N00174.AR.000428
NSWC INDIAN HEAD
5090.3a

Mattawoman Creek Study

Indian Head Division
Naval Surface Warfare Center
Indian Head, Maryland

VOLUME II - APPENDICES

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888
Contract Task Order 0803

January 2004

APPENDIX A

FIELD DATA

A-1 SAMPLE LOG SHEETS

A-2 CHAIN OF CUSTODY FORMS

A-3 PARTICLE SIZE DISTRIBUTION REPORTS

A-4 SAMPLE LOCATION DATA

APPENDIX A-1

SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: NJC.SW00101
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-5-01								
Time: 1615								
Depth:								
Method:	Clear	7.23	7.54	28.04	–	8.33	0.4	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Reference Site

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Matteawoman Creek
Project No.:

Sample ID No.: NJCSW002001
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-5-01								
Time: 1715								
Depth:								
Method:		7.88	~~8.91~~ 8.41	27.79	—	9.79	0.5	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Reference Site

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSW00101
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-9-01								
Time: 1320								
Depth:	murky green	9.32	0.259	24.81	—	13.97	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

massive hydrilla bed 1-2 ft below surface

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW002201
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-9-01								
Time: 1225								
Depth:		9.44	0.257	27.2	—	13.76	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

FD vials missing from samples - so MTCSW FD004 vials not taken

Lutrilla bed to surface

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.: MTCSW FD004

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW00301
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-9-01								
Time: 1150								
Depth:								
Method:	Clear	9.16	0.256	28.19	—	10.94	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

massive mytilla bed

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSW004401
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-9-01								
Time: 1120								
Depth:	Green murky	7.32	0.259	26.06	—	9.9	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Boat problem - samples have time of 9:20

~5ft from shore Rip rap lines shore.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTC SW 00501
Sample Location:
Sampled By:
C.O.C. No.:

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-8-01	murky brown	9.97	0.252	28.4	—	12.11	0.0	
Time: 1540								
Depth:								
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

~10 ft from shore - all grasses + shrubs
Roots/sediment exposed from waves
breaking from boats/jetskis

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW00601
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-8-01								
Time: 1435								
Depth:								
Method:	Clear	11.17	0.269	28.3	—	14.72	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Hydrilla almost to surface
Low tide

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

Sample ID No.: MTCSW06~~5~~701
Sample Location:
Sampled By:
C.O.C. No.:

[✓] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-8-01								
Time: 1505								
Depth:								
Method:	Clear	11.47	0.305	31.04	—	14.15	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

hydrilla bed – thickest yet
20 ft from shoreline – steep w/ erosion – abandon appliance on bank + some cans floating in H2O, driftwood, scum
Debris gets caught at this site during tide changes
Many bldg ~50 ft from H2O

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW00801
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-8-01								
Time: 1255								
Depth:								
Method:	clear	10.92	0.274	27.0	—	11.63	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

SD/SW only
heavy hydrilla patch ~0.5 below surface. Possible pH calibration problem.
~40 ft from "grass island"

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSW00901
Sample Location:
Sampled By:
C.O.C. No.:

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-8-01								
Time: 1225								
Depth:								
Method:	clear	11.04	0.275	27.12	—	13.01	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Site along neg across from silver outfall. pH reading seems high
300-400 ft from shore - steep
Shore N of site eroded, bare industry
Thick hydrilla 1-2ft under H_2O surface

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTC01001
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-8-01								
Time: 1150								
Depth:								
Method:	clear	10.74	0.261	24.96	—	12.83	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

High tide
massive hydrilla bed
200-300 yf from shore - grasses & shrubs, some large deciduous trees w/ steep gradient.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponi Creek
Project No.:

Sample ID No.: MTCSW01101
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-8-01								
Time: 1100								
Depth:	Green murky	9.57	0.254	26.35	—	10.68	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

- High tide
- neg 1-2 ft below H_2O surface

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Matthewman Creek
Project No.:

Sample ID No.: MTCSW0120 1
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-8-01								
Time: 900								
Depth:	green murky	7.0	0.254	24.77	—	10.30	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Around bunker from detonation area
many fallen trees in H2O
Steep shoreline w/ shrubs. Chain link fence ~5 ft up bank. Samples taken near out fall ditch

High tide

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: MTCSWFD003

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponi Creek
Project No.:

Sample ID No.: MTCSW01301
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-7-01 Time: 1450 Depth: Method:	clear	10.39	0.262	27.03	—	8.52	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Sampled during low tide

Site off massive hydrilla bed island

Sample taken several ft. from shore - erosion of shore was evident

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW01401
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-7-01								
Time: 1425								
Depth:								
Method:	Clear	10.45	0.269	30.00	—	12.53	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Massive hydrilla bed ~~on~~ reaching surface of H2O

Shoreline - deciduous trees few shrubs or understory, steep gradient

Numerous dead + fallen trees in/near H2O

Sample taken ~ 100 ft from shore

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaweman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW01501
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9-7-01
Time: 1355
Depth:
Method:

Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
clear	9.84	0.257	27.95	—	11.36	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW01601
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-7-01								
Time: 1320								
Depth:	green-murky	9.02	0.253	26.97	—	10.62	00	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Veg. bed around cove from MTC01701
Lots of hydrilla 1-2 ft below H_2O surface
"Lily" type plants make up "islands"

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSW01701
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-7-00								
Time: 1225								
Depth:	green-brown	8.33	0.252	26.87	—	14.14	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Located at outfall below lightning rods. Many flowering plants + grasses - numerous large deciduous trees
Limited emergent veg.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

Sample ID No.: MTCSW01801
Sample Location:
Sampled By:
C.O.C. No.:

[x] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-7-01								
Time:								
Depth:								
Method:	green	8.91	0.25	26.28	—	11.91	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Veg bed at high tide w/ large Hydrilla bed
Green murky H2O
Shore - shrubs + flowering plants near lighting rods

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSW01901
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-7-01								
Time: 1005								
Depth:								
Method:	green	7.53	0.251	25.83	~~25.83~~	8.88	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Low clarity
~200 ft SW of footbridge along "neg. island"
~300 ft to concrete retaining wall w/metal fence. Rusted train car near safety bunker where Hazmat equip. stored

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[] Stream
[X] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW02001
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-7-01								
Time: 930								
Depth:								
Method:	brown	7.67	0.251	25.8	—	9.75	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Collected near old footbridge
murky brown H_2O – no veg seen
Shoreline – concrete retaining wall
Emergent veg bed on right of bridge

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW02101
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-7-01								
Time: 845								
Depth:		5.43	0.284	25.67	—	8.07	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Site where motor oil (?) spill occurred 2-3 prior. Heavy veg + shrubs along shore
HEAVY film on H_2O

Concerned about possible equip. contam.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTGSW02201
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-6-01								
Time: 1600								
Depth:	murky	8.54	0.232	27.43	—	17.2	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

murky H_2O near veg. bed about 50 ft off shore. Shore lined w/ broken cement blocks

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW0230'
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-6-01								
Time: 1515								
Depth:	murky	9.03	0.232	27.14	—	13.92	2.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

murky H_2O near massive veg. bed

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.: MTCSWFD002

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW0 2401
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-6-01								
Time: 1415								
Depth:	green-brown	7.95	0.232	26.9	—	14.11	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

murky H_2O – no veg. Sun on bottom

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTC SW 02501
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-6-01								
Time: 1425								
Depth:								
Method:	Clear	6.78	0.227	27.27	—	11.95	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Sm veg on bottom, mucky in places

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW02601
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-6-01								
Time: 1145								
Depth:								
Method:	Cloudy	7.06	0.236	24.41	—	11.4	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Some floating leaves

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.: MTCSWFD001

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSW02801
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-6-01								
Time: 1025								
Depth:								
Method:	Cloudy	6.61	0.233	25.95	—	11.18	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

No veg. seen in H_2O

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW0~~02~~27 01
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-6-01								
Time: 945								
Depth:		6.30	0.232	25.67	—	9.02	0.0	
Method:								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Cloudy water - no veg seen

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[✓] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSW02901
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-9-01								
Time: 1400								
Depth:								
Method:	Clear	10.14	0.254	24.61	—	11.92	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

~10 ft off shore - ~~50~~ lots of deciduous trees w/ pieces of driftwood
hydrilla bed starts about 25-30 ft off shore

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSW03001
Sample Location:
Sampled By:
C.O.C. No.:

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 9-9-01								
Time: 1440								
Depth:								
Method:	Clear	10.93	0.228	28.20	—	14.71	0.0	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES:

Near marina - marshy area to the right near foot bridge
Massive hydrilla bed 1-2 miles below surface
Grassest deciduous trees along shoreline

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mathiwomen Creek
Project No.:

Sample ID No.: NJCS020101
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-5-01	~~1600~~		brown	Silty clay
Method:	1630			
Power				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Easy to collect
Benthic ~~tox~~ also collected
Nangemoy Creek Reference

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaweman Creek
Project No.:

Sample ID No.: NJCSD0020 1
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-5-01	1730		brown	Sand w/ Some Silt
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

benthic samples taken
Reference Site

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSD00101
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date:	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-9-01	1330		brown-black	clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Site near cove ~150 ft from shore
Shore - gravel + burn pans - OBOD location?
Some grasses along lake.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[] Surface Soil
[] Subsurface Soil
[x] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSD00201
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date:	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-9-01	1235		brown-black	clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Siene - no neg taken out
SD vials mislabeled as SW

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: MTCSDE0002

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSD00301
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date:	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-9-01	1155		brown-blk	clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

50 ft from shore - eroded
dead trees in H2O

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

Sample ID No.: MTC SD 00401
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[x] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-9			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-9-01	1130		brown-black	sand
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

~50 ft out - ale shells
~100 ft shells + brown/black sand.
Samples labeled 9:30 - boat problems

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

Sample ID No.: MTCSD00501
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-8-01	1550		dk brown	sand
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Lots of root mat.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponoman Creek
Project No.:

Sample ID No.: MTCSD00601
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-8-01	1450		Brown-Gray	mud - muck
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Some sample may have been mislabeled for time 1435. Should be 1450.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSP00701
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-8-01	1575		Brown/black	Sand, Silt
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

more sand than previous samples in area.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman
Project No.:

Sample ID No.: MTCSD00801
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-8-01	1310		brown-black	clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

trouble due to hydrilla

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaweman Creek
Project No.:

Sample ID No.: MTC SD009D1
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-8-01	1235		Dark brown - black	clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Easy to collect.
Lots of roots in samples.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Matthewman Creek
Project No.:

Sample ID No.: MTCSD01001
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9.8.01	1210		Dark brown/ black	Clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Lots of veg roots in Sd.
Relatively easy to collect

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaweman Creek
Project No.:

Sample ID No.: MTCSD01101
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-8-01			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-8-01	1120		dark brown/black	clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

4oz amber jar (metals/CN/AVS-SEM) was dropped - place sample in ziploc & put immediately into cooler
Siem - all ~~ste~~ clay - put plant mg/remnants into sample

MAP:

Circle If Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSD01201
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[x] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-8-01	930		brown/black	Sandy silt
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

moved ~15 ft offshore to get out of mytilla bed
Bottom sample easy to sieve - Some rootmat. in sample

MAP:

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSD01301
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-7-01	1505		light brown	clay - very thick w/ hydrilla roots
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle If Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaweoman Creek
Project No.:

Sample ID No.: MTCSD01401
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-7-01	1440		brown-gray	Clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattaponi Creek
Project No.:

Sample ID No.: MTCSD01S01
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-7-01	1410		brown-gray	Clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Difficult to collect due to hydrilla

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSD0~~2~~16 01
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-7-01	1325		dark brown + black	
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

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Project Site Name: Mattamoman Creek
Project No.:

Sample ID No.: MTCSD01701
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-7-01	1240		brown	Sand
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Tried to collect nearshore - too much veg + rock
moved ~~[illegible]~~ + 15ft upstream.
Had to collect out of boat - lots of pebbles

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of___

Project Site Name: ~~MTCS~~ Mattaponoman Creek
Project No.:

Sample ID No.: MTCS001801
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-7-01	1210		brown-gray	Clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Easy to sieve

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

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Project Site Name: Mattaponi Creek
Project No.:

Sample ID No.: MTCSD01901
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-7-01	1020		brown-gray	clay-very gelatinous
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Sieve difficult since mostly clay
Small anthracite pieces

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

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Project Site Name: Mattaweman Creek
Project No.:

Sample ID No.: MTC.SD0[redacted]2001
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-7-01			
Time: 945			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-7-01	945		black	grainy w/ pieces of anthracite (possibly) Sandy
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Easy to sieve.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

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Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSD02101
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-7-01	850		dark brown	mud/silt
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Easy to collect once neg. out of way. Could see product in sample

MAP:

100 ft from shore

Circle If Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Matthewman Creek
Project No.:

[] Surface Soil
[] Subsurface Soil
[x] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSD02201
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-6-01			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-6-01	1615		brown-green	clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Easy to collect

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSD 02301
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-6-01	1525		brown-green	Clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

hard to sieve

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
	MTCSD FD002

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

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Project Site Name: Mattanoon Creek
Project No.:

Sample ID No.: MTGSD0240 1
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-6-01			
Time: 1450			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date: 9-6-01	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	1450		brown-green	mostly clay, mud
Method: B				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Pungent odor

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSD02501
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-4-01	1430		Brown	Sand
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman
Project No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: MTCSD02601
Sample Location:
Sampled By:
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-6-01	1200		brown	Sand & gravel
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: MTCSD FD001

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mathiwaman Creek
Project No.:

Sample ID No.: MTCSD02701
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-6-01	1000		brown	Sand + muck
Method:				some veg material
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Benthic + tox test

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mathewman Creek
Project No.:

Sample ID No.: MTCSD0 2801
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9-6-01	1025		brown	silt+clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Some veg. in sample
Benthic & tox test

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattapononi Creek
Project No.:

Sample ID No.: MTCSD02901
Sample Location:
Sampled By:
C.O.C. No.:

- [ ] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [ ] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-9-01	~~1230~~		~~Brown-Blk~~	~~Clay~~
Method:	1410			Sand-Gravel
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

Sample taken outside of bout
SD/SW only

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Mattawoman Creek
Project No.:

Sample ID No.: MTCSD 03001
Sample Location:
Sampled By:
C.O.C. No.:

[] Surface Soil
[] Subsurface Soil
[x] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date:	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
9-9-01	1450		brown-blk	clay
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other

OBSERVATIONS / NOTES:

SD/SW only.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Shipped 9-7

Fish Collection Log
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek	Project Number:	
Station Number:	006		
Species:	Spot tailed Shiner		
Samplers:	WS, JJ,		

Date	Time	Sample Number	Length (cm)	Weight (grams)
9-7-01	1715	MTC SS006	10.7	335 [combined]
			10.6	
			11.2	
			11.5	
			11.1	
			11.2	
			11.3	
			9.1	
			11.1	
			11.3	
			11.2	
			11.0	
			11.2	
			11.1	
			9.7	
			10.0	
			10.1	
			10.2	
			10.6	
			9.9	
			10.7	

10.1	9.4	7.0
11.1	10.5	6.9
9.7	11.0	11.0
10.8	11.3	11.4
7.5	11.6	11.0
9.8	10.0	10.5
9.7	10.2	10.2
		10.3

Comments:

Shipped 9-6

Fish Composite Summary for Laboratory Analysis
Indian Head Investigation
NSWC Indian Head, Virginia

Water Body	Nanjemoy Creek				**Project Number:**
Station Number:	NJM ~~WP~~ 007				
Species:	pumpkinseed, white perch				
Duplicate Analyses?			**If Yes, Which Composite?**		
Samplers:	WS, JJ, EK				
Date	**Time**	**Length (cm)**	**Weight (grams)**	**Individual Fish Sample Number**	**Composite Fish Sample Number**
9-6-01	~0930	15.4	81		NJMFS007 pumpkinseed
		14.2	66 ~~197~~		
		13.3	88 ~~194~~		
		12.5	41 ~~395~~		
		12.0	30 ~~265~~		
			[illegible]		NJM WP 007 Fillet white perch
9-6-01	~0930	29.2	389		
		21.7	187		

Sample Analyses: *******NEED TO CORRECT*********

Metals: Arsenic, cadmium, chromium, copper, mercury, manganese, nickel, lead, silver, and zinc

Pesticides: Aldrin, alpha-BHC, gamma-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT (op&pp), dieldrin, endosulfan I and II, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, methoxychlor-pp, trans-nonachlor, mirex, technical chlordane and PAHs.

Percent Lipids

Comments: Only use left fillet for composite of "regular samples." Use right fillet for duplicate samples (if any). Freeze the remaining portion of the fish. Call the Project Manager immediately if there is inadequate sample volume in left fillets for analysis.

Shipped 9-6

Fish Collection Log
NSWC Indian Head, Virginia

Water Body	Nanjemoy Creek	Project Number:	
Station Number:	NJMMC007		
Species:	Mummichog		
Samplers:	WS, JJ, EK		

Date	Time	Sample Number	Length (cm)	Weight (grams)
9-6-01	0930	NJMMC007	8.8	189.
			7.0	
			5.8	
			6.5	
			5.6	
			6.7	
			6.8	
			6.8	
			5.8	
			6.5	
			7.1	
			8.0	
			6.7	
			6.6	
			7.0	
			7.5	
			7.1	
			6.6	
			7.6	
			6.2	
			6.3	
			6.2	
			6.1	
			6.7	
			5.6	
			6.9	
			6.1	
			5.9	

Composit

6.1	6.0	
5.5	6.1	
5.6	6.1	
6.0	6.5	
	6.2	
	6.3	
	6.3	

Comments:

Fish Composite Summary for Laboratory Analysis
Indian Head Investigation
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek			**Project Number:**	
Station Number:	001				
Species:	Channel catfish (CT), Largemouth bass (LB), Pumpkinseed (CF)				
Duplicate Analyses?	No		**If Yes, Which Composite?**		
Samplers:	WS, EK, SS				
Date	**Time**	**Length (cm)**	**Weight (grams)**	**Individual Fish Sample Number**	**Composite Fish Sample Number**
9-8-01	0900	44.6	920	MTCCT00101	MTCCT001 (Fillet)
9-8-01	0900	40.7	681	MTCCT00102	
9-8-01	1145	29.5	368	MTCLB001	MTC LB 001 (Fillet)
98-01	1145	12.4	40	None (pooled)	MTC FS 001
		12.4	35 ~~75~~		
		10.6	26 ~~101~~		
		11.1	27 ~~128~~		
			Fcom		

Sample Analyses: *******NEED TO CORRECT*********

Metals: Arsenic, cadmium, chromium, copper, mercury, manganese, nickel, lead, silver, and zinc

Pesticides: Aldrin, alpha-BHC, gamma-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT (op&pp), dieldrin, endosulfan I and II, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, methoxychlor-pp, trans-nonachlor, mirex, technical chlordane and PAHs.

Percent Lipids

Comments: Only use left fillet for composite of "regular samples." Use right fillet for duplicate samples (if any).
Freeze the remaining portion of the fish. Call the Project Manager immediately if there is inadequate sample
volume in left fillets for analysis.

Fish Collection Log
NSWC Indian Head, Virginia

Water Body		Mattawoman Creek	**Project Number:**	
Station Number:		001		
Species:		Spottailed shiner (SS), including some golden shiners		
Samplers:		WS, EK, SS		
Date	**Time**	**Sample Number**	**Length (cm)**	**Weight (grams)**
9-8-01	1145	MTCSS001	11.2	~~116~~ (combine
			10.0	* 98 (combi
			10.5	
			9.5	
			10.5	
		* delete	~~8.0~~	
			~~8.7~~	
			7.9	
			7.2	
			7.3	
			6.2	
		SS 10	6.5	
		golden 8	8.0	
		↓	7.5	
			7.0	
			7.1	
			7.2	
			7.1	
			6.7	
			7.3	

Comments: Killifish, banded: less than 100 g.
and count/lengths deleted
* Weight changed because 2 fish were later taken out of the sample (wrong species)

Fish Composite Summary for Laboratory Analysis
Indian Head Investigation
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek				**Project Number:**
Station Number:	002				
Species:	Pumpkinseed (FS), Largemouth bass				
Duplicate Analyses?	No		**If Yes, Which Composite?**		
Samplers:	WS, EK, SS				
Date	**Time**	**Length (cm)**	**Weight (grams)**	**Individual Fish Sample Number**	**Composite Fish Sample Number**
9-8-01	1345	14.5	62	None (packed)	MTC FS002
		12.6	39 ~~101~~		
		10.7	24 ~~135~~		
		9.8	19 ~~144~~		
			~~Total~~		
9-8-01	1345	37.6	920	MTCLB00201	MTCLB002
9-8-01	1345	34.7	727	MTCLB00202	Fillet
9-8-01	1345	35.6	730	MTCLB00203	

Sample Analyses: *******NEED TO CORRECT*********

Metals: Arsenic, cadmium, chromium, copper, mercury, manganese, nickel, lead, silver, and zinc

Pesticides: Aldrin, alpha-BHC, gamma-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT (op&pp), dieldrin, endosulfan I and II, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, methoxychlor-pp, trans-nonachlor, mirex, technical chlordane and PAHs.

Percent Lipids

Comments: Only use left fillet for composite of "regular samples." Use right fillet for duplicate samples (if any). Freeze the remaining portion of the fish. Call the Project Manager immediately if there is inadequate sample volume in left fillets for analysis.

Fish Collection Log
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek		**Project Number:**	
Station Number:	002			
Species:	Golden Shiner (GS)			
Samplers:	WS, SS, EK			
Date	**Time**	**Sample Number**	**Length (cm)**	**Weight (grams)**
9-8-01	1345	MTCGS002	13.5	77 (combine
			9.0	
			6.5	
			7.6	
			7.0	
			6.6	
			6.5	
			6.8	
			7.0	
			6.9	
			6.9	
			6.7	
			6.6	
			5.7	
			6.5	
			7.1	
			6.6	
			6.7	
			6.7	
			6.3	
			6.4	
			5.8	

Comments: 3 small killifish
no spot tail

Fish Composite Summary for Laboratory Analysis
Indian Head Investigation
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek				**Project Number:**
Station Number:	003				
Species:	Pumpkinseed (FS), largemouth bass (LB)				
Duplicate Analyses?	No		**If Yes, Which Composite?**		
Samplers:	WS, SS, EK				
Date	**Time**	**Length (cm)**	**Weight (grams)**	**Individual Fish Sample Number**	**Composite Fish Sample Number**
9-8-01	1625	12.1	35	none (pooled)	MTCFS003
		12.1	32 ~~67~~		
		11.9	34 ~~101~~		
		11.3	27 ~~128~~		
		10.7	24 ~~152~~		
			~~Equal~~		
9-8-01	1625	43.7	1390	MTCLB003	MTCLB003 (Fillet)
9-8-01	1000	46.5	1057	MTCCT00301	MTCCT003 (Fillet)
9-8-01	1000	31.4	219	MTCCT00302	

Sample Analyses: *******NEED TO CORRECT*********

Metals: Arsenic, cadmium, chromium, copper, mercury, manganese, nickel, lead, silver, and zinc

Pesticides: Aldrin, alpha-BHC, gamma-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT (op&pp), dieldrin, endosulfan I and II, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, methoxychlor-pp, trans-nonachlor, mirex, technical chlordane and PAHs.

Percent Lipids

Comments: Only use left fillet for composite of "regular samples." Use right fillet for duplicate samples (if any).
Freeze the remaining portion of the fish. Call the Project Manager immediately if there is inadequate sample
volume in left fillets for analysis.

Fish Collection Log
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek		**Project Number:**	
Station Number:	003			
Species:	Golden Shiner (GS)			
Samplers:	WS, SS, EK			
Date	**Time**	**Sample Number**	**Length (cm)**	**Weight (grams)**
9-8-01	1625	MTC GS 003	20.8	313 (combine
			19.4	
			21.1	
			7.3	
			5.4	

Comments:

Fish Composite Summary for Laboratory Analysis
Indian Head Investigation
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek				**Project Number:**
Station Number:	004				
Species:	Pumkinseed (FS), White catfish (CT), Largemouth bass (LB)				
Duplicate Analyses?	No		**If Yes, Which Composite?**		
Samplers:	[illegible]				
Date	**Time**	**Length (cm)**	**Weight (grams)**	**Individual Fish Sample Number**	**Composite Fish Sample Number**
9-9-01	0840	13.5	51	None (pole)	MTCFS004
		13.3	49 ~~Fw7~~		
		10.5	23 ~~Fw7~~		
		10.3	22 ~~Fw5~~		
			~~Fw7~~		
9-9-01	840	33.6	471	MTCCT00401	MTCCT004 fillet
9-9-01	840	29.0	293	MTCCT00402	
9-9-01	840	30.5	332	MTCCT00403	
9-9-01	840	31.5	489	MTCLB00401	MTCLB004 fillet
9-9-01	840	34.7	597	MTCLB00402	

Sample Analyses: *******NEED TO CORRECT*********

Metals: Arsenic, cadmium, chromium, copper, mercury, manganese, nickel, lead, silver, and zinc

Pesticides: Aldrin, alpha-BHC, gamma-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT (op&pp), dieldrin, endosulfan I and II, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, methoxychlor-pp, trans-nonachlor, mirex, technical chlordane and PAHs.

Percent Lipids

Comments: Only use left fillet for composite of "regular samples." Use right fillet for duplicate samples (if any). Freeze the remaining portion of the fish. Call the Project Manager immediately if there is inadequate sample volume in left fillets for analysis.

Fish Collection Log
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek	**Project Number:**	
Station Number:	004		
Species:	Spotfail shiner (SS) some golden shiner		
Samplers:	WS, SS, EK		

Date	Time	Sample Number	Length (cm)	Weight (grams)
9-9-01	0840	MTC SS 004	11	96 — total
			10.4	
			12.2	
			10.4	
		SS	10.4	
			10.8	
			7.5	
			6.8	
			7.2	
		Goldenn Shiner	6.8	
			7.3	
			6.5	
			7.4	
			6.2	
			6.3	
			7.6	
			7.4	
			5.5	
			5.4	

Comments:

Shipped 9-6

Fish Composite Summary for Laboratory Analysis
Indian Head Investigation
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek				**Project Number:**
Station Number:	005				
Species:	Channel catfish (CC) / pumpkinseed				
Duplicate Analyses?	No		**If Yes, Which Composite?**		
Samplers:	WS, JJ, EK				
Date	**Time**	**Length (cm)**	**Weight (grams)**	**Individual Fish Sample Number**	**Composite Fish Sample Number**
9-6-01	1445	46.3	545	MTCCT00501	MTCCT005 - Fillet CC
		29.9	372	MTCLB00501	MTCLB005 - Fillet CC
9-6-01	1445	13.3	49	MTCFS005	MTCFS005 pumpkinseed
		12.0	37 ~~86~~		
		10.9	28 ~~114~~		
		10.3	22 ~~136~~		
		10.0	20 ~~156~~		
		9.8	18 ~~174~~		
		8.5	10 ~~184~~		
			~~644~~		

Sample Analyses: *******NEED TO CORRECT*********

Metals: Arsenic, cadmium, chromium, copper, mercury, manganese, nickel, lead, silver, and zinc

Pesticides: Aldrin, alpha-BHC, gamma-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT (op&pp), dieldrin, endosulfan I and II, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, methoxychlor-pp, trans-nonachlor, mirex, technical chlordane and PAHs.

Percent Lipids

Comments: Only use left fillet for composite of "regular samples." Use right fillet for duplicate samples (if any). Freeze the remaining portion of the fish. Call the Project Manager immediately if there is inadequate sample volume in left fillets for analysis.

Shipped 9-6

Fish Collection Log
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek	Project Number:	
Station Number:	MTC SS 005		
Species:	spottail shiner		
Samplers:	WS, JJ, EK		

Date	Time	Sample Number	Length (cm)	Weight (grams)
9-6-01	1445	MTC SS 005	10.8	150. -all
			10.5	
			10.9	
			9.7	
			10.5	
			10.1	
			10.2	
			10.2	
			11.4	
			10.0	
			9.8	
			9.9	
			10.1	
			9.5	
			11.1	
			9.6	
			8.0	
			7.6	
			7.3	

Comments:

Shipped 9-6

Fish Composite Summary for Laboratory Analysis
Indian Head Investigation
NSWC Indian Head, Virginia

Water Body	Mattawoman Creek				**Project Number:**
Station Number:	006				
Species:	Brown bullhead (BBH) / pumpkinseed				
Duplicate Analyses?	No		**If Yes, Which Composite?**		
Samplers:	WS, JJ, EK				
Date	**Time**	**Length (cm)**	**Weight (grams)**	**Individual Fish Sample Number**	**Composite Fish Sample Number**
9-6-01	1245	26.9	220	MTCCT00601	BBH MTCCT 006 - fillet
		23.4	158	MTCCT00602	
9-6-01	1245	11.6	33		
		11.8	32 ~~65~~		
		11.6	32 ~~97~~		MTCFS006 pumpkinseed
		11.0	30 ~~127~~		
		10.8	27 ~~154~~		
		10.2	25 ~~179~~		
		9.5	19 ~~198~~		
		10.0	18 ~~216~~ [illegible]		

Sample Analyses: *******NEED TO CORRECT**********

Metals: Arsenic, cadmium, chromium, copper, mercury, manganese, nickel, lead, silver, and zinc

Pesticides: Aldrin, alpha-BHC, gamma-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT (op&pp), dieldrin, endosulfan I and II, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, methoxychlor-pp, trans-nonachlor, mirex, technical chlordane and PAHs.

Percent Lipids

Comments: Only use left fillet for composite of "regular samples." Use right fillet for duplicate samples (if any). Freeze the remaining portion of the fish. Call the Project Manager immediately if there is inadequate sample volume in left fillets for analysis.

Fish Composite Summary for Laboratory Analysis
Indian Head Investigation
NSWC Indian Head, Virginia

Shipped 9-7

Water Body	Mattawoman Creek	**Project Number:**	
Station Number:	006		
Species:	Large mouth Bass		
Duplicate Analyses?	No	**If Yes, Which Composite?**	
Samplers:	WS, JJ, EK		

Date	Time	Length (cm)	Weight (grams)	Individual Fish Sample Number	Composite Fish Sample Number
9-7-01	1715	37.6	786	MTCLB00601	MTC LB 006 Fillet only one needed

Sample Analyses: *******NEED TO CORRECT*********

Metals: Arsenic, cadmium, chromium, copper, mercury, manganese, nickel, lead, silver, and zinc

Pesticides: Aldrin, alpha-BHC, gamma-BHC, alpha-chlordane, gamma-chlordane, DDD, DDE, DDT (op&pp), dieldrin, endosulfan I and II, endosulfan sulfate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, methoxychlor-pp, trans-nonachlor, mirex, technical chlordane and PAHs.

Percent Lipids

Comments: Only use left fillet for composite of "regular samples." Use right fillet for duplicate samples (if any). Freeze the remaining portion of the fish. Call the Project Manager immediately if there is inadequate sample volume in left fillets for analysis.

APPENDIX A-2

CHAIN OF CUSTODY FORMS

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CHAIN-OF-CUSTODY RECORD

Page ____ of ____

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 4129217090	COMPANY	PHONE	LAB PROJECT #:
NAME George LaTulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr. Foster Plaza VII		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh, PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:
Indian Head Mattawoman Creek		

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	o/o Lipids	TAL metals	TCL pest/PCBs	TCL SVOCs	Explosives	Nitrogen/Cl	Nitrobenzene/nitroglycerin	Cyanide	Perchlorate				COMMENTS
MTCLB006	9-7-01/1715					X			X	X	X	X	X	X	X	X	X				Hold; Fillet
MTCSS006	9-7-01/1715					X			X	X	X	X	X	X	X	X	X				
MTCVG001	9-7-01/1245					X				X	X										
MTCVG002	9-7-01/1345					X				X	X										
MTCVG003	9-7-01/1440					X				X	X										
MTCVG004	9-7-01/1510					X				X	X										
	/																				
	/																				
	/																				
	/																				
	/																				
	/																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	[illegible]	9-7-01/1821		/
2		/		/
3		/		/

ADDITIONAL REMARKS: Fish and vegetation matrices If marked so, please hold for further instructions

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412.921790	COMPANY	PHONE	LAB PROJECT #:
NAME George LaPhilippe	FAX	NAME	FAX	
ADDRESS 661 Andersen Dr. Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	Benthic Community	COMMENTS
MTCSD001701	9-7-01 / 1240								X	
MTCSD02401	9-6-01 / 1450									
MTCSD02501	9-6-01 / 1435									
NJCSD00101	9-7-01 / 1410									
MTCSD01501	9-7-01 / 1630									
MTCSD02001	9-7-01 / 1545									
MTCSDFD002	9-6-01 / 1515									
MTCSD02701	9-6-01 / 1000									
MTCSDFD001	9-6-01 / 1200									
MTCSD02301	9-6-01 / 1515									
MTCSD00401	9-7-01 930									
MTCSD00301	9-7-01 / 1155									

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Jo Ellen Pinto	9-10-01 900		/
2		/		/
3		/		/

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME G. Latulippe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	Benthic Com											COMMENTS
MTCSD01101	9-8-01 1120								X											
MTCSD01001	9-8-01 1210																			
MTCSP00901	9-8-01 1235																			
MTCSD01201	9-8-01 930																			
MTCSD01601	9-7-01 1335																			
MTCSD FD003	9-8-01 930																			
MTCSD01801	9-7-01 1230																			
MTCSD02601	9-6-01 1200																			
MTCSD01401	9-7-01 1440																			
MTCSD02801	9-6-01 1025																			
MTCSD01901	9-7-01 1210																			
NJCSD00102	9-5-01 1730																			

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Jo Ellen Shiel	9-10-01 800		/
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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY TetraTech NUS	PHONE 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME G Catulippi	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES: Benthic Com

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	Benthic Com	COMMENTS
MTCSD0020	9-9-01 1235								X	
MTCSD0001	9-9-01 1330								X	
MTCSDF000X	9-9-01 1235								X	Field Duplicate
	/									
	/									
	/									
	/									
	/									
	/									
	/									
	/									
	/									

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Joseph Allen Stroh	9-10-01 800		/
2		/		/
3		/		/

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412/921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr. Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mattawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	TCL VOCs	TCL SVOCs, Pest/PCBs	TAL metals	Explosives, nitroaromatics, nitramines	TOC	AVS/SEM							COMMENTS
MTCSD01601	9-7-01/1335				X				X	X	X	X	X	X							
MTCSD01301	97-01/1505				X				X	X	X	X	X	X							
MTCSD01701	9-7-01/1240				X				X	X	X	X	X	X							
MTCSD02001	9-7-01/0945				X				X	X	X	X	X	X							
MTCSD01901	9-7-01/1020				X				X	X	X	X	X	X							
MTCSD02101	9-7-01/8:40				X				X	X	X	X	X	X							
MTCSD01801	9-7-01/12:10				X				X	X	X	X	X	X							
MTCSD01401	9-7-01/1440				X				X	X	X	X	X	X							
MTCSD01501	9-7-01/1410				X				X	X	X	X	X	X							
MTCSD02201	9-6-01/1615				X				X	X	X	X	X	X							
MTCSD02401	9-6-01/1450				X				X	X	X	X	X	X							
MTCSD02301	9-6-01/1525				X				X	X	X	X	X	X							

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
	Ellen Sloth	9/7/01/1830		/		
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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412/921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George LaTulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr. Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Matta Woman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	TCL VOCs	TCL SVOCs + Pest/PCB	TAL metals	Explosives	Nitroglycerin	Nitrocellulose/Nitrogen	TOC	AVS-SEM					COMMENTS
MTCSD02501	9-6-01/1425				X				X	X	X	X	X	X	X	X					
MTCSDFD002	9-6-01/1525				X				X	X	X	X	X	X	X	X					Field Duplicate
	/																				
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TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
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REPORT TO		INVOICE TO		
COMPANY: Tetra Tech NUS	PHONE: 412-921-7090	COMPANY:	PHONE:	LAB PROJECT #:
NAME: George Latulippe	FAX:	NAME:	FAX:	
ADDRESS: 661 Anderson Dr. Foster Plaza 7		ADDRESS:		TURNAROUND TIME:
CITY/ST/ZIP: Pittsburgh PA 15220		CITY/ST/ZIP:		

CLIENT PROJECT NAME: Indian Head Mathawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	SVOC, Pest/PCB	TCL VOCs	TAL metals (total)	TAL metals (dissolved)	Cyanide	Explosives, Nitroglycerin	Nitroaromatics/Nitroamines	Turbidity, TSS, TDS	Nitrate / Nitrite	Chloride, Sulfate, Fluoride	Perchlorate	TOC, pH, Hardness	COMMENTS
MTCSW 02501	9-6-01 / 1425		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW 02301	9-6-01 / 1515		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW 02201	9-6-01 / 1600		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW 02401	9-6-01 / 1445		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTC RBD01	9-6-01 / 1700		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTC SWFD002	9-6-01 / 1515		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW02101	9-7-01 / 0845		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW02001	9-6-01 / 0930		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW01301	9-7-01 / 1450		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW01501	9-7-01 / 1355		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW01601	9-7-01 / 1320		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW01901	9-7-01 / 1005		X	X					X	X	X	X	X	X	X	X	X	X	X	X	

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Jo Ellen Sinch	9/7/01 / 1850		/
2		/		/
3		/		/

ADDITIONAL REMARKS:

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412/921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr. Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mattawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	SVOC, Pest/PCB	TCL VOCs	TAL metals (total)	TAL metals (dissolved)	Cyanide	Explosives/Nitroaromatics	Nitrocellulose, nitroglycerine	turbidity, TSS, TDS	metals, nitrate	chloride, sulfate, fluoride	Perchlorate	TOC, pH, Hardness	TCL VOCs	COMMENTS
MTCFB001	9-7-01/1630		X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW01701	9-7-01/1225		X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW01801	9-7-01/1200		X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW01401	9-7-01/1425		X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW02601	9-6-01/1130		X	X	X																	Forgot to put in yesterday
MTCFB002	9-7-01/		X	X																	X	
	/																					
	/																					
	/																					
	/																					
	/																					
	/																					

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
	Ellen Stuch	9-7-01/1830		/		
2		/		/		
3		/		/		

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME G. Catulippe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	Grain Size											COMMENTS
MTCSD002-01	9-9-01 / 1235				X				+											
MTCSD00101	9-9-01 / 1330				X				+											
MTCSDFD001	9-9-01 / 1235				X				+											
	/																			
	/																			
	/																			
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	/																			
	/																			
	/																			
	/																			

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	J. Ellen Glick	9/10/01 / 0815		/
2		/		/
3		/		/

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME G. Lotulippe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	Grain Size											COMMENTS
MTCSD01701	9-7-01/1240								X											
MTCSD02401	9-6-01/1450								X											
MTCSD02501	9-6-01/1425								X											
MTCSD01501	9-7-01/1410								X											
NJCSD00101	9-5-01/1630								X											
MTCSD02001	9-7-01/0945								X											
MTCSDFD002	9-6-01/1515								X											
MTCSD02701	9-6-01/1000								X											
MTCSDFD001	9-6-01/1200								X											
MTCSD02301	9-6-01/1515								X											
MTCSD00401	9-9-01/930								X											
MTCSD00301	9-9-01/1155								X											

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Ellen Street	9/10/01 0815		/
2		/		/
3		/		/

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412-921-7040	COMPANY	PHONE	LAB PROJECT #:
NAME George LaFulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mattawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	Grain Size											COMMENTS
MTCSD01101	9-8-01 / 1120								X											
MTCSD01001	9-8-01 / 1210								X											
MTCSD00901	9-8-01 / 1235								X											
MTCSD01201	9-8-01 / 0930								X											
MTCSD01601	9-7-01 / 1335								X											
MTCFD003	9-8-01 / 0930								X											
MTCSD01901	9-7-01 / 1020								X											
MTCSD01501	9-7-01 / 1210								X											
MTCSD02601	9-6-01 / 1200								X											
MTCSD01401	9-7-01 / 1440								X											
MTCSD02801	9-6-01 / 1025								X											
NJCSD00102	9-5-01 / 1730								X											

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
1	Joellen Hunter	9-10-01 / 0815		/		
2		/		/		
3		/		/		

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME George Latolippi	FAX	NAME	FAX	
ADDRESS 661 Anderson Drive, Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:
Indian Head, Mattawoman Creek		

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	SVOC, Pest/PCB	TAL metals (total)	TAL metals (dissolved)	Cyanide	Explosives	Nitroglycerin	Nitrocellulose/nitroguanidine	Turbidity, TSS, TDS	nitrate/nitrite	Chloride, sulfide, fluoride	Perchlorate	TOC, pH, Hardness	TCL VOCs	COMMENTS
MTCSW02601	9-6-01 / 1130		X	X				14	X	X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW02601 MS/MSD	9-6-01 / 1130		X	X				28	X	X	X	X	X	X	X				X		X	
MTCSWFD01	9-6-01 / 1130		X	X				14	X	X	X	X	X	X	X	X	X	X	X	X	X	
NTCSW00101	9-5-01 / 1615		X	X				14	X	X	X	X	X	X	X	X	X	X	X	X	X	
NTCSW00102	9-5-01 / 1715		X	X				14	X	X	X	X	X	X	X	X	X	X	X	X	X	Change sample to NTCSW00201
MTCSW02701	9/6/01 / 945		X	X				14	X	X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW07801	9/6/01 / 1025		X	X				14	X	X	X	X	X	X	X	X	X	X	X	X	X	
MTCFB001	9/6/01 / 1830		X	X																	X	
	/																					
	/																					
	/																					
	/																					

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	[signature]	9-6-01 / 1830		/
2		/		/
3		/		/

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Drive, Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mattawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	TCL VOCs	TCL SVOCs, Pest/PCBs	TAL metals	Explosives	Nitroglycerin	Nitrocellulose/Nitroguanidine	TOC	NUS/SEM	Perchlorate	Cyanide	TCL Pest/PCBs		COMMENTS
MTCSD00102	9-5-01 / 1730				X				X	X	X	X	X	X	X	X					Change sample name to MTCSD00201
MTCUG005	9/6/01 / 1415	X				X					X								X		
MTCUG006	9/6/01 / 1200	X				X					X								X		
MTCUG007	9/5/01 / 1600	X				X					X								X		
MTCSD00101	9-5-01 / 1630								X	X	X	X	X	X	X	X					
1mB ~~MTCSNO2701~~	~~09-6-01 / 915~~																				
1mB ~~MTCSNO2401~~	~~9-6-01 / 1025~~																				
MTCSD02801	9-6-01 / 1025								X	X	X	X	X	X	X	X					
MTCSD02601	9-6-01 / 1200								X	X	X	X	X	X	X	X					
MTCSD02701	9-6-01 / 1000								X	X	X	X	X	X	X	X					
MTCSDFD001	9-6-01 / 1200								X	X	X	X	X	X	X	X					
MTCSD02601	9-6-01 / 1200								X	X	X	X	X	X	X	X					MS/MSD

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	[signature]	9-6-01 / 1830		/
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3		/		/

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Drive, Suite Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mattawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	TCL PCB/Pest	TAL metals	TCL SVOCs	Explosives	Nitroglycerin	Nitrocellulose and Nitroguanidine	Cyanide	Perchlorate					COMMENTS
MTCLB005	9-6-01 1445	X				X			X	X	X	X	X	X	X	X					Fillet. Hold
MTCCT005	9-6-01 1445					X			X	X	X	X	X	X	X	X					Fillet
MTCSS005	9-6-01 1445					X			X	X	X	X	X	X	X	X					Hold
MTCFS005	9-6-01 1445					X			X	X	X	X	X	X	X	X					
MTCCT006	9-6-01 1245					X			X	X	X	X	X	X	X	X					Fillet
MTCFS006	9-6-01 1245					X			X	X	X	X	X	X	X	X					
NJMFS007	9-6-01 0900					X			X	X	X	X	X	X	X	X					
NJMWP007	9-6-01 0900					X			X	X	X	X	X	X	X	X					Fillet Hold
NJMMC007	9-6-01 0900					X			X	X	X	X	X	X	X	X					
	/																				
	/																				
	/																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	[illegible]	9-6-01 / 1830		/
2		/		/
3		/		/

ADDITIONAL REMARKS: If marked "Hold", do not analyze until advised by project manager. Matrix = Fish tissue

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412 912-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George LaTulippe	FAX	NAME	FAX	
ADDRESS Lotet Anderson Dr. Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Irwin Head Matthewman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	TCL VOCs	TCL SVOCs, Pest/PCB	TAL Metals	Explosives Nitroaromatics	Nitroalkanes/Glycols	TOC	gem-AIS						COMMENTS
MTCSD00401	9-9-01 930				X				X	X	X	X	X	X	X						
MTCSD00301	9-9-01 1155																				
MTCSD00201	9-9-01 1235																				
MTCSD00101	9-9-01 1330																				
MTCSD00301	9-9-01 1450																				
MTCSD00201	9-9-01 1410																				
MTCSD FD004	9-9-01 1235																				Field Dup
	/																				
	/																				
	/																				
	/																				
	/																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
1	Ellen Stuck	9-10-01 0815		/		
2		/		/		
3		/		/		

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412/921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr. Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh, PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mattawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	TLC VOCs	TLC SVOCs, Pest/PCB	TAL Metals	Explosives Nitroglycerin	Nitrocellulose/Nitro	TOC	AVS-SEM	Grain Size				COMMENTS
MTCSD01101	9-8-01 1120				X				X	X	X	X	X	X	X	X				
MTCSD01001	9-8-01 1210															X				
MTCSD00901	9-8-01 1235															X				
MTCSD00801	9-8-01 1310															X				
MTCSD00701	9-8-01 1515															X				
MTCSD00601	9-8-01 1450															X				
MTCSD00501	9-8-01 1550															X				
MTCSD01201 MS/MSD	9-8-01 0930															X				
MTCFD003	9-8-01 0930															X				Field Duplicate
~~MTCSD01601~~	~~9-7-01 1335~~															X				
~~MTCSD01901~~	~~9-7-01 1030~~															X				
~~MTCSD01801~~	~~9-7-01 1210~~															X				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
1	Jo Ellen Sluda	9-10-01 1815		/		
2		/		/		
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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY: TT NUS	PHONE: 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME: George Latulippe	FAX	NAME	FAX	
ADDRESS: 661 Anderson Drive Foster Plaza VII		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP: Pittsburgh, PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mattawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	% Lipids	TAL metals	TCL Pest/PCBs	TCL SVOCs	Explosives	Nitroglycerin	Nitrocellulose/Nitroguanidine	Cyanide	Perchlorate				COMMENTS
MTCCT00101	9-8-01 0900					X			X	X	X	X	X	X	X	X	X				Fillet
MTCCT00102	9-8-01 0900					X			X	X	X	X	X	X	X	X	X				Fillet
MTCLB001	9-8-01 1145					X			X	X	X	X	X	X	X	X	X				Fillet
MTCFS001	9-8-01 1145					X			X	X	X	X	X	X	X	X	X				
MTCSS001	9-8-01 1145					X			X	X	X	X	X	X	X	X	X				
MTCFS002	9-8-01 1345					X			X	X	X	X	X	X	X	X	X				
MTCLB00201	9-8-01 1345					X			X	X	X	X	X	X	X	X	X				Fillet
MTCLB00202	9-8-01 1345					X			X	X	X	X	X	X	X	X	X				Fillet
MTCLB00203	9-8-01 1345					X			X	X	X	X	X	X	X	X	X				Fillet
MTCGS002	9-8-01 1345					X			X	X	X	X	X	X	X	X	X				
	/																				
	/																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	[signature]	9-10-01 0815		/
2		/		/
3		/		/

ADDITIONAL REMARKS: Fish tissue samples. If marked, lab needs to Fillet. Please hold all fish samples until instructed further.

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY: Tetra Tech NUS	PHONE: 412-921-7016	COMPANY	PHONE	LAB PROJECT #:
NAME: George LaMullipe	FAX	NAME	FAX	
ADDRESS: 661 Anderson Dr. Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP: Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mattaponi Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	SVOCs, Pest/PCB	TCL VOCs	TAL metals (total)	Cyanide	Sulfide, Nitrate/Nitrite	Nitrate/Nitrite/Cyanide	Turbidity, TSS, TDS	Nitrate, Nitrite	Chloride, Sulfate, Fluoride	TAL metals (dissolved)	Residual Cl	TDS, pH, hardness	COMMENTS
MTCSW00401	9-9-01 / 920		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCSW00301	9-9-01 / 1150																				
MTCSW00201	9-9-01 / 1225																				
MTCSW00101	9-9-01 / 1320																				
MTCSW03001	9-9-01 / 1440																				
MTCSW02901	9-9-01 / 1400																				
MTCSWFD004	9-9-01 / 1225																				Missing VOA vials
MTCSWRB004	9-9-01 / 1700																				
MTCTB004	9-10-01 / 0800																				Temp Blank
	/																				
	/																				
	/																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Ellen Stuart	9-10-01 / 0845		/
2		/		/
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ADDITIONAL REMARKS:

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CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412/921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr. Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Mathawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	SVOCs, Pest/PCB	TLC VOCs	TAL Metals (total)	Cyanide	Explosive, Nitroglycerin	Nitrocellulose/Nitro	Turbidity, TSS, TDS	Nitrate/Nitrite	Chloride, Sulfide, Fluoride	TAL Metals (dissolved)	Perchlorate	TOC, PH, hydrogen	COMMENTS
MTCSW00601	9-8-01/1435		X	X					X	X	X	X	X	X	X	X	X	X	X	X	
MTCRB003	9-8-01/1700																				
MTCSW00701	9-8-01/1505																				
MTCRB002	9-7-01/1900																				
MTCSW00501	9-8-01/1540																				
MTCSW00801	9-8-01/1255																				
MTCSW00901	9-8-01/1225																				
MTCSW01201 MS/MSD	9-8-01/0900																				
MTCSW01101	9-8-01/1100																				
MTCSW01001	9-8-01/1150																				
MTCFD003	9-8-01/0900																				Field Dup
TB	/																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
1	Jo Ellen Stred	9-10-01/0815		/		
2		/		/		
3		/		/		

WHITE: LABORATORY COPY YELLOW: REPORT COPY PINK: CLIENT'S COPY

MITKEM CORPORATION
175 Metro Center Boulevard
Warwick, Rhode Island 02886-1755
(401) 732-3400 • Fax (401) 732-3499
email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY: TT NUS	PHONE: 412921-7090	COMPANY:	PHONE:	LAB PROJECT #:
NAME: George Latulippe	FAX:	NAME:	FAX:	
ADDRESS: 661 Anderson Drive Foster Plaza VII		ADDRESS:		TURNAROUND TIME:
CITY/ST/ZIP: Pittsburgh, PA 15220		CITY/ST/ZIP:		

CLIENT PROJECT NAME: Indian Head Mattawoman Creek
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	% lipids	TAL metals	TCL Pest/PCBs	TCL SVOCs	Explosives	Nitroglycerin	Nitrocellulose/Nitroguanidine	Cyanide	Perchlorate				COMMENTS
MTCFS003	9-8-01 1625					X			X	X	X	X	X	X	X	X	X				
MTCLB003	9-8-01 1625					X			X	X	X	X	X	X	X	X	X				Fillet
MTCCT00301	9-8-01 1000					X			X	X	X	X	X	X	X	X	X				Fillet
MTCCT00302	9-8-01 1000					X			X	X	X	X	X	X	X	X	X				Fillet
MTCGS003	9-8-01 1625					X			X	X	X	X	X	X	X	X	X				
MTCFS004	9-9-01 0840					X			X	X	X	X	X	X	X	X	X				
MTCCT00401	9-9-01 0840					X			X	X	X	X	X	X	X	X	X				Fillet
MTCCT00402	9-9-01 0840					X			X	X	X	X	X	X	X	X	X				Fillet
MTCCT00403	9-9-01 0840					X			X	X	X	X	X	X	X	X	X				Fillet
MTCLB00401	9-9-01 0840					X			X	X	X	X	X	X	X	X	X				Fillet
MTCLB00402	9-9-01 0840					X			X	X	X	X	X	X	X	X	X				Fillet
MTCSS004	9-9-01 0840					X			X	X	X	X	X	X	X	X	X				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Ellen Smith	9-10-01 0815		/
2		/		/
3		/		/

ADDITIONAL REMARKS: Fish Tissue samples. Please hold all fish tissue samples until further instructions are given. Lab needs to fillet samples marked "fillet."

COOLER TEMP:

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email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	10-Hydrilla Azteca												COMMENTS
MTCSD001701	9-7-01 / 1240								X												
MTCSD002401	9-6-01 / 1450																				
MTCSD002501	9-6-01 / 1425																				
MTCSD001501	9-7-01 / 1410																				
NJCS1200101	9-5-01 / 1630																				
MTCSD002201	9-7-01 / 945																				
MTCSDFD0012	9-6-01 / 1515																				
MTCSD002701	9-6-01 / 1000																				
MTCSDFD001	9-6-01 / 1200																				
MTCSD002301	9-6-01 / 1515																				
MTCSD004001	9-7-01 / 930																				
MTCSD00301	9-7-01 / 1155																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME	ADDITIONAL REMARKS:	COOLER TEMP:
1	Ellen Hirsch	9-10-01 / 0800		/		
2		/		/		
3		/		/		

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email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra tech NUS	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES: 10-day Hydrolab test

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	10-day Hydrolab test	COMMENTS
MTCSD0[illegible]1101	9-8-01 1120								X	
MTCSD01001	9-8-01 1210									
MTCSD00901	9-8-01 1235									
MTCSD01201	9-8-01 930									
MTCSD01601	9-7-01 1335									
MTCSDFD003	9-8-01 930									
MTCSD01801	9-7-01 1210									
MTCSD02601	9-6-01 1200									
MTCSD01401	9-7-01 1440									
MTCSD02801	9-6-01 1025									
MTCSD01901	9-7-01 1210									
MTCSD[illegible]1102	9-5-01 1730									

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Ellen [illegible]	9/10/01 0800		/
2		/		/
3		/		/

ADDITIONAL REMARKS:

COOLER TEMP.:

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email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME G. Latulippe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	16-Hydrocarbon Oxygen												COMMENTS
MTCSD00201	9-7-01 1235								X												
MTCSD00101	9-7-01 1330								X												
MTCSDFD001	9-7-01 1235								X												
	/																				
	/																				
	/																				
	/																				
	/																				
	/																				
	/																				
	/																				
	/																				

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Joellen Street	9-10-01 0800		/
2		/		/
3		/		/

ADDITIONAL REMARKS:

COOLER TEMP:

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email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra tech	PHONE 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME Gerry Latulippe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:
Indian Head Mattaponi Creek		

REQUESTED ANALYSES: 10-day Hyallella

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	10-day Hyallella	COMMENTS
NJCSD00102	9/5/01 1730		X		X			1	X	Change sample number to NJCSD00201
NJCSD00101	9/5/01 1630									
MTCSD02501	9/6/01 1425									
MTCSDFD002	9/6/01 1515									
MTCSDFD001	9/6/01 1200									
MTCSD02301	9/6/01 1515									
MTCSD02401	9/6/01 1450									
MTCSD02601	9/6/01 1025									
MTCSD02601	9/6/01 1200									
MTCSD02701	9/6/01 1000									
	/									
	/									

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Hans [illegible]	9/6/01 1800		/
2		/		/
3		/		/

ADDITIONAL REMARKS:

COOLER TEMP

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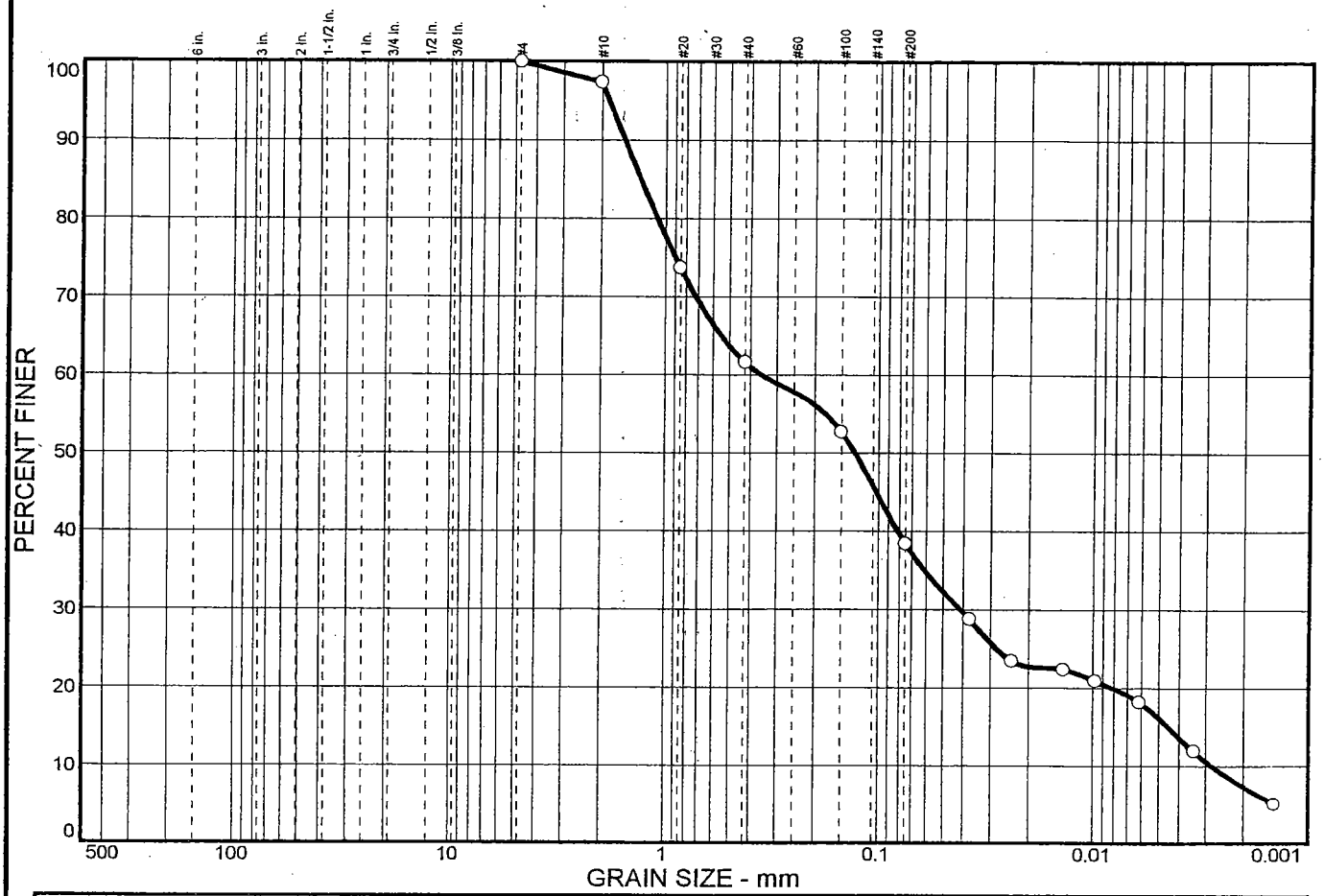
APPENDIX A-3

PARTICLE SIZE DISTRIBUTION REPORTS

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	61.6	22.2	16.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.4		
#20	73.7		
#40	61.6		
#100	52.7		
#200	38.4		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 1.31 D_{60}= 0.355 D_{50}= 0.129
D_{30}= 0.0413 D_{15}= 0.0045 D_{10}= 0.0028
C_u= 126.40 C_c= 1.71

Classification

USCS= SM AASHTO= A-4(0)

Remarks

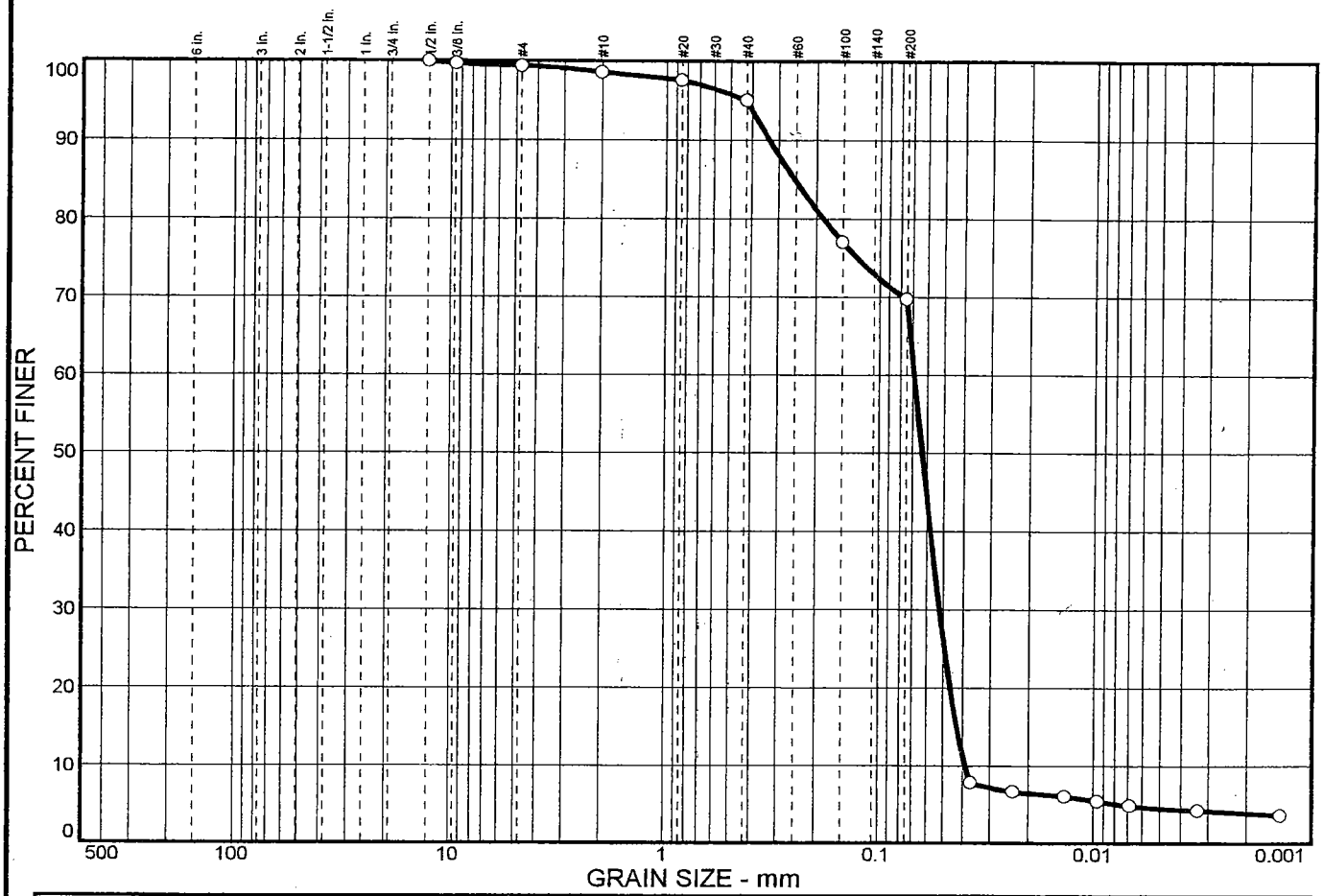
Natural Water Content: 273.2%

Sample No.: NJCSD-00101 **Date:** 9-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.6	29.7	65.2	4.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	99.7		
#4	99.4		
#10	98.6		
#20	97.6		
#40	95.0		
#100	77.0		
#200	69.7		

* (no specification provided)

Soil Description

USCS Group Name: Sandy silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.253 D_{60}= 0.0689 D_{50}= 0.0630
D_{30}= 0.0518 D_{15}= 0.0427 D_{10}= 0.0390
C_u= 1.77 C_c= 1.00

Classification

USCS= ML AASHTO= A-4(0)

Remarks

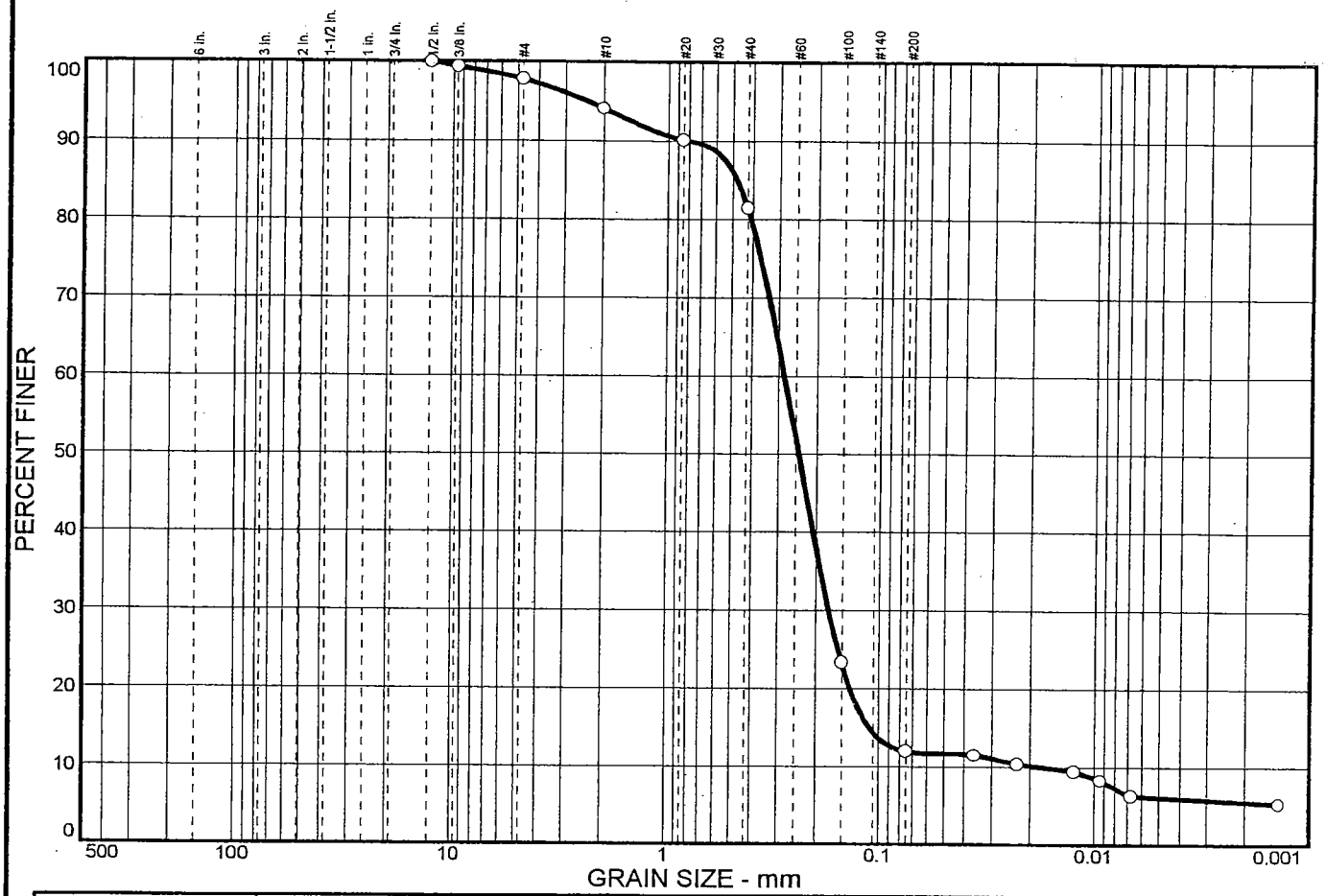
Natural Water Content: 27.8%

Sample No.: NJCSD-00102 **Date:** 9-23-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	2.2	85.8	5.9	6.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2 in.	100.0		
3/8 in.	99.4		
#4	97.8		
#10	94.1		
#20	90.1		
#40	81.4		
#100	23.3		
#200	12.0		

* (no specification provided)

Soil Description

USCS Group Name: Poorly Graded Sand with Silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.479 D_{60}= 0.282 D_{50}= 0.241
D_{30}= 0.173 D_{15}= 0.111 D_{10}= 0.0177
C_u= 15.98 C_c= 6.02

Classification

USCS= SP-SM AASHTO= A-2-4(0)

Remarks

Natural Water Content: 32.8%

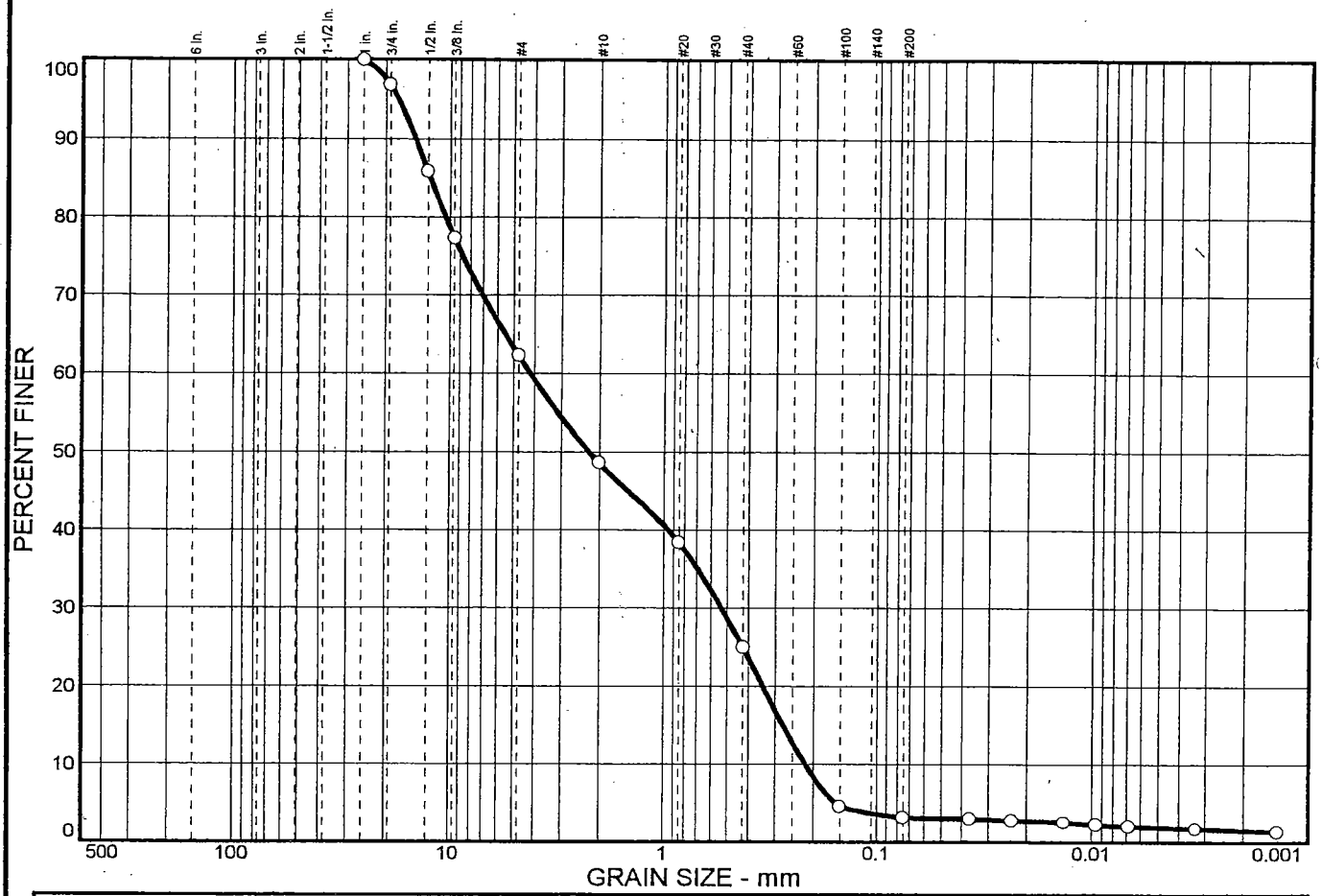
Sample No.: MTCFD-003
Location: Indian Head, Maryland

Date: 9/20/01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	37.7	59.1	1.2	2.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	96.9		
.5 in.	85.8		
.375 in.	77.3		
#4	62.3		
#10	48.6		
#20	38.4		
#40	25.0		
#100	4.6		
#200	3.2		

* (no specification provided)

Soil Description

USCS Group Name: Poorly graded sand with gravel

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 12.4 D_{60}= 4.18 D_{50}= 2.23
D_{30}= 0.534 D_{15}= 0.276 D_{10}= 0.217
C_u= 19.23 C_c= 0.31

Classification

USCS= SP AASHTO= A-1-a

Remarks

Natural Water Content: 14.7%

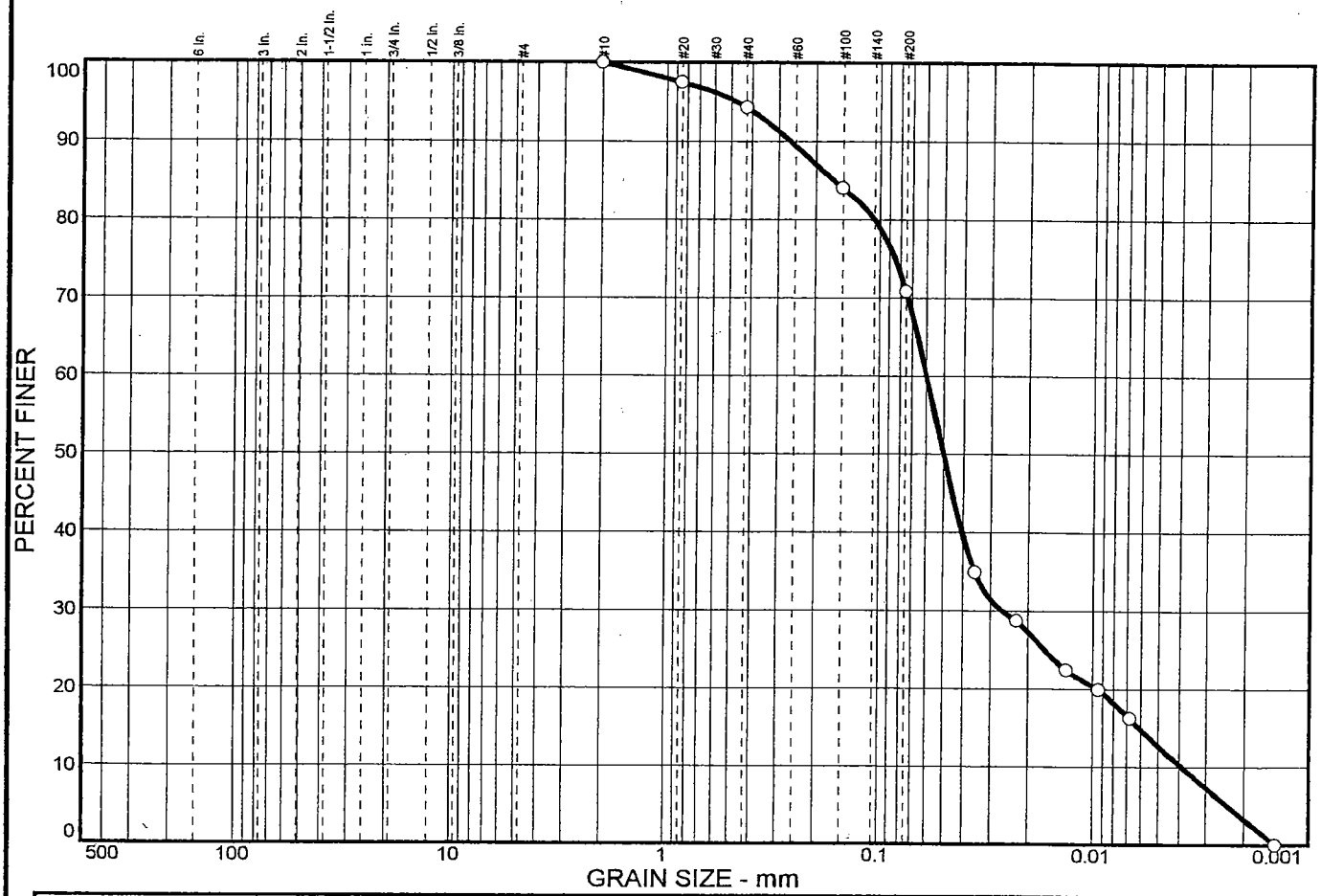
Sample No.: MTCSDFD-001
Location: Indian Head, Maryland

Date: 9-23-01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	29.2	58.0	12.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	97.5		
#40	94.3		
#100	84.0		
#200	70.8		

* (no specification provided)

Soil Description

USCS Group Name: Silt with Sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.166 D_{60}= 0.0597 D_{50}= 0.0496
D_{30}= 0.0263 D_{15}= 0.0061 D_{10}= 0.0039
C_u= 15.41 C_c= 3.00

Classification

USCS= ML AASHTO= A-8

Remarks

Natural Water Content: 162.8%

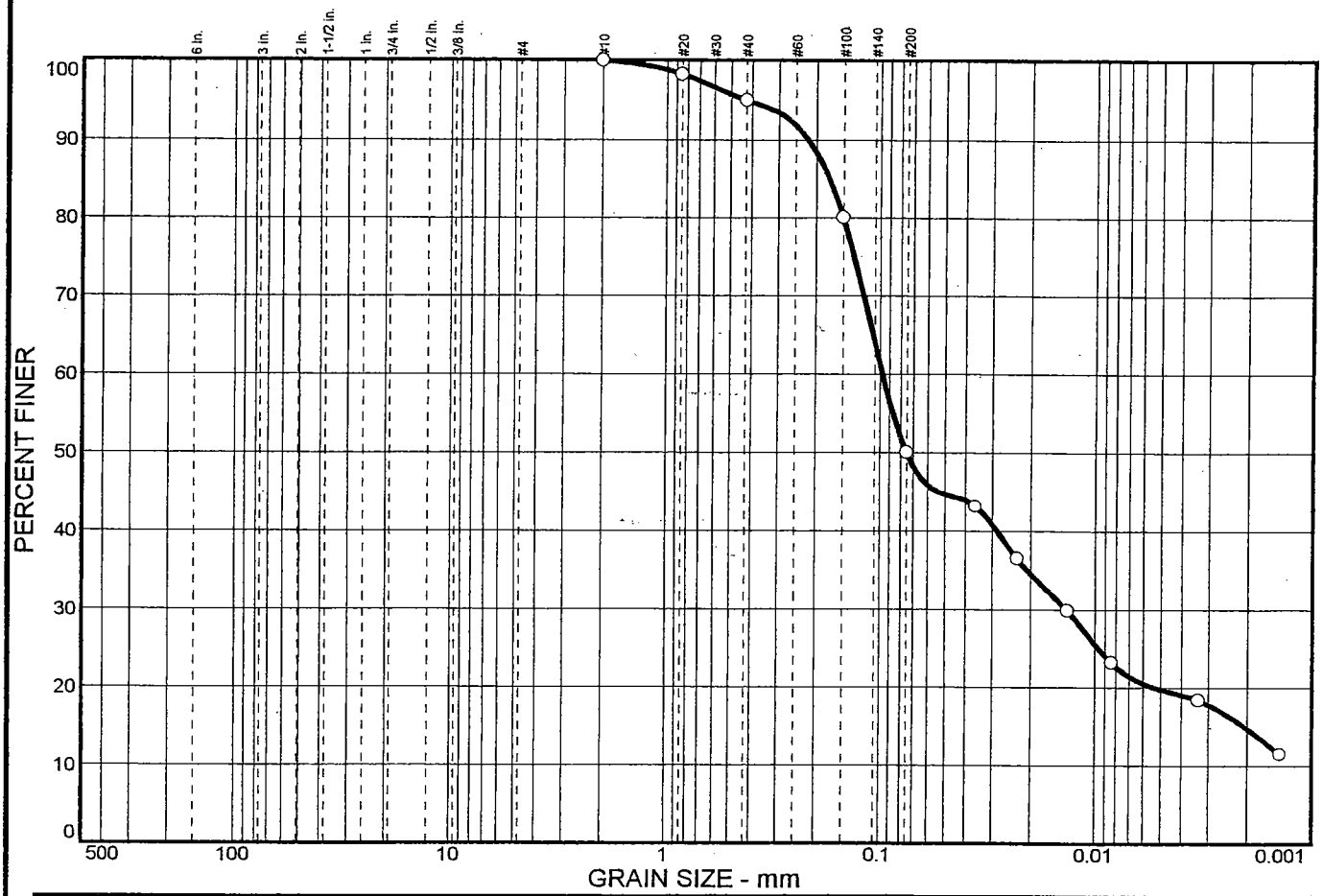
Sample No.: MTCSDFD-002
Location: Indian Head Maryland

Date: 9/19/01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	50.0	30.2	19.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	98.3		
#40	95.0		
#100	80.0		
#200	50.0		

* (no specification provided)

Soil Description

USCS Group Name: Sandy silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.174 D_{60}= 0.0973 D_{50}= 0.0750
D_{30}= 0.0136 D_{15}= 0.0021 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

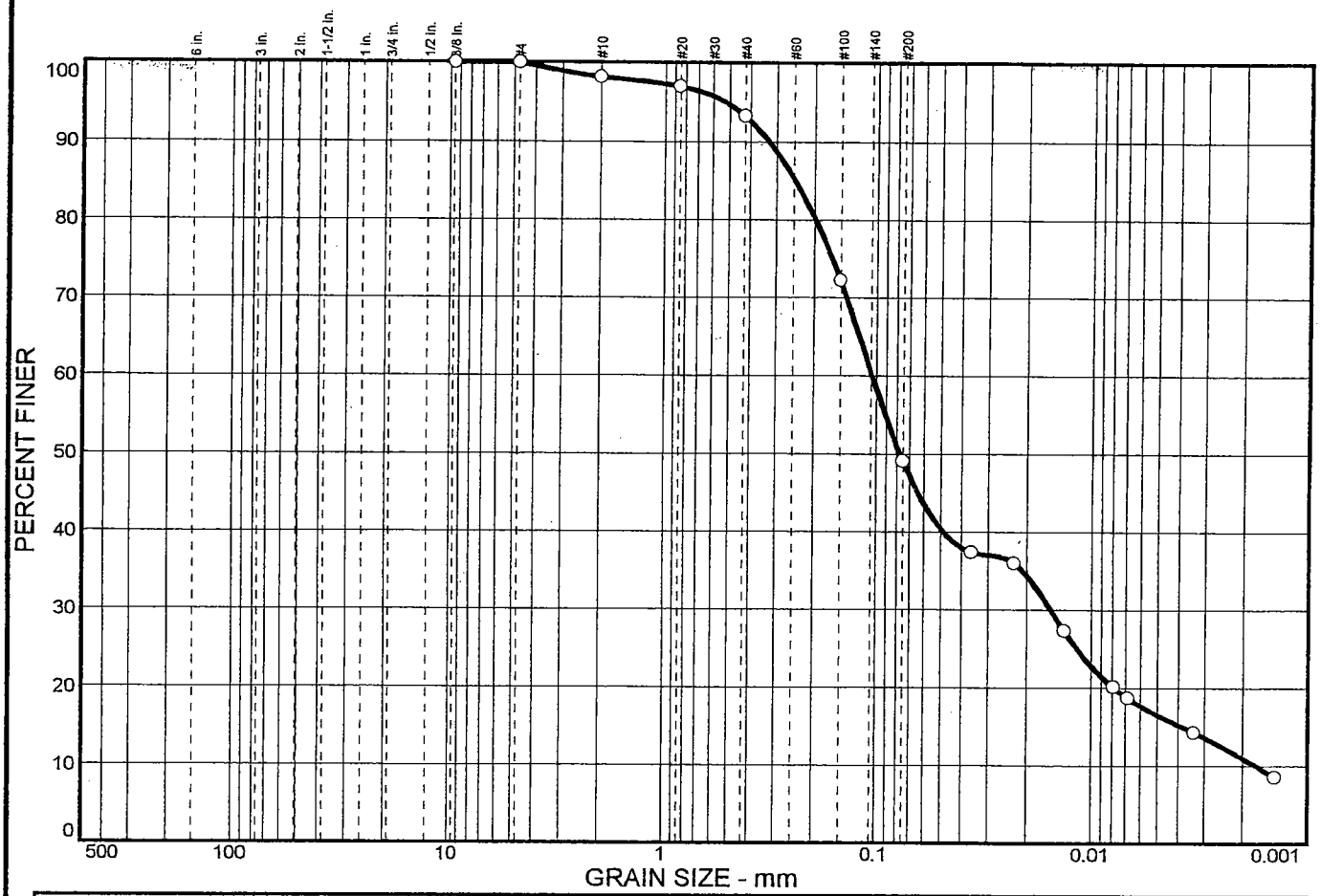
Natural Water Content: 174.1%

Sample No.: MTCSDFD-004 **Date:** 9-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	50.9	32.6	16.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	100.0		
#10	98.2		
#20	97.0		
#40	93.3		
#100	72.2		
#200	49.1		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.245 D_{60}= 0.105 D_{50}= 0.0774
D_{30}= 0.0155 D_{15}= 0.0038 D_{10}= 0.0017
C_u= 60.63 C_c= 1.32

Classification

USCS= SM AASHTO= A-4(0)

Remarks

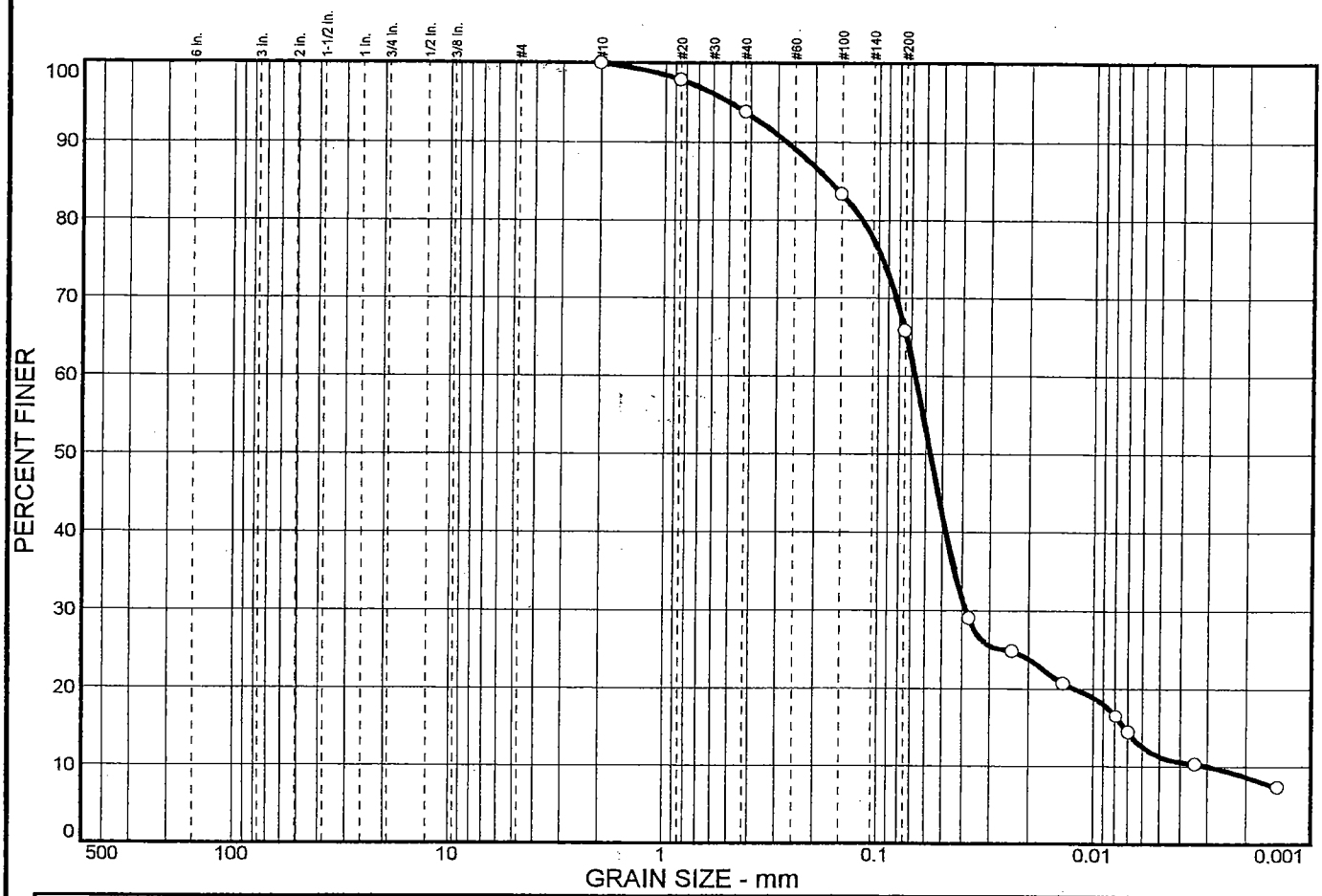
Natural Water Content: 175.0%

Sample No.: MTCSD-00101 **Date:** 9-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	34.2	54.5	11.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	97.9		
#40	93.8		
#100	83.3		
#200	65.8		

* (no specification provided)

Soil Description

USCS Group Name: Sandy silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.172 D_{60}= 0.0671 D_{50}= 0.0567
D_{30}= 0.0385 D_{15}= 0.0072 D_{10}= 0.0030
C_u= 22.46 C_c= 7.37

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Water Content: 167.4%

Sample No.: MTCSD-00201 **Date:** 9-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report

% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
-		67.1	15.3	5.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	89.4		
.375 in.	88.7		
#4	88.0		
#10	86.6		
#20	86.3		
#40	85.9		
#100	53.8		
#200	20.9		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.408 D_{60}= 0.172 D_{50}= 0.139
D_{30}= 0.0949 D_{15}= 0.0333 D_{10}= 0.0173
C_u= 9.95 C_c= 3.02

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

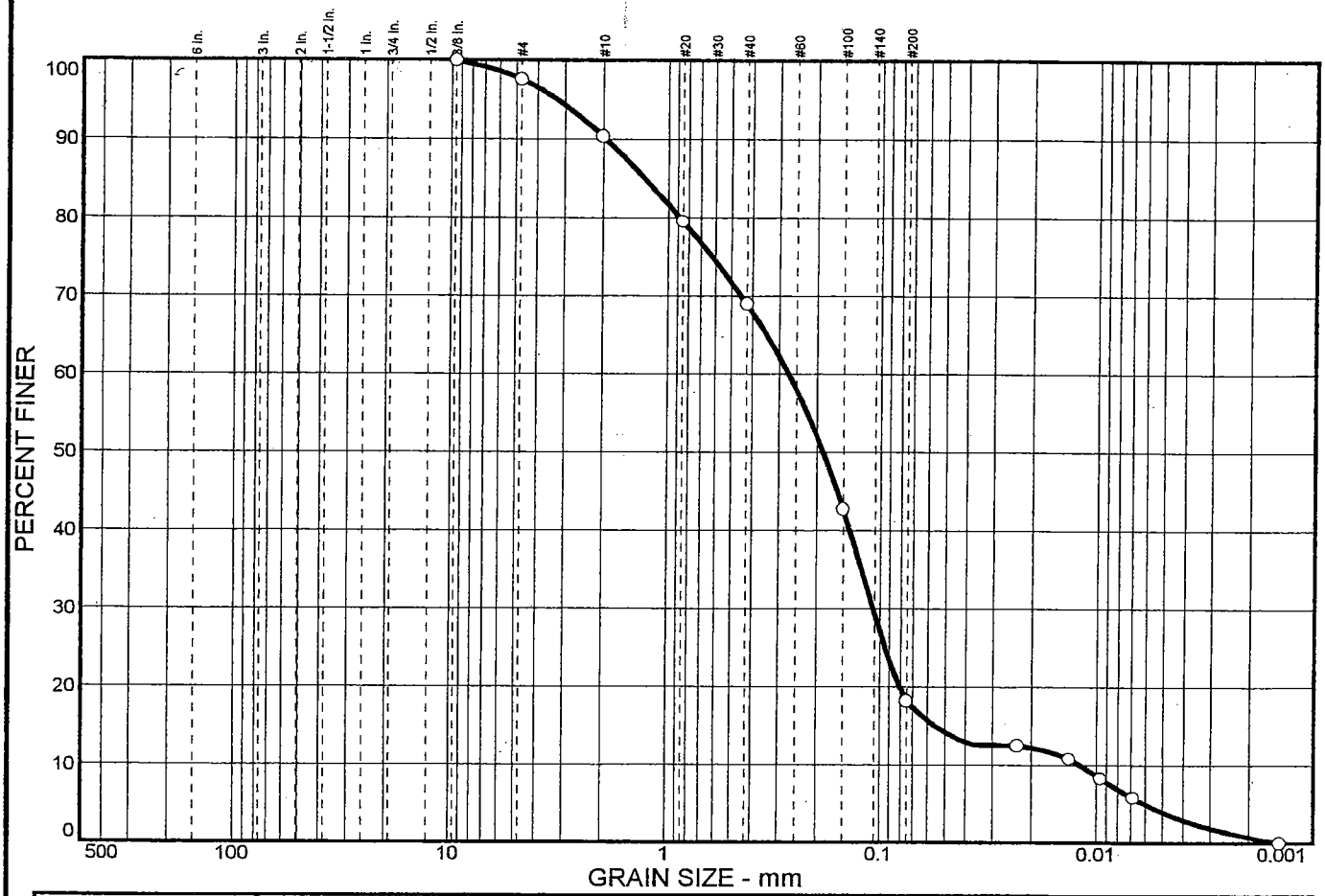
Natural Water Content: 51.7%

Sample No.: MTCSD-00301 **Date:** 9-23-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	2.4	79.4	14.2	4.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8 in.	100.0		
#4	97.6		
#10	90.3		
#20	79.5		
#40	68.9		
#100	42.7		
#200	18.2		

* (no specification provided)

Soil Description

USCS Group Name: Silty Sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 1.28 D_{60}= 0.272 D_{50}= 0.187
D_{30}= 0.108 D_{15}= 0.0551 D_{10}= 0.0119
C_u= 22.80 C_c= 3.60

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

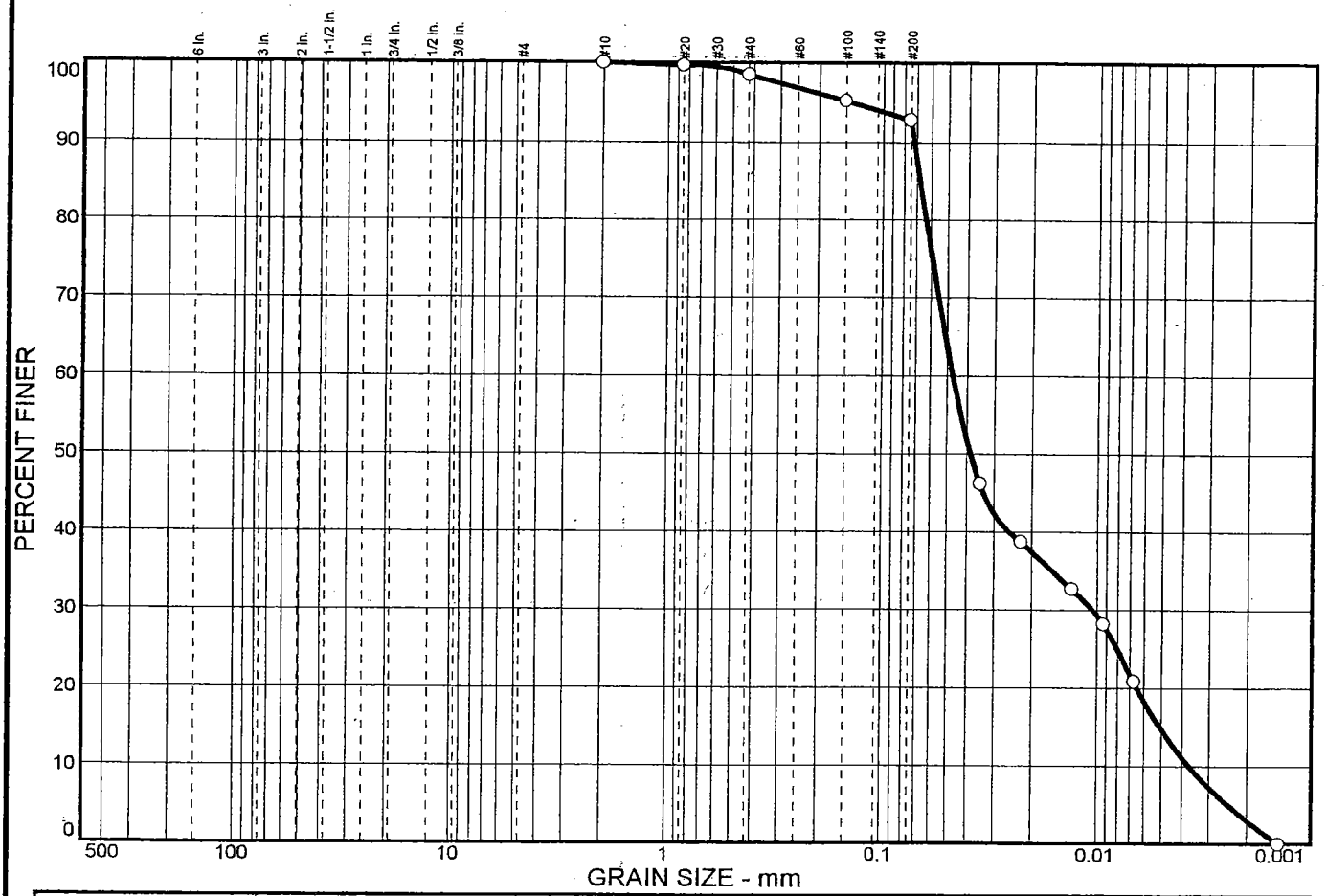
Natural Water Content: 73.1%

Sample No.: MTCSD-00401 **Date:** 9/19/01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	7.2	78.0	14.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.7		
#40	98.5		
#100	95.2		
#200	92.8		

* (no specification provided)

Soil Description

USCS Group Name: Silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.0676 D_{60}= 0.0469 D_{50}= 0.0386
D_{30}= 0.0105 D_{15}= 0.0050 D_{10}= 0.0037
C_u= 12.70 C_c= 0.63

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Water Content: 281.6%

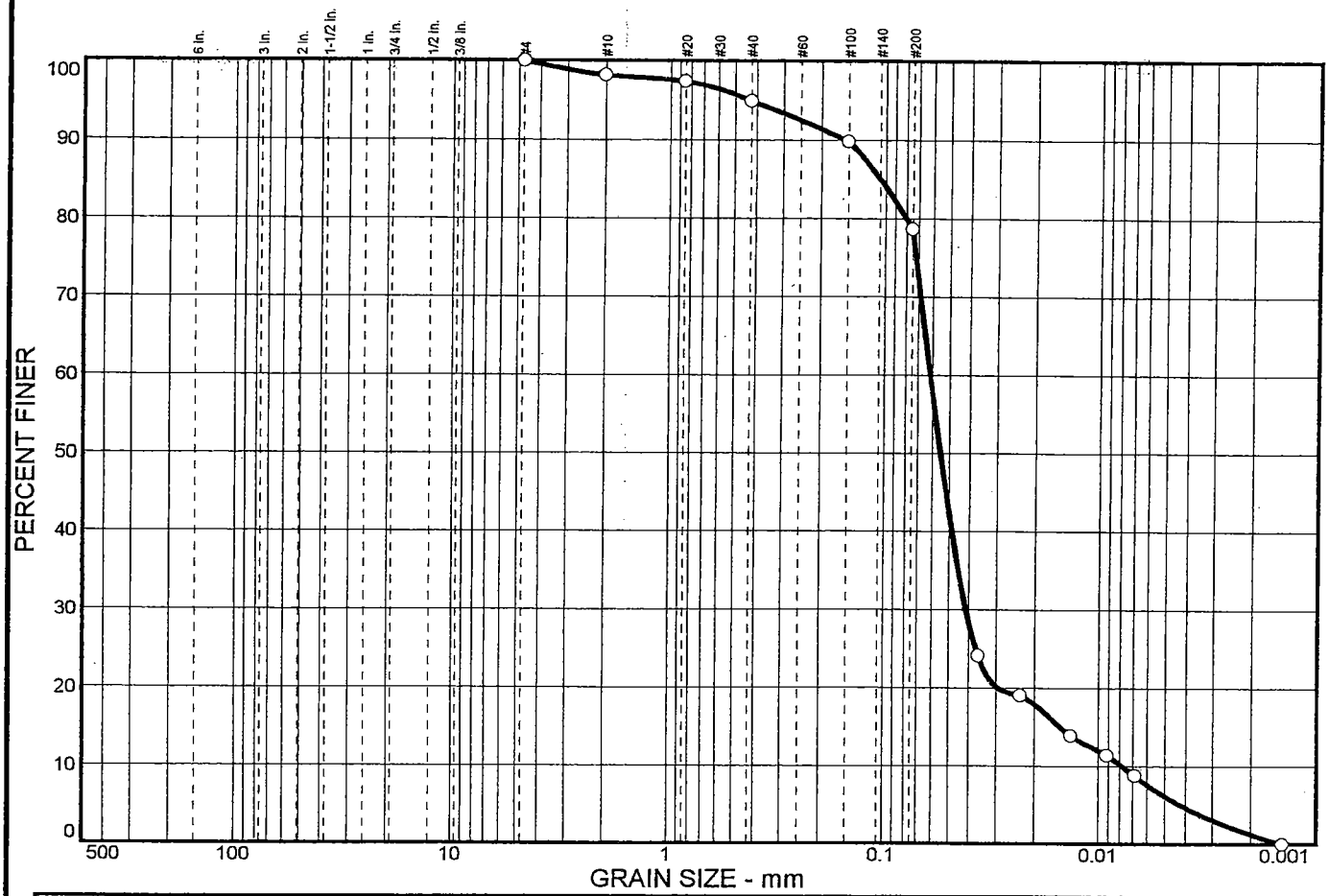
Sample No.: MTCSD-00901
Location: Indian Head, Maryland

Date: 9/20/01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	21.4	72.4	6.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	98.2		
#20	97.4		
#40	94.9		
#100	89.8		
#200	78.6		

* (no specification provided)

Soil Description

USCS Group Name: Silt with Sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.106 D_{60}= 0.0613 D_{50}= 0.0547
D_{30}= 0.0413 D_{15}= 0.0152 D_{10}= 0.0078
C_u= 7.89 C_c= 3.58

Classification

USCS= ML AASHTO= A-4(0)

Remarks

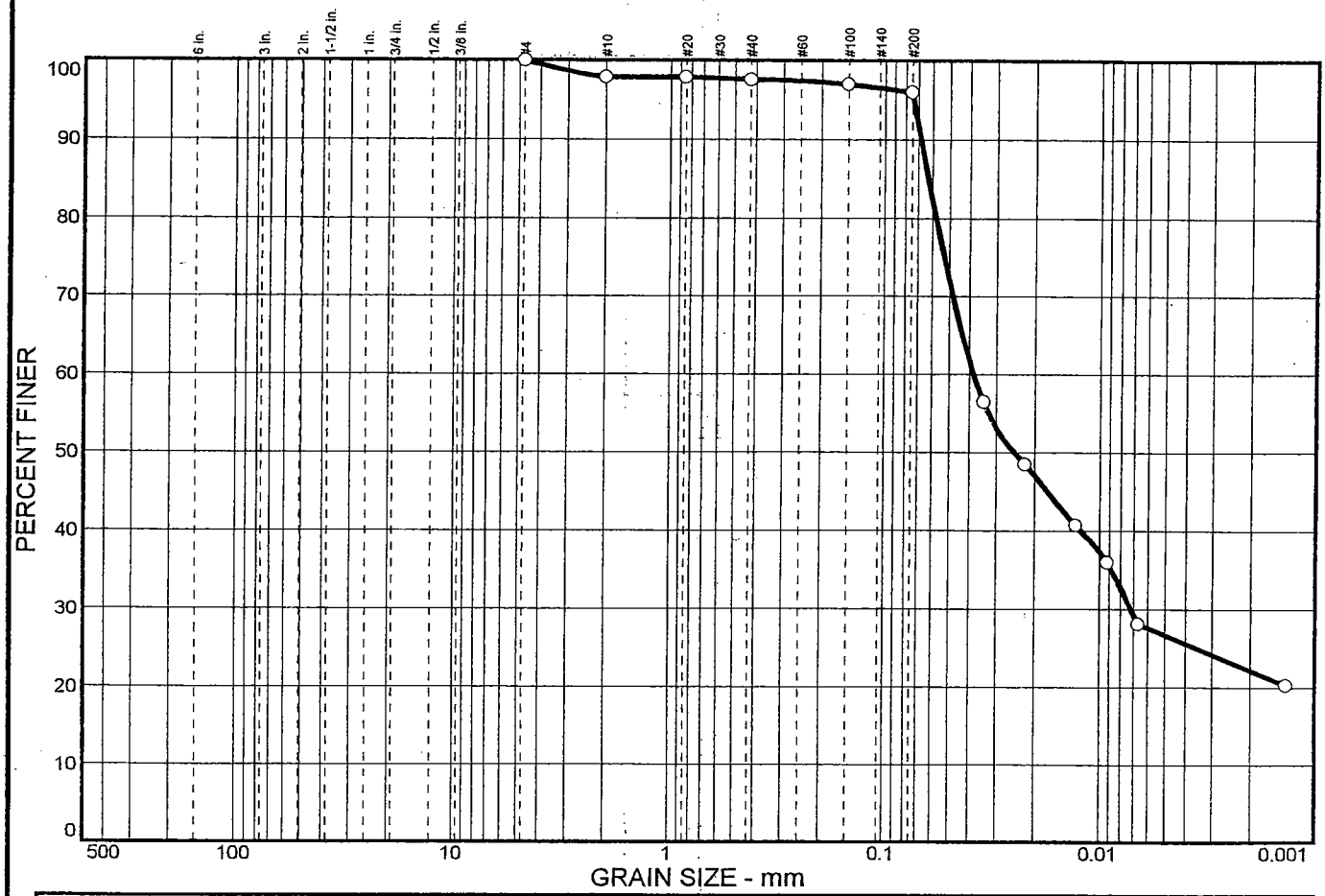
Natural Water Content: 173.8%

Sample No.: MTCSD-01001 **Date:** 9/20/01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	4.0	69.3	26.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	97.9		
#20	97.9		
#40	97.6		
#100	97.0		
#200	96.0		

* (no specification provided)

Soil Description

USCS Group Name: Silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.0626 D_{60}= 0.0383 D_{50}= 0.0247
D_{30}= 0.0072 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Water Content: 218.5%

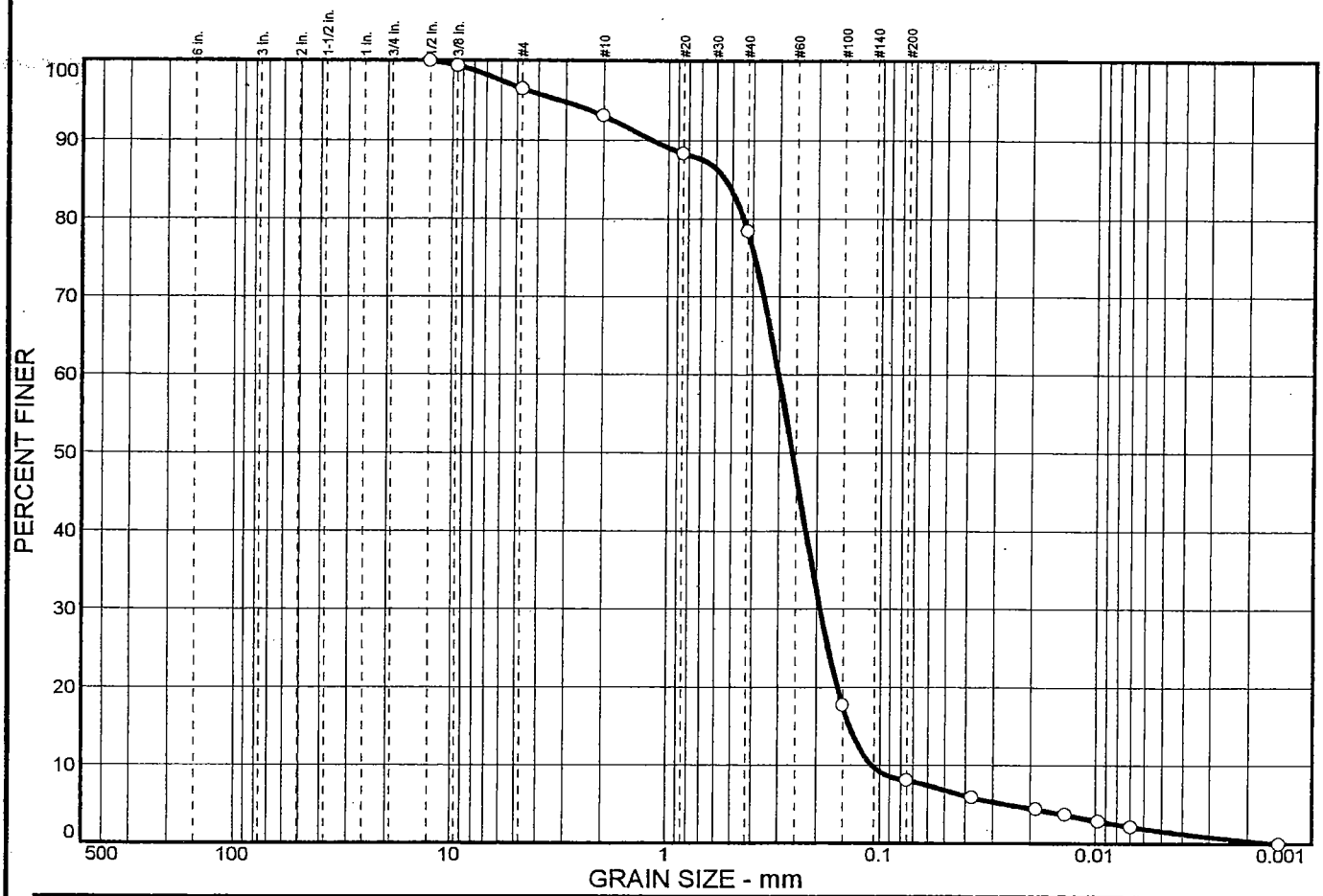
Sample No.: MTCSD-01101
Location: Indian Head, Maryland

Date: 9/20/01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	3.5	88.4	6.5	1.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2 in.	100.0		
3/8 in.	99.4		
#4	96.5		
#10	93.1		
#20	88.3		
#40	78.4		
#100	17.7		
#200	8.1		

* (no specification provided)

Soil Description

USCS Group Name: Poorly Graded Sand with Silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.543 D_{60}= 0.302 D_{50}= 0.260
D_{30}= 0.191 D_{15}= 0.139 D_{10}= 0.109
C_u= 2.78 C_c= 1.12

Classification

USCS= SP-SM AASHTO= A-3

Remarks

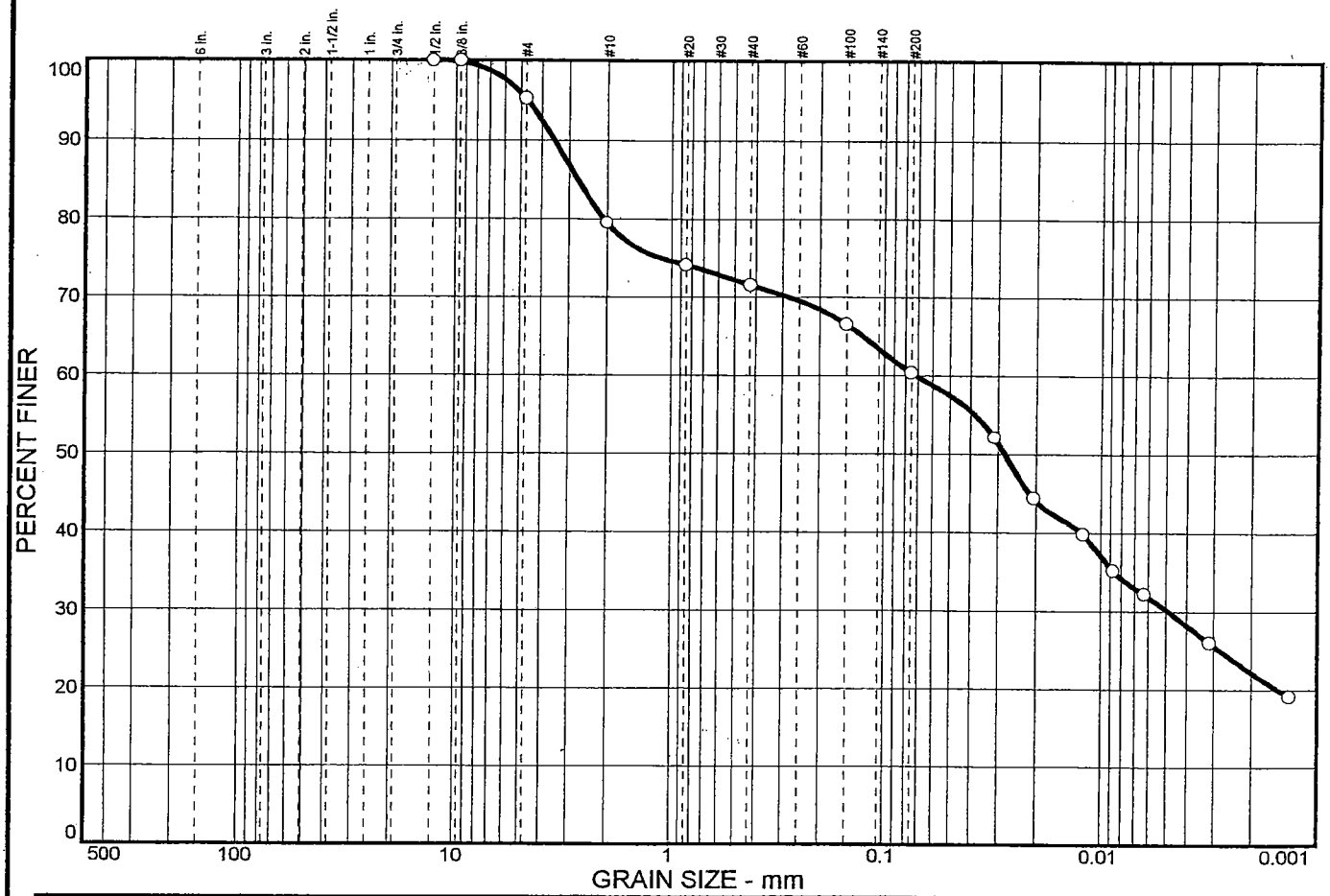
Natural Water Content: 28.6%

Sample No.: MTCSD-01201 **Date:** 9/19/01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	4.8	34.9	30.0	30.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	100.0		
#4	95.2		
#10	79.5		
#20	74.1		
#40	71.5		
#100	66.5		
#200	60.3		

* (no specification provided)

Soil Description

USCS Group Name: Sandy silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 2.74 D_{60}= 0.0721 D_{50}= 0.0279
D_{30}= 0.0048 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Water Content: 48.7%

Sample No.: MTCSD-01301 **Date:** 9-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report

% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	18.0	46.4	35.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	96.2		
#20	95.9		
#40	95.3		
#100	91.2		
#200	82.0		

* (no specification provided)

Soil Description

USCS Group Name: Silt with Sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.0930 D_{60}= 0.0204 D_{50}= 0.0123
D_{30}= 0.0025 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

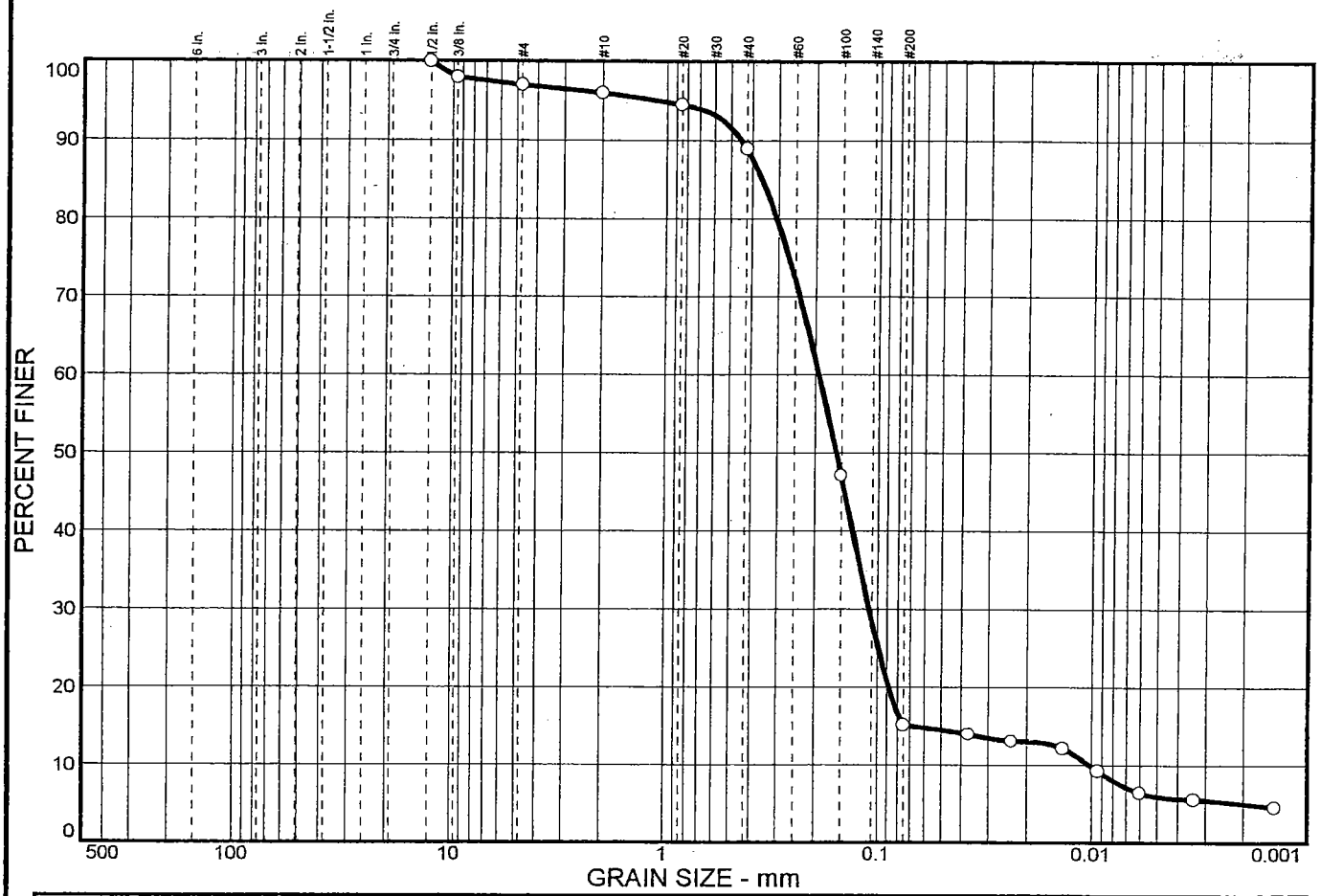
Natural Water Content: 231.9%

Sample No.: MTCSD-01401 **Date:** 9/20/01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	3.0	81.9	9.1	6.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	98.0		
#4	97.0		
#10	96.0		
#20	94.5		
#40	88.9		
#100	47.1		
#200	15.1		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.361 D_{60}= 0.192 D_{50}= 0.158
D_{30}= 0.110 D_{15}= 0.0696 D_{10}= 0.0102
C_u= 18.78 C_c= 6.13

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

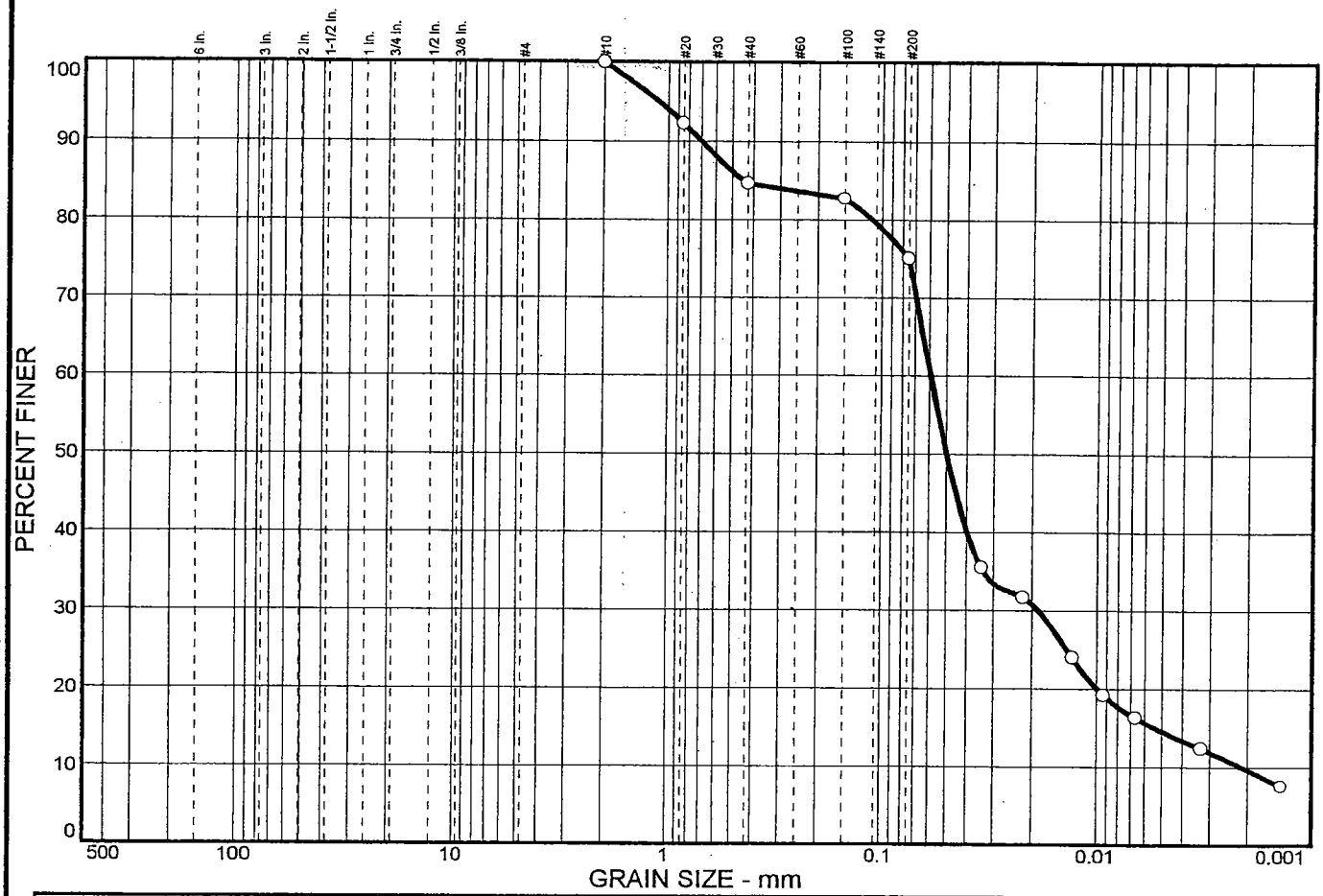
Natural Water Content: 51.5%

Sample No.: MTCSD-01501 **Date:** 9-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	25.0	60.4	14.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	92.3		
#40	84.6		
#100	82.7		
#200	75.0		

* (no specification provided)

Soil Description

USCS Group Name: Silt with sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.445 D_{60}= 0.0590 D_{50}= 0.0495
D_{30}= 0.0187 D_{15}= 0.0054 D_{10}= 0.0021
C_u= 27.82 C_c= 2.80

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Water Content: 321.3%

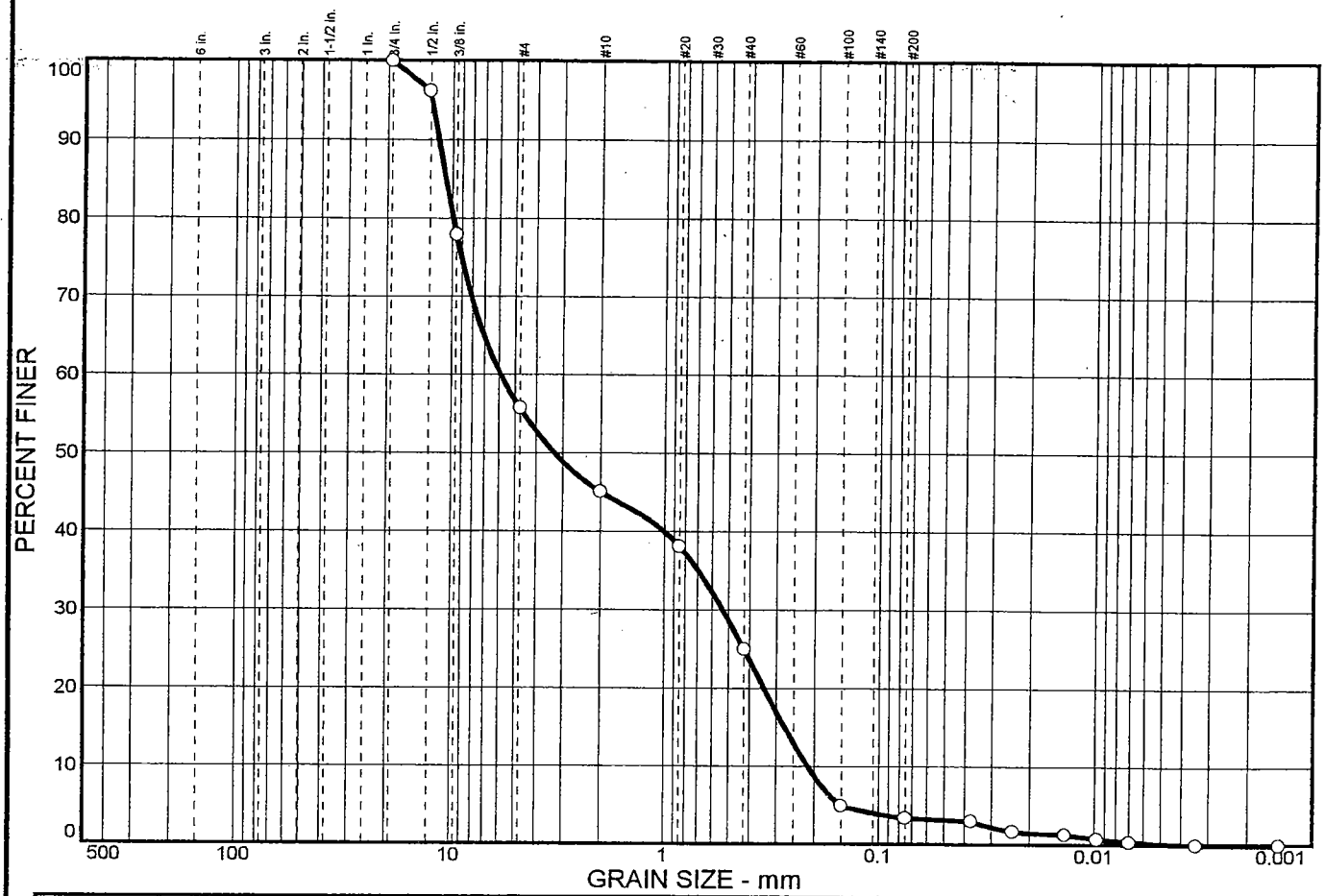
Sample No.: MTCSD-01601
Location: Indian Head, Maryland

Date: 9-23-01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	44.3	52.3	3.2	0.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	96.2		
.375 in.	77.9		
#4	55.7		
#10	45.0		
#20	38.1		
#40	25.0		
#100	5.0		
#200	3.4		

* (no specification provided)

Soil Description

USCS Group Name: Poorly graded sand with gravel

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 10.7 D_{60}= 5.87 D_{50}= 3.28
D_{30}= 0.534 D_{15}= 0.274 D_{10}= 0.214
C_u= 27.45 C_c= 0.23

Classification

USCS= SP AASHTO= A-1-a

Remarks

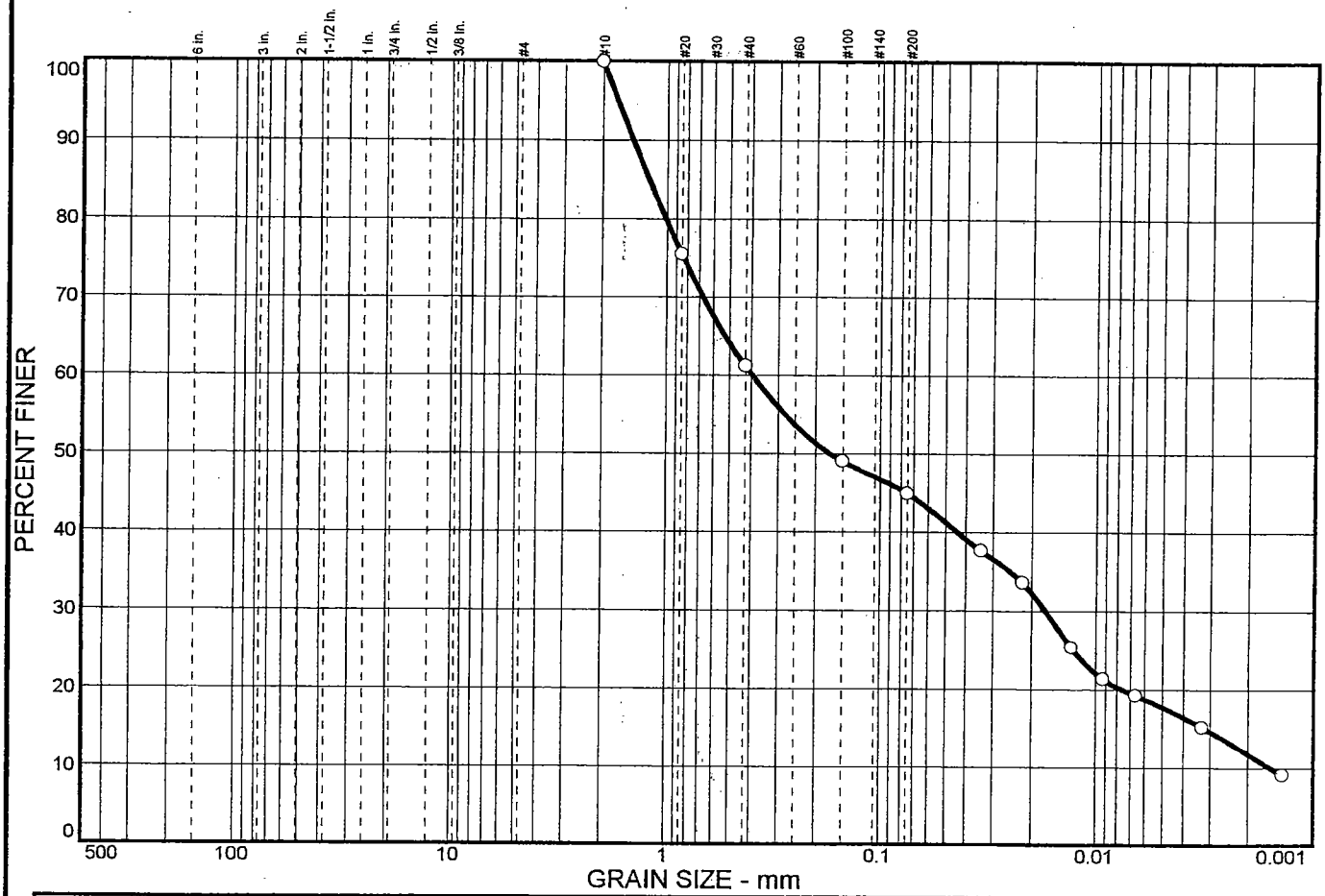
Natural Water Content: 15.7%

Sample No.: MTCSD-01701 **Date:** 9-23-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	55.1	27.1	17.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	75.5		
#40	61.2		
#100	49.0		
#200	44.9		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 1.21 D_{60}= 0.395 D_{50}= 0.172
D_{30}= 0.0172 D_{15}= 0.0032 D_{10}= 0.0016
C_u= 251.94 C_c= 0.48

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Natural Water Content: 234.2%

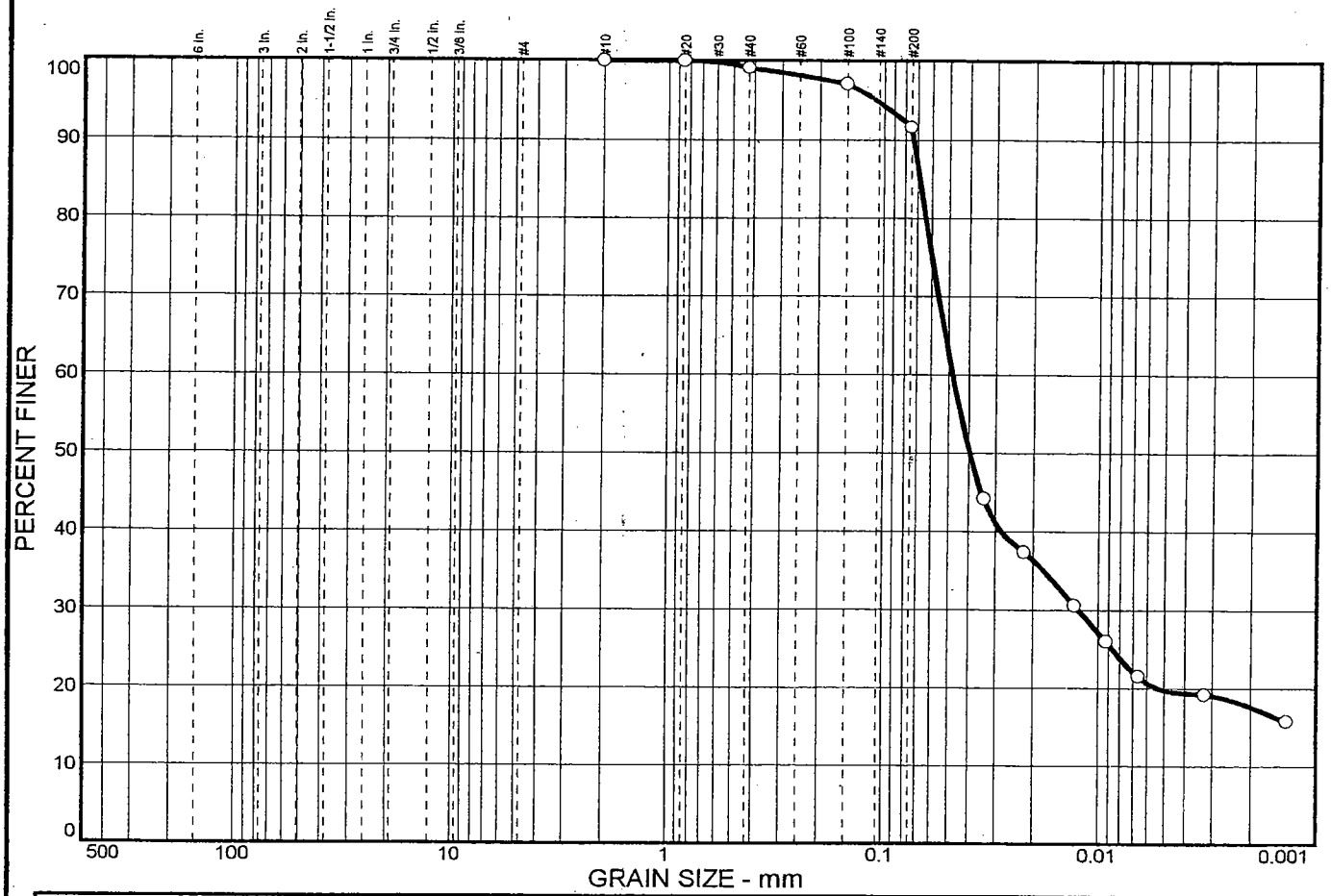
Sample No.: MTCSD-01801
Location: Indian Head, Maryland

Date: 9-23-01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	8.4	71.8	19.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	100.0		
#40	99.1		
#100	97.1		
#200	91.6		

* (no specification provided)

Soil Description

USCS Group: Silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.0685 D_{60}= 0.0476 D_{50}= 0.0395
D_{30}= 0.0124 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

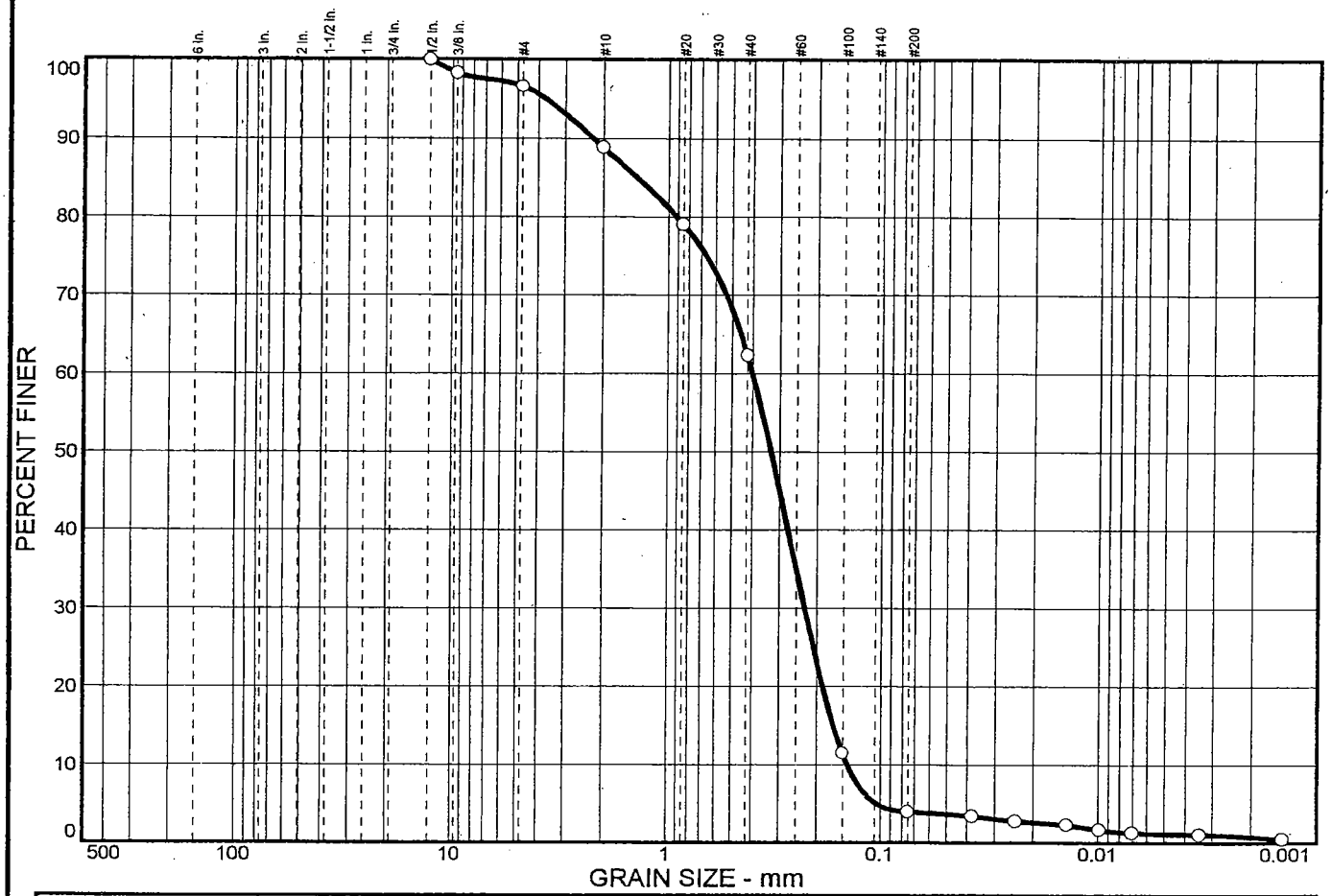
Natural Water Content: 202.1%

Sample No.: MTCSD-01901 **Date:** 9-22-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	3.4	92.6	2.8	1.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	98.3		
#4	96.6		
#10	88.8		
#20	79.0		
#40	62.3		
#100	11.5		
#200	4.0		

* (no specification provided)

Soil Description

USCS Group Name: Poorly graded sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 1.40 D_{60}= 0.403 D_{50}= 0.328
D_{30}= 0.228 D_{15}= 0.166 D_{10}= 0.142
C_u= 2.83 C_c= 0.91

Classification

USCS= SP AASHTO= A-3

Remarks

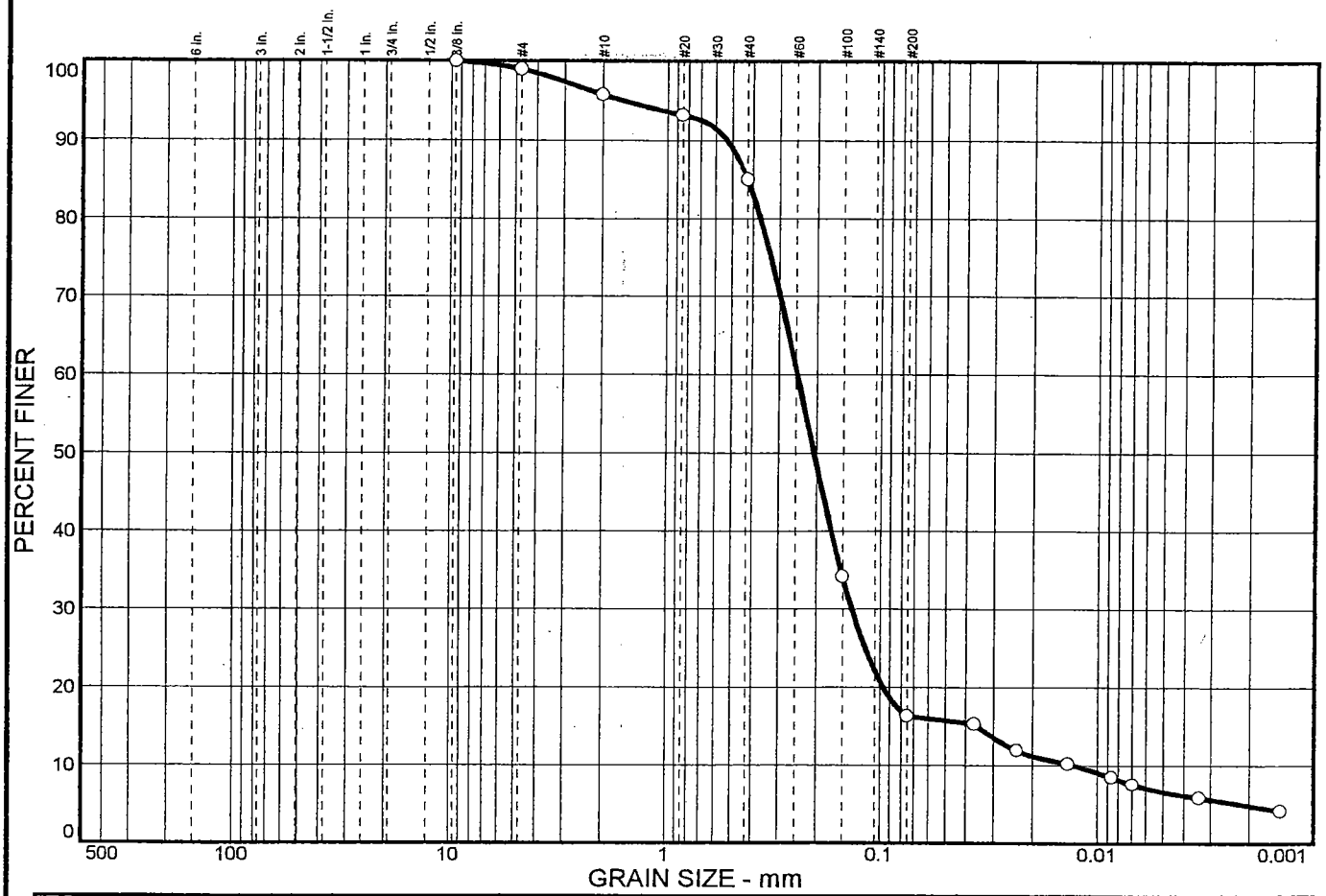
Natural Water Content: 47.4%

Sample No.: MTCSD-02001 **Date:** 9-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.0	82.7	9.6	6.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.0		
#10	95.8		
#20	93.2		
#40	85.0		
#100	34.2		
#200	16.3		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.425 D_{60}= 0.246 D_{50}= 0.205
D_{30}= 0.135 D_{15}= 0.0356 D_{10}= 0.0128
C_u= 19.26 C_c= 5.82

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

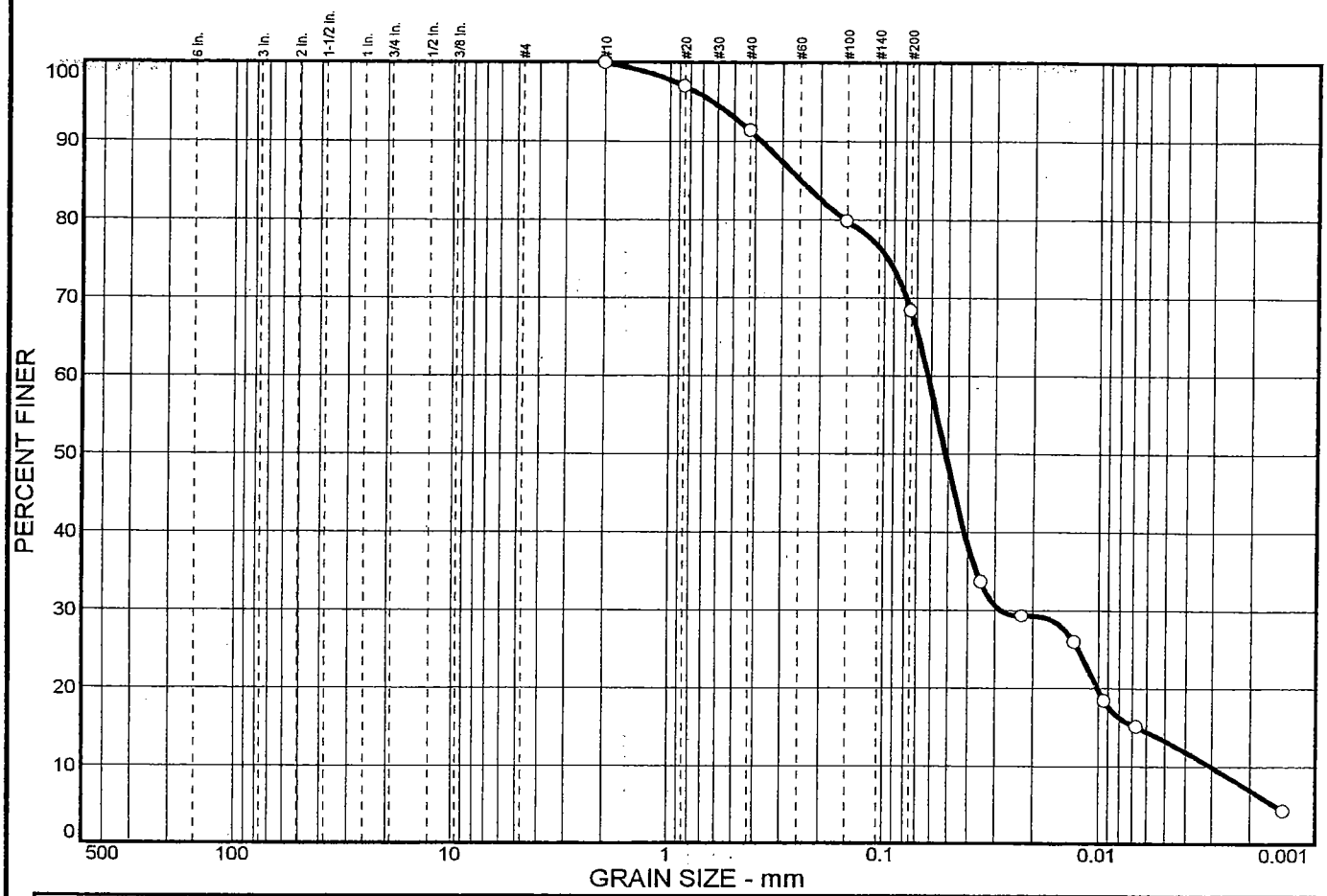
Natural Water Content: 88.5%

Sample No.: MTCSD-02101 **Date:** 9-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	31.7	54.9	13.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	97.0		
#40	91.3		
#100	79.8		
#200	68.3		

* (no specification provided)

Soil Description

USCS Group Name: Sandy Silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.247 D_{60}= 0.0621 D_{50}= 0.0511
D_{30}= 0.0282 D_{15}= 0.0066 D_{10}= 0.0030
C_u= 20.51 C_c= 4.23

Classification

USCS= ML AASHTO= A-8

Remarks

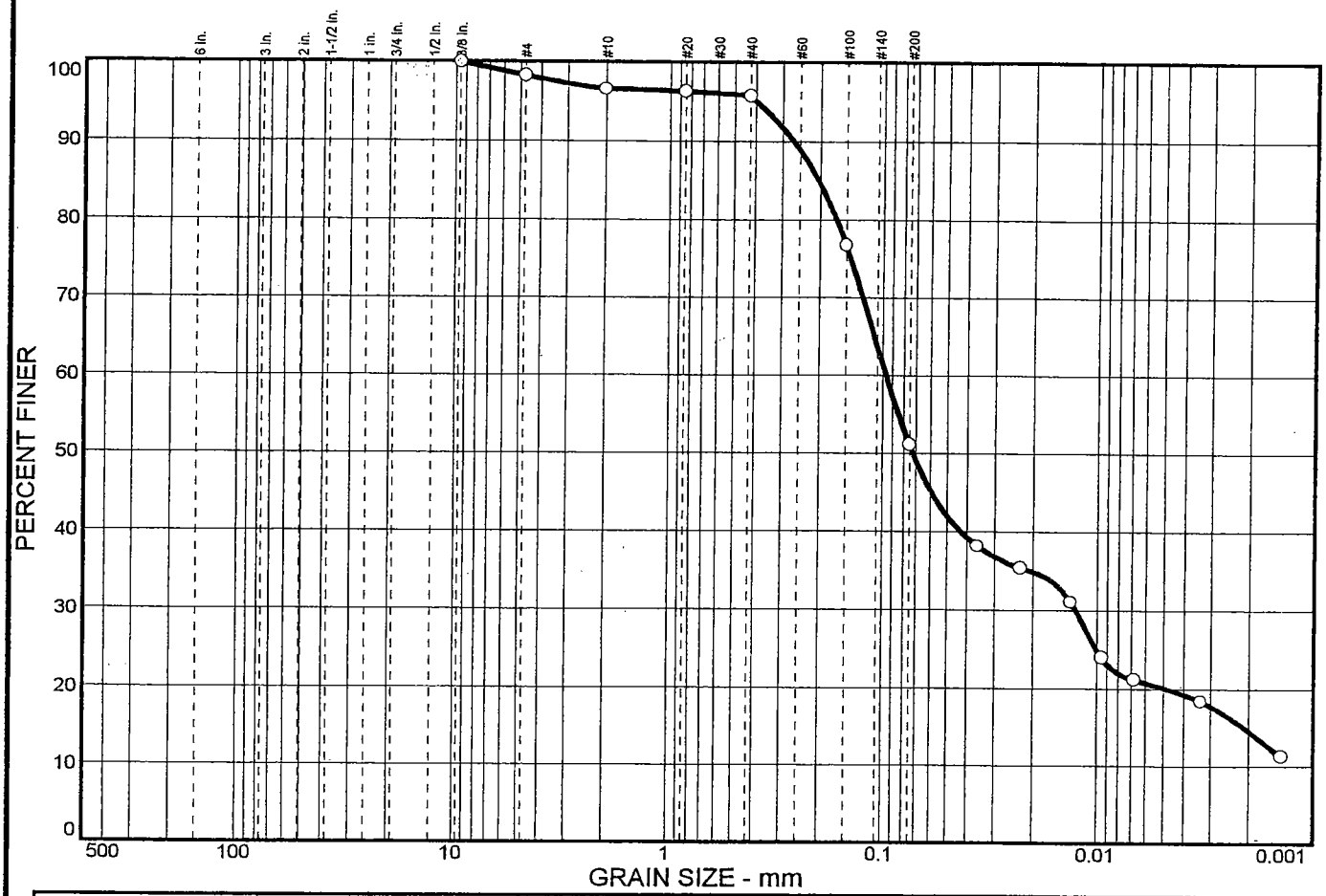
Natural Water Content: 132.1%

Sample No.: MTCSD-02301 **Date:** 9/18/01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.7	47.2	31.0	20.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	98.3		
#10	96.6		
#20	96.3		
#40	95.8		
#100	76.7		
#200	51.1		

* (no specification provided)

Soil Description

USCS Group Name: Sandy silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.204 D_{60}= 0.0965 D_{50}= 0.0723
D_{30}= 0.0126 D_{15}= 0.0021 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Water Content: 115.5%

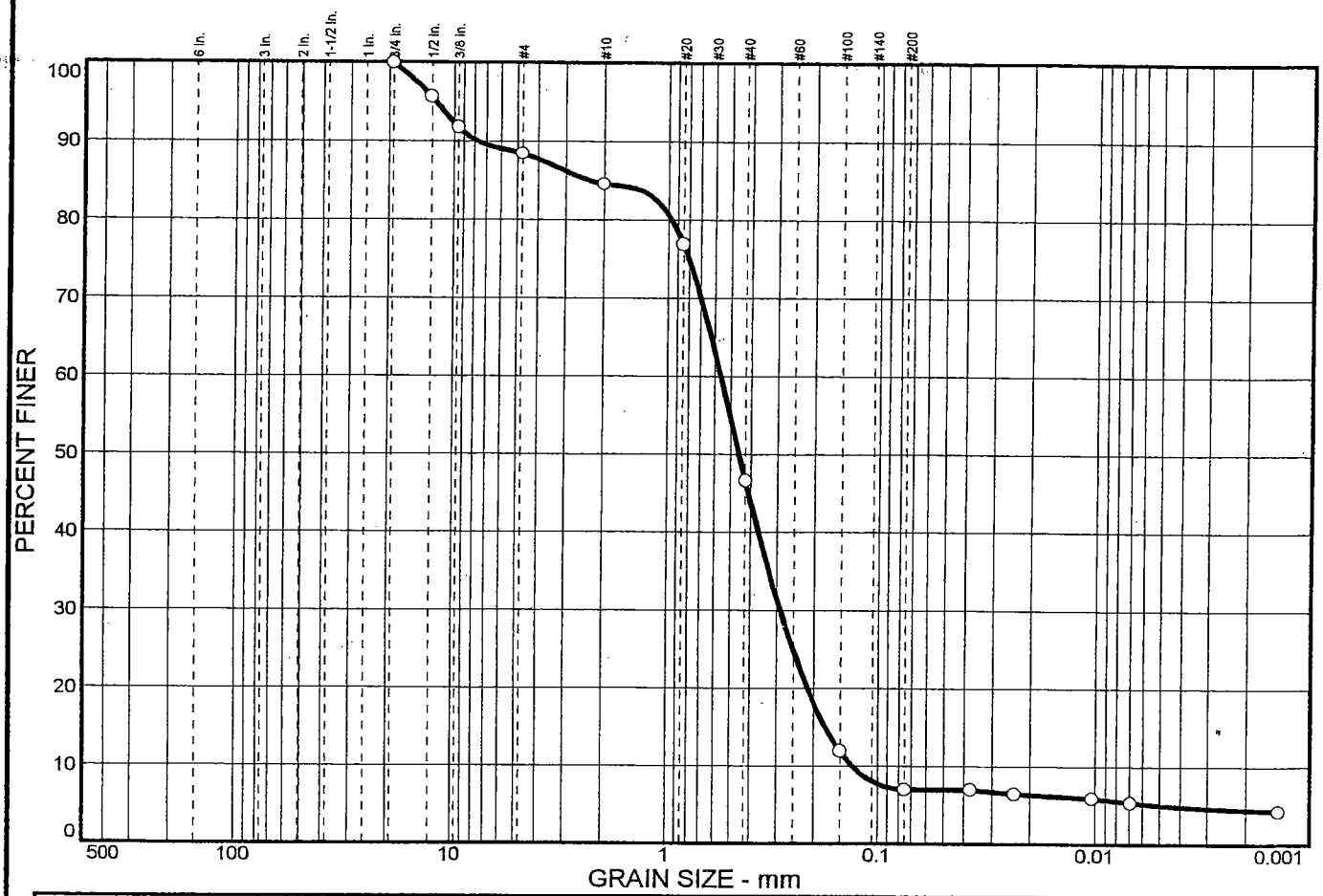
Sample No.: MTCSD-02401
Location: Indian Head, Maryland

Date: 9-13-01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	11.6	81.4	1.9	5.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	95.6		
.375 in.	91.7		
#4	88.4		
#10	84.5		
#20	76.9		
#40	46.6		
#100	11.9		
#200	7.0		

* (no specification provided)

Soil Description

USCS Group Name: Poorly graded sand with silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 2.36 D_{60}= 0.560 D_{50}= 0.456
D_{30}= 0.288 D_{15}= 0.176 D_{10}= 0.131
C_u= 4.27 C_c= 1.13

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

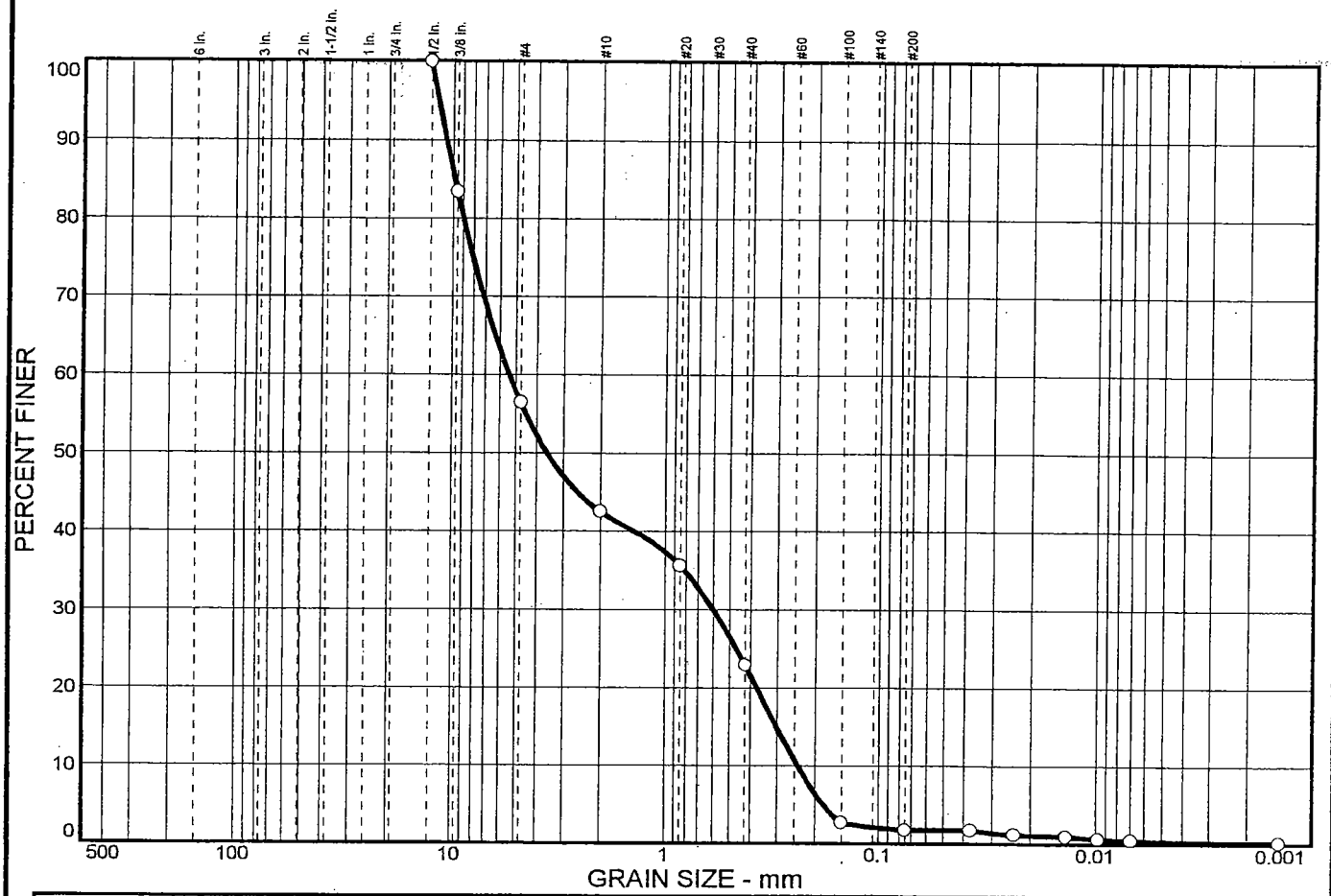
Natural Water Content: 36.2%

Sample No.: MTCSD-02501 **Date:** 09-13-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	43.6	54.6	1.4	0.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2 in.	100.0		
3/8 in.	83.4		
#4	56.4		
#10	42.5		
#20	35.6		
#40	22.9		
#100	2.7		
#200	1.8		

* (no specification provided)

Soil Description

USCS Group Name: Poorly Graded Sand w/Gravel

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 9.81 D_{60}= 5.39 D_{50}= 3.57
D_{30}= 0.597 D_{15}= 0.302 D_{10}= 0.241
C_u= 22.39 C_c= 0.27

Classification

USCS= SP AASHTO= A-1-a

Remarks

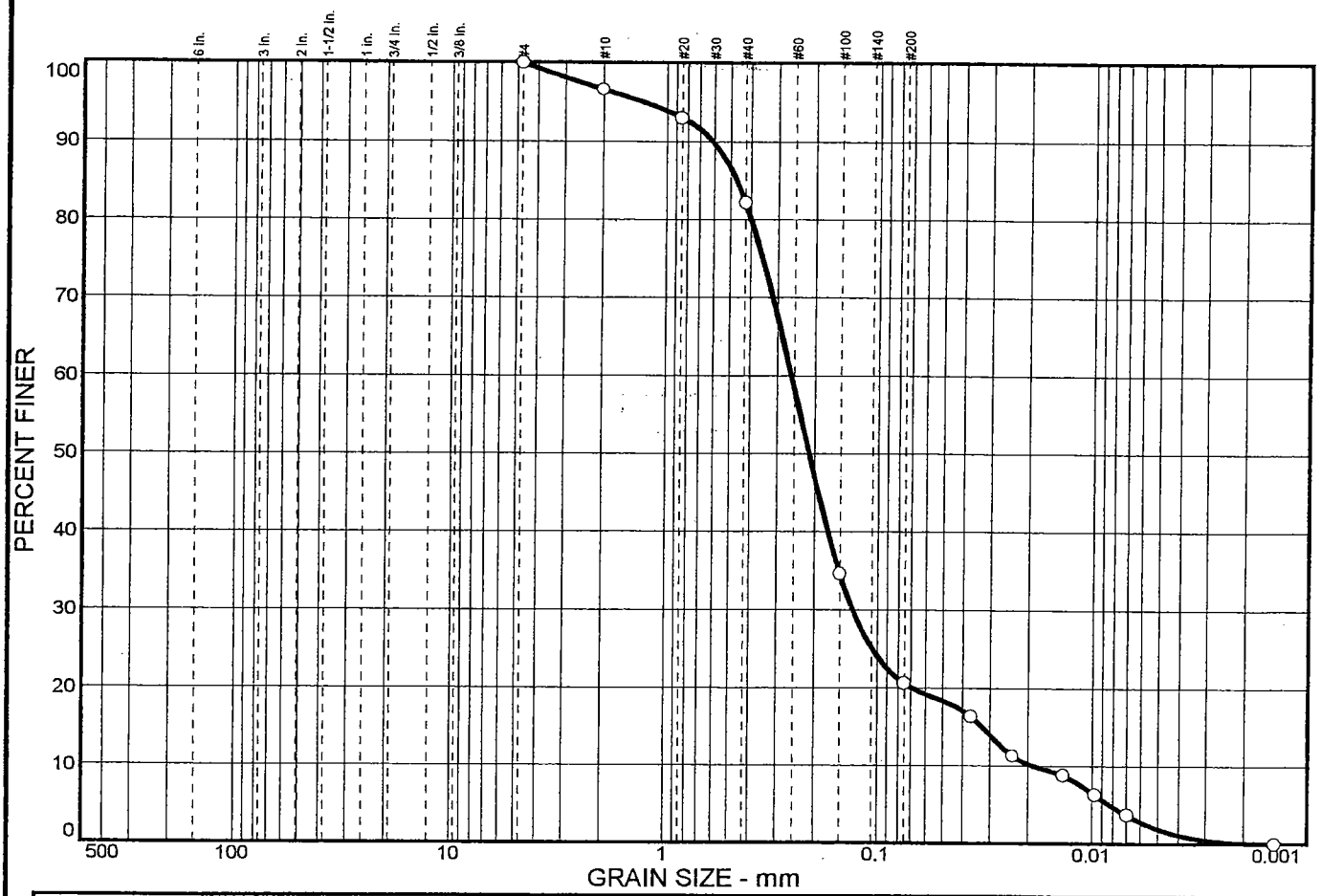
Natural Water Content: 15.8%

Sample No.: MTCSD-02601 **Date:** 9/20/01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	79.4	18.6	2.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	96.6		
#20	93.0		
#40	82.1		
#100	34.6		
#200	20.6		

* (no specification provided)

Soil Description

USCS Group Name: Sandy Silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.470 D_{60}= 0.258 D_{50}= 0.212
D_{30}= 0.130 D_{15}= 0.0325 D_{10}= 0.0189
C_u= 13.66 C_c= 3.48

Classification

USCS= SM AASHTO= A-8

Remarks

Natural Water Content: 115.4%

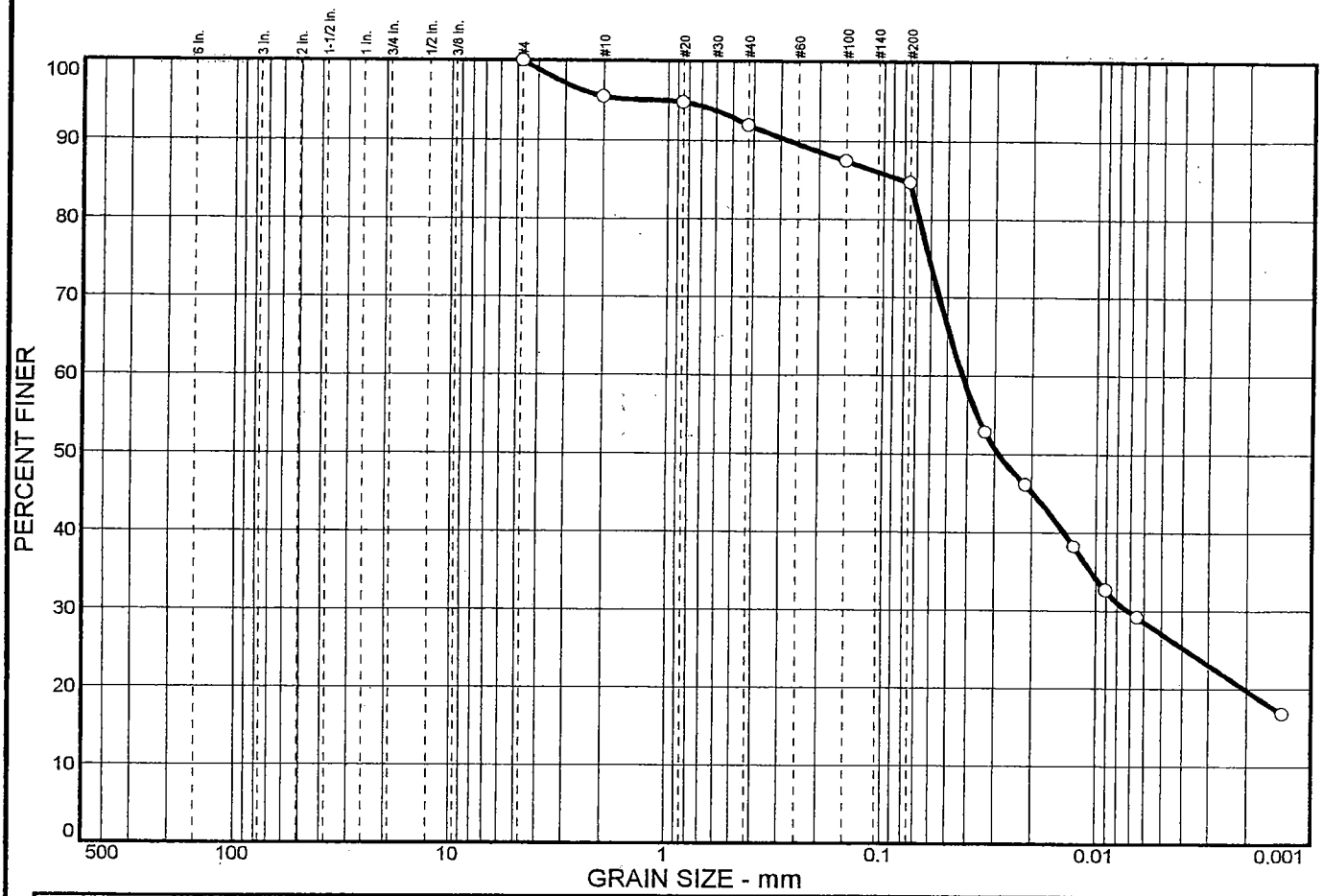
Sample No.: MTCSD-02701
Location: Indian Head, Maryland

Date: 9/19/01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	15.3	57.6	27.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	95.5		
#20	94.8		
#40	91.9		
#100	87.4		
#200	84.7		

* (no specification provided)

Soil Description

USCS Group Name: Silt with Sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.0813 D_{60}= 0.0423 D_{50}= 0.0287
D_{30}= 0.0071 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Water Content: 216.6%

Sample No.: MTCSD-02801 **Date:** 9/20/01
Location: Indian Head Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

Client: Tetra Tech NUS, Inc.
Project: Naval Surface Weapons Center (Mattawoman Creek)
Indian Head, Maryland (CTO 245)
Project No: 21730

APPENDIX A-4

SAMPLE LOCATION DATA

APPENDIX A-4
SAMPLE LOCATION DATA
MATTAWOMAN CREEK STUDY
INDIV-NSWC, INDIAN HEAD, MARYLAND

	SAMPLING LOCATION	NORTHING	EASTING
Sampling Locations in Mattawoman Creek and Najamoy Creek, TtNUS Field Investigation Sampling in September 2001 - Coordinates in NAD 83	MTC001	326600.34	1255101.17
	MTC002	327189.67	1255150.97
	MTC003	327401.28	1255740.44
	MTC004	327403.21	1256268.56
	MTC005	328220.38	1258899.46
	MTC006	329298.47	1259041.41
	MTC007	329016.99	1258314.94
	MTC008	330390.01	1258888.66
	MTC009	330505.76	1258552.33
	MTC010	331849.97	1259621.28
	MTC011	330868.23	1260476.85
	MTC012	330879.62	1260918.38
	MTC013	330304.28	1261707.03
	MTC014	331387.89	1261625.22
	MTC015	332415.51	1262267.10
	MTC016	332464.04	1262770.26
	MTC017	333712.68	1263026.98
	MTC018	333940.86	1263462.35
	MTC019	333623.25	1264439.07
	MTC020	333717.68	1264638.88
	MTC021	333790.95	1264888.80
	MTC022	334449.65	1265916.98
	MTC023	335186.55	1265947.96
	MTC024	335618.15	1266001.52
	MTC025	335895.61	1265973.33
	MTC026	336165.78	1266131.04
	MTC027	335538.46	1271543.78
	MTC028	335705.07	1271379.33
	MTC029	324317.72	1256000.16
	MTC030	324577.98	1257980.50
	NJC001	282855.94	1272625.48
	NJC002	282348.50	1272913.41

APPENDIX A-4
SAMPLE LOCATION DATA
MATTAWOMAN CREEK STUDY
INDIV-NSWC, INDIAN HEAD, MARYLAND

Sampling Locations in Mattawoman Creek and Najamoy Creek, SPAWAR Field Screening Sampling in September 2001 - Coordinates in NAD 83

SAMPLING LOCATION	NORTHING	EASTING
boatdka	336360.43	1266399.38
marinapt	325513.56	1258708.22
mtc07	323207.18	1252898.35
mtc11	324252.61	1256013.35
mtc13	324678.17	1257979.46
mtc15	325084.11	1257287.56
mtc17	326607.17	1255111.76
mtc19	327185.16	1255149.56
mtc20	327398.04	1255734.44
mtc23	327406.90	1256269.04
mtc26	327483.33	1256976.39
mtc28	328222.86	1258907.25
mtc30	329291.80	1259053.24
mtc32	329023.21	1258348.58
mtc38	330496.47	1258558.68
mtc39	331242.44	1258706.23
mtc40	331856.72	1259614.99
mtc42	331166.30	1259207.48
mtc45	330876.57	1260482.72
mtc47	330885.24	1260916.70
mtc55	330282.00	1261717.19
mtc56	330810.31	1261317.17
mtc57	331390.64	1261640.68
mtc58	332409.42	1262275.42
mtc59	332456.10	1262756.44
mtc60	332871.64	1262759.08
mtc62	332962.86	1262969.31
mtc63	333947.34	1263259.59
mtc64	333948.20	1263469.35
mtc65	333621.98	1264431.82
mtc66	333375.44	1262921.19
mtc67	333736.12	1263055.17
mtc68	333747.23	1264691.70
mtc70	334473.58	1265925.66
mtc71	335195.55	1265958.13
mtc72	335265.17	1265768.30
mtc73	334623.62	1266077.45
mtc75	335658.90	1266029.48
mtc76	335909.56	1265970.52
mtc77	336139.33	1266124.95
mtc78	335560.11	1271523.42
mtc79	335697.99	1271393.71
mtc80	335751.31	1271119.64
mtc81	335515.50	1271577.95
mtc82	336309.57	1267772.59
mtc83	336321.84	1267583.61
mtcdo2	333707.26	1263064.97
njc01	282855.94	1272625.48
njc02	282348.50	1272913.41
njc03	282620.26	1272821.85
njc04	283339.07	1272601.28
njcref1	283345.25	1272507.76
njcref2	286772.81	1269282.33

APPENDIX A-4
SAMPLE LOCATION DATA
MATTAWOMAN CREEK STUDY
INDIV-NSWC, INDIAN HEAD, MARYLAND

	SAMPLING LOCATION	NORTHING	EASTING
Sampling Locations in Mattawoman Creek, CH2M HILL Remedial Investigation of IR Site 11 and IR Site 17, 2001, Coordinates in NAD 83	IS11SD01	327410.22	1256703.53
	IS11SD02	327450.54	1256510.02
	IS11SD03	327423.66	1256429.39
	IS11SD04	327416.94	1256260.06
	IS11SD05	327548.00	1256048.60
	IS11SD06	327645.39	1256062.52
	IS11SD07	327744.84	1255946.95
	IS11SW01	327410.22	1256703.53
	IS11SW02	327450.54	1256510.02
	IS11SW03	327423.66	1256429.39
	IS11SW04	327416.94	1256260.06
	IS11SW05	327548.00	1256048.60
	IS11SW06	327645.39	1256062.52
	IS11SW07	327744.84	1255946.95
	IS17SD01	328117.17	1257859.44
	IS17SD02	328030.81	1257636.92
	IS17SD03	327941.14	1257442.63
	IS17SD04	327795.01	1257264.94
	IS17SD05	327680.43	1257142.06
	IS17SD06	327549.24	1256995.92
	IS17SW01	328117.17	1257859.44
	IS17SW02	328030.81	1257636.92
	IS17SW03	327941.14	1257442.63
	IS17SW04	327795.01	1257264.94
	IS17SW05	327680.43	1257142.06
	IS17SW06	327549.24	1256995.92

APPENDIX B

ANALYTICAL DATA

B-1 TtNUS 2001 DATA, MATTAWOMAN CREEK

B-1.1 SURFACE WATER DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

B-1.2 SEDIMENT DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

B-1.3 FISH FILLET DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

B-1.4 WHOLE BODY FISH DATA – TtNUS 2001 MATAWOMAN CREEK INVESTIGATION

B-1.5 VEGETATION DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

B-2 ANALYTICAL DATA – TtNUS 1997 DATA, IR SITES 39/41

B-2.1 SURFACE WATER DATA – TtNUS 1997 DATA, IR SITES 39/41

B-2.2 SEDIMENT DATA – TtNUS 1997 DATA, IR SITES 39/41

B-3 ANALYTICAL DATA – CH2M HILL DATA, IR SITES 11 AND 17

B-3.1 SURFACE WATER DATA – CH2M HILL DATA, IR SITES 11 AND 17

B-3.2 SEDIMENT DATA – CH2M HILL DATA, IR SITES 11 AND 17

B-4 SEDIMENT DATA - 1992

B-5 DATA VALIDATION MEMORANDA

B-6 DATA EVALUATION REPORT

B-7 ECOLOGICAL CRITERIA

B-8 TIE AND SPAWAR DATA

B-8.1 TIE DATA

B-8.2 SPAWAR RAPID SCREENING RESULTS

B-8.3 CONFIRMATION OF RAPID SCREENING RESULTS

B-9 PAHS ANTHROPOGENIC LITERATURE

APPENDIX B-1

TtNUS 2001 DATA, MATTAWOMAN CREEK

APPENDIX B-1.1

SURFACE WATER DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005		MTC006	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38		329298.47	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46		1259041.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 2	
SAMPLE ID	MTCSW00101 / MTCSW00101-F		MTCSW00201 / MTCSW00201-F		MTCSW00201-D / MTCSW00201-F-D		MTCSW00201-AVG / MTCSW00201-F-AVG		MTCSW00301 / MTCSW00301-F		MTCSW00401 / MTCSW00401-F		MTCSW00501 / MTCSW00501-F		MTCSW00601 / MTCSW00601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL
VOLATILE ORGANICS (UG/L)																
1,1,1-TRICHLOROETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,1,2,2-TETRACHLOROETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,1,2-TRICHLOROETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,2,4-TRICHLOROBENZENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	1	UR					1	UR	1	UR	1	UR	1	UR
1,2-DIBROMOETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROBENZENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROPROPANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,3-DICHLOROBENZENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
1,4-DICHLOROBENZENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
2-BUTANONE	5	UR	5	UR					5	UR	5	UR	5	UR	5	UR
2-HEXANONE	5	U	5	U			5	U	5	U	5	U	5	U	5	U
4-METHYL-2-PENTANONE	5	U	5	U			5	U	5	U	5	U	5	U	5	U
ACETONE	5	UR	5	UR					5	UR	5	UR	5	UR	5	UR
BENZENE	1	U	1	U			1	U	0.7	J	1	U	1	U	1	U
BROMOCHLOROMETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
BROMODICHLOROMETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
BROMOFORM	1	U	1	U			1	U	0.5	J	1	U	1	U	1	U
BROMOMETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CARBON DISULFIDE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CARBON TETRACHLORIDE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CHLOROBENZENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CHLORODIBROMOMETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CHLOROETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CHLOROFORM	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CHLOROMETHANE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CIS-1,2-DICHLOROETHENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
CIS-1,3-DICHLOROPROPENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
DIETHYL ETHER	1	UJ	1	UJ			1	UJ	1	UJ	1	UJ	1	UJ	1	UJ
ETHYLBENZENE	1	U	1	U			1	U	0.6	J	1	U	1	U	1	U
METHYLENE CHLORIDE	2	U	2	U			2	U	2	U	2	U	2	U	2	U
STYRENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
TETRACHLOROETHENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
TOLUENE	1	U	1	U			1	U	3		1	U	1	U	1	
TOTAL XYLENES	1	U	1	U			1	U	4		1	U	1	U	1	
TRANS-1,2-DICHLOROETHENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
TRANS-1,3-DICHLOROPROPENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
TRICHLOROETHENE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
VINYL CHLORIDE	1	U	1	U			1	U	1	U	1	U	1	U	1	U
SEMIVOLATILE ORGANICS (UG/L)																
2,2'-OXYBIS(1-CHLOROPROPANE)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4,5-TRICHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2,4,6-TRICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005		MTC006	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38		329298.47	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46		1259041.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 2	
SAMPLE ID	MTCSW00101 / MTCSW00101-F		MTCSW00201 / MTCSW00201-F		MTCSW00201-D / MTCSW00201-F-D		MTCSW00201-AVG / MTCSW00201-F-AVG		MTCSW00301 / MTCSW00301-F		MTCSW00401 / MTCSW00401-F		MTCSW00501 / MTCSW00501-F		MTCSW00601 / MTCSW00601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL
2,4-DIMETHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DINITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-CHLORONAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-CHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-METHYLNAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-NITROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
3,3'-DICHLOROBENZIDINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
3-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4,6-DINITRO-2-METHYLPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-BROMOPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLORO-3-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROANILINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-NITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
ACENAPHTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACENAPHTHYLENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(A)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(A)PYRENE	5	U	5	U	5	U	5	U	5	UJ	5	UJ	5	U	5	U
BENZO(B)FLUORANTHENE	5	U	5	U	5	U	5	U	5	UJ	5	UJ	5	U	5	U
BENZO(G,H,I)PERYLENE	5	U	5	U	5	U	5	U	5	UJ	5	UJ	5	U	5	U
BENZO(K)FLUORANTHENE	5	U	5	U	5	U	5	U	5	UJ	5	UJ	5	U	5	U
BIS(2-CHLOROETHOXY)METHANE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHYL)ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-ETHYLHEXYL)PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	1	J	5	U
BUTYL BENZYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
CHRYSENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DI-N-BUTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DI-N-OCTYL PHTHALATE	5	U	5	U	5	U	5	U	5	UJ	5	UJ	5	U	5	U
DIBENZO(A,H)ANTHRACENE	5	U	5	U	5	U	5	U	5	UJ	5	UJ	5	U	5	U
DIBENZOFURAN	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIMETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
FLUORENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROBUTADIENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROCYCLOPENTADIENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
INDENO(1,2,3-CD)PYRENE	5	U	5	U	5	U	5	U	5	UJ	5	UJ	5	U	5	U
ISOPHORONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
LOW MOLECULAR WEIGHT PAHS																
N-NITROSO-DI-N-PROPYLAMINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
N-NITROSODIPHENYLAMINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005		MTC006	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38		329298.47	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46		1259041.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 2	
SAMPLE ID	MTCSW00101 / MTCSW00101-F		MTCSW00201 / MTCSW00201-F		MTCSW00201-D / MTCSW00201-F-D		MTCSW00201-AVG / MTCSW00201-F-AVG		MTCSW00301 / MTCSW00301-F		MTCSW00401 / MTCSW00401-F		MTCSW00501 / MTCSW00501-F		MTCSW00601 / MTCSW00601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL
NAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PENTACHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
PHENANTHRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
TOTAL PAHS																
INORGANICS (UG/L)																
ALUMINUM	85.6	B	140		124		132		347		231		351		126	
ANTIMONY	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	4.2	U	4.2	U	4.2	U	4.2	U	6.5	K	4.2	U	4.2	U	4.2	U
BARIUM	29.7		26.2		36.3		31.25		33.6		31.9		28.3		28.4	
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.12	
CADMIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.14	K
CALCIUM	15900		13200		13100		13150		14800		15300		12900		13300	
CHROMIUM	0.65	B	0.53	B	2.3	B	1.415	B	1.2	B	3.4	K	1	B	0.93	B
COBALT	1.2	B	0.88	B	1.1	B	0.99	B	1.1	B	1	B	1.3	B	1.4	B
COPPER	3.6	B	1.3	B	1.7	B	1.5	B	1.8	B	3	B	2.4	B	6.3	B
CYANIDE	3	U	3	U	3	U	3	U	3	U	3	U	10		3	U
IRON	130		192		211		201.5		457		263		669		134	
LEAD	1.2	U	1.2	U	3	B	2.1	B	1.2	U	1.2	U	2	B	1.2	U
MAGNESIUM	8520		8600		8570		8585		8600		8650		8490		8720	
MANGANESE	28.3	K	38.8		40.7		39.75		68.9		47.9		147		28.5	K
MERCURY	0.14	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.14	U	0.13	U
NICKEL	2.7	B	2.5	B	2.9	B	2.7	B	2.7	B	2.8	B	2.9	B	3.3	B
POTASSIUM	4030		3760		3870		3815		4230		4020		3820		3450	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL
SODIUM	20100		22100		22000		22050		22000		20500		23000		22200	
THALLIUM	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
VANADIUM	1.3	K	1.2	K	1.4	K	1.3	K	1.7	K	1.6	K	2.6	K	1.2	K
ZINC	5.8	B	0.7	U	1	B	0.85	B	1.1	B	2.7	B	6.1	B	12.3	B
FILTERED INORGANICS (UG/L)																
ALUMINUM	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	25.2	B	7.3	B
ANTIMONY	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.5	K	4.2	U	4.2	U
BARIUM	39.3		25.9		24.4		25.15		32.9		34.7		22.4	B	30.3	
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.22	K	0.17	K	0.1	U	0.11	K	0.3	K	0.16	K	0.1	U	0.1	U
CALCIUM	15800		13000		13200		13100		13700		15700		12200		13000	
CHROMIUM	0.73	B	1.1	B	9.7	K	5.125	K	0.8	B	0.78	B	0.87	B	1	B
COBALT	0.99	B	0.86	B	1.1	B	0.98	B	0.92	B	1	B	1.2	B	1.6	B
COPPER	4.3	B	1	B	2	B	1.5	B	1.5	B	2.8	B	3.9	B	6.4	B
IRON	19.5	B	21.7	B	136		73.425		133		14.5	B	35.2	B	28.5	B
LEAD	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.6	B	1.2	U	1.2	U
MAGNESIUM	8450		8430		8470		8450		7790		8780		8090		8480	
MANGANESE	2.3	B	1.6	B	2	B	1.8	B	3.4	B	1	B	2	B	1.8	B
MERCURY	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.13	U	0.14	U
NICKEL	3.3	B	2.6	B	16.2	K	8.75	K	3	B	3.9	B	2.7	B	3.6	B

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005		MTC006	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38		329298.47	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46		1259041.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 2	
SAMPLE ID	MTCSW00101 / MTCSW00101-F		MTCSW00201 / MTCSW00201-F		MTCSW00201-D / MTCSW00201-F-D		MTCSW00201-AVG / MTCSW00201-F-AVG		MTCSW00301 / MTCSW00301-F		MTCSW00401 / MTCSW00401-F		MTCSW00501 / MTCSW00501-F		MTCSW00601 / MTCSW00601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL
POTASSIUM	3700		3660		3610		3635		3730		3980		3490		3270	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.6	UL	0.6	UL	1.4	B	1	B	0.6	UL	0.6	UL	0.63	B	1.1	B
SODIUM	20200		21900		22000		21950		20600		21000		22000		22000	
THALLIUM	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
VANADIUM	1.2	K	1	K	0.81	K	0.905	K	1.3	K	0.98	K	1.5	K	1.4	K
ZINC	11.7	B	5.3	B	13.5	B	9.4	B	5.8	B	8.7	B	19.4	B	24.4	B
PESTICIDES/PCBS (UG/L)																
4,4'-DDD	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDT	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ALDRIN	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
AROCLOR-1016	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1221	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
AROCLOR-1232	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1242	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1248	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1254	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1260	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
BETA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DELTA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DIELDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN I	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ENDOSULFAN II	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN SULFATE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN ALDEHYDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN KETONE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
GAMMA-BHC (LINDANE)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
GAMMA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR EPOXIDE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
METHOXYCHLOR	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
TOXAPHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
EXPLOSIVES (UG/L)																
1,3,5-TRINITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
1,3-DINITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,4,6-TRINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,4-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2-AMINO-4,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
3-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
4-AMINO-2,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
4-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
HMX	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005		MTC006	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38		329298.47	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46		1259041.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 2	
SAMPLE ID	MTCSW00101 / MTCSW00101-F		MTCSW00201 / MTCSW00201-F		MTCSW00201-D / MTCSW00201-F-D		MTCSW00201-AVG / MTCSW00201-F-AVG		MTCSW00301 / MTCSW00301-F		MTCSW00401 / MTCSW00401-F		MTCSW00501 / MTCSW00501-F		MTCSW00601 / MTCSW00601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL
NITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
NITROCELLULOSE	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ
NITROGLYCERIN	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ
NITROGUANIDINE	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ
RDX	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
TETRYL	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
MISCELLANEOUS PARAMETERS																
CHLORIDE (MG/L)	36.4		37.3		35.7		36.5		35.6		36.6		38.7		39.1	
FLUORIDE (MG/L)	0.19		0.2		0.19		0.195		0.2		0.2		0.2		0.19	
HARDNESS (MG/L)	75		67		68		67.5		72		73		66		69	
NITRATE (MG/L)	0.077	J	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.076	J	0.05	UJ	0.05	UJ
NITRITE (MG/L)	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
PERCHLORATE (UG/L)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PH (S.U.)	8.8	J	9	J	9	J	9	J	9.1	J	8.2	J	8.9	J	9.6	J
SULFATE (MG/L)	31.5		29.8		28.5		29.15		28.6		31.5		30.3		30.6	
TOTAL DISSOLVED SOLIDS (MG/L)	160		150		140		145		170		510		150		160	
TOTAL ORGANIC CARBON (MG/L)	7		6				6		7		8		6		6	
TOTAL SUSPENDED SOLIDS (MG/L)	10	U	10	U	11		8		10	U	11		48		10	U
FIELD PARAMETERS																
DISSOLVED OXYGEN (MG/L)	13.87		13.76						10.94		9.9		12.11		14.72	
PH (S.U.)	9.31		9.44						9.16		7.32		9.97		11.17	
SALINITY (%)	0		0						0		0		0		0	
SPECIFIC CONDUCTANCE (MS/CM)	0.259		0.257						0.256		0.259		0.252		0.269	
TEMPERATURE (C)	26.81		27.2						28.19		26.06		28.4		28.3	

APPENDIX B-1.1

SURFACE WATER DATA - TINUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC007		MTC008		MTC009		MTC010		MTC011		MTC012		MTC012		MTC012	
NORTHING	329016.99		330390.01		330505.76		331849.97		330868.23		330879.62		330879.62		330879.62	
EASTING	1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38		1260918.38		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSW00701 / MTCSW00701-F		MTCSW00801 / MTCSW00801-F		MTCSW00901 / MTCSW00901-F		MTCSW01001 / MTCSW01001-F		MTCSW01101 / MTCSW01101-F		MTCSW01201 / MTCSW01201-F		MTCSW01201-D / MTCSW01201-F-D		MTCSW01201-AVG / MTCSW01201-F-AVG	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	9/8/2001		9/8/2001		9/8/2001		9/8/2001		9/8/2001		9/8/2001		9/8/2001		9/8/2001	
VOLATILE ORGANICS (UG/L)																
1,1,1-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-TETRACHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-TRICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR
1,2-DIBROMOETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROPROPANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,4-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-BUTANONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
2-HEXANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYL-2-PENTANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACETONE	5	UR	5	J	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
BENZENE	1	U	1		1	U	8		1		1	U	1	U	1	U
BROMOCHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMODICHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON DISULFIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON TETRACHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLORODIBROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
DIETHYL ETHER	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ
ETHYLBENZENE	1	U	0.8	J	1	U	7		1		1	U	1	U	1	U
METHYLENE CHLORIDE	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
STYRENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TETRACHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TOLUENE	1	U	5		1	U	23		6		1	U	1	U	1	U
TOTAL XYLENES	1	U	6		1	U	48		7		1	U	1	U	1	U
TRANS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRANS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
VINYL CHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SEMIVOLATILE ORGANICS (UG/L)																
2,2'-OXYBIS(1-CHLOROPROPANE)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4,5-TRICHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2,4,6-TRICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC007		MTC008		MTC009		MTC010		MTC011		MTC012		MTC012		MTC012	
NORTHING	329016.99		330390.01		330505.76		331849.97		330868.23		330879.62		330879.62		330879.62	
EASTING	1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38		1260918.38		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSW00701 / MTCSW00701-F		MTCSW00801 / MTCSW00801-F		MTCSW00901 / MTCSW00901-F		MTCSW01001 / MTCSW01001-F		MTCSW01101 / MTCSW01101-F		MTCSW01201 / MTCSW01201-F		MTCSW01201-D / MTCSW01201-F-D		MTCSW01201-AVG / MTCSW01201-F-AVG	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL
2,4-DIMETHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DINITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-CHLORONAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-CHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-METHYLNAPHTHALENE	5	U	5	U	5	U	2	J	5	U	5	U	5	U	5	U
2-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-NITROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
3,3'-DICHLOROBENZIDINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
3-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4,6-DINITRO-2-METHYLPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-BROMOPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLORO-3-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROANILINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-NITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
ACENAPHTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACENAPHTHYLENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(A)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(A)PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(B)FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(G,H,I)PERYLENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(K)FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHOXY)METHANE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHYL)ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-ETHYLHEXYL)PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BUTYL BENZYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
CHRYSENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DI-N-BUTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DI-N-OCTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIBENZO(A,H)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIBENZOFURAN	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIMETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
FLUORENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROBUTADIENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROCYCLOPENTADIENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
INDENO(1,2,3-CD)PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ISOPHORONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
LOW MOLECULAR WEIGHT PAHS							4									
N-NITROSO-DI-N-PROPYLAMINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
N-NITROSODIPHENYLAMINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TINUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC007		MTC008		MTC009		MTC010		MTC011		MTC012		MTC012		MTC012	
NORTHING	329016.99		330390.01		330505.76		331849.97		330868.23		330879.62		330879.62		330879.62	
EASTING	1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38		1260918.38		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSW00701 / MTCSW00701-F		MTCSW00801 / MTCSW00801-F		MTCSW00901 / MTCSW00901-F		MTCSW01001 / MTCSW01001-F		MTCSW01101 / MTCSW01101-F		MTCSW01201 / MTCSW01201-F		MTCSW01201-D / MTCSW01201-F-D		MTCSW01201-AVG / MTCSW01201-F-AVG	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL
NAPHTHALENE	5	U	5	U	5	U	2	J	5	U	5	U	5	U	5	U
PENTACHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
PHENANTHRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
TOTAL PAHS							4									
INORGANICS (UG/L)																
ALUMINUM	125		22.1	B	24.2	B	97.1	B	181		111	B	102	B	106.5	B
ANTIMONY	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	4.2	U	4.2	U	5.1	K	5.6	K	4.2	U	4.2	U	6.9	K	4.5	K
BARIUM	29.8		23.9		25.3		22.2		27.6		27		30.3		28.65	
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CALCIUM	12500		12400		12500		9970		12900		12200		12400		12300	
CHROMIUM	0.71	B	0.43	B	0.4	U	0.82	B	0.91	B	0.65	B	0.82	B	0.735	B
COBALT	1.1	B	0.83	B	1.1	B	0.87	B	1.2	B	1	B	1	B	1	B
COPPER	2.4	B	1.1	B	3.1	B	3	B	5.8	B	2.3	B	2.4	B	2.35	B
CYANIDE	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
IRON	224		128		84.8		352		240		184		176		180	
LEAD	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
MAGNESIUM	8460		9010		8810		7860		8690		8430		8550		8490	
MANGANESE	58.2		46.2		15.5	K	82		51.2		39.6		37.2		38.4	
MERCURY	0.13	U	0.13	U	0.13	U	0.14	U	0.14	U	0.13	U	0.14	U	0.135	U
NICKEL	2.9	B	2.3	B	2.6	B	2.3	B	2.8	B	2.4	B	2.5	B	2.45	B
POTASSIUM	4030		3440		3370		3680		3650		3500		3610		3555	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL
SODIUM	23500		24600		25200		27100		22800		23000		23400		23200	
THALLIUM	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
VANADIUM	1.7	K	1	K	1.1	K	0.82	K	1.2	K	0.95	K	0.85	K	0.9	K
ZINC	5.2	B	1.4	B	7.8	B	3.2	B	8.1	B	4.5	B	3.6	B	4.05	B
FILTERED INORGANICS (UG/L)																
ALUMINUM	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U	4.6	U
ANTIMONY	2.4	U	3.1	B	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	4.2	U	4.2	U	4.8	K	4.2	U	4.2	U	5.4	K	4.2	U	3.75	K
BARIUM	31.5		29		24.8		24.3		30.6		26.1		27.6		26.85	
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.68	K	0.365	K
CALCIUM	11800		12000		12000		9740		12900		11800		12100		11950	
CHROMIUM	0.48	B	0.64	B	0.76	B	0.8	B	1.2	B	0.5	B	1.4	B	0.95	B
COBALT	1.1	B	1.1	B	0.99	B	0.87	B	0.89	B	0.87	B	0.87	B	0.87	B
COPPER	2.6	B	2	B	1.6	B	1.2	B	2.2	B	1.4	B	2.3	B	1.85	B
IRON	12.8	B	39.1	B	33.6	B	80.7		23.4	B	26.5	B	27.2	B	26.85	B
LEAD	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
MAGNESIUM	7820		8740		8560		7640		8560		8270		8430		8350	
MANGANESE	0.81	B	4.9	B	3.2	B	6	K	0.87	B	0.98	B	1.9	B	1.44	B
MERCURY	0.14	U	0.15	U	0.15	U	0.14	U	0.14	U	0.14	U	0.14	U	0.14	U
NICKEL	2.8	B	2.1	B	2.4	B	2.3	B	2.5	B	2.5	B	2.7	B	2.6	B

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC007		MTC008		MTC009		MTC010		MTC011		MTC012		MTC012		MTC012	
NORTHING	329016.99		330390.01		330505.76		331849.97		330868.23		330879.62		330879.62		330879.62	
EASTING	1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38		1260918.38		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSW00701 / MTCSW00701-F		MTCSW00801 / MTCSW00801-F		MTCSW00901 / MTCSW00901-F		MTCSW01001 / MTCSW01001-F		MTCSW01101 / MTCSW01101-F		MTCSW01201 / MTCSW01201-F		MTCSW01201-D / MTCSW01201-F-D		MTCSW01201-AVG / MTCSW01201-F-AVG	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL
POTASSIUM	3700		3350		3210		3360		3560		3320		3480		3400	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.92	B	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL
SODIUM	23000		24200		24800		26500		22700		22700		23200		22950	
THALLIUM	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
VANADIUM	1.6	K	0.94	K	1	K	0.75	K	0.62	K	0.55	K	0.73	K	0.64	K
ZINC	16.7	B	14.4	B	12.6	B	8.5	B	8.5	B	12.1	B	11.6	B	11.85	B
PESTICIDES/PCBS (UG/L)																
4,4'-DDD	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDT	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ALDRIN	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
AROCLOR-1016	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1221	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
AROCLOR-1232	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1242	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1248	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1254	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1260	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
BETA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DELTA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DIELDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN I	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ENDOSULFAN II	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN SULFATE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN ALDEHYDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN KETONE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
GAMMA-BHC (LINDANE)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
GAMMA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR EPOXIDE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
METHOXYCHLOR	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
TOXAPHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
EXPLOSIVES (UG/L)																
1,3,5-TRINITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
1,3-DINITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,4,6-TRINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,4-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2-AMINO-4,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
3-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
4-AMINO-2,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
4-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
HMX	0.1	UJ	0.1	UJ	0.1	UJ	0.15	J	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC007		MTC008		MTC009		MTC010		MTC011		MTC012		MTC012		MTC012	
NORTHING	329016.99		330390.01		330505.76		331849.97		330868.23		330879.62		330879.62		330879.62	
EASTING	1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38		1260918.38		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSW00701 / MTCSW00701-F		MTCSW00801 / MTCSW00801-F		MTCSW00901 / MTCSW00901-F		MTCSW01001 / MTCSW01001-F		MTCSW01101 / MTCSW01101-F		MTCSW01201 / MTCSW01201-F		MTCSW01201-D / MTCSW01201-F-D		MTCSW01201-AVG / MTCSW01201-F-AVG	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	9/8/2001		9/8/2001		9/8/2001		9/8/2001		9/8/2001		9/8/2001		9/8/2001		9/8/2001	
NITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
NITROCELLULOSE	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ
NITROGLYCERIN	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ
NITROGUANIDINE	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ
RDX	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
TETRYL	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
MISCELLANEOUS PARAMETERS																
CHLORIDE (MG/L)	38.7		43.5		43.3		44.2		39.3		42.9		40		41.45	
FLUORIDE (MG/L)	0.2		0.19		0.2		0.19		0.18		0.19		0.19		0.19	
HARDNESS (MG/L)	66		67		67		58		68		65		65		65	
NITRATE (MG/L)	0.05	UJ	0.09	J	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
NITRITE (MG/L)	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
PERCHLORATE (UG/L)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PH (S.U.)	9.9	J	9.7	J	9.7	J	9	J	8.4	J	8.6	J	9.3	J	8.95	J
SULFATE (MG/L)	28.9		30.4		28.2		23.8		30.3		32.2		30.1		31.15	
TOTAL DISSOLVED SOLIDS (MG/L)	170		160		150		140		160		140		140		140	
TOTAL ORGANIC CARBON (MG/L)	6		6		11		8		8		7		7		7	
TOTAL SUSPENDED SOLIDS (MG/L)	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
FIELD PARAMETERS																
DISSOLVED OXYGEN (MG/L)	14.15		11.63		13.01		12.83		10.68		10.3					
PH (S.U.)	11.47		10.92		11.04		10.74		9.57		7					
SALINITY (%)	0		0		0		0		0		0					
SPECIFIC CONDUCTANCE (MS/CM)	0.305		0.274		0.275		0.261		0.254		0.254					
TEMPERATURE (C)	31		27		27.12		26.86		26.35		24.77					

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC013		MTC014		MTC015		MTC016		MTC017		MTC018		MTC019		MTC020	
NORTHING	330304.28		331387.89		332415.51		332464.04		333712.68		333940.86		333623.25		333717.68	
EASTING	1261707.03		1261625.22		1262267.1		1262770.26		1263026.98		1263462.35		1264439.07		1264638.88	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 3		AREA 3		AREA 3		AREA 3		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	MTCSW01301 / MTCSW01301-F		MTCSW01401 / MTCSW01401-F		MTCSW01501 / MTCSW01501-F		MTCSW01601 / MTCSW01601-F		MTCSW01701 / MTCSW01701-F		MTCSW01801 / MTCSW01801-F		MTCSW01901 / MTCSW01901-F		MTCSW02001 / MTCSW02001-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL
VOLATILE ORGANICS (UG/L)																
1,1,1-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-TETRACHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-TRICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR
1,2-DIBROMOETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROPROPANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,4-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-BUTANONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
2-HEXANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYL-2-PENTANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACETONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
BENZENE	1	U	1	U	5		1	U	1	U	1	U	1	U	1	U
BROMOCHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMODICHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON DISULFIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON TETRACHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLORODIBROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
DIETHYL ETHER	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ
ETHYLBENZENE	1	U	1	U	6		1	U	1	U	1	U	1	U	1	U
METHYLENE CHLORIDE	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
STYRENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TETRACHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TOLUENE	1	U	1	U	30		1	U	1	U	0.6	J	1	U	1	U
TOTAL XYLENES	1	U	1	U	40		1	U	1	U	1	U	1	U	1	U
TRANS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRANS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
VINYL CHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SEMIVOLATILE ORGANICS (UG/L)																
2,2'-OXYBIS(1-CHLOROPROPANE)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4,5-TRICHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2,4,6-TRICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC013		MTC014		MTC015		MTC016		MTC017		MTC018		MTC019		MTC020	
NORTHING	330304.28		331387.89		332415.51		332464.04		333712.68		333940.86		333623.25		333717.68	
EASTING	1261707.03		1261625.22		1262267.1		1262770.26		1263026.98		1263462.35		1264439.07		1264638.88	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 3		AREA 3		AREA 3		AREA 3		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	MTCSW01301 / MTCSW01301-F		MTCSW01401 / MTCSW01401-F		MTCSW01501 / MTCSW01501-F		MTCSW01601 / MTCSW01601-F		MTCSW01701 / MTCSW01701-F		MTCSW01801 / MTCSW01801-F		MTCSW01901 / MTCSW01901-F		MTCSW02001 / MTCSW02001-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL
2,4-DIMETHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DINITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-CHLORONAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-CHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-METHYLNAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-NITROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
3,3'-DICHLOROBENZIDINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
3-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4,6-DINITRO-2-METHYLPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-BROMOPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLORO-3-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROANILINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-NITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
ACENAPHTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACENAPHTHYLENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(A)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(A)PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(B)FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(G,H,I)PERYLENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(K)FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHOXY)METHANE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHYL)ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-ETHYLHEXYL)PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BUTYL BENZYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
CHRYSENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DI-N-BUTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DI-N-OCTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIBENZO(A,H)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIBENZOFURAN	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIMETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
FLUORENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROBUTADIENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROCYCLOPENTADIENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
INDENO(1,2,3-CD)PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ISOPHORONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
LOW MOLECULAR WEIGHT PAHS																
N-NITROSO-DI-N-PROPYLAMINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
N-NITROSODIPHENYLAMINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC013		MTC014		MTC015		MTC016		MTC017		MTC018		MTC019		MTC020	
NORTHING	330304.28		331387.89		332415.51		332464.04		333712.68		333940.86		333623.25		333717.68	
EASTING	1261707.03		1261625.22		1262267.1		1262770.26		1263026.98		1263462.35		1264439.07		1264638.88	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 3		AREA 3		AREA 3		AREA 3		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	MTCSW01301 / MTCSW01301-F		MTCSW01401 / MTCSW01401-F		MTCSW01501 / MTCSW01501-F		MTCSW01601 / MTCSW01601-F		MTCSW01701 / MTCSW01701-F		MTCSW01801 / MTCSW01801-F		MTCSW01901 / MTCSW01901-F		MTCSW02001 / MTCSW02001-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL
NAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PENTACHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
PHENANTHRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
TOTAL PAHS																
INORGANICS (UG/L)																
ALUMINUM	47.1	B	56.8	B	36.5	B	88.5	B	104	B	95.8	B	204		215	
ANTIMONY	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	K
BARIUM	28.2		25.7		28.6		26.1		31.4		28.7		29		29.9	
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.1	U	0.1	U	0.11	K	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CALCIUM	11300		12500		11300		11700		13300		13000		12900		12600	
CHROMIUM	0.56	B	1.1	B	0.91	B	0.8	B	0.62	B	0.82	B	0.95	B	0.89	B
COBALT	1.2	B	0.78	B	0.96	B	1	B	1.1	B	0.86	B	1.2	B	1.2	B
COPPER	6.7	B	1.5	B	3.6	B	2.6	B	1.9	B	1.5	B	2.3	B	1.8	B
CYANIDE	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
IRON	220		125		214		184		218		206		296		339	
LEAD	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
MAGNESIUM	8640		8420		8420		8200		8790		8670		8580		8670	
MANGANESE	29.7	K	30.1		59.7		37		44.5		46.1		45.7		53.5	
MERCURY	0.14	U	0.14	U	0.14	U	0.14	U	0.13	U	0.14	U	0.14	U	0.14	U
NICKEL	2.8	B	2.9	B	2.6	B	2.4	B	2.5	B	2.6	B	2.9	B	2.9	B
POTASSIUM	3690	K	3620	K	3330	K	3530	K	3800	K	3740	K	3600	K	3600	K
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL
SODIUM	19000		18500		18800		17800		18400		17800		17900		18400	
THALLIUM	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UJ
VANADIUM	0.87		1.1		0.91		1.1		1.2		0.88		1.1		1.5	
ZINC	15.4	B	8.8	B	11.7	B	8.9	B	7.6	B	6.6	B	9.6	B	11.8	B
FILTERED INORGANICS (UG/L)																
ALUMINUM	12.1	B	19.3	B	11.3	B	5.9	B	4.6	U	4.6	U	9.3	B	22.2	B
ANTIMONY	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U
BARIUM	21.7		23.8		27.8		24.7		26		27.2		62.3		30.5	
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.57	K	0.1	U	1.1	K	0.91	K	1.4	K	0.1	U	0.48	K	1	K
CALCIUM	10000		12100		11000		11800		12100		12500		12900		12900	
CHROMIUM	0.7	B	0.46	B	1.3	B	0.78	B	0.81	B	0.71	B	0.9	B	1.3	B
COBALT	0.47	B	0.58	B	0.82	B	0.64	B	0.6	B	0.61	B	0.94	B	0.98	B
COPPER	11.1	B	2.4	B	17.6	B	5	B	5	B	2.2	B	8.7	B	29.7	B
IRON	74.9	B	37.2	B	84.1		39.6	B	61.1	B	26.1	B	53.4	B	65.6	B
LEAD	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	2.5	K
MAGNESIUM	7450		8090		8130		8240		8130		8210		8600		8080	
MANGANESE	8.9	K	2.5	B	10.1	K	3.3	B	22.3	K	14	K	3.6	K	6.4	K
MERCURY	0.13	U	0.15	U	0.13	U	0.14	U	0.13	U	0.13	U	0.14	U	0.14	U
NICKEL	2.2	B	1.8	B	3.4	B	2.3	B	2.1	B	1.9	B	2.9	B	3.8	B

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC013		MTC014		MTC015		MTC016		MTC017		MTC018		MTC019		MTC020	
NORTHING	330304.28		331387.89		332415.51		332464.04		333712.68		333940.86		333623.25		333717.68	
EASTING	1261707.03		1261625.22		1262267.1		1262770.26		1263026.98		1263462.35		1264439.07		1264638.88	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 3		AREA 3		AREA 3		AREA 3		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	MTCSW01301 / MTCSW01301-F		MTCSW01401 / MTCSW01401-F		MTCSW01501 / MTCSW01501-F		MTCSW01601 / MTCSW01601-F		MTCSW01701 / MTCSW01701-F		MTCSW01801 / MTCSW01801-F		MTCSW01901 / MTCSW01901-F		MTCSW02001 / MTCSW02001-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL	9/7/2001	QUAL
POTASSIUM	3790		3540		3360		3540		3560		3630		3710		3660	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL
SODIUM	16400		17700		18600		17900		17600		17100		18400		18300	
THALLIUM	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL
VANADIUM	0.58		0.84		0.63		0.56		0.55		0.7		0.66		0.93	
ZINC	11	B	12.7	B	16.7	B	8.3	B	9.2	B	6.6	B	28	B	19.8	B
PESTICIDES/PCBS (UG/L)																
4,4'-DDD	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDT	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ALDRIN	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
AROCLOR-1016	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1221	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
AROCLOR-1232	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1242	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1248	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1254	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1260	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
BETA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DELTA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DIELDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN I	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ENDOSULFAN II	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN SULFATE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN ALDEHYDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN KETONE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
GAMMA-BHC (LINDANE)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
GAMMA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR EPOXIDE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
METHOXYCHLOR	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
TOXAPHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
EXPLOSIVES (UG/L)																
1,3,5-TRINITROBENZENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U
1,3-DINITROBENZENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U
2,4,6-TRINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U
2,4-DINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U
2,6-DINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U
2-AMINO-4,6-DINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U
2-NITROTOLUENE	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.56	U
3-NITROTOLUENE	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.56	U
4-AMINO-2,6-DINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U
4-NITROTOLUENE	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.56	U
HMX	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC013		MTC014		MTC015		MTC016		MTC017		MTC018		MTC019		MTC020	
NORTHING	330304.28		331387.89		332415.51		332464.04		333712.68		333940.86		333623.25		333717.68	
EASTING	1261707.03		1261625.22		1262267.1		1262770.26		1263026.98		1263462.35		1264439.07		1264638.88	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 3		AREA 3		AREA 3		AREA 3		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	MTCSW01301 / MTCSW01301-F		MTCSW01401 / MTCSW01401-F		MTCSW01501 / MTCSW01501-F		MTCSW01601 / MTCSW01601-F		MTCSW01701 / MTCSW01701-F		MTCSW01801 / MTCSW01801-F		MTCSW01901 / MTCSW01901-F		MTCSW02001 / MTCSW02001-F	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	9/7/2001		9/7/2001		9/7/2001		9/7/2001		9/7/2001		9/7/2001		9/7/2001		9/7/2001	
NITROBENZENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U
NITROCELLULOSE	500	U	500	U	500	U	500	U	500	U	500	U	500	U	500	U
NITROGLYCERIN	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.72	U
NITROGUANIDINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
RDX	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
TETRYL	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
MISCELLANEOUS PARAMETERS																
CHLORIDE (MG/L)	42.6		40.3		42.7		40.3		36.1		39.6		39		40	
FLUORIDE (MG/L)	0.31		0.31		0.29		0.29		0.3		0.28		0.28		0.28	
HARDNESS (MG/L)	63		66		61	U	63		69		54		54		67	
NITRATE (MG/L)	0.047	J	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UR
NITRITE (MG/L)	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.25	UJ	0.05	UR
PERCHLORATE (UG/L)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PH (S.U.)	9	J	9.5	J	9	J	7.5	J	7.4	J	7.4	J	6.8	J	7.2	J
SULFATE (MG/L)	29.1		29		29.4		29.7		27.7		30.6		30		30.1	
TOTAL DISSOLVED SOLIDS (MG/L)	150		160				110		150		140		140		110	
TOTAL ORGANIC CARBON (MG/L)	7		6				7		7		7		8		7	
TOTAL SUSPENDED SOLIDS (MG/L)	10	U	10	U			10	U	10	U	10	U	10		11	
FIELD PARAMETERS																
DISSOLVED OXYGEN (MG/L)	8.52		12.53		11.36		10.62		14.14		11.91		8.88		9.75	
PH (S.U.)	10.39		10.45		9.84		9.02		8.33		8.91		7.53		7.67	
SALINITY (%)	0		0		0		0		0		0		0		0	
SPECIFIC CONDUCTANCE (MS/CM)	0.262		0.269		0.257		0.253		0.252		0.25		0.251		0.251	
TEMPERATURE (C)	27.03		30		27.95		26.97		26.87		26.28		25.83		25.8	

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC021		MTC022		MTC023		MTC023		MTC023		MTC024		MTC025		MTC026	
NORTHING	333790.95		334449.65		335186.55		335186.55		335186.55		335618.15		335895.61		336165.78	
EASTING	1264888.8		1265916.98		1265947.96		1265947.96		1265947.96		1266001.52		1265973.33		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSW02101 / MTCSW02101-F		MTCSW02201 / MTCSW02201-F		MTCSW02301 / MTCSW02301-F		MTCSW02301-D / MTCSW02301-F-D		MTCSW02301-AVG / MTCSW02301-F-AVG		MTCSW02401 / MTCSW02401-F		MTCSW02501 / MTCSW02501-F		MTCSW02601/ MTCSW02601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL
VOLATILE ORGANICS (UG/L)																
1,1,1-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-TETRACHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-TRICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR
1,2-DIBROMOETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROPROPANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,4-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-BUTANONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
2-HEXANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYL-2-PENTANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACETONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
BENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOCHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMODICHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON DISULFIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON TETRACHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLORODIBROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,2-DICHLOROETHENE	4		1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
DIETHYL ETHER	6	J	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	10	UJ
ETHYLBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
METHYLENE CHLORIDE	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
STYRENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TETRACHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TOLUENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	2	
TOTAL XYLENES	1	U	1	U	1	U	1	U	1	U	1	U	1	U	2	
TRANS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRANS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRICHLOROETHENE	6		1	U	1	U	1	U	1	U	1	U	1	U	1	U
VINYL CHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SEMIVOLATILE ORGANICS (UG/L)																
2,2'-OXYBIS(1-CHLOROPROPANE)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4,5-TRICHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2,4,6-TRICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC021		MTC022		MTC023		MTC023		MTC023		MTC024		MTC025		MTC026	
NORTHING	333790.95		334449.65		335186.55		335186.55		335186.55		335618.15		335895.61		336165.78	
EASTING	1264888.8		1265916.98		1265947.96		1265947.96		1265947.96		1266001.52		1265973.33		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSW02101 / MTCSW02101-F		MTCSW02201 / MTCSW02201-F		MTCSW02301 / MTCSW02301-F		MTCSW02301-D / MTCSW02301-F-D		MTCSW02301-AVG / MTCSW02301-F-AVG		MTCSW02401 / MTCSW02401-F		MTCSW02501 / MTCSW02501-F		MTCSW02601/ MTCSW02601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL
2,4-DIMETHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DINITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-CHLORONAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
2-CHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-METHYLNAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
2-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	UL	20	U	20	U
2-NITROPHENOL	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
3,3'-DICHLOROBENZIDINE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
3-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	UL	20	U	20	U
4,6-DINITRO-2-METHYLPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-BROMOPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
4-CHLORO-3-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROANILINE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
4-CHLOROPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
4-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	UL	20	U	20	U
4-NITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
ACENAPHTHENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
ACENAPHTHYLENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
BENZO(A)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
BENZO(A)PYRENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
BENZO(B)FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
BENZO(G,H,I)PERYLENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
BENZO(K)FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
BIS(2-CHLOROETHOXY)METHANE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
BIS(2-CHLOROETHYL)ETHER	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
BIS(2-ETHYLHEXYL)PHTHALATE	5	U	5	U	5	U	1	J	1	J	1	L	5	U	1	J
BUTYL BENZYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
CHRYSENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
DI-N-BUTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
DI-N-OCTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
DIBENZO(A,H)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
DIBENZOFURAN	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
DIETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
DIMETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
FLUORENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
HEXACHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
HEXACHLOROBUTADIENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
HEXACHLOROCYCLOPENTADIENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
HEXACHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
INDENO(1,2,3-CD)PYRENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
ISOPHORONE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
LOW MOLECULAR WEIGHT PAHS																
N-NITROSO-DI-N-PROPYLAMINE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
N-NITROSODIPHENYLAMINE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC021		MTC022		MTC023		MTC023		MTC023		MTC024		MTC025		MTC026	
NORTHING	333790.95		334449.65		335186.55		335186.55		335186.55		335618.15		335895.61		336165.78	
EASTING	1264888.8		1265916.98		1265947.96		1265947.96		1265947.96		1266001.52		1265973.33		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSW02101 / MTCSW02101-F		MTCSW02201 / MTCSW02201-F		MTCSW02301 / MTCSW02301-F		MTCSW02301-D / MTCSW02301-F-D		MTCSW02301-AVG / MTCSW02301-F-AVG		MTCSW02401 / MTCSW02401-F		MTCSW02501 / MTCSW02501-F		MTCSW02601/ MTCSW02601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL
NAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
PENTACHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
PHENANTHRENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
PHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PYRENE	5	U	5	U	5	U	5	U	5	U	5	UL	5	U	5	U
TOTAL PAHS																
INORGANICS (UG/L)																
ALUMINUM	200		161		158		298		228		84.4	B	312		227	
ANTIMONY	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	8.3	K	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U
BARIUM	42.7		28.9		25.8		25.8		25.8		28.6		31.9		30.5	
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.1	U	0.1	U	0.1	U	0.21	K	0.13	K	0.1	U	0.1	U	0.1	U
CALCIUM	18300		9980		9660		9490		9575		9810		10100		11500	
CHROMIUM	0.89	B	0.88	B	0.94	B	1.1	B	1.02	B	0.57	B	1.3	B	0.93	K
COBALT	1.6	B	1.3	B	1.4	B	1.2	B	1.3	B	1.4	B	2.3	B	1.2	B
COPPER	28.1	K	2.5	B	3.1	B	2.2	B	2.65	B	4.8	B	9.1	B	5.3	B
CYANIDE	4.4	B	3	U	3.2	B	3	U	3.1	U	3	U	3	U	10.3	B
IRON	522		401		384		460		422		322		632		324	
LEAD	1.3	K	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
MAGNESIUM	7080		7790		7750		7650		7700		7670		7890		8510	
MANGANESE	35.7		50.3		47.2		41.4		44.3		46.6		63.6		46.4	
MERCURY	0.13	U	0.14	U	0.15	U	0.14	U	0.145	U	0.14	U	0.13	U	0.15	U
NICKEL	8.2	B	4.2	B	2.8	B	3.9	B	3.35	B	2.9	B	4.1	B	3.3	B
POTASSIUM	4220	K	3190	K	3140	K	3170	K	3155	K	3140	K	3280	K	3280	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.64	B	0.83	B	1.3	B	0.66	B	0.98	B	1.1	B	1.7	B	0.6	UL
SODIUM	24900		20700		20500		19900		20200		20700		20300		24300	
THALLIUM	3.9	UJ	3.9	UJ	3.9	UJ	3.9	UJ	3.9	UJ	3.9	UJ	3.9	UJ	3.9	U
VANADIUM	7.4		1.3		1.4		1		1.2		1.1		1.7		1.2	B
ZINC	24	B	17.8	B	17.7	B	14.3	B	16	B	19.6	B	28	B	24.1	B
FILTERED INORGANICS (UG/L)																
ALUMINUM	81.4	B	4.6	U	4.6	U	11.5	B	8.05	B	8.7	B	4.6	U	23	B
ANTIMONY	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	4.9		4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U
BARIUM	55.8	K	24.7		20.8		22.4		21.6		28.8		26.1		79.1	B
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	2.5	K	0.66	K	0.26	K	0.14	K	0.2	K	5.9	K	6.5	K	0.41	B
CALCIUM	16300		9810		9170		9680		9425		10100		10100		11800	
CHROMIUM	1.7	B	0.66	B	0.78	B	0.57	B	0.675	B	0.84	B	0.75	B	0.58	B
COBALT	1.7	B	0.74	B	0.75	B	0.74	B	0.745	B	1.1	B	0.99	B	1.2	B
COPPER	69.1		2	B	5.5	B	3.7	B	4.6	B	16.8	B	3.6	B	20.3	B
IRON	227		50.1	B	58.5	B	73.8	B	66.15	B	77.7		72	B	46.9	B
LEAD	32		1.2	U	1.2	U	1.2	U	1.2	U	66.9		1.2	U	1.2	U
MAGNESIUM	6940		7490		7380		7580		7480		7440		7730		7950	
MANGANESE	26.4	K	2.3	B	3.3	B	33.6		17.625		3.7	K	22.5	K	11.6	B
MERCURY	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U	0.15	U
NICKEL	6.8	B	2.4	B	2.1	B	2.2	B	2.15	B	3.2	B	4.1	B	3.8	B

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC021		MTC022		MTC023		MTC023		MTC023		MTC024		MTC025		MTC026	
NORTHING	333790.95		334449.65		335186.55		335186.55		335186.55		335618.15		335895.61		336165.78	
EASTING	1264888.8		1265916.98		1265947.96		1265947.96		1265947.96		1266001.52		1265973.33		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSW02101 / MTCSW02101-F		MTCSW02201 / MTCSW02201-F		MTCSW02301 / MTCSW02301-F		MTCSW02301-D / MTCSW02301-F-D		MTCSW02301-AVG / MTCSW02301-F-AVG		MTCSW02401 / MTCSW02401-F		MTCSW02501 / MTCSW02501-F		MTCSW02601/ MTCSW02601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL
POTASSIUM	3980		3190	K	3050	K	3150		3100		3140		3220	K	3350	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL
SODIUM	22600		20000		19500		19400		19450		20100		20200		24000	
THALLIUM	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	UL	3.9	U
VANADIUM	3.4		0.61		0.48		0.57		0.525		0.51		0.4	U	0.77	B
ZINC	56.5	B	11.7	B	11.9	B	10.6	B	11.25	B	24.1	B	14.1	B	119	B
PESTICIDES/PCBS (UG/L)																
4,4'-DDD	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDT	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ALDRIN	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
AROCLOR-1016	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1221	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
AROCLOR-1232	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1242	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1248	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1254	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1260	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
BETA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DELTA-BHC	0.01	U	0.01	U	0.02	U	0.01	U	0.015	U	0.01	U	0.01	U	0.01	U
DIELDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN I	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ENDOSULFAN II	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN SULFATE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN ALDEHYDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN KETONE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
GAMMA-BHC (LINDANE)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
GAMMA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR EPOXIDE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
METHOXYCHLOR	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.1	U
TOXAPHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
EXPLOSIVES (UG/L)																
1,3,5-TRINITROBENZENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
1,3-DINITROBENZENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
2,4,6-TRINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
2,4-DINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
2,6-DINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
2-AMINO-4,6-DINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
2-NITROTOLUENE	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ
3-NITROTOLUENE	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ
4-AMINO-2,6-DINITROTOLUENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
4-NITROTOLUENE	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ
HMX	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC021		MTC022		MTC023		MTC023		MTC023		MTC024		MTC025		MTC026	
NORTHING	333790.95		334449.65		335186.55		335186.55		335186.55		335618.15		335895.61		336165.78	
EASTING	1264888.8		1265916.98		1265947.96		1265947.96		1265947.96		1266001.52		1265973.33		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSW02101 / MTCSW02101-F		MTCSW02201 / MTCSW02201-F		MTCSW02301 / MTCSW02301-F		MTCSW02301-D / MTCSW02301-F-D		MTCSW02301-AVG / MTCSW02301-F-AVG		MTCSW02401 / MTCSW02401-F		MTCSW02501 / MTCSW02501-F		MTCSW02601/ MTCSW02601-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/7/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL
NITROBENZENE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
NITROCELLULOSE	500	U	500	U	500	U	500	U	500	U	500	U	500	U	500	UJ
NITROGLYCERIN	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	U	0.65	UJ
NITROGUANIDINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	UJ
RDX	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
TETRYL	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
MISCELLANEOUS PARAMETERS																
CHLORIDE (MG/L)	30.5		43.5		44.5		44.2		44.35		43.5		43.2		41.5	
FLUORIDE (MG/L)	0.31		0.3		0.31		0.31		0.31		0.3		0.28		0.18	
HARDNESS (MG/L)	74		57		56		55		55.5		56		58		64	
NITRATE (MG/L)	0.19	J	0.05	UR	0.05	UR	0.05	UR	0.05	UR	0.05	UR	0.05	UR	0.05	UJ
NITRITE (MG/L)	0.05	UJ	0.05	UR	0.05	UR	0.05	UR	0.05	UR	0.05	UR	0.05	UR	0.05	UJ
PERCHLORATE (UG/L)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PH (S.U.)	7	J	7.1	J	7.2	J	6.7	J	6.95	J	7.1	J	6.9	J	7.5	J
SULFATE (MG/L)	30.2		28.1		28.6		28.4		28.5		28.4		29.1		28.9	
TOTAL DISSOLVED SOLIDS (MG/L)	170		150		140		140		140		140		150		170	
TOTAL ORGANIC CARBON (MG/L)	9		7		7		9		8		7		7		7	
TOTAL SUSPENDED SOLIDS (MG/L)	47		10	U	14		13		13.5		10	U	12		23	
FIELD PARAMETERS																
DISSOLVED OXYGEN (MG/L)	8.07		17.2		13.92						14.11		11.95		26.41	
PH (S.U.)	5.43		8.54		9.0299						7.95		6.78		7.06	
SALINITY (%)	0		0		0						0		0		0	
SPECIFIC CONDUCTANCE (MS/CM)	0.284		0.232		0.232						0.232		0.227		0.236	
TEMPERATURE (C)	25.67		27.43		27.14						26.9		27.27		11.4	

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC026		MTC026		MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
NORTHING	336165.78		336165.78		335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1266131.04		1266131.04		1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSW02601-D / MTCSW02601-F-D		MTCSW02601-AVG / MTCSW02601-F-AVG		MTCSW02701 / MTCSW02701-F		MTCSW02801 / MTCSW02801-F		MTCSW02901 / MTCSW02901-F		MTCSW03001 / MTCSW03001-F		NJCSW00101 / NJCSW00101-F		NJCSW00201 / NJCSW00201-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/5/2001	QUAL	9/5/2001	QUAL
VOLATILE ORGANICS (UG/L)																
1,1,1-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-TETRACHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-TRICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DIBROMO-3-CHLOROPROPANE	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR	1	UR
1,2-DIBROMOETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROPROPANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,4-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-BUTANONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
2-HEXANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYL-2-PENTANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACETONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
BENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOCHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMODICHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON DISULFIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON TETRACHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLORODIBROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
DIETHYL ETHER	10	UJ	10	UJ	10	UJ	10	UJ	1	UJ	1	UJ	10	UJ	10	UJ
ETHYLBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
METHYLENE CHLORIDE	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
STYRENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TETRACHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TOLUENE	1	U	1.25		1	U	1	U	1	U	1	U	1	U	1	U
TOTAL XYLENES	1	U	1.25		1	U	1	U	1	U	1	U	1	U	1	U
TRANS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRANS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
VINYL CHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SEMIVOLATILE ORGANICS (UG/L)																
2,2'-OXYBIS(1-CHLOROPROPANE)	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4,5-TRICHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2,4,6-TRICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DICHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC026		MTC026		MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
NORTHING	336165.78		336165.78		335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1266131.04		1266131.04		1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSW02601-D / MTCSW02601-F-D		MTCSW02601-AVG / MTCSW02601-F-AVG		MTCSW02701 / MTCSW02701-F		MTCSW02801 / MTCSW02801-F		MTCSW02901 / MTCSW02901-F		MTCSW03001 / MTCSW03001-F		NJCSW00101 / NJCSW00101-F		NJCSW00201 / NJCSW00201-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/5/2001	QUAL	9/5/2001	QUAL
2,4-DIMETHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2,4-DINITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-CHLORONAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-CHLOROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-METHYLNAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
2-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
2-NITROPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
3,3'-DICHLOROBENZIDINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
3-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4,6-DINITRO-2-METHYLPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-BROMOPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLORO-3-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROANILINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-CHLOROPHENYL PHENYL ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYLPHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-NITROANILINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
4-NITROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
ACENAPHTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACENAPHTHYLENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(A)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(A)PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(B)FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(G,H,I)PERYLENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BENZO(K)FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHOXY)METHANE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHYL)ETHER	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
BIS(2-ETHYLHEXYL)PHTHALATE	5	U	1	J	5	U	5	U	5	U	5	U	5	U	5	U
BUTYL BENZYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
CHRYSENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DI-N-BUTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DI-N-OCTYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIBENZO(A,H)ANTHRACENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIBENZOFURAN	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
DIMETHYL PHTHALATE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
FLUORANTHENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
FLUORENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROBUTADIENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROCYCLOPENTADIENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
HEXACHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
INDENO(1,2,3-CD)PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ISOPHORONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
LOW MOLECULAR WEIGHT PAHS																
N-NITROSO-DI-N-PROPYLAMINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
N-NITROSODIPHENYLAMINE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC026		MTC026		MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
NORTHING	336165.78		336165.78		335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1266131.04		1266131.04		1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSW02601-D / MTCSW02601-F-D		MTCSW02601-AVG / MTCSW02601-F-AVG		MTCSW02701 / MTCSW02701-F		MTCSW02801 / MTCSW02801-F		MTCSW02901 / MTCSW02901-F		MTCSW03001 / MTCSW03001-F		NJCSW00101 / NJCSW00101-F		NJCSW00201 / NJCSW00201-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/5/2001	QUAL	9/5/2001	QUAL
NAPHTHALENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PENTACHLOROPHENOL	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
PHENANTHRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PHENOL	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
PYRENE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
TOTAL PAHS																
INORGANICS (UG/L)																
ALUMINUM	70.9	B	131.225		253		255		24.3	B	4.6	U	587		440	
ANTIMONY	3.1	B	2.75	B	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
ARSENIC	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.4	K	4.2	U	4.2	U
BARIUM	28.6		29.55		35.4		30.8		21.5		23.1		57		55.6	
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.17	K	0.1	U
CALCIUM	10900		11200		10300		10300		13600		10000		50300		40500	
CHROMIUM	0.57	K	0.75	K	1.1	K	0.59	K	0.6	B	0.71	B	1.8	K	1.4	K
COBALT	1.2	B	1.2	B	1.3	B	1.2	B	0.98	B	0.64	B	1.7	B	2.3	B
COPPER	5.2	B	5.25	B	1.7	B	1.2	B	1.7	B	1.9	B	2.7	B	3.3	B
CYANIDE	9.7	B	10	B	9.9	B	6.1	B	3	U	4		10.2	B	36.8	
IRON	197		260.5		410		404		193		102		577		512	
LEAD	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
MAGNESIUM	8120		8315		8190		8130		8810		6900		153000		132000	
MANGANESE	39.1		42.75		50		49.4		27.5	K	9.3	K	353		1190	
MERCURY	0.14	U	0.145	U	0.13	U	0.14	U	0.14	U	0.13	U	0.14	U	0.14	U
NICKEL	3.2	B	3.25	B	3.2	B	3.1	B	2.3	B	2	B	3.7	B	4.1	B
POTASSIUM	3120		3200		3530		3300		3600		3010		64400		52700	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL
SODIUM	22800		23550		25200		25000		23300		17800		1230000		1040000	
THALLIUM	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
VANADIUM	0.99	B	1.095	B	1.3	B	0.93	B	1.4	K	0.73	K	1.8	B	2.2	B
ZINC	23	B	23.55	B	11.9	B	11	B	1.1	B	2.9	B	1.7	B	10.7	B
FILTERED INORGANICS (UG/L)																
ALUMINUM	4.6	U	13.8	U	4.6	U	4.6	U	4.6	U	4.6	U	30.8	B	22.5	B
ANTIMONY	2.4	U	2.4	U	2.4	U	2.4	U	3.5	B	2.4	U	3.7	B	2.4	U
ARSENIC	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U	4.2	U
BARIUM	80.3	B	79.7	B	132	B	129	B	37.5		27.5		104	B	122	B
BERYLLIUM	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.5	B	0.455	B	0.2	B	0.1	U	0.1	U	0.1	U	0.33	B	0.49	B
CALCIUM	11200		11500		10200		10400		13000		9250		49700		40200	
CHROMIUM	0.75	B	0.665	B	0.72	B	0.75	B	0.77	B	0.65	B	0.8	B	0.93	B
COBALT	1.4	B	1.3	B	1.1	B	1.3	B	0.86	B	0.86	B	1.5	B	1.5	B
COPPER	6.7	B	13.5	B	6.4	B	8.8	B	1.1	B	1.4	B	5.5	B	6	B
IRON	34.4	B	40.65	B	49.9	B	52.3	B	36.6	B	39.9	B	13	B	20.4	B
LEAD	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
MAGNESIUM	7830		7890		7850		7710		8430		6360		149000		126000	
MANGANESE	5.4	B	8.5	B	4.9	B	2.2	B	2.5	B	1.8	B	249		153	
MERCURY	0.14	U	0.145	U	0.13	U	0.14	U	0.14	U	0.13	U	0.14	U	0.14	U
NICKEL	5	B	4.4	B	3.8	B	3.7	B	2.5	B	2	B	4.2	B	4.2	B

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC026		MTC026		MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
NORTHING	336165.78		336165.78		335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1266131.04		1266131.04		1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSW02601-D / MTCSW02601-F-D		MTCSW02601-AVG / MTCSW02601-F-AVG		MTCSW02701 / MTCSW02701-F		MTCSW02801 / MTCSW02801-F		MTCSW02901 / MTCSW02901-F		MTCSW03001 / MTCSW03001-F		NJCSW00101 / NJCSW00101-F		NJCSW00201 / NJCSW00201-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/5/2001	QUAL	9/5/2001	QUAL
POTASSIUM	3220		3285		3590		3110		3370		2690		64800		54700	
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
SILVER	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.6	UL	0.66	B	0.84	B
SODIUM	22800		23400		25800		24000		21900		16500		1150000		957000	
THALLIUM	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U	3.9	U
VANADIUM	0.52	B	0.645	B	0.48	B	0.69	B	0.94	K	0.74	K	0.75	B	0.4	UL
ZINC	42.7	B	80.85	B	19.9	B	24.5	B	6.5	B	7.1	B	12.4	B	34.4	B
PESTICIDES/PCBS (UG/L)																
4,4'-DDD	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
4,4'-DDT	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ALDRIN	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ALPHA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
AROCLOR-1016	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1221	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
AROCLOR-1232	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1242	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1248	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1254	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
AROCLOR-1260	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
BETA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DELTA-BHC	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
DIELDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN I	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
ENDOSULFAN II	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDOSULFAN SULFATE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN ALDEHYDE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
ENDRIN KETONE	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
GAMMA-BHC (LINDANE)	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
GAMMA-CHLORDANE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
HEPTACHLOR EPOXIDE	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U	0.01	R
METHOXYCHLOR	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
TOXAPHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
EXPLOSIVES (UG/L)																
1,3,5-TRINITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
1,3-DINITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,4,6-TRINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,4-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2-AMINO-4,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
2-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
3-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
4-AMINO-2,6-DINITROTOLUENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
4-NITROTOLUENE	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
HMX	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ

APPENDIX B-1.1

SURFACE WATER DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC026		MTC026		MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
NORTHING	336165.78		336165.78		335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1266131.04		1266131.04		1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSW02601-D / MTCSW02601-F-D		MTCSW02601-AVG / MTCSW02601-F-AVG		MTCSW02701 / MTCSW02701-F		MTCSW02801 / MTCSW02801-F		MTCSW02901 / MTCSW02901-F		MTCSW03001 / MTCSW03001-F		NJCSW00101 / NJCSW00101-F		NJCSW00201 / NJCSW00201-F	
MATRIX	SW		SW		SW		SW		SW		SW		SW		SW	
SAMPLE DATE	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/6/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL	9/5/2001	QUAL	9/5/2001	QUAL
NITROBENZENE	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
NITROCELLULOSE	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ	500	UJ
NITROGLYCERIN	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ	0.65	UJ
NITROGUANIDINE	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ	20	UJ
RDX	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
TETRYL	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ	0.1	UJ
MISCELLANEOUS PARAMETERS																
CHLORIDE (MG/L)	40.8		41.15		40.7		42		38.5		29.5		2420		2040	
FLUORIDE (MG/L)	0.19		0.185		0.19		0.19		0.2		0.17		25	U	25	U
HARDNESS (MG/L)	60		62		59		59		70		53		760		640	
NITRATE (MG/L)	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.5	J	0.5	J
NITRITE (MG/L)	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	2.5	J	2.5	J
PERCHLORATE (UG/L)	5	U	5	U	5	U	5	U	5	U	5	U	25	U	25	U
PH (S.U.)	7.5	J	7.5	J	7.3	J	7.2	J	9.1	J	10	J	7.1	J	7.2	J
SULFATE (MG/L)	28.4		28.65		26.3		27.3		27.9		23.2		299		276	
TOTAL DISSOLVED SOLIDS (MG/L)	160		165		180		160		140		120		4000		2900	
TOTAL ORGANIC CARBON (MG/L)	7		7		6		7		7		6		7		8	
TOTAL SUSPENDED SOLIDS (MG/L)	11		17		13		11		10	U	10	U	28		38	
FIELD PARAMETERS																
DISSOLVED OXYGEN (MG/L)					25.67		25.95		11.92		16.71		8.33		9.79	
PH (S.U.)					6.3		6.61		10.14		10.93		7.23		7.88	
SALINITY (%)					0		0		0		0		0.4		0.5	
SPECIFIC CONDUCTANCE (MS/CM)					0.232		0.233		0.254		0.228		7.54		8.91	
TEMPERATURE (C)					9.02		11.18		26.61		28.2		28.04		27.79	

APPENDIX B-1.2

SEDIMENT DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	MTCSD00101		MTCSD00201		MTCSD00201-D		MTCSD00201-AVG		MTCSD00301		MTCSD00401		MTCSD00501	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/08/01	
VOLATILE ORGANICS (UG/KG)														
1,1,1-TRICHLOROETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,1,2,2-TETRACHLOROETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,1,2-TRICHLOROETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,1,2-TRICHLOROTRIFLUOROETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,1-DICHLOROETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,1-DICHLOROETHENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,2,4-TRICHLOROBENZENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,2-DIBROMO-3-CHLOROPROPANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,2-DIBROMOETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,2-DICHLOROBENZENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,2-DICHLOROETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,2-DICHLOROPROPANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,3-DICHLOROBENZENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
1,4-DICHLOROBENZENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
2-BUTANONE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
2-HEXANONE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
4-METHYL-2-PENTANONE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
ACETONE	51	J	47	J	66	J	56.5	J	11	J	16	U	130	J
BENZENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
BROMODICHLOROMETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
BROMOFORM	17	U	17	U	13	U	15	U	10	U	16	U	15	U
BROMOMETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CARBON DISULFIDE	20		13	J	15		14		2	J	16	U	15	U
CARBON TETRACHLORIDE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CHLOROBENZENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CHLORODIBROMOMETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CHLOROETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CHLOROFORM	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CHLOROMETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CIS-1,2-DICHLOROETHENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CIS-1,3-DICHLOROPROPENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
CYCLOHEXANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
DICHLORODIFLUOROMETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
DIETHYL ETHER	17	UJ	17	UJ	13	UJ	15	UJ	10	UJ	16	UJ	15	UJ
ETHYLBENZENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
ISOPROPYLBENZENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
METHYL ACETATE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
METHYL CYCLOHEXANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
METHYL TERT-BUTYL ETHER	17	U	17	U	13	U	15	U	10	U	16	U	15	U
METHYLENE CHLORIDE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
STYRENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
TETRACHLOROETHENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	MTCSD00101		MTCSD00201		MTCSD00201-D		MTCSD00201-AVG		MTCSD00301		MTCSD00401		MTCSD00501	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/08/01	
TOLUENE	17	U	17	U	13	U	15	U	0.8	J	16	U	15	U
TOTAL XYLENES	17	U	17	U	13	U	15	U	10	U	16	U	15	U
TRANS-1,2-DICHLOROETHENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
TRANS-1,3-DICHLOROPROPENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
TRICHLOROETHENE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
TRICHLOROFLUOROMETHANE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
VINYL CHLORIDE	17	U	17	U	13	U	15	U	10	U	16	U	15	U
SEMIVOLATILE ORGANICS (UG/KG)														
1,1-BIPHENYL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2,2'-OXYBIS(1-CHLOROPROPANE)	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2,4,5-TRICHLOROPHENOL	2400	U	2300	U	2300	U	2300	U	1300	U	1300	U	2200	U
2,4,6-TRICHLOROPHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2,4-DICHLOROPHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2,4-DIMETHYLPHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2,4-DINITROPHENOL	2400	U	2300	U	2300	U	2300	U	1300	U	1300	U	2200	U
2-CHLORONAPHTHALENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2-CHLOROPHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2-METHYLNAPHTHALENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2-METHYLPHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
2-NITROANILINE	2400	U	2300	U	2300	U	2300	U	1300	U	1300	U	2200	U
2-NITROPHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
3,3'-DICHLOROBENZIDINE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
3-NITROANILINE	2400	U	2300	U	2300	U	2300	U	1300	U	1300	U	2200	U
4,6-DINITRO-2-METHYLPHENOL	2400	U	2300	U	2300	U	2300	U	1300	U	1300	U	2200	U
4-BROMOPHENYL PHENYL ETHER	950	U	910	U	900	U	905	U	500	U	520	U	880	U
4-CHLORO-3-METHYLPHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
4-CHLOROANILINE	950	UJ	910	UJ	900	UJ	905	UJ	500	UJ	520	UJ	880	UJ
4-CHLOROPHENYL PHENYL ETHER	950	U	910	U	900	U	905	U	500	U	520	U	880	U
4-METHYLPHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
4-NITROANILINE	2400	U	2300	U	2300	U	2300	U	1300	U	1300	U	2200	U
4-NITROPHENOL	2400	U	2300	U	2300	U	2300	U	1300	U	1300	U	2200	U
ACENAPHTHENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
ACENAPHTHYLENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
ACETOPHENONE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
ANTHRACENE	950	U	910	U	900	U	905	U	500	U	76	J	880	U
ATRAZINE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
BAP EQUIVALENT	9.7		12.098				12.098				271.33			
BENZALDEHYDE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
BENZO(A)ANTHRACENE	950	U	910	U	900	U	905	U	500	U	210	J	880	U
BENZO(A)PYRENE	950	U	910	U	900	U	905	U	500	U	210	J	880	U
BENZO(B)FLUORANTHENE	97	J	120	J	900	U	120	J	500	U	260	J	880	U
BENZO(G,H,I)PERYLENE	950	U	910	U	900	U	905	U	500	U	120	J	880	U
BENZO(K)FLUORANTHENE	950	U	910	U	900	U	905	U	500	U	110	J	880	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	MTCSD00101		MTCSD00201		MTCSD00201-D		MTCSD00201-AVG		MTCSD00301		MTCSD00401		MTCSD00501	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/08/01	
BIS(2-CHLOROETHOXY)METHANE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
BIS(2-CHLOROETHYL)ETHER	950	U	910	U	900	U	905	U	500	U	520	U	880	U
BIS(2-ETHYLHEXYL)PHTHALATE	130	B	95	B	160	B	127.5	B	500	U	310	B	140	B
BUTYL BENZYL PHTHALATE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
CAPROLACTAM	950	U	910	U	900	U	905	U	500	U	520	U	880	U
CARBAZOLE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
CHRYSENE	950	U	98	J	900	U	98	J	500	U	230	J	880	U
DI-N-BUTYL PHTHALATE	950	U	910	U	900	U	905	U	500	U	630		880	U
DI-N-OCTYL PHTHALATE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
DIBENZO(A,H)ANTHRACENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
DIBENZOFURAN	950	U	910	U	900	U	905	U	500	U	520	U	880	U
DIETHYL PHTHALATE	950	U	910	U	900	U	905	U	500	U	99	J	880	U
DIMETHYL PHTHALATE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
FLUORANTHENE	110	J	160	J	900	U	160	J	500	U	410	J	880	U
FLUORENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
HEXACHLOROBENZENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
HEXACHLOROBUTADIENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
HEXACHLOROCYCLOPENTADIENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
HEXACHLOROETHANE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
HIGH MOLECULAR WEIGHT PAHS	307		518				518				2030			
INDENO(1,2,3-CD)PYRENE	950	U	910	U	900	U	905	U	500	U	130	J	880	U
ISOPHORONE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
LOW MOLECULAR WEIGHT PAHS			98				98				366			
N-NITROSO-DI-N-PROPYLAMINE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
N-NITROSODIPHENYLAMINE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
NAPHTHALENE	950	U	910	U	900	U	905	U	500	U	520	U	880	U
PENTACHLOROPHENOL	2400	U	2300	U	2300	U	2300	U	1300	U	1300	U	2200	U
PHENANTHRENE	950	U	98	J	900	U	98	J	500	U	290	J	880	U
PHENOL	950	U	910	U	900	U	905	U	500	U	520	U	880	U
PYRENE	100	J	140	J	900	U	140	J	500	U	350	J	880	U
TOTAL PAHS	307		616				616				2396			
PESTICIDES/PCBS (UG/KG)														
4,4'-DDD	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
4,4'-DDE	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
4,4'-DDT	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
ALDRIN	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
ALPHA-BHC	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
ALPHA-CHLORDANE	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
AROCLOR-1016	96	U	91	U	90	U	90.5	U	49	U	51	U	89	U
AROCLOR-1221	200	U	190	U	180	U	185	U	100	U	100	U	180	U
AROCLOR-1232	96	U	91	U	90	U	90.5	U	49	U	51	U	89	U
AROCLOR-1242	96	U	91	U	90	U	90.5	U	49	U	51	U	89	U
AROCLOR-1248	96	U	91	U	90	U	90.5	U	49	U	170		89	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	MTCSD00101		MTCSD00201		MTCSD00201-D		MTCSD00201-AVG		MTCSD00301		MTCSD00401		MTCSD00501	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/08/01	
AROCLOR-1254	96	U	91	U	90	U	90.5	U	49	U	51	U	89	U
AROCLOR-1260	96	U	91	U	90	U	90.5	U	49	U	51	U	89	U
BETA-BHC	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
DELTA-BHC	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
DIELDRIN	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
ENDOSULFAN I	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
ENDOSULFAN II	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
ENDOSULFAN SULFATE	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
ENDRIN	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
ENDRIN ALDEHYDE	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
ENDRIN KETONE	9.6	U	9.1	U	9	U	9.05	U	4.9	U	5.1	U	8.9	U
GAMMA-BHC (LINDANE)	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
GAMMA-CHLORDANE	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
HEPTACHLOR	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
HEPTACHLOR EPOXIDE	5	U	4.7	U	4.7	U	4.7	U	2.5	U	2.6	U	4.6	U
METHOXYCHLOR	50	U	47	U	47	U	47	U	25	U	26	U	46	U
TOXAPHENE	500	U	470	U	470	U	470	U	250	U	260	U	460	U
INORGANICS (MG/KG)														
ALUMINUM	12100		9710		8630		9170		2510		3660		4070	
ANTIMONY	1.1	UL	1.2	UL	1.9	B	1.55	B	0.49	UL	1.8	B	0.95	UL
ARSENIC	7.1	K	6.6	K	4.2	K	5.4	K	1.1	K	20		2.7	K
BARIUM	124		112		101		106.5		32		102		42.6	
BERYLLIUM	1.2		0.97		0.86		0.915		0.28		0.98		0.37	
CADMIUM	0.79	K	0.62	K	0.64	K	0.63	K	1	K	0.77	K	0.66	K
CALCIUM	2040		1930		1710		1820		483		1520		2330	
CHROMIUM	28.2		24.1		21.4		22.75		7.2		13.8		7.9	
COBALT	20		17.5		15.2		16.35		6		12.6	K	2.2	
COPPER	37.4		29.8		25.7		27.75		8.6		18.4	L	4.7	B
CYANIDE	0.24	U	4.7	J	0.24	UJ	2.41	J	0.15	U	0.18	U	0.3	U
IRON	30100		24400		21600		23000		8000		37100		6000	
LEAD	60.5		43.4		38.3		40.85		15.8		53.4		6.1	
MAGNESIUM	3030		2360		2090		2225		550		939		1050	
MANGANESE	799		635		575		605		157		1120		109	
MERCURY	0.2		0.16		0.14	U	0.115		0.069	U	0.13		0.14	U
NICKEL	28.4	K	23.6	K	20.5	K	22.05	K	6.9	K	13.5	K	4.9	
POTASSIUM	1270		1060		1060		1060		299		403	K	409	
SELENIUM	2	U	2.1	U	2.1	U	2.1	U	0.89	U	1.2	U	1.7	U
SILVER	1.3	L	1.4	L	1.2	L	1.3	L	0.34	L	3.2	J	0.24	UL
SODIUM	546	B	473	B	329	B	401	B	149	B	271	B	155	B
THALLIUM	1.8	UL	1.9	UL	1.9	UL	1.9	UL	0.8	UL	2.9	L	1.6	UL
VANADIUM	39		32.3		29.1		30.7		9.1		23.1		11.2	
ZINC	89.7	J	74.3	J	72.2	J	73.25	J	7.8	B	37.1	J	16.4	B

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC001		MTC002		MTC002		MTC002		MTC003		MTC004		MTC005	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	326600.34		327189.67		327189.67		327189.67		327401.28		327403.21		328220.38	
EASTING	1255101.17		1255150.97		1255150.97		1255150.97		1255740.44		1256268.56		1258899.46	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	MTCSD00101		MTCSD00201		MTCSD00201-D		MTCSD00201-AVG		MTCSD00301		MTCSD00401		MTCSD00501	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/09/01		09/08/01	
AVS/SEM PARAMETERS (UMO/G)														
ACID VOLATILE SULFIDE	0.52776		0.51211		0.14469		0.3284		0.29335		0.14027		0.0126	U
CADMIUM	0.00403	B	0.00342	B	0.00395	B	0.00369	B	0.00212	B	0.00403		0.00048	B
COPPER	0.29695	J	0.22577	J	0.21793	J	0.22185	J	0.09477	J	2.5668	J	0.15462	J
LEAD	0.165		0.10459		0.12621		0.1154		0.05669		0.15174		0.01264	
MERCURY	0.00004	U	0.00003	U	0.00003	U	0.00003	U	0.00002	U	0.00002	U	0.00003	U
NICKEL	0.16847	J	0.14719	J	0.126	B	0.1051	J	0.05187	B	5.94795	J	0.90473	J
TOTAL SEM-AVS	1.55107		1.01627		1.4539		1.23509		0.4261		9.8476		1.07199	
ZINC	1.44841		1.05083		1.25445		1.15264		0.56799		1.31735		0.0562	B
MISCELLANEOUS PARAMETERS (MG/KG)														
TOTAL ORGANIC CARBON	23400		20800		21400		21100		5170		15300		69900	
EXPLOSIVES (MG/KG)														
1,3,5-TRINITROBENZENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
1,3-DINITROBENZENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2,4,6-TRINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2,4-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2-AMINO-4,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
3-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
4-AMINO-2,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
4-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
HMX	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
NITROBENZENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
NITROCELLULOSE	1.8	B	2.7	J	2.5	J	2.6	J	1.5	B	3.6	J	1.3	B
NITROGLYCERIN	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
NITROGUANIDINE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
RDX	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
TETRYL	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
FIELD PARAMETERS														
PERCENT CLAY	16.5		11.3		19.8		15.6		5.6		4			
PERCENT GRAVEL	0		0		0		0		12		2.4			
PERCENT SAND	50.9		34.2		50		42.1		67.0999		79.4			
PERCENT SILT	32.6		54.5		30.2		42.4		15.3		14.2			

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC006		MTC007		MTC008		MTC009		MTC010		MTC011		MTC012	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	329298.47		329016.99		330390.01		330505.76		331849.97		330868.23		330879.62	
EASTING	1259041.41		1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSD00601		MTCSD00701		MTCSD00801		MTCSD00901		MTCSD01001		MTCSD01101		MTCSD01201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01	
VOLATILE ORGANICS (UG/KG)														
1,1,1-TRICHLOROETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,1,2,2-TETRACHLOROETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,1,2-TRICHLOROETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,1,2-TRICHLOROTRIFLUOROETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,1-DICHLOROETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,1-DICHLOROETHENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,2,4-TRICHLOROBENZENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,2-DIBROMO-3-CHLOROPROPANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,2-DIBROMOETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,2-DICHLOROBENZENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,2-DICHLOROETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,2-DICHLOROPROPANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,3-DICHLOROBENZENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
1,4-DICHLOROBENZENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
2-BUTANONE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
2-HEXANONE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
4-METHYL-2-PENTANONE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
ACETONE	72	J	13	J	140	J	160	J	110	J	170	J	11	U
BENZENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
BROMODICHLOROMETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
BROMOFORM	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
BROMOMETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CARBON DISULFIDE	21	J	2	J	37	J	45	J	27	J	28	J	11	J
CARBON TETRACHLORIDE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CHLOROBENZENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CHLORODIBROMOMETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CHLOROETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CHLOROFORM	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CHLOROMETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CIS-1,2-DICHLOROETHENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CIS-1,3-DICHLOROPROPENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
CYCLOHEXANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
DICHLORODIFLUOROMETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
DIETHYL ETHER	19	UJ	10	UJ	26	UJ	26	UJ	19	UJ	33	UJ	11	UJ
ETHYLBENZENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
ISOPROPYLBENZENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
METHYL ACETATE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
METHYL CYCLOHEXANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
METHYL TERT-BUTYL ETHER	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
METHYLENE CHLORIDE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
STYRENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
TETRACHLOROETHENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC006		MTC007		MTC008		MTC009		MTC010		MTC011		MTC012	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	329298.47		329016.99		330390.01		330505.76		331849.97		330868.23		330879.62	
EASTING	1259041.41		1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSD00601		MTCSD00701		MTCSD00801		MTCSD00901		MTCSD01001		MTCSD01101		MTCSD01201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01	
TOLUENE	19	UJ	10	U	3	J	26	UJ	19	UJ	33	UJ	11	U
TOTAL XYLENES	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
TRANS-1,2-DICHLOROETHENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
TRANS-1,3-DICHLOROPROPENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
TRICHLOROETHENE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
TRICHLOROFLUOROMETHANE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
VINYL CHLORIDE	19	UJ	10	U	26	UJ	26	UJ	19	UJ	33	UJ	11	U
SEMIVOLATILE ORGANICS (UG/KG)														
1,1-BIPHENYL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2,2'-OXYBIS(1-CHLOROPROPANE)	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2,4,5-TRICHLOROPHENOL	2800	UJ	1400	U	3900	UJ	3900	UJ	2800	UJ	3000	UJ	1200	U
2,4,6-TRICHLOROPHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2,4-DICHLOROPHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2,4-DIMETHYLPHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2,4-DINITROPHENOL	2800	UJ	1400	U	3900	UJ	3900	UJ	2800	UJ	3000	UJ	1200	U
2-CHLORONAPHTHALENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2-CHLOROPHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2-METHYLNAPHTHALENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2-METHYLPHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
2-NITROANILINE	2800	UJ	1400	U	3900	UJ	3900	UJ	2800	UJ	3000	UJ	1200	U
2-NITROPHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
3,3'-DICHLOROBENZIDINE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
3-NITROANILINE	2800	UJ	1400	U	3900	UJ	3900	UJ	2800	UJ	3000	UJ	1200	U
4,6-DINITRO-2-METHYLPHENOL	2800	UJ	1400	U	3900	UJ	3900	UJ	2800	UJ	3000	UJ	1200	U
4-BROMOPHENYL PHENYL ETHER	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
4-CHLORO-3-METHYLPHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
4-CHLOROANILINE	1100	UJ	550	UJ	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	UJ
4-CHLOROPHENYL PHENYL ETHER	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
4-METHYLPHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
4-NITROANILINE	2800	UJ	1400	U	3900	UJ	3900	UJ	2800	UJ	3000	UJ	1200	U
4-NITROPHENOL	2800	UJ	1400	U	3900	UJ	3900	UJ	2800	UJ	3000	UJ	1200	U
ACENAPHTHENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
ACENAPHTHYLENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	52	J
ACETOPHENONE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
ANTHRACENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	69	J
ATRAZINE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
BAP EQUIVALENT			94.877						14				392.6	
BENZALDEHYDE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
BENZO(A)ANTHRACENE	1100	UJ	76	J	1600	UJ	1600	UJ	1100	UJ	1200	UJ	290	J
BENZO(A)PYRENE	1100	UJ	78	J	1600	UJ	1600	UJ	1100	UJ	1200	UJ	310	J
BENZO(B)FLUORANTHENE	1100	UJ	92	J	1600	UJ	1600	UJ	140	J	1200	UJ	340	J
BENZO(G,H,I)PERYLENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	170	J
BENZO(K)FLUORANTHENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	130	J

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC006		MTC007		MTC008		MTC009		MTC010		MTC011		MTC012	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	329298.47		329016.99		330390.01		330505.76		331849.97		330868.23		330879.62	
EASTING	1259041.41		1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSD00601		MTCSD00701		MTCSD00801		MTCSD00901		MTCSD01001		MTCSD01101		MTCSD01201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01	
BIS(2-CHLOROETHOXY)METHANE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
BIS(2-CHLOROETHYL)ETHER	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
BIS(2-ETHYLHEXYL)PHTHALATE	120	B	190	B	1600	UJ	200	B	680	B	1200	UJ	120	B
BUTYL BENZYL PHTHALATE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
CAPROLACTAM	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
CARBAZOLE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
CHRYSENE	1100	UJ	77	J	1600	UJ	1600	UJ	1100	UJ	1200	UJ	300	J
DI-N-BUTYL PHTHALATE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
DI-N-OCTYL PHTHALATE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
DIBENZO(A,H)ANTHRACENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
DIBENZOFURAN	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
DIETHYL PHTHALATE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
DIMETHYL PHTHALATE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
FLUORANTHENE	1100	UJ	140	J	1600	UJ	1600	UJ	130	J	1200	UJ	520	J
FLUORENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
HEXACHLOROBENZENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
HEXACHLOROBUTADIENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
HEXACHLOROCYCLOPENTADIENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
HEXACHLOROETHANE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
HIGH MOLECULAR WEIGHT PAHS			583						410				2810	
INDENO(1,2,3-CD)PYRENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	180	J
ISOPHORONE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
LOW MOLECULAR WEIGHT PAHS			77										311	
N-NITROSO-DI-N-PROPYLAMINE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
N-NITROSODIPHENYLAMINE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
NAPHTHALENE	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
PENTACHLOROPHENOL	2800	UJ	1400	U	3900	UJ	3900	UJ	2800	UJ	3000	UJ	1200	U
PHENANTHRENE	1100	UJ	77	J	1600	UJ	1600	UJ	1100	UJ	1200	UJ	190	J
PHENOL	1100	UJ	550	U	1600	UJ	1600	UJ	1100	UJ	1200	UJ	460	U
PYRENE	1100	UJ	120	J	1600	UJ	1600	UJ	140	J	1200	UJ	570	J
TOTAL PAHS			660						410				3121	
PESTICIDES/PCBS (UG/KG)														
4,4'-DDD	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
4,4'-DDE	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
4,4'-DDT	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
ALDRIN	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
ALPHA-BHC	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
ALPHA-CHLORDANE	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
AROCLOR-1016	110	UJ	55	U	160	UJ	160	UJ	110	UJ	120	UJ	47	U
AROCLOR-1221	230	UJ	110	U	320	UJ	320	UJ	230	UJ	250	UJ	95	U
AROCLOR-1232	110	UJ	55	U	160	UJ	160	UJ	110	UJ	120	UJ	47	U
AROCLOR-1242	110	UJ	55	U	160	UJ	160	UJ	110	UJ	120	UJ	47	U
AROCLOR-1248	110	UJ	55	U	160	UJ	160	UJ	110	UJ	120	UJ	47	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC006		MTC007		MTC008		MTC009		MTC010		MTC011		MTC012	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	329298.47		329016.99		330390.01		330505.76		331849.97		330868.23		330879.62	
EASTING	1259041.41		1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSD00601		MTCSD00701		MTCSD00801		MTCSD00901		MTCSD01001		MTCSD01101		MTCSD01201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01	
AROCLOR-1254	110	UJ	55	U	160	UJ	160	UJ	110	UJ	120	UJ	47	U
AROCLOR-1260	110	UJ	55	U	160	UJ	160	UJ	110	UJ	120	UJ	47	U
BETA-BHC	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
DELTA-BHC	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
DIELDRIN	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
ENDOSULFAN I	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
ENDOSULFAN II	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
ENDOSULFAN SULFATE	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
ENDRIN	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
ENDRIN ALDEHYDE	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
ENDRIN KETONE	11	UJ	5.5	U	16	UJ	16	UJ	11	UJ	12	UJ	4.7	U
GAMMA-BHC (LINDANE)	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
GAMMA-CHLORDANE	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
HEPTACHLOR	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
HEPTACHLOR EPOXIDE	5.8	UJ	2.8	U	8	UJ	8.1	UJ	5.7	UJ	6.2	UJ	2.4	U
METHOXYCHLOR	58	UJ	28	U	80	UJ	81	UJ	57	UJ	62	UJ	24	U
TOXAPHENE	580	UJ	280	U	800	UJ	810	UJ	570	UJ	620	UJ	240	U
INORGANICS (MG/KG)														
ALUMINUM	11100	J	2790		10700	J	13400	J	9130	J	12400	J	3170	
ANTIMONY	1.5	UJ	0.58	UL	2.1	UJ	2.2	B	1.2	UJ	1.7	UJ	0.6	UL
ARSENIC	4.2	J	1.9	K	7.5	J	6.8	J	14.6	J	5	J	5.6	
BARIUM	129	J	32.4		130	J	152	J	130	J	143	J	24.5	
BERYLLIUM	1.1	J	0.29		1.2	J	1.4	J	1.1	J	1.3	J	0.39	
CADMIUM	3.2	J	0.95	K	3.5	J	4.1	J	1.1	J	1.1	J	0.074	K
CALCIUM	1790	J	1070		3250	J	2730	J	2370	J	2300	J	378	
CHROMIUM	25.4	J	7		26.9	J	31.6	J	22.4	J	28.2	J	16.5	
COBALT	16.8	J	6.7		18.4	J	22.2	J	22.6	J	18.8	J	5.9	
COPPER	26.1	J	6.9		33.3	J	36.3	J	27.7	J	30.2	J	4.4	
CYANIDE	0.36	UJ	0.19	U	0.62	UJ	0.63	UJ	0.45	UJ	0.49	UJ	0.2	UJ
IRON	26500	J	7470		26200	J	32800	J	26600	J	30700	J	13800	
LEAD	35.5	J	11.2		50.2	J	47.2	J	54.2	J	43.5	J	10.3	
MAGNESIUM	2430	J	611		2540	J	2850	J	1670	J	2650	J	655	
MANGANESE	703	J	123		596	J	945	J	530	J	1030	J	135	
MERCURY	0.23	J	0.083	U	0.22	J	0.24	J	0.54	J	0.17	UJ	0.071	U
NICKEL	24.2	J	6.9	K	27.9	J	30.6	J	25	J	27.1	J	5.3	
POTASSIUM	1210	J	299		1240	J	1530	J	871	J	1360	J	263	
SELENIUM	2.7	UJ	1	U	3.7	UJ	3.9	UJ	2.1	UJ	3.1	UJ	1.1	U
SILVER	1.2	J	0.24	L	1.3	J	1.4	J	0.76	J	1.3	J	0.15	UL
SODIUM	233	B	102	B	417	B	428	B	511	B	607	B	110	B
THALLIUM	2.5	UJ	0.95	UL	3.4	UJ	3.6	UJ	2.2	J	2.9	J	0.98	UL
VANADIUM	35.1	J	9.3		37.5	J	43.5	J	37	J	38.6	J	16	
ZINC	146	J	43	J	148	J	143	J	107	J	39.3	B	19.2	B

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC006		MTC007		MTC008		MTC009		MTC010		MTC011		MTC012	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	329298.47		329016.99		330390.01		330505.76		331849.97		330868.23		330879.62	
EASTING	1259041.41		1258314.94		1258888.66		1258552.33		1259621.28		1260476.85		1260918.38	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2		AREA 2	
SAMPLE ID	MTCSD00601		MTCSD00701		MTCSD00801		MTCSD00901		MTCSD01001		MTCSD01101		MTCSD01201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01		09/08/01	
AVS/SEM PARAMETERS (UMO/G)														
ACID VOLATILE SULFIDE	0.0158	U	0.53256		2.11354		2.2066		0.2964		0.52949		0.15667	U
CADMIUM	0.00526	B	0.00776		0.00738	B	0.00736	B	0.00815		0.00477	B	0.00037	B
COPPER	2.05949	J	0.35302	J	0.31806	J	0.45534	J	4.63429	J	0.63855	J	0.04912	B
LEAD	0.13774		0.06336		0.17479		0.20349		0.22683		0.11172		0.04079	
MERCURY	0.00004	U	0.00008	B	0.00006	U	0.00006	U	0.00004	U	0.00005	U	0.00002	U
NICKEL	6.14299	J	1.06173	J	0.29859	J	0.78279	J	12.93815	J	1.59312	J	0.02579	B
TOTAL SEM-AVS	9.87702		2.89762		0.58989		1.36658		20.12979		3.09267		0.36452	
ZINC	1.5368		1.94431		1.91199		2.13156		2.61877		1.27877		0.32373	
MISCELLANEOUS PARAMETERS (MG/KG)														
TOTAL ORGANIC CARBON	26700	J	8240		74200	J	56100	J	40800	J	34600	J	5350	
EXPLOSIVES (MG/KG)														
1,3,5-TRINITROBENZENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
1,3-DINITROBENZENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2,4,6-TRINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2,4-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2-AMINO-4,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
2-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
3-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
4-AMINO-2,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
4-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
HMX	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
NITROBENZENE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
NITROCELLULOSE	7	J	2.5	J	4	J	3.8	J	2.4	J	9.2	J	1.6	B
NITROGLYCERIN	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ	0.5	UJ
NITROGUANIDINE	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
RDX	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
TETRYL	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ	0.25	UJ
FIELD PARAMETERS														
PERCENT CLAY							14.8		6.2		26.7		1.6	
PERCENT GRAVEL							0		0		0		3.5	
PERCENT SAND							7.2		21.4		4		88.4	
PERCENT SILT							78		72.4		69.3		6.5	

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC012		MTC012		MTC013		MTC014		MTC015		MTC016		MTC017	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	330879.62		330879.62		330304.28		331387.89		332415.51		332464.04		333712.68	
EASTING	1260918.38		1260918.38		1261707.03		1261625.22		1262267.1		1262770.26		1263026.98	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 3		AREA 3		AREA 3		AREA 3		AREA 4	
SAMPLE ID	MTCSD01201-D		MTCSD01201-AVG		MTCSD01301		MTCSD01401		MTCSD01501		MTCSD01601		MTCSD01701	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/07/01		09/07/01		09/07/01		09/07/01		09/07/01	
VOLATILE ORGANICS (UG/KG)														
1,1,1-TRICHLOROETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,1,2,2-TETRACHLOROETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,1,2-TRICHLOROETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,1,2-TRICHLOROTRIFLUOROETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,1-DICHLOROETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,1-DICHLOROETHENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,2,4-TRICHLOROBENZENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,2-DIBROMO-3-CHLOROPROPANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,2-DIBROMOETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,2-DICHLOROBENZENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,2-DICHLOROETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,2-DICHLOROPROPANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,3-DICHLOROBENZENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
1,4-DICHLOROBENZENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
2-BUTANONE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
2-HEXANONE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
4-METHYL-2-PENTANONE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
ACETONE	12	U	11.5	U	13	J	170	J	53	J	100	J	10	U
BENZENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
BROMODICHLOROMETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
BROMOFORM	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
BROMOMETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
CARBON DISULFIDE	37	J	24	J	3	J	17	J	10	J	20	J	10	U
CARBON TETRACHLORIDE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
CHLOROBENZENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
CHLORODIBROMOMETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
CHLOROETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
CHLOROFORM	12	U	11.5	U	10	U	50	UJ	10	J	22	UJ	10	U
CHLOROMETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
CIS-1,2-DICHLOROETHENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
CIS-1,3-DICHLOROPROPENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
CYCLOHEXANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
DICHLORODIFLUOROMETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
DIETHYL ETHER	12	UJ	11.5	UJ	10	UJ	50	UJ	13	UJ	22	UJ	10	UJ
ETHYLBENZENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
ISOPROPYLBENZENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
METHYL ACETATE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
METHYL CYCLOHEXANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
METHYL TERT-BUTYL ETHER	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
METHYLENE CHLORIDE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
STYRENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
TETRACHLOROETHENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC012		MTC012		MTC013		MTC014		MTC015		MTC016		MTC017	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	330879.62		330879.62		330304.28		331387.89		332415.51		332464.04		333712.68	
EASTING	1260918.38		1260918.38		1261707.03		1261625.22		1262267.1		1262770.26		1263026.98	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 3		AREA 3		AREA 3		AREA 3		AREA 4	
SAMPLE ID	MTCSD01201-D		MTCSD01201-AVG		MTCSD01301		MTCSD01401		MTCSD01501		MTCSD01601		MTCSD01701	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/07/01		09/07/01		09/07/01		09/07/01		09/07/01	
TOLUENE	12	U	11.5	U	10	U	50	UJ	3	J	22	UJ	10	U
TOTAL XYLENES	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
TRANS-1,2-DICHLOROETHENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
TRANS-1,3-DICHLOROPROPENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
TRICHLOROETHENE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
TRICHLOROFLUOROMETHANE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
VINYL CHLORIDE	12	U	11.5	U	10	U	50	UJ	13	U	22	UJ	10	U
SEMIVOLATILE ORGANICS (UG/KG)														
1,1-BIPHENYL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2,2'-OXYBIS(1-CHLOROPROPANE)	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2,4,5-TRICHLOROPHENOL	1500	U	1350	U	1300	U	3000	UJ	1400	U	3100	UJ	1000	U
2,4,6-TRICHLOROPHENOL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2,4-DICHLOROPHENOL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2,4-DIMETHYLPHENOL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2,4-DINITROPHENOL	1500	U	1350	U	1300	U	3000	UJ	1400	U	3100	UJ	1000	U
2-CHLORONAPHTHALENE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2-CHLOROPHENOL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2-METHYLNAPHTHALENE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2-METHYLPHENOL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
2-NITROANILINE	1500	U	1350	U	1300	U	3000	UJ	1400	U	3100	UJ	1000	U
2-NITROPHENOL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
3,3'-DICHLOROBENZIDINE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
3-NITROANILINE	1500	U	1350	U	1300	U	3000	UJ	1400	U	3100	UJ	1000	U
4,6-DINITRO-2-METHYLPHENOL	1500	U	1350	U	1300	U	3000	UJ	1400	U	3100	UJ	1000	U
4-BROMOPHENYL PHENYL ETHER	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
4-CHLORO-3-METHYLPHENOL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
4-CHLOROANILINE	580	UJ	520	UJ	530	UJ	1200	UJ	540	UJ	1200	UJ	410	UJ
4-CHLOROPHENYL PHENYL ETHER	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
4-METHYLPHENOL	80	J	80	J	530	U	1200	UJ	540	U	1200	UJ	410	U
4-NITROANILINE	1500	U	1350	U	1300	U	3000	UJ	1400	U	3100	UJ	1000	U
4-NITROPHENOL	1500	U	1350	U	1300	U	3000	UJ	1400	U	3100	UJ	1000	U
ACENAPHTHENE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
ACENAPHTHYLENE	340	J	196	J	530	U	1200	UJ	540	U	1200	UJ	410	U
ACETOPHENONE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
ANTHRACENE	540	J	304.5	J	530	U	1200	UJ	540	U	1200	UJ	410	U
ATRAZINE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
BAP EQUIVALENT	2509		1451				15		118.12				190.68	
BENZALDEHYDE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
BENZO(A)ANTHRACENE	1700	J	995	J	530	U	1200	UJ	100	J	1200	UJ	150	J
BENZO(A)PYRENE	1800	J	1055	J	530	U	1200	UJ	96	J	1200	UJ	150	J
BENZO(B)FLUORANTHENE	2000	J	1170	J	530	U	150	J	120	J	1200	UJ	170	J
BENZO(G,H,I)PERYLENE	1100	J	635	J	530	U	1200	UJ	540	U	1200	UJ	71	J
BENZO(K)FLUORANTHENE	730		430		530	U	1200	UJ	540	U	1200	UJ	83	J

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC012		MTC012		MTC013		MTC014		MTC015		MTC016		MTC017	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	330879.62		330879.62		330304.28		331387.89		332415.51		332464.04		333712.68	
EASTING	1260918.38		1260918.38		1261707.03		1261625.22		1262267.1		1262770.26		1263026.98	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 3		AREA 3		AREA 3		AREA 3		AREA 4	
SAMPLE ID	MTCSD01201-D		MTCSD01201-AVG		MTCSD01301		MTCSD01401		MTCSD01501		MTCSD01601		MTCSD01701	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/07/01		09/07/01		09/07/01		09/07/01		09/07/01	
BIS(2-CHLOROETHOXY)METHANE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
BIS(2-CHLOROETHYL)ETHER	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
BIS(2-ETHYLHEXYL)PHTHALATE	72	B	96	B	59	B	160	B	100	B	250	B	82	B
BUTYL BENZYL PHTHALATE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
CAPROLACTAM	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
CARBAZOLE	110	J	110	J	530	U	1200	UJ	540	U	1200	UJ	410	U
CHRYSENE	1700	J	1000	J	530	U	1200	UJ	120	J	1200	UJ	150	J
DI-N-BUTYL PHTHALATE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
DI-N-OCTYL PHTHALATE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
DIBENZO(A,H)ANTHRACENE	220	J	220	J	530	U	1200	UJ	540	U	1200	UJ	410	U
DIBENZOFURAN	80	J	80	J	530	U	1200	UJ	540	U	1200	UJ	410	U
DIETHYL PHTHALATE	65	J	65	J	530	U	1200	UJ	840		1200	UJ	410	U
DIMETHYL PHTHALATE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
FLUORANTHENE	4000	J	2260	J	530	U	160	J	110	J	1200	UJ	200	J
FLUORENE	180	J	180	J	530	U	1200	UJ	540	U	1200	UJ	410	U
HEXACHLOROBENZENE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
HEXACHLOROBUTADIENE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
HEXACHLOROCYCLOPENTADIENE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
HEXACHLOROETHANE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
HIGH MOLECULAR WEIGHT PAHS	18350		10580				480		676		130		1241	
INDENO(1,2,3-CD)PYRENE	1100	J	640	J	530	U	1200	UJ	540	U	1200	UJ	77	J
ISOPHORONE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
LOW MOLECULAR WEIGHT PAHS	3660		1986											
N-NITROSO-DI-N-PROPYLAMINE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
N-NITROSODIPHENYLAMINE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
NAPHTHALENE	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
PENTACHLOROPHENOL	1500	U	1350	U	1300	U	3000	UJ	1400	U	3100	UJ	1000	U
PHENANTHRENE	2600	J	1395	J	530	U	1200	UJ	540	U	1200	UJ	410	U
PHENOL	580	U	520	U	530	U	1200	UJ	540	U	1200	UJ	410	U
PYRENE	4000	J	2285	J	530	U	170	J	130	J	130	J	190	J
TOTAL PAHS	22010		12566				480		676		130		1241	
PESTICIDES/PCBS (UG/KG)														
4,4'-DDD	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
4,4'-DDE	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
4,4'-DDT	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
ALDRIN	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
ALPHA-BHC	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
ALPHA-CHLORDANE	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
AROCLOR-1016	59	U	53	U	53	U	120	UJ	55	U	120	UJ	41	U
AROCLOR-1221	120	U	107.5	U	110	U	240	UJ	110	U	240	UJ	82	U
AROCLOR-1232	59	U	53	U	53	U	120	UJ	55	U	120	UJ	41	U
AROCLOR-1242	59	U	53	U	53	U	120	UJ	55	U	120	UJ	41	U
AROCLOR-1248	59	U	53	U	53	U	120	UJ	55	U	120	UJ	41	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC012		MTC012		MTC013		MTC014		MTC015		MTC016		MTC017	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	330879.62		330879.62		330304.28		331387.89		332415.51		332464.04		333712.68	
EASTING	1260918.38		1260918.38		1261707.03		1261625.22		1262267.1		1262770.26		1263026.98	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 3		AREA 3		AREA 3		AREA 3		AREA 4	
SAMPLE ID	MTCSD01201-D		MTCSD01201-AVG		MTCSD01301		MTCSD01401		MTCSD01501		MTCSD01601		MTCSD01701	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/07/01		09/07/01		09/07/01		09/07/01		09/07/01	
AROCLOR-1254	59	U	53	U	53	U	120	UJ	55	U	120	UJ	41	U
AROCLOR-1260	59	U	53	U	53	U	120	UJ	55	U	120	UJ	41	U
BETA-BHC	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
DELTA-BHC	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
DIELDRIN	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
ENDOSULFAN I	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
ENDOSULFAN II	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
ENDOSULFAN SULFATE	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
ENDRIN	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
ENDRIN ALDEHYDE	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
ENDRIN KETONE	5.9	U	5.3	U	5.3	U	12	UJ	5.5	U	12	UJ	4.1	U
GAMMA-BHC (LINDANE)	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
GAMMA-CHLORDANE	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
HEPTACHLOR	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
HEPTACHLOR EPOXIDE	3	U	2.7	U	2.7	U	6.1	UJ	2.8	U	6.1	UJ	2.1	U
METHOXYCHLOR	30	U	27	U	27	U	61	UJ	28	U	61	UJ	21	U
TOXAPHENE	300	U	270	U	270	U	610	UJ	280	U	610	UJ	210	U
INORGANICS (MG/KG)														
ALUMINUM	2800		2985		5590		10400	J	3290		12400	J	975	
ANTIMONY	0.65	UL	0.625	UL	1.1	B	3.2	B	0.62	U	2.6	B	0.41	U
ARSENIC	3.6	K	4.6	K	9.6		5.7	B	1.7	B	7.5	B	0.97	B
BARIUM	26.5		25.5		106		120	J	41.3		154	J	8.8	
BERYLLIUM	0.32		0.355		1		1.2	J	0.43		1.5	J	0.25	
CADMIUM	0.084	K	0.079	K	0.15	B	0.93	J	1.4	K	1.5	J	0.42	K
CALCIUM	523		450.5		1330		1950	J	637		2200	J	123	
CHROMIUM	12		14.25		17.6		24.5	J	10.1		29	J	5.6	
COBALT	5.5		5.7		5.5	K	17.3	J	7.4	K	21.7	J	2	K
COPPER	5.1		4.75		15	L	28.7	J	9.9		37.1	J	6.8	K
CYANIDE	3.8	J	1.95	J	0.18	U	0.52	UJ	0.14	U	0.34	UJ	0.17	U
IRON	11800		12800		27400		25900	J	9190		31500	J	3840	
LEAD	12.9		11.6		19.3		36.5	J	13.4		45.8	J	10.5	
MAGNESIUM	498		576.5		1020		2240	J	656		2400	J	104	B
MANGANESE	164		149.5		144		693	J	208		851	J	28.2	
MERCURY	0.071	U	0.071	U	0.082	U	0.24	J	0.076	U	0.22	J	0.05	U
NICKEL	4.2		4.75		7.4	K	24	J	7.8	K	28.4	J	3.1	K
POTASSIUM	347		305		547		1050	J	355		1270	J	91.6	
SELENIUM	1.2	U	1.15	U	1	UL	2.6	UJ	1.1	UL	3	UJ	0.74	UL
SILVER	0.16	UL	0.155	UL	0.14	UL	2	J	4.8	L	2.7	J	0.1	UL
SODIUM	69.2	B	89.6	B	227	B	260	B	158	B	497	B	34.9	B
THALLIUM	1.1	UL	1.04	UL	0.93	U	2.3	UJ	1	U	2.8	UJ	0.67	U
VANADIUM	16.3		16.15		34.6		35.1	J	12	K	40.3	J	6.2	K
ZINC	46.1	J	27.85	J	36.5		149	B	59.7		204	J	13.3	

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC012		MTC012		MTC013		MTC014		MTC015		MTC016		MTC017	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	330879.62		330879.62		330304.28		331387.89		332415.51		332464.04		333712.68	
EASTING	1260918.38		1260918.38		1261707.03		1261625.22		1262267.1		1262770.26		1263026.98	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 2		AREA 2		AREA 3		AREA 3		AREA 3		AREA 3		AREA 4	
SAMPLE ID	MTCSD01201-D		MTCSD01201-AVG		MTCSD01301		MTCSD01401		MTCSD01501		MTCSD01601		MTCSD01701	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/08/01		09/08/01		09/07/01		09/07/01		09/07/01		09/07/01		09/07/01	
AVS/SEM PARAMETERS (UMO/G)														
ACID VOLATILE SULFIDE	0.56746		0.3229		0.01841		0.18424		0.1607		5.34313		0.00579	U
CADMIUM	0.00067	B	0.00053	B	0.00606	B	0.01074	B	0.00422	B	0.01444	B	0.00226	B
COPPER	5.26722	J	2.64589	J	0.12143		1.13024		0.09266		0.332		1.17227	
LEAD	0.06372		0.05226		0.06177		0.16154		0.05151		0.17449		0.07071	
MERCURY	0.00002	U	0.00002	U	0.00002	U	0.00004	U	0.00002	U	0.00005	U	0.00002	U
NICKEL	3.48352	J	1.74821	J	0.04795	B	2.39209	J	0.05121	B	0.2719	J	1.4536	J
TOTAL SEM-AVS	8.82176		4.59314		0.16479		5.31961		-0.01653		-2.04119		2.69658	
ZINC	0.57476		0.44925		0.29644	B	1.81998		0.73799	B	2.52355		0.36876	B
MISCELLANEOUS PARAMETERS (MG/KG)														
TOTAL ORGANIC CARBON	8780		7065		4310		33000		11300		42400		2370	
EXPLOSIVES (MG/KG)														
1,3,5-TRINITROBENZENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-NITROTOLUENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROBENZENE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROCELLULOSE	2	J	1.4	J	4.2		65.7		23.2		122		2.6	
NITROGLYCERIN	0.5	UJ	0.5	UJ	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
NITROGUANIDINE	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
RDX	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
TETRYL	0.25	UJ	0.25	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
FIELD PARAMETERS														
PERCENT CLAY	6.1		3.9		30.3		35.6		6		14.6		0.2	
PERCENT GRAVEL	2.2		2.9		4.8		0		3		0		44.3	
PERCENT SAND	85.8		87.1		34.9		18		81.9		25		52.3	
PERCENT SILT	5.9		6.2		30		46.4		9.1		60.4		3.2	

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC018		MTC019		MTC020		MTC021		MTC022		MTC023		MTC023	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333940.86		333623.25		333717.68		333790.95		334449.65		335186.55		335186.55	
EASTING	1263462.35		1264439.07		1264638.88		1264888.8		1265916.98		1265947.96		1265947.96	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD01801		MTCSD01901		MTCSD02001		MTCSD02101		MTCSD02201		MTCSD02301		MTCSD02301-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/07/01		09/07/01		09/07/01		09/07/01		09/06/01		09/06/01		09/06/01	
VOLATILE ORGANICS (UG/KG)														
1,1,1-TRICHLOROETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,1,2,2-TETRACHLOROETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,1,2-TRICHLOROETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,1,2-TRICHLOROTRIFLUOROETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,1-DICHLOROETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,1-DICHLOROETHENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,2,4-TRICHLOROBENZENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,2-DIBROMO-3-CHLOROPROPANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,2-DIBROMOETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,2-DICHLOROBENZENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,2-DICHLOROETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,2-DICHLOROPROPANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,3-DICHLOROBENZENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
1,4-DICHLOROBENZENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
2-BUTANONE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
2-HEXANONE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
4-METHYL-2-PENTANONE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
ACETONE	110	J	25	UJ	19	J	34	J	140	J	100	J	150	J
BENZENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
BROMODICHLOROMETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
BROMOFORM	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
BROMOMETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
CARBON DISULFIDE	7	J	16	J	3	J	10	U	21	J	7	J	16	J
CARBON TETRACHLORIDE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
CHLOROBENZENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
CHLORODIBROMOMETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
CHLOROETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
CHLOROFORM	27	UJ	25	UJ	11	U	10	U	26	U	19	U	12	J
CHLOROMETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
CIS-1,2-DICHLOROETHENE	27	UJ	25	UJ	11	U	2	J	26	U	19	U	31	U
CIS-1,3-DICHLOROPROPENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
CYCLOHEXANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
DICHLORODIFLUOROMETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
DIETHYL ETHER	27	UJ	25	UJ	6	J	57	J	26	UJ	19	UJ	31	UJ
ETHYLBENZENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
ISOPROPYLBENZENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
METHYL ACETATE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
METHYL CYCLOHEXANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
METHYL TERT-BUTYL ETHER	27	UJ	25	UJ	11	U	10	U	3	J	19	U	31	U
METHYLENE CHLORIDE	13	B	25	UJ	11	U	10	U	26	U	19	U	31	U
STYRENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
TETRACHLOROETHENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC018		MTC019		MTC020		MTC021		MTC022		MTC023		MTC023	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333940.86		333623.25		333717.68		333790.95		334449.65		335186.55		335186.55	
EASTING	1263462.35		1264439.07		1264638.88		1264888.8		1265916.98		1265947.96		1265947.96	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD01801		MTCSD01901		MTCSD02001		MTCSD02101		MTCSD02201		MTCSD02301		MTCSD02301-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/07/01		09/07/01		09/07/01		09/07/01		09/06/01		09/06/01		09/06/01	
TOLUENE	27	UJ	4	J	11	U	10	U	26	U	19	U	31	U
TOTAL XYLENES	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
TRANS-1,2-DICHLOROETHENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
TRANS-1,3-DICHLOROPROPENE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
TRICHLOROETHENE	27	UJ	25	UJ	11	U	5	J	26	U	19	U	31	U
TRICHLOROFLUOROMETHANE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
VINYL CHLORIDE	27	UJ	25	UJ	11	U	10	U	26	U	19	U	31	U
SEMIVOLATILE ORGANICS (UG/KG)														
1,1-BIPHENYL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
2,2'-OXYBIS(1-CHLOROPROPANE)	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
2,4,5-TRICHLOROPHENOL	3300	UJ	3100	UJ	1100	U	1500	U	2600	U	2100	U	2300	U
2,4,6-TRICHLOROPHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
2,4-DICHLOROPHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
2,4-DIMETHYLPHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
2,4-DINITROPHENOL	3300	UJ	3100	UJ	1100	U	1500	U	2600	U	2100	U	2300	U
2-CHLORONAPHTHALENE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
2-CHLOROPHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
2-METHYLNAPHTHALENE	1300	UJ	1200	UJ	48	J	85	J	1000	U	840	U	910	U
2-METHYLPHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
2-NITROANILINE	3300	UJ	3100	UJ	1100	U	1500	U	2600	U	2100	U	2300	U
2-NITROPHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
3,3'-DICHLOROBENZIDINE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
3-NITROANILINE	3300	UJ	3100	UJ	1100	U	1500	U	2600	U	2100	U	2300	U
4,6-DINITRO-2-METHYLPHENOL	3300	UJ	3100	UJ	1100	U	1500	U	2600	U	2100	U	2300	U
4-BROMOPHENYL PHENYL ETHER	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
4-CHLORO-3-METHYLPHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
4-CHLOROANILINE	1300	UJ	1200	UJ	440	UJ	580	UJ	1000	UJ	840	UJ	910	UJ
4-CHLOROPHENYL PHENYL ETHER	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
4-METHYLPHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
4-NITROANILINE	3300	UJ	3100	UJ	1100	U	1500	U	2600	U	2100	U	2300	U
4-NITROPHENOL	3300	UJ	3100	UJ	1100	U	1500	U	2600	U	2100	U	2300	U
ACENAPHTHENE	1300	UJ	1200	UJ	50	J	120	J	1000	U	840	U	910	U
ACENAPHTHYLENE	1300	UJ	1200	UJ	440	U	83	J	1000	U	840	U	910	U
ACETOPHENONE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
ANTHRACENE	1300	UJ	1200	UJ	160	J	480	J	1000	U	840	U	910	U
ATRAZINE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
BAP EQUIVALENT			25.22		998.29		1476.4		140.14				117.18	
BENZALDEHYDE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
BENZO(A)ANTHRACENE	1300	UJ	1200	UJ	720		1400		120	J	840	U	910	U
BENZO(A)PYRENE	1300	UJ	1200	UJ	700		1000	J	110	J	840	U	95	J
BENZO(B)FLUORANTHENE	1300	UJ	250	J	1100		1500	J	180	J	840	U	220	J
BENZO(G,H,I)PERYLENE	1300	UJ	1200	UJ	270	J	330	J	1000	U	840	U	910	U
BENZO(K)FLUORANTHENE	1300	UJ	1200	UJ	350	J	1500	J	1000	U	840	U	910	U

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC018		MTC019		MTC020		MTC021		MTC022		MTC023		MTC023	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333940.86		333623.25		333717.68		333790.95		334449.65		335186.55		335186.55	
EASTING	1263462.35		1264439.07		1264638.88		1264888.8		1265916.98		1265947.96		1265947.96	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD01801		MTCSD01901		MTCSD02001		MTCSD02101		MTCSD02201		MTCSD02301		MTCSD02301-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/07/01		09/07/01		09/07/01		09/07/01		09/06/01		09/06/01		09/06/01	
BIS(2-CHLOROETHOXY)METHANE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
BIS(2-CHLOROETHYL)ETHER	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
BIS(2-ETHYLHEXYL)PHTHALATE	150	B	300	B	79	B	150	B	190	B	840	U	180	B
BUTYL BENZYL PHTHALATE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
CAPROLACTAM	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
CARBAZOLE	1300	UJ	1200	UJ	96	J	140	J	1000	U	840	U	910	U
CHRYSENE	1300	UJ	220	J	790		1400		140	J	840	U	180	J
DI-N-BUTYL PHTHALATE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
DI-N-OCTYL PHTHALATE	1300	UJ	1200	UJ	440	U	580	UJ	1000	U	840	U	910	U
DIBENZO(A,H)ANTHRACENE	1300	UJ	1200	UJ	83	J	130	J	1000	U	840	U	910	U
DIBENZOFURAN	1300	UJ	1200	UJ	440	U	94	J	1000	U	840	U	910	U
DIETHYL PHTHALATE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
DIMETHYL PHTHALATE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
FLUORANTHENE	1300	UJ	170	J	1100		2600		170	J	840	U	180	J
FLUORENE	1300	UJ	1200	UJ	64	J	200	J	1000	U	840	U	910	U
HEXACHLOROBENZENE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
HEXACHLOROBUTADIENE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
HEXACHLOROCYCLOPENTADIENE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
HEXACHLOROETHANE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
HIGH MOLECULAR WEIGHT PAHS			820		6403		12560		960				855	
INDENO(1,2,3-CD)PYRENE	1300	UJ	1200	UJ	290	J	400	J	1000	U	840	U	910	U
ISOPHORONE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
LOW MOLECULAR WEIGHT PAHS					942		2539							
N-NITROSO-DI-N-PROPYLAMINE	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
N-NITROSODIPHENYLAMINE	1300	UJ	140	J	270	J	4800	J	240	J	840	U	500	J
NAPHTHALENE	1300	UJ	1200	UJ	50	J	71	J	1000	U	840	U	910	U
PENTACHLOROPHENOL	3300	UJ	3100	UJ	1100	U	1500	U	2600	U	2100	U	2300	U
PHENANTHRENE	1300	UJ	1200	UJ	570		1500		1000	U	840	U	910	U
PHENOL	1300	UJ	1200	UJ	440	U	580	U	1000	U	840	U	910	U
PYRENE	1300	UJ	180	J	1000		2300		240	J	840	U	180	J
TOTAL PAHS			820		7345		15099		960				855	
PESTICIDES/PCBS (UG/KG)														
4,4'-DDD	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
4,4'-DDE	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
4,4'-DDT	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
ALDRIN	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
ALPHA-BHC	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
ALPHA-CHLORDANE	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
AROCLOR-1016	130	UJ	130	UJ	45	U	58	U	110	U	84	U	92	U
AROCLOR-1221	270	UJ	260	UJ	91	U	120	U	220	U	170	U	190	U
AROCLOR-1232	130	UJ	130	UJ	45	U	58	U	110	U	84	U	92	U
AROCLOR-1242	130	UJ	130	UJ	45	U	58	U	110	U	84	U	92	U
AROCLOR-1248	130	UJ	130	UJ	45	U	58	U	110	U	84	U	92	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC018		MTC019		MTC020		MTC021		MTC022		MTC023		MTC023	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333940.86		333623.25		333717.68		333790.95		334449.65		335186.55		335186.55	
EASTING	1263462.35		1264439.07		1264638.88		1264888.8		1265916.98		1265947.96		1265947.96	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD01801		MTCSD01901		MTCSD02001		MTCSD02101		MTCSD02201		MTCSD02301		MTCSD02301-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/07/01		09/07/01		09/07/01		09/07/01		09/06/01		09/06/01		09/06/01	
AROCLOR-1254	130	UJ	130	UJ	45	U	58	U	110	U	84	U	92	U
AROCLOR-1260	130	UJ	130	UJ	45	U	58	U	110	U	84	U	92	U
BETA-BHC	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
DELTA-BHC	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
DIELDRIN	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
ENDOSULFAN I	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
ENDOSULFAN II	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
ENDOSULFAN SULFATE	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
ENDRIN	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
ENDRIN ALDEHYDE	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
ENDRIN KETONE	13	UJ	13	UJ	4.5	U	5.8	U	11	U	8.4	U	9.2	U
GAMMA-BHC (LINDANE)	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
GAMMA-CHLORDANE	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
HEPTACHLOR	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
HEPTACHLOR EPOXIDE	6.7	UJ	6.5	UJ	2.3	U	3	U	5.5	U	4.3	U	4.7	U
METHOXYCHLOR	67	UJ	65	UJ	23	U	30	U	55	U	43	U	47	U
TOXAPHENE	670	UJ	650	UJ	230	U	300	U	550	U	430	U	470	U
INORGANICS (MG/KG)														
ALUMINUM	9010	J	13900	J	2140		4200		9450		9860		9710	
ANTIMONY	1.3	UJ	2.4	B	0.7	B	1.2	B	2.2	B	1.3	B	1.2	B
ARSENIC	5.4	B	10.3	B	13.9		16.1		9.4	B	7.1	B	9.6	B
BARIUM	119	J	163	J	92.6		114		122		103		112	
BERYLLIUM	1.1	J	1.6	J	0.79		0.8		1.2		1		1.1	
CADMIUM	1.3	J	1.7	J	0.35	K	1.2	K	1.7	K	1.3	K	1.4	K
CALCIUM	1760	J	2200	J	874		2980		1970		1770		2170	
CHROMIUM	21.6	J	30.7	J	9.7		18.6		23.1		21.3		22.6	
COBALT	15.7	J	21.2	J	10.7	K	17	K	15.9	K	11.3	K	13.1	K
COPPER	25.7	J	35.2	J	15.6		120		28.3		24.1		25.9	
CYANIDE	0.54	UJ	0.48	UJ	0.18		0.15	U	0.35	U	0.25	U	0.35	U
IRON	24100	J	34000	J	15600		21600		23300		22300		25200	
LEAD	34.4	J	46.5	J	16.3		85.7		43.6		43.5		47.2	
MAGNESIUM	1790	J	2540	J	491		2140		1770		1770		1890	
MANGANESE	932	J	1470	J	101		294		691		522		684	
MERCURY	0.37	J	0.26	J	0.13		0.7		0.34		0.12		0.21	
NICKEL	20.6	J	28.6	J	16.8	K	37.6		22	K	16.2	K	17.8	K
POTASSIUM	822	J	1360	J	190		473		889		867		855	
SELENIUM	2.4	UJ	2.6	UJ	1	UL	1.1	UL	1.9	UL	2.1	UL	1.9	UL
SILVER	1.5	J	1.6	J	0.14	UL	1.2	L	1.4	L	3.3	L	5.9	L
SODIUM	372	B	529	B	161	B	228	B	375	B	278	B	372	B
THALLIUM	2.1	UJ	2.7	J	1.3		1.9		1.7	U	1.9	U	1.7	U
VANADIUM	30	J	41.7	J	31.7		53.4		33.6	K	29.5	K	32	K
ZINC	158	J	210	J	59.4		216		183		117		128	

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC018		MTC019		MTC020		MTC021		MTC022		MTC023		MTC023	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333940.86		333623.25		333717.68		333790.95		334449.65		335186.55		335186.55	
EASTING	1263462.35		1264439.07		1264638.88		1264888.8		1265916.98		1265947.96		1265947.96	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD01801		MTCSD01901		MTCSD02001		MTCSD02101		MTCSD02201		MTCSD02301		MTCSD02301-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/07/01		09/07/01		09/07/01		09/07/01		09/06/01		09/06/01		09/06/01	
AVS/SEM PARAMETERS (UMO/G)														
ACID VOLATILE SULFIDE	0.12145		0.08005		0.85941		0.25986		0.99619		0.90195		0.68593	
CADMIUM	0.01555	B	0.01517	B	0.00334	B	0.0082	B	0.01444	B	0.01372	B	0.00984	B
COPPER	0.36614		0.3534		0.37028		1.62886		0.35146		0.33827		0.23678	
LEAD	0.17967		0.1774		0.06265		0.28633		0.18357		0.19359		0.17658	
MERCURY	0.00005	U	0.00005	U	0.00002	U	0.00002	U	0.00004	U	0.00003	U	0.00003	U
NICKEL	0.20712	B	0.23583	J	0.90436	J	3.59178	J	0.51301	J	0.40768	J	0.10244	B
TOTAL SEM-AVS	2.79199		3.04193		1.29488		7.23572		2.31363		1.63255		-0.27257	
ZINC	2.36763		2.35535		0.817		1.98861		2.26178		1.59496		1.23919	B
MISCELLANEOUS PARAMETERS (MG/KG)														
TOTAL ORGANIC CARBON	45700		44000		43400		40200		46000		38100		41600	
EXPLOSIVES (MG/KG)														
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROCELLULOSE	226		213		80.7		4780		399		265		277	
NITROGLYCERIN	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
NITROGUANIDINE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
RDX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
TETRYL	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
FIELD PARAMETERS														
PERCENT CLAY	17.8		19.8		1.2		6.7				13.4		12.8	
PERCENT GRAVEL	0		0		3.4		1				0		0	
PERCENT SAND	55.1		8.4		92.6		82.7				31.7		29.2	
PERCENT SILT	27.1		71.8		2.8		9.6				54.9		58	

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC023		MTC024		MTC025		MTC026		MTC026		MTC026	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335186.55		335618.15		335895.61		336165.78		336165.78		336165.78	
EASTING	1265947.96		1266001.52		1265973.33		1266131.04		1266131.04		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD02301-AVG		MTCSD02401		MTCSD02501		MTCSD02601 / MTCSD02601-A		MTCSD02601-D / MTCSD02601-A-D		MTCSD02601-AVG / MTCSD02601-A-AVG	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/06/01		09/06/01		09/06/01		09/06/01	
VOLATILE ORGANICS (UG/KG)												
1,1,1-TRICHLOROETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,1,2,2-TETRACHLOROETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,1,2-TRICHLOROETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,1,2-TRICHLOROTRIFLUOROETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,1-DICHLOROETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,1-DICHLOROETHENE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,2,4-TRICHLOROBENZENE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,2-DIBROMO-3-CHLOROPROPANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,2-DIBROMOETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,2-DICHLOROBENZENE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,2-DICHLOROETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,2-DICHLOROPROPANE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,3-DICHLOROBENZENE	25	U	34	U	11	U	12	U	11	U	11.5	U
1,4-DICHLOROBENZENE	25	U	34	U	11	U	12	U	11	U	11.5	U
2-BUTANONE	25	U	34	U	11	U	12	U	11	U	11.5	U
2-HEXANONE	25	U	34	U	11	U	12	U	11	U	11.5	U
4-METHYL-2-PENTANONE	25	U	34	U	11	U	12	U	11	U	11.5	U
ACETONE	125	J	150	J	18	J	42		32		37	
BENZENE	25	U	34	U	11	U	12	U	11	U	11.5	U
BROMODICHLOROMETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
BROMOFORM	25	U	34	U	11	U	12	U	11	U	11.5	U
BROMOMETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
CARBON DISULFIDE	11.5	J	13	J	5	J	12	U	11	U	11.5	U
CARBON TETRACHLORIDE	25	U	34	U	11	U	12	U	11	U	11.5	U
CHLOROBENZENE	25	U	34	U	11	U	12	U	11	U	11.5	U
CHLORODIBROMOMETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
CHLOROETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
CHLOROFORM	12	J	34	U	11	U	12	U	11	U	11.5	U
CHLOROMETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
CIS-1,2-DICHLOROETHENE	25	U	34	U	11	U	12	U	11	U	11.5	U
CIS-1,3-DICHLOROPROPENE	25	U	34	U	11	U	12	U	11	U	11.5	U
CYCLOHEXANE	25	U	34	U	11	U	12	U	11	U	11.5	U
DICHLORODIFLUOROMETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
DIETHYL ETHER	25	UJ	34	UJ	11	UJ	12	UJ	11	UJ	11.5	UJ
ETHYLBENZENE	25	U	34	U	11	U	12	U	11	U	11.5	U
ISOPROPYLBENZENE	25	U	34	U	11	U	12	U	11	U	11.5	U
METHYL ACETATE	25	U	34	U	11	U	12	U	11	U	11.5	U
METHYL CYCLOHEXANE	25	U	34	U	11	U	12	U	11	U	11.5	U
METHYL TERT-BUTYL ETHER	25	U	34	U	11	U	12	U	11	U	11.5	U
METHYLENE CHLORIDE	25	U	34	U	11	U	12	U	11	U	11.5	U
STYRENE	25	U	34	U	11	U	12	U	11	U	11.5	U
TETRACHLOROETHENE	25	U	34	U	11	U	12	U	11	U	11.5	U

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC023		MTC024		MTC025		MTC026		MTC026		MTC026	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335186.55		335618.15		335895.61		336165.78		336165.78		336165.78	
EASTING	1265947.96		1266001.52		1265973.33		1266131.04		1266131.04		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD02301-AVG		MTCSD02401		MTCSD02501		MTCSD02601 / MTCSD02601-A		MTCSD02601-D / MTCSD02601-A-D		MTCSD02601-AVG / MTCSD02601-A-AVG	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/06/01		09/06/01		09/06/01		09/06/01	
TOLUENE	25	U	34	U	11	U	12	U	11	U	11.5	U
TOTAL XYLENES	25	U	34	U	11	U	12	U	11	U	11.5	U
TRANS-1,2-DICHLOROETHENE	25	U	34	U	11	U	12	U	11	U	11.5	U
TRANS-1,3-DICHLOROPROPENE	25	U	34	U	11	U	12	U	11	U	11.5	U
TRICHLOROETHENE	25	U	34	U	11	U	12	U	11	U	11.5	U
TRICHLOROFLUOROMETHANE	25	U	34	U	11	U	12	U	11	U	11.5	U
VINYL CHLORIDE	25	U	34	U	11	U	12	U	11	U	11.5	U
SEMIVOLATILE ORGANICS (UG/KG)												
1,1-BIPHENYL	875	U	760	U	420	U	410	U	390	U	400	U
2,2'-OXYBIS(1-CHLOROPROPANE)	875	U	760	U	420	U	410	U	390	U	400	U
2,4,5-TRICHLOROPHENOL	2200	U	1900	U	1100	U	1000	U	980	U	990	U
2,4,6-TRICHLOROPHENOL	875	U	760	U	420	U	410	U	390	U	400	U
2,4-DICHLOROPHENOL	875	U	760	U	420	U	410	U	390	U	400	U
2,4-DIMETHYLPHENOL	875	U	760	U	420	U	410	U	390	U	400	U
2,4-DINITROPHENOL	2200	U	1900	U	1100	U	1000	U	980	U	990	U
2-CHLORONAPHTHALENE	875	U	760	U	420	U	410	U	390	U	400	U
2-CHLOROPHENOL	875	U	760	U	420	U	410	U	390	U	400	U
2-METHYLNAPHTHALENE	875	U	760	U	420	U	410	U	390	U	400	U
2-METHYLPHENOL	875	U	760	U	420	U	410	U	390	U	400	U
2-NITROANILINE	2200	U	1900	U	1100	U	1000	U	980	U	990	U
2-NITROPHENOL	875	U	760	U	420	U	410	U	390	U	400	U
3,3'-DICHLOROBENZIDINE	875	U	760	U	420	U	410	U	390	U	400	U
3-NITROANILINE	2200	U	1900	U	1100	U	1000	U	980	U	990	U
4,6-DINITRO-2-METHYLPHENOL	2200	U	1900	U	1100	U	1000	U	980	U	990	U
4-BROMOPHENYL PHENYL ETHER	875	U	760	U	420	U	410	U	390	U	400	U
4-CHLORO-3-METHYLPHENOL	875	U	760	U	420	U	410	U	390	U	400	U
4-CHLOROANILINE	875	UJ	760	UJ	420	UJ	410	UJ	390	UJ	400	UJ
4-CHLOROPHENYL PHENYL ETHER	875	U	760	U	420	U	410	U	390	U	400	U
4-METHYLPHENOL	875	U	760	U	420	U	410	U	390	U	400	U
4-NITROANILINE	2200	U	1900	U	1100	U	1000	U	980	U	990	U
4-NITROPHENOL	2200	U	1900	U	1100	U	1000	U	980	U	990	U
ACENAPHTHENE	875	U	760	U	420	U	410	U	390	U	400	U
ACENAPHTHYLENE	875	U	760	U	420	U	410	U	390	U	400	U
ACETOPHENONE	875	U	760	U	420	U	410	U	390	U	400	U
ANTHRACENE	875	U	760	U	420	U	410	U	390	U	400	U
ATRAZINE	875	U	760	U	420	U	410	U	390	U	400	U
BAP EQUIVALENT	117.18				137.1							
BENZALDEHYDE	875	U	760	U	420	U	410	U	390	U	400	U
BENZO(A)ANTHRACENE	875	U	760	U	70	J	410	U	390	U	400	U
BENZO(A)PYRENE	95	J	760	U	110	J	410	U	390	U	400	U
BENZO(B)FLUORANTHENE	220	J	760	U	140	J	410	U	390	U	400	U
BENZO(G,H,I)PERYLENE	875	U	760	U	51	J	410	U	390	U	400	U
BENZO(K)FLUORANTHENE	875	U	760	U	50	J	410	U	390	U	400	U

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC023		MTC024		MTC025		MTC026		MTC026		MTC026	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335186.55		335618.15		335895.61		336165.78		336165.78		336165.78	
EASTING	1265947.96		1266001.52		1265973.33		1266131.04		1266131.04		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD02301-AVG		MTCSD02401		MTCSD02501		MTCSD02601 / MTCSD02601-A		MTCSD02601-D / MTCSD02601-A-D		MTCSD02601-AVG / MTCSD02601-A-AVG	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/06/01		09/06/01		09/06/01		09/06/01	
BIS(2-CHLOROETHOXY)METHANE	875	U	760	U	420	U	410	U	390	U	400	U
BIS(2-CHLOROETHYL)ETHER	875	U	760	U	420	U	410	U	390	U	400	U
BIS(2-ETHYLHEXYL)PHTHALATE	510	B	140	B	59	B	50	B	73	B	61.5	B
BUTYL BENZYL PHTHALATE	875	U	760	U	420	U	410	U	390	U	400	U
CAPROLACTAM	875	U	760	U	420	U	410	U	390	U	400	U
CARBAZOLE	875	U	760	U	420	U	410	U	390	U	400	U
CHRYSENE	180	J	760	U	100	J	410	U	390	U	400	U
DI-N-BUTYL PHTHALATE	875	U	760	U	420	U	410	U	390	U	400	U
DI-N-OCTYL PHTHALATE	875	U	760	U	420	U	410	U	390	U	400	U
DIBENZO(A,H)ANTHRACENE	875	U	760	U	420	U	410	U	390	U	400	U
DIBENZOFURAN	875	U	760	U	420	U	410	U	390	U	400	U
DIETHYL PHTHALATE	875	U	760	U	420	U	410	U	390	U	400	U
DIMETHYL PHTHALATE	875	U	760	U	420	U	410	U	390	U	400	U
FLUORANTHENE	180	J	760	U	63	J	410	U	390	U	400	U
FLUORENE	875	U	760	U	420	U	410	U	390	U	400	U
HEXACHLOROBENZENE	875	U	760	U	420	U	410	U	390	U	400	U
HEXACHLOROBUTADIENE	875	U	760	U	420	U	410	U	390	U	400	U
HEXACHLOROCYCLOPENTADIENE	875	U	760	U	420	U	410	U	390	U	400	U
HEXACHLOROETHANE	875	U	760	U	420	U	410	U	390	U	400	U
HIGH MOLECULAR WEIGHT PAHS	855				759							
INDENO(1,2,3-CD)PYRENE	875	U	760	U	55	J	410	U	390	U	400	U
ISOPHORONE	875	U	760	U	420	U	410	U	390	U	400	U
LOW MOLECULAR WEIGHT PAHS												
N-NITROSO-DI-N-PROPYLAMINE	875	U	760	U	420	U	410	U	390	U	400	U
N-NITROSODIPHENYLAMINE	500	J	120	J	420	U	410	U	42	J	42	J
NAPHTHALENE	875	U	760	U	420	U	410	U	390	U	400	U
PENTACHLOROPHENOL	2200	U	1900	U	1100	U	1000	U	980	U	990	U
PHENANTHRENE	875	U	760	U	420	U	410	U	390	U	400	U
PHENOL	875	U	760	U	420	U	410	U	390	U	400	U
PYRENE	180	J	760	U	120	J	410	U	390	U	400	U
TOTAL PAHS	855				759							
PESTICIDES/PCBS (UG/KG)												
4,4'-DDD	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
4,4'-DDE	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
4,4'-DDT	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
ALDRIN	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
ALPHA-BHC	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
ALPHA-CHLORDANE	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
AROCLOR-1016	88	U	75	U	43	U	41	U	37	U	39	U
AROCLOR-1221	180	U	150	U	87	U	84	U	75	U	79.5	U
AROCLOR-1232	88	U	75	U	43	U	41	U	37	U	39	U
AROCLOR-1242	88	U	75	U	43	U	41	U	37	U	39	U
AROCLOR-1248	88	U	75	U	43	U	41	U	37	U	39	U

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC023		MTC024		MTC025		MTC026		MTC026		MTC026	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335186.55		335618.15		335895.61		336165.78		336165.78		336165.78	
EASTING	1265947.96		1266001.52		1265973.33		1266131.04		1266131.04		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD02301-AVG		MTCSD02401		MTCSD02501		MTCSD02601 / MTCSD02601-A		MTCSD02601-D / MTCSD02601-A-D		MTCSD02601-AVG / MTCSD02601-A-AVG	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/06/01		09/06/01		09/06/01		09/06/01	
AROCLOR-1254	88	U	75	U	43	U	41	U	37	U	39	U
AROCLOR-1260	88	U	75	U	43	U	41	U	37	U	39	U
BETA-BHC	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
DELTA-BHC	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
DIELDRIN	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
ENDOSULFAN I	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
ENDOSULFAN II	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
ENDOSULFAN SULFATE	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
ENDRIN	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
ENDRIN ALDEHYDE	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
ENDRIN KETONE	8.8	U	7.5	U	4.3	U	4.1	U	3.7	U	3.9	U
GAMMA-BHC (LINDANE)	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
GAMMA-CHLORDANE	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
HEPTACHLOR	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
HEPTACHLOR EPOXIDE	4.5	U	3.9	U	2.2	U	2.1	U	1.9	U	2	U
METHOXYCHLOR	45	U	39	U	22	U	21	U	19	U	20	U
TOXAPHENE	450	U	390	U	220	U	210	U	190	U	200	U
INORGANICS (MG/KG)												
ALUMINUM	9785		7210		545		1130		993		1061.5	
ANTIMONY	1.25	B	1.2	B	0.61	U	5.2	B	4.6	B	4.9	B
ARSENIC	8.35	B	2.8	B	13.8		70.7	J	45.5	J	58.1	J
BARIUM	107.5		84.9		8.7		29.6		19.1		24.35	
BERYLLIUM	1.05		0.8		0.11		0.16		0.16		0.16	
CADMIUM	1.35	K	2.3	K	0.4	K	116	J	43.8	J	79.9	J
CALCIUM	1970		1400		131		248		132		190	
CHROMIUM	21.95		16.2		1.8	K	10.9	K	7.6	K	9.25	K
COBALT	12.2	K	9.7	K	1.4	B	3.2	K	1.6	K	2.4	K
COPPER	25		12.7		1.6	B	229	J	92.4	J	160.7	J
CYANIDE	0.3	U	0.24	U	0.15	U	0.15	UL	0.15	U	0.15	U
IRON	23750		15400		1710		14000		9620		11810	
LEAD	45.35		18.7		16		3010	J	1330	J	2170	J
MAGNESIUM	1830		1300		106	B	244		217		230.5	
MANGANESE	603		401		33.9		80.2	J	46.1	J	63.15	J
MERCURY	0.165		0.12		0.059	U	0.06	UR	0.048	UR	0.054	UR
NICKEL	17	K	11.9	K	1.2	B	8.7	K	3.7	K	6.2	K
POTASSIUM	861		639		85.5		8.9	U	74.7		39.575	
SELENIUM	2	UL	1.7	UL	1.1	UL	0.77	UR	0.71	UR	0.74	UR
SILVER	4.6	L	0.43	L	0.15	UL	0.4	L	0.12	L	0.26	L
SODIUM	325	B	296	B	119	B	23000	J	16200	J	19600	J
THALLIUM	1.8	U	1.5	U	0.98	U	2.4	K	1.1	K	1.75	K
VANADIUM	30.75	K	23	K	3.5	K	7.4	K	6.9	K	7.15	K
ZINC	122.5		74.2		35.3		71000	J	52800	J	61900	J

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC023		MTC024		MTC025		MTC026		MTC026		MTC026	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335186.55		335618.15		335895.61		336165.78		336165.78		336165.78	
EASTING	1265947.96		1266001.52		1265973.33		1266131.04		1266131.04		1266131.04	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 5		AREA 5		AREA 5		AREA 5		AREA 5		AREA 5	
SAMPLE ID	MTCSD02301-AVG		MTCSD02401		MTCSD02501		MTCSD02601 / MTCSD02601-A		MTCSD02601-D / MTCSD02601-A-D		MTCSD02601-AVG / MTCSD02601-A-AVG	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/06/01		09/06/01		09/06/01		09/06/01	
AVS/SEM PARAMETERS (UMO/G)												
ACID VOLATILE SULFIDE	0.79394		0.38018		0.50089		0.15717		0.05986		0.10852	
CADMIUM	0.01178	B	0.00692	B	0.00298	B	0.6833	J	0.64725	J	0.66528	J
COPPER	0.28753		1.12564		0.03104	B	7.68749	J	6.17558	J	6.93154	J
LEAD	0.18509		0.06352		0.07335		6.80611		9.9676		8.38686	
MERCURY	0.00003	U	0.00003	U	0.00002	U	0.00004	U	0.00005	B	0.00005	B
NICKEL	0.22945	J	2.63256	J	0.0221	B	5.65373	J	0.04563	B	2.83828	
TOTAL SEM-AVS	0.67999		3.44154		-0.42754		734.96312		963.08542		849.02427	
ZINC	1.10728		0.86475	B	0.60917	B	714.28966		946.35485		830.32226	
MISCELLANEOUS PARAMETERS (MG/KG)												
TOTAL ORGANIC CARBON	39850		44700		1800		5040	J	2640	J	3840	J
EXPLOSIVES (MG/KG)												
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
HMX	0.25	U	0.1	J	0.25	U	0.25	UJ	0.25	U	0.25	U
NITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
NITROCELLULOSE	271		112		6.9		57.5	J	27.4	J	42.45	J
NITROGLYCERIN	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U
NITROGUANIDINE	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
RDX	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
TETRYL	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	U	0.25	U
FIELD PARAMETERS												
PERCENT CLAY	13.1		20.1		5.1		0.4		2		1.2	
PERCENT GRAVEL	0		1.7		11.6		43.6		37.7		40.7	
PERCENT SAND	30.5		47.2		81.4		54.6		59.1		56.9	
PERCENT SILT	56.5		31		1.9		1.4		1.2		1.3	

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSD02701 / MTCSD02701-A		MTCSD02801 / MTCSD02801-A		MTCSD02901		MTCSD03001		NJCSD00101 / NJCSD00101-A		NJCSD00201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/09/01		09/09/01		09/05/01		09/05/01	
VOLATILE ORGANICS (UG/KG)												
1,1,1-TRICHLOROETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,1,2,2-TETRACHLOROETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,1,2-TRICHLOROETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,1,2-TRICHLOROTRIFLUOROETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,1-DICHLOROETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,1-DICHLOROETHENE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,2,4-TRICHLOROBENZENE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,2-DIBROMO-3-CHLOROPROPANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,2-DIBROMOETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,2-DICHLOROBENZENE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,2-DICHLOROETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,2-DICHLOROPROPANE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,3-DICHLOROBENZENE	23	U	21	U	10	U	13	U	39	UJ	14	U
1,4-DICHLOROBENZENE	23	U	21	U	10	U	13	U	39	UJ	14	U
2-BUTANONE	23	U	21	U	10	U	13	U	39	UJ	14	U
2-HEXANONE	23	U	21	U	10	U	13	U	39	UJ	14	U
4-METHYL-2-PENTANONE	23	U	21	U	10	U	13	U	39	UJ	14	U
ACETONE	100		120		7	J	66	J	210	J	14	U
BENZENE	23	U	21	U	10	U	13	U	39	UJ	14	U
BROMODICHLOROMETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
BROMOFORM	23	U	21	U	10	U	13	U	39	UJ	14	U
BROMOMETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
CARBON DISULFIDE	19	J	15	J	10	U	16		71	J	14	U
CARBON TETRACHLORIDE	23	U	21	U	10	U	13	U	39	UJ	14	U
CHLOROBENZENE	23	U	21	U	10	U	13	U	39	UJ	14	U
CHLORODIBROMOMETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
CHLOROETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
CHLOROFORM	23	U	21	U	10	U	13	U	39	UJ	14	U
CHLOROMETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
CIS-1,2-DICHLOROETHENE	23	U	21	U	10	U	13	U	39	UJ	14	U
CIS-1,3-DICHLOROPROPENE	23	U	21	U	10	U	13	U	39	UJ	14	U
CYCLOHEXANE	23	U	21	U	10	U	13	U	39	UJ	14	U
DICHLORODIFLUOROMETHANE	23	U	21	U	10	U	13	U	39	UJ	14	U
DIETHYL ETHER	23	UJ	21	UJ	10	UJ	13	UJ	39	UJ	14	UJ
ETHYLBENZENE	23	U	21	U	10	U	13	U	39	UJ	14	U
ISOPROPYLBENZENE	23	U	21	U	10	U	13	U	39	UJ	14	U
METHYL ACETATE	23	U	21	U	10	U	13	U	42	J	14	U
METHYL CYCLOHEXANE	23	U	21	U	10	U	13	U	39	UJ	14	U
METHYL TERT-BUTYL ETHER	23	U	21	U	10	U	13	U	39	UJ	14	U
METHYLENE CHLORIDE	23	U	21	U	10	U	13	U	10	J	4	J
STYRENE	23	U	21	U	10	U	13	U	39	UJ	14	U
TETRACHLOROETHENE	23	U	21	U	10	U	13	U	39	UJ	4	J

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSD02701 / MTCSD02701-A		MTCSD02801 / MTCSD02801-A		MTCSD02901		MTCSD03001		NJCSD00101 / NJCSD00101-A		NJCSD00201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/09/01		09/09/01		09/05/01		09/05/01	
TOLUENE	23	U	21	U	10	U	13	U	39	UJ	14	U
TOTAL XYLENES	23	U	21	U	10	U	13	U	39	UJ	14	U
TRANS-1,2-DICHLOROETHENE	23	U	21	U	10	U	13	U	39	UJ	14	U
TRANS-1,3-DICHLOROPROPENE	23	U	21	U	10	U	13	U	39	UJ	14	U
TRICHLOROETHENE	23	U	21	U	10	U	13	U	39	UJ	14	U
TRICHLOROFLUOROMETHANE	23	U	21	U	10	U	13	U	39	UJ	7	J
VINYL CHLORIDE	23	U	21	U	10	U	13	U	39	UJ	14	U
SEMIVOLATILE ORGANICS (UG/KG)												
1,1-BIPHENYL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2,4,5-TRICHLOROPHENOL	2600	U	2600	U	990	U	1700	U	3800	UJ	1100	UJ
2,4,6-TRICHLOROPHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2,4-DICHLOROPHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2,4-DIMETHYLPHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2,4-DINITROPHENOL	2600	U	2600	U	990	U	1700	U	3800	UJ	1100	UJ
2-CHLORONAPHTHALENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2-CHLOROPHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2-METHYLNAPHTHALENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2-METHYLPHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
2-NITROANILINE	2600	U	2600	U	990	U	1700	U	3800	UJ	1100	UJ
2-NITROPHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
3,3'-DICHLOROBENZIDINE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
3-NITROANILINE	2600	U	2600	U	990	U	1700	U	3800	UJ	1100	UJ
4,6-DINITRO-2-METHYLPHENOL	2600	U	2600	U	990	U	1700	U	3800	UJ	1100	UJ
4-BROMOPHENYL PHENYL ETHER	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
4-CHLORO-3-METHYLPHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
4-CHLOROANILINE	1000	UJ	1000	UJ	400	UJ	690	UJ	1500	UJ	460	UJ
4-CHLOROPHENYL PHENYL ETHER	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
4-METHYLPHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
4-NITROANILINE	2600	U	2600	U	990	U	1700	U	3800	UJ	1100	UJ
4-NITROPHENOL	2600	U	2600	U	990	U	1700	U	3800	UJ	1100	UJ
ACENAPHTHENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
ACENAPHTHYLENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
ACETOPHENONE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
ANTHRACENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
ATRAZINE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
BAP EQUIVALENT							7.5					
BENZALDEHYDE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
BENZO(A)ANTHRACENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
BENZO(A)PYRENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
BENZO(B)FLUORANTHENE	1000	U	1000	U	400	U	75	J	1500	UJ	460	UJ
BENZO(G,H,I)PERYLENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
BENZO(K)FLUORANTHENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSD02701 / MTCSD02701-A		MTCSD02801 / MTCSD02801-A		MTCSD02901		MTCSD03001		NJCSD00101 / NJCSD00101-A		NJCSD00201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/09/01		09/09/01		09/05/01		09/05/01	
BIS(2-CHLOROETHOXY)METHANE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
BIS(2-CHLOROETHYL)ETHER	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
BIS(2-ETHYLHEXYL)PHTHALATE	150	B	160	B	400	U	690	U	1500	UJ	48	B
BUTYL BENZYL PHTHALATE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
CAPROLACTAM	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
CARBAZOLE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
CHRYSENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
DI-N-BUTYL PHTHALATE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
DI-N-OCTYL PHTHALATE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
DIBENZO(A,H)ANTHRACENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
DIBENZOFURAN	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
DIETHYL PHTHALATE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
DIMETHYL PHTHALATE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
FLUORANTHENE	1000	U	1000	U	400	U	81	J	1500	UJ	460	UJ
FLUORENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
HEXACHLOROBENZENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
HEXACHLOROBUTADIENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
HEXACHLOROCYCLOPENTADIENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
HEXACHLOROETHANE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
HIGH MOLECULAR WEIGHT PAHS							254					
INDENO(1,2,3-CD)PYRENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
ISOPHORONE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
LOW MOLECULAR WEIGHT PAHS												
N-NITROSO-DI-N-PROPYLAMINE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
N-NITROSODIPHENYLAMINE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
NAPHTHALENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
PENTACHLOROPHENOL	2600	U	2600	U	990	U	1700	U	3800	UJ	1100	UJ
PHENANTHRENE	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
PHENOL	1000	U	1000	U	400	U	690	U	1500	UJ	460	UJ
PYRENE	1000	U	1000	U	400	U	98	J	1500	UJ	460	UJ
TOTAL PAHS							254					
PESTICIDES/PCBS (UG/KG)												
4,4'-DDD	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
4,4'-DDE	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
4,4'-DDT	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
ALDRIN	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
ALPHA-BHC	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
ALPHA-CHLORDANE	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
AROCLOR-1016	100	U	100	U	41	U	68	U	150	UJ	45	UJ
AROCLOR-1221	210	U	210	U	82	U	140	U	300	UJ	91	UJ
AROCLOR-1232	100	U	100	U	41	U	68	U	150	UJ	45	UJ
AROCLOR-1242	100	U	100	U	41	U	68	U	150	UJ	45	UJ
AROCLOR-1248	100	U	100	U	41	U	68	U	150	UJ	45	UJ

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSD02701 / MTCSD02701-A		MTCSD02801 / MTCSD02801-A		MTCSD02901		MTCSD03001		NJCSD00101 / NJCSD00101-A		NJCSD00201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/09/01		09/09/01		09/05/01		09/05/01	
AROCLOR-1254	100	U	100	U	41	U	68	U	150	UJ	45	UJ
AROCLOR-1260	100	U	100	U	41	U	68	U	150	UJ	45	UJ
BETA-BHC	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
DELTA-BHC	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
DIELDRIN	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
ENDOSULFAN I	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
ENDOSULFAN II	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
ENDOSULFAN SULFATE	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
ENDRIN	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
ENDRIN ALDEHYDE	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
ENDRIN KETONE	10	U	10	U	4.1	U	6.8	U	15	UJ	4.5	UJ
GAMMA-BHC (LINDANE)	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
GAMMA-CHLORDANE	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
HEPTACHLOR	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
HEPTACHLOR EPOXIDE	5.3	U	5.3	U	2.1	U	3.5	U	7.7	UJ	2.3	UJ
METHOXYCHLOR	53	U	53	U	21	U	35	U	77	UJ	23	UJ
TOXAPHENE	530	U	530	U	210	U	350	U	770	UJ	230	UJ
INORGANICS (MG/KG)												
ALUMINUM	5430		11400		245		5300		9770	J	1250	
ANTIMONY	1.3	UL	1.5	UL	0.4	UL	1.1	B	2.3	B	0.58	B
ARSENIC	2.7	J	2.5	UJ	0.69	U	3.1	K	4.1	J	1.3	J
BARIUM	68.1		112		5.5		59.2		58	J	7.6	
BERYLLIUM	0.72		1		0.13		0.59		1.3	J	0.19	
CADMIUM	2.6	J	2.3	J	0.59	K	1.9	K	3.5	J	0.47	J
CALCIUM	1380		1490		85		980		1490	J	980	
CHROMIUM	14.1	K	21.3	K	2.5	K	13.4		25	J	4.5	K
COBALT	12	K	10.8	K	1.5		10.2		19.8	J	2.7	K
COPPER	13.8	J	11.1	J	0.3	B	11.5		22.7	J	2.8	B
CYANIDE	0.47	U	0.41	B	0.14	U	0.41	U	0.63	B	0.18	UL
IRON	13600		18100		6100		15800		27900	J	3720	
LEAD	19.4	J	14.6	J	1.7		19		30.7	J	4.9	J
MAGNESIUM	1000		1850		56.2	B	977		3590	J	416	
MANGANESE	299	J	288	J	71.3		393		876	J	175	J
MERCURY	0.15	UR	0.12	UR	0.056	U	0.099	U	0.21	UR	0.056	UR
NICKEL	12.9	K	15	K	1.3	K	11.2	K	22.5	J	2.7	K
POTASSIUM	512		770		44.8	B	596		1460	J	352	
SELENIUM	2.3	UR	2.6	UR	0.71	U	1.8	U	3.2	UR	1	UR
SILVER	0.76	L	0.36	UL	0.099	UL	0.4	L	0.44	UJ	0.14	UL
SODIUM	304	B	234	B	101	B	371	B	3760	J	382	J
THALLIUM	2.1	U	2.4	U	0.64	UL	1.6	UL	2.9	UJ	0.9	U
VANADIUM	18.2	K	28.1	K	6.4		18.7		32.9	J	4.6	K
ZINC	108	J	69.9	J	3.5	B	22	B	142	J	19	J

APPENDIX B-1.2

SEDIMENT DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	MTC027		MTC028		MTC029		MTC030		NJC001		NJC002	
LOCATION TYPE	SWSD		SWSD		SWSD		SWSD		SWSD		SWSD	
NORTHING	335538.46		335705.07		324317.72		324577.98		282855.94		282348.5	
EASTING	1271543.78		1271379.33		1256000.16		1257980.5		1272625.48		1272913.41	
SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		NANJEMOY CREEK		NANJEMOY CREEK	
AREA OF CONCERN	AREA 6		AREA 6		AREA 1		AREA 1		AREA 7		AREA 7	
SAMPLE ID	MTCSD02701 / MTCSD02701-A		MTCSD02801 / MTCSD02801-A		MTCSD02901		MTCSD03001		NJCSD00101 / NJCSD00101-A		NJCSD00201	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/06/01		09/06/01		09/09/01		09/09/01		09/05/01		09/05/01	
AVS/SEM PARAMETERS (UMO/G)												
ACID VOLATILE SULFIDE	7.87781		0.19738		0.00566	U	0.00945		0.16959	U	0.0541	U
CADMIUM	0.01657	B	0.01529	B	0.00038	B	0.00319	B	0.0207	B	0.00216	B
COPPER	0.17613	B	0.50898	J	0.01884	B	0.16217	J	0.12321	B	1.99241	J
LEAD	0.14997		0.16439		0.00295	B	0.07631		0.21833		0.02679	
MERCURY	0.00009	U	0.0001	U	0.00002	U	0.00003	U	0.00014	U	0.00002	U
NICKEL	0.12923	B	1.5042	J	0.04445	B	0.08866	B	0.19825	B	2.28138	J
TOTAL SEM-AVS	0.33602		9.98627				1.10988		0.21833		4.30058	
ZINC	8.06386		8.00608		0.04249	B	0.88085		1.92936	B	0.20161	B
MISCELLANEOUS PARAMETERS (MG/KG)												
TOTAL ORGANIC CARBON	25000	J	34500	J	550		16000		69200	J	1460	J
EXPLOSIVES (MG/KG)												
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
HMX	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.17	J	0.25	U
NITROBENZENE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
NITROCELLULOSE	56	J	26.4	J	0.52	B	2	J	8.2	J	1.3	J
NITROGLYCERIN	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	U	0.5	U
NITROGUANIDINE	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
RDX	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
TETRYL	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U	0.25	U
FIELD PARAMETERS												
PERCENT CLAY	2		27.1						16.2		4.5	
PERCENT GRAVEL	0		0						0		0.6	
PERCENT SAND	79.4		15.3						31.6		29.7	
PERCENT SILT	18.6		57.6						22.2		65.2	

APPENDIX B-1.3

FISH FILLET DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCCT00101 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 1 MTCCT00102 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCCT00301 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCCT00302 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00401 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00402 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00403 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCCT005 ET 9/6/2001	QUAL
SEMIVOLATILE ORGANICS (UG/KG)																
1,1-BIPHENYL	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
2,2'-OXYBIS(1-CHLOROPROPANE)	330	U	3300	U	330	U	9800	U	330	U	330	U	330	U	330	U
2,4,5-TRICHLOROPHENOL	820	UJ	8300	UJ	830	U	25000	U	830	U	830	U	820	U	820	U
2,4,6-TRICHLOROPHENOL	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
2,4-DICHLOROPHENOL	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
2,4-DIMETHYLPHENOL	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
2,4-DINITROPHENOL	820	UJ	8300	UJ	830	UJ	25000	UJ	830	U	830	UJ	820	UJ	820	U
2-CHLORONAPHTHALENE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
2-CHLOROPHENOL	330	U	3300	U	330	U	9800	U	330	U	330	U	330	U	330	U
2-METHYLNAPHTHALENE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
2-METHYLPHENOL	330	U	3300	U	330	U	9800	U	330	U	330	U	330	U	330	U
2-NITROANILINE	820	UJ	8300	UJ	830	U	25000	U	830	U	830	U	820	U	820	U
2-NITROPHENOL	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
3,3'-DICHLOROBENZIDINE	330	UR	3300	UJ	330	UJ	9800	U	1300	U	330	UJ	330	UJ	330	U
3-NITROANILINE	820	UJ	8300	UJ	830	U	25000	U	830	U	830	U	820	U	820	U
4,6-DINITRO-2-METHYLPHENOL	820	UJ	8300	UJ	830	UJ	25000	U	3300	U	830	UJ	820	UJ	820	U
4-BROMOPHENYL PHENYL ETHER	330	UJ	3300	UJ	330	UJ	9800	U	1300	U	330	U	330	U	330	U
4-CHLORO-3-METHYLPHENOL	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
4-CHLOROANILINE	330	UR	3300	UR	330	UR	9800	UR	330	UR	330	UR	330	UR	330	UJ
4-CHLOROPHENYL PHENYL ETHER	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
4-METHYLPHENOL	620		2500	J	14000		64000		9800		200	J	16000		330	U
4-NITROANILINE	820	UJ	8300	UJ	830	U	25000	U	830	U	830	U	820	U	820	U
4-NITROPHENOL	820	UJ	8300	UJ	830	U	25000	U	830	U	830	U	820	U	820	U
ACENAPHTHENE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
ACENAPHTHYLENE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
ACETOPHENONE	330	U	3300	U	330	U	9800	U	330	U	330	U	330	U	330	U
ANTHRACENE	330	UJ	3300	UJ	330	UJ	9800	U	1300	U	330	U	330	U	330	U
ATRAZINE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
BENZALDEHYDE	330	U	3300	U	330	U	9800	U	330	U	330	U	330	U	330	U
BENZO(A)ANTHRACENE	330	UR	3300	UJ	330	UJ	9800	U	1300	U	330	UJ	330	UJ	330	U
BENZO(A)PYRENE	330	UJ	3300	UJ	330	UJ	9800	U	330	U	330	UJ	330	UJ	330	UJ
BENZO(B)FLUORANTHENE	330	UJ	3300	UJ	330	UJ	9800	U	330	U	330	UJ	330	UJ	330	UJ
BENZO(G,H,I)PERYLENE	330	UJ	3300	UJ	330	UJ	9800	U	330	U	330	UJ	330	UJ	330	UJ
BENZO(K)FLUORANTHENE	330	UJ	3300	UJ	330	UJ	9800	U	330	U	330	UJ	330	UJ	330	UJ
BIS(2-CHLOROETHOXY)METHANE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
BIS(2-CHLOROETHYL)ETHER	330	U	3300	U	330	U	9800	U	330	U	330	U	330	U	330	U
BIS(2-ETHYLHEXYL)PHTHALATE	720	J	1800	J	480		1200	J	1400		1300		2200		330	U
BUTYL BENZYL PHTHALATE	330	UR	3300	UJ	330	UJ	9800	U	1300	U	330	UJ	330	UJ	330	U
CAPROLACTAM	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
CARBAZOLE	330	UJ	3300	UJ	330	UJ	9800	U	1300	U	330	U	330	U	330	U
CHRYSENE	330	UR	3300	UJ	330	UJ	9800	U	1300	U	330	UJ	330	UJ	330	U
DI-N-BUTYL PHTHALATE	330	UJ	3300	UJ	330	UJ	9800	U	330	U	330	U	330	U	330	UJ
DI-N-OCTYL PHTHALATE	330	UJ	3300	UJ	330	UJ	9800	UJ	1300	U	330	UJ	330	UJ	330	UJ
DIBENZO(A,H)ANTHRACENE	330	UJ	3300	UJ	330	UJ	9800	U	330	U	330	UJ	330	UJ	330	UJ
DIBENZOFURAN	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
DIETHYL PHTHALATE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	UJ

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCCT00101 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 1 MTCCT00102 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCCT00301 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCCT00302 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00401 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00402 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00403 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCCT005 ET 9/6/2001	QUAL
DIMETHYL PHTHALATE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
FLUORANTHENE	330	UJ	3300	UJ	330	UJ	9800	U	1300	U	330	U	330	U	330	U
FLUORENE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
HEXACHLOROBENZENE	330	UJ	3300	UJ	330	UJ	9800	U	1300	U	330	U	330	U	330	U
HEXACHLOROBUTADIENE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
HEXACHLOROCYCLOPENTADIENE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
HEXACHLOROETHANE	330	U	3300	U	330	U	9800	U	330	U	330	U	330	U	330	U
INDENO(1,2,3-CD)PYRENE	330	UJ	3300	UJ	330	UJ	9800	U	330	U	330	UJ	330	UJ	330	UJ
ISOPHORONE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
N-NITROSO-DI-N-PROPYLAMINE	330	U	3300	U	330	U	9800	U	330	U	330	U	330	U	330	U
N-NITROSODIPHENYLAMINE	330	UJ	3300	UJ	330	UJ	9800	U	1300	U	330	U	330	U	330	U
NAPHTHALENE	330	UJ	3300	UJ	330	U	9800	U	330	U	330	U	330	U	330	U
PENTACHLOROPHENOL	820	UR	8300	UR	830	UJ	25000	UR	3300	UR	830	U	820	U	820	U
PHENANTHRENE	330	UJ	3300	UJ	330	UJ	9800	U	1300	U	330	U	330	U	330	U
PHENOL	54	J	3300	U	330	U	9800	U	330	U	330	U	330	U	150	J
PYRENE	330	UR	3300	UJ	330	UJ	9800	UJ	1300	U	330	UJ	330	UJ	330	UJ
PESTICIDES/PCBS (UG/KG)																
4,4'-DDD	3.3	U	3.3	U	6.3	R	3.3	U	3.3	U	9.7	R	3.3	U	3.3	U
4,4'-DDE	35		46		110		35		30		41		5		4.5	
4,4'-DDT	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ALDRIN	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ALPHA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ALPHA-CHLORDANE	7.9	R	21	R	20	R	3	R	1.7	U	1.7	U	1.7	U	1.7	U
AROCLOR-1016	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1221	67	U	67	U	66	U	67	U	67	U	67	U	67	U	67	U
AROCLOR-1232	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1242	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1248	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1254	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1260	160	J	280		380	J	240	J	180	J	230		39		33	U
BETA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
DELTA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
DIELDRIN	3.3	U	3.9	R	7.3	J	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDOSULFAN I	1.7	U	2.1	J	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ENDOSULFAN II	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDOSULFAN SULFATE	5.4	R	5.4	R	7.1	R	4.5	R	6.4	R	4.1	R	3.3	U	3.3	U
ENDRIN	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	5		3.3	U	3.3	U
ENDRIN ALDEHYDE	3.7	R	4.6	R	7.5	R	4.7	R	3.3	U	3.5	R	3.3	U	3.3	U
ENDRIN KETONE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
GAMMA-BHC (LINDANE)	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
GAMMA-CHLORDANE	3.2	J	7	J	8.5	J	1.7	R	1.7	U	2.5	R	1.7	U	1.7	U
HEPTACHLOR	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
HEPTACHLOR EPOXIDE	1.7	U	1.7	U	1.8	R	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
METHOXYCHLOR	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U
TOXAPHENE	170	U	170	U	170	U	170	U	170	U	170	U	170	U	170	U

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCCT00101 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 1 MTCCT00102 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCCT00301 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCCT00302 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00401 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00402 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCCT00403 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCCT005 ET 9/6/2001	QUAL
INORGANICS (MG/KG)																
ALUMINUM	6.8		22.4		2.3	B	3.3	B	4.1	B	3.7	B	3	B	8.5	
ANTIMONY	0.48	U	0.44	B	0.38	U	0.37	U	0.34	U	0.34	U	0.37	U	0.35	U
ARSENIC	0.84	U	0.75	K	0.66	U	0.65		0.6	U	0.6	U	0.67		0.61	U
BARIUM	0.06	U	0.065	B	0.18	B	0.67		0.29	B	0.42	B	0.21	B	0.19	B
BERYLLIUM	0.02	U	0.018	U	0.016	U	0.016	U	0.014	U	0.014	U	0.016	U	0.014	U
CADMIUM	0.034		0.031		0.021		0.019		0.017		0.017		0.033		0.033	K
CALCIUM	101		544		801		3220		220		1400		877		856	
CHROMIUM	0.29	B	0.23	B	0.2	B	0.26	B	0.19	B	0.18	B	0.26	B	0.32	B
COBALT	0.069	B	0.041	B	0.031	U	0.031	U	0.029	U	0.028	U	0.031	U	0.052	B
COPPER	0.78	B	0.65	B	0.42	B	0.33	B	0.66	B	0.53	B	0.53	B	3.6	
CYANIDE	0.3	U	0.49		0.37	U	0.32	U	0.38	U	0.38	U	0.38	U	0.33	U
IRON	7.5	B	6	B	7.3	J	11.8	J	9.3	J	10	J	8.7	J	16.6	
LEAD	0.43	B	0.42	B	0.2		0.29		0.17	U	0.17	U	0.2		0.54	B
MAGNESIUM	125		150		151		164		113		142		140		176	
MANGANESE	0.39	K	1.6	K	0.67	J	4	J	1.9	J	3.5	J	1.7	J	0.64	K
MERCURY	0.05	U	0.048	U	0.045	U	0.048	U	0.048	U	0.042	U	0.045	U	0.048	U
NICKEL	0.12	B	0.085	B	0.08	B	0.16	B	0.042	B	0.069	B	0.1	B	0.51	B
POTASSIUM	1740		1760		1990	J	1400	J	1670	J	1600	J	1930	J	2690	
SELENIUM	0.86	U	0.76	U	0.67	U	0.67	U	0.61	U	0.61	U	0.67	U	0.62	UJ
SILVER	0.12	UL	0.11	UL	0.094	UL	0.093	UL	0.086	UL	0.085	UL	0.093	UL	0.087	UL
SODIUM	219		256		322		200		338		431		401		880	
THALLIUM	0.78	U	0.69	U	0.61	U	0.6	U	0.56	U	0.55	U	0.6	U	0.57	U
VANADIUM	0.08	U	0.071	U	0.062	U	0.062	U	0.057	U	0.057	U	0.062	U	0.058	U
ZINC	6.9	B	7.4		8.6	J	9.2	J	5.1	B	5.1	B	6.7	J	10.9	
MISCELLANEOUS PARAMETERS																
LIPIDS (%)	7.23		4.82		5.15		0.97		1.52		1.91		3.04		0.03	
PERCHLORATE (UG/KG)	5000	U	5000	U	5000	U	2500	U	2500	U	2500	U	5000	U	5000	U
EXPLOSIVES (MG/KG)																
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.057	J
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.096	J	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.083	J
NITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROCELLULOSE	1.9	B	1.3	B	1.8	B	1.2	B	3.5	B	5.7		1.3	B	2.7	B
NITROGLYCERIN	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
NITROGUANIDINE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
RDX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
TETRYL	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 6 MTCCT006 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 1 MTCLB001 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCLB00201 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCLB00202 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCLB00203 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCLB003 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCLB00401 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCLB00402 ET 9/9/2001	QUAL
SEMIVOLATILE ORGANICS (UG/KG)																
1,1-BIPHENYL	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
2,2'-OXYBIS(1-CHLOROPROPANE)	330	U	330	U	330	U	330	U	330	U	330	U	330	U	330	U
2,4,5-TRICHLOROPHENOL	830	U	830	U	830	UJ	820	UJ	820	U	820	U	820	U	830	U
2,4,6-TRICHLOROPHENOL	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
2,4-DICHLOROPHENOL	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
2,4-DIMETHYLPHENOL	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
2,4-DINITROPHENOL	830	U	830	U	830	UJ	820	UJ	820	U	820	U	820	UJ	830	UJ
2-CHLORONAPHTHALENE	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
2-CHLOROPHENOL	330	U	330	U	330	U	330	U	330	U	330	U	330	U	330	U
2-METHYLNAPHTHALENE	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
2-METHYLPHENOL	330	U	330	U	330	U	330	U	330	U	330	U	330	U	330	U
2-NITROANILINE	830	U	830	U	830	UJ	820	UJ	820	U	820	U	820	U	830	U
2-NITROPHENOL	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
3,3'-DICHLOROBENZIDINE	9900	UJ	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
3-NITROANILINE	830	U	830	U	830	UJ	820	UJ	820	U	820	U	820	U	830	U
4,6-DINITRO-2-METHYLPHENOL	830	UJ	830	UJ	830	UJ	820	UJ	820	U	820	UJ	820	UJ	830	UJ
4-BROMOPHENYL PHENYL ETHER	330	UJ	330	UJ	330	UJ	330	UJ	330	U	330	UJ	330	U	330	U
4-CHLORO-3-METHYLPHENOL	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
4-CHLOROANILINE	330	UJ	330	UJ	330	UR	330	UR	330	UJ	330	UR	330	UR	330	UR
4-CHLOROPHENYL PHENYL ETHER	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
4-METHYLPHENOL	45000		8300		330	U	330	U	80	J	330	U	550		23000	
4-NITROANILINE	830	U	830	U	830	UJ	820	UJ	820	U	820	U	820	U	830	U
4-NITROPHENOL	830	U	830	U	830	UJ	820	UJ	820	U	820	U	820	U	830	U
ACENAPHTHENE	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
ACENAPHTHYLENE	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
ACETOPHENONE	330	U	330	U	330	U	330	U	330	U	330	U	330	U	330	U
ANTHRACENE	330	UJ	330	UJ	330	UJ	330	UJ	330	U	330	UJ	330	U	330	U
ATRAZINE	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
BENZALDEHYDE	330	U	330	U	75	J	77	J	43	J	43	J	330	U	330	U
BENZO(A)ANTHRACENE	9900	UJ	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BENZO(A)PYRENE	9900	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BENZO(B)FLUORANTHENE	9900	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BENZO(G,H,I)PERYLENE	9900	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BENZO(K)FLUORANTHENE	9900	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BIS(2-CHLOROETHOXY)METHANE	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
BIS(2-CHLOROETHYL)ETHER	330	U	330	U	330	U	330	U	330	U	330	U	330	U	330	U
BIS(2-ETHYLHEXYL)PHTHALATE	9900	UJ	380	J	140	J	75	J	1200	J	640	J	1600	J	980	J
BUTYL BENZYL PHTHALATE	9900	UJ	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
CAPROLACTAM	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
CARBAZOLE	330	UJ	330	UJ	330	UJ	330	UJ	330	U	330	UJ	330	U	330	U
CHRYSENE	9900	UJ	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
DI-N-BUTYL PHTHALATE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	U	330	U
DI-N-OCTYL PHTHALATE	9900	UJ	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
DIBENZO(A,H)ANTHRACENE	9900	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
DIBENZOFURAN	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
DIETHYL PHTHALATE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	U	330	U	330	U

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 6 MTCCT006 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 1 MTCLB001 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCLB00201 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCLB00202 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCLB00203 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCLB003 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCLB00401 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCLB00402 ET 9/9/2001	QUAL
DIMETHYL PHTHALATE	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
FLUORANTHENE	330	UJ	330	UJ	330	UJ	330	UJ	330	U	330	UJ	330	U	330	U
FLUORENE	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
HEXACHLOROBENZENE	330	UJ	330	UJ	330	UJ	330	UJ	330	U	330	UJ	330	U	330	U
HEXACHLOROBUTADIENE	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
HEXACHLOROCYCLOPENTADIENE	330	U	330	U	330	UJ	330	UJ	330	U	330	U	330	U	330	U
HEXACHLOROETHANE	330	U	330	U	330	U	330	U	330	U	330	U	330	U	330	U
INDENO(1,2,3-CD)PYRENE	9900	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
ISOPHORONE	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
N-NITROSO-DI-N-PROPYLAMINE	330	U	330	U	330	U	330	U	330	U	330	U	330	U	330	U
N-NITROSODIPHENYLAMINE	330	UJ	330	U	330	UJ	330	UJ	330	U	330	UJ	330	U	330	U
NAPHTHALENE	330	U	330	U	330	U	330	UJ	330	U	330	U	330	U	330	U
PENTACHLOROPHENOL	830	UJ	830	UJ	830	UR	820	UR	820	U	820	UR	820	U	830	U
PHENANTHRENE	330	UJ	330	UJ	330	UJ	330	UJ	330	U	330	UJ	330	U	330	U
PHENOL	330	U	330	U	330	UJ	330	U	330	U	330	U	71	J	330	U
PYRENE	9900	UJ	1600	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
PESTICIDES/PCBS (UG/KG)																
4,4'-DDD	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
4,4'-DDE	8.7	J	4.2		3.3	U	3.3	U	3.3	U	8.4	J	5.2		8.6	J
4,4'-DDT	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ALDRIN	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ALPHA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ALPHA-CHLORDANE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
AROCLOR-1016	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1221	66	U	67	U	67	U	67	U	67	U	67	U	66	U	67	U
AROCLOR-1232	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1242	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1248	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1254	33	U	33	U	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1260	73	J	33	U	47	J	43	J	33	U	51	J	42	J	59	
BETA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
DELTA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
DIELDRIN	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDOSULFAN I	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ENDOSULFAN II	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDOSULFAN SULFATE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDRIN	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDRIN ALDEHYDE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDRIN KETONE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
GAMMA-BHC (LINDANE)	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
GAMMA-CHLORDANE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
HEPTACHLOR	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
HEPTACHLOR EPOXIDE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
METHOXYCHLOR	17	U	17	U	17	U	17	U	17	U	17	U	17	U	17	U
TOXAPHENE	170	U	170	U	170	U	170	U	170	U	170	U	170	U	170	U

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE	MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK		MATTAWOMAN CREEK	
AREA OF CONCERN	AREA 6		AREA 1		AREA 2		AREA 2		AREA 2		AREA 3		AREA 4		AREA 4	
SAMPLE ID	MTCCT006		MTCLB001		MTCLB00201		MTCLB00202		MTCLB00203		MTCLB003		MTCLB00401		MTCLB00402	
MATRIX	ET		ET		ET		ET		ET		ET		ET		ET	
SAMPLE DATE	9/6/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/8/2001	QUAL	9/9/2001	QUAL	9/9/2001	QUAL
INORGANICS (MG/KG)																
ALUMINUM	20.1		2.8		5		14		3.7		4.1	B	2.8	B	1.4	B
ANTIMONY	0.41	U	0.45	B	0.37	U	0.42	U	0.48	U	0.45	U	0.48	U	0.32	U
ARSENIC	0.71	U	1.5	K	0.89	K	1.6	K	1.2	K	0.79	U	0.84	U	0.57	U
BARIUM	1.1		0.14	B	0.36		0.3		0.08	B	0.15	B	0.15	B	0.2	B
BERYLLIUM	0.017	U	0.018	U	0.016	U	0.017	U	0.02	U	0.019	U	0.02	U	0.014	U
CADMIUM	0.017	U	0.018	U	0.016	U	0.03		0.02	U	0.019	U	0.02	U	0.014	U
CALCIUM	619		3630		7900		6740		2320		207		1680		2770	
CHROMIUM	0.19	B	0.24	B	0.23	B	6.2		0.26	B	0.28	B	1.4		0.17	B
COBALT	0.081	B	0.045	B	0.069	B	0.095	B	0.063	B	0.038	U	0.04	U	0.027	U
COPPER	1.3	B	0.4	B	0.74	B	0.82	B	0.62	B	0.63	B	0.3	B	0.44	B
CYANIDE	0.34	U	0.3	U	5.5		0.33	U	0.42	U	0.37	U	0.35	U	0.38	U
IRON	47.3		3.9	B	3	B	48		4.1	B	7.5	B	32.5	J	3	B
LEAD	0.26	B	0.28	B	0.19	U	1.1		0.24	U	0.23	U	0.24	U	0.16	U
MAGNESIUM	104		229		402		330		233		220		212		232	
MANGANESE	3.1	K	0.81	K	0.93	K	1.7	K	0.56	K	0.34	B	0.78	J	0.52	J
MERCURY	0.043	U	0.042	U	0.052		0.048	U	0.045	U	0.042	U	0.042	U	0.042	U
NICKEL	0.097	B	0.11	B	0.83	B	0.32	B	0.12	B	0.13	B	0.15	B	0.097	B
POTASSIUM	1330		1870		3130		2290		2440		2810	J	2510	J	2240	J
SELENIUM	0.73	UJ	0.77	U	0.67	U	0.75	U	0.86	U	0.81	U	0.86	U	0.58	U
SILVER	0.1	UL	0.11	UL	0.093	UL	0.1	UL	0.12	UL	0.11	UL	0.12	UL	0.081	UL
SODIUM	267		342		554		431		367		395		413		391	
THALLIUM	0.66	U	0.7	U	0.6	U	0.68	U	0.78	U	0.74	U	0.78	U	0.53	U
VANADIUM	0.072		0.071	U	0.062	U	0.07	U	0.08	U	0.075	U	0.08	U	0.054	U
ZINC	5	B	7.2	B	11.9		7.8		6.2	B	6	B	6.3	B	6.1	J
MISCELLANEOUS PARAMETERS																
LIPIDS (%)	0.59		0.91		1.16		0.6		1.19		0.89		1.17		0.75	
PERCHLORATE (UG/KG)	5000	U	5000	U	10200		5000	U	5000	U	2500	U	2500	U	5000	U
EXPLOSIVES (MG/KG)																
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROCELLULOSE	1.4	B	1.6	B	1.6	B	2	B	1.8	B	1.7	B	1.2	B	1.8	B
NITROGLYCERIN	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
NITROGUANIDINE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.12	J	0.19	J	0.25	U
RDX	0.12	J	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
TETRYL	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 5 MTCLB005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCLB006 ET 9/7/2001	QUAL	NANJEMOY CREEK AREA 7 NJCWP007 ET 9/6/2001	QUAL
SEMIVOLATILE ORGANICS (UG/KG)						
1,1-BIPHENYL	330	U	320	U	330	U
2,2'-OXYBIS(1-CHLOROPROPANE)	330	U	320	U	330	U
2,4,5-TRICHLOROPHENOL	830	U	820	U	820	UJ
2,4,6-TRICHLOROPHENOL	330	U	320	U	330	UJ
2,4-DICHLOROPHENOL	330	U	320	U	330	U
2,4-DIMETHYLPHENOL	330	U	320	U	330	U
2,4-DINITROPHENOL	830	U	820	U	820	UJ
2-CHLORONAPHTHALENE	330	U	320	U	330	UJ
2-CHLOROPHENOL	330	U	320	U	330	U
2-METHYLNAPHTHALENE	330	U	320	U	330	U
2-METHYLPHENOL	330	U	320	U	330	U
2-NITROANILINE	830	U	820	U	820	UJ
2-NITROPHENOL	330	U	320	U	330	U
3,3'-DICHLOROBENZIDINE	330	U	320	UJ	330	UJ
3-NITROANILINE	830	U	820	U	820	U
4,6-DINITRO-2-METHYLPHENOL	830	U	820	U	820	UJ
4-BROMOPHENYL PHENYL ETHER	330	U	320	U	330	UJ
4-CHLORO-3-METHYLPHENOL	330	U	320	U	330	U
4-CHLOROANILINE	330	UJ	320	UJ	330	U
4-CHLOROPHENYL PHENYL ETHER	330	U	320	U	330	UJ
4-METHYLPHENOL	330	U	320	U	330	U
4-NITROANILINE	830	U	820	U	820	UJ
4-NITROPHENOL	830	U	820	U	820	UJ
ACENAPHTHENE	330	U	320	U	330	U
ACENAPHTHYLENE	330	U	320	U	330	UJ
ACETOPHENONE	330	U	320	U	330	U
ANTHRACENE	330	U	320	U	330	UJ
ATRAZINE	330	U	320	U	330	U
BENZALDEHYDE	91	J	500		330	U
BENZO(A)ANTHRACENE	330	U	320	UJ	330	UJ
BENZO(A)PYRENE	330	UJ	320	UR	330	UJ
BENZO(B)FLUORANTHENE	330	UJ	320	UR	330	UJ
BENZO(G,H,I)PERYLENE	330	UJ	320	UR	330	UJ
BENZO(K)FLUORANTHENE	330	UJ	320	UR	330	UJ
BIS(2-CHLOROETHOXY)METHANE	330	U	320	U	330	U
BIS(2-CHLOROETHYL)ETHER	330	U	320	U	330	U
BIS(2-ETHYLHEXYL)PHTHALATE	330	U	78	J	800	J
BUTYL BENZYL PHTHALATE	330	U	320	UJ	330	UJ
CAPROLACTAM	330	U	320	U	330	U
CARBAZOLE	330	U	320	U	330	UJ
CHRYSENE	330	U	320	UJ	330	UJ
DI-N-BUTYL PHTHALATE	330	UJ	320	UJ	330	UJ
DI-N-OCTYL PHTHALATE	330	UJ	320	UR	330	UJ
DIBENZO(A,H)ANTHRACENE	330	UJ	320	UR	330	UJ
DIBENZOFURAN	330	U	320	U	330	UJ
DIETHYL PHTHALATE	330	UJ	320	UJ	330	UJ

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 5 MTCLB005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCLB006 ET 9/7/2001	QUAL	NANJEMOY CREEK AREA 7 NJCWP007 ET 9/6/2001	QUAL
DIMETHYL PHTHALATE	330	U	320	U	330	UJ
FLUORANTHENE	330	U	320	U	330	UJ
FLUORENE	330	U	320	U	330	UJ
HEXACHLOROBENZENE	330	U	320	U	330	UJ
HEXACHLOROBUTADIENE	330	U	320	U	330	U
HEXACHLOROCYCLOPENTADIENE	330	U	320	U	330	UJ
HEXACHLOROETHANE	330	U	320	U	330	U
INDENO(1,2,3-CD)PYRENE	330	UJ	320	UR	330	UJ
ISOPHORONE	330	U	320	U	330	U
N-NITROSO-DI-N-PROPYLAMINE	330	U	320	U	330	U
N-NITROSODIPHENYLAMINE	330	U	320	U	330	UJ
NAPHTHALENE	330	U	320	U	330	U
PENTACHLOROPHENOL	830	U	820	U	820	UJ
PHENANTHRENE	330	U	320	U	330	UJ
PHENOL	330	U	46	J	330	U
PYRENE	330	U	320	UJ	330	UJ
PESTICIDES/PCBS (UG/KG)						
4,4'-DDD	3.3	U	3.3	U	3.3	U
4,4'-DDE	3.3	U	3.3	U	4.5	J
4,4'-DDT	3.3	U	3.3	U	3.3	U
ALDRIN	1.7	U	1.7	U	1.7	U
ALPHA-BHC	1.7	U	1.7	U	1.7	U
ALPHA-CHLORDANE	1.7	U	1.7	U	1.7	U
AROCLOR-1016	33	U	33	U	33	U
AROCLOR-1221	67	U	66	U	67	U
AROCLOR-1232	33	U	33	U	33	U
AROCLOR-1242	33	U	33	U	33	U
AROCLOR-1248	33	U	33	U	33	U
AROCLOR-1254	33	U	33	U	33	U
AROCLOR-1260	33	U	33	U	33	U
BETA-BHC	1.7	U	1.7	U	1.7	U
DELTA-BHC	1.7	U	1.7	U	1.7	U
DIELDRIN	3.3	U	3.3	U	3.3	U
ENDOSULFAN I	1.7	U	1.7	U	1.7	U
ENDOSULFAN II	3.3	U	3.3	U	3.3	U
ENDOSULFAN SULFATE	3.3	U	3.3	U	3.3	U
ENDRIN	3.3	U	3.3	U	3.3	U
ENDRIN ALDEHYDE	3.3	U	3.3	U	3.3	U
ENDRIN KETONE	3.3	U	3.3	U	3.3	U
GAMMA-BHC (LINDANE)	1.7	U	1.7	U	1.7	U
GAMMA-CHLORDANE	1.7	U	1.7	U	1.7	U
HEPTACHLOR	1.7	U	1.7	U	1.7	U
HEPTACHLOR EPOXIDE	1.7	U	1.7	U	1.7	U
METHOXYCHLOR	17	U	17	U	17	U
TOXAPHENE	170	U	170	U	170	U

APPENDIX B-1.3

FISH FILET DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 5 MTCLB005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCLB006 ET 9/7/2001	QUAL	NANJEMOY CREEK AREA 7 NJCWP007 ET 9/6/2001	QUAL
INORGANICS (MG/KG)						
ALUMINUM	3.2		5.3		3.5	
ANTIMONY	0.48	U	0.48	U	0.4	U
ARSENIC	1.5	K	2.2	K	2	K
BARIUM	0.74		0.8	K	1.3	
BERYLLIUM	0.02	U	0.02	U	0.017	U
CADMIUM	0.02	U	0.02	U	0.024	K
CALCIUM	16900		21900		15500	
CHROMIUM	0.92	K	0.59	K	0.3	B
COBALT	0.12	B	0.11	B	0.075	B
COPPER	1.1	B	0.86	B	0.83	B
CYANIDE	0.43	U	0.35	U	0.36	U
IRON	6.9	B	6.5	B	3.2	B
LEAD	0.24	U	0.24	U	0.32	B
MAGNESIUM	611		674		406	
MANGANESE	2	K	1.6	K	7.8	
MERCURY	0.098		0.17		0.059	
NICKEL	1	B	0.45	B	0.19	B
POTASSIUM	3680		3250		2030	
SELENIUM	0.86	UJ	0.86	UJ	0.72	UJ
SILVER	0.16	B	0.12	UL	0.1	UL
SODIUM	698		969		519	
THALLIUM	0.78	U	0.78	U	0.65	U
VANADIUM	0.08	U	0.08	UL	0.11	
ZINC	11.5		13.4		17.3	
MISCELLANEOUS PARAMETERS						
LIPIDS (%)	0.12		0.19		1.74	
PERCHLORATE (UG/KG)	5000	U	5000	U	5000	U
EXPLOSIVES (MG/KG)						
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U
HMX	0.25	U	0.25	U	0.25	U
NITROBENZENE	0.25	U	0.25	U	0.25	U
NITROCELLULOSE	1.8	B	1.7	B	1.4	B
NITROGLYCERIN	0.5	U	0.5	U	0.5	U
NITROGUANIDINE	0.25	U	0.25	U	0.25	U
RDX	0.25	U	0.25	U	0.25	U
TETRYL	0.25	U	0.25	U	0.25	U

APPENDIX B-1.4

WHOLE BODY FISH DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

APPENDIX B-1.4

WHOLE BODY FISH DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCFS001 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCFS002 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCFS003 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCFS004 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCFS005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCFS006 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCGS002 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCGS003 ET 9/8/2001	QUAL
SEMIVOLATILE ORGANICS (UG/KG)																
1,1-BIPHENYL	330	U	330	U	330	U	6600	U	330	U	330	U	330	U	330	U
2,2'-OXYBIS(1-CHLOROPROPANE)	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
2,4,5-TRICHLOROPHENOL	820	U	820	U	820	U	17000	U	820	UJ	830	U	830	U	830	U
2,4,6-TRICHLOROPHENOL	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
2,4-DICHLOROPHENOL	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
2,4-DIMETHYLPHENOL	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
2,4-DINITROPHENOL	820	UJ	820	UJ	820	UJ	17000	UJ	820	UJ	830	UJ	830	UJ	830	UJ
2-CHLORONAPHTHALENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
2-CHLOROPHENOL	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
2-METHYLNAPHTHALENE	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
2-METHYLPHENOL	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	170	J
2-NITROANILINE	820	U	820	U	820	U	17000	U	820	UJ	830	U	830	U	830	U
2-NITROPHENOL	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
3,3'-DICHLOROBENZIDINE	330	UJ	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
3-NITROANILINE	820	U	820	U	820	U	17000	U	820	UJ	830	U	830	U	830	U
4,6-DINITRO-2-METHYLPHENOL	820	U	820	UJ	820	UJ	17000	U	820	UJ	830	UJ	830	UJ	830	UJ
4-BROMOPHENYL PHENYL ETHER	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
4-CHLORO-3-METHYLPHENOL	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
4-CHLOROANILINE	330	UR	330	UR	330	UR	6600	UR	330	UJ	330	UR	330	UR	330	UR
4-CHLOROPHENYL PHENYL ETHER	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
4-METHYLPHENOL	5400		35	J	11000		39000		31000		310	J	2800		150	J
4-NITROANILINE	820	U	820	U	820	U	17000	U	820	UJ	830	U	830	U	830	U
4-NITROPHENOL	820	U	820	U	820	U	17000	U	820	UJ	830	U	830	U	830	U
ACENAPHTHENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
ACENAPHTHYLENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
ACETOPHENONE	330	U	330	U	330	U	6600	U	330	U	330	U	330	U	330	U
ANTHRACENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
ATRAZINE	330	U	330	U	330	U	6600	U	330	U	330	U	330	U	330	U
BENZALDEHYDE	34	J	46	J	330	U	6600	U	53	J	330	U	330	U	330	U
BENZO(A)ANTHRACENE	330	UJ	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
BENZO(A)PYRENE	330	U	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
BENZO(B)FLUORANTHENE	330	U	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
BENZO(G,H,I)PERYLENE	330	U	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
BENZO(K)FLUORANTHENE	330	U	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
BIS(2-CHLOROETHOXY)METHANE	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
BIS(2-CHLOROETHYL)ETHER	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
BIS(2-ETHYLHEXYL)PHTHALATE	1900	J	330	UJ	780	J	1300	J	4900	UJ	260	J	330	UJ	120	J
BUTYL BENZYL PHTHALATE	330	UJ	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
CAPROLACTAM	330	U	330	U	330	U	6600	U	330	U	330	U	330	U	330	U
CARBAZOLE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
CHRYSENE	330	UJ	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
DI-N-BUTYL PHTHALATE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
DI-N-OCTYL PHTHALATE	330	UJ	330	UJ	330	UJ	6600	UJ	4900	UJ	330	U	330	UJ	330	UJ
DIBENZO(A,H)ANTHRACENE	330	UJ	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
DIBENZOFURAN	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
DIETHYL PHTHALATE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U

APPENDIX B-1.4

WHOLE BODY FISH DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCFS001 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCFS002 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCFS003 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCFS004 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCFS005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCFS006 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCGS002 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCGS003 ET 9/8/2001	QUAL
DIMETHYL PHTHALATE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
FLUORANTHENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
FLUORENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
HEXACHLOROBENZENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
HEXACHLOROBUTADIENE	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
HEXACHLOROCYCLOPENTADIENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
HEXACHLOROETHANE	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
INDENO(1,2,3-CD)PYRENE	330	UJ	330	UJ	330	UJ	6600	U	4900	UJ	330	UJ	330	UJ	330	UJ
ISOPHORONE	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
N-NITROSO-DI-N-PROPYLAMINE	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
N-NITROSODIPHENYLAMINE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
NAPHTHALENE	330	U	330	U	330	U	6600	U	330	U	330	UJ	330	U	330	U
PENTACHLOROPHENOL	820	UR	820	U	820	U	17000	UR	820	UJ	830	U	830	U	830	U
PHENANTHRENE	330	U	330	U	330	U	6600	U	330	UJ	330	U	330	U	330	U
PHENOL	330	U	330	U	140	J	6600	U	330	U	65	J	120	J	330	U
PYRENE	330	UJ	330	UJ	330	UJ	6600	UJ	4900	UJ	330	UJ	330	UJ	330	UJ
PESTICIDES/PCBS (UG/KG)																
4,4'-DDD	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	6.5	U	3.3	U
4,4'-DDE	5.2	J	3.3	U	3.3	U	4.8		5.3		4.7		6.5	U	3.3	J
4,4'-DDT	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	6.5	U	3.3	U
ALDRIN	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.7	U
ALPHA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.7	U
ALPHA-CHLORDANE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	2.7	R
AROCLOR-1016	33	U	33	U	33	U	33	U	33	U	33	U	65	U	33	U
AROCLOR-1221	67	U	66	U	67	U	67	U	67	U	67	U	130	U	66	U
AROCLOR-1232	33	U	33	U	33	U	33	U	33	U	33	U	65	U	33	U
AROCLOR-1242	33	U	33	U	33	U	33	U	33	U	33	U	65	U	33	U
AROCLOR-1248	33	U	33	U	33	U	33	U	33	U	33	U	65	U	33	U
AROCLOR-1254	33	U	33	U	33	U	33	U	33	U	33	U	65	U	33	U
AROCLOR-1260	33	U	36	J	33	U	50	J	34	J	33	U	65	U	33	U
BETA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.7	U
DELTA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.7	U
DIELDRIN	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	6.5	U	3.3	U
ENDOSULFAN I	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.7	U
ENDOSULFAN II	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	6.5	U	3.3	U
ENDOSULFAN SULFATE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	6.5	U	3.3	U
ENDRIN	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	6.5	U	3.3	U
ENDRIN ALDEHYDE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	6.5	U	3.3	U
ENDRIN KETONE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	6.5	U	3.3	U
GAMMA-BHC (LINDANE)	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.7	U
GAMMA-CHLORDANE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.7	U
HEPTACHLOR	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.7	U
HEPTACHLOR EPOXIDE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	3.4	U	1.9	R
METHOXYCHLOR	17	U	17	U	17	U	17	U	17	U	17	U	34	U	17	U
TOXAPHENE	170	U	170	U	170	U	170	U	170	U	170	U	340	U	170	U

APPENDIX B-1.4

WHOLE BODY FISH DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCFS001 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCFS002 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCFS003 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCFS004 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCFS005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCFS006 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCGS002 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCGS003 ET 9/8/2001	QUAL
INORGANICS (MG/KG)																
ALUMINUM	6.6		3.6		16.4		2.7	B	5.4		7.2		8.7		7.3	
ANTIMONY	0.47	U	0.4	U	0.41	U	0.33	U	0.46	U	0.47	U	0.32	U	0.39	U
ARSENIC	1.5	K	1.6	K	2		1.2		1.7	K	1.4	K	0.59		0.7	
BARIUM	0.54		0.95		1.3		0.82		1		1.6		1.5		1.6	
BERYLLIUM	0.02	U	0.017	U	0.017	U	0.014	U	0.019	U	0.02	U	0.013	U	0.016	U
CADMIUM	0.02	U	0.017	U	0.022		0.025		0.019	U	0.02	U	0.023		0.016	U
CALCIUM	5020		10800		9580		6340		7800		8210		2860		2990	
CHROMIUM	0.31	B	0.26	B	0.31	B	0.74		0.28	B	0.29	B	6.6		0.28	B
COBALT	0.062	B	0.1	B	0.048	B	0.047	B	0.083	B	0.071	B	0.066	B	0.033	U
COPPER	0.67	B	0.62	B	0.64	B	0.62	B	0.57	B	0.65	B	0.87	B	0.73	B
CYANIDE	0.3	U	0.42	U	0.37	U	0.32	U	0.38	U	0.3	U	0.31	U	0.45	
IRON	9.6		10.2		17.6	J	12.5	J	13.5		19.1		166	J	17.9	J
LEAD	0.24	U	0.33	B	0.41		0.2		0.28	B	0.24	U	0.16	U	0.2	U
MAGNESIUM	180		293		274		200		211		247		176		181	
MANGANESE	4.1	K	7.8		8.2	J	4.8	J	7.3		5.8	K	6.3	J	5.6	J
MERCURY	0.045	U	0.045	U	0.05	U	0.043	U	0.042	U	0.045	U	0.04	U	0.042	U
NICKEL	0.081	B	0.15	B	0.16	B	0.38	B	0.16	B	0.14	B	0.33	B	0.18	B
POTASSIUM	1000		1130		1360	J	1200	J	1270		1310		1210	J	1420	J
SELENIUM	0.84	U	0.72	U	0.74	U	0.59	U	0.82	UJ	0.84	UJ	0.57	U	0.7	U
SILVER	0.12	UL	0.1	UL	0.1	UL	0.082	UL	0.11	UL	0.12	UL	0.08	UL	0.098	UL
SODIUM	331		429		493		463		413		443		309		400	
THALLIUM	0.76	U	0.65	U	0.67	U	0.53	U	0.74	U	0.76	U	0.52	U	0.64	U
VANADIUM	0.078	U	0.076		0.078		0.055	U	0.24		0.087		0.38		0.066	U
ZINC	12.4		17.4		16	J	13.3	J	14.2		15.1		16.7	J	12.1	J
MISCELLANEOUS PARAMETERS																
LIPIDS (%)	1.23		0.95		1.17		1.3		1.06		1.4		0.57		2.38	
PERCHLORATE (UG/KG)	5000	U	2500	U	5000	U	2500	U	2500	U	5000	U	5000	U	5000	U
EXPLOSIVES (MG/KG)																
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.7	U	0.25	U
NITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROCELLULOSE	1.4	B	1.9	B	1.7	B	2.6	B	1.7	B	1.3	B	2	B	1.6	B
NITROGLYCERIN	0.1	J	0.5	U	0.5	U	0.1	J	0.5	U	0.5	U	0.18	J	1.3	U
NITROGUANIDINE	0.25	U	1	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	3	U
RDX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
TETRYL	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U

APPENDIX B-1.4

WHOLE BODY FISH DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCSS001 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCSS004 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCSS005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCSS006 ET 9/7/2001	QUAL	NANJEMOY CREEK AREA 7 NJCFS007 ET 9/6/2001	QUAL	NANJEMOY CREEK AREA 7 NJCMC007 ET 9/6/2001	QUAL
SEMIVOLATILE ORGANICS (UG/KG)												
1,1-BIPHENYL	330	U	330	UJ	330	U	330	UJ	330	U	330	U
2,2'-OXYBIS(1-CHLOROPROPANE)	330	U	330	UJ	330	U	330	U	330	U	330	U
2,4,5-TRICHLOROPHENOL	820	U	4100	UJ	830	UJ	820	UJ	830	UJ	830	U
2,4,6-TRICHLOROPHENOL	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
2,4-DICHLOROPHENOL	330	U	330	UJ	330	U	330	UJ	330	U	330	U
2,4-DIMETHYLPHENOL	330	U	330	UJ	330	U	330	UJ	330	U	330	U
2,4-DINITROPHENOL	820	UJ	4100	UJ	830	UJ	820	UJ	830	UJ	830	UJ
2-CHLORONAPHTHALENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
2-CHLOROPHENOL	330	U	330	UJ	330	U	330	U	330	U	330	U
2-METHYLNAPHTHALENE	330	U	330	UJ	330	U	330	UJ	330	U	330	U
2-METHYLPHENOL	73	J	330	UJ	330	U	330	U	330	U	330	U
2-NITROANILINE	820	U	4100	UJ	830	UJ	820	UJ	830	UJ	830	U
2-NITROPHENOL	330	U	330	UJ	330	U	330	UJ	330	U	330	U
3,3'-DICHLOROBENZIDINE	330	UJ	1600	UJ	330	UJ	330	UR	330	U	330	UJ
3-NITROANILINE	820	U	4100	UJ	830	UJ	820	UJ	830	UJ	830	U
4,6-DINITRO-2-METHYLPHENOL	820	UJ	4100	UJ	830	UJ	820	UJ	830	UJ	830	UJ
4-BROMOPHENYL PHENYL ETHER	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
4-CHLORO-3-METHYLPHENOL	330	U	330	UJ	330	U	330	UJ	330	U	330	U
4-CHLOROANILINE	330	UR	330	UR	330	UR	330	UR	330	UR	330	UR
4-CHLOROPHENYL PHENYL ETHER	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
4-METHYLPHENOL	330	U	12000		870		660		61	J	84	J
4-NITROANILINE	820	U	4100	UJ	830	U	820	UJ	830	UJ	830	U
4-NITROPHENOL	820	U	4100	UJ	830	UJ	820	UJ	830	UJ	830	U
ACENAPHTHENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
ACENAPHTHYLENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
ACETOPHENONE	330	U	330	UJ	330	U	330	U	330	U	330	U
ANTHRACENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
ATRAZINE	330	U	330	UJ	330	U	330	UJ	330	U	330	U
BENZALDEHYDE	330	U	330	UJ	330	U	320	J	120	J	410	
BENZO(A)ANTHRACENE	330	UJ	1600	UJ	330	UJ	330	UR	330	U	330	UJ
BENZO(A)PYRENE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BENZO(B)FLUORANTHENE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BENZO(G,H,I)PERYLENE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BENZO(K)FLUORANTHENE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
BIS(2-CHLOROETHOXY)METHANE	330	U	330	UJ	330	U	330	UJ	330	U	330	U
BIS(2-CHLOROETHYL)ETHER	330	U	330	UJ	330	U	330	U	330	U	330	U
BIS(2-ETHYLHEXYL)PHTHALATE	330	UJ	880	J	150	J	330	UR	330	U	330	UJ
BUTYL BENZYL PHTHALATE	330	UJ	1600	UJ	330	UJ	330	UR	330	U	330	UJ
CAPROLACTAM	330	U	330	UJ	330	U	330	UJ	330	U	330	U
CARBAZOLE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
CHRYSENE	330	UJ	1600	UJ	330	UJ	330	UR	330	U	330	UJ
DI-N-BUTYL PHTHALATE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
DI-N-OCTYL PHTHALATE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
DIBENZO(A,H)ANTHRACENE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
DIBENZOFURAN	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
DIETHYL PHTHALATE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U

APPENDIX B-1.4

WHOLE BODY FISH DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCSS001 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCSS004 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCSS005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCSS006 ET 9/7/2001	QUAL	NANJEMOY CREEK AREA 7 NJCFS007 ET 9/6/2001	QUAL	NANJEMOY CREEK AREA 7 NJCMC007 ET 9/6/2001	QUAL
DIMETHYL PHTHALATE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
FLUORANTHENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
FLUORENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
HEXACHLOROBENZENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
HEXACHLOROBUTADIENE	330	U	330	UJ	330	U	330	UJ	330	U	330	U
HEXACHLOROCYCLOPENTADIENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
HEXACHLOROETHANE	330	U	330	UJ	330	U	330	U	330	U	330	U
INDENO(1,2,3-CD)PYRENE	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ	330	UJ
ISOPHORONE	330	U	330	UJ	330	U	330	UJ	330	U	330	U
N-NITROSO-DI-N-PROPYLAMINE	330	U	330	UJ	330	U	330	U	330	U	330	U
N-NITROSODIPHENYLAMINE	330	U	1600	UJ	330	UJ	330	UJ	330	U	330	U
NAPHTHALENE	330	U	330	UJ	330	U	330	UJ	330	U	330	U
PENTACHLOROPHENOL	820	U	4100	UR	830	UR	820	UR	830	UR	830	U
PHENANTHRENE	330	U	1600	UJ	330	UJ	330	UJ	330	UJ	330	U
PHENOL	330	U	94	J	330	U	330	U	330	U	98	J
PYRENE	330	UJ	1600	UJ	330	UJ	330	UR	330	U	330	UJ
PESTICIDES/PCBS (UG/KG)												
4,4'-DDD	3.3	U	3.9	J	3.3	U	3.3	U	3.3	U	3.3	U
4,4'-DDE	5.3	J	17		8.1		6.8	J	3.3	U	3.3	U
4,4'-DDT	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ALDRIN	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ALPHA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ALPHA-CHLORDANE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
AROCLOR-1016	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1221	66	U	67	U	67	U	66	U	67	U	67	U
AROCLOR-1232	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1242	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1248	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1254	33	U	33	U	33	U	33	U	33	U	33	U
AROCLOR-1260	46		130	J	58		59	J	36	J	33	U
BETA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
DELTA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
DIELDRIN	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDOSULFAN I	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
ENDOSULFAN II	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDOSULFAN SULFATE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDRIN	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDRIN ALDEHYDE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
ENDRIN KETONE	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
GAMMA-BHC (LINDANE)	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
GAMMA-CHLORDANE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
HEPTACHLOR	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
HEPTACHLOR EPOXIDE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
METHOXYCHLOR	17	U	17	U	17	U	17	U	17	U	17	U
TOXAPHENE	170	U	170	U	170	U	170	U	170	U	170	U

APPENDIX B-1.4

WHOLE BODY FISH DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCSS001 ET 9/8/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCSS004 ET 9/9/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCSS005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCSS006 ET 9/7/2001	QUAL	NANJEMOY CREEK AREA 7 NJCFS007 ET 9/6/2001	QUAL	NANJEMOY CREEK AREA 7 NJCMC007 ET 9/6/2001	QUAL
INORGANICS (MG/KG)												
ALUMINUM	18		6	B	20.6		6.3		6.4		15.9	
ANTIMONY	0.44	U	0.39	U	0.51	B	0.48	U	0.44	U	0.46	U
ARSENIC	1.7	K	0.7		1.9	K	1.5	K	1.7	K	1.4	K
BARIUM	2.3		2.6		4.8		6.2		1.1		2.6	
BERYLLIUM	0.018	U	0.016	U	0.02	U	0.02	U	0.019	U	0.019	U
CADMIUM	0.025		0.017		0.022	K	0.02	U	0.019	U	0.019	U
CALCIUM	3240		1800		6260		7990		13300		6920	
CHROMIUM	0.29	B	0.26	B	0.58	K	1.2	K	0.3	B	0.33	B
COBALT	0.07	B	0.032	U	0.13	B	0.094	B	0.12	B	0.12	B
COPPER	0.79	B	0.32	B	0.79	B	0.61	B	0.81	B	1.4	B
CYANIDE	0.4		0.35	U	0.34	U	0.36	U	0.42	U	0.38	U
IRON	38.7		13	J	48.6		17.9		40.5		35.2	
LEAD	0.52	B	0.19	U	0.32	B	0.24	U	0.35	B	0.23	U
MAGNESIUM	145		100		224		308		358		260	
MANGANESE	7.8		2.3	J	6.1		5	K	11.7		21.5	
MERCURY	0.04	U	0.042	U	0.042	U	0.05	U	0.045	U	0.05	U
NICKEL	0.16	B	0.13	B	0.3	B	0.57	B	0.21	B	0.18	B
POTASSIUM	866		726	J	1620		2050		1600		1400	
SELENIUM	0.78	U	0.69	U	1.1	B	0.86	UJ	0.8	UJ	0.82	UJ
SILVER	0.11	UL	0.097	UL	0.12	UL	0.12	UL	0.11	UL	0.11	UL
SODIUM	225		169		397		533		667		655	
THALLIUM	0.71	U	0.63	U	0.78	U	0.78	U	0.72	U	0.74	U
VANADIUM	0.073	U	0.065	U	0.1		0.08	U	0.14		0.1	
ZINC	16.5		12.1	J	24.9		35.1		17.4		22.7	
MISCELLANEOUS PARAMETERS												
LIPIDS (%)	0.64		0.54		0.56		0.87		1		30.2	
PERCHLORATE (UG/KG)	2500	U	2500	U	5000	U	5000	U	2500	U	5000	U
EXPLOSIVES (MG/KG)												
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
NITROCELLULOSE	1.8	B	2.2	B	1.7	B	2	B	1.7	B	2.2	B
NITROGLYCERIN	0.5	U	0.5	U	0.22	J	0.5	U	0.5	U	0.5	U
NITROGUANIDINE	0.25	U	0.25	U	0.068	J	0.25	U	0.25	U	3	U
RDX	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
TETRYL	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U

APPENDIX B-1.5

VEGETATION DATA – TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION

APPENDIX B-1.5

VEGETATION DATA - TtNUS 2001 MATTAWOMAN CREEK INVESTIGATION
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SITE AREA OF CONCERN SAMPLE ID MATRIX SAMPLE DATE	MATTAWOMAN CREEK AREA 1 MTCVG001 ET 9/7/2001	QUAL	MATTAWOMAN CREEK AREA 2 MTCVG002 ET 9/7/2001	QUAL	MATTAWOMAN CREEK AREA 3 MTCVG003 ET 9/7/2001	QUAL	MATTAWOMAN CREEK AREA 4 MTCVG004 ET 9/7/2001	QUAL	MATTAWOMAN CREEK AREA 5 MTCVG005 ET 9/6/2001	QUAL	MATTAWOMAN CREEK AREA 6 MTCVG006 ET 9/6/2001	QUAL	NANJEMOY CREEK AREA 7 NJCVG007 ET 9/5/2001	QUAL
PESTICIDES/PCBS (UG/KG)														
4,4'-DDD	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
4,4'-DDE	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
4,4'-DDT	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
ALDRIN	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
ALPHA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
ALPHA-CHLORDANE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
AROCLOR-1016	33	U	33	U	33	U	32	U	33	UJ	33	UJ	33	UJ
AROCLOR-1221	67	U	66	U	66	U	66	U	67	UJ	66	UJ	67	UJ
AROCLOR-1232	33	U	33	U	33	U	32	U	33	UJ	33	UJ	33	UJ
AROCLOR-1242	33	U	33	U	33	U	32	U	33	UJ	33	UJ	33	UJ
AROCLOR-1248	33	U	33	U	33	U	32	U	33	UJ	33	UJ	33	UJ
AROCLOR-1254	33	U	33	U	33	U	32	U	33	UJ	33	UJ	33	UJ
AROCLOR-1260	33	U	33	U	33	U	32	U	33	UJ	33	UJ	33	UJ
BETA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
DELTA-BHC	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
DIELDRIN	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
ENDOSULFAN I	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
ENDOSULFAN II	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
ENDOSULFAN SULFATE	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
ENDRIN	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
ENDRIN ALDEHYDE	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
ENDRIN KETONE	3.3	U	3.3	U	3.3	U	3.2	U	3.3	UJ	3.3	UJ	3.3	UJ
GAMMA-BHC (LINDANE)	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
GAMMA-CHLORDANE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
HEPTACHLOR	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
HEPTACHLOR EPOXIDE	1.7	U	1.7	U	1.7	U	1.7	U	1.7	UJ	1.7	UJ	1.7	UJ
METHOXYCHLOR	17	U	17	U	17	U	17	U	17	UJ	17	UJ	17	UJ
TOXAPHENE	170	U	170	U	170	U	170	U	170	UJ	170	UJ	170	UJ
INORGANICS (MG/KG)														
ALUMINUM	65.2		45.5		275		184		110		286		134	
ANTIMONY	0.49	B	0.45	U	0.44	B	0.71	B	0.45	UL	0.5	B	0.43	B
ARSENIC	0.79	U	0.79	U	0.63	U	0.93	B	0.79	UJ	0.82	UJ	2	J
BARIUM	9.5		9.7		17.2		18.4		15.8		14.6		35.1	
BERYLLIUM	0.019	U	0.019	U	0.032		0.031		0.019		0.044		0.029	
CADMIUM	0.11	B	0.082	B	0.13	K	0.14	B	0.097	B	0.18	J	0.39	J
CALCIUM	703		746		720		859		960		616		372	
CHROMIUM	0.5	B	0.41	B	0.9	K	0.74	B	0.56	B	0.98	K	0.067	U
COBALT	0.34	B	0.3	B	0.69	B	1.1	B	0.55	B	0.92	K	1.7	K
COPPER	1.4	B	1.2	B	1.5	B	1.6	B	1	B	1.3	B	0.067	U
IRON	171		122		684		464		278		990		2260	
LEAD	0.69	B	0.31	B	0.76	B	0.99	B	0.43	B	1.1	B	0.97	B
MAGNESIUM	339		356		394		389		334		369		427	
MANGANESE	230		178		327		354		324	J	338	J	1970	J
MERCURY	0.04	U	0.05	U	0.04	U	0.04	U	0.045	UR	0.048	UR	0.043	UR
NICKEL	1.2	B	1.2	B	1.4	K	1.7	K	1.6	K	1.2	K	2.1	K
POTASSIUM	3580		2690		2790		2920		3360		2560		2040	
SELENIUM	0.81	UL	0.81	UL	0.65	UL	0.85	UL	0.8	UR	0.83	UR	0.72	UR
SILVER	0.11	UL	0.11	UL	0.09	UL	0.12	UL	0.11	UL	0.12	UL	0.11	L
SODIUM	499		393	B	311	B	403	B	304	J	321	J	1420	J
THALLIUM	0.74	U	0.74	U	0.59	U	0.77	U	0.73	U	0.76	U	0.66	U
VANADIUM	0.39	K	0.29	K	0.99	K	0.69	K	0.4	K	1.2	K	1.1	K
ZINC	8.9	B	6.2	B	10.3	B	11.9	B	21.6	J	18.3	J	14.8	J

APPENDIX B-2

ANALYTICAL DATA – TtNUS 1997 DATA, IR SITES 39/41

APPENDIX B-2.1

SURFACE WATER DATA – TtNUS 1997 DATA, IR SITES 39/41

APPENDIX B-2.1

ANALYTICAL DATABASE -
TtNUS 1997 SURFACE WATER DATA, IR SITES 39/41
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S39SD/SW01		S39SD03/SW02		S39SD03/SW02		S39SD03/SW02		S39SD05/SW03		S39SD06/SW04		S39SD07/SW05		S39SD08/SW06	
NORTHING	333870.82		333965.84		333965.84		333965.84		334087.73		334080.9		334006.71		333872.54	
EASTING	1263146.93		1263213.02		1263213.02		1263213.02		1263535.69		1263724.64		1264038.08		1264422.12	
SITE	39		39		39		39		39		39		39		39	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	S39SW0010001		S39SW0020001		S39SW0020001-D		S39SW0020001-AVG		S39SW0030001		S39SW0040001		S39SW0050001		S39SW0060001	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997	
VOLATILE ORGANICS (UG/L)																
1,1,1-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2,2-TETRACHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1,2-TRICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,1-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-TRICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DIBROMO-3-CHLOROPROPANE	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ	1	UJ
1,2-DIBROMOETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-DICHLOROPROPANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,3-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,4-DICHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
2-BUTANONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
2-HEXANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
4-METHYL-2-PENTANONE	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
ACETONE	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR	5	UR
BENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOCHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMODICHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
BROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON DISULFIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CARBON TETRACHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLORODIBROMOMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROFORM	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CHLOROMETHANE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
CIS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
ETHYLBENZENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
METHYLENE CHLORIDE	1	B	1	B	1	B	1	B	1	B	1	B	1	B	1	B
STYRENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TETRACHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TOLUENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TOTAL XYLENES	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRANS-1,2-DICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRANS-1,3-DICHLOROPROPENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
TRICHLOROETHENE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	
VINYL CHLORIDE	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
SEMIVOLATILE ORGANICS (UG/L)																
2,2'-OXYBIS(1-CHLOROPROPANE)	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2,4,5-TRICHLOROPHENOL	20	U	22	U	22	U	22	U	21	U	20	U	20	U	20	U
2,4,6-TRICHLOROPHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2,4-DICHLOROPHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U

APPENDIX B-2.1

ANALYTICAL DATABASE -
TtNUS 1997 SURFACE WATER DATA, IR SITES 39/41
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S39SD/SW01		S39SD03/SW02		S39SD03/SW02		S39SD03/SW02		S39SD05/SW03		S39SD06/SW04		S39SD07/SW05		S39SD08/SW06	
NORTHING	333870.82		333965.84		333965.84		333965.84		334087.73		334080.9		334006.71		333872.54	
EASTING	1263146.93		1263213.02		1263213.02		1263213.02		1263535.69		1263724.64		1264038.08		1264422.12	
SITE	39		39		39		39		39		39		39		39	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	S39SW0010001		S39SW0020001		S39SW0020001-D		S39SW0020001-AVG		S39SW0030001		S39SW0040001		S39SW0050001		S39SW0060001	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997	
2,4-DIMETHYLPHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2,4-DINITROPHENOL	20	U	22	U	22	U	22	U	21	U	20	U	20	U	20	U
2,4-DINITROTOLUENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2,6-DINITROTOLUENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2-CHLORONAPHTHALENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2-CHLOROPHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2-METHYLNAPHTHALENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2-METHYLPHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
2-NITROANILINE	20	U	22	U	22	U	22	U	21	U	20	U	20	U	20	U
2-NITROPHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
3,3'-DICHLOROBENZIDINE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
3-NITROANILINE	20	U	22	U	22	U	22	U	21	U	20	U	20	U	20	U
4,6-DINITRO-2-METHYLPHENOL	20	U	22	U	22	U	22	U	21	U	20	U	20	U	20	U
4-BROMOPHENYL PHENYL ETHER	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
4-CHLORO-3-METHYLPHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
4-CHLOROANILINE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
4-CHLOROPHENYL PHENYL ETHER	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
4-METHYLPHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
4-NITROANILINE	20	U	22	U	22	U	22	U	21	U	20	U	20	U	20	U
4-NITROPHENOL	20	U	22	U	22	U	22	U	21	U	20	U	20	U	20	U
ACENAPHTHENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
ACENAPHTHYLENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
ANTHRACENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
BENZO(A)ANTHRACENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
BENZO(A)PYRENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
BENZO(B)FLUORANTHENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
BENZO(G,H,I)PERYLENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
BENZO(K)FLUORANTHENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHOXY)METHANE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
BIS(2-CHLOROETHYL)ETHER	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
BIS(2-ETHYLHEXYL)PHTHALATE	5	U	1	J	6	U	1	J	5	U	1	J	5	U	5	U
BUTYL BENZYL PHTHALATE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
CHRYSENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
DI-N-BUTYL PHTHALATE	6	B	6	U	6	U	6	U	5	U	5	U	14	B	3	B
DI-N-OCTYL PHTHALATE	5	UJ	6	UJ	6	UJ	6	UJ	5	UJ	5	UJ	5	UJ	5	UJ
DIBENZO(A,H)ANTHRACENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
DIBENZOFURAN	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
DIETHYL PHTHALATE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
DIMETHYL PHTHALATE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
FLUORANTHENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
FLUORENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
HEXACHLOROBENZENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
HEXACHLOROBUTADIENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
HEXACHLOROCYCLOPENTADIENE	5	UJ	6	UJ	6	UJ	6	UJ	5	UJ	5	UJ	5	UJ	5	UJ
HEXACHLOROETHANE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
INDENO(1,2,3-CD)PYRENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
ISOPHORONE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U

APPENDIX B-2.1

ANALYTICAL DATABASE -
TtNUS 1997 SURFACE WATER DATA, IR SITES 39/41
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S39SD/SW01		S39SD03/SW02		S39SD03/SW02		S39SD03/SW02		S39SD05/SW03		S39SD06/SW04		S39SD07/SW05		S39SD08/SW06	
NORTHING	333870.82		333965.84		333965.84		333965.84		334087.73		334080.9		334006.71		333872.54	
EASTING	1263146.93		1263213.02		1263213.02		1263213.02		1263535.69		1263724.64		1264038.08		1264422.12	
SITE	39		39		39		39		39		39		39		39	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	S39SW0010001		S39SW0020001		S39SW0020001-D		S39SW0020001-AVG		S39SW0030001		S39SW0040001		S39SW0050001		S39SW0060001	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997		10/21/1997	
N-NITROSO-DI-N-PROPYLAMINE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
N-NITROSODIPHENYLAMINE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
NAPHTHALENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
NITROBENZENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
PENTACHLOROPHENOL	20	U	22	U	22	U	22	U	21	U	20	U	20	U	20	U
PHENANTHRENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
PHENOL	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
PYRENE	5	U	6	U	6	U	6	U	5	U	5	U	5	U	5	U
INORGANICS (UG/L)																
ALUMINUM	139	B	410		918		664		133	B	131	B	292	K	190	B
ANTIMONY	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U	2.6	U
ARSENIC	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U	3.3	U
BARIUM	72.3		64.7		64.8		64.75		72.8		74.2		76.8		63.9	
BERYLLIUM	0.1	U	0.14	B	0.11	B	0.125	B	0.1	U	0.1	U	0.1	U	0.1	U
CADMIUM	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
CALCIUM	34200		26900		26600		26750		34400		34300		33800		31100	
CHROMIUM	0.52	B	0.72	B	2.4	B	1.56	B	1.8	B	0.5	U	1.3	B	0.9	B
COBALT	0.55	B	4.4	B	6.3		4.25		0.5	B	0.4	U	0.94	B	0.52	B
COPPER	2.8	B	4.5	B	6.0	B	5.25	B	6.1	B	2.5	B	3.6	B	4.5	B
CYANIDE	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
IRON	300	K	1060	K	1620	K	1340	K	326	K	382	K	976	K	410	K
LEAD	1.6	B	5.2	L	5.0	L	5.1	L	2.1	B	1.9	B	2.7	B	4.1	B
MAGNESIUM	34200		27300		25500		26400		34300		33900		33100		28500	
MANGANESE	75.8		153		202		177.5		78.0		83.4		143		67.2	
MERCURY	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
NICKEL	3.1		2.4		4.0		3.2		2.5		1.9		3.0		2.9	
POTASSIUM	12400		10400		9360		9880		12400		12400		12200		11000	
SELENIUM	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U
SILVER	0.8	U	1.1		6.0		3.55		0.8	U	0.8	U	0.8	U	0.8	U
SODIUM	210000	J	172000	J	155000	J	163500	J	211000	J	210000	J	206000	J	181000	J
THALLIUM	2.9	UL	2.9	UL	2.9	UL	2.9	UL	2.9	UL	2.9	UL	2.9	UL	2.9	UL
VANADIUM	1.1	U	1.1	U	2.5		1.525		1.1	U	1.1	U	1.3		1.1	U
ZINC	8.2	B	31.5		42.5		37.0		11.2	B	6.5	B	90.4		16.0	

APPENDIX B-2.2

SEDIMENT DATA – TtNUS 1997 DATA, IR SITES 39/41

APPENDIX B-2.2

ANALYTICAL DATABASE TtNUS 1997 SEDIMENT DATA, IR SITES 39/41
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S39SD/SW01		S39SD02		S39SD03/SW02		S39SD04		S39SD05/SW03		S39SD06/SW04		S39SD07/SW05		S39SD08/SW06	
LOCATION TYPE	SWSD		SD		SWSD		SD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333870.82		333963.51		333965.84		333971.64		334087.73		334080.9		334006.71		333872.54	
EASTING	1263146.93		1263193.31		1263213.02		1263213.68		1263535.69		1263724.64		1264038.08		1264422.12	
SITE	39		39		39		39		39		39		39		39	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	S39SD0010001		S39SD0020001		S39SD0030001		S39SD0040001		S39SD0050001		S39SD0060001		S39SD0070001		S39SD0080001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97	
VOLATILE ORGANICS (UG/KG)																
1,1,1-TRICHLOROETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
1,1,2,2-TETRACHLOROETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
1,1,2-TRICHLOROETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
1,1-DICHLOROETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
1,1-DICHLOROETHENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
1,2-DICHLOROETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
1,2-DICHLOROPROPANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
2-BUTANONE	13	U	12	U	12	U	12	U	14	U	19	U	390		200	J
2-HEXANONE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
4-METHYL-2-PENTANONE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
ACETONE	13	U	12	U	12	U	12	U	14	U	160	B	2400	J	1100	J
BENZENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
BROMODICHLOROMETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
BROMOFORM	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
BROMOMETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
CARBON DISULFIDE	13	U	12	U	12	U	12	U	4	J	10	J	23	J	14	J
CARBON TETRACHLORIDE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
CHLOROBENZENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
CHLORODIBROMOMETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
CHLOROETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
CHLOROFORM	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
CHLOROMETHANE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
CIS-1,3-DICHLOROPROPENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
ETHYLBENZENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
METHYLENE CHLORIDE	7	B	7	B	8	B	8	B	9	B	13	B	23	B	22	B
STYRENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
TETRACHLOROETHENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
TOLUENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
TOTAL 1,2-DICHLOROETHENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
TOTAL XYLENES	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
TRANS-1,3-DICHLOROPROPENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
TRICHLOROETHENE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
VINYL CHLORIDE	13	U	12	U	12	U	12	U	14	U	19	U	31	U	25	UJ
SEMIVOLATILE ORGANICS (UG/KG)																
1,2,4-TRICHLOROBENZENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
1,2-DICHLOROBENZENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
1,3,5-TRINITROBENZENE	40.2	U	40.2	U	40.2	U	40.2	U	40.2	U	40.2	U	40.2	U	40.2	U
1,3-DICHLOROBENZENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
1,4-DICHLOROBENZENE	420	UR	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2,4,5-TRICHLOROPHENOL	1100	UJ	970	UJ	1000	UJ	1000	UJ	1200	UJ	1500	UJ	2600	UJ	2100	UJ
2,4,6-TRICHLOROPHENOL	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2,4-DICHLOROPHENOL	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2,4-DIMETHYLPHENOL	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2,4-DINITROPHENOL	1100	UJ	970	UJ	1000	UJ	1000	UJ	1200	UJ	1500	UJ	2600	UJ	2100	UJ
2,4-DINITROTOLUENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2,6-DINITROTOLUENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2-CHLORONAPHTHALENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2-CHLOROPHENOL	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2-METHYLNAPHTHALENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2-METHYLPHENOL	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
2-NITROANILINE	1100	UJ	970	UJ	1000	UJ	1000	UJ	1200	UJ	1500	UJ	2600	UJ	2100	UJ
2-NITROPHENOL	420	UJ	390	UJ	410	UJ	410	UJ	1200	UJ	620	UJ	1000	UJ	830	UJ

APPENDIX B-2.2

ANALYTICAL DATABASE TtNUS 1997 SEDIMENT DATA, IR SITES 39/41
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S39SD/SW01		S39SD02		S39SD03/SW02		S39SD04		S39SD05/SW03		S39SD06/SW04		S39SD07/SW05		S39SD08/SW06	
LOCATION TYPE	SWSD		SD		SWSD		SD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333870.82		333963.51		333965.84		333971.64		334087.73		334080.9		334006.71		333872.54	
EASTING	1263146.93		1263193.31		1263213.02		1263213.68		1263535.69		1263724.64		1264038.08		1264422.12	
SITE	39		39		39		39		39		39		39		39	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	S39SD0010001		S39SD0020001		S39SD0030001		S39SD0040001		S39SD0050001		S39SD0060001		S39SD0070001		S39SD0080001	
MATRIX	SD		SD		SD		SD		SD		SD		SD		SD	
SAMPLE DATE	10/21/97	QUAL	10/21/97	QUAL	10/21/97	QUAL	10/21/97	QUAL	10/21/97	QUAL	10/21/97	QUAL	10/21/97	QUAL	10/21/97	QUAL
3,3'-DICHLOROBENZIDINE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
3-NITROANILINE	1100	UJ	970	UJ	1000	UJ	1000	UJ	1200	UJ	1500	UJ	2600	UJ	2100	UJ
4,6-DINITRO-2-METHYLPHENOL	1100	UJ	970	UJ	1000	UJ	1000	UJ	1200	UJ	1500	UJ	2600	UJ	2100	UJ
4-BROMOPHENYL PHENYL ETHER	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
4-CHLORO-3-METHYLPHENOL	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
4-CHLOROANILINE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
4-CHLOROPHENYL PHENYL ETHER	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
4-METHYLPHENOL	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
4-NITROANILINE	1100	UJ	970	UJ	1000	UJ	1000	UJ	1200	UJ	1500	UJ	2600	UJ	2100	UJ
4-NITROPHENOL	1100	UJ	970	UJ	1000	UJ	1000	UJ	1200	UJ	1500	UJ	2600	UJ	2100	UJ
ACENAPHTHENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
ACENAPHTHYLENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
ANTHRACENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
BAP EQUIVALENT											11.12		13.16		22.6	
BENZO(A)ANTHRACENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	95	J
BENZO(A)PYRENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
BENZO(B)FLUORANTHENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	110	J	130	J	130	J
BENZO(G,H,I)PERYLENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
BENZO(K)FLUORANTHENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
BIS(2-CHLOROETHOXY)METHANE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
BIS(2-CHLOROETHYL)ETHER	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
BIS(2-ETHYLHEXYL)PHTHALATE	420	UJ	390	UJ	48	J	410	J	480	UJ	86	J	1000	UJ	88	J
BUTYL BENZYL PHTHALATE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
CARBAZOLE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
CHRYSENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	120	J	160	J	100	J
DI-N-BUTYL PHTHALATE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	470	J	620	J	640	J
DI-N-OCTYL PHTHALATE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
DIBENZO(A,H)ANTHRACENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
DIBENZOFURAN	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
DIETHYL PHTHALATE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
DIMETHYL PHTHALATE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
FLUORANTHENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	97	J	190	J	170	J
FLUORENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
HEXACHLOROBENZENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
HEXACHLOROBUTADIENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
HEXACHLOROCYCLOPENTADIENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
HEXACHLOROETHANE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
HIGH MOLECULAR WEIGHT PAHS											437		720		655	
INDENO(1,2,3-CD)PYRENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
ISOPHORONE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
LOW MOLECULAR WEIGHT PAHS											77		150		150	
N-NITROSO-DI-N-PROPYLAMINE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
N-NITROSODIPHENYLAMINE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	180	J	2000	J	3100	J
NAPHTHALENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
NITROBENZENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
PENTACHLOROPHENOL	1100	UJ	970	UJ	1000	UJ	1000	UJ	1200	UJ	1500	UJ	2600	UJ	2100	UJ
PHENANTHRENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	77	J	150	J	150	J
PHENOL	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	620	UJ	1000	UJ	830	UJ
PYRENE	420	UJ	390	UJ	410	UJ	410	UJ	480	UJ	110	J	240	J	160	J

APPENDIX B-2.2

ANALYTICAL DATABASE TtNUS 1997 SEDIMENT DATA, IR SITES 39/41
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S39SD/SW01		S39SD02		S39SD03/SW02		S39SD04		S39SD05/SW03		S39SD06/SW04		S39SD07/SW05		S39SD08/SW06	
LOCATION TYPE	SWSD		SD		SWSD		SD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333870.82		333963.51		333965.84		333971.64		334087.73		334080.9		334006.71		333872.54	
EASTING	1263146.93		1263193.31		1263213.02		1263213.68		1263535.69		1263724.64		1264038.08		1264422.12	
SITE	39		39		39		39		39		39		39		39	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	S39SD0010001		S39SD0020001		S39SD0030001		S39SD0040001		S39SD0050001		S39SD0060001		S39SD0070001		S39SD0080001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97	
PESTICIDES/PCBS (UG/KG)																
4,4'-DDD	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	7.7	J	6	J
4,4'-DDE	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	6	J	4.1	J
4,4'-DDT	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	11	UJ	8.3	UJ
ALDRIN	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
ALPHA-BHC	2.1	UJ	1.9	UJ	0.7	J	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
ALPHA-CHLORDANE	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
AROCLOR-1016	42	UJ	39	UJ	41	UJ	40	UJ	48	UJ	61	UJ	110	UJ	83	UJ
AROCLOR-1221	84	UJ	78	UJ	81	UJ	81	UJ	96	UJ	120	UJ	210	UJ	170	UJ
AROCLOR-1232	42	UJ	39	UJ	41	UJ	40	UJ	48	UJ	61	UJ	110	UJ	83	UJ
AROCLOR-1242	42	UJ	39	UJ	41	UJ	40	UJ	48	UJ	61	UJ	110	UJ	83	UJ
AROCLOR-1248	42	UJ	39	UJ	41	UJ	40	UJ	48	UJ	61	UJ	110	UJ	83	UJ
AROCLOR-1254	42	UJ	39	UJ	41	UJ	40	UJ	48	UJ	61	UJ	110	UJ	83	UJ
AROCLOR-1260	42	UJ	39	UJ	41	UJ	40	UJ	48	UJ	61	UJ	110	UJ	83	UJ
BETA-BHC	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
DELTA-BHC	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
DIELDRIN	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	11	UJ	8.3	UJ
ENDOSULFAN I	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
ENDOSULFAN II	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	11	UJ	8.3	UJ
ENDOSULFAN SULFATE	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	11	UJ	8.3	UJ
ENDRIN	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	11	UJ	8.3	UJ
ENDRIN ALDEHYDE	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	11	UJ	8.3	UJ
ENDRIN KETONE	4.2	UJ	3.9	UJ	4.1	UJ	4	UJ	4.8	UJ	6.1	UJ	11	UJ	8.3	UJ
GAMMA-BHC (LINDANE)	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
GAMMA-CHLORDANE	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
HEPTACHLOR	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
HEPTACHLOR EPOXIDE	2.1	UJ	1.9	UJ	2	UJ	2	UJ	2.4	UJ	3.1	UJ	5.3	UJ	4.1	UJ
METHOXYCHLOR	21	UJ	19	UJ	20	UJ	20	UJ	24	UJ	31	UJ	53	UJ	41	UJ
TOXAPHENE	210	UJ	190	UJ	200	UJ	200	UJ	240	UJ	310	UJ	530	UJ	410	UJ
INORGANICS (MG/KG)																
ALUMINUM	3670		1310		990		834		3000		1920		19600		13400	
ANTIMONY	0.64	UL	0.6	UL	0.63	UL	0.69	L	0.74	UL	0.94	UL	1.6	UL	1.3	UL
ARSENIC	3.2		3.6		3.6	K	1.8		1.6		5.0		16.6		12.2	
BARIUM	16.3		35.4		7.8		7.6		22.4		32.7		98.9		92.6	
BERYLLIUM	0.18		0.44		0.61		0.29		0.17		0.19		1.0		0.44	
CADMIUM	0.07	U	0.21		0.81	K	0.28	B	0.21	B	0.15	B	0.8	B	0.88	
CALCIUM	230	K	262	K	220	K	151	B	604	K	836	K	2930	K	4730	
CHROMIUM	7.4	J	8.9	J	27.8	J	12.3	J	5.9	J	5.4	J	32.3	J	24.3	J
COBALT	24.1		34.7		13.8		8.1		5.0		2.6		15.7		10.4	
COPPER	5.4		4.8		27.6		6.7		3.8		6.6		49.1		28.2	
CYANIDE	0.18	U	0.25	U	0.27	U	0.17	U	0.28	U	0.31	U	0.72	U	0.61	U
IRON	11300		9860		20700		14200		4960		5510		43800		23600	
LEAD	7.5		15.6		87.9		15.9		6.7		14.5		58.1		61.4	
MAGNESIUM	247	J	148	J	1900	J	1910	J	465	J	347	J	2290	J	2180	J
MANGANESE	162		620		121		83.3		48.7		46.6		384		310	
MERCURY	0.02		0.02		0.1		0.05		0.03		0.29		8.7		2.0	
NICKEL	4.4		7.7		39.8		21.1		4.5		4.2		25.6		17.1	
POTASSIUM	304	J	195	J	102	J	111	J	408	J	205	J	1350	J	1160	J
SELENIUM	0.68	U	0.65	U	0.68	UL	0.68	U	0.8	U	1.0	U	1.8	U	1.4	U
SILVER	0.2	U	2.6		66.4		308		0.27		1.7		26.8		6.8	
SODIUM	106	B	132	B	100	B	168	B	203	B	235	B	329	B	364	B
THALLIUM	0.71	UL	0.67	UL	0.7	UL	0.7	UL	0.82	UL	1.0	UL	1.8	UL	1.4	UL
VANADIUM	11.2		8.7		8.1		9.3		8.9		6.8		49.7		33.5	
ZINC	18.7	K	65.2	K	151	K	63.4	K	21.0	K	27.3	K	273	K	188	K

APPENDIX B-2.2

ANALYTICAL DATABASE TtNUS 1997 SEDIMENT DATA, IR SITES 39/41
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S39SD/SW01		S39SD02		S39SD03/SW02		S39SD04		S39SD05/SW03		S39SD06/SW04		S39SD07/SW05		S39SD08/SW06	
LOCATION TYPE	SWSD		SD		SWSD		SD		SWSD		SWSD		SWSD		SWSD	
NORTHING	333870.82		333963.51		333965.84		333971.64		334087.73		334080.9		334006.71		333872.54	
EASTING	1263146.93		1263193.31		1263213.02		1263213.68		1263535.69		1263724.64		1264038.08		1264422.12	
SITE	39		39		39		39		39		39		39		39	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	S39SD0010001		S39SD0020001		S39SD0030001		S39SD0040001		S39SD0050001		S39SD0060001		S39SD0070001		S39SD0080001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97		10/21/97	
AVS/SEM PARAMETERS (UMO/G)																
ACID VOLATILE SULFIDE	0.01341	U	0.01996		0.03243		0.07921		0.15655		0.2604		21.82998		39.29396	
CADMIUM	0.00142	U	0.00133	U	0.00365	J	0.00133	U	0.0016	U	0.00205	U	0.00356	U	0.00641	J
COPPER	0.01888		0.03462		0.19199		0.03934		0.04721		0.13691		0.03147	U	0.16051	
LEAD	0.02172		0.05792		0.2611		0.04585		0.04488		0.12259		0.29199		0.27944	
MERCURY	0.0001	B	0.0001	B	0.00005	U	0.00005	U	0.00005	U	0.00005	U	0.0001	U	0.00005	U
NICKEL	0.02215	U	0.02896	K	0.07837	B	0.02045	U	0.03578		0.04259		0.16867		0.12267	B
TOTAL SEM-AVS	0.14918		0.35846		1.81443		0.39136		0.23589		1.58627		-17.92843		-37.5003	
ZINC	0.10858		0.25692		1.39012		0.38538		0.26457		1.54458		3.44089		1.3473	
MISCELLANEOUS PARAMETERS (MG/KG)																
PH (S.U.)	6.37		7.06		6.74		6.61		7.21		6.55		6.85		6.99	
TOTAL ORGANIC CARBON	1480		1070		1400		1460		9800		29200		40500		37700	
EXPLOSIVES (MG/KG)																
1,3-DINITROBENZENE	0.0372	U	0.0372	U	0.0372	U	0.0372	U	0.0372	U	0.0372	U	0.0372	U	0.0372	U
2,4,6-TRINITROTOLUENE	0.0356	U	0.0356	U	0.0356	U	0.0356	U	0.0356	U	0.0356	U	0.0356	U	0.0356	U
2,4-DINITROTOLUENE	0.0516	U	0.0516	U	0.0516	U	0.0516	U	0.0516	U	0.0516	U	0.0516	U	0.0516	U
2,6-DINITROTOLUENE	0.0476	U	0.0476	U	0.0476	U	0.0476	U	0.0476	U	0.0476	U	0.0476	U	0.0476	U
2-AMINO-4,6-DINITROTOLUENE	0.0467	U	0.0467	U	0.0467	U	0.0467	U	0.0467	U	0.0467	U	0.0467	U	0.0467	U
2-NITROTOLUENE	0.0814	U	0.0814	U	0.0814	U	0.0814	U	0.0814	U	0.0814	U	0.0814	U	0.0814	U
3-NITROTOLUENE	0.0818	U	0.0818	U	0.0818	U	0.0818	U	0.0818	U	0.0818	U	0.0818	U	0.0818	U
4-AMINO-2,6-DINITROTOLUENE	0.0409	U	0.0409	U	0.0409	U	0.0409	U	0.0409	U	0.0409	U	0.0409	U	0.0409	U
4-NITROTOLUENE	0.0872	U	0.0872	U	0.0872	U	0.0872	U	0.0872	U	0.0872	U	0.0872	U	0.0872	U
HMX	0.0705	U	0.0705	U	0.0705	U	0.0705	U	0.0705	U	0.0705	U	0.0705	U	0.0705	U
NITROBENZENE	0.0352	U	0.0352	U	0.0352	U	0.0352	U	0.0352	U	0.0352	U	0.0352	U	0.0352	U
NITROCELLULOSE	14.5	U	16.4	U	23.5		139		27.4		158		1460		1580	
NITROGLYCERIN	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
NITROGUANIDINE	0.0625	U	0.0625	U	0.0625	U	0.0625	U	0.0625	U	0.0625	U	0.0625	U	0.0625	U
RDX	0.0509	U	0.0509	U	0.0509	U	0.0509	U	0.0509	U	0.0509	U	0.0509	U	0.0509	U
TETRYL	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U	0.163	U

APPENDIX B-3

ANALYTICAL DATA – CH2M HILL DATA, IR SITES 11 AND 17

APPENDIX B-3.1

SURFACE WATER DATA – CH2M HILL DATA, IR SITES 11 AND 17

APPENDIX B-3.1

ANALYTICAL DATABASE - CH2M HILL SURFACE WATER DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS11SW01		IS11SW02		IS11SW03		IS11SW04		IS17SW01		IS17SW01		IS17SW01		IS17SW02		IS17SW03		IS17SW04		IS17SW05		IS17SW06	
NORTHING	327410.222		327450.538		327423.661		327416.942		328117.17		328117.1663		328117.166		328030.815		327941.142		327795.008		327680.426		327549.238	
EASTING	1256703.53		1256510.02		1256429.39		1256260.06		1257859.4		1257859.44		1257859.44		1257636.92		1257442.63		1257264.94		1257142.06		1256995.92	
SITE	SITE11		SITE11		SITE11		SITE11		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS11SW01		IS11SW02		IS11SW03		IS11SW04		IS17SW01		IS17SW01-AVG		IS17SW01P		IS17SW02		IS17SW03		IS17SW04		IS17SW05		IS17SW06	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	7/20/2000		7/20/2000		7/20/2000		7/20/2000		7/21/2000		7/21/2000		7/21/2000		7/20/2000		7/21/2000		7/24/2000		7/24/2000		7/24/2000	
VOLATILE ORGANICS (UG/L)																								
1,1,1-TRICHLOROETHANE	10	U	10	U	10	U	10	U																
1,1,2,2-TETRACHLOROETHANE	10	U	10	U	10	U	10	U																
1,1,2-TRICHLOROETHANE	10	U	10	U	10	U	10	U																
1,1,2-TRICHLOROTRIFLUOROETHANE	10	U	10	U	10	U	10	U																
1,1-DICHLOROETHANE	10	U	10	U	10	U	10	U																
1,1-DICHLOROETHENE	10	U	10	U	10	U	10	U																
1,2,4-TRICHLOROBENZENE	10	U	10	U	10	U	10	U																
1,2-DIBROMO-3-CHLOROPROPANE	10	U	10	U	10	U	10	U																
1,2-DIBROMOETHANE	10	U	10	U	10	U	10	U																
1,2-DICHLOROBENZENE	10	U	10	U	10	U	10	U																
1,2-DICHLOROETHANE	10	U	10	U	10	U	10	U																
1,2-DICHLOROPROPANE	10	U	10	U	10	U	10	U																
1,3-DICHLOROBENZENE	10	U	10	U	10	U	10	U																
1,4-DICHLOROBENZENE	10	U	10	U	10	U	10	U																
2-BUTANONE	10	U	10	U	10	U	10	U																
2-HEXANONE	10	U	10	U	10	U	10	U																
4-METHYL-2-PENTANONE	10	U	10	U	10	U	10	U																
ACETONE	10	U	10	U	10	U	10	U																
BENZENE	10	U	10	U	10	U	10	U																
BROMODICHLOROMETHANE	10	U	10	U	10	U	10	U																
BROMOFORM	10	U	10	U	10	U	10	U																
BROMOMETHANE	10	U	10	U	10	U	10	U																
CARBON DISULFIDE	10	U	10	U	10	U	10	U																
CARBON TETRACHLORIDE	10	U	10	U	10	U	10	U																
CHLOROBENZENE	10	U	10	U	10	U	10	U																
CHLORODIBROMOMETHANE	10	U	10	U	10	U	10	U																
CHLOROETHANE	10	U	10	U	10	U	10	U																
CHLOROFORM	10	U	10	U	10	U	10	U																
CHLOROMETHANE	10	U	10	U	10	U	10	U																
CIS-1,2-DICHLOROETHENE	10	U	10	U	10	U	10	U																
CIS-1,3-DICHLOROPROPENE	10	U	10	U	10	U	10	U																
CYCLOHEXANE	10	U	10	U	10	U	10	U																
DICHLORODIFLUOROMETHANE	10	U	10	U	10	U	10	U																
ETHYLBENZENE	10	U	10	U	10	U	10	U																
ISOPROPYLBENZENE	10	U	10	U	10	U	10	U																
METHYL ACETATE	10	U	10	U	10	U	10	U																
METHYL CYCLOHEXANE	10	U	10	U	10	U	10	U																
METHYL TERT-BUTYL ETHER	1	J	10	U	10	U	10	U																
METHYLENE CHLORIDE	10	U	10	U	10	U	10	U																
STYRENE	10	U	10	U	10	U	10	U																
TETRACHLOROETHENE	10	U	10	U	10	U	10	U																
TOLUENE	10	U	10	U	10	U	10	U																
TOTAL 1,2-DICHLOROETHENE	0		0		0		0																	
TOTAL XYLENES	10	U	10	U	10	U	10	U																
TRANS-1,2-DICHLOROETHENE	10	U	10	U	10	U	10	U																
TRANS-1,3-DICHLOROPROPENE	10	U	10	U	10	U	10	U																
TRICHLOROETHENE	10	U	10	U	10	U	10	U																
TRICHLOROFLUOROMETHANE	10	U	10	U	10	U	10	U																
VINYL CHLORIDE	10	U	10	U	10	U	10	U																

APPENDIX B-3.1

ANALYTICAL DATABASE - CH2M HILL SURFACE WATER DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS11SW01		IS11SW02		IS11SW03		IS11SW04		IS17SW01		IS17SW01		IS17SW01		IS17SW02		IS17SW03		IS17SW04		IS17SW05		IS17SW06	
NORTHING	327410.222		327450.538		327423.661		327416.942		328117.17		328117.1663		328117.166		328030.815		327941.142		327795.008		327680.426		327549.238	
EASTING	1256703.53		1256510.02		1256429.39		1256260.06		1257859.4		1257859.44		1257859.44		1257636.92		1257442.63		1257264.94		1257142.06		1256995.92	
SITE	SITE11		SITE11		SITE11		SITE11		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS11SW01		IS11SW02		IS11SW03		IS11SW04		IS17SW01		IS17SW01-AVG		IS17SW01P		IS17SW02		IS17SW03		IS17SW04		IS17SW05		IS17SW06	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	7/20/2000		7/20/2000		7/20/2000		7/20/2000		7/21/2000		7/21/2000		7/21/2000		7/20/2000		7/21/2000		7/24/2000		7/24/2000		7/24/2000	
SEMIVOLATILE ORGANICS (UG/L)																								
1,1-BIPHENYL	10	U	10	U	10	U	10	U																
2,2'-OXYBIS(1-CHLOROPROPANE)	10	U	10	U	10	U	10	U																
2,4,5-TRICHLOROPHENOL	25	U	25	U	25	U	25	U																
2,4,6-TRICHLOROPHENOL	10	U	10	U	10	U	10	U																
2,4-DICHLOROPHENOL	10	U	10	U	10	U	10	U																
2,4-DIMETHYLPHENOL	10	U	10	U	10	U	10	U																
2,4-DINITROPHENOL	25	R	25	R	25	R	25	R																
2-CHLORONAPHTHALENE	10	U	10	U	10	U	10	U																
2-CHLOROPHENOL	10	U	10	U	10	U	10	U																
2-METHYLNAPHTHALENE	10	U	10	U	10	U	10	U																
2-METHYLPHENOL	10	U	10	U	10	U	10	U																
2-NITROANILINE	25	U	25	U	25	U	25	U																
2-NITROPHENOL	10	U	10	U	10	U	10	U																
3,3'-DICHLOROBENZIDINE	10	U	10	U	10	U	10	U																
3-NITROANILINE	25	U	25	U	25	U	25	U																
4,6-DINITRO-2-METHYLPHENOL	25	U	25	U	25	U	25	U																
4-BROMOPHENYL PHENYL ETHER	10	U	10	U	10	U	10	U																
4-CHLORO-3-METHYLPHENOL	10	U	10	U	10	U	10	U																
4-CHLOROANILINE	10	U	10	U	10	U	10	U																
4-CHLOROPHENYL PHENYL ETHER	10	U	10	U	10	U	10	U																
4-METHYLPHENOL	10	U	10	U	10	U	10	U																
4-NITROANILINE	25	U	25	U	25	U	25	U																
4-NITROPHENOL	25	U	25	U	25	U	25	U																
ACENAPHTHENE	10	U	10	U	10	U	10	U																
ACENAPHTHYLENE	10	U	10	U	10	U	10	U																
ACETOPHENONE	10	U	10	U	10	U	10	U																
ANTHRACENE	10	U	10	U	10	U	10	U																
ATRAZINE	10	U	10	U	10	U	10	U																
BENZALDEHYDE	10	U	10	U	10	U	10	U																
BENZO(A)ANTHRACENE	10	U	10	U	10	U	10	U																
BENZO(A)PYRENE	10	U	10	U	10	U	10	U																
BENZO(B)FLUORANTHENE	10	U	10	U	10	U	10	U																
BENZO(G,H,I)PERYLENE	10	U	10	U	10	U	10	U																
BENZO(K)FLUORANTHENE	10	U	10	U	10	U	10	U																
BIS(2-CHLOROETHOXY)METHANE	10	U	10	U	10	U	10	U																
BIS(2-CHLOROETHYL)ETHER	10	U	10	U	10	U	10	U																
BIS(2-ETHYLHEXYL)PHTHALATE	1	J	10	U	10	U	10	U																
BUTYL BENZYL PHTHALATE	10	U	10	U	10	U	10	U																
CAPROLACTAM	10	U	10	U	10	U	10	U																
CARBAZOLE	10	U	10	U	10	U	10	U																
CHRYSENE	10	U	10	U	10	U	10	U																
DI-N-BUTYL PHTHALATE	10	U	10	U	10	U	10	U																
DI-N-OCTYL PHTHALATE	10	U	10	U	10	U	10	U																
DIBENZO(A,H)ANTHRACENE	10	U	10	U	10	U	10	U																
DIBENZOFURAN	10	U	10	U	10	U	10	U																
DIETHYL PHTHALATE	10	U	10	U	10	U	10	U																
DIMETHYL PHTHALATE	10	U	10	U	10	U	10	U																
FLUORANTHENE	10	U	10	U	10	U	10	U																
FLUORENE	10	U	10	U	10	U	10	U																
HEXACHLOROBENZENE	10	U	10	U	10	U	10	U																

APPENDIX B-3.1

ANALYTICAL DATABASE - CH2M HILL SURFACE WATER DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS11SW01		IS11SW02		IS11SW03		IS11SW04		IS17SW01		IS17SW01		IS17SW01		IS17SW02		IS17SW03		IS17SW04		IS17SW05		IS17SW06	
NORTHING	327410.222		327450.538		327423.661		327416.942		328117.17		328117.1663		328117.166		328030.815		327941.142		327795.008		327680.426		327549.238	
EASTING	1256703.53		1256510.02		1256429.39		1256260.06		1257859.4		1257859.44		1257859.44		1257636.92		1257442.63		1257264.94		1257142.06		1256995.92	
SITE	SITE11		SITE11		SITE11		SITE11		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS11SW01		IS11SW02		IS11SW03		IS11SW04		IS17SW01		IS17SW01-AVG		IS17SW01P		IS17SW02		IS17SW03		IS17SW04		IS17SW05		IS17SW06	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	7/20/2000		7/20/2000		7/20/2000		7/20/2000		7/21/2000		7/21/2000		7/21/2000		7/20/2000		7/21/2000		7/24/2000		7/24/2000		7/24/2000	
HEXACHLOROBUTADIENE	10	U	10	U	10	U	10	U																
HEXACHLOROCYCLOPENTADIENE	10	U	10	U	10	U	10	U																
HEXACHLOROETHANE	10	U	10	U	10	U	10	U																
INDENO(1,2,3-CD)PYRENE	10	U	10	U	10	U	10	U																
ISOPHORONE	10	U	10	U	10	U	10	U																
N-NITROSO-DI-N-PROPYLAMINE	10	U	10	U	10	U	10	U																
N-NITROSODIPHENYLAMINE	10	U	10	U	10	U	10	U																
NAPHTHALENE	10	U	10	U	10	U	10	U																
NITROBENZENE	10	U	0		0		0																	
PENTACHLOROPHENOL	25	U	25	U	25	U	25	U																
PHENANTHRENE	10	U	10	U	10	U	10	U																
PHENOL	10	U	10	U	10	U	10	U																
PYRENE	10	U	10	U	10	U	10	U																
INORGANICS (UG/L)																								
ALUMINUM	457		239		276		366		25.1	B	93.05	B	161	B	664		553	J	258		171	B	124	B
ANTIMONY	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
ARSENIC	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
BARIUM	29	J	24	J	24.7	J	26	J	19	J	21.2	J	23.4	J	24.7	J	25.8	J	24	J	25.2	J	24.4	J
BERYLLIUM	0.2	U	0.2	U	0.35	B	0.2	U	0.2	U	0.31	B	0.42	B	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
CADMIUM	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
CALCIUM	11500		10400		10700		10100		10600		10400		10200		10000		10100		9750		10800		11800	
CHROMIUM	2	U	2	U	2	U	2	U	2	U	2.0	U	2	U	2	U	2	U	2	U	2	U	2	U
COBALT	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U
COPPER	4.3	B	1.9	U	4.2	J	5.2	J	1.9	U	1.9	U	1.9	U	3.9	J	2.4	J	4.5	J	5	J	5.4	J
CYANIDE	1.6	B	4.9	B	1.5	B	1.5	B	6.2	L	4.2	L	2.2	L	10	L	1.1	L	2.7	B	0.98	B	2.7	B
IRON	772		475		564		726		32.3	B	234.575		453		725		981		576		362		227	
LEAD	38.4		1.6	J	1.3	J	6.1		1.3	U	1.3	U	1.3	U	1.3	U	1.3	K	1.3	U	1.9	J	7.3	
MAGNESIUM	5920		5380		5360		5190		5690		5595		5500		5300		5310		5140		5600		5900	
MANGANESE	127		98.3		103		111		1.6	B	47.35		93.9		87.4		106		105		105		95.9	
MERCURY	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
NICKEL	3.5	B	2.6	B	2.6	B	3.1	B	1.9	U	1.725	K	2.5	K	2	B	2.7	J	3.5	J	2.8	J	2.8	J
POTASSIUM	2950	J	2670	J	2630	J	2650	J	2770	J	2780	J	2790	J	2670	J	2700	J	2650	J	2920	J	3030	J
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	860	U	432.15	U	4.3	U	860	U	4.3	U	4.3	U	5.8		4.3	U
SILVER	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U
SODIUM	13300		12200		12000		11900		13400		12800		12200		12200		12100		15000		15800		15900	
THALLIUM	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U
VANADIUM	2	J	1.5	J	1.5	J	2.1	B	1.4	U	1.4	U	1.4	U	2.1	J	2.1	J	1.7	J	1.5	J	1.4	U
ZINC	42.3	B	10.8	B	18.5	B	53.5	B	7.4	B	11.3	B	15.2	B	9.4	B	32.8	B	24.2		26		32.7	
FILTERED INORGANICS (UG/L)																								
ALUMINUM	31.6	B	23.1	B	32.5	B	22.3	B	199	B	108.9	U	18.8	U	38.4	B	55.4	B	44.3	B	43.7	B	52.2	B
ANTIMONY	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U
ARSENIC	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U	3.6	U
BARIUM	23.6	J	21.2	J	22	J	22.9	J	21.8	J	20.1	J	18.4	J	17	J	17.8	J	20.4	J	20.7	J	21	J
BERYLLIUM	0.2	U	0.2	U	0.2	U	0.2	U	0.31	J	0.205	J	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
CADMIUM	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
CALCIUM	12000		11600		11900		11400		9120		9760		10400		10100		10200		10000		10700		12200	
CHROMIUM	4.4	B	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
COBALT	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U
COPPER	1.9	U	1.9	U	2.4	J	1.9	U	4.8	J	2.875	J	1.9	U	1.9	U	1.9	U	2.8	J	2.2	J	1.9	U
IRON	47.3	B	27.3	U	32.3	B	34	B	456		235.35		29.4	B	27.3	U	28.2	J	59.2	J	47.6	B	37.5	J
LEAD	1.3		1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U

APPENDIX B-3.1

ANALYTICAL DATABASE - CH2M HILL SURFACE WATER DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS11SW01		IS11SW02		IS11SW03		IS11SW04		IS17SW01		IS17SW01		IS17SW01		IS17SW02		IS17SW03		IS17SW04		IS17SW05		IS17SW06	
NORTHING	327410.222		327450.538		327423.661		327416.942		328117.17		328117.1663		328117.166		328030.815		327941.142		327795.008		327680.426		327549.238	
EASTING	1256703.53		1256510.02		1256429.39		1256260.06		1257859.4		1257859.44		1257859.44		1257636.92		1257442.63		1257264.94		1257142.06		1256995.92	
SITE	SITE11		SITE11		SITE11		SITE11		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS11SW01		IS11SW02		IS11SW03		IS11SW04		IS17SW01		IS17SW01-AVG		IS17SW01P		IS17SW02		IS17SW03		IS17SW04		IS17SW05		IS17SW06	
MATRIX	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL	SW	QUAL
SAMPLE DATE	7/20/2000		7/20/2000		7/20/2000		7/20/2000		7/21/2000		7/21/2000		7/21/2000		7/20/2000		7/21/2000		7/24/2000		7/24/2000		7/24/2000	
MAGNESIUM	6050	B	5960	B	5980		5910		4840	J	5250		5660		5320		5470		5230		5630		6180	
MANGANESE	4.5	J	2.2	J	3.6	B	2.5	B	86.7		44.2	J	1.7	J	1.6	B	2.2	B	5.1	B	4.4	B	4.2	B
MERCURY	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
NICKEL	5.3	B	3.7	B	2.2	B	1.9	U	17.9	J	9.425	J	1.9	U	1.9	U	1.9	U	3.1	J	3.7	J	3.3	J
POTASSIUM	2940	J	2910	J	2870	J	2910	J	2400	J	2600	J	2800	J	2550	J	2710	J	2640	J	2840	J	3090	J
SELENIUM	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.3	U	4.9	J	4.3	U	4.3	U
SILVER	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U	3.1	U
SODIUM	13900		14000		13900		14300		11300		12050		12800		12300		12900		14900		13700		14200	
THALLIUM	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U	5.3	U
VANADIUM	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
ZINC	33.8	B	24	B	15.2	B	7.2	B	15.7	B	10.95	B	6.2	B	7.2	B	8	B	29.9		19.8	B	19.2	B
EXPLOSIVES (UG/L)																								
1,3,5-TRINITROBENZENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
1,3-DINITROBENZENE	0.075	J	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2,4,6-TRINITROTOLUENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2,4-DINITROTOLUENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2,6-DINITROTOLUENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2-AMINO-4,6-DINITROTOLUENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
2-NITROTOLUENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
3-NITROTOLUENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
4-AMINO-2,6-DINITROTOLUENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
4-NITROTOLUENE	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.11	J	0.2	U	0.2	U	0.2	U	0.2	U
AMMONIUM PERCHLORATE	4	U	1.6	J	2.9	J	3.6	J	4	U	4	U	4	U	4	U	4	U	4	U	4	U	4	U
HMX	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
NITROBENZENE	0		0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
NITROGLYCERIN	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U	30	U
NITROGUANIDINE	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U	20	U
PETN	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
RDX	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
TETRYL	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
MISCELLANEOUS PARAMETERS																								
DIESEL RANGE ORGANICS (UG/L)	160		160		100		120																	
GASOLINE RANGE ORGANICS (UG/L)	100	U	100	U	100	U	100	U																
HARDNESS (MG/L)									42		45		48		44		46		40		36		42	

APPENDIX B-3.2

SEDIMENT DATA – CH2M HILL DATA, IR SITES 11 AND 17

APPENDIX B-3.2

ANALYTICAL DATABASE - CH2M HILL SEDIMENT DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS11SD01		IS11SD02		IS11SD03		IS11SD04		IS17SD01		IS17SD02		IS17SD03	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD	
NORTHING	327410.2225		327450.5376		327423.6608		327416.9417		328117.1663		328030.8146		327941.1417	
EASTING	1256703.528		1256510.015		1256429.385		1256260.062		1257859.44		1257636.918		1257442.627	
SITE	SITE11		SITE11		SITE11		SITE11		SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS11SD010001		IS11SD020001		IS11SD030001		IS11SD040001		IS17SD010001		IS17SD020001		IS17SD030001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	07/20/00		07/20/00		07/20/00		07/20/00		07/21/00		07/21/00		07/21/00	
VOLATILE ORGANICS (UG/KG)														
1,1,1-TRICHLOROETHANE	14	U	13	U	13	U	13	U						
1,1,2,2-TETRACHLOROETHANE	14	U	13	U	13	U	13	U						
1,1,2-TRICHLOROETHANE	14	U	13	U	13	U	13	U						
1,1,2-TRICHLOROTRIFLUOROETHANE	14	U	13	U	13	U	13	U						
1,1-DICHLOROETHANE	14	U	13	U	13	U	13	U						
1,1-DICHLOROETHENE	14	U	13	U	13	U	13	U						
1,2,4-TRICHLOROBENZENE	14	U	13	U	13	U	13	U						
1,2-DIBROMO-3-CHLOROPROPANE	14	U	13	U	13	U	13	U						
1,2-DIBROMOETHANE	14	U	13	U	13	U	13	U						
1,2-DICHLOROBENZENE	14	U	13	U	13	U	13	U						
1,2-DICHLOROETHANE	14	U	13	U	13	U	13	U						
1,2-DICHLOROPROPANE	14	U	13	U	13	U	13	U						
1,3-DICHLOROBENZENE	14	U	13	U	13	U	13	U						
1,4-DICHLOROBENZENE	14	U	13	U	13	U	13	U						
2-BUTANONE	14	J	13	U	13	U	13	U						
2-HEXANONE	14	U	13	U	13	U	13	U						
4-METHYL-2-PENTANONE	14	U	13	U	13	U	13	U						
ACETONE	8.7	B	13	U	13	U	13	U						
BENZENE	14	U	13	U	13	U	13	U						
BROMODICHLOROMETHANE	14	U	13	U	13	U	13	U						
BROMOFORM	14	U	13	U	13	U	13	U						
BROMOMETHANE	14	U	13	U	13	U	13	U						
CARBON DISULFIDE	14	U	13	U	13	U	13	U						
CARBON TETRACHLORIDE	14	U	13	U	13	U	13	U						
CHLOROBENZENE	14	U	13	U	13	U	13	U						
CHLORODIBROMOMETHANE	14	U	13	U	13	U	13	U						
CHLOROETHANE	14	U	13	U	13	U	13	U						
CHLOROFORM	14	U	13	U	13	U	13	U						
CHLOROMETHANE	14	J	13	U	13	U	13	U						
CIS-1,2-DICHLOROETHENE	14	U	13	U	13	U	13	U						
CIS-1,3-DICHLOROPROPENE	14	U	13	U	13	U	13	U						
CYCLOHEXANE	14	U	13	U	13	U	13	U						
DICHLORODIFLUOROMETHANE	14	U	13	U	13	U	13	U						
ETHYLBENZENE	14	U	13	U	13	U	13	U						
ISOPROPYLBENZENE	14	U	13	U	13	U	13	U						
METHYL ACETATE	14	U	13	U	13	U	13	U						
METHYL CYCLOHEXANE	14	U	13	U	13	U	13	U						
METHYL TERT-BUTYL ETHER	14	U	13	U	13	U	13	U						
METHYLENE CHLORIDE	14	U	13	U	13	U	13	U						
STYRENE	14	U	13	U	13	U	13	U						
TETRACHLOROETHENE	14	U	13	U	13	U	13	U						
TOLUENE	14	U	13	U	13	U	13	U						

APPENDIX B-3.2

ANALYTICAL DATABASE - CH2M HILL SEDIMENT DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS11SD01		IS11SD02		IS11SD03		IS11SD04		IS17SD01		IS17SD02		IS17SD03	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD	
NORTHING	327410.2225		327450.5376		327423.6608		327416.9417		328117.1663		328030.8146		327941.1417	
EASTING	1256703.528		1256510.015		1256429.385		1256260.062		1257859.44		1257636.918		1257442.627	
SITE	SITE11		SITE11		SITE11		SITE11		SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS11SD010001		IS11SD020001		IS11SD030001		IS11SD040001		IS17SD010001		IS17SD020001		IS17SD030001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	07/20/00		07/20/00		07/20/00		07/20/00		07/21/00		07/21/00		07/21/00	
TOTAL 1,2-DICHLOROETHENE	14	U	0		0		0							
TOTAL XYLENES	14	U	13	U	13	U	13	U						
TRANS-1,2-DICHLOROETHENE	14	U	13	U	13	U	13	U						
TRANS-1,3-DICHLOROPROPENE	14	U	13	U	13	U	13	U						
TRICHLOROETHENE	14	U	13	U	13	U	13	U						
TRICHLOROFLUOROMETHANE	14	U	13	U	13	U	13	U						
VINYL CHLORIDE	14	U	13	U	13	U	13	U						
SEMIVOLATILE ORGANICS (UG/KG)														
1,1-BIPHENYL	450	U	440	U	420	U	420	U						
2,2'-OXYBIS(1-CHLOROPROPANE)	450	U	440	U	420	U	420	U						
2,4,5-TRICHLOROPHENOL	1100	U	1100	U	1100	U	1100	U						
2,4,6-TRICHLOROPHENOL	450	U	440	U	420	U	420	U						
2,4-DICHLOROPHENOL	450	U	440	U	420	U	420	U						
2,4-DIMETHYLPHENOL	450	U	440	U	420	U	420	U						
2,4-DINITROPHENOL	1100	R	1100	R	1100	R	1100	R						
2-CHLORONAPHTHALENE	450	U	440	U	420	U	420	U						
2-CHLOROPHENOL	450	U	440	U	420	U	420	U						
2-METHYLNAPHTHALENE	450	U	440	U	420	U	420	U						
2-METHYLPHENOL	450	U	440	U	420	U	420	U						
2-NITROANILINE	1100	U	1100	U	1100	U	1100	U						
2-NITROPHENOL	450	U	440	U	420	U	420	U						
3,3'-DICHLOROBENZIDINE	450	U	440	U	420	U	420	U						
3-NITROANILINE	1100	U	1100	U	1100	U	1100	U						
4,6-DINITRO-2-METHYLPHENOL	1100	U	1100	U	1100	U	1100	U						
4-BROMOPHENYL PHENYL ETHER	450	U	440	U	420	U	420	U						
4-CHLORO-3-METHYLPHENOL	450	U	440	U	420	U	420	U						
4-CHLOROANILINE	450	U	440	U	420	U	420	U						
4-CHLOROPHENYL PHENYL ETHER	450	U	440	U	420	U	420	U						
4-METHYLPHENOL	450	U	440	U	420	U	420	U						
4-NITROANILINE	1100	U	1100	U	1100	U	1100	U						
4-NITROPHENOL	1100	U	1100	U	1100	U	1100	U						
ACENAPHTHENE	450	U	440	U	420	U	420	U						
ACENAPHTHYLENE	450	U	440	U	420	U	420	U						
ACETOPHENONE	450	U	440	U	420	U	420	U						
ANTHRACENE	450	U	440	U	420	U	420	U						
ATRAZINE	450	U	440	U	420	U	420	U						
BAP EQUIVALENT			208.27		5.146									
BENZALDEHYDE	450	U	440	U	420	U	420	U						
BENZO(A)ANTHRACENE	450	U	250	J	420	U	420	U						
BENZO(A)PYRENE	450	U	77	J	420	U	420	U						
BENZO(B)FLUORANTHENE	450	U	400	J	51	J	420	U						
BENZO(G,H,I)PERYLENE	450	U	440	U	420	U	420	U						
BENZO(K)FLUORANTHENE	450	U	170	J	420	U	420	U						

APPENDIX B-3.2

ANALYTICAL DATABASE - CH2M HILL SEDIMENT DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS11SD01		IS11SD02		IS11SD03		IS11SD04		IS17SD01		IS17SD02		IS17SD03	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD	
NORTHING	327410.2225		327450.5376		327423.6608		327416.9417		328117.1663		328030.8146		327941.1417	
EASTING	1256703.528		1256510.015		1256429.385		1256260.062		1257859.44		1257636.918		1257442.627	
SITE	SITE11		SITE11		SITE11		SITE11		SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS11SD010001		IS11SD020001		IS11SD030001		IS11SD040001		IS17SD010001		IS17SD020001		IS17SD030001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	07/20/00		07/20/00		07/20/00		07/20/00		07/21/00		07/21/00		07/21/00	
BIS(2-CHLOROETHOXY)METHANE	450	U	440	U	420	U	420	U						
BIS(2-CHLOROETHYL)ETHER	450	U	440	U	420	U	420	U						
BIS(2-ETHYLHEXYL)PHTHALATE	450	U	440	U	150	J	67	J						
BUTYL BENZYL PHTHALATE	450	U	440	U	420	U	420	U						
CAPROLACTAM	450	U	440	U	420	U	420	U						
CARBAZOLE	450	U	440	U	420	U	420	U						
CHRYSENE	450	U	370	J	46	J	420	U						
DI-N-BUTYL PHTHALATE	450	U	440	U	420	U	420	U						
DI-N-OCTYL PHTHALATE	450	U	440	U	420	U	420	U						
DIBENZO(A,H)ANTHRACENE	450	U	55	J	420	U	420	U						
DIBENZOFURAN	450	U	440	U	420	U	420	U						
DIETHYL PHTHALATE	450	U	440	U	420	U	420	U						
DIMETHYL PHTHALATE	450	U	440	U	420	U	420	U						
FLUORANTHENE	450	U	300	J	56	J	420	U						
FLUORENE	450	U	440	U	420	U	420	U						
HEXACHLOROBENZENE	450	U	440	U	420	U	420	U						
HEXACHLOROBUTADIENE	450	U	440	U	420	U	420	U						
HEXACHLOROCYCLOPENTADIENE	450	U	440	U	420	U	420	U						
HEXACHLOROETHANE	450	U	440	U	420	U	420	U						
HIGH MOLECULAR WEIGHT PAHS			1954		201									
INDENO(1,2,3-CD)PYRENE	450	U	92	J	420	U	420	U						
ISOPHORONE	450	U	440	U	420	U	420	U						
LOW MOLECULAR WEIGHT PAHS			79											
N-NITROSO-DI-N-PROPYLAMINE	450	U	440	U	420	U	420	U						
N-NITROSODIPHENYLAMINE	450	U	440	U	420	U	420	U						
NAPHTHALENE	450	U	440	U	420	U	420	U						
PENTACHLOROPHENOL	1100	U	1100	U	1000	U	1000	U						
PHENANTHRENE	450	U	79	J	420	U	420	U						
PHENOL	450	U	440	U	420	U	420	U						
PYRENE	450	U	240	J	48	J	420	U						
TOTAL PAHS			2033		201									
INORGANICS (MG/KG)														
ALUMINUM	8230		2450		3740		1900		837		5440		5360	
ANTIMONY	22.8	L	63.9	L	33.6	L	34.4	L	1.1	U	1.1	U	1.1	U
ARSENIC	6.7	J	15.2	J	24.5	J	18.9	J	2.1	J	3.4		3.5	
BARIUM	169		86.4		50.4	J	112		7.6	J	56.1		61.1	
BERYLLIUM	0.055	U	0.095	B	0.058	B	0.072	B	0.2	J	0.14	B	0.22	B
CADMIUM	1.2	L	4.5	L	6.5	L	4.9	L	0.13	J	0.1	B	0.12	B
CALCIUM	3610	J	22100	J	632	J	1070	J	198	B	349	J	441	J
CHROMIUM	14.2	L	57.2	L	28.8	L	69.7	L	7		10.6		10	

APPENDIX B-3.2

ANALYTICAL DATABASE - CH2M HILL SEDIMENT DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS11SD01		IS11SD02		IS11SD03		IS11SD04		IS17SD01		IS17SD02		IS17SD03	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD	
NORTHING	327410.2225		327450.5376		327423.6608		327416.9417		328117.1663		328030.8146		327941.1417	
EASTING	1256703.528		1256510.015		1256429.385		1256260.062		1257859.44		1257636.918		1257442.627	
SITE	SITE11		SITE11		SITE11		SITE11		SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS11SD010001		IS11SD020001		IS11SD030001		IS11SD040001		IS17SD010001		IS17SD020001		IS17SD030001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	07/20/00		07/20/00		07/20/00		07/20/00		07/21/00		07/21/00		07/21/00	
COBALT	5.1	B	6.3	J	7.4	J	14		2.5	J	3.9	J	7.4	J
COPPER	757	L	149	L	343	L	650	L	3	J	6.5		11.7	
CYANIDE	2.7	U	2.6	U	2.6	U	0.12	J	0.66	U	0.62	U	0.67	U
IRON	23100	J	8360	J	134000	J	129000	J	7270		11100		10600	
LEAD	76400	J	1160	J	375	J	1000	J	4.4	J	10.9	J	21.6	J
MAGNESIUM	2660	J	3190	J	717	J	688	J	108	J	563	J	516	J
MANGANESE	330	J	637	J	432	J	940	J	85.3		73.6		311	
MERCURY	0.2		0.081	J	0.53		0.11	J	0.066	UL	0.062	J	0.097	J
NICKEL	14.6	L	45.1	L	29.5	L	46.4	L	2	B	5.6	J	6	J
POTASSIUM	454	J	182	J	164	J	131	J	91.7	J	340	J	356	J
SELENIUM	1.2	UL	1.1	UL	1.7	L	2.2	UL	1.1	U	1.1	U	1.1	U
SILVER	8.7		0.82	U	10.9		7.5		0.82	U	0.77	U	0.82	U
SODIUM	428	B	332	B	226	B	378	B	329	B	547	B	437	B
THALLIUM	4.2		1.4	U	1.5	J	2.7	U	1.4	U	1.3	U	1.4	U
VANADIUM	22.1		16.1		12.9		14.1	J	7.7	J	17		17.5	
ZINC	1310	J	847	J	898	J	1910	J	8.8	J	23.5	J	25.6	J
MISCELLANEOUS PARAMETERS (MG/KG)														
DIESEL RANGE ORGANICS	4.1	U	13		26		15							
GASOLINE RANGE ORGANICS	0.14	U	0.13	U	0.13	U	0.13	U						
PERCENT MOISTURE	26.6		24.3		22.1		21.2		24.1		19		24.8	
PERCENT SOLIDS									79.7		75.3		65.3	
PH (S.U.)									7.1		5.4		5.8	
TOTAL ORGANIC CARBON									125	U	133	U	13000	
AMMONIUM PERCHLORATE (UG/KG)	130	U	230	U	110	U	100	U	120	U	110	U	120	U
PERCHLORATE-CALCULATED FROM ABOVE (UG/KG)	110.17	U	194.92	U	93.22	U	84.75	U	101.69	U	93.22	U	101.69	U
EXPLOSIVES (MG/KG)														
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.094	J	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.069	J	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.1	J	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.1	J
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.18	J	0.25	U	0.25	U	0.25	U	0.25	U	0.22	J	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U	0.14	J	0.16	B	0.25	U	0.25	U
HMX	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
NITROBENZENE	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.098	B	0.25	U
NITROGLYCERIN	1.2	U	1.2	U	1.3	U	1.2	U	1.3	U	1.3	U	1.2	U
NITROGUANIDINE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
PETN	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
RDX	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
TETRYL	0.65	U	0.65	U	0.65	U	0.65	U	0.65	R	0.65	R	0.65	R

APPENDIX B-3.2

ANALYTICAL DATABASE - CH2M HILL SEDIMENT DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS17SD04		IS17SD05		IS17SD06	
LOCATION TYPE	SD		SD		SD	
NORTHING	327795.0081		327680.4261		327549.2379	
EASTING	1257264.942		1257142.056		1256995.923	
SITE	SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS17SD040001		IS17SD050001		IS17SD060001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	07/24/00		07/24/00		07/24/00	
VOLATILE ORGANICS (UG/KG)						
1,1,1-TRICHLOROETHANE						
1,1,2,2-TETRACHLOROETHANE						
1,1,2-TRICHLOROETHANE						
1,1,2-TRICHLOROTRIFLUOROETHANE						
1,1-DICHLOROETHANE						
1,1-DICHLOROETHENE						
1,2,4-TRICHLOROBENZENE						
1,2-DIBROMO-3-CHLOROPROPANE						
1,2-DIBROMOETHANE						
1,2-DICHLOROBENZENE						
1,2-DICHLOROETHANE						
1,2-DICHLOROPROPANE						
1,3-DICHLOROBENZENE						
1,4-DICHLOROBENZENE						
2-BUTANONE						
2-HEXANONE						
4-METHYL-2-PENTANONE						
ACETONE						
BENZENE						
BROMODICHLOROMETHANE						
BROMOFORM						
BROMOMETHANE						
CARBON DISULFIDE						
CARBON TETRACHLORIDE						
CHLOROBENZENE						
CHLORODIBROMOMETHANE						
CHLOROETHANE						
CHLOROFORM						
CHLOROMETHANE						
CIS-1,2-DICHLOROETHENE						
CIS-1,3-DICHLOROPROPENE						
CYCLOHEXANE						
DICHLORODIFLUOROMETHANE						
ETHYLBENZENE						
ISOPROPYLBENZENE						
METHYL ACETATE						
METHYL CYCLOHEXANE						
METHYL TERT-BUTYL ETHER						
METHYLENE CHLORIDE						
STYRENE						
TETRACHLOROETHENE						
TOLUENE						

APPENDIX B-3.2

ANALYTICAL DATABASE - CH2M HILL SEDIMENT DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS17SD04		IS17SD05		IS17SD06	
LOCATION TYPE	SD		SD		SD	
NORTHING	327795.0081		327680.4261		327549.2379	
EASTING	1257264.942		1257142.056		1256995.923	
SITE	SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS17SD040001		IS17SD050001		IS17SD060001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	07/24/00		07/24/00		07/24/00	
TOTAL 1,2-DICHLOROETHENE						
TOTAL XYLENES						
TRANS-1,2-DICHLOROETHENE						
TRANS-1,3-DICHLOROPROPENE						
TRICHLOROETHENE						
TRICHLOROFLUOROMETHANE						
VINYL CHLORIDE						
SEMIVOLATILE ORGANICS (UG/KG)						
1,1-BIPHENYL						
2,2'-OXYBIS(1-CHLOROPROPANE)						
2,4,5-TRICHLOROPHENOL						
2,4,6-TRICHLOROPHENOL						
2,4-DICHLOROPHENOL						
2,4-DIMETHYLPHENOL						
2,4-DINITROPHENOL						
2-CHLORONAPHTHALENE						
2-CHLOROPHENOL						
2-METHYLNAPHTHALENE						
2-METHYLPHENOL						
2-NITROANILINE						
2-NITROPHENOL						
3,3'-DICHLOROBENZIDINE						
3-NITROANILINE						
4,6-DINITRO-2-METHYLPHENOL						
4-BROMOPHENYL PHENYL ETHER						
4-CHLORO-3-METHYLPHENOL						
4-CHLOROANILINE						
4-CHLOROPHENYL PHENYL ETHER						
4-METHYLPHENOL						
4-NITROANILINE						
4-NITROPHENOL						
ACENAPHTHENE						
ACENAPHTHYLENE						
ACETOPHENONE						
ANTHRACENE						
ATRAZINE						
BAP EQUIVALENT						
BENZALDEHYDE						
BENZO(A)ANTHRACENE						
BENZO(A)PYRENE						
BENZO(B)FLUORANTHENE						
BENZO(G,H,I)PERYLENE						
BENZO(K)FLUORANTHENE						

APPENDIX B-3.2

ANALYTICAL DATABASE - CH2M HILL SEDIMENT DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS17SD04		IS17SD05		IS17SD06	
LOCATION TYPE	SD		SD		SD	
NORTHING	327795.0081		327680.4261		327549.2379	
EASTING	1257264.942		1257142.056		1256995.923	
SITE	SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS17SD040001		IS17SD050001		IS17SD060001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	07/24/00		07/24/00		07/24/00	
BIS(2-CHLOROETHOXY)METHANE						
BIS(2-CHLOROETHYL)ETHER						
BIS(2-ETHYLHEXYL)PHTHALATE						
BUTYL BENZYL PHTHALATE						
CAPROLACTAM						
CARBAZOLE						
CHRYSENE						
DI-N-BUTYL PHTHALATE						
DI-N-OCTYL PHTHALATE						
DIBENZO(A,H)ANTHRACENE						
DIBENZOFURAN						
DIETHYL PHTHALATE						
DIMETHYL PHTHALATE						
FLUORANTHENE						
FLUORENE						
HEXACHLOROBENZENE						
HEXACHLOROBUTADIENE						
HEXACHLOROCYCLOPENTADIENE						
HEXACHLOROETHANE						
HIGH MOLECULAR WEIGHT PAHS						
INDENO(1,2,3-CD)PYRENE						
ISOPHORONE						
LOW MOLECULAR WEIGHT PAHS						
N-NITROSO-DI-N-PROPYLAMINE						
N-NITROSODIPHENYLAMINE						
NAPHTHALENE						
PENTACHLOROPHENOL						
PHENANTHRENE						
PHENOL						
PYRENE						
TOTAL PAHS						
INORGANICS (MG/KG)						
ALUMINUM	1560		13100		11900	
ANTIMONY	1.3	J	3.5	J	3.2	J
ARSENIC	7.1		17.8		32.7	
BARIUM	11	J	95		85.8	
BERYLLIUM	0.061	J	0.39	J	0.39	J
CADMIUM	0.71	J	4.2		18.7	
CALCIUM	362	J	1750	J	3350	J
CHROMIUM	27.5		38.8		43.4	

APPENDIX B-3.2

ANALYTICAL DATABASE - CH2M HILL SEDIMENT DATA, IR SITES 11 AND 17
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	IS17SD04		IS17SD05		IS17SD06	
LOCATION TYPE	SD		SD		SD	
NORTHING	327795.0081		327680.4261		327549.2379	
EASTING	1257264.942		1257142.056		1256995.923	
SITE	SITE17		SITE17		SITE17	
AREA OF CONCERN	AREA 1		AREA 1		AREA 1	
SAMPLE ID	IS17SD040001		IS17SD050001		IS17SD060001	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	07/24/00		07/24/00		07/24/00	
COBALT	2.9	J	12	J	12.2	J
COPPER	80.4		335		483	
CYANIDE	0.65	U	0.35	B	0.42	B
IRON	26900		34100		118000	
LEAD	138	J	707	J	1140	J
MAGNESIUM	181	J	1550		1510	J
MANGANESE	172		305		763	
MERCURY	0.065	U	0.34		0.26	
NICKEL	9.5	J	39.4		35.7	
POTASSIUM	94.8	J	796	J	581	J
SELENIUM	1.1	U	1.1	U	1.4	U
SILVER	0.8	U	8.3		4.5	
SODIUM	372	J	521	J	604	J
THALLIUM	1.4	U	1.4	U	1.8	U
VANADIUM	11.3	J	28.1		33.6	
ZINC	156	J	712	J	939	J
MISCELLANEOUS PARAMETERS (MG/KG)						
DIESEL RANGE ORGANICS						
GASOLINE RANGE ORGANICS						
PERCENT MOISTURE	22.6		21.4		39.6	
PERCENT SOLIDS	81		79.5		60.2	
PH (S.U.)	6.8		7.1		7.5	
TOTAL ORGANIC CARBON	123	U	39200		52100	
AMMONIUM PERCHLORATE (UG/KG)	86	U	140	U	160	U
PERCHLORATE-CALCULATED FROM ABOVE (UG/KG)	72.88	U	118.64	U	135.59	U
EXPLOSIVES (MG/KG)						
1,3,5-TRINITROBENZENE	0.25	U	0.25	U	0.25	U
1,3-DINITROBENZENE	0.25	U	0.25	U	0.25	U
2,4,6-TRINITROTOLUENE	0.25	U	0.066	J	0.25	U
2,4-DINITROTOLUENE	0.25	U	0.25	U	0.25	U
2,6-DINITROTOLUENE	0.25	U	0.25	U	0.25	U
2-AMINO-4,6-DINITROTOLUENE	0.25	U	0.22	J	0.25	U
2-NITROTOLUENE	0.25	U	0.25	U	0.25	U
3-NITROTOLUENE	0.25	U	0.25	U	0.25	U
4-AMINO-2,6-DINITROTOLUENE	0.25	U	0.15	B	0.25	U
4-NITROTOLUENE	0.25	U	0.25	U	0.25	U
HMX	0.5	U	0.5	U	0.5	U
NITROBENZENE	0.25	U	0.25	U	0.25	U
NITROGLYCERIN	1.2	U	1.3	U	1.5	U
NITROGUANIDINE	0.1	U	0.1	U	0.1	U
PETN	2.5	U	2.5	U	2.5	U
RDX	0.5	U	0.5	U	0.5	U
TETRYL	0.65	R	0.65	R	0.65	R

APPENDIX B-4

SEDIMENT DATA – 1992

APPENDIX B-4

ANALYTICAL DATABASE - TtNUS 1992 SEDIMENT DATA
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	39DP01		39DP01		39DP02		39DP03		39DP04		39DP05		39DP06		41DP01		41DP01	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD		SD		SD	
NORTHING	333909.14		333909.14		333899.06		333553.47		333730.91		333873.41		333524.42		334008.79		334008.79	
EASTING	1263170.45		1263170.45		1263174.93		1262986.48		1263077.8		1263216.15		1263143.95		1264042.38		1264042.38	
SITE	39		39		39		39		39		39		39		41		41	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	39DP01		39DP01-D		39DP02		39DP03		39DP04		39DP05		39DP06		41DP01		41DP01-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		08/01/92		08/01/92	
VOLATILE ORGANICS (UG/KG)																		
1,1,1-TRICHLOROETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
1,1,2,2-TETRACHLOROETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
1,1,2-TRICHLOROETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
1,1-DICHLOROETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
1,1-DICHLOROETHENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
1,1-DIETHOXYETHANE	12	U			11	U	31	U	42	U	14	U	43	U				
1,2-DICHLOROETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
1,2-DICHLOROPROPANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
2-BUTANONE	12	U	12	U	11	U	17	U	14	U	7	U	14	U	6	U	33	UJ
2-HEXANONE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
4-METHYL-2-PENTANONE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
ACETONE	12	U	12	U	11	U	110	U	110	U	280	U	110	U	55	UJ	130	UJ
BENZENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
BROMODICHLOROMETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
BROMOFORM	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
BROMOMETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
CARBON DISULFIDE	12	U	12	U	11	U	5	J	42	U	14	U	43	U	14	U	3	J
CARBON TETRACHLORIDE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
CHLOROBENZENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
CHLORODIBROMOMETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
CHLOROETHANE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
CHLOROFORM	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
CHLOROMETHANE	12	U	12	U	11	U	31	U	13	J	14	U	5	J	14	U	23	U
CIS-1,3-DICHLOROPROPENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
DIMETHOXYMETHANE	12	U			11	U	31	U	42	U	14	U	43	U				
ETHYLBENZENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
METHYLENE CHLORIDE	12	U	12	U	11	U	31	U	42	U	14	U	7	U	14	U	23	U
STYRENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
TETRACHLOROETHENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
TOLUENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
TOTAL 1,2-DICHLOROETHENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
TOTAL XYLENES	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
TRANS-1,3-DICHLOROPROPENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
TRICHLOROETHENE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
VINYL CHLORIDE	12	U	12	U	11	U	31	U	42	U	14	U	43	U	14	U	23	U
SEMIVOLATILE ORGANICS (UG/KG)																		
1,1-DIMETHYLHYDRAZINE	5400	U	5800	U	5600	U	61800		57500		5100	U	85500					
1,2,4-TRICHLOROBENZENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
1,2-DICHLOROBENZENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
1,3-DICHLOROBENZENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
1,4-DICHLOROBENZENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U

APPENDIX B-4

ANALYTICAL DATABASE - TtNUS 1992 SEDIMENT DATA
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	39DP01		39DP01		39DP02		39DP03		39DP04		39DP05		39DP06		41DP01		41DP01	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD		SD		SD	
NORTHING	333909.14		333909.14		333899.06		333553.47		333730.91		333873.41		333524.42		334008.79		334008.79	
EASTING	1263170.45		1263170.45		1263174.93		1262986.48		1263077.8		1263216.15		1263143.95		1264042.38		1264042.38	
SITE	39		39		39		39		39		39		39		41		41	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	39DP01		39DP01-D		39DP02		39DP03		39DP04		39DP05		39DP06		41DP01		41DP01-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		08/01/92		08/01/92	
2,2'-OXYBIS(1-CHLOROPROPANE)	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2,4,5-TRICHLOROPHENOL	900	U	950	U	890	U	2700	U	3300	U	1000	U	3300	U	2000	U	1500	U
2,4,6-TRICHLOROPHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2,4-DICHLOROPHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2,4-DIMETHYLPHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2,4-DINITROPHENOL	900	U	950	U	890	U	2700	U	3300	U	1000	U	3300	U	2000	U	1500	U
2,4-DINITROTOLUENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2,6-DINITROTOLUENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2-CHLORONAPHTHALENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2-CHLOROPHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2-METHYLNAPHTHALENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2-METHYLPHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
2-NITROANILINE	900	U	950	U	890	U	2700	U	3300	U	1000	U	3300	U	2000	U	1500	U
2-NITROPHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
3,3'-DICHLOROBENZIDINE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
3-NITROANILINE	900	U	950	U	890	U	2700	U	3300	U	1000	U	3300	U	2000	U	1500	U
4,6-DINITRO-2-METHYLPHENOL	900	U	950	U	890	U	2700	U	3300	U	1000	U	3300	U	2000	U	1500	U
4-BROMOPHENYL PHENYL ETHER	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
4-CHLORO-3-METHYLPHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
4-CHLOROANILINE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
4-CHLOROPHENYL PHENYL ETHER	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
4-METHYLPHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
4-NITROANILINE	900	U	950	U	890	U	2700	U	3300	U	1000	U	3300	U	2000	U	1500	U
4-NITROPHENOL	900	U	950	U	890	U	2700	U	3300	U	1000	U	3300	U	2000	U	1500	U
ACENAPHTHENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
ACENAPHTHYLENE	33	J	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
ANTHRACENE	27	J	64	J	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
BAP EQUIVALENT	114.358		44.809				0.064				73.849				213.91		98.893	
BENZO(A)ANTHRACENE	82	J	39	J	370	U	1100	U	1400	U	65	J	1400	U	240	J	78	J
BENZO(A)PYRENE	95	J	36	J	370	U	1100	U	1400	U	59	J	1400	U	170	J	79	J
BENZO(B)FLUORANTHENE	54	J	24	J	370	U	1100	U	1400	U	45	J	1400	U	180	J	120	J
BENZO(G,H,I)PERYLENE	62	J	28	J	370	U	1100	U	1400	U	40	J	1400	U	840	U	630	U
BENZO(K)FLUORANTHENE	76	J	36	J	370	U	1100	U	1400	U	48	J	1400	U	170	J	630	U
BIS(2-CHLOROETHOXY)METHANE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
BIS(2-CHLOROETHYL)ETHER	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
BIS(2-ETHYLHEXYL)PHTHALATE	68	U	390	U	370	U	120	U	130	U	68	U	190	U	100	J	630	U
BUTYL BENZYL PHTHALATE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
CARBAZOLE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
CHRYSENE	98	J	49	J	370	U	64	J	1400	U	69	J	1400	U	210	J	93	J
DI-N-BUTYL PHTHALATE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
DI-N-OCTYL PHTHALATE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
DIBENZO(A,H)ANTHRACENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U

APPENDIX B-4

ANALYTICAL DATABASE - TtNUS 1992 SEDIMENT DATA
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	39DP01		39DP01		39DP02		39DP03		39DP04		39DP05		39DP06		41DP01		41DP01	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD		SD		SD	
NORTHING	333909.14		333909.14		333899.06		333553.47		333730.91		333873.41		333524.42		334008.79		334008.79	
EASTING	1263170.45		1263170.45		1263174.93		1262986.48		1263077.8		1263216.15		1263143.95		1264042.38		1264042.38	
SITE	39		39		39		39		39		39		39		41		41	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	39DP01		39DP01-D		39DP02		39DP03		39DP04		39DP05		39DP06		41DP01		41DP01-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		08/01/92		08/01/92	
DIBENZOFURAN	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
DIETHYL PHTHALATE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
DIMETHYL PHTHALATE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
FLUORANTHENE	110	J	65	J	370	U	92	J	83	J	87	J	1400	U	400	J	160	J
FLUORENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
HEXACHLOROBENZENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
HEXACHLOROBUTADIENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
HEXACHLOROCYCLOPENTADIENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
HEXACHLOROETHANE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
HIGH MOLECULAR WEIGHT PAHS	816		408				254		160		596		78		1720		680	
INDENO(1,2,3-CD)PYRENE	49	J	21	J	370	U	1100	U	1400	U	33	J	1400	U	840	U	630	U
ISOPHORONE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
LOW MOLECULAR WEIGHT PAHS	109		119								30				160			
N-NITROSO-DI-N-PROPYLAMINE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
N-NITROSODIPHENYLAMINE	370	U	390	U	370	U	230	J	1400	U	420	U	1400	U	130	J	120	J
NAPHTHALENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
NITROBENZENE	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
PENTACHLOROPHENOL	900	U	950	U	890	U	2700	U	3300	U	1000	U	3300	U	2000	U	1500	U
PHENANTHRENE	49	J	55	J	370	U	1100	U	1400	U	30	J	1400	U	160	J	630	U
PHENOL	370	U	390	U	370	U	1100	U	1400	U	420	U	1400	U	840	U	630	U
PYRENE	190	J	110	J	370	U	98	J	77	J	150	J	78	J	350	J	150	J
TOTAL PAHS	925		527				254		160		626		78		1880		680	
PESTICIDES/PCBS (UG/KG)																		
4,4'-DDD															3.8	U	3.9	JP
4,4'-DDE															3	U	1.8	U
4,4'-DDT															14	U	6.3	
ALDRIN															4.3	U	3.2	U
ALPHA-BHC															4.3	U	3.2	U
ALPHA-CHLORDANE															4.3	U	3.2	U
AROCLOR-1016															84	U	63	U
AROCLOR-1221															170	U	130	U
AROCLOR-1232															84	U	63	U
AROCLOR-1242															84	U	63	U
AROCLOR-1248															84	U	63	U
AROCLOR-1254															84	U	63	U
AROCLOR-1260															84	U	63	U
BETA-BHC															4.3	U	3.2	U
DELTA-BHC															4.3	U	3.2	U
DIELDRIN															8.4	U	6.3	U
ENDOSULFAN I															4.3	U	3.2	U
ENDOSULFAN II															8.4	U	6.3	U
ENDOSULFAN SULFATE															8.4	U	6.3	U

APPENDIX B-4

ANALYTICAL DATABASE - TtNUS 1992 SEDIMENT DATA
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	39DP01		39DP01		39DP02		39DP03		39DP04		39DP05		39DP06		41DP01		41DP01	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD		SD		SD	
NORTHING	333909.14		333909.14		333899.06		333553.47		333730.91		333873.41		333524.42		334008.79		334008.79	
EASTING	1263170.45		1263170.45		1263174.93		1262986.48		1263077.8		1263216.15		1263143.95		1264042.38		1264042.38	
SITE	39		39		39		39		39		39		39		41		41	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	39DP01		39DP01-D		39DP02		39DP03		39DP04		39DP05		39DP06		41DP01		41DP01-D	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		09/01/92		08/01/92		08/01/92	
ENDRIN															1.9	U	3.3	U
ENDRIN ALDEHYDE															8.4	U	6.3	U
ENDRIN KETONE															8.4	U	6.3	U
GAMMA-BHC (LINDANE)															4.3	U	3.2	U
GAMMA-CHLORDANE															1.2	U	3.2	U
HEPTACHLOR															4.3	U	3.2	U
HEPTACHLOR EPOXIDE															4.3	U	3.2	U
METHOXYCHLOR															43	U	32	U
TOXAPHENE															430	U	320	U
INORGANICS (MG/KG)																		
ALUMINUM	381		470		352		9030		12600		916		8410		6780		7930	
ANTIMONY	5.1	U	6.0	U	5.6	U	17.0	U	20.5	U	6.5	U	21.2	U	12.9	UJ	9.7	UJ
ARSENIC	0.87	B	3.7		1.7	B	7.7		2.5	U	3.8		6.8	B	4.4	BJ	5.7	J
BARIUM	6.5	B	3.7	B	13.5	B	110	B	138	B	11.5	B	113	B	73.3	B	72.2	B
BERYLLIUM	0.2	B	0.24	B	0.22	B	0.99	B	1.2	B	0.26	U	0.85	U	0.83	B	0.86	B
CADMIUM	1.0		1.2	U	1.1	U	3.4	U	4.1	U	1.3	U	4.2	U	2.6	U	2.4	
CALCIUM	417	B	577	B	191	B	3170	B	4200		407	B	3060	B	1780	B	1680	B
CHROMIUM	6.3		12.0		2.8		21.6		27.5		6.9		18.7		17.6		17.4	
COBALT	8.5	B	9.2	B	16.2		19.4	B	22.9	B	5.2	B	16.7	B	18.5	B	16.5	B
COPPER	11.4		11.2		2.2	U	27.7		35.9		5.4	B	29.6		30.8		25.1	
CYANIDE	1.2	U	1.4	U	1.3	U	4.1	U	4.9	U	1.6	U	5.2	U	3.0	U	2.0	U
IRON	8560		7020		2320		22000		29800		3750		22200		16700		16800	
LEAD	45.2		89.6		10.8		45.9	J	46.6	J	12.5	J	38.0	J	36.4	J	27.2	J
MAGNESIUM	3260		1730	B	82.9	B	1790	B	25.2	B	290	B	1780	B	1260	B	1310	B
MANGANESE	76.0	J	52.3	J	250	J	700	J	1050	J	71.7	J	933	J	447	J	366	J
MERCURY	0.1	U	0.12	U	0.1	U	2.2		9.5		0.12	U	0.42	U	0.26	U	0.19	U
NICKEL	31.1		59.8		3.4	U	17.7	B	24.2	B	3.9	U	12.7	U	15.0	B	14.0	B
POTASSIUM	188	U	220	U	207	U	968	B	1040	B	238	U	857	B	988	B	848	B
SELENIUM	1.0	U	1.2	U	1.1	U	3.4	U	4.1	U	1.3	U	4.2	U	1.7	J	0.78	UJ
SILVER	7.9	J	12.7	J	1.4	BJ	3.4	UJ	4.1	UJ	42.7	J	4.2	UJ	3.8	B	3.9	
SODIUM	32.7	B	59.0	B	29.5	B	201	B	253	B	40.1	B	202	B	150	B	119	B
THALLIUM	0.61	U	0.72	U	0.67	U	2.0	U	2.5	U	0.78	U	2.5	U	7.8	UJ	5.8	UJ
VANADIUM	3.9	B	2.9	B	3.3	B	29.3	B	36.6	B	4.0	B	26.4	B	28.0		27.3	
ZINC	117	J	76.5	J	27.3	J	158	J	191	J	42.6	J	150	J	127		128	
MISCELLANEOUS PARAMETERS (MG/KG)																		
TOTAL PETROLEUM HYDROCARBONS															25.7	U	19.2	U
EXPLOSIVES (MG/KG)																		
NITROCELLULOSE	17.3	J	10.2	J	9.9	J	365	J	209	J	41.6	J	227	J				
NITROGUANIDINE	0.429		0.178		1.88		0.088	U	0.088	U	0.088	U	0.088	U				

APPENDIX B-4

ANALYTICAL DATABASE - TtNUS 1992 SEDIMENT DATA
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	41DP02		41DP03		41DP04		41DP05		41DP06		41DP07		41DP08		41DP09		41DP10	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD		SD		SD	
NORTHING	334070.91		334047.31		334026.23		333977.71		333883.38		333909.08		333889.33		333694.65		333835.92	
EASTING	1263754.33		1263851.72		1263944.22		1263721.42		1263684.17		1263785.59		1263881.77		1264342.57		1264409.33	
SITE	41		41		41		41		41		41		41		41		41	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	41DP02		41DP03		41DP04		41DP05		41DP06		41DP07		41DP08		41DP09		41DP10	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92	
VOLATILE ORGANICS (UG/KG)																		
1,1,1-TRICHLOROETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
1,1,2,2-TETRACHLOROETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
1,1,2-TRICHLOROETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
1,1-DICHLOROETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
1,1-DICHLOROETHENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
1,1-DIETHOXYETHANE																		
1,2-DICHLOROETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
1,2-DICHLOROPROPANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
2-BUTANONE	66	UJ	49	UJ	94	BJ	120	BJ	89	B	26	UJ	71	BJ	21	UJ	1700	U
2-HEXANONE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
4-METHYL-2-PENTANONE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
ACETONE	220	BJ	520	BJ	350	B	5800	DBE	430	B	88	UJ	1700	DBJ	94	UJ	4500	U
BENZENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
BROMODICHLOROMETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
BROMOFORM	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
BROMOMETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
CARBON DISULFIDE	38	U	40	U	42	U	43	U	37	U	14	UJ	6	J	43	U	4000	U
CARBON TETRACHLORIDE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
CHLOROBENZENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
CHLORODIBROMOMETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
CHLOROETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
CHLOROFORM	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
CHLOROMETHANE	38	U	40	U	42	U	43	U	37	U	14	UJ	17	J	16	J	4000	U
CIS-1,3-DICHLOROPROPENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
DIMETHOXYMETHANE																		
ETHYLBENZENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
METHYLENE CHLORIDE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	650	U
STYRENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
TETRACHLOROETHENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
TOLUENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
TOTAL 1,2-DICHLOROETHENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
TOTAL XYLENES	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	UJ	4000	U
TRANS-1,3-DICHLOROPROPENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
TRICHLOROETHENE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
VINYL CHLORIDE	38	U	40	U	42	U	43	U	37	U	14	UJ	42	U	43	U	4000	U
SEMIVOLATILE ORGANICS (UG/KG)																		
1,1-DIMETHYLHYDRAZINE																		
1,2,4-TRICHLOROBENZENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
1,2-DICHLOROBENZENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
1,3-DICHLOROBENZENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
1,4-DICHLOROBENZENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U

APPENDIX B-4

ANALYTICAL DATABASE - TtNUS 1992 SEDIMENT DATA
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	41DP02		41DP03		41DP04		41DP05		41DP06		41DP07		41DP08		41DP09		41DP10	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD		SD		SD	
NORTHING	334070.91		334047.31		334026.23		333977.71		333883.38		333909.08		333889.33		333694.65		333835.92	
EASTING	1263754.33		1263851.72		1263944.22		1263721.42		1263684.17		1263785.59		1263881.77		1264342.57		1264409.33	
SITE	41		41		41		41		41		41		41		41		41	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	41DP02		41DP03		41DP04		41DP05		41DP06		41DP07		41DP08		41DP09		41DP10	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92	
2,2'-OXYBIS(1-CHLOROPROPANE)	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2,4,5-TRICHLOROPHENOL	2900	U	3000	U	3000	U	2800	U	2900	U	2900	U	2900	U	2900	U	2300	U
2,4,6-TRICHLOROPHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2,4-DICHLOROPHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2,4-DIMETHYLPHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2,4-DINITROPHENOL	2900	U	3000	U	3000	U	2800	U	2900	U	2900	U	2900	U	2900	U	2300	U
2,4-DINITROTOLUENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2,6-DINITROTOLUENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2-CHLORONAPHTHALENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2-CHLOROPHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2-METHYLNAPHTHALENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2-METHYLPHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
2-NITROANILINE	2900	U	3000	U	3000	U	2800	U	2900	U	2900	U	2900	U	2900	U	2300	U
2-NITROPHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
3,3'-DICHLOROBENZIDINE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
3-NITROANILINE	2900	U	3000	U	3000	U	2800	U	2900	U	2900	U	2900	U	2900	U	2300	U
4,6-DINITRO-2-METHYLPHENOL	2900	U	3000	U	3000	U	2800	U	2900	U	2900	U	2900	U	2900	U	2300	U
4-BROMOPHENYL PHENYL ETHER	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
4-CHLORO-3-METHYLPHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
4-CHLOROANILINE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
4-CHLOROPHENYL PHENYL ETHER	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
4-METHYLPHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
4-NITROANILINE	2900	U	3000	U	3000	U	2800	U	2900	U	2900	U	2900	U	2900	U	2300	U
4-NITROPHENOL	2900	U	3000	U	3000	U	2800	U	2900	U	2900	U	2900	U	2900	U	2300	U
ACENAPHTHENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
ACENAPHTHYLENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
ANTHRACENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
BAP EQUIVALENT					193.25		0.12										10.14	
BENZO(A)ANTHRACENE	1200	U	1200	U	210	J	1100	U	1200	U	1200	U	1200	U	1200	U	100	J
BENZO(A)PYRENE	1200	U	1200	UJ	140	J	1100	U	1200	UJ	1200	U	1200	U	1200	UJ	970	U
BENZO(B)FLUORANTHENE	1200	U	1200	UJ	320	J	1100	U	1200	UJ	1200	U	1200	U	1200	UJ	970	U
BENZO(G,H,I)PERYLENE	1200	U	1200	UJ	1200	UJ	1100	U	1200	UJ	1200	U	1200	U	1200	UJ	970	U
BENZO(K)FLUORANTHENE	1200	U	1200	UJ	1200	UJ	1100	U	1200	UJ	1200	U	1200	U	1200	UJ	970	U
BIS(2-CHLOROETHOXY)METHANE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
BIS(2-CHLOROETHYL)ETHER	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
BIS(2-ETHYLHEXYL)PHTHALATE	1200	U	140	U	170	U	1100	U	1200	U	160	U	1200	U	140	U	110	U
BUTYL BENZYL PHTHALATE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
CARBAZOLE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
CHRYSENE	1200	U	1200	U	250	J	120	J	1200	U	1200	U	1200	U	1200	U	140	J
DI-N-BUTYL PHTHALATE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
DI-N-OCTYL PHTHALATE	1200	U	1200	UJ	1200	UJ	1100	U	1200	UJ	1200	U	1200	U	1200	UJ	970	U
DIBENZO(A,H)ANTHRACENE	1200	U	1200	UJ	1200	UJ	1100	U	1200	UJ	1200	U	1200	U	1200	UJ	970	U

APPENDIX B-4

ANALYTICAL DATABASE - TtNUS 1992 SEDIMENT DATA
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	41DP02		41DP03		41DP04		41DP05		41DP06		41DP07		41DP08		41DP09		41DP10	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD		SD		SD	
NORTHING	334070.91		334047.31		334026.23		333977.71		333883.38		333909.08		333889.33		333694.65		333835.92	
EASTING	1263754.33		1263851.72		1263944.22		1263721.42		1263684.17		1263785.59		1263881.77		1264342.57		1264409.33	
SITE	41		41		41		41		41		41		41		41		41	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	41DP02		41DP03		41DP04		41DP05		41DP06		41DP07		41DP08		41DP09		41DP10	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92	
DIBENZOFURAN	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
DIETHYL PHTHALATE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
DIMETHYL PHTHALATE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
FLUORANTHENE	1200	U	1200	U	590	J	240	J	1200	U	1200	U	1200	U	1200	U	240	J
FLUORENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
HEXACHLOROBENZENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
HEXACHLOROBUTADIENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
HEXACHLOROCYCLOPENTADIENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
HEXACHLOROETHANE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
HIGH MOLECULAR WEIGHT PAHS					2040		570										700	
INDENO(1,2,3-CD)PYRENE	1200	U	1200	UJ	1200	UJ	1100	U	1200	UJ	1200	U	1200	U	1200	UJ	970	U
ISOPHORONE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
LOW MOLECULAR WEIGHT PAHS					130													
N-NITROSO-DI-N-PROPYLAMINE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
N-NITROSODIPHENYLAMINE	1200	U	1200	U	1200	U	620	J	1200	U	1200	U	1200	U	1200	U	430	J
NAPHTHALENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
NITROBENZENE	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
PENTACHLOROPHENOL	2900	U	3000	U	3000	U	2800	U	2900	U	2900	U	2900	U	2900	U	2300	U
PHENANTHRENE	1200	U	1200	U	130	J	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
PHENOL	1200	U	1200	U	1200	U	1100	U	1200	U	1200	U	1200	U	1200	U	970	U
PYRENE	1200	U	1200	U	530	J	210	J	1200	U	1200	U	1200	U	1200	U	220	J
TOTAL PAHS					2170		570										700	
PESTICIDES/PCBS (UG/KG)																		
4,4'-DDD	12	U	12	U	3.1	JP	3.6	JP	12	U	12	U	12	U	12	U	7.8	JP
4,4'-DDE	12	U	12	U	12	U	11	U	12	U	3.3	JP	2.4	JP	2.4	JP	4.1	JP
4,4'-DDT	12	U	3.3	JP	5.1	J	4.4	JP	12	U	3	JP	11	J	12	U	8.2	JP
ALDRIN	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
ALPHA-BHC	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
ALPHA-CHLORDANE	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
AROCLOR-1016	120	U	120	U	120	U	110	U	120	U	120	U	120	U	120	U	97	U
AROCLOR-1221	240	U	250	U	240	U	230	U	240	U	240	U	240	U	240	U	200	U
AROCLOR-1232	120	U	120	U	120	U	110	U	120	U	120	U	120	U	120	U	97	U
AROCLOR-1242	120	U	120	U	120	U	110	U	120	U	120	U	120	U	120	U	97	U
AROCLOR-1248	120	U	120	U	120	U	110	U	120	U	120	U	120	U	120	U	97	U
AROCLOR-1254	120	U	120	U	120	U	110	U	120	U	120	U	120	U	120	U	97	U
AROCLOR-1260	120	U	120	U	120	U	110	U	120	U	120	U	120	U	120	U	97	U
BETA-BHC	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
DELTA-BHC	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
DIELDRIN	12	U	12	U	12	U	11	U	12	U	12	U	12	U	12	U	9.7	U
ENDOSULFAN I	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
ENDOSULFAN II	12	U	12	U	12	U	11	U	12	U	12	U	12	U	12	U	9.7	U
ENDOSULFAN SULFATE	12	U	12	U	12	U	11	U	12	U	12	U	12	U	12	U	9.7	U

APPENDIX B-4

ANALYTICAL DATABASE - TtNUS 1992 SEDIMENT DATA
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	41DP02		41DP03		41DP04		41DP05		41DP06		41DP07		41DP08		41DP09		41DP10	
LOCATION TYPE	SD		SD		SD		SD		SD		SD		SD		SD		SD	
NORTHING	334070.91		334047.31		334026.23		333977.71		333883.38		333909.08		333889.33		333694.65		333835.92	
EASTING	1263754.33		1263851.72		1263944.22		1263721.42		1263684.17		1263785.59		1263881.77		1264342.57		1264409.33	
SITE	41		41		41		41		41		41		41		41		41	
AREA OF CONCERN	AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4		AREA 4	
SAMPLE ID	41DP02		41DP03		41DP04		41DP05		41DP06		41DP07		41DP08		41DP09		41DP10	
MATRIX	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL	SD	QUAL
SAMPLE DATE	08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92		08/01/92	
ENDRIN	12	U	12	U	12	U	2.7	JP	12	U	12	U	12	U	12	U	2.6	J
ENDRIN ALDEHYDE	12	U	12	U	12	U	11	U	12	U	12	U	12	U	12	U	9.7	U
ENDRIN KETONE	12	U	12	U	12	U	11	U	12	U	12	U	12	U	12	U	9.7	U
GAMMA-BHC (LINDANE)	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
GAMMA-CHLORDANE	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	1.5	J	1.4	JP	1.1	JP
HEPTACHLOR	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
HEPTACHLOR EPOXIDE	6	U	6.3	U	6.2	U	5.8	U	6	U	6	U	6	U	6	U	5	U
METHOXYCHLOR	60	U	63	U	62	U	58	U	60	U	60	U	60	U	60	U	50	U
TOXAPHENE	600	U	630	U	620	U	580	U	600	U	600	U	600	U	600	U	500	U
INORGANICS (MG/KG)																		
ALUMINUM	11600		12900		14100		17400		13700		12900		17400		20500		11000	
ANTIMONY	18.1	UJ	18.6	UJ	18.4	UJ	17.2	UJ	17.7	UJ	17.6	UJ	18.1	UJ	17.7	UJ	14.7	UJ
ARSENIC	4.1	BJ	8.8	J	4.5	J	7.3	J	3.2	J	5.8	J	4.6	J	5.1	J	5.0	J
BARIUM	126	B	121	B	132	B	143		123	B	140	B	154		182		125	
BERYLLIUM	1.2	B	1.1	B	1.0	B	1.2	B	0.98	B	1.2	B	1.2	B	1.6	B	1.2	B
CADMIUM	3.6	U	3.7	U	3.7	U	3.4	U	3.5	U	3.5	U	3.6	U	3.8		2.9	U
CALCIUM	3020	B	3040	B	3280	B	3850		2860	B	3540		3790		3920		2850	B
CHROMIUM	28.4		28.8		28.6		36.4		31.1		33.4		37.2		43.3		26.5	
COBALT	22.3	B	20.7	B	21.3	B	25.3	B	20.9	B	25.1	B	25.1	B	30.4	B	23.3	B
COPPER	32.3		38.1		32.8		39.9		31.4		42.2		36.6		44.5		40.3	
CYANIDE	3.9	U	4.6	U	3.7	U	3.4	U	4.4	U	4.4	U	4.5	U	4.1	U	3.4	U
IRON	27900		27000		29300		32500		27500		32700		33000		38200		26800	
LEAD	35.3	J	43.3	J	31.5	J	38.1	J	31.4	J	42.3	J	42.3	J	105	J	46.7	J
MAGNESIUM	2260	B	2470	B	2470	B	2730	B	2420	B	2680	B	2960	B	3400	B	2120	B
MANGANESE	986	J	924	J	1150	J	1150	J	1020	J	1300	J	1010	J	1240	J	581	J
MERCURY	0.36	U	0.37	U	0.45		0.62		0.36		0.36		0.36	U	0.36		0.78	
NICKEL	17.4	B	17.8	B	20.6	B	25.5	B	16.3	B	23.9	B	26.1	B	31.1		21.7	B
POTASSIUM	1330	B	1660	B	1800	B	1890	B	1440	B	1270	B	1460	B	2240	B	1060	B
SELENIUM	1.4	UJ	1.5	UJ	1.5	UJ	1.4	UJ	1.4	UJ	1.4	UJ	1.4	UJ	1.4	UJ	1.2	UJ
SILVER	5.1	B	5.3	B	4.5	B	7.8		4.3	B	6.3	B	5.1	B	8.7		6.3	
SODIUM	267	B	337	B	270	B	269	B	328	B	384	B	298	B	339	B	245	B
THALLIUM	2.2	UJ	11.2	UJ	2.2	UJ	2.1	UJ	10.6	UJ	10.6	UJ	10.9	UJ	10.6	UJ	1.8	UJ
VANADIUM	35.9	B	38.6		41.7		45.0		39.4		43.4		45.9		53.6		55.0	
ZINC	172		171		177		189		163		213		199		253		201	
MISCELLANEOUS PARAMETERS (MG/KG)																		
TOTAL PETROLEUM HYDROCARBONS	39.7	U	62		215		119		43.9		50.1		39		34.9	U	63.6	
EXPLOSIVES (MG/KG)																		
NITROCELLULOSE																		
NITROGUANIDINE																		

APPENDIX B-5

DATA VALIDATION MEMORANDA

TETRA TECH NUS

TO:	**G. LATULIPPE**	**DATE:**	**JANUARY 4, 2002**
FROM:	**MEGAN N. CLOUD**	**COPIES:**	**FILE**

SUBJECT: **INORGANIC DATA VALIDATION - METALS AND WET CHEMISTRY**
CTO803 - NSWC INDIAN HEAD
SDG NO. 81928

SAMPLES: **6/Aqueous/**

NJCSW00101(-F)	MTCSW02701(-F)
NJCSW00201(-F)	MTCSW02801(-F)
MTCSW02601(-F)	MTCSWFD001(-F)

6/Sediment/

NJCSD00101	MTCSD02701
NJCSD00102	MTCSD02801
MTCSD02601	MTCSDFD001

3/Vegetation/

MTCVG005
MTCVG006
NJCVG007

OVERVIEW

The sample set for the CTO803-NSWC Indian Head, SDG 81928 consists of six aqueous environmental samples (designated MTCSW-, NJCSW-), six sediment samples (designated MTCSD-, NJCSD-), and three plant tissue samples (designated MTCVG-, and NJCVG-). Three field duplicate pairs (MTCSW02601/MTCSWFD001, MTCSW02601-F/MTCSWFD001-F, and MTDSD02601/MTCSDFD001) were included in this sample set. Samples MTCSW02601 and MTCSD02601 were designated for matrix spike and laboratory duplicate analysis. All aqueous samples were analyzed for target analyte list (TAL) total and dissolved metals, cyanide, chloride, sulfate, fluoride, nitrate, nitrite, perchlorate, hardness, pH, total organic carbon (TOC), total dissolved solids (TDS), and total suspended solids (TSS). All sediment samples were analyzed for TAL Metals, cyanide, TOC, and acid volatile sulfides/simultaneously extracted metals (AVS/SEM). The plant tissue samples were analyzed for TAL metals.

The samples were collected by Tetra Tech NUS on September 5 and 6, 2001 and analyzed by Mitkem Corporation of Warwick, Rhode Island and Severn Trent Laboratories (STL) of Sacramento, California.

All analyses were conducted using contract laboratory program (CLP) Method ILM04.1 for TAL Metals and cyanide, EPA 300.0 for anions, EPA 314.0 for perchlorate, Standard Method (SM) 2340B for hardness, SM 4500-H+ for pH, SW-846 9060 (soil) and EPA 415.1 (aqueous) for TOC, SM 2540-C for TDS, SM 2540-D for TSS, and AVS/SEM by EPA draft method.

SUMMARY

Most analytes were successfully analyzed in all samples. The findings offered in this report are based upon a general review of all available data including data completeness, holding times until analysis, calibration data, laboratory blank results, ICP interference check samples, matrix spike (MS) results, laboratory control spike (LCS) results, laboratory duplicate results, field duplicate results, ICP serial dilution results, detection limits, and analyte quantitation.

Areas of concern with respect to data quality are listed below as follows:

MAJOR PROBLEMS

- None.

MINOR PROBLEMS

- The following table summarizes the analytes detected as contaminants in the aqueous laboratory blanks at the maximum concentration indicated:

Analyte	Maximum Concentration	Action Level (Aqueous)
Total Aluminum	19.9 ug/L	99.5 ug/L
Dissolved Aluminum	69.7 ug/L	348 ug/L
Total Antimony	5.3 ug/L	26.5 ug/L
Dissolved Antimony	2.7 ug/L	13.5 ug/L
Total Barium(1)	4.5 ug/L	22.5 ug/L
Dissolved Barium(1)	81.4 ug/L	407 ug/L
Dissolved Cadmium(1)	0.207 ug/L	1.04 ug/L
Dissolved Calcium(1)	423 ug/L	2115 ug/L
Dissolved Chromium(1)	0.859 ug/L	4.3 ug/L
Total and Dissolved Cobalt	1.7 ug/L	8.5 ug/L
Total Copper	4.9 ug/L	24.5 ug/L
Dissolved Copper(1)	21.6 ug/L	108 ug/L
Cyanide(1)	5.91 ug/L	29.55 ug/L
Total Iron(1)	21.5 ug/L	107.5 ug/L
Dissolved Iron(1)	27 ug/L	135 ug/L
Dissolved Lead(1)	1.92 ug/L	9.6 ug/L
Total Magnesium	115 ug/L	575 ug/L
Dissolved Magnesium	121 ug/L	605 ug/L
Total Manganese	0.6 ug/L	3.0 ug/L

Analyte	Maximum Concentration	Action Level (Aqueous)
Dissolved Manganese[1]	3.76 ug/L	18.8 ug/L
Total and Dissolved Nickel[1]	3.13 ug/L	15.6 ug/L
Total Potassium	103 ug/L	515 ug/L
Dissolved Potassium[1]	135 ug/L	675 ug/L
Total Silver[1]	0.838 ug/L	4.19 ug/L
Dissolved Silver[1]	1.06 ug/L	5.3 ug/L
Total Sodium[1]	253 ug/L	1265 ug/L
Dissolved Sodium	657 ug/L	3285 ug/L
Total and Dissolved Vanadium	0.5 ug/L	2.5 ug/L
Total Zinc[1]	18.8 ug/L	94 ug/L
Dissolved Zinc[1]	50.92 ug/L	251.45 ug/L

[1] Maximum concentration present in a preparation blank.

Samples affected: The aqueous action levels apply to all aqueous environmental samples.

Adjustments were made for the samples aliquot size and dilution factors. Results reported at concentrations within the action level are qualified (B) and are considered to be false positives (artifacts of blank contamination).

- The following table summarizes the analytes detected as contaminants in the soil laboratory blanks at the maximum concentration indicated:

Analyte	Maximum Concentration	Action Level (Soil)
Aluminum	55 ug/L	55 mg/Kg
Antimony	5.9 ug/L	5.9 mg/Kg
Barium	0.7 ug/L	0.7 mg/Kg
Cadmium[2]	0.023 mg/Kg	0.115 mg/Kg
Chromium[2]	0.179 mg/Kg	0.898 mg/Kg
Chromium[3]	0.24 mg/Kg	1.2 mg/Kg
Cobalt	0.9 ug/L	0.9 mg/Kg
Copper	3.6 ug/L	3.6 mg/Kg
Cyanide	6.2 ug/L	1.55 mg/Kg
Iron	14.9 ug/L	14.9 mg/Kg
Iron[3]	4.25 mg/Kg	21.2 mg/Kg
Lead[2]	0.426 mg/Kg	2.13 mg/Kg
Magnesium	106 ug/L	106 mg/Kg

Analyte	Maximum Concentration	Action Level (Soil)
Manganese[2]	0.337 mg/Kg	1.685 mg/Kg
Manganese[3]	0.688 mg/Kg	3.44 mg/Kg
Nickel	1.1 mg/Kg	1.1 mg/Kg
Potassium[2]	11.8 mg/Kg	59 mg/Kg
Sodium	305.1 ug/L	305.1 mg/Kg
Sodium[3]	84.9 mg/Kg	424 mg/Kg
Zinc	10.0 ug/L	10.0 mg/Kg
Zinc[2]	2.27 mg/Kg	11.4 mg/Kg
AVS/SEM Cadmium[1]	15 ug/L	75 ug/L
AVS/SEM Copper[1]	37.8 ug/L	189 ug/L
AVS/SEM Lead[1]	24.8 ug/L	124 ug/L
AVS/SEM Mercury[1]	0.209 ug/L	1.04 ug/L
AVS/SEM Nickel[1]	27 ug/L	135 ug/L
AVS/SEM Zinc[1]	267 ug/L	1335 ug/L

[1] Maximum concentration present in an AVS/SEM preparation blank.

[2] Maximum concentration present in a preparation blank affecting sediment samples prepared on 9/11/2001.

[3] Maximum concentration present in a preparation blank affecting sample MTCSD02601.

Samples affected: The soil action levels apply to all sediment and plant tissue samples.

Adjustments were made for the samples aliquot size, percent solid, and dilution factors. Results reported at concentrations within the action level are qualified (B) and are considered to be false positives (artifacts of blank contamination).

- The positive results less than 2X the contract required detection limit (CRDL) for total and dissolved arsenic, cadmium, chromium, cobalt, copper, nickel, thallium, and zinc in all associated aqueous and solid samples were qualified as biased high (K) because the CRDL standard was above the 110% QC limit or estimated (J) due to conflicting noncompliances.
- The positive results less than 2X the CRDL and the non-detected results for total and dissolved silver in all associated aqueous and solid samples were qualified as biased low (L/UL) or estimated (UJ) because the CRDL standard was below the 90% QC limit.
- The total cadmium result for sample NJCSW00101 was qualified as biased high (K) because the estimated interference level exceeded QC criteria. The interference check sample Solution A exhibited positive results for cadmium.
- The non-detected results for thallium were qualified as biased low (UL) in samples NJCSW00101, NJCSW00101-F, NJCSW00201, and NJCSW00201-F because estimated interference levels exceeded QC criteria. The interference check sample Solution A exhibited negative results greater than the instrument detection limit (IDL) for thallium.

- The non-detected result for vanadium is qualified as biased low (UL) in sample NJCSW00101-F because estimated interference levels exceeded QC criteria. The interference check sample Solution A exhibited negative results greater than the instrument detection limit (IDL) for vanadium.
- The matrix spike %R was <75% QC limit for antimony affecting the sediment and vegetation matrices. The positive and non-detected antimony results were qualified as biased low (L/UL).
- The matrix spike %R was >125% QC limit for chromium and manganese affecting the sediment and vegetation matrices. The positive results for chromium and manganese were qualified as biased high (K) or estimated (J) due to conflicting noncompliances.
- The MS %Rs for mercury and selenium were <30% QC limit. The non-detected results reported for mercury and selenium in the affected samples were qualified as unusable (UR).
- The laboratory duplicate relative percent difference (RPD) exceeded the QC criteria for arsenic, cadmium, lead, sodium, and zinc affecting the sediment and vegetation matrices. The positive and non-detected results for these compounds in all the associated solid samples are qualified as estimated (J/UJ), except where previously qualified (B) due to blank contamination.
- The field duplicate RPDs for cadmium, copper, lead, manganese, AVS/SEM lead, nickel, zinc, and TOC in field duplicate pair MTCSD02601 and MTCSDFD001 exceeded the QC limit of ±50%. The positive results for these compounds were qualified as estimated (J).
- The laboratory duplicate relative percent difference (RPD) exceeded the QC criteria (>35%) for AVS/SEM cadmium, copper, and nickel. The positive results for these compounds in all the associated solid samples are qualified as estimated (J), except where previously qualified (B) due to blank contamination.
- The nitrate, nitrite, orthophosphate, and pH positive and non-detected results were qualified as estimated (J/UJ) due to exceedance of holding times.
- Positive and non-detected results reported for samples NJCSD00101 were qualified as estimated (J/UJ) due to percent solids <30.

NOTES

Comparisons of field duplicate pairs MTCSW02601/MTCSWFD001, MTCSW02601-F/MTCSWFD001-F, and MTCSD02601/MTCSDFD001 are included in Appendix C.

The TOC analyses have different percent solid results because they were analyzed by STL Sacramento.

The plant tissue samples were reported on a wet weight basis.

The serial dilution percent difference (%D) exceeded the QC limit for dissolved barium, copper, and zinc. No validation action was necessary because all results were previously qualified (B) due to blank contamination.

The post digestion spike (PDS) %Rs for antimony, selenium, and chromium were <75% QC limit. No validation action was taken based on the PDS %Rs.

The laboratory reported several results for bromide and orthophosphate. These parameters were no t requested on the chain of custody (COC) and the results were removed from the database.

EXECUTIVE SUMMARY

Laboratory Performance: Total and dissolved aluminum, antimony, barium, cobalt, copper, iron, nickel, potassium, sodium, vanadium, and zinc were present in the aqueous laboratory blanks. Dissolved cadmium, calcium, and lead were present in the aqueous laboratory blanks. Total zinc was present in the aqueous laboratory blanks. Mercury-SEM was present in the laboratory blanks. Aluminum, antimony, barium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, nickel, potassium, sodium, and zinc were present in the solid laboratory blanks. Fourteen total and dissolved metals exceeded the CRDL standard QC criteria. The laboratory duplicate exceeded QC limits for eight parameters for the solid samples.

Other Factors Affecting Data Quality: The solid field duplicate pair RPDs exceeded QC criteria for eight parameters. Three total and dissolved metals exceeded the ICP interference check sample QC criteria. The serial dilution %D exceeded the QC limit for three dissolved metals. The matrix spike recoveries for five metals exceeded QC criteria for the solid samples. Results for sample NJCSD00101 were qualified due to low percent solids. Four wet chemistry parameters exceeded holding times due to unavoidable delays during shipping of the samples.

The data for these analyses were reviewed with reference to the EPA "Functional Guidelines for Inorganic Data Review", as amended for use within EPA Region 3 (4/93).

The text of this report has been formatted to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the Functional Guidelines and the Quality Assurance Project Plan (QAPjP)."

Megan N. Cloud

Megan N. Cloud
Chemist

Tetra Tech NUS, Inc.
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**MR. G. LATUILPPE**	**DATE:**	**FEBRUARY 25, 2002**
FROM:	**BERNARD F SPADA III**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PEST/PCB/EXPLOSIVES**
CTO 803, NSWC INDIAN HEAD
SDG 81928

SAMPLES: 7/Aqueous

MTCSW02601	MTCSW02701	MTCSW02801
MTCSWFD01	MTCTB001	NJCSW00201
NJCSW00101		

6/Sediment

MTCSD02601	MTCSD02701	MTCSD02801
MTCSDFD001	NJCSD00101	NJCSD00102

3/Vegetation

MTCVG005	MTCVG006	MTCVG007

Overview

The sample set for CTO 803, NSWC INDIAN HEAD, SDG 81928 consists of six (6) aqueous environmental samples, six (6) sediment environmental samples, three (3) vegetation samples, and one (1) trip blank. All samples except MTCVG005, MTCVG006, and MTCVG007 were analyzed for volatile organic compounds (VOC) by method CLP OLC02.1 (aqueous) or CLP OLM04.2 (solid). All samples except MTCVG005, MTCVG006, MTCVG007, and MTCTB001 were analyzed for semivolatile organic compounds (SVOC), and explosives (EXP) by method SW-846 8330, CLP OLC02.1 (aqueous) or CLP OLM04.2 (solid). All samples except MTCTB001 were also analyzed for polychlorinated biphenyls (PEST/PCB) by method CLP OLC02.1 (aqueous) or CLP OLM04.2 (solid). There was a field duplicate pair included with the sample group. The pair is MTCSWFD01 and MTCSW02601.

The samples were collected by Tetra Tech NUS on September 5 and 6, 2001 and analyzed by Mitkem Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using OLC02.1, OLM04.2, and SW-846 analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters: data completeness, holding times, GCMS tuning, initial/continuing calibrations, laboratory method blank results, surrogate spike recoveries, blank spike/blank spike duplicate results, internal standard recoveries, chromatographic resolution, compound identification, compound quantitation and detection limits. Areas of concern are listed below.

Major

- The initial calibration for VOA had average relative response factors (RRF) less than 0.05 for

acetone, 2-butanone, and 1,2-dibromo-3-chloropropane. All non-detects were qualified as rejected (UR).

- The %D between columns in sample NJSW00201 was 500% for heptachlor epoxide. The result was qualified as rejected (R).

Minor

- All aqueous samples exceeded the 7 day holding time criteria for explosives. All results are qualified as estimated (J,UJ).

- All vegetation samples exceeded the 7 day holding time criteria for pesticides and PCBs. All results are qualified as estimated (J,UJ).

- Samples NJCSD00101 and NJCSD00102 exceeded the 7 day holding time criteria for semivolatiles, pesticides, and PCBs. All results are qualified as estimated (J,UJ).

- Sample MTCSD02601 exceeded the 7 day holding time criteria explosives. All results are qualified as estimated (J,UJ).

- Sample NJCSD00101 had less than 30% solids. Positive results for the sample were qualified as estimated (J). Non-detects were qualified as estimated (UJ). No qualifications were made to the explosives fraction of this sample due to explosives being prepared on a dry weight basis.

- Several samples had positive results below the reporting limit. These samples were qualified as estimated (J) due to uncertainty near detection limit.

- 4-Chloroaniline exceeded the acceptance limits for %RSD in the initial calibration. All non-detects were qualified as estimated (UJ).

- The continuing calibration analyzed on September 25 at 12:05 exceeded the %D acceptance limits for hexachlorocyclopentadiene. All associated non-detects were qualified as estimated (UJ).

- The following compound was detected in the solid method blank:

Compound	Maximum Concentration	Blank Action Level
Bis(2-ethylhexyl)phthalate	41 ug/kg	410 ug/kg

Sample aliquot, percent solids, and dilution factors were taken into consideration when applying the blank action levels. Positive results for bis(2-ethylhexyl)phthalate below the blank action level were qualified as nondetected, (U). Field blank samples were not qualified due to blank contamination.

Notes

The laboratory did not initially analyze for ethyl ether in the volatiles fraction. Upon notifying the laboratory of this, they responded that they would perform a library search for ethyl ether.

The continuing calibration analyzed on September 21 at 09:42 exceeded the %D acceptance limits for N-nitroso-di-n-propylamine, 4,6-dinitro-2-methylphenol, 4-chloroaniline, hexachlorocyclopentadiene, 2,4-dinitrophenol, and 3,3'-dichlorobenzidine. All associated non-detects were qualified as estimated (UJ).

2,4-Dinitrotoluene exceeded the acceptance limits in the MS/MSD. Recovery was 100%. No action was taken for MS/MSD recovery exceedances.

The internal standard perylene-d12 (IS6) exceeded the acceptance limits in the MS/MSD samples. No

action was taken.

Sample MTCSW02601 was used as the MS/MSD sample. Heptachlor had a %D of over 1000% between the two columns in both the MS and MSD. The discrepancy appears to be caused by an unknown peak co-elution in the MSD for heptachlor.

The explosives fraction of the water matrix were reported twice on the EDD. This happened due to nitrocellulose being reported in mg/L and the remainder of the fraction being reported as ug/L. The result for nitrocellulose was calculated to ug/L and reported with the remainder of the fraction.

All except the nitroguanidine portion of the explosives fraction of sample MTCSD02601 was reported as an incorrect sample ID. The sample number was corrected from the chain of custody.

Executive Summary

Laboratory Performance: Qualifications were made based on calibration RRF, method blank contamination, and calibration noncompliance.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to U.S. EPA National Functional Guidelines for Data Validation as modified by EPA Region III (9/94) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999).
The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Bernard F Spada III

Tetra Tech NUS
Bernard F Spada III
Chemist/Data Validator

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**FEBURARY 22, 2002**
FROM:	**SETH C. STAFFEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PEST/PCB/EXP**
CTO 803, NSWC INDIAN HEAD
SDG: 81934

SAMPLES: 14/SEDIMENT/VOA/SVOA/EXP/PEST/PCB

MTCSD01301	MTCSD01401	MTCSD01501	MTCSD01601	MTCSD01701
MTCSD01801	MTCSD01901	MTCSD02001	MTCSD02101	MTCSD02201
MTCSD02301	MTCSD02401	MTCSD02501	MTCSDFD002	

4/VEG/PEST/PCB

MTCVG001	MTCVG002	MTCVG003	MTCVG004

OVERVIEW

The sample set for CTO 803, SDG: 81934, NSWC Indian Head consists of fourteen (14) sediment environmental samples and four (4) vegetation samples. All samples were analyzed for Target Compound List (TCL) volatile organic compounds (plus diethyl ether), TCL semivolatile organic compounds, pesticides/PCBs, explosives, nitroguanidine, and nitrocellulose. One field duplicate pair was included in the SDG: MTCSD02301 and MTCSDFD002.

The samples were collected by TetraTech NUS on September 6th and 7th, 2001 and were analyzed by the Mitkem Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using Contract Laboratory Program (CLP) Statement of Work (SOW) OLM04.2, SW-846 Method 8330, HPLC/UV using Lab SOP, and Method 353.2 analytical and reporting protocols.

All samples were successfully analyzed. The findings offered in this report are based upon a general review of all available data including: data completeness, system performance and tuning, holding times, initial/continuing calibrations, laboratory method blank results, surrogate spike recoveries, internal standard recoveries, blank spike results, field duplicate results, matrix spike/matrix spike duplicate results, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- There were no major problems that would have resulted in the rejection of data.

Minor Problems

- An initial calibration on 09/20/01 contained a percent relative standard deviation (%RSD) that exceeded the 30% quality control limit for 4-chloroaniline. The aforementioned compound was qualified as estimated, UJ, because the reported results were nondetects and the exceedance was greater than 50%.

- The following compounds were detected in the laboratory method blanks or field quality control blanks (*):

Compound	Maximum Concentration	Blank Action Level
Methylene Chloride	3 µg/kg	30 µg/kg
Bis(2-ethylhexyl)phthalate	60 µg/Kg	600 µg/Kg

  Sample aliquot, percent solids, and dilution factor were taken into consideration when applying the blank action limit. Positive results for methylene chloride and bis(2-ethylhexyl)phthalate below the blank action level were qualified as, B.

- Despite the absence of acetone in the laboratory method blank, acetone is a common laboratory contaminant. Therefore, the presence of acetone in environmental samples is a suspected laboratory contaminant. Positive results were qualified as estimated, J.

- The percent solids for samples MTCSD01401, MTCSD01601, MTCSD01801, and MTCSD01901, were less than the 30% quality control limit. Positive and nondetected results were qualified as estimated J, and UJ, respectively in the aforementioned samples in the volatile, semivolatile, and pesticides/PCBs fractions.

- The internal standard recovery of perylene-d12 fell below the lower quality control limit in sample MTCSD02101. Positive and nondetected compounds associated with perylene-d12 were qualified as estimated, J, and, UJ, in the aforementioned sample.

- The laboratory did not calibrate and initially report diethyl ether in any volatile fraction samples as requested in the analytical statement of work. The laboratory was contacted regarding the omission by the data reviewer. In an attempt to provide data for diethyl ether, the laboratory performed a reverse library search for diethyl ether in all volatile samples. The laboratory also analyzed a standard to determine both a retention time and a reporting limit for aqueous and solid samples. The laboratory then provided results for diethyl ether for all volatile samples. The data reviewer used the data for diethyl ether and included the results into the existing volatile fraction database for all samples. Nevertheless, because of the lack of calibration data for each day of analysis and because the manner in which results were reported is similar to the reporting of a Tentatively Identified Compound (TIC), all results, both positive and nondetected were qualified as estimated, J and UJ, respectively.

- Positive results below the RL were qualified as estimated, J, due to uncertainty near the detection limit. The direction of bias cannot be determined.

Notes

Continuing calibration on 09/21/01 at 0942 contained %Ds that exceeded the 25% quality control limit, but did not exceed 50%, for N-nitroso-di-n-propylamine, 4-chloroaniline, hexachlorocyclopentadiene, 2,4-dinitrophenol, 4,6-dinitro-2-methylphenol, and 3,3'-dichlorobenzidine. Therefore, nondetected sample results were not qualified on this basis. 4-Chloroaniline was qualified for initial calibration %RSD noncompliance.

The surrogate recovery of 2,4,6-tribromophenol was greater than the upper quality control limit for sample MTCSD02501. No qualification action was taken because the other acid surrogates were compliant.

The linear calibration range of the instrument was exceeded in sample MTCSD02101 for compound N-nitrosodiphenylamine. The reported result for N-nitrosodiphenylamine was transposed over from the dilution analysis and used for data validation.

The surrogate recovery of decachlorobiphenyl exceeded the upper quality control limit on one analytical column in sample MTCSD02001. No qualifiers were assigned on this basis.

The surrogate recoveries of decachlorobiphenyl and tetrachloro-m-xylene exceeded the lower quality control limits in MTCSD02101. No qualifiers were assigned on this basis.

The continuing verification on 08/28/01 contained a %D that was greater than the 15% quality control limit for a-BHC. No qualification action was taken because the other column was compliant.

The continuing verification on 09/27/01 contained %Ds that were greater than the 15% quality control limit for a-BHC and methoxychlor on both columns and 4,4'-DDT and g-BHC on one column. Methoxychlor and a-BHC were not qualified because the reported results were nondetected and the exceedances were not a gross noncompliance. 4,4'-DDT and g-BHC were not qualified because the other column was compliant.

The continuing verification on 09/28/01 contained %Ds that were greater than the 15% quality control limit for methoxychlor on both columns. No qualification action was taken because the reported results were nondetected and the exceedance was not a gross noncompliance.

The continuing verification on 09/27/01 contained %Ds that were greater than the 15% quality control limit for 4,4'-DDD and 4,4'-DDT on one column. No qualification action was taken because the other column was compliant.

The continuing verification on 09/28/01 contained %Ds that were greater than the 15% quality control limit for 4,4'-DDD and methoxychlor on one column. No qualification action was taken because the other column was compliant.

The MS/MSD RPD exceeded the quality control limit for nitrocellulose. No qualification action was based on RPD noncompliance.

The calibration verification 08/30/01 contained a %D that was greater than the 15% quality control limit for HMX. No qualification action was taken because the reported results were nondetected.

The following samples were analyzed at a dilution for the nitrocellulose analysis:

Sample	Dilution
SD02101	50X
SD02301	5X
SD01801	2X
SD02201	5X

Sample, MTCSDFD002, was labeled as MTCSDF0002 by the laboratory on the EDD and Form Is. The EDD and Form Is were changed to reflect the appropriate sample id.

EXECUTIVE SUMMARY

Laboratory Performance Issues:. Several compounds failed to meet the continuing calibration %D quality control limits in the semivolatile and pesticide/PCB fractions. Laboratory and method blank contamination occurred in both the volatile and semivolatile fractions. Surrogate recoveries exceeded the quality control limits in the semivolatile and pesticide/PCB fractions. The percent solids were less than the quality control limit for several samples.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", (September 1994) as amended for use within USEPA Region III, and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Seth C. Staffen
Environmental Scientist/Data Validator

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**MARCH 19, 2002**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS AND MISCELLANEOUS PARAMETERS**
CTO 803 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – 81934

SAMPLES: 14/Sediments/

MTCSD01301	MTCSD01401	MTCSD01501
MTCSD01601	MTCSD01701	MTCSD01801
MTCSD01901	MTCSD02001	MTCSD02101
MTCSD02201	MTCSD02301	MTCSD02401
MTCSD02501	MTCSDFD002	

4/Vegetation Tissues/

MTCVG001	MTCVG002	MTCVG003
MTCVG004		

Overview

The sample set for CTO 803, NSWC Indian Head, SDG 81934, consists of fourteen (14) sediment environmental samples and four (4) vegetation tissue samples. One (1) field duplicate pair (MTCSDFD002 / MTCSDFD02301) is included within this SDG.

All sediment samples were analyzed for target analyte list (TAL) metals, cyanide, total organic carbon (TOC), Acid Volatile Sulfide (AVS) and the Simultaneously Extracted Metals (SEM) cadmium, copper, lead, mercury, nickel and zinc. The vegetation samples were analyzed for TAL metals only. The samples were collected by Tetra Tech NUS on September 6-7, 2001 and analyzed by Mitkem Corporation under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. TAL metals and cyanide analyses were conducted using Contract Laboratory Program (CLP) method ILM04.1. Analyses for TOC were conducted using SW 846 method 9060. The AVS/SEM analyses were conducted using the EPA Draft Analytical Method for the Determination of Acid Volatile Sulfide in Sediment.

Metals analyses, with the exception of mercury, were conducted using Inductively Coupled Plasma (ICP) instrumentation. Mercury analyses were conducted using Cold Vapor Atomic Absorption (CVAA) instrumentation.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data. The data review was based on data completeness, holding times, calibration data, laboratory method/preparation blanks, ICP interference check sample results, matrix spike results, laboratory control sample (LCS) results, ICP serial dilution results, field duplicate results, detection limits and analyte quantitation.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) percent recoveries for cadmium, chromium, cobalt, lead, manganese, nickel, vanadium and zinc were >110% quality control limit, affecting all samples analyzed for TAL metals. Positive results greater than two times the CRDL reported for cadmium, chromium, cobalt, nickel and vanadium were qualified as biased high, "K" or estimated, "J" due to conflicting noncompliances. No validation action was required for lead, manganese or zinc because the results were greater than two times the CRDL.

- The CRDL percent recoveries for antimony, arsenic and copper were >110% quality control limit, affecting samples MTCSD01301, MTCSD01601, MTCSD01701, MTCSD01801, MTCSD01901, MTCSD02001 and MTCSD02101. Positive results greater than two times the CRDL reported for copper in the affected samples were qualified as biased high, "K" or estimated, "J", due to conflicting noncompliances. No validation action was necessary for antimony or arsenic because the results were either reported by the laboratory as nondetected, qualified "B" as a result of laboratory blank contamination or were greater than two times the CRDL.

- The CRDL percent recoveries for selenium and silver were < 90% quality control limit, affecting all samples analyzed for TAL metals. Positive results greater than two times the CRDL reported for silver were qualified as biased low, "L" or estimated, "J", due to conflicting noncompliances. Nondetected results reported for silver and selenium were qualified as biased low, "UL" or estimated, "UJ", due to conflicting noncompliances.

- The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations :

Samples Affected: All samples analyzed for TAL metals.

Analyte	Maximum Concentration	Action Level
Aluminum	41.4 µg/L	41.4 mg/kg
Antimony	3.7 µg/L	3.7 mg/kg
Arsenic[1]	0.941 mg/kg	4.705 mg/kg
Barium	2.8 µg/L	2.8 mg/kg
Cadmium[1]	0.029 mg/kg	0.145 mg/kg
Chromium[1]	0.225 mg/kg	1.125 mg/kg
Cobalt	1.5 µg/L	1.5 mg/kg
Copper	5.4 µg/L	5.4 mg/kg
Iron	20.0 µg/L	20.0 mg/kg
Lead[1]	0.32 mg/kg	1.6 mg/kg
Magnesium	146.6 µg/L	146.6 mg/kg
Manganese[1]	0.209 mg/kg	1.045 mg/kg
Nickel	1.6 µg/L	1.6 mg/kg
Sodium[1]	86.47 mg/kg	432.35 mg/kg
Zinc	14.3 µg/L	14.3 mg/kg

[1] Maximum concentration present in a laboratory preparation blank.

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot, percent solids and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the action level reported for all of the above analytes except

aluminum, barium, iron and manganese were qualified, "B", as a result of blank contamination.

Samples Affected: All samples analyzed for SEM metals.

Analyte	Maximum Concentration	Action Level
Cadmium[1]	15.003 µg/L	75.015 µg/L
Copper[1]	26.5 µg/L	132.5 µg/L
Lead[1]	24.806 µg/L	24.806 µg/L
Mercury[1]	0.209 µg/L	1.045 µg/L
Nickel[1]	26.966 µg/L	134.83 µg/L
Zinc[1]	263.91 µg/L	1319.55 µg/L

[1] Maximum concentration present in a laboratory preparation blank.

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the action level reported for cadmium, copper, nickel and zinc were qualified, "B", as a result of blank contamination.

- The interfering analyte iron was present in sample MTCSD01301 at a concentration that was comparable to the level of iron in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, cadmium, chromium, cobalt, copper, manganese, nickel, potassium, selenium, silver, sodium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the absolute value of the Instrument Detection Limit (IDL). Interference affects exist for cobalt and copper in the affected sample. The positive result reported for cobalt was qualified as biased high, "K". The positive result reported for copper was qualified as biased low, "L".

- All positive and nondetected results reported for metals in samples MTCSD01401, MTCSD01601, MTCSD01801 and MTCSD01901 were qualified as estimated, "J" and "UJ", respectively, due to percent solids < 30%.

- All positive results reported for TOC in samples MTCSD01601, MTCSD01801 and MTCSD01901 were qualified as estimated, "J", due to percent solids < 30%.

- Field duplicate imprecision (RPD > 50%) was noted for nickel, affecting the SEM matrix. The positive results reported for nickel were qualified as estimated, "J".

Notes

The laboratory mis-labeled several sample names. The sample names were corrected and entered into the database.

Executive Summary

Laboratory Performance: Cadmium, chromium, cobalt, copper, nickel, selenium, silver, vanadium and zinc were qualified due to calibration noncompliance. Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: The interfering analyte iron was present in sample MTCSD01301. Several analytes in several samples were qualified due to low percent solids. Field duplicate imprecision was noted for nickel, affecting the SEM matrix.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Chemical Data Quality Manual" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M Faust

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
K	-	Positive result is considered biased high, "K", as a result of technical noncompliances.
L	-	Positive result is considered biased low, "L", as a result of technical noncompliances.
UL	-	Nondetected result is considered biased low, "UL", as a result of technical noncompliances.
UJ	-	Nondetected result is considered estimated, "UJ", as a result of technical noncompliances.
J	-	Positive result is considered estimated, "J", as a result of technical noncompliances.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**MR. G. LATUILPPE**	**DATE:**	**FEBRUARY 22, 2001**
FROM:	**BERNARD F SPADA III**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PEST/PCB/EXPLOSIVES**
CTO 803, NSWC INDIAN HEAD
SDG 81937

SAMPLES: 17/Aqueous

FB001	RB01	SW01301
SW01401	SW01501	SW01601
SW01701	SW01801	SW01901
SW02001	SW02101	SW02201
SW02301	SW02401	SW02501
SWFD002	TB002	

Overview

The sample set for CTO 803, NSWC INDIAN HEAD, SDG 81937 consists of fourteen (14) aqueous environmental samples, one (1) field blank, one (1) rinse blank, and one (1) trip blank. All samples were analyzed for volatile organic compounds (VOC) plus diethyl ether, semivolatile organic compounds (SVOC), pesticides and polychlorinated biphenyls (PEST/PCB) by method CLP OLC02.1. All samples were also analyzed for explosives (EXP) by method SW-846 8330.

The samples were collected by Tetra Tech NUS on September 6 and 7, 2001 and analyzed by Mitkem Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using OLM04.2 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters: data completeness, holding times, GCMS tuning, initial/continuing calibrations, laboratory method blank results, surrogate spike recoveries, blank spike/blank spike duplicate results, internal standard recoveries, chromatographic resolution, compound identification, compound quantitation and detection limits. Areas of concern are listed below.

Major

- The initial calibration for VOA had average relative response factors (RRF) less than 0.05 for acetone, 2-butanone, and 1,2-dibromo-3-chloropropane. All non-detects were rejected (UR) and all positive results were qualified as low biased (L).

- Sample MTCFB001 fell below the 10% quality control criteria for surrogate recovery of phenol-d5. The remaining two acid surrogates recovered acceptably. Phenol was rejected (UR) in this sample.

Minor

- Several samples had positive results below the detection limit. These samples were qualified as

estimated (J) due to uncertainty near detection limit.

- The laboratory evaluated the surrogates for all aqueous samples in the semivolatile fraction using quality control criteria for soils. The aqueous quality control criteria were used for validation. Sample SW02401 had 2 base/neutral surrogates outside of the aqueous quality control criteria. All base/neutral results were qualified as low biased (L,UL).

Notes

The laboratory did not calibrate and initially analyze for diethyl ether in the any volatile fraction samples as requested in the analytical statement of work. The laboratory was contacted regarding the omission by the data reviewer. In an attempt to provide data for diethyl ether, the laboratory performed a reverse library search for diethyl ether in all volatile samples. The laboratory also analyzed a standard to determine both a retention time and a reporting limit for aqueous and solid samples. The laboratory then provided results for diethyl ether for all volatile samples. The data reviewer used the data for diethyl ether and included the results into the existing volatile fraction database for all samples. Nevertheless, because of the lack of calibration data for each day of analysis and because the manner in which results were reported is similar to the reporting of a Tentatively Identified Compound (TIC), all results, both positive and non-detected were qualified as estimated, J and UJ, respectively.

Results for nitrobenzene, 2,4-dinitrotoluene, and 2,6-dinitrotoluene were removed from the semivolatiles fraction. The aforementioned compounds were reported in the explosives fraction with lower reporting limits.

The EDD differed from the Form I for two VOA samples. Sample FB001 showed a result of 1 on the EDD for chlorodibromomethane, and the Form I showed a result of 0.8. Sample SW01801 showed a result of 1 on the EDD for toluene, and the Form I showed a result of 0.6.

Sample SW01501 had a positive result for toluene over the linear calibration range for the instrument. The sample was re-analyzed at a dilution. The result for toluene was transposed to the original analysis.

Sample SW1501 contained several tentatively identified aromatic compounds at low concentrations. The chromatography and spectra support the reported data. These compounds were also detected in the diluted analysis of the sample.

The case narrative provided by Mitkem states that sample RB-01 was not analyzed for VOAs. There are results on both the EDD and in the data package for sample RB-01 for VOAs.

The EDD for all samples in the PEST/PCB fraction showed reporting limits of 0 for all target analytes except toxaphene. The laboratory's reporting limits were transposed to the EDD.

The EDD for all samples in the explosives fraction were re-submitted a number of times. Nitrocellulose was still missing from the EDD and needed added. Results were taken from the Form I's.

Executive Summary

Laboratory Performance: Qualifications were made based on calibration RRF, surrogate recovery noncompliance, and uncertainty near the detection limit.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to U.S. EPA National Functional Guidelines for Data Validation as modified by EPA Region III (9/94) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Bernard F Spada III
Chemist/Data Validator

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE**	**MARCH 19, 2002**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS AND MISCELLANEOUS PARAMETERS**
CTO-803 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – 81937

SAMPLES: 16/Aqueous/

MTCFB001	MTCRB001	MTCSW01301
MTCSW01401	MTCSW01501	MTCSW01601
MTCSW01701	MTCSW01801	MTCSW01901
MTCSW02001	MTCSW02101	MTCSW02201
MTCSW02301	MTCSW02401	MTCSW02501
MTCSWFD002		

Overview

The sample set for CTO 803, NSWC Indian Head, SDG 81937, consists of fourteen (14) aqueous environmental samples, one (1) aqueous field blank, MTCFB001 and one (1) aqueous rinsate blank, MTCRB001. Two (2) field duplicate pairs (MTCSWFD002 / MTCSW02301 and MTCSWFD002-F / MTCSW02301-F) are included within this SDG.

All samples were analyzed for cyanide, hardness, pH, total dissolved solids (TDS), total organic carbon (TOC), total suspended solids (TSS), chloride, fluoride, nitrate, nitrite, perchlorate, sulfate and total and dissolved target analyte list (TAL) metals. Samples for analyzed for dissolved metals are designated –F. The samples were collected by TetraTech NUS on September 6-8, 2001 and analyzed by Mitkem Corporation under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metals and cyanide analyses were conducted using Contract Laboratory Program (CLP) method ILM04.1. Analyses for hardness, pH, TDS and TSS were conducted using Standard Methods 18th Edition methods 2340B, 4500H, 2540C and 2540D, respectively. Analyses for chloride, fluoride, nitrate, nitrite and sulfate were conducted using EPA method 300.0. TOC and perchlorate analyses were conducted using EPA methods 415.1 and 314.0, respectively.

Metals analyses, with the exception of mercury, were conducted using Inductively Coupled Plasma (ICP) instrumentation. Mercury analyses were conducted using Cold Vapor Atomic Absorption (CVAA) instrumentation.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data. The data review was based on data completeness, holding times, calibration data, laboratory method/preparation blanks, interference check sample (ICS) results, matrix spike results, post digestion spike recoveries, laboratory control sample (LCS) results, ICP serial dilution results, field duplicate results, detection limits and analyte quantitation. Areas of concern with respect to data quality are listed below.

Minor Problems

- Analyses for pH should be conducted immediately. The samples were received at the laboratory on 9/8/01 and were not analyzed for pH until 9/11/01. All results reported for pH were qualified as estimated, "J".

- The 48-hour holding times for nitrate and nitrite were exceeded by 2-3 days for all samples. Nondetected results reported for nitrate and nitrite were qualified as unusable, "UR" due to holding time exceedances > 2X the holding time. ~~or as estimated, "UJ"~~. Positive results reported for nitrate were qualified as estimated, "J". SZT

- The Contract Required Detection Limit (CRDL) percent recoveries for antimony, arsenic, cadmium, cobalt, lead, manganese and nickel were > 110% quality control limit, affecting all samples. Positive results reported for arsenic, cadmium, cobalt, lead, nickel and manganese were qualified as biased high, "K". No validation action was necessary for antimony because the results for antimony were reported by the laboratory as nondetected.

- The CRDL percent recovery for silver was < 90% quality control limit, affecting all samples. Positive and nondetected results reported for silver were qualified as biased low, "L" and "UL", respectively.

- The CRDL percent recovery for silver was < 90% quality control limit, affecting all samples except MTCSW02501, MTCSW02301, MTCSW02201, MTCSW02401, MTCRB001, MTCSWFD002, MTCSW02101 and MTCSW02001. Nondetected results reported for silver in the affected samples were qualified as biased low, "UL".

- The CRDL percent recoveries for thallium were both above and below the 90-110% quality control limits, affecting samples MTCSW02501, MTCSW02301, MTCSW02201, MTCSW02401, MTCRB001, MTCSWFD002, MTCSW02101 and MTCSW02001. Nondetected results reported for thallium in the affected samples were qualified as estimated, "UJ", due to conflicting directional bias.

- The CRDL percent recoveries for chromium, potassium and zinc were >110% quality control limit, affecting all samples except MTCSW02401-F, MTCRB001-F, MTCSWFD002-F, MTCSW02101-F, MTCSW02001-F, MTCSW01301-F, MTCSW01501-F, MTCSW01601-F, MTCSW01901-F, MTCFB001-F, MTCSW01701-F, MTCSW01801-F and MTCSW01401-F. Positive results reported for potassium in these samples were qualified as biased high, "K". No validation action was required for chromium or zinc because all reported results were qualified "B" as a result of laboratory blank contamination.

- The CRDL percent recovery for copper was >110% quality control limit, affecting samples MTCRB001 and MTCSW02101. The positive results reported for copper in the affected samples were qualified as biased high, "K".

- The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Aluminum	27.5 µg/L	137.5 µg/L
Antimony	3.1 µg/L	15.5 µg/L
Barium	1.7 µg/L	8.5 µg/L
Barium[1]	1.7 µg/L	8.5 µg/L
Chromium	0.5 µg/L	2.5 µg/L
Chromium[1]	0.623 µg/L	3.115 µg/L
Cobalt	1.7 µg/L	8.5 µg/L
Copper	5.3 µg/L	26.5 µg/L
Copper[1]	6.472 µg/L	32.36 µg/L
Cyanide	4.8 µg/L	24.0 µg/L
Iron	15.2 µg/L	76.0 µg/L
Magnesium	7.7 µg/L	38.5 µg/L
Magnesium[1]	1.7297 µg/L	8.645 µg/L
Manganese	0.70 µg/L	3.5 µg/L
Nickel	1.8 µg/L	9.0 µg/L
Potassium	61.5 µg/L	307.5 µg/L
Potassium[1]	121.074 µg/L	605.37 µg/L
Silver	0.60 µg/L	3.0 µg/L
Zinc	13.3 µg/L	66.5 µg/L
Zinc[1]	17.713 µg/L	88.565 µg/L

[1]Maximum concentration present in a preparation blank, affecting the dissolved metals matrix.

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. Positive results less than the action level reported for all of the above analytes except antimony and magnesium were qualified "B" due laboratory blank contamination.

Notes

The CRDL percent recovery for selenium was >110% quality control limit, affecting samples MTCSW02401-F, MTCRB001-F, MTCSWFD002-F, MTCSW02101-F, MTCSW02001-F, MTCSW01301-F, MTCSW01501-F, MTCSW01601-F, MTCSW01901-F, MTCFB001-F, MTCSW01701-F, MTCSW01801-F and MTCSW01401-F. No validation action was required because all results for selenium were reported by the laboratory as nondetected.

The rinsate blank and field blank samples were not used to establish blank action levels and were not qualified due to laboratory blank contamination.

Orthophosphate and bromide results were reported by the laboratory but were removed from the database because these analytes were not requested.

Executive Summary

Laboratory Performance: The holding times were exceeded for pH, nitrate and nitrite for all samples. Several analytes were present in the laboratory method / preparation blanks. Antimony, arsenic, cadmium, cobalt, copper, lead, manganese, nickel, potassium, silver and thallium were qualified due to calibration noncompliance.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
K	-	Positive result is considered biased high, "K", as a result of technical noncompliances.
L	-	Positive result is considered biased low, "L", as a result of technical noncompliances.
UL	-	Nondetected result is considered biased low, "UL", as a result of technical noncompliances.
UJ	-	Nondetected result is considered estimated, "UJ", as a result of technical noncompliances.
J	-	Positive result is considered estimated, "J", as a result of technical noncompliances.
UR	-	Nondetected result is considered unusable, "UR", as a result of extreme technical noncompliances

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**FEBRUARY 22, 2002**
FROM:	**SETH C. STAFFEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PEST/PCB/EXP**
CTO 803, NSWC INDIAN HEAD
SDG: 81943

SAMPLES: 16/SEDIMENT/VOA/SVOA/PEST/PCB

MTCSD00101	MTCSD00201	MTCSD00301	MTCSD00401	MTCSD00501
MTCSD00601	MTCSD00701	MTCSD00801	MTCSD00901	MTCSD01001
MTCSD01101	MTCSD01201	MTCSD02901	MTCSD03001	MTCSDFD003
MTCSDFD004				

OVERVIEW

The sample set for CTO 803, SDG: 81943, NSWC Indian Head consists of sixteen (16) sediment environmental samples. All samples were analyzed for Target Compound List (TCL) volatile organic compounds (plus diethyl ether), TCL semivolatile organic compounds, pesticides/PCBs, explosives, nitroguanidine, and nitrocellulose. Two field duplicate pairs were included in the SDG: MTCSD01201 / MTCSDFD003 and MTCSD00201 / MTCSDFD004.

The samples were collected by TetraTech NUS on September 8th and 9th, 2001 and were analyzed by the Mitkem Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using Contract Laboratory Program (CLP) Statement of Work (SOW) OLM04.2, SW-846 Method 8330, HPLC/UV using Lab SOP, and Method 353.2 analytical and reporting protocols.

All samples were successfully analyzed. The findings offered in this report are based upon a general review of all available data including: data completeness, system performance and tuning, holding times, initial/continuing calibrations, laboratory method blank results, surrogate spike recoveries, internal standard recoveries, blank spike results, field duplicate results, matrix spike/matrix spike duplicate results, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- There were no major problems that would have resulted in the rejection of data.

Minor Problems

- An initial calibration on 09/21/01 contained a percent relative standard deviation (%RSD) that exceeded the 30% quality control limit for 4-chloroaniline. The aforementioned compound was qualified as estimated, UJ, because the reported results were nondetects and the exceedance was greater than 50%.

- The following compounds were detected in the laboratory method blanks or field quality control blanks (*):

Compound	Maximum Concentration	Blank Action Level
Methylene Chloride	4 µg/kg	40 µg/kg
Bis(2-ethylhexyl)phthalate	310 µg/Kg	3100 µg/Kg
Nitrocellulose	0.36 mg/Kg	1.8 mg/Kg

  Sample aliquot, percent solids, and dilution factor were taken into consideration when applying the blank action limit. Positive results for methylene chloride and bis(2-ethylhexyl)phthalate and nitrocellulose below the blank action level were qualified as, B.

- Despite the absence of acetone in the laboratory method blank, acetone is a common laboratory contaminant. Therefore, the presence of acetone in environmental samples is a suspected laboratory contaminant. Positive results were qualified as estimated, J.

- Field duplicate imprecision occurred between sample MTCSD01201 and its duplicate MTCSDFD003 for the following compounds: carbon disulfide, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene. Positive results were qualified as estimated, J, in the field pair.

- The percent solids for samples MTCSD0601, MTCSD0801, MTCSD0901, and MTCSD01001, and MTCSD1101 were less than the 30% quality control limit. Positive and nondetected results were qualified as estimated J, and UJ, respectively in the aforementioned samples in the volatile, semivolatile, and pesticides/PCBs fractions.

- The holding time from collection date to extraction was exceeded for all of the explosive samples. The reported nondetected results were qualified as estimated, UJ. Positive and nondetected results for nitrocellulose were qualified as estimated, J, and UJ.

- The laboratory did not calibrate and initially report diethyl ether in any volatile fraction samples as requested in the analytical statement of work. The laboratory was contacted regarding the omission by the data reviewer. In an attempt to provide data for diethyl ether, the laboratory performed a reverse library search for diethyl ether in all volatile samples. The laboratory also analyzed a standard to determine both a retention time and a reporting limit for aqueous and solid samples. The laboratory then provided results for diethyl ether for all volatile samples. The data reviewer used the data for diethyl ether and included the results into the existing volatile fraction database for all samples. Nevertheless, because of the lack of calibration data for each day of analysis and because the manner in which results were reported is similar to the reporting of a Tentatively Identified Compound (TIC), all results, both positive and nondetected were qualified as estimated, J and UJ, respectively.

- Positive results below the RL were qualified as estimated, J, due to uncertainty near the detection limit. The direction of bias cannot be determined.

Notes

Continuing calibration on 09/21/01 at 1720 contained a %D that exceeded the 25% quality control limit, but did not exceed 50%, for 4-chloroaniline. 4-Chloroaniline was qualified for initial calibration %RSD noncompliance.

Continuing calibration on 09/22/01 at 0828 contained %Ds that exceeded the 25% quality control limit, but did not exceed 50%, for 2,2'-oxybis(1-chloropropane), 4-chloroaniline, 2,4-dinitrophenol, and 4,6-dinitro-2-methylphenol. Therefore, nondetected sample results were not qualified on this basis. 4-Chloroaniline was qualified for initial calibration %RSD noncompliance.

The matrix spike duplicate %R was greater than the upper quality control limit for phenol and 2,4-dinitrotoluene. No qualification action was warranted on MSD %R noncompliance.

The MS/MSD %R RPD was greater than the upper quality control for 4-nitrotoluene. No qualification action was taken based on MS/MSD RPD noncompliance.

The MS/MSD RPD exceeded the quality control limit for nitrocellulose. No qualification action was based on RPD noncompliance.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several compounds failed to meet the continuing calibration %D quality control limits in the semivolatile and pesticide/PCB fractions. Laboratory and method blank contamination occurred in the volatile, semivolatile, and explosive fraction. Explosive holding times were exceeded for all of the samples.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", (September 1994) as amended for use within USEPA Region III, and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Seth C. Staffen
Environmental Scientist/Data Validator

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**MARCH 19, 2002**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS AND MISCELLANEOUS PARAMETERS**
CTO 803 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – 81943

SAMPLES: 16/Sediment/

MTCSD00101	MTCSD00201	MTCSD00301
MTCSD00401	MTCSD00501	MTCSD00601
MTCSD00701	MTCSD00801	MTCSD00901
MTCSD01001	MTCSD01101	MTCSD01201
MTCSD02901	MTCSD03001	MTCSDFD003
MTCSDFD004		

Overview

The sample set for CTO 803, NSWC Indian Head, SDG 81943, consists of sixteen (16) sediment environmental samples. Two (2) field duplicate pairs (MTCSDFD003 / MTCSDFD01201 and MTCSDFD004 / MTCSDFD00201) are included within this SDG.

All samples were analyzed for target analyte list (TAL) metals, cyanide, total organic carbon (TOC), Acid Volatile Sulfide (AVS) and the Simultaneously Extracted Metals (SEM) cadmium, copper, lead, mercury, nickel and zinc. The samples were collected by Tetra Tech NUS on September 8-9, 2001 and analyzed by Mitkem Corporation under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. TAL metals and cyanide analyses were conducted using Contract Laboratory Program (CLP) method ILM04.1. Analyses for TOC were conducted using SW 846 method 9060. The AVS/SEM analyses were conducted using the EPA Draft Analytical Method for the Determination of Acid Volatile Sulfide in Sediment.

Metals analyses, with the exception of mercury were conducted using Inductively Coupled Plasma (ICP) instrumentation. Mercury analyses were conducted using Cold Vapor Atomic Absorption (CVAA) instrumentation.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data. The data review was based on data completeness, holding times, calibration data, laboratory method/preparation blanks, ICP interference check sample results, matrix spike results, laboratory duplicate results, laboratory control sample (LCS) results, ICP serial dilution results, field duplicate results, detection limits and analyte quantitation.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) percent recoveries for antimony, arsenic, cadmium, manganese and zinc were >110% quality control limit, affecting all samples. Positive results greater than two times the CRDL reported for arsenic and cadmium were qualified as biased high, "K" or estimated, "J" due to conflicting noncompliances. No validation action was required for antimony, manganese or zinc because the results were either reported by the laboratory as nondetected, qualified "B" due to laboratory blank contamination or were greater than two times the CRDL.

- The CRDL percent recoveries for chromium and nickel were >110% quality control limit, affecting all of the samples except samples MTCSD00501, MTCSD01201 and MTCSDFD003. Positive results reported for chromium and nickel in the affected samples were qualified as biased high, "K" or estimated, "J", due to conflicting noncompliances.

- The CRDL percent recoveries for thallium and silver were < 90% quality control limit, affecting all samples. Positive results reported for silver were qualified as biased low, "L" or estimated, "J", due to conflicting noncompliances. Nondetected results reported for silver and thallium were qualified as biased low, "UL" or estimated, "UJ", due to conflicting noncompliances.

- The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations :

Samples Affected: All samples analyzed for TAL metals.

Analyte	Maximum Concentration	Action Level
Aluminum	145.7 µg/L	145.7 mg/kg
Antimony[1]	0.544 mg/kg	2.72 mg/kg
Chromium[1]	0.24mg/kg	1.2 mg/kg
Cobalt	0.90 µg/L	0.90 mg/kg
Copper	3.5 µg/L	3.5 mg/kg
Iron	27.1 µg/L	27.1 mg/kg
Magnesium	119.4 µg/L	119.4 mg/kg
Manganese[1]	0.688 mg/kg	3.44 mg/kg
Nickel	1.1 µg/L	1.1 mg/kg
Potassium	58.6 µg/L	58.6 mg/kg
Sodium	1039.8 µg/L	1039.8 mg/kg
Zinc	18.2 µg/L	18.2 mg/kg

[1] Maximum concentration present in a laboratory preparation blank.

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot, percent solids and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the action level reported for antimony, copper, magnesium, potassium, sodium and zinc were qualified, "B", as a result of blank contamination.

Samples Affected: All samples analyzed for SEM metals.

Analyte	Maximum Concentration	Action Level
Cadmium[1]	1.55 µg/L	7.75 µg/L
Copper[1]	28.959 µg/L	144.795 µg/L
Lead	5.8 µg/L	29.0 µg/L
Mercury[1]	0.126 µg/L	0.63 µg/L
Nickel[1]	26.563 µg/L	132.815 µg/L
Zinc[1]	32.715 µg/L	163.575 µg/L

[1] Maximum concentration present in a laboratory preparation blank.

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the action level reported for all of the above analytes were qualified, "B", as a result of blank contamination.

- The interfering analyte iron was present in sample MTCSD00401 at a concentration that was comparable to the level of iron in the Interference Check Sample (ICS) solution. Several analytes namely arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the absolute value of the Instrument Detection Limit (IDL). Interference affects exist for cadmium, cobalt, copper, potassium, silver and thallium in the affected sample. The positive results reported for cadmium, cobalt and potassium were qualified as biased high, "K". The positive result reported for silver was qualified as estimated, "J", due to conflicting noncompliances. The positive results reported for copper and thallium were qualified as biased low, "L".

- The Matrix Spike (MS) percent recovery for antimony was < 75% quality control limit, affecting the total metals matrix. Nondetected results reported for antimony were qualified as biased low, "UL" or estimated, "UJ", due to conflicting noncompliances.

- The MS percent recovery for copper was >125% quality control limit, affecting the SEM matrix. Positive results reported for copper were qualified as estimated, "J", due to conflicting noncompliances.

- Laboratory duplicate imprecision (difference >2X CRDL) was noted for zinc, affecting the total metals matrix. Positive results reported for zinc were qualified as estimated, "J".

- Laboratory duplicate imprecision (RPD > 35%) was noted for copper and nickel, affecting the SEM matrix. Positive results reported for copper and zinc were qualified as estimated, "J".

- All positive and nondetected results reported for metals in samples MTCSD00601, MTCSD00801, MTCSD00901, MTCSD01001 and MTCSD01101 were qualified as estimated, "J" and "UJ", due to percent solids < 30%.

- All positive results reported for TOC in samples MTCSD00601, MTCSD00801, MTCSD00901 and MTCSD01101 were qualified as estimated, "J", due to percent solids < 30%.

- Field duplicate imprecision (RPD > 50%) was noted for zinc in the MTCSDFD003 / MTCSD01201 sample pair, affecting the total metals matrix. The positive result reported for zinc in sample MTCSDFD003 was qualified as estimated, "J".

- Field duplicate imprecision (difference > 4X CRDL) was noted for cyanide in the MTCSDFD003 / MTCSD01201 sample pair. The positive and nondetected results reported for cyanide in this sample pair only were qualified as estimated, "J" and "UJ", respectively.

- Field duplicate imprecision (RPD > 50%) was noted for copper and nickel in the MTCSDFD003 / MTCSD01201 sample pair, affecting the SEM matrix. The positive results reported for copper and nickel in this sample pair only were qualified as estimated, "J".

- Field duplicate imprecision (difference > 4X CRDL) was noted for cyanide in the MTCSDFD004 / MTCSD00201 sample pair. The positive and nondetected results reported for cyanide in this sample pair only were qualified as estimated, "J" and "UJ", respectively.

Notes

The CRDL percent recoveries for lead were both above and below the 90-110% quality control limits, affecting all samples. No validation action was required because the reported results were greater than two times the CRDL.

Executive Summary

Laboratory Performance: Arsenic, cadmium, chromium, nickel, thallium and silver were qualified due to calibration noncompliance. Several analytes were present in the laboratory method/preparation blanks. Laboratory duplicate imprecision was noted for zinc in the total metals matrix and copper and nickel in the SEM matrix.

Other Factors Affecting Data Quality: Antimony was qualified due to MS noncompliance in the total metals matrix. Copper was qualified due to MS noncompliance in the SEM matrix. The interfering analyte iron was present in sample MTCSD00401. Several analytes in several samples were qualified due to low percent solids. Field duplicate imprecision was noted for several analytes in both field duplicate pairs.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Chemical Data Quality Manual" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M Faust

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
K	-	Positive result is considered biased high, "K", as a result of technical noncompliances.
L	-	Positive result is considered biased low, "L", as a result of technical noncompliances.
UL	-	Nondetected result is considered biased low, "UL", as a result of technical noncompliances.
UJ	-	Nondetected result is considered estimated, "UJ", as a result of technical noncompliances.
J	-	Positive result is considered estimated, "J", as a result of technical noncompliances.

TETRA TECH NUS

TO:	**G. LATULIPPE**	**DATE:**	**JANUARY 4, 2002**
FROM:	**MEGAN N. CLOUD**	**COPIES:**	**FILE**

SUBJECT: **INORGANIC DATA VALIDATION - METALS AND WET CHEMISTRY**
CTO803 - NSWC INDIAN HEAD
SDG NO. 81944

SAMPLES: **19/Aqueous/**

MTCSW00101(-F)	MTCSW00201(-F)	MTCSW00701(-F)	MTCSW01201(-F)
MTCSWFD003(-F)	MTCSW00301(-F)	MTCSW00801(-F)	MTCSW02901(-F)
RB002(-F)	MTCSW00401(-F)	MTCSW00901(-F)	MTCSW03001(-F)
RB003(-F)	MTCSW00501(-F)	MTCSW01001(-F)	MTCSWFD004(-F)
RB004(-F)	MTCSW00601(-F)	MTCSW01101(-F)	

OVERVIEW

The sample set for the CTO803-NSWC Indian Head, SDG 81944 consists of sixteen aqueous environmental samples (designated MTCSW-, MTCFD-), and three rinsate blanks (designated RB-). One field duplicate pair (MTC01201 and FD003) was included in this sample set. Sample SW01201 was designated for matrix spike and laboratory duplicate analysis. All samples were analyzed for total and dissolved target analyte list (TAL) Metals, cyanide, chloride, sulfate, fluoride, nitrate, nitrite, perchlorate, hardness, pH, total organic carbon (TOC), total dissolved solids (TDS), and total suspended solids (TSS). Samples designated -F were analyzed for dissolved metals.

The samples were collected by Tetra Tech NUS on September 7 through 9, 2001 and analyzed by Mitkem Corporation of Warwick, Rhode Island and Severn Trent Laboratories (STL) of Sacramento, California, under NFESC QA/QC criteria.

All analyses were conducted using contract laboratory program (CLP) Method ILM04.1 for TAL Metals and cyanide, EPA 300.0 for anions, EPA 314.0 for perchlorate, Standard Method (SM) 2340B for hardness, SM 4500-H+ for pH, EPA 415.1 for TOC, SM 2540-C for TDS, SM 2540-D for TSS, and SM 4500-NO_2B for total nitrate.

SUMMARY

Most analytes were successfully analyzed in all samples. The findings offered in this report are based upon a general review of all available data including data completeness, holding times until analysis, calibration data, laboratory blank results, ICP interference check samples, matrix spike results, laboratory control spike results, laboratory duplicate results, field duplicate results, ICP serial dilution results, detection limits, and analyte quantitation.

Areas of concern with respect to data quality are listed below as follows:

MAJOR PROBLEMS

- None.

MINOR PROBLEMS

- The following table summarizes the analytes detected as contaminants in the laboratory blanks at the maximum concentration indicated:

Analyte	Maximum Concentration	Action Level (Aqueous)
Total and Dissolved Aluminum	23.7 ug/L	118.5 ug/L
Total and Dissolved Antimony	4.6 ug/L	23 ug/L
Total Barium[1]	2.13 ug/L	10.6 ug/L
Dissolved Barium[1]	4.68 ug/L	23.4 ug/L
Total and Dissolved Chromium[1]	0.5 ug/L	2.5 ug/L
Total and Dissolved Cobalt	1.3 ug/L	6.5 ug/L
Total and Dissolved Copper	5.2 ug/L	26 ug/L
Total Iron[1]	12.9 ug/L	64.5 ug/L
Dissolved Iron	11 ug/L	55 ug/L
Total and Dissolved Lead	1.2 ug/L	6 ug/L
Total and Dissolved Magnesium	121.4 ug/L	607 ug/L
Total Manganese	0.4 ug/L	2 ug/L
Dissolved Manganese[1]	1.12 ug/L	5.61 ug/L
Total Nickel[1]	1.63 ug/L	8.15 ug/L
Dissolved Nickel	1.3 ug/L	6.5 ug/L
Total Potassium[1]	119 ug/L	595 ug/L
Dissolved Potassium[1]	133 ug/L	665 ug/L
Dissolved Silver[1]	0.78 ug/L	3.9 ug/L
Total Sodium[1]	212 ug/L	1060 ug/L
Dissolved Sodium[1]	230 ug/L	1150 ug/L
Total and Dissolved Zinc	14.2 ug/L	71 ug/L

[1] Maximum concentration present in a preparation blank.

Samples affected: The aqueous action levels apply to all aqueous environmental samples.

Adjustments were made for the samples aliquot size and dilution factors. Results reported at concentrations within the action level are qualified (B) and are considered to be false positives (artifacts of blank contamination).

- The positive results less than 2X the contract required detection limit (CRDL) for arsenic, cadmium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, and zinc are qualified as biased high (K) because the CRDL standard was above the 110% QC limit.

- The positive results less than 2X the CRDL and the non-detected results for total and dissolved silver are qualified as biased low (L/UL) because the CRDL standard was below the 90% QC limit.
- The analyses for nitrite, nitrate, and pH exceeded holding time criteria. The results for nitrite, nitrate and pH are qualified as estimated (J/UJ) in associated samples.
- The TDS result for MTCRB002 is qualified as estimated (J) because the analysis exceeded holding time.

Notes

The rinsate blanks were not used to establish blank action levels and were not qualified due to laboratory blank contamination.

Orthophosphate results were reported by the laboratory but were not requested. These results were removed from the database.

No vials were submitted for TOC for sample MTCSWFD004, therefore, this parameter was not analyzed for this sample.

A comparison of field duplicate pair MTC01201 and FD003 is included in Appendix C.

Dilutions were performed for chloride and sulfate analyses for most of the samples.

EXECUTIVE SUMMARY

Laboratory Performance: Total and dissolved aluminum, antimony, barium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, and zinc were present in the laboratory blanks. Dissolved silver was present in the laboratory blanks. Eleven metals exceeded the CRDL standard QC criteria.

Other Factors Affecting Data Quality: Holding times were exceeded for nitrate, nitrite, and pH analyses due to unavoidable delays during shipping of the samples.

The data for these analyses were reviewed with reference to the EPA "Functional Guidelines for Inorganic Data Review", as amended for use within EPA Region 3 (4/93).

The text of this report has been formatted to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the Functional Guidelines and the Quality Assurance Project Plan (QAPjP)."

Megan N. Cloud

Megan N. Cloud
Chemist

Tetra Tech NUS, Inc.
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**FEBRUARY 22, 2002**
FROM:	**SETH C. STAFFEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PEST/PCB/EXP**
CTO 803, NSWC INDIAN HEAD
SDG: 81944

SAMPLES: 19/AQUEOUS/VOA

MTCFD003	MTCRB002	MTCRB003	MTCRB004	MTCSW00101
MTCSW00201	MTCSW00301	MTCSW00401	MTCSW00501	MTCSW00601
MTCSW00701	MTCSW00801	MTCSW00901	MTCSW01001	MTCSW01101
MTCSW01201	MTCSW02901	MTCSW03001	MTCTB004	

18/AQUEOUS/SVOA/PEST/PCB/EXP

MTCFD003	MTCRB002	MTCRB003	MTCRB004	MTCSW00101
MTCSW00201	MTCSW00301	MTCSW00401	MTCSW00501	MTCSW00601
MTCSW00701	MTCSW00801	MTCSW00901	MTCSW01001	MTCSW01101
MTCSW01201	MTCSW02901	MTCSW03001	MTCFD004	

OVERVIEW

The sample set for CTO 803; SDG 81944, NSWC Indian Head, MD consists of sixteen (16) surface water environmental samples, three (3) rinsate blanks, and one (1) trip blank. All samples were analyzed for Target Compound List (TCL) low concentration volatile organic compounds (plus diethyl ether), TCL semivolatile organic compounds, pesticides/PCBs, explosives, nitroglycerin, nitrocellulose and nitroguanidine, except sample MTCTB004 was analyzed for volatile organic compounds only. Two field duplicate pairs were included in the SDG: MTCSW01201 / MTCFD003 and MTCSW00201 / MTCFD004.

The samples were collected by TetraTech NUS on September 8, 9, and 10, 2001 and were analyzed by the Mitkem Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using Contract Laboratory Program (CLP) Statement of Work (SOW) OLC02.1, SW-846 Method 8330, HPLC/UV using Laboratory SOP, and Method 353.2 analytical and reporting protocols.

All samples were successfully analyzed with the exception of those results that were rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, system performance and tuning, holding times, initial/continuing calibrations, laboratory method blank results, surrogate spike recoveries, internal standard recoveries, blank spike results, field duplicate results, matrix spike/matrix spike duplicate results, compound identification, compound quantitation, and detection limits. Areas of concern are listed below.

Major Problems

- The volatile initial calibration on 09/13/01 contained RRFs that were less than the 0.05 quality control limit for acetone, 2-butanone, and 1,2-dibromo-3-chloropropane. The aforementioned compounds were qualified as rejected, UR, in all of the samples.

- The volatile continuing calibration on 09/18/01 at 1147 contained RRFs that were less than the 0.05 quality control limit for acetone, 2-butanone, and 1,2-dibromo-3-chloropropane. The aforementioned compounds were qualified as rejected, UR, in the associated samples.

Minor Problems

- Despite the absence of bis(2-ethylhexyl)phthalate in the semivolatile laboratory method blank, bis(2-ethylhexyl)phthalate is a common laboratory contaminant. Therefore, the presence of bis(2-ethylhexyl)phthalate in environmental samples is a possible laboratory contaminant. Positive results were qualified as estimated, J.

- All explosive samples were extracted on September 19, 2001. The samples were collected on September 7-9, 2001. The samples were extracted after the seven-day holding time (collection date to extraction date). All of the samples were qualified as estimated, UJ, due to holding time exceedance.

- The internal standard, perylene-d12, was less than the lower quality control limit for samples MTCSW00301 and MTCSW00401. The re-analyses yielded the same results. Therefore, the original analyses were used for data validation. Positive and nondetected results were qualified as estimated, J, and, UJ, respectively, in the aforementioned samples.

- The laboratory did not calibrate and initially report diethyl ether in any volatile fraction samples as requested in the analytical statement of work. The laboratory was contacted regarding the omission by the data reviewer. In an attempt to provide data for diethyl ether, the laboratory performed a reverse library search for diethyl ether in all volatile samples. The laboratory also analyzed a standard to determine both a retention time and a reporting limit for aqueous and solid samples. The laboratory then provided results for diethyl ether for all volatile samples. The data reviewer used the data for diethyl ether and included the results into the existing volatile fraction database for all samples. Nevertheless, because of the lack of calibration data for each day of analysis and because the manner in which results were reported is similar to the reporting of a Tentatively Identified Compound (TIC), all results, both positive and nondetected were qualified as estimated, J and UJ, respectively.

- Positive results below the RL were qualified as estimated, J, due to uncertainty near the detection limit. The direction of bias cannot be determined.

Notes

Sample, MTCSWFD004, was listed on the Chain of Custody and should have been analyzed for volatile organic compounds. According to the laboratory SDG narrative, no volatile vials were received.

The laboratory truncated the sample ids. The MTCSW, was removed from the sample ids by the laboratory on the laboratory Form Is. Also, the explosives, nitrocellulose, and nitroguanidine fraction Form Is used Mitkem sample ids. However, there was a dash and not a zero in the ids on the form Is. The dash was assumed to be a zero and the form Is were labeled accordingly.

The matrix spike/matrix spike duplicate percent recoveries were greater than the upper quality control limit for 1,4-dichlorobenzene. No qualification action was taken because the reported result was nondetected in the unspiked sample, MTCSW01201.

The continuing calibration on 09/22/01 contained %Ds that exceeded the 20% quality control limit on both columns, but did not exceed 50%, for a-BHC. Therefore, nondetected sample results were not qualified on this basis.

The continuing calibration on 09/23/01 contained %Ds that exceeded the 20% quality control limit on one column for a-BHC and g-BHC. No qualification action was taken because the other column was compliant.

The continuing calibration on 09/25/01 contained a %D that exceeded the 20% quality control limit on one column for a-BHC. No qualification action was taken because the other column was compliant.

The calibration verifications on 09/24/01 at 1711, 09/24/01 at 2250, and 09/252/01 0100 contained %Ds that were greater than the 15% quality control limit for nitroguanidine. No qualification action was taken because the reported results were nondetects.

The surrogate %R of 2,4-dinitrotoluene was less than the lower quality control limit for samples MTCSW00101 and MTCSW03001.

The laboratory control sample %R for 4-nitrotoluene was greater than the upper quality control limit. No qualification action was taken because the reported results were nondetected.

The MS/MSD %Rs were greater than the upper quality control limit for RDX. No qualification action was taken because the reported result was nondetected.

The explosive samples were sub-contacted to Severn Trent Laboratories – Sacramento, upon delivery to Sacramento the samples were at 10-13 degree Celsius temperatures. No qualification action was taken.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several compounds failed to meet the initial and continuing calibration RRF quality control limits in the volatile fraction. Bis(2-ethylhexyl)phthalate was a suspected laboratory contamination in the semivolatile fraction. Explosive samples were extracted beyond the seven-day holding time.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", (September 1994) as amended for use within USEPA Region III, and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Seth C. Staffen
Environmental Scientist/Data Validator

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**MR. G. LATUILPPE**	**DATE:**	**MARCH 19, 2002**
FROM:	**BERNARD F SPADA III**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- SVOA/PEST/PCB/EXPLOSIVES**
CTO 803, NSWC INDIAN HEAD
SDG 81977

SAMPLES: 33/Tissue

MTCCT00101	MTCCT00102	MTCCT00301
MTCCT00302	MTCCT00401	MTCCT00402
MTCCT00403	MTCCT005	MTCCT006
MTCFS001	MTCFS002	MTCFS003
MTCFS004	MTCFS005	MTCFS006
NJCFS007	MTCGS002	MTCGS003
MTCLB001	MTCLB00201	MTCLB00202
MTCLB00203	MTCLB003	MTCLB00401
MTCLB00402	MTCLB005	MTCLB006
MTCSS001	MTCSS004	MTCSS005
MTCSS006	NJCMC007	NJCWP007

Overview

The sample set for CTO 803, NSWC INDIAN HEAD, SDG 81977 consists of thirty-three (33) tissue environmental samples. All samples were analyzed for semivolatile organic compounds (SVOC), pesticides and polychlorinated biphenyls (PEST/PCB) by method CLP OLM04.1. All samples were also analyzed for explosives (EXP) by method SW-846 8330.

The samples were collected by Tetra Tech NUS on September 6, 7, 8, and 9, 2001 and analyzed by Mitkem Corporation. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using OLM04.1 and SW-846 8330 analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters: data completeness, holding times, GCMS tuning, initial/continuing calibrations, laboratory method blank results, surrogate spike recoveries, blank spike/blank spike duplicate results, internal standard recoveries, chromatographic resolution, compound identification, compound quantitation and detection limits. Areas of concern are listed below.

Major

- The initial calibration performed on October 26 between 12:50 and 16:36 for SVOA had an average relative response factor (RRF) less than 0.05 for 4-chloroaniline. All associated non-detects were qualified as rejected (UR).

- The continuing calibration performed on October 26 at 17:41 for SVOA had a relative response factor (RRF) less than 0.05 for 4-chloroaniline. All associated non-detects were qualified as rejected (UR).

- The initial calibration performed on October 28 and 29 between 21:52 and 01:46 for SVOA had an average relative response factor (RRF) less than 0.05 for 4-chloroaniline. All associated non-detects were qualified as rejected (UR).

- The continuing calibration performed on October 29 at 01:46 for SVOA had a RRF less than 0.05 for pentachlorophenol. All associated non-detects were qualified as rejected (UR).

- The initial calibration performed on October 29, between 14:59 and 17:57 for SVOA had average relative response factors (RRF) less than 0.05 for 4-chloroaniline, and pentachlorophenol. All associated non-detects were qualified as rejected (UR).

- The continuing calibration performed on October 29 at 19:53 for SVOA had a RRF less than 0.05 for 4-chloroaniline and pentachlorophenol. All associated non-detects were qualified as rejected (UR).

- The continuing calibration performed on October 30 at 11:10 for SVOA had a RRF with no response for pentachlorophenol. All associated non-detects were qualified as rejected (UR).

- The continuing calibration performed on October 31 at 12:45 for SVOA had a RRF less than 0.05 for 4-chloroaniline and pentachlorophenol. All associated non-detects were qualified as rejected (UR).

- The following table summarizes the pesticide/PCB % difference between analytical columns non-compliances.

Sample	Compound	% Difference	Qualification
MTCCT00101	Endosulfan sulfate	196.3	R
	Endrin aldehyde	197.3	R
	alpha-Chlordane	102.5	R
	gamma-Chlordane	81.3	J
	PCB-1260	31.3	J
MTCCT00102	Endosulfan I	47.6	J
	Dieldrin	133.3	R
	Endosulfan sulfate	159.3	R
	Endrin aldehyde	204.3	R
	alpha-Chlordane	104.8	R
	gamma-Chlordane	42.9	J
MTCCT00301	Heptachlor epoxide	566.7	R
	Dieldrin	50.7	J
	4,4'-DDD	169.8	R
	Endosulfan sulfate	308.5	R
	Endrin aldehyde	206.7	R
	alpha-Chlordane	105.0	R
	gamma-chlordane	76.5	J
	PCB-1260	26.3	J
MTCCT00302	Endosulfan sulfate	677.8	R
	Endrin aldehyde	346.8	R
	alpha-Chlordane	143.3	R
	gamma-Chlordane	164.7	R
	PCB-1260	54.2	J
MTCCCT00401	Endosulfan sulfate	228.1	R
	PCB-1260	33.3	J

MTCCT00402	4,4'-DDD	44.3	J
	Endosulfan sulfate	412.2	R
	Endrin aldehyde	357.1	R
	gamma-Chlordane	140.4	R
MTCFS005	PCB-1260	38.2	J
MTCGS003	Heptachlor epoxide	900.0	R
	4,4'-DDE	36.4	J
	alpha-Chlordane	114.8	R
MTCSS004	4,4'-DDD	46.2	J
MTCSS006	PCB-1260	32.2	J

Minor

- Several samples had positive results below the detection limit but above the method detection limit. These samples were qualified as estimated (J) due to uncertainty near detection limit.
- The semivolatile initial calibration performed on October 28 and 29 exceeded the 30% RSD quality control criteria (and was >50%) for pentachlorophenol. All non-detects are qualified as estimated (UJ).
- The semivolatile continuing calibration performed on October 29 at 01:46 exceeded the 25%D quality control criteria (and was >50%) for 4-chloroaniline. All associated non-detected results are qualified as estimated (UJ).

Surrogate Spike Recoveries /Internal Standard Performance

The following table summarizes the non-compliant surrogate spike recoveries and internal standard performances:

Samples	Surrogate Recoveries	Internal Standard Performances	Validated	Qualifications
MTCCT00101		3(L) 4(L) 5(L<10%) 6(L<10%)	N	
MTCCT00101RE		2(L) 3(L) 4(L) 5(L<10%) 6(L)	Y	UR, J, UJ
MTCCT00102		4(L) 5(L) 6(L<10%)	N	
MTCCT00102RE		2(L) 3(L) 4(L) 5(L) 6(L)	Y	UJ
MTCCT00301		4(L) 5(L) 6(L)	Y	UJ
MTCCT00301DL		3(L) 4(L) 5(L) 6(L)	N	
MTCCT00401		1(L) 2(L) 3(L) 6(L) 4&5(L<10%)	Y	UJ
MTCCT00401DL		3(L) 4(L) 5(L) 6(L)	Y	UJ

MTCCT00402		5(L) 6(L)	Y	UJ
MTCCT00402RE		3(L) 4(L) 5(L) 6(L)	N	
MTCCT00403		5(L) 6(L)	Y	UJ
MTCCT00403DL		4(L) 5(L) 6(L)	N	
MTCCT005		6(L)	Y	UJ
MTCCT005RE		5(L) 6(L)	N	
MTCCT006		4(L) 5(L<10%) 6(L<10%)	Y	UJ
MTCCT006DL	X(6)	5(L)	Y	UJ
MTCFS001		1(H) 5(L) 6(L)	Y	UJ
MTCFS001DL		5(L)	N	
MTCFS002		5(L) 6(L)	Y	UJ
MTCFS002RE		4(L) 5(L) 6(L)	N	
MTCFS003		5(L) 6(L)	Y	UJ
MTCFS003DL		5(L) 6(L)	N	
MTCFS005		3(L) 4(L) 5(L<10%) 6(L<10%)	Y	UJ
MTCFS005DL		4(L) 5(L) 6(L)	Y	UJ
MTCFS006		4(L) 5(L<10%) 6(L<10%)	N	
MTCFS006RE		1(H) 2(H) 5(L) 6(L)	Y	J, UJ
NJCFS007		4(L) 5(L<10%) 6(L<10%)	N	
NJCFS007RE		3(L) 4(L) 5(L) 6(L)	Y	UJ
MTCGS002		5(L) 6(L)	Y	UJ
MTCGS002DL		4(L) 5(L)	N	

MTCGS003	5(L) 6(L)	Y	UJ
MTCGS003RE	3(L) 4(L<10%) 5(L) 6(L)	N	
MTCLB001	4(L) 5(L<10%) 6(L<10%)	Y	UJ
MTCLB001DL	5(L) 6(L)	Y	UJ
MTCLB00201	3(L) 4(L) 5(L<10%) 6(L<10%)	N	
MTCLB00201RE	3(L) 4(L) 5(L) 6(L)	Y	UJ
MTCLB00202	5(L) 6(L<10%)	N	
MTCLB00202RE	2(L) 3(L) 4(L) 5(L) 6(L)	Y	UJ
MTCLB00203	5(L) 6(L)	Y	UJ
MTCLB00203RE	4(L) 5(L) 6(L)	N	
MTCLB003	4(L) 5(L) 6(L)	Y	UJ
MTCLB003RE	4(L) 5(L) 6(L)	N	
MTCLB00401	5(L) 6(L)	Y	UJ
MTCLB00401RE	4(L) 5(L) 6(L)	N	
MTCLB00402	5(L) 6(L)	Y	UJ
MTCLB00402DL (DILUTED)		N	
MTCLB005	6(L)	Y	UJ
MTCLB005RE	5(L) 6(L)	N	
MTCLB006	5(L) 6(L<10%)	Y	UR, UJ
MTCLB006RE	3(L) 4(L) 5(L<10%) 6(L)	N	
MTCSS001	5(L) 6(L)	Y	UJ
MTCSS001RE	4(L) 5(L) 6(L)	N	

MTCSS004	1(L) 2(L) 3,4&5(L<10%) 6(L)	Y	UJ
MTCSS004DL	3(L) 4(L) 5(L) 6(L)	Y	UJ
MTCSS005	3(L) 4(L) 5(L<10%) 6(L<10%)	N	
MTCSS005RE	3(L) 4(L) 5(L) 6(L)	Y	UJ
MTCSS006	4(L) 5(L<10%) 6(L<10%)	N	
MTCSS006RE	2(L) 3(L) 4(L) 5(L<10%) 6(L)	Y	UR, UJ
NJCMC007	5(L) 6(L)	Y	UJ
NJCMC007RE	3(L) 4(L) 5(L) 6(L)	N	
NJCWP007	4(L) 5(L<10%) 6(L<10%)	N	
NJCWP007RE	3(L) 4(L) 5(L) 6(L)	Y	UJ

Surrogate Recoveries: + Recovery greater than upper limit
X Recovery less than lower limit

Number of non-compliant surrogate recoveries noted in ( ).

Internal Standards:
1 – 1,4-Dichlorobenzene-d4
2 – Naphthalene-d8
3 – Acenaphthene-d10
4 – Phenanthrene-d10
5 – Chrysene-d12
6 – Perylene-d12

(L) indicates a low performance.
(H) indicates a high performance.

The following compound was detected in the solid method blank:

Compound	Maximum Concentration	Blank Action Level
Nitrocellulose	0.91 mg/kg	4.55 mg/kg

Sample aliquot, and dilution factors were taken into consideration when applying the blank action levels. Positive results for nitrocellulose below the blank action level were qualified as non-detected, (B).

Notes

The semivolatile initial calibration performed on October 19 between 13:26 and 15:54 exceeded the 30% RSD quality control criteria (but was <50%) for 4-chloroaniline. No action was taken because all results are non-detected.

The semivolatile initial calibration performed on October 29 between 14:59 and 17:57 exceeded the 30% RSD quality control criteria (but was <50%) for pentachlorophenol. No action was taken because all results are non-detected.

The semivolatile continuing calibration performed on October 22 at 11:18 exceeded the 25% RSD quality control criteria (but was <50%) for diethyl phthalate, di-n-butyl phthalate, pyrene, di-n-octyl phthalate, and benzo(g,h,I)perylene. No action was taken because all associated results are non-detected.

The semivolatile continuing calibration performed on October 26 at 17:41 exceeded the 25% RSD quality control criteria (but was <50%) for 4,6-dinitro-2-methylphenol. No action was taken because all associated results are non-detected.

The semivolatile continuing calibration performed on October 29 at 19:53 exceeded the 25% RSD quality control criteria (but was <50%) for 4-chloroaniline. No action was taken because all associated results are non-detected.

The semivolatile continuing calibration performed on October 30 at 11:10 exceeded the 25% RSD quality control criteria (but was <50%) for 4-chloroaniline, 2,4-dinitrophenol, and pyrene. No action was taken because all associated results are non-detected.

The semivolatile continuing calibration performed on October 31 at 12:45 exceeded the 25% RSD quality control criteria (but was <50%) for 4-chloroaniline, 2,4-dinitrophenol, and 2,4,6-tribromophenol. No action was taken because all associated results are non-detected.

Samples MTCCT00301, MTCCT00403, MTCFS001, MTCFS003, MTCFS005, MTCGS002, and MTCLB00401 had a positive result for 4-methylphenol over the linear calibration range for the instrument. Sample MTCCT00403 also had a positive result for bis(2-ethylhexyl)phthalate over the linear calibration range for the instrument. The sample was re-analyzed at a dilution. The diluted results were transposed to the undiluted analysis and used for validation.

Samples MTCCT00401, MTCLB001, MTCFS005, MTCSS004, and MTCCT006 had a positive result for 4-methylphenol over the linear calibration range for the instrument. The sample was re-analyzed at a dilution. The diluted results for 4-methylphenol were transposed to the undiluted analysis and used for validation. The undiluted analysis of MTCCT00401 was <10% for two internal standards (4,5). The undiluted analyses of MTCCT006 MTCLB001, and MTCFS005 were <10% for two internal standards (5,6). The undiluted analyses of MTCSS004 was <10% for three internal standards (3,4,5). The results from the diluted analyses were transposed to the undiluted analyses for all analytes associated with the <10% internal standards and used for validation. This is the reason some analytes have elevated reporting limits. Sample MTCCT006 also had six surrogates diluted out in the re-analysis.

All samples contained several tentatively identified compounds in the semivolatiles fraction.

The EDD showed the results from the original analyses twice for the semivolatiles and Pest/PCB fractions. The re-analyzed or diluted sample results were not shown on the EDD. The results shown on the Form I's for the re-analyzed or diluted samples were transposed to the appropriate areas on the EDD. The EDD for the explosives fraction showed a result of zero in place of the laboratories reporting limit. The laboratories reporting limits were transposed to the EDD from the Form I's.

Sample MTCCT00301 exceeded the linear calibration range of the instrument for 4,4'-DDE. The sample was analyzed at a dilution. The result from the diluted analysis was transposed to the undiluted analysis on the EDD.

The extraction of sample MTCGS002 for pesticides used only 15g of tissue. This resulted in elevated reporting limits for this sample.

The MS/MSD analyzed on sample MTCLB005 exceeded method parameters for 4-amino-2,6-dinitrotoluene, tetryl, 1,3,5-trinitrobenzene, and 1,2,4-trinitrotoluene indicating matrix interference. The MS/MSD analyzed on sample MTCGS002 exceeded method parameters for HMX and tetryl indicating matrix interference.

The LCS for nitroguanidine exceeded the % recovery quality control criteria.

Executive Summary

Laboratory Performance: Qualifications were made based on calibrations, %D between columns for PEST/PCBs, holding time noncompliance, and internal standard noncompliance.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to U.S. EPA National Functional Guidelines for Data Validation as modified by EPA Region III (9/94) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Bernard F Spada III
Tetra Tech NUS

Bernard F Spada III
Chemist/Data Validator

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**MARCH 19, 2002**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS, CYANIDE AND PERCHLORATE**
CTO 803 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – 81977

SAMPLES: 33/Tissue/

MTCCT00101	MTCCT00102	MTCCT00301
MTCCT00302	MTCCT00401	MTCCT00402
MTCCT00403	MTCCT005	MTCCT006
MTCFS001	MTCFS002	MTCFS003
MTCFS004	MTCFS005	MTCFS006
MTCGS002	MTCGS003	MTCLB001
MTCLB00201	MTCLB00202	MTCLB00203
MTCLB003	MTCLB00401	MTCLB00402
MTCLB005	MTCLB006	MTCSS001
MTCSS004	MTCSS005	MTCSS006
NJCFS007	NJCMC007	NJCWP007

Overview

The sample set for CTO 803, NSWC Indian Head, SDG 81977, consists of thirty-three (33) tissue environmental samples.

All samples were analyzed for target analyte list (TAL) metals, cyanide and perchlorate. The samples were collected by Tetra Tech NUS on September 6-9, 2001 and analyzed by Mitkem Corporation under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. Metals and cyanide analyses were conducted using Contract Laboratory Program (CLP) method ILM04.1. Analyses for perchlorate were conducted using EPA method 314.0.

Metals analyses, with the exception of mercury were conducted using Inductively Coupled Plasma (ICP) instrumentation. Mercury analyses were conducted using Cold Vapor Atomic Absorption (CVAA) instrumentation.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data. The data review was based on data completeness, holding times, calibration data, laboratory method/preparation blanks, ICP interference check sample results, matrix spike results, laboratory duplicate results, laboratory control sample (LCS) results, ICP serial dilution results, detection limits and analyte quantitation.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) percent recoveries for manganese, nickel, thallium and zinc were >110% quality control limit, affecting all samples. Positive results greater than two times the CRDL reported for manganese were qualified as biased high, "K" or estimated, "J" due to conflicting noncompliances. No validation action was required for nickel, thallium or zinc because the results were either reported by the laboratory as nondetected, qualified "B" due to laboratory blank contamination or were greater than two times the CRDL.

- The CRDL percent recoveries for antimony, arsenic, chromium, cobalt and lead were >110% quality control limit, affecting the samples from preparation batch 81977A (see Notes section). Positive results reported for arsenic and chromium in the affected samples were qualified as biased high, "K". No validation action was required for antimony, cobalt or lead because the results were either reported by the laboratory as nondetected, qualified "B" due to laboratory blank contamination or were greater than two times the CRDL.

- The CRDL percent recovery for cadmium was >110% quality control limit, affecting samples MTCCT005, MTCSS005 and NJCWP007. Positive results reported for cadmium in the affected samples were qualified as biased high, "K".

- The CRDL percent recoveries for selenium were both above and below the 90-110% quality control limits, affecting samples MTCLB005, MTCCT005, MTCFS005, MTCCT006, MTCFS006, NJCFS007, NJCWP007, NJCMC007, MTCLB006 and MTCSS006. Nondetected results reported for selenium in the affected samples were qualified as estimated, "UJ", due to conflicting directional bias.

- The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations :

Samples Affected: All samples in preparation batch 81977A.

Analyte	Maximum Concentration	Action Level
Antimony	4.6 µg/L	4.6 mg/kg
Barium[1]	0.064 mg/kg	0.32 mg/kg
Chromium[1]	0.132 mg/kg	0.66 mg/kg
Cobalt	1.0 µg/L	1.0 mg/kg
Copper	2.8 µg/L	2.8 mg/kg
Iron	7.6 µg/L	7.6 mg/kg
Lead	1.2 µg/L	1.2 mg/kg
Magnesium	98.1 µg/L	98.1 mg/kg
Manganese[1]	0.076 mg/kg	0.38 mg/kg
Nickel	1.0 µg/L	1.0 mg/kg
Selenium	4.6 µg/L	4.6 mg/kg
Silver	1.8 µg/L	1.8 mg/kg
Zinc	8.1 µg/L	8.1 mg/kg

[1] Maximum concentration present in a laboratory preparation blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the action level reported for all of the above analytes except magnesium and manganese were qualified, "B", as a result of blank contamination.

Samples Affected: All samples in preparation batch 81977B.

Analyte	Maximum Concentration	Action Level
Aluminum	7.54 µg/L	7.54 mg/kg
Antimony	3.7 µg/L	3.7 mg/kg
Barium	0.70 µg/L	0.70mg/kg
Chromium[1]	0.208 mg/kg	1.04 mg/kg
Cobalt	1.0 µg/L	1.0 mg/kg
Copper	3.0 µg/L	3.0 mg/kg
Iron[1]	1.784 mg/kg	8.92 mg/kg
Magnesium	115.7 µg/L	115.7 mg/kg
Manganese[1]	0.122 mg/kg	0.61 mg/kg
Nickel	1.0 µg/L	1.0 mg/kg
Thallium	5.2 µg/L	5.2 mg/kg
Zinc[1]	1.682 mg/kg	8.41 mg/kg

[1] Maximum concentration present in a laboratory preparation blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the action level reported for all of the above analytes except antimony, magnesium, potassium and thallium were qualified, "B", as a result of blank contamination.

- The interfering analyte iron was present in sample MTCLB006 at a concentration that was comparable to the level of iron in the Interference Check Sample (ICS) solution. Several analytes namely antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, nickel, potassium, silver, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the absolute value of the Instrument Detection Limit (IDL). Interference affects exist for barium and vanadium in the affected sample. The positive result reported for barium was qualified as biased high, "K". The nondetected result reported for vanadium was qualified as biased low, "UL".

- The ICP Serial Dilution Percent Differences (%Ds) for iron, manganese, potassium and zinc were >10% quality control limit, affecting the samples in preparation batch 81977B (see Notes section). Positive results reported for these analytes were qualified as estimated, "J" in the affected samples. A direction of bias could not be determined.

Notes

Because the samples were frozen tissue samples, typical holding times did not apply.

The CRDL percent recovery for selenium was >110% quality control limit, affecting the samples from preparation batch 81977B (see below) and samples MTCCT00101, MTCCT00102, MTCLB001, MTCFS002, MTCFS001, MTCSS001, MTCLB00201, MTCLB00202 and MTCLB00203. No validation action was required because the results were either reported by the laboratory as nondetected, qualified "B" due to laboratory blank contamination or were greater than two times the CRDL.

The CRDL percent recovery for copper was >110% quality control limit, affecting samples MTCGS002, MTCFS003, MTCLB003, MTCCT00301, MTCCT00302, MTCLB00401, MTCGS003, MTCFS004, MTCCT00401, MTCCT00402 and MTCCT00403. No validation action was required because the results were either reported by the laboratory as nondetected, qualified "B" due to laboratory blank contamination or were greater than two times the CRDL.

The CRDL percent recovery for lead was >110% quality control limit, affecting samples MTCLB00402 and MTCSS004. No validation action was required because the results were either reported by the laboratory as nondetected, qualified "B" due to laboratory blank contamination or were greater than two times the CRDL.

The samples were prepared in two different preparation batches. The samples in preparation batch 81977A are: MTCLB005, MTCCT005, MTCSS005, MTCFS005, MTCCT006, MTCFS006, NJCFS007, NJCWP007, NJCMC007, MTCLB006, MTCSS006, MTCCT00101, MTCCT00102, MTCLB001, MTCFS002, MTCFS001, MTCSS001, MTCLB00201, MTCLB00202 and MTCLB00203. The samples in preparation batch 81977B are: MTCGS002, MTCFS003, MTCLB003, MTCCT00301, MTCCT00302, MTCLB00401, MTCGS003, MTCFS004, MTCCT00401, MTCCT00402, MTCCT00403, MTCLB00402 and MTCSS004.

Executive Summary

Laboratory Performance: Arsenic, cadmium, chromium, manganese, selenium and silver were qualified due to calibration noncompliance. Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: Iron, manganese, potassium and zinc were qualified due to ICP serial dilution noncompliance. The interfering analyte iron was present in sample MTCLB006.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Chemical Data Quality Manual" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M Faust

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

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Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
K	-	Positive result is considered biased high, "K", as a result of technical noncompliances.
UL	-	Nondetected result is considered biased low, "UL", as a result of technical noncompliances.
UJ	-	Nondetected result is considered estimated, "UJ", as a result of technical noncompliances.
J	-	Positive result is considered estimated, "J", as a result of technical noncompliances.

APPENDIX B-6

DATA EVALUATION REPORT

DATA QUALITY REVIEW

Various data quality control measures were implemented during the field investigation performed for Mattawoman Creek Study at NSWC Indian Head, Maryland (September, 2001). These quality measures were conducted to help ensure that the resultant data were suitable for their intended uses. A brief summary of the measures is provided in this report. Section 1.0 contains a summary of the Data Quality Indicators (DQIs) and an evaluation of analytical sensitivity versus the human health and ecological criteria used to select chemicals of potential concern for risk assessment. Field Quality Control Samples are discussed in Section 2.0. A summary of the data validation procedures and the results of the data validation process appear in Section 3.0. Section 4.0 addresses the benthic macroinvertebrate community analyses. Sediment toxicity tests are evaluated and discussed in Section 5.0.

Samples were collected and analyzed from the following media: sediment, surface waters, fish tissue and vegetation tissue. Sediment samples were analyzed for target compound list (TCL) semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), TCL pesticides (Pest) and polychlorinated biphenyls (PCBs), target analyte list (TAL) metals and cyanide, explosives (Exp), acid volatile sulfides and simultaneously extracted metals (AVS/SEM) and total organic carbon (TOC). Surface water samples were analyzed for TCL SVOCs, TCL VOCs, TCL Pest/PCBs, total and dissolved TAL metals, cyanide, explosives, chloride, fluoride, hardness, nitrate, nitrite, perchlorate, pH, sulfate, total dissolved solids (TDS), TOC and total suspended solids (TSS). Fish tissue samples were analyzed for TCL SVOCs, TCL Pest/PCBs, TAL metals, cyanide, explosives and perchlorate. Vegetation tissue samples were analyzed for TCL Pest/PCBs and TAL metals only.

1.0 DATA QUALITY INDICATORS

DQIs are parameters that are monitored to establish the quality of data generated during an investigation. Some of the DQIs are generated from analysis of field samples (e.g., from field duplicates) while others result from the analysis of laboratory samples (e.g., laboratory duplicates). Individually, field and laboratory DQIs provide measures of the performance of the respective investigative operations (field or laboratory). Taken together, the DQIs provide a measure of the overall project performance. An overall evaluation of DQIs may also be used to improve the investigative process by identifying where in the process major uncertainties or biases are occurring.

1.1 Precision

Precision is a measure of the degree to which two or more measurements are in agreement and describes the reproducibility of measurements of the same parameter for samples analyzed under similar conditions.

Precision is expressed as a Relative Percent Difference (RPD), which is defined as the ratio of the range to the mean. RPDs, which are typically expressed as percentages, are used to evaluate both field and laboratory duplicate precision and are calculated as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference
V1, V2 = two results obtained by analyzing duplicate samples

Field precision is assessed by collecting and measuring field duplicates at a rate of 1 duplicate per 10 environmental samples. This precision estimate encompasses the combined uncertainty associated with sample collection, homogenization, splitting, handling, laboratory and field storage (as applicable), preparation for analysis, and analysis. In contrast, precision estimates obtained from analyzing duplicate laboratory samples incorporate only homogenization, subsampling, preparation for analysis, laboratory storage (if applicable), and analysis uncertainties.

Laboratory precision QC samples [i.e., laboratory duplicates for inorganic chemicals and matrix spike duplicates (MSDs) for organic chemicals] will be analyzed with a minimum frequency of 5 percent (i.e., 1 QC sample per 20 environmental samples). Laboratory precision is measured by comparing RPD values to precision control limits specified in the applicable analytical standard operating procedures (SOPs).

The precision objectives for parameters are specified in the associated analytical protocols. General precision objectives such as ± 50 percent for solid matrices and ± 30 percent for aqueous matrices were employed for this project for field duplicates while precision objectives were ± 35 percent for solid matrices and ± 20 percent for aqueous matrices for laboratory duplicates. Table 1-1 shows the percentage of the entire data set (by matrix and parameter) that was judged during data validation to have not met the precision objectives noted above. A 0% qualification rate indicates that no data were qualified due to duplicate imprecision.

Table 1-1 - Rates of Qualification (Estimations) for Laboratory and Field Duplicate Precision

	SVOCs	VOCs	Pest/ PCBs	Metals & CN[1]	Metals (filtered)	Exp.	AVS/ SEM	Misc.[2]
	Sediment							
Lab Duplicate Imprecision	0%	0%	0%	4.4%	NA	0%	13.5%	0%
Field Duplicate Imprecision	<1%	<1%	0%	3.1%	NA	0%	5.6%	17%
	Surface Water							
Lab Duplicate Imprecision	0%	0%	0%	0%	0%	0%	NA	<1%
Field Duplicate Imprecision	0%	0%	0%	0%	0%	0%	NA	0%
	Fish Tissue							
Lab Duplicate Imprecision	0%	NA	0%	0%	NA	0%	NA	0%
Field Duplicate Imprecision	0%	NA	0%	0%	NA	0%	NA	0%
	Vegetation Tissue							
Lab Duplicate Imprecision	NA	NA	0%	7.5%	NA	NA	NA	NA
Field Duplicate Imprecision	NA	NA	0%	3.1%	NA	NA	NA	NA
	Field Quality Control Blanks							
Lab Duplicate Imprecision	NA	NA	NA	NA	NA	NA	NA	NA
Field Duplicate Imprecision	NA	NA	NA	NA	NA	NA	NA	NA

[1] Cyanide was not analyzed for in vegetation tissue.

[2] Miscellaneous parameters consist of TOC in the sediment samples; chloride, fluoride, hardness, nitrate, nitrite, perchlorate, pH, sulfate, TDS, TOC and TSS in the surface water samples; and perchlorate in the fish tissue samples.

Five (5) field duplicates were collected for 41 sediment samples. Eight (8) field duplicates were collected for 73 surface water samples. Therefore, the 10 percent frequency criterion was achieved. True field duplicates could not be collected for fish and vegetation tissue due to the nature of the samples. Instead, the laboratory duplicate serves as the indicator to measure precision in the tissue samples. Laboratory and field duplicates were not performed on the field quality control blanks.

In general, qualification due to imprecision was not a significant cause of data qualification and does not impact the usability of the data, as depicted in Table 1-1 above. The higher rates of qualification for AVS/SEM (13.5%) and TOC (17%) in the sediment samples are due to the non-homogeneous nature of the sediment, which makes it more difficult to obtain reproducible results upon multiple attempts. Qualifications due to laboratory or field duplicate imprecision are limited to estimated results and are considered to be suitable for decision-making purposes. No data rejections resulted from laboratory or field duplicate imprecision.

Analytical sensitivity is also a measure of data quality. Consequently, Section 1.6 contains an evaluation of the data with regard to the ability of the selected analytical methods to achieve desired detection limits, specifically detection limits that are equal to or less than human and ecological criteria.

1.2 Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. This parameter is assessed by measuring spiked samples [e.g., surrogate spikes or matrix spikes (MSs)] or well-characterized samples of certified analyte concentrations (e.g., laboratory control samples) and by measuring blanks. Accuracy measurements are designed to detect biases resulting from sample handling and analysis.

Accuracy requirements for field measurements are typically ensured through control over the sample collection and handling, and through routine instrument calibration. Accuracy is also typically monitored through the use of blanks to detect cross-contamination and by monitoring adherence to procedures that prevent sample contamination or degradation. Equipment rinsate blanks were collected for this investigation to assess cross-contamination via sample collection equipment. Source water blanks were collected to monitor the purity of water used to decontaminate sampling equipment. Accuracy was also measured qualitatively through adherence to all sample handling, preservation, and holding time requirements.

Accuracy in the laboratory is measured through the comparison of a spiked sample or laboratory control sample (LCS) result to a known or calculated value and is expressed as a percent recovery (%R). It is also assessed by monitoring the analytical recovery of select surrogate compounds added to samples that are analyzed by organic chromatographic methods. MS and surrogate compound analyses measure the combined accuracy effects of the sample matrix, sample preparation, and sample measurement. LCSs are used to assess the accuracy of laboratory operations with minimal sample matrix effects. Spiking concentrations shall equal or approximate the default concentrations detailed in the applicable sample preparation or analysis SOPs. LCS and MS analyses were performed at a frequency no less than 1 per 20 associated samples of like matrix as required by the QAPP. Laboratory accuracy is assessed by comparing calculated %R values to accuracy control limits specified in the applicable laboratory SOP.

Percent recovery is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where %R = percent recovery
Ss = result of spiked sample
So = result of non-spiked sample
S = concentration of spiked amount.

In general, a percent recovery range of 75 to 125 defines the accuracy objective for the analytical data. It should be noted, however, that the analytical laboratory establishes analyte-specific percent recoveries.

Table 1-2 depicts the qualification rates (i.e., the percentage of data, judged during data validation to have not met the accuracy objectives) for MS, LCS, surrogate, and internal standard recoveries. A 0% qualification rate indicates that no data were qualified due to noncompliances in the accuracy measurements listed below. No matrix spikes were performed on the field quality control blanks.

Table 1-2 - Rates of Qualification (Estimations and/or Rejections) for Surrogate, Matrix Spike, LCS and Internal Standard Recoveries

	SVOCs	VOCs	Pest/ PCBs	Metals & CN[1]	Metals (filtered)	Exp.	AVS/ SEM	Misc.[2]
	Sediment							
Matrix Spike Recovery	0%	0%	0%	4.4%[3]	NA	0%	5.6%	0%
LCS Recovery	0%	0%	0%	<1%	NA	0%	0%	0%
Surrogate Recovery	0%	0%	0%	NA	NA	0%	0%	0%
Internal Standard Recovery	<1%	0%	NA	NA	NA	NA	NA	NA
	Surface Water							
Matrix Spike Recovery	0%	0%	0%	0%	0%	0%	NA	0%
LCS Recovery	0%	0%	0%	0%	0%	0%	NA	0%
Surrogate Recovery	2.1%	0%	0%	NA	NA	0%	NA	0%
Internal Standard Recovery	<1%	0%	NA	NA	NA	NA	NA	NA
	Fish Tissue							
Matrix Spike Recovery	0%	NA	0%	0%	NA	0%	NA	0%
LCS Recovery	0%	NA	0%	0%	NA	0%	NA	0%
Surrogate Recovery	0%	NA	0%	NA	NA	0%	NA	0%
Internal Standard Recovery	36.4%[4]	NA	NA	NA	NA	NA	NA	NA
	Vegetation Tissue							
Matrix Spike Recovery	NA	NA	0%	5%[3]	NA	NA	NA	NA
LCS Recovery	NA	NA	0%	0%	NA	NA	NA	NA
Surrogate Recovery	NA	NA	0%	NA	NA	NA	NA	NA
Internal Standard Recovery	NA	NA	NA	NA	NA	NA	NA	NA
	Field Quality Control Blanks							
Matrix Spike Recovery	NA	NA	NA	NA	NA	NA	NA	NA
LCS Recovery	0%	0%	0%	0%	0%	0%	NA	0%
Surrogate Recovery	<1%[5]	0%	0%	NA	NA	0%	NA	NA
Internal Standard Recovery	0%	0%	NA	NA	NA	NA	NA	NA

[1] Cyanide was not analyzed for in vegetation tissue.

[2] Miscellaneous parameters consist of TOC in the sediment samples; chloride, fluoride, hardness, nitrate, nitrite, perchlorate, pH, sulfate, TDS, TOC and TSS in the surface water samples; and perchlorate in the fish tissue samples.

Shaded cells in the above table represent data that were qualified as estimated and/or rejected and are addressed individually below.

[3] Mercury and selenium in the metals matrix were the only two analytes qualified as rejected in the sediment and vegetation matrices due to matrix spike noncompliance. Of the 4.4% of qualified data in the sediment matrix, 1.4% was qualified as rejected while 3.2% was qualified as estimated. Of the 5% of qualified data in the vegetation matrix,

3.7% was qualified as rejected while 1.2% was qualified as estimated. These rates of qualification are not significant and did not impact the usability of the data.

(4) The last paragraph of this section addresses the issues associated with the internal standard noncompliance for the SVOC fraction in the fish tissue samples.

(5) Only one result (phenol in sample FB001) out of a total of 280 was qualified for SVOCs in the field quality control blanks due to surrogate recovery noncompliance. This noncompliance was severe enough to warrant a rejection of the result; however, this one rejected result was not a significant cause of data qualification and does not impact the usability of the data.

Rates of qualification > 10% represent a significant cause of data qualification and could possibly impact the usability of the data. For this reason, rates of qualification > 10% are discussed individually. The percentage of SVOC fish tissue data qualified as estimated or rejected due to internal standard recovery from Table 1-2 above is 36.4%. This is most likely due to the differences between the tissue matrix and the matrix of the calibration standards used by the laboratory. The matrix of the calibration standards used by the laboratory cannot be made to match every possible variation of sample matrix available; therefore, qualifications due to differences in matrices are to be expected. While the rate of qualification for this data quality indicator is high (36.4%), only 1.7% of the results were qualified as rejected. The remaining 34.8% were qualified as estimated and are considered to be suitable for decision-making purposes.

1.3 Completeness

Completeness is a measure of the amount of usable, valid analytical data obtained compared to the amount expected to be obtained. Completeness is expressed as a percentage.

Field completeness is a measure of the amount of valid field measurements obtained from all the field measurements taken in the project. A completeness criterion of 100 percent applies to these measurements.

Laboratory completeness is a measure of the amount of usable, valid laboratory measurements per matrix obtained for each target analyte. Usable, valid results are those that are judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or data assessment. Completeness is typically expressed as a percentage and is determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness
V = number of results determined to be valid
T = Total number of results

Under ideal conditions, the laboratory completeness objective would be 100 percent. However, samples can be rendered unusable during shipping and preparation (e.g., bottles broken or extracts accidentally destroyed) or analysis (e.g., loss of instrument sensitivity, strong matrix effects). Laboratory completeness objectives are 90% for sediment, surface water, fish tissue and vegetation tissue. Table 1-3 depicts the percent completeness (i.e., the percentage of usable, valid, analytical data) for the different matrices.

Table 1-3 – Percent Completeness

	SVOCs	VOCs	Pest/PCBs	Metals & CN[1]	Metals (filtered)	Exp.	AVS/SEM	Misc.[2]
	Sediment							
Total Data Points	2232	1764	1008	864	NA	612	252	36
Rejected Data Points	0	0	0	12	NA	0	0	0
% Completeness	100%	100%	100%	98.6%	NA	100%	100%	100%
	Surface Water							
Total Data Points	2016	1470	1008	864	828	612	NA	392
Rejected Data Points	0	104	1	0	0	0	NA	12
% Completeness	100%	92.9%	99.9%	100%	100%	100%	NA	96.9%
	Fish Tissue							
Total Data Points	2046	NA	924	792	NA	561	NA	33
Rejected Data Points	56	NA	23	0	NA	0	NA	0
% Completeness	97.3%	NA	97.5%	100%	NA	100%	NA	100%
	Vegetation Tissue							
Total Data Points	NA	NA	196	161	NA	NA	NA	NA
Rejected Data Points	NA	NA	0	6	NA	NA	NA	NA
% Completeness	NA	NA	100%	96.3%	NA	NA	NA	NA
	Field Quality Control Blanks							
Total Data Points	280	336	140	120	115	85	NA	55
Rejected Data Points	1	20	0	0	0	0	NA	2
% Completeness	99.6%	94%	100%	100%	100%	100%	NA	96.4%

(1) Cyanide was not analyzed for in vegetation tissue.

(2) Miscellaneous parameters consist of TOC in the sediment samples; chloride, fluoride, hardness, nitrate, nitrite, perchlorate, pH, sulfate, TDS, TOC and TSS in the surface water samples; and perchlorate in the fish tissue samples.

The calculated percent completeness for laboratory analytical data collected during the field investigation is >90% for all analytes in all matrices sampled; therefore, the data completeness objectives for the project were achieved.

As mentioned above, laboratory completeness is a measure of the amount of usable, valid laboratory data obtained for each target analyte. Usable, valid results are those that are judged, after data assessment, to represent the sampling populations and to have not been disqualified for use through data validation or data assessment. Unusable or rejected results are considered invalid and are not used for decision-making purposes unless they are used in a qualitative way and the use is justified and documented. Table 1-4 depicts the results (by sample and parameter) that were judged as unusable during data validation, along with the reasons for disqualification of the results.

Table 1-4 – Rejected Results

Sample	Parameter	Basis for Rejection
MTCSD02601	MERCURY	Matrix Spike Percent Recovery < 30%
MTCSDFD001	MERCURY	Matrix Spike Percent Recovery < 30%
MTCSD02601	SELENIUM	Matrix Spike Percent Recovery < 30%
MTCSDFD001	SELENIUM	Matrix Spike Percent Recovery < 30%
MTCSD02701	MERCURY	Matrix Spike Percent Recovery < 30%
MTCSD02801	MERCURY	Matrix Spike Percent Recovery < 30%
MTCSD02701	SELENIUM	Matrix Spike Percent Recovery < 30%

Sample	Parameter	Basis for Rejection
MTCSD02801	SELENIUM	Matrix Spike Percent Recovery < 30%
NJCSD00101	MERCURY	Matrix Spike Percent Recovery < 30%
NJCSD00201	MERCURY	Matrix Spike Percent Recovery < 30%
NJCSD00101	SELENIUM	Matrix Spike Percent Recovery < 30%
NJCSD00201	SELENIUM	Matrix Spike Percent Recovery < 30%
MTCSW00101	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00101	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00101	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00201	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00201	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00201	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00301	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00301	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00301	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00401	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00401	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00401	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00501	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00501	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00501	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00601	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00601	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00601	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00701	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00701	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00701	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00801	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00801	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00901	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00901	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW00901	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01001	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01001	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01001	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01101	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01101	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01101	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01201	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01201	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01201	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01301	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01301	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01301	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01401	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01401	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01401	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01501	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01501	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01501	ACETONE	Calibration RRF < 0.05 Quality Control Limit

Sample	Parameter	Basis for Rejection
MTCSW01601	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01601	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01601	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01701	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01701	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01701	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01801	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01801	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01801	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01901	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01901	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW01901	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02001	NITRATE	Holding Time Noncompliance
MTCSW02001	NITRITE	Holding Time Noncompliance
MTCSW02001	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02001	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02001	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02101	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02101	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02101	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02201	NITRATE	Holding Time Noncompliance
MTCSW02201	NITRITE	Holding Time Noncompliance
MTCSW02201	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02201	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02201	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02301	NITRATE	Holding Time Noncompliance
MTCSW02301	NITRITE	Holding Time Noncompliance
MTCSW02301	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02301	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02301	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02401	NITRATE	Holding Time Noncompliance
MTCSW02401	NITRITE	Holding Time Noncompliance
MTCSW02401	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02401	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02401	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02501	NITRATE	Holding Time Noncompliance
MTCSW02501	NITRITE	Holding Time Noncompliance
MTCSW02501	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02501	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02501	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02601	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02601	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02601	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02701	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02701	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02701	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02801	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02801	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02801	ACETONE	Calibration RRF < 0.05 Quality Control Limit

Sample	Parameter	Basis for Rejection
MTCSW02901	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02901	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW02901	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW03001	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSW03001	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSW03001	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD001	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD001	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD001	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD002	NITRATE	Holding Time Noncompliance
MTCSWFD002	NITRITE	Holding Time Noncompliance
MTCSWFD002	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD002	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD002	ACETONE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD003	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD003	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
MTCSWFD003	ACETONE	Calibration RRF < 0.05 Quality Control Limit
NJCSW00101	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
NJCSW00101	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
NJCSW00101	ACETONE	Calibration RRF < 0.05 Quality Control Limit
NJCSW00201	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
NJCSW00201	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
NJCSW00201	ACETONE	Calibration RRF < 0.05 Quality Control Limit
NJCSW00201	HEPTACHLOR EPOXIDE	% Difference Between Positive Results >100%
MTCCT00101	3,3'-DICHLOROBENZIDINE	Internal Standard Area < -25%
MTCCT00101	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCCT00101	4-CHLOROANILINE	Internal Standard Area < -25%
MTCCT00101	BENZO(A)ANTHRACENE	Internal Standard Area < -25%
MTCCT00101	BUTYL BENZYL PHTHALATE	Internal Standard Area < -25%
MTCCT00101	CHRYSENE	Internal Standard Area < -25%
MTCCT00101	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCCT00101	PENTACHLOROPHENOL	Internal Standard Area < -25%
MTCCT00101	PYRENE	Internal Standard Area < -25%
MTCCT00101	ALPHA-CHLORDANE	% Difference Between Positive Results >100%
MTCCT00101	ENDOSULFAN SULFATE	% Difference Between Positive Results >100%
MTCCT00101	ENDRIN ALDEHYDE	% Difference Between Positive Results >100%
MTCCT00102	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCCT00102	4-CHLOROANILINE	Internal Standard Area < -25%
MTCCT00102	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCCT00102	PENTACHLOROPHENOL	Internal Standard Area < -25%
MTCCT00102	ALPHA-CHLORDANE	% Difference Between Positive Results >100%
MTCCT00102	DIELDRIN	% Difference Between Positive Results >100%
MTCCT00102	ENDOSULFAN SULFATE	% Difference Between Positive Results >100%
MTCCT00102	ENDRIN ALDEHYDE	% Difference Between Positive Results >100%
MTCCT00301	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCCT00301	4,4'-DDD	% Difference Between Positive Results >100%
MTCCT00301	ALPHA-CHLORDANE	% Difference Between Positive Results >100%
MTCCT00301	ENDOSULFAN SULFATE	% Difference Between Positive Results >100%
MTCCT00301	ENDRIN ALDEHYDE	% Difference Between Positive Results >100%

Sample	Parameter	Basis for Rejection
MTCCT00301	HEPTACHLOR EPOXIDE	% Difference Between Positive Results >100%
MTCCT00302	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCCT00302	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCCT00302	ALPHA-CHLORDANE	% Difference Between Positive Results >100%
MTCCT00302	ENDOSULFAN SULFATE	% Difference Between Positive Results >100%
MTCCT00302	ENDRIN ALDEHYDE	% Difference Between Positive Results >100%
MTCCT00302	GAMMA-CHLORDANE	% Difference Between Positive Results >100%
MTCCT00401	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCCT00401	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCCT00401	ENDOSULFAN SULFATE	% Difference Between Positive Results >100%
MTCCT00402	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCCT00402	4,4'-DDD	% Difference Between Positive Results >100%
MTCCT00402	ENDOSULFAN SULFATE	% Difference Between Positive Results >100%
MTCCT00402	ENDRIN ALDEHYDE	% Difference Between Positive Results >100%
MTCCT00402	GAMMA-CHLORDANE	% Difference Between Positive Results >100%
MTCCT00403	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCFS001	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCFS001	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCFS002	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCFS003	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCFS004	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCFS004	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCFS006	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCFS006	4-CHLOROANILINE	Internal Standard Area < -25%
MTCGS002	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCGS003	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCGS003	ALPHA-CHLORDANE	% Difference Between Positive Results >100%
MTCGS003	HEPTACHLOR EPOXIDE	% Difference Between Positive Results >100%
MTCLB00201	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCLB00201	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCLB00201	PENTACHLOROPHENOL	Internal Standard Area < -25%
MTCLB00202	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCLB00202	4-CHLOROANILINE	Internal Standard Area < -25%
MTCLB00202	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCLB00202	PENTACHLOROPHENOL	Internal Standard Area < -25%
MTCLB003	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCLB003	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCLB003	PENTACHLOROPHENOL	Internal Standard Area < -25%
MTCLB00401	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCLB00402	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCLB006	BENZO(A)PYRENE	Internal Standard Area < -25%
MTCLB006	BENZO(B)FLUORANTHENE	Internal Standard Area < -25%
MTCLB006	BENZO(G,H,I)PERYLENE	Internal Standard Area < -25%
MTCLB006	BENZO(K)FLUORANTHENE	Internal Standard Area < -25%
MTCLB006	DI-N-OCTYL PHTHALATE	Internal Standard Area < -25%
MTCLB006	DIBENZO(A,H)ANTHRACENE	Internal Standard Area < -25%
MTCLB006	INDENO(1,2,3-CD)PYRENE	Internal Standard Area < -25%
MTCSS001	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCSS004	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit

Sample	Parameter	Basis for Rejection
MTCSS004	4-CHLOROANILINE	Internal Standard Area < -25%
MTCSS004	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCSS004	PENTACHLOROPHENOL	Internal Standard Area < -25%
MTCSS005	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCSS005	4-CHLOROANILINE	Internal Standard Area < -25%
MTCSS005	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCSS005	PENTACHLOROPHENOL	Internal Standard Area < -25%
MTCSS006	3,3'-DICHLOROBENZIDINE	Internal Standard Area < -25%
MTCSS006	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
MTCSS006	4-CHLOROANILINE	Internal Standard Area < -25%
MTCSS006	BENZO(A)ANTHRACENE	Internal Standard Area < -25%
MTCSS006	BIS(2-ETHYLHEXYL)PHTHALATE	Internal Standard Area < -25%
MTCSS006	BUTYL BENZYL PHTHALATE	Internal Standard Area < -25%
MTCSS006	CHRYSENE	Internal Standard Area < -25%
MTCSS006	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
MTCSS006	PENTACHLOROPHENOL	Internal Standard Area < -25%
MTCSS006	PYRENE	Internal Standard Area < -25%
MTCVG005	MERCURY	Matrix Spike Percent Recovery < 30%
MTCVG005	SELENIUM	Matrix Spike Percent Recovery < 30%
MTCVG006	MERCURY	Matrix Spike Percent Recovery < 30%
MTCVG006	SELENIUM	Matrix Spike Percent Recovery < 30%
NJCFS007	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
NJCFS007	PENTACHLOROPHENOL	Calibration RRF < 0.05 Quality Control Limit
NJCFS007	PENTACHLOROPHENOL	Internal Standard Area < -25%
NJCMC007	4-CHLOROANILINE	Calibration RRF < 0.05 Quality Control Limit
NJCVG007	MERCURY	Matrix Spike Percent Recovery < 30%
NJCVG007	SELENIUM	Matrix Spike Percent Recovery < 30%
FB001	PHENOL	Surrogate Recovery < 10%
FB001	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
FB001	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
FB001	ACETONE	Calibration RRF < 0.05 Quality Control Limit
RB001	NITRATE	Holding Time Noncompliance
RB001	NITRITE	Holding Time Noncompliance
RB001	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
RB002	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
RB002	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
RB003	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
RB003	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
RB003	ACETONE	Calibration RRF < 0.05 Quality Control Limit
RB004	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
RB004	ACETONE	Calibration RRF < 0.05 Quality Control Limit
TB001	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
TB001	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
TB001	ACETONE	Calibration RRF < 0.05 Quality Control Limit
TB002	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
TB002	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit
TB002	ACETONE	Calibration RRF < 0.05 Quality Control Limit
TB004	1,2-DIBROMO-3-CHLOROPROPANE	Calibration RRF < 0.05 Quality Control Limit
TB004	2-BUTANONE	Calibration RRF < 0.05 Quality Control Limit

Sample	Parameter	Basis for Rejection
TB004	ACETONE	Calibration RRF < 0.05 Quality Control Limit

As noted in Table 1-4 above, all of the surface water samples and field quality control blanks had VOC data that were qualified as unusable for 1,2-dibromo-3-chloropropane, 2-butanone and/or acetone due to calibration noncompliance. In addition, all of the fish tissue samples had SVOC data that were qualified as unusable for 4-chloroaniline and/or pentachlorophenol due to calibration noncompliance. The calibration noncompliances were severe enough to leave doubt about the presence of the analyte in the sample entirely and were therefore considered to be unusable for this reason.

1.4 Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., among sampling points and/or among sampling events). This is a key parameter because data will be compared between sampling points (monitoring stations and reference locations) and among sampling events (as part of trend analysis) to make interim decisions. Comparability is achieved by using standardized sampling and analysis methods, as well as data reporting formats. Additionally, consideration is given to seasonal conditions and other environmental variations that could exist to influence data results. Comparability of laboratory measurements will be assessed primarily through the use and documentation of similar sampling and analytical methods. Results will be reported in units to ensure comparability with previous data and with current state and Federal standards and guidelines. Comparability of field data will be satisfied by ensuring that the field sampling plan is followed and that proper sampling techniques are used. It is also dependent on recording field measurements using the correct units. Comparability of laboratory measurements will be assessed primarily through the use of Certified Reference Materials, spike recoveries, and RPD values. Failure to achieve comparability will result in corrective action.

Laboratory data were generated using methodologies specified in the QAPP. Results were also reported in the units as specified in the QAPP. The laboratory analyzed laboratory control samples, matrix and blank spikes; however, these quality control samples were not included in the project database because the request was not made to the laboratory to provide this information. Therefore, comparability between Sample Delivery Groups could not be assessed.

Field data were generated using the methodologies and units as specified in the QAPP. Sampling techniques as described in the Work Plan and field sampling SOPs were followed.

There is a comparability concern associated with the diethyl ether analyses of these samples. The laboratory initially failed to calibrate the instrumentation for diethyl ether and failed to report results for this analyte in any of the samples as requested in the analytical statement of work. The data reviewer contacted the laboratory regarding the omission. In an attempt to provide data for diethyl ether, the laboratory performed a reverse library search for diethyl ether in all volatile samples. The laboratory also analyzed a standard to determine both a retention time and a reporting limit for aqueous and solid samples. The laboratory then provided results for diethyl ether for all volatile samples. The data reviewer used the data for diethyl ether and included the results into the existing volatile fraction database for all samples. Nevertheless, because of the lack of calibration data for each day of analysis and because the manner in which results were reported is similar to the reporting of a Tentatively Identified Compound (TIC), all results reported for diethyl ether were qualified as estimated in all associated samples.

1.5 Representativeness

Representativeness is an expression of the degree to which the data accurately and precisely depict the actual characteristics of a population or environmental condition existing at an individual sampling point and is contingent on a good design for the sampling program. The project planning documents (Work Plan and QAPP) and use of standardized sampling, handling, analytical, and

reporting procedures are designed so that the final data derived are accurate representations of actual site conditions. A number of conditions could arise that cause the representativeness of samples to be questioned. For example, data outliers or samples collected from a place different from the intended location could adversely impact representativeness of the data set.

Surface water, sediment and vegetation samples were collected from the specified locations using sampling, handling, analytical, and reporting procedures as specified in the QAPP. Therefore, no data representativeness concerns have been raised for the surface water, sediment or vegetation data and the data are suitable for use. Proposed species of fish to be collected for the human health and ecological risk assessments were channel catfish and mummichogs, respectively. During sampling, both species were found to be scarce (e.g., only one mummichog sample was collected). Because the target species were not sufficiently abundant, surrogates were selected. White catfish, brown bullhead catfish, largemouth bass and white perch were collected as surrogates for the channel catfish. Pumpkinseed, spot-tailed shiners and golden shiners were collected as surrogates for the mummichogs.

1.6 Analytical Sensitivity

Tables 1-5 through 1-10 provide an evaluation of the sensitivity of the laboratory reporting limits (RLs), method detection limits (MDL), instrument detection limits (IDLs), and the sample quantitation limits (SQLs) to the human health and ecological chemical of potential concern (COPC) criteria for each media sampled in the Mattawoman Creek Study. In some cases, individual sample detection limits (i.e., SQLs) exceed the laboratory MDLs/IDLs due to sample dilutions or percent moisture. Observed exceedances of the laboratory MDL/IDLs as compared to the human health and ecological COPC selection criteria also occur in several instances. However, the analytical methods used for sample analyses were approved EPA methods, are considered appropriate for the media sampled, and are those specified in the planning documents for the project. Additionally, the COPC selection criteria used in the Mattawoman Creek study are very conservative (i.e., low concentrations). For the human health risk assessment, the screening levels utilized conservatively assume a residential land use scenario even though recreational exposure assumptions (which are less stringent than those specified for the residential land use scenario) would be more appropriate for the study area. For the ecological risk assessment, the screening levels used are recommended for COPC selection even though they are not specifically tailored to site conditions and receptors. The ecological COPC screening levels are typically not the thresholds used to make risk management decisions. Consequently, RLs, MDLs/IDLs/SQLs that exceed a COPC selection criterion are not necessarily an indication that analytical sensitivity is inadequate to meet project needs. The following narrative provides a media specific discussion of the analytical sensitivity issue.

Surface Water Evaluation

Table 1-5 compares RLs and MDLs (or IDLs for inorganics) to the COPC selection criteria used for surface water data collected for the Mattawoman Creek Study. RLs and MDLs [IDLs] were determined on a per method basis. Generally, the RLs are detection limits the laboratory can "comfortably achieve" for a method on a routine basis. (For organic analytes, the RL values are often an order of magnitude greater than the quantitation limits actually achievable by the laboratory.) On the other hand, MDLs [IDLs] represent the lower limit of quantitation. Positive detections between the RL and the MDL (IDL) are reported by the analytical laboratories as estimated ("J") values. Non-detect results for organics are typically reported to the RL. Whereas, non-detect results for inorganics are typically reported to the IDL. However, RLs, MDLs, and IDLs are sometimes adjusted to produce a sample specific quantitation limit (SQL) that reflects factors such as sample dilution or matrix effects. Table 1-6 summarizes the number of times the SQLs reported by the laboratory for Mattawoman Creek samples exceed the COPC selection criteria for human and ecological risk assessment. (The SQLs are the values reported for "non-detect results" by the analytical laboratory.)

As indicated on Tables 1-5 and 1-6, the RLs and SQLs exceed COPC selection criteria for several organic and a few inorganic analytes. However, for most of the highlighted organic analytes, MDLs are similar to or do not exceed COPC selection criteria. In some cases, only a few of the reported SQLs exceeded the COPC selection criteria; this is most likely a consequence of sample dilution or matrix effects. Consequently, the analytical methods (and detection limits achievable) for these organics are generally considered appropriate (sensitive enough) for the ecological and human health risk assessments. Organic compounds with MDLs clearly exceeding the COPC selection criteria and inorganic compounds with IDLs clearly exceeding the COPC selection criteria are discussed in the following items:

- As summarized in the following Table 1-11, MDLs reported for 1,2-dibromoethane, methyl tert-butyl ether, trichloroethene, vinyl chloride, 3,3-dichlorobenzidine, bis(2-chloroethyl)ether, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, carbazole, hexachlorobenzene, indeno(1,2,3-cd)pyrene, n-nitroso-di-n-propylamine, the aroclors, and toxaphene exceed the Region 3 risk-based concentration for tap water (RBC_{tap}) which was used as the COPC selection criteria.

Table 1-11 – Comparison of Risk-Based Concentrations, SQLs, MDLs, and MCLs for Select Organic Chemicals in Surface Water Samples

Parameter	Region 3 RBC_{tap} (ug/L)	Recreational[(1)] RBC (ug/L)	SQLs (ug/L)	MDLs (ug/L)	MCLs/ SDWA Benchmarks (ug/L)
1,2–Dibromoethane	0.00075	0.049	1-10	0.1	NA
Methyl tert-butyl ether	2.6	NC	10	NA	20
Trichloroethene	0.026	4.2	1-10	0.06	5
Vinyl chloride	0.015	2.4	1-10	0.13	2
3,3-Dichlorobenzidine	0.15	2	5-10	1.84	NA
Benzo (a) anthracene	0.092	16	5-10	0.59	NA
Benzo (a) pyrene	0.0092	1.6	5-10	0.56	0.2
Benzo (b) fluoranthene	0.092	16	5-10	0.57	NA
Bis (2-chloroethyl) ether	0.0096	5.4	5-10	0.58	NA
Carbazole	3.3	NC	10	NA	NA
Hexachlorobenzene	0.042	0.052	5-10	0.76	1
Indeno (1,2,3 cd) pyrene	0.092	16	5-10	0.56	NA
N-nitroso-di-n-propylamine	0.0096	1.4	5-10	0.95	NA
Arochlor	0.033	5.7	0.2	0.07-0.23	0.5
Toxaphene	0.061	0.4	1	0.0259	3

(1) The risk-based concentration (RBC) was calculated assuming .05 L/hr, 4 hrs/day, 26 days/yr, 30 yrs (adult), 10 yrs (adolescent), 20,000 cm2 (adult), 12,400 cm2 (adolescent), 70 kg (adult), 43 kg (adolescent).

NC – Not calculated. The values presented for the other PAHs may be used as a surrogate for carbazole. Note that a SDWA benchmark is available for methyl tert-butyl ether.

However, the MDLs achievable for several of these organics are similar to or less than available federal Safe Drinking Water Act (SDWA) maximum contaminant levels (MCLs). Additionally, the

surface water of the Mattawoman Creek study area is not used as domestic water supply source; thus, the MCLs and the RBC_{tap}, used as COPC screening levels for the HHRA, are very conservative criteria for COPC selection. The preceding table also shows COPC screening levels calculated specifically using exposure assumptions reflective of a recreational land use scenario. These recreational risk-based concentrations (RBCs) are based on the dermal and ingestion route of exposure, with the exception of the PAHs and Arochlor, which because of the uncertainty attached to the dermal absorption model for these compounds, are based on the ingestion route of exposure only. The calculated recreational RBCs are at least an order of magnitude greater than the RBC_{tap} presented, with the exception of hexachlorobenzene and toxaphene. With the exception of hexachlorobenzene and toxaphene, the available recreational RBCs are greater than the MDLs. However, the MCLs for hexachlorobenzene and toxaphene exceed the listed MDLs, and 1, 2-dibromoethane is not anticipated to be a significant site-related compound. (Also, pesticides, PCBs, and explosives were not significant contaminants in the SPAWAR confirmation or rapid sediment screening samples.)

- For anthracene, the SQL range reported by the laboratory, the RL, and MDL (5-10 ug/L, 5 ug/L, and 0.7 ug/L) exceed the minimum criteria for ecological receptors (0.1 ug/L). However, the 0.1 ug/L BTAG screening level is based on the protozoan, *Paramecium caudatum*. Because, protozoans are not assessment endpoints, a more appropriate benchmark is the secondary chronic value (SCV) of 0.73 ug/L developed by Suter and Tsao (1996) for the Oak Ridge National Laboratory (ORNL). Although this number is less than the SQL and the RL, it is greater than the MDL of 0.7 ug/L.

- For the Aroclors, the SQL range reported by the laboratory, the RL, and MDL (0.2-0.4 ug/L, 0.2-0.4 ug/L, and 0.032-0.23 ug/L) exceed the minimum criteria for ecological receptors (0.014 ug/L). However, the 0.014 ug/L value for PCBs is based on a tissue residue number, not on risks to aquatic life. Therefore, more appropriate benchmarks are the SCVs for PCBs developed by Suter and Tsao (1996) for the ORNL. These values range from 0.033 ug/L for Aroclor-1254 to 94 ug/L for Aroclor-1260. The SCVs for some of the PCBs are lower than the MDLs. However, PCBs are not very water soluble, so elevated concentrations of these chemicals would not be expected in the water.

- For toxaphene, the SQL range reported by the laboratory, the RL, and MDL for toxaphene (1ug/L, 1ug/L, and 0.0259 ug/L) exceed the minimum criteria for ecological receptors (0.0002 ug/L). The reference listed by the BTAG for the 0.0002 ug/L screening level is the USEPA IRIS, but the cited value could not be located in the IRIS printout. A more appropriate reference would be the ecological toxicity threshold/water quality level (WQL) of 0.011 ug/L (EPA, 1996). Because the SQL, RL, and MDL are still greater than the WQL, it is possible that toxaphene is present between the WQL and the MDL at concentrations that could pose risks to aquatic life. However, it is unlikely that a large number of samples would have toxaphene present in the small range of 0.015 ug/L between the WQL and MDL.

- For arsenic, the SQL range reported by the laboratory, the RL, and the MDL (3.3-4.2 ug/L, 4.2 ug/L, and 4.2 ug/L) exceed the RBC_{tap} (0.045 ug/L). However, the SQL range, the RL, and the MDL are all less than the current SDWA MCL for arsenic (10 ug/L). Thus, any arsenic concentration that was undetected, but was above the RBC_{tap} screening level, would still be below the SDWA MCL for arsenic.

- For mercury, the SQL range reported by the laboratory, the RL, and MDL for mercury (0.1-0.15 ug/L, 0.1 ug/L, and 0.1ug/L) exceed the minimum criteria for ecological

receptors (0.012 ug/L). The reference listed by BTAG for the 0.012 ug/L screening level is the USEPA IRIS, however, the cited value could not be located in the IRIS printout. A more appropriate reference would be the current chronic USEPA Water Quality Criteria (WQC) of 0.77 ug/l for mercury (USEPA, November 2002). The SQL, RL, and MDL are all lower than the WQC.

- For silver, the SQL range reported by the laboratory, the RL, and MDL (0.6-3.1 ug/L, 0.6 ug/L, and 0.6 ug/L) exceed the minimum criteria for ecological receptors (0.0001 ug/L). However, the 0.0001 ug/L BTAG screening level was not referenced, so its source could not be verified. A more appropriate reference would be the SCV of 0.36 ug/L for silver developed by Suter and Tsao (1996). Because the SQL, RL, and MDL are still greater than the SCV it is possible that silver is present between the SCV and the MDL at concentrations that could pose risks to aquatic life. However, it is unlikely that a large number of samples would have silver present in the small range of 0.24 ug/L between the SCV and MDL.

- For thallium, the SQL range reported in the database, the RL, and MDL (2.9-5.3 ug/L, 3.9 ug/L, and 3.9 ug/L) exceed the RBC_{tap} (2.6 ug/L). However, the surface water of the Mattawoman Creek study area is not used as domestic water supply source; thus, the RBC_{tap}, used as COPC screening levels for the HHRA, are very conservative criteria for COPC selection. COPC screening levels calculated specifically using exposure assumptions reflective of a recreational land use scenario would be at least an order of magnitude greater than the RBC_{tap}.

Sediment Evaluation

Table 1-7 compares RLs and MDLs (or IDLs for inorganics) to the COPC selection criteria used for sediment data collected for the Mattawoman Creek Study. Table 1-8 summarizes the number of times the SQLs reported in the analytical database for Mattawoman Creek exceed the COPC selection criteria for human and ecological risk assessment. The explanations regarding the derivation of the RLs, MDLs, and SQLs presented above for the surface water samples also apply to the sediment samples.

As summarized in Tables 1-7 and 1-8, the RLs and SQLs exceed COPC selection criteria for several organic and a few inorganic analytes. However, with the exception of the MDLs reported for four explosive compounds (1,3,5-trinitrobenzene, 1,3-dinitrobenzene, 2,4,6-trinitrotoluene, and HMX), the MDLs for the highlighted organics are similar to or do not exceed COPC selection criteria. In some cases, only a few of the reported SQLs exceeded the COPC selection criteria; this is most likely a consequence of sample dilution or matrix effects. Consequently, the analytical methods (and detection limits achievable) for most organics are generally considered appropriate (sensitive enough) for the ecological and human health risk assessments. Inorganic compounds with IDLs clearly exceeding the COPC selection criteria and organic compounds with MDLs clearly exceeding COPC selection criteria are discussed in the following items:

- For 1,3,5-trinitrobenzene (TNB), 37 of the SQL values (i.e., non-detect results) reported by the laboratory, the RL, and MDL (0.25 mg/kg, 0.25 mg/kg, and 0.015 mg/kg, respectively) exceed the minimum ecological screening level (0.002mg/kg). In order to better understand the potential for under-estimating risks, alternate toxicity studies were researched. In studies conducted with *Leptocheirus plumulosus* 28 day LC50 values for TNB were 95.4 mg/kg for TNB (Lotufo et al., 2001). In the same study significant inhibitory effects on growth and offspring production were observed at 30 mg/kg of TNB (Lotufo et al., 2001). The SQL values reported by the laboratory for 1,3,5–TNB are significantly lower than these measured effects levels. Therefore, 1,3,5–TNB concentrations in the sediment below the MDL, SQL, and/or RL are not expected to cause a risk to sediment invertebrates.

- For 1,3-dintrobenzene, 45 of the SQL values (i.e., non-detect results) reported by the laboratory, the RL, and MDL (0.0372 - 0.25 mg/kg, 0.25 mg/kg, and 0.017 mg/kg, respectively) exceed the minimum ecological screening level (0.007 mg/kg). However, the ecological screening level was developed as a sediment quality benchmark (SQB) assuming a TOC of one percent. The SQB can be recalculated at 0.016 mg/kg, using the average TOC in sediment at Mattawoman Creek of 2.45 percent. The MDL for 1,3-dinitrobenzene of 0.017 mg/kg is comparable to the recalculated SQB. Therefore it is unlikely that a large number of samples have concentrations of 1,3-DNB between the recalculated SQB and MDL, limiting the uncertainty involved with potentially underestimating risks.

- For 2,4,6-trinitrotoluene, 36 of the SQL values (i.e., non-detect results) reported by the laboratory and the RL (0.0356 - 0.25 mg/kg and 0.25 mg/kg, respectively) exceed the minimum ecological screening level (0.09 mg/kg). In the case of 2,4,6-trinitrotoluene, the MDL (0.031 mg/kg) is less than the ecological screening level. In order to better understand the potential for underestimating risks, alternate toxicity studies were researched. In a study based on the survival of *Neanthes arenaceodentata* (marine benthic organism) exposed to TNT, LOEC (lowest observed effect concentration) and NOEC (no observed effect concentration) concentrations were 400 mg/kg and 228 mg/kg, respectively (Green et al., 1999). In another study based on the survival of *Leptocheirus plumulosus* (estuarine benthic organism) exposed to TNT, LOEC and NOEC concentrations were 177 mg/kg and 84 mg/kg, respectively (Green et al., 1999). In a study using the freshwater organism *Hyalella azteca* LOEC and NOEC concentrations using survival as an endpoint were 50 mg/kg and 25 mg/kg, respectively (Steevens, et al., 2002). The SQL values reported by the laboratory for 2,4,6-TNT are significantly lower than these measured effects levels. Therefore, 2,4,6-TNT concentrations in the sediment below the SQL, and RL are not expected to cause a risk to sediment invertebrates.

- For HMX, 45 of the SQL values (i.e., non-detect results) reported by the laboratory, the RL, and MDL (0.0705 - .5 mg/kg, 0.25 mg/kg, and 0.014 mg/kg, respectively) exceed the minimum ecological screening level (0.005 mg/kg). However, the ecological screening level was developed as a sediment quality benchmark (SQB) assuming a TOC of one percent. The SQB can be recalculated at 0.012 mg/kg, using the average TOC in sediment at Mattawoman Creek of 2.45 percent. The MDL for HMX of 0.014 mg/kg is comparable to the recalculated SQB. In addition, alternate toxicity studies were researched to better understand the potential for underestimating risks. LOEC and NOEC concentrations based on growth of *Chironomus tentans* exposed to HMX were 39.3 mg/kg and 22.1 mg/kg, respectively (Steevens, et al., 2002). It was also found in the same study that survival of *Chironomus tentans* was not statistically different from control samples at concentrations as high as 146 mg/kg. The SQL values reported by the laboratory for HMX are significantly lower than these measured effects levels. Therefore, HMX concentrations in the sediment below the MDL, SQL, and/or RL are not expected to cause a risk to sediment invertebrates

- For arsenic, ten of the SQL values (i.e., non-detect results) reported by the laboratory, the RL, and MDL (0.69-10.3 mg/kg, 0.84 mg/kg, and 0.84 mg/kg, respectively) exceed the $RBC_{res\text{-}soil}$ (0.43 mg/kg). However, the MDL is only a factor of 2 greater than the $RBC_{res\text{-}soil}$ and the $RBC_{res\text{-}soil}$ has been conservatively used to select COPCs for sediments. Because human exposure to sediments is expected to be less intensive (by an order of magnitude or more) than human exposure to soils, an RBC based on recreational exposure to the sediments of Mattawoman Creek would be greater than both the MDL and the $RBC_{res\text{-}soil}$. The RBC for the $1x10^{-6}$ cancer risk level, calculated based on the exposure assumptions presented in the HHRA, would be 11 mg/kg.

- For selenium, thirty-two of the SQL values (i.e., non-detected results) reported by the laboratory (SQL range = 0.65mg/kg-3.9 mg/kg) exceed the minimum ecological criteria (1 mg/kg). However, the MDL (0.86 mg/kg) and the reported SQLs are similar to the minimum ecological criteria. Additionally, for the limited number of samples collected, SPAWAR confirmation samples also indicated low selenium concentrations (i.e., the reported concentrations do not exceed 1 mg/kg).

Fish Tissue Evaluation

Table 1-9 compares RLs and MDLs (or IDLs for inorganics) to the COPC selection criteria used for fish tissue data collected for the Mattawoman Creek Study. Tables 1-9 and 1-10 summarize the number of times the SQLs reported in the analytical database for Mattawoman Creek exceed the COPC selection criteria for human health risk assessment. (Fish tissue screening criteria are not available for ecological risk assessment.) The explanations regarding the derivation of the RLs, MDLs, and SQLs presented above for the surface water database also apply to the sediment database.

As indicated on Tables 1-9 and 1-10, the RLs and SQLs exceed COPC selection criteria for several organic and a few inorganic analytes. For most analytes, MDLs/IDLs are similar to or do not exceed COPC selection criteria. In some cases, only a few of the reported SQLs exceeded the COPC selection criteria; this is most likely a consequence of sample dilution or matrix effects. Organic compounds with MDLs clearly exceeding the COPC selection criteria and inorganic compounds with IDLs clearly exceeding the COPC selection criteria are discussed in the following items, as indicated below:

- As summarized on the following Table 1-12, MDLs for benzo(a)pyrene, bis(2-chloroethyl)ether, dibenzo(ah)anthracene hexachlorobenzene, N-nitroso-di-n-propylamine, the Aroclors, and RDX exceed the RBC_{fish} used to select COPCs :

Table 1-12 – Comparison of Risk-Based Concentrations, SQLs, MDLs, and RLs for Select Organic Chemicals of Fish Tissue

Parameter	SQLs (ug/kg)	MDL (ug/kg)	RL (ug/kg)	RBC (ug/kg)	Recreational RBC (ug/kg)
Benzo(a)pyrene	330-9800	18	330	0.43	.61
Bis (2-chloroethyl) ether	330-9800	10	330	2.9	4
Dibenzo(ah)anthracene	330-9800	4.3	330	0.43	.61
Hexachlorobenzene	330-9800	7.9	330	2	2.8
N-nitroso-di-n-propylamine	330-9800	12	330	0.45	.63
Aroclor	32-130	2-8.8	33-67	1.6	2.2
RDX	250	51	250	29	40

The preceding table also includes RBCs calculated using the same exposure factors presented in the HHRA. These RBCs are slightly greater than Region 3 RBCs for fish. With the exception of benzo(a)pyrene, dibenzo(ah)anthracene, and n-nitroso-di-n-propylamine, the calculated RBCs are similar to the MDLs. MDLs for the other organics represent the $1x10^{-5}$ cancer risk level (approximately) using the exposure assumptions presented in the HHRA for the Mattawoman Creek Study (See Comment 1 Table 7). With the exception of benzo(a)pyrene and n-nitroso-di-n-propylamine the MDLs are also within an order of magnitude of the RBC_{fish}. Additionally, PAHs

do not tend to partition from solid media (i.e., sediments or soils) to aqueous media (i.e., surface water) or to bioconcentrate from environmental media to fish tissue samples (reference). N-nitroso-di-n-propylamine was also not detected in surface water or sediment samples and has not been identified as a significant site contaminant at environmental sites located along Mattawoman Creek.

- For arsenic, the SQL range, RL, and IDL reported by the laboratory (0.57-0.93 mg/kg; 0.84 mg/kg; and 0.84 mg/kg) exceed the RBC_{fish} (0.0021 mg/kg). However, the RBC_{fish} is based on the cancer slope factor for inorganic arsenic. Typically only 4 % of the arsenic in fish tissue is in the inorganic form. Consequently, the RBC_{fish} is a very conservative COPC screening level for the total arsenic content of fish tissue samples. A cancer risk estimate based on the MDL reported for arsenic, the exposure factors presented in the HHRA, and the 4% inorganic/total arsenic assumption is 1.1E-05.

- For thallium, the SQL range, RL, and IDL (0.52-0.78 mg/kg; 0.78 mg/kg; and 0.78 mg/kg) exceed the RBC_{fish} (0.095 mg/kg). However, thallium has not been identified as a significant contaminant in the Mattawoman Creek study area in other media.

2.0 FIELD QUALITY CONTROL SAMPLES

The following field quality control (QC) samples were collected for the sampling efforts and analyzed in accordance with DQI requirements, as specified in the Work Plan and QAPP:

Field duplicates for sediments were a single sample homogenized and split into two portions. Field duplicates were collected during a single act of sampling and analyzed for chemical constituents to measure the precision of the sampling and analysis program, as well as natural sample heterogeneity.

Source water blanks (field blanks) consist of sampling of source waters, used in decontamination and steam cleaning, before use. The samples were obtained at the rate of one per source per sampling event. Source water is analyzed for all organic and inorganic constituents under investigation, as a means of determining whether the source water used in field procedures could potentially have introduced contaminants to the environmental samples collected. Source water blanks were evaluated in accordance with the planned data validation protocols to determine whether false positive results may exist. A false positive result is a result that indicates the presence of an analyte when the analyte should have been classified as nondetected.

Equipment rinsate blanks were collected and analyzed to check the effectiveness of decontamination procedures. Samples were obtained under representative field conditions by collecting the rinse water generated by running analyte-free water through sample collection equipment after decontamination and before use. Rinsate blanks were obtained for each type of sampling equipment for each day that the sampling equipment was decontaminated. Where pre-cleaned, dedicated sampling equipment was used, one rinsate blank was collected as a "batch blank." Rinsate blanks were analyzed for the same chemical constituents as the associated environmental samples.

Trip blanks are samples of deionized water that are analyzed for VOCs. Vials of deionized water accompany the empty sample containers to the site and then accompany the filled sample containers from the site to the laboratory. These blanks are used to indicate the potential for cross contamination of the samples by VOCs during sample shipment.

Temperature blanks were included in each cooler as a temperature indicator to assure that samples were received at the laboratory at the appropriate temperature.

Positive results in the field blanks were not used as a basis for data validation because field blank results were not necessarily included in the SDG with their associated samples. Therefore, false

positives may exist particularly for sample data close to or less than the reporting limit. Table 2-1 presents the maximum contamination values reported in the field and rinsate blanks associated with the sampling event. No positive detections were noted in any of the trip blanks.

Table 2-1 – Maximum Positive Concentrations in Field and Rinsate Blanks

Parameter/(units)	Analytes	Maximum Rinsate Blank	Maximum Field Blank
SVOCs/(µg/L)	1,3,5-TRINITROBENZENE	0.61	
	BIS(2-ETHYLHEXYL)PHTHALATE	1	
	DI-N-BUTYL PHTHALATE	1	
	PHENOL	3	
VOCs/(µg/L)	2-BUTANONE	26	
	ACETONE	24	
	BROMOFORM		2
	CHLORODIBROMOMETHANE		0.8
	METHYLENE CHLORIDE	6	
Metals/(µg/L)	ALUMINUM	178	
	CADMIUM	2.5	
	LEAD	2	
	VANADIUM	0.55	
Metals-filtered(dissolved)/(µg/L)	ALUMINUM		25.3
	BARIUM	8.7	11.8
	CALCIUM	1230	1120
	CHROMIUM	2.9	0.65
	COBALT	1.1	0.52
	COPPER	13.2	6.1
	IRON	135	87.6
	MAGNESIUM	496	302
	MANGANESE	54	7
	NICKEL	2.5	0.61
	POTASSIUM	415	3820
	SILVER	1.1	
	SODIUM	2140	70200
	ZINC	20.8	48.4
Explosives/(µg/L)	4-NITROTOLUENE	0.31	
	TETRYL	0.068	
Misc./(mg/L)	CHLORIDE	0.46	19.6
	FLUORIDE		0.61
	SULFATE	0.63	4.8
	TOTAL DISSOLVED SOLIDS	96	270
	TOTAL ORGANIC CARBON		17

For several of the analytes in the above table all of the results were either reported by the laboratory as nondetected or were qualified during data validation due to laboratory blank contamination. False positives could not exist with these analytes because no positive results were reported. These analytes include 1,3,5-trinitrobenzene, 2-butanone, chlorodibromomethane, dissolved aluminum, dissolved cobalt, dissolved silver, dissolved zinc, 4-nitrotoluene and tetryl. For the remaining analytes, the possibility of false positives exists. However, the possibility of false

positives due to field or rinsate blank contamination is not a guarantee that false positives exist. The positive concentration found in the field or rinsate blank could be due to an isolated event, independent from the rest of the samples, and could occur anywhere from sample collection to analysis. It is difficult to assess, with much certainty, the cause of the positive detections in the field blanks because contamination can be introduced by many means at many different stages in the process. In addition, if sample results are sufficiently high (5-10 times the concentration found in the blank) then any amount of contamination introduced in the field (as found in the blank) would not add a significant amount to the overall concentration. Every analyte in every sample would need to be examined individually to determine if positive results are the result of contamination from the field. A direct overall comparison cannot be made between the concentrations in the field and rinsate blanks and the other samples because there will be differences in reporting units between the different matrices. Differences also exist (on a sample-by-sample and analyte-by-analyte basis) due to dilution factors and initial and final weights and volumes involved in the preparation and analysis of the samples.

3.0 DATA VALIDATION

Data validation is an objective and systematic review of analytical chemical data packages with respect to sample receipt and handling, analytical methods, data reporting and deliverables, and document control. The quality of data generated by a laboratory is extremely important; it is an integral part of the investigation and must be clearly tied to the project goals. This section summarizes the various aspects of the data validation process.

3.1 General Data Validation Procedures

After receipt of analytical results, data validation was performed based upon USEPA Region 3 Standard Operating Procedures for Validation of CLP Inorganic and Organic Data (USEPA, September, 1994) and the National Functional Guidelines for Inorganic and Organic Data Review (USEPA, April, 1993).

After the data were validated, a listing of non-conformities requiring data qualifiers, which are used to alert the data user to inaccurate or imprecise data, were developed. For situations in which several quality control criteria were out of specification, the data validator made professional judgments and/or comments on the validity of the overall data package. The reviewer then prepared a technical memorandum presenting qualification of the data and, if necessary, the rationale for making such qualifications.

The net result is a data package that has been carefully reviewed for its adherence to prescribed technical requirements. One hundred percent of the environmental samples were validated. Validators incorporated data qualifiers into the electronic database and submitted the information to the data management group.

3.2 Data Validation Qualifiers

As mentioned previously, the qualification of analytical data during the validation process (i.e., application of B, UJ, J, K, L, UL, UR, and R qualifiers) was conducted as required by the USEPA Region 3 Standard Operating Procedures for Validation of CLP Inorganic and Organic Data and the National Functional Guidelines for Inorganic and Organic Data Review. The attachment of the data qualifiers to analytical results signifies the occurrence of QC noncompliances that were noted during the course of data validation. The various data qualifiers are defined, as follows:

U - Indicates that the chemical was not detected at the numerical detection limit (sample-specific quantitation limit) noted. Nondetected results from the laboratory are reported in this manner.

B - This qualifier is added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

UJ - Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

J - Indicates that the chemical was detected. However, the associated numerical result is not a precise representation of the amount that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

K - Indicates that the chemical was detected. However, the associated numerical result is not a precise representation of the amount that is actually present in the sample. The laboratory reported concentration is considered to be an estimate, biased high, of the true concentration.

L - Indicates that the chemical was detected. However, the associated numerical result is not a precise representation of the amount that is actually present in the sample. The laboratory reported concentration is considered to be an estimate, biased low, of the true concentration.

UL - Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as biased low.

UR - Indicates that the chemical may or may not be present. The nondetected analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control recoveries).

R - Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data, qualified with UR and R data validation qualifiers. These data are considered invalid and are not used for decision-making purposes unless they are used in a qualitative way and the use is justified and documented. Minor problems are defined as issues resulting in the estimation of data, qualified with B, J, K, L, UL and UJ data validation qualifiers. Estimated analytical results are considered to be suitable for decision-making purposes unless the data use requirements are very stringent and the qualifier indicates a deficiency that is incompatible with the intended data use.

3.3 Summary of Data Validation Results

A summary of the data validation results for the analytical data effort is provided in the remainder of this section.

Table 3-1 presents the percentages of data qualified as estimated or rejected for each matrix. Please note that the percentage of qualified and unqualified data will not equal 100% as some data points are qualified for more than one technical noncompliance. Qualification for PARCC parameters (field and laboratory duplicates, surrogates, matrix spikes, laboratory control samples, and internal standards) were presented and discussed in Section 1.0. Unqualified data are data that did not require qualification for any technical noncompliances.

Method Blank Contamination – Positive results in the rinsate and field blanks were not used as a basis for data validation. Therefore, the likelihood of false positives exists. Field blanks, rinsate blanks and trip blanks were not qualified on the basis of method blank contamination. Table 2-1 in Section 2.0 depicts the maximum values detected in the rinsate and field blanks.

Table 3-1 - Rates of Qualification (Estimations and/or Rejections)

	SVOCs	VOCs	Pest/ PCBs	Metals & CN[1]	Metals (filtered)	Exp.	AVS/ SEM	Misc.[2]
	Sediment							
Unqualified Data	61.8%	68.4%	69.4%	42.2%	NA	51.6%	58.3%	69.4%
<Reporting Limit	5.4%	2%	0%	0%	NA	2.9%	0%	0%
Hold Time Noncompliance	5.5%	0%	5.6%	0%	NA	46.4%	0%	0%
Method Blank Contamination	1.3%	1.5%	0%	9.3%	NA	<1%	24.6%	0%
Calibration Noncompliance	1.8%	0%	0%	21.9%	NA	0%	0%	0%
Percent Solids <30%	27.5%	27.2%	27.8%	25.3%	NA	NA	0%	16.7%
Other Noncompliance[3]	0%	2%	0%	<1%	NA	0%	0%	0%
	Surface Water							
Unqualified Data	97%	90.1%	99.9%	64.5%	55.4%	38.9%	NA	72.4%
<Reporting Limit	<1%	<1%	0%	0%	0%	0%	NA	0%
Hold Time Noncompliance	0%	0%	0%	0%	0%	61.6%	NA	27.3%[4]
Method Blank Contamination	<1%	0%	0%	25%	32.7%	0%	NA	0%
Calibration Noncompliance	0%	7.1%[5]	0%	11.6%	11.7%	0%	NA	0%
Other Noncompliance[3]	0%	2.4%	<1%[6]	<1%	<1%	0%	NA	0%
	Fish Tissue							
Unqualified Data	58.7%	NA	94.4%	62.8%	NA	92.3%	NA	100%
<Reporting Limit	1.9%	NA	1.7%	0%	NA	2%	NA	0%
Hold Time Noncompliance	<1%	NA	0%	0%	NA	0%	NA	0%
Method Blank Contamination	0%	NA	0%	21%	NA	5.7%	NA	0%
Calibration Noncompliance	5.2%[7]	NA	0%	11%	NA	0%	NA	0%
Other Noncompliance[3]	0%	NA	3.9%[6]	5.9%	NA	0%	NA	0%
	Vegetation Tissue							
Unqualified Data	NA	NA	57.1%	44.1%	NA	NA	NA	NA
<Reporting Limit	NA	NA	0%	0%	NA	NA	NA	NA
Hold Time Noncompliance	NA	NA	42.9%	0%	NA	NA	NA	NA
Method Blank Contamination	NA	NA	0%	25.5%	NA	NA	NA	NA
Calibration Noncompliance	NA	NA	0%	19.3%	NA	NA	NA	NA
Other Noncompliance[3]	NA	NA	0%	0%	NA	NA	NA	NA
	Field Quality Control Blanks							
Unqualified Data	97.9%	90.2%	100%	72.5%	72.2%	40%	NA	70.9%
<Reporting Limit	1.8%	<1%	0%	0%	0%	3.5%	NA	0%
Hold Time Noncompliance	0%	0%	0%	0%	0%	60%	NA	29.1%[4]
Method Blank Contamination	NA	NA	NA	NA	NA	NA	NA	NA
Calibration Noncompliance	0%	7.1%[5]	0%	27.5%	27.8%	0%	NA	0%
Other Noncompliance[3]	0%	2.4%	0%	0%	0%	0%	NA	0%

[1] Cyanide was not analyzed for in vegetation tissue.

[2] Miscellaneous parameters consist of TOC in the sediment samples; chloride, fluoride, hardness, nitrate, nitrite, perchlorate, pH, sulfate, TDS, TOC and TSS in the surface water samples; and perchlorate in the fish tissue samples.

[3] Other noncompliances in the sediment samples consist of Interference Check Sample (ICS) noncompliances for metals and the diethyl ether noncompliance (Refer to Section

1.4) for VOCs. Other noncompliances in the surface water samples consist of ICS noncompliances for filtered and non-filtered metals, percent difference noncompliances between columns for Pest/PCBs and the diethyl ether noncompliance for VOCs. Other noncompliances in the fish tissue samples consist of serial dilution noncompliances and ICS noncompliances for metals and percent difference noncompliances between columns for Pest/PCBs.
Shaded cells in the above table represent data that were qualified as estimated and/or rejected and are addressed individually below.

(4) The last paragraph of this section addresses the holding time issues with the miscellaneous and explosive parameters and the reasoning for rejection of some of the miscellaneous parameter results.

(5) The majority of the qualifications in the VOC fraction of the surface waters and field quality control blanks (approximately all of the 7.1% of the qualified data in the surface water samples and 6% of the 7.1% of the qualified data in the field quality control blanks) were qualified as rejected due to calibration noncompliance. Due to the small percentage of data affected, the impact on data quality is negligible.

(6) A pesticide analysis is run on two different columns, the reporting column and the confirmation column. If the reporting column and confirmation column have concentrations with a percent difference greater than the 100% quality control limit the positive results are rejected, because of the poor reproducibility of results between the columns. The majority of the qualifications in the Pest/PCB fraction of the surface waters and fish tissue matrices (all of the <1% of the qualified data in the surface water samples and 2.5% of the 3.9% of the qualified data in the fish tissue samples) were qualified as rejected due to this noncompliance. However, due to the small percentage of data affected, the impact on data quality is negligible.

(7) Of the 5.2% of data qualified due to calibration noncompliance in the SVOC fraction of the fish tissue samples, only 2% were qualified as rejected. Due to the small percentage of data affected, the impact on data quality is negligible.

Rates of qualification > 10% represent a significant cause of data qualification and could possibly impact the usability of the data. For this reason, rates of qualification > 10% are discussed in the following paragraphs.

Because the sediments were submerged under water at the time of collection, it is reasonable to expect the samples to contain a significant amount of water. Due to the high moisture content in the samples, all reported results in samples that were less than 30% solid were qualified as estimated. Rates of qualification for SVOCs (27.5%), VOCs (27.2%), Pest/PCBs (27.8%), metals and cyanide (25.3%) and TOC (16.7%) represent the uncertainty in the concentrations due to the high moisture contents of the samples. As previously mentioned, estimated analytical results are considered to be suitable for decision-making purposes; therefore the impact to data quality is considered to be small.

The higher rates of qualifications due to calibration noncompliance noted for metals in the above table reflect the stricter Region 3 validation criteria (as opposed to the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review) for the Contract Required Detection Limit (CRDL) standard. This is a low-level standard (concentration equal to two times the CRDL value) for which the EPA has not established any quality control guidelines for the laboratories. The USEPA Region 3 Standard Operating Procedures for Validation of CLP Inorganic Data has set a 90%-100% quality control acceptance range for this standard, which is frequently not achieved by the laboratory. These qualifications, however numerous, [sediment samples (21.9%), surface water samples (11.6% for total metals and 11.7% for filtered metals), fish tissue samples (11%), vegetation samples (19.3%) and field quality control blanks (27.5% for

total metals and 27.8% for filtered metals)] are limited to estimated results and are considered to be suitable for decision-making purposes. No data rejections resulted from these calibration noncompliances.

Because metals are very common in the environment and in the laboratory, there are generally more qualifications due to method blank contamination in the metals fraction than in any of the other fractions analyzed. The qualification rates from Table 3-1 for AVS/SEM (24.6%), total metals in surface water (25%), dissolved metals in surface water (32.7%), metals in fish tissue (21%) and metals in vegetation tissue (25.5%) are typical due to the presence of metals in the environment.

These samples were collected from September 5-9, 2001. Analyses for explosives and TOC were subcontracted from Mitkem Corporation in Warwick, Rhode Island to Severn Trent Laboratories in Sacramento, California. Due to unavoidable delays in shipping following September 11, 2001, many samples were received at the laboratories after the recommended holding time had expired. Several aqueous samples to be analyzed for nitrate and nitrite, which have 48-hour holding times until analysis, were received at the laboratory after the holding time had expired. Some of the samples were analyzed after a period of time, greater than twice the holding time, had expired, resulting in a rejection of those results. In the above table, only 3.1% of the 27.3% of estimated results in the surface water samples were qualified as rejected due to holding time noncompliances for nitrate and nitrite. In addition, only 3.6% of the 29.1% of estimated results in the field quality control blanks were qualified as rejected due to holding time noncompliances for nitrate and nitrite. The remaining results were qualified as estimated due to holding time noncompliances for pH, nitrate and nitrite. Because of the delays in shipping, the subcontracted laboratory received some of the samples for explosive analyses after the 7-day holding time for extraction had expired. These delays resulted in the 46.4% (sediment), 61.6% (surface water) and 60% (field quality control blanks) qualification rates from the table above. These qualifications are; however, limited to estimated results. No data rejections resulted from these holding time noncompliances. There was also a large amount (42.9%) of pesticide/PCB data that were qualified due to holding time noncompliance. There was no explanation provided by the laboratory; however, shipping delays are not likely to have been the reason for these noncompliances because the affected samples were collected on September 5 and 6 and were received by the laboratory prior to September 11. None of these results were qualified as rejected and; as previously mentioned, estimated analytical results are considered to be suitable for decision-making purposes; therefore the impact to data quality is considered to be small.

4.0 BENTHIC MACROINVERTEBRATE COMMUNITY ANALYSIS

Benthic macroinvertebrates in the Mattawoman Creek ecosystem could be at risk from contaminants related to IHDIV-NSWC. To assess this risk, sediment samples were collected for analyses of the benthic macroinvertebrate community. The analyses were conducted by Pennington and Associates, Inc., Cookeville, Tennessee.

The Pennington and Associates data set represents a fairly standard suite of metrics/descriptive statistics for benthic community analysis. The report provides measures of the following for each sample:

- Number of organisms
- Number of taxa
- Biotic indices
- Measures of diversity
- Indices of community similarity
- Measure of pollution tolerance

A measure of organic waste tolerance is also included for each taxon, and the functional feeding group is identified for each taxon.

The data appear to be adequate and defensible, and no data gaps or deficiencies were noted in a review of the data.

5.0 SEDIMENT TOXICITY TESTS

As mentioned above, benthic macroinvertebrates in the Mattawoman Creek ecosystem could be at risk from contaminants related to IHDIV-NSWC. To assess this risk, particularly since several chemicals without screening guidelines are present in Mattawoman Creek sediments, sediment samples were collected for 10-day toxicity tests using the amphipod *Hyalella azteca*. The toxicity tests were conducted by Tetra Tech, Inc., Owings Mills, Maryland.

The toxicity tests were conducted following standardized methods described in a U.S. EPA (2000) publication entitled *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates*, Second Edition, EPA/600/R-99/064. *Hyalella azteca* is an organism that is widely used in toxicity tests, and the EPA (2000) guidance document provides detailed methods for conducting toxicity tests. Based on the information provided in the toxicity test report, the tests appear to have followed all appropriate guidelines. Data are presented for each replicate of each sample from Mattawoman Creek, and for two laboratory control samples. Survival and growth of test organisms in the laboratory control samples exceeded acceptability criteria.

The overlying water quality conditions were unremarkable except for ammonia and dissolved oxygen concentrations in overlying water. EPA (2000) guidance states that "...ammonia in the overlying water typically should not vary by more than 50% during the test". Overlying water concentrations of ammonia in some samples varied by more than 50% from day 0 to day 10 of the tests, but concentrations *decreased* in these samples. Increased ammonia concentrations could be cause for concern, but decreasing concentrations are normal. Initial ammonia concentrations in toxicity tests are usually the result of organic compounds being broken down by bacteria in sediment. Decreasing ammonia concentrations in toxicity tests are expected due to daily renewal using "clean" overlying water. Aeration (see below) also probably contributed to decreasing ammonia concentrations. Nevertheless, ammonia concentrations were relatively low (maximum = 10 mg/L), and are not cause for concern.

The laboratory report noted that aeration of overlying water was provided after the dissolved oxygen levels dropped below 2.5 mg/L in some test chambers. Since aeration can potentially alter the chemical characteristics of some compounds (especially volatile compounds); 10-day toxicity tests are generally conducted without aeration of overlying water. EPA (2000) states, however, that aeration should be provided when the dissolved oxygen levels drop below 2.5 mg/L. Declining dissolved oxygen levels in toxicity tests are usually caused by decomposing organic substances in sediment. Low dissolved oxygen levels can impact the survival of test organisms, and thus, can complicate the interpretation of survival data. The toxicity test report stated that after aeration was initiated, dissolved oxygen levels were sub-optimal for only a few hours before daily morning renewals of overlying water. It should be noted that volatile organic compounds are not chemicals of concern in Mattawoman Creek sediments. Aeration would not be expected to impact the chemical characteristics of most chemicals of concern. For these reasons, the somewhat low dissolved oxygen levels in some samples do not invalidate the test results.

References:

Green, Andrew, D. Moore, and D. Farrar. 1999. Chronic Toxicity of 2,4,6-Trinitrotoluene to a Marine Polychaete and an Estuarine Amphipod. Environmental Toxicology and Chemistry. Vol. 18, No. 8, pp. 1783-1790.

Lotufo, Guilherme R., Farrar, J.D., Inouye, L.S., Bridges, T.S., and Ringelber, D.B. 2001. Toxicity of Sediment-Associated Nitroaromatic and Cyclonitramine Compounds to Benthic Invertebrates. Environmental Toxicology and Chemistry. Vol. 20, No.8, pp. 1762-1771.

Steevens, Jeffrey A., B.M. Duke, G.R. Lotufo, and T.S. Bridges. 2002. Toxicity of the Explosives 2,4,6-Trinitrotoluene, Hexahydro-1,3,5-Trinitro-1,3,5-Triazine, and Octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine in Sediments to Chironomus No. 7, pp. 1475-1482.

TABLE 1-5

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SURFACE WATER SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL) (UG/L)	LABORATORY REPORTING LIMIT (RL) (UG/L)	EPA REGION 3 RBC-TAP WATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-FRESHWATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-SALTWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-FRESHWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-MARINE (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)	MINIMUM OVERALL CRITERIA (UG/L)
1,1,1-TRICHLOROETHANE	71-55-6	OV	0.19	1	3200	NA	NA	31200	9400	9400	3200
1,1,2,2-TETRACHLOROETHANE	79-34-5	OV	0.12	1	0.053	NA	NA	NA	NA	NA	0.053
1,1,2-TRICHLOROETHANE	79-00-5	OV	0.1	1	**0.19**	NA	NA	31200	9400	9400	**0.19**
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1	OV	NA	NA	59000	NA	NA	NA	NA	NA	59000
1,1-BIPHENYL	92-52-4	OS	NA	NA	300	NA	NA	NA	NA	NA	300
1,1-DICHLOROETHANE	75-34-3	OV	0.11	1	800	NA	NA	320000	160000	160000	800
1,1-DICHLOROETHENE	75-35-4	OV	0.13	1	350	NA	NA	224000	11600	11600	350
1,2,4-TRICHLOROBENZENE	120-82-1	OV	0.28	1	7.2	NA	NA	129	50	50	7.2
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	OV	0.22	1	0.047	NA	NA	NA	NA	NA	0.047
1,2-DIBROMOETHANE	106-93-4	OV	0.1	1	0.00075	NA	NA	NA	18000	18000	0.00075
1,2-DICHLOROBENZENE	95-50-1	OV	0.19	1	270	NA	NA	129	763	129	129
1,2-DICHLOROETHANE	107-06-2	OV	0.1	1	**0.12**	NA	NA	113000	20000	20000	**0.12**
1,2-DICHLOROPROPANE	78-87-5	OV	0.15	1	**0.16**	NA	NA	3040	5700	3040	**0.16**
1,3,5-TRINITROBENZENE	99-35-4	EXP	0.02	0.1	1100	NA	NA	NA	NA	NA	1100
1,3-DICHLOROBENZENE	541-73-1	OV	0.25	1	180	NA	NA	NA	763	763	180
1,3-DINITROBENZENE	99-65-0	EXP	0.027	0.1	3.7	NA	NA	NA	1200	1200	3.7
1,4-DICHLOROBENZENE	106-46-7	OV	0.27	1	**0.47**	NA	NA	129	763	129	**0.47**
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	OS	0.48	5	0.26	NA	NA	NA	NA	NA	0.26
2,4,5-TRICHLOROPHENOL	95-95-4	OS	2.91	20	3700	NA	NA	**11**	63	**11**	**11**
2,4,6-TRICHLOROPHENOL	88-06-2	OS	0.87	5	6.1	NA	NA	NA	970	970	6.1
2,4,6-TRINITROTOLUENE	118-96-7	EXP	0.028	0.1	2.2	NA	NA	NA	NA	NA	2.2
2,4-DICHLOROPHENOL	120-83-2	OS	0.61	5	110	NA	NA	NA	365	365	110
2,4-DIMETHYLPHENOL	105-67-9	OS	1.41	5	730	NA	NA	NA	2120	2120	730
2,4-DINITROPHENOL	51-28-5	OS	4.05	20	73	NA	NA	4850	150	150	73
2,4-DINITROTOLUENE	121-14-2	EXP	0.035	0.1	73	NA	NA	370	230	230	73
2,4-DINITROTOLUENE	121-14-2	OS	0.5	5	73	NA	NA	370	230	230	73
2,6-DINITROTOLUENE	606-20-2	EXP	0.059	0.1	37	NA	NA	NA	NA	NA	37
2,6-DINITROTOLUENE	606-20-2	OS	0.79	5	37	NA	NA	NA	NA	NA	37
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	EXP	0.037	0.1	2.2	NA	NA	NA	NA	NA	2.2
2-BUTANONE	78-93-3	OV	1.35	5	1900	NA	NA	NA	3220000	3220000	1900
2-CHLORONAPHTHALENE	91-58-7	OS	0.66	5	490	NA	NA	7.5	620	7.5	7.5
2-CHLOROPHENOL	95-57-8	OS	0.72	5	30	NA	NA	NA	970	970	30
2-HEXANONE	591-78-6	OV	0.82	5	1500	NA	NA	NA	428000	428000	1500
2-METHYLNAPHTHALENE	91-57-6	OS	0.68	5	120	NA	NA	300	NA	300	120
2-METHYLPHENOL	95-48-7	OS	0.82	5	1800	NA	NA	NA	NA	NA	1800
2-NITROANILINE	88-74-4	OS	2.32	20	NA	NA	NA	NA	NA	NA	NA
2-NITROPHENOL	88-75-5	OS	0.73	5	290	NA	NA	NA	NA	NA	290

TABLE 1-5

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MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL) (UG/L)	LABORATORY REPORTING LIMIT (RL) (UG/L)	EPA REGION 3 RBC-TAP WATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-FRESHWATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-SALTWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-FRESHWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-MARINE (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)	MINIMUM OVERALL CRITERIA (UG/L)
2-NITROTOLUENE	88-72-2	EXP	0.055	0.5	61	NA	NA	NA	NA	NA	61
3,3'-DICHLOROBENZIDINE	91-94-1	OS	1.84	5	0.15	NA	NA	NA	NA	NA	0.15
3-NITROANILINE	99-09-2	OS	1.8	20	**3.3**	NA	NA	NA	NA	NA	**3.3**
3-NITROTOLUENE	99-08-1	EXP	0.14	0.5	120	NA	NA	NA	NA	NA	120
4,4'-DDD	72-54-8	PEST/PCB	0.00153	0.02	0.28	NA	NA	0.68	0.6	0.6	0.28
4,4'-DDE	72-55-9	PEST/PCB	0.00048	0.02	0.2	NA	NA	14	1050	14	0.2
4,4'-DDT	50-29-3	PEST/PCB	0.0012	0.02	0.2	0.001	0.001	0.001	0.001	0.001	0.001
4,6-DINITRO-2-METHYLPHENOL	534-52-1	OS	2.44	20	**3.7**	NA	NA	NA	NA	NA	**3.7**
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	EXP	0.037	0.1	NA	NA	NA	NA	NA	NA	NA
4-BROMOPHENYL PHENYL ETHER	101-55-3	OS	0.87	5	NA	NA	NA	NA	NA	NA	NA
4-CHLORO-3-METHYLPHENOL	59-50-7	OS	0.66	5	NA	NA	NA	NA	NA	NA	NA
4-CHLOROANILINE	106-47-8	OS	1.43	5	150	NA	NA	29700	NA	29700	150
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	OS	0.75	5	NA	NA	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE	108-10-1	OV	0.69	5	140	NA	NA	NA	460000	460000	140
4-METHYLPHENOL	106-44-5	OS	0.79	5	180	NA	NA	NA	NA	NA	180
4-NITROANILINE	100-01-6	OS	1.85	20	**3.3**	NA	NA	NA	NA	NA	**3.3**
4-NITROPHENOL	100-02-7	OS	2.31	20	290	NA	NA	4850	150	150	150
4-NITROTOLUENE	99-99-0	EXP	0.09	0.5	61	NA	NA	NA	NA	NA	61
ACENAPHTHENE	83-32-9	OS	0.79	5	370	NA	NA	710	520	520	370
ACENAPHTHYLENE	208-96-8	OS	0.63	5	370	NA	NA	300	NA	300	300
ACETONE	67-64-1	OV	3.42	5	610	NA	NA	NA	9000000	9000000	610
ACETOPHENONE	98-86-2	OS	NA	NA	0.042	NA	NA	NA	NA	NA	0.042
ALDRIN	309-00-2	PEST/PCB	0.00251	0.01	**0.0039**	NA	NA	1.3	3	1.3	**0.0039**
ALPHA-BHC	319-84-6	PEST/PCB	0.00172	0.01	0.011	NA	NA	0.34	100	0.34	0.011
ALPHA-CHLORDANE	5103-71-9	PEST/PCB	0.00057	0.01	0.19	**0.0043**	**0.004**	**0.004**	**0.0043**	**0.004**	**0.004**
ALUMINUM	7429-90-5	M	4.6	4.6	37000	87	NA	NA	25	25	25
AMMONIUM PERCHLORATE	7790-98-9	MISC	NA	NA	NA	NA	NA	NA	NA	NA	NA
ANTHRACENE	120-12-7	OS	0.7	5	1800	NA	NA	300	0.1	0.1	0.1
ANTIMONY	7440-36-0	M	2.4	2.4	15	NA	NA	500	30	30	15
AROCLOR-1016	12674-11-2	PEST/PCB	0.14	0.2	0.96	0.014	0.03	0.03	0.014	0.014	0.014
AROCLOR-1221	11104-28-2	PEST/PCB	0.23	0.4	0.033	0.014	0.03	0.03	0.014	0.014	0.014
AROCLOR-1232	11141-16-5	PEST/PCB	0.16	0.2	0.033	0.014	0.03	0.03	0.014	0.014	0.014
AROCLOR-1242	53469-21-9	PEST/PCB	0.041	0.2	0.033	0.014	0.03	0.03	0.014	0.014	0.014
AROCLOR-1248	12672-29-6	PEST/PCB	0.12	0.2	0.033	0.014	0.03	0.03	0.014	0.014	0.014
AROCLOR-1254	11097-69-1	PEST/PCB	0.032	0.2	**0.033**	0.014	0.03	0.03	0.014	0.014	0.014
AROCLOR-1260	11096-82-5	PEST/PCB	0.07	0.2	0.033	0.014	0.03	0.03	0.014	0.014	0.014
ARSENIC	7440-38-2	M	4.2	4.2	0.045	150	36	10	48	10	0.045

TABLE 1-5

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IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL) (UG/L)	LABORATORY REPORTING LIMIT (RL) (UG/L)	EPA REGION 3 RBC-TAP WATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-FRESHWATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-SALTWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-FRESHWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-MARINE (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)	MINIMUM OVERALL CRITERIA (UG/L)
ATRAZINE	1912-24-9	OS	NA	NA	0.3	NA	NA	NA	NA	NA	0.3
BARIUM	7440-39-3	M	0.3	0.3	2600	NA	NA	10000	10000	10000	2600
BENZALDEHYDE	100-52-7	OS	NA	NA	3700	NA	NA	NA	NA	NA	3700
BENZENE	71-43-2	OV	0.07	1	**0.32**	NA	NA	700	5300	700	**0.32**
BENZO(A)ANTHRACENE	56-55-3	OS	0.59	5	0.092	NA	NA	8.13	6.3	6.3	0.092
BENZO(A)PYRENE	50-32-8	OS	0.56	5	0.0092	NA	NA	0.21	NA	0.21	0.0092
BENZO(B)FLUORANTHENE	205-99-2	OS	0.57	5	0.092	NA	NA	300	NA	300	0.092
BENZO(G,H,I)PERYLENE	191-24-2	OS	3.13	5	180	NA	NA	300	NA	300	180
BENZO(K)FLUORANTHENE	207-08-9	OS	0.55	5	**0.92**	NA	NA	300	NA	300	**0.92**
BERYLLIUM	7440-41-7	M	0.1	0.1	73	NA	NA	1500	5.3	5.3	5.3
BETA-BHC	319-85-7	PEST/PCB	0.00228	0.01	0.037	NA	NA	0.34	100	0.34	0.037
BIS(2-CHLOROETHOXY)METHANE	111-91-1	OS	0.74	5	NA	NA	NA	6400	11000	6400	6400
BIS(2-CHLOROETHYL)ETHER	111-44-4	OS	0.58	5	0.0096	NA	NA	NA	NA	NA	0.0096
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	OS	0.94	5	**4.8**	NA	NA	360	30	30	**4.8**
BROMOCHLOROMETHANE	74-97-5	OV	0.33	1	NA	NA	NA	6400	11000	6400	6400
BROMODICHLOROMETHANE	75-27-4	OV	0.05	1	**0.17**	NA	NA	6400	11000	6400	**0.17**
BROMOFORM	75-25-2	OV	0.05	1	8.5	NA	NA	1000	11000	1000	8.5
BROMOMETHANE	74-83-9	OV	0.23	1	8.5	NA	NA	NA	NA	NA	8.5
BUTYL BENZYL PHTHALATE	85-68-7	OS	0.7	5	7300	NA	NA	**3.4**	**3**	**3**	**3**
CADMIUM	7440-43-9	M	0.1	0.1	18	0.25	8.8	9.3	0.53	0.25	0.25
CALCIUM	7440-70-2	M	133	133	NA	NA	NA	NA	NA	NA	NA
CAPROLACTAM	105-60-2	OS	NA	NA	18000	NA	NA	NA	NA	NA	18000
CARBAZOLE	86-74-8	OS	NA	NA	3.3	NA	NA	NA	NA	NA	3.3
CARBON DISULFIDE	75-15-0	OV	0.09	1	1000	NA	NA	2	2	2	2
CARBON TETRACHLORIDE	56-23-5	OV	0.07	1	**0.16**	NA	NA	50000	35200	35200	**0.16**
CHLORIDE	16887-00-6	MISC	500	1000	NA	230000	NA	NA	NA	230000	230000
CHLOROBENZENE	108-90-7	OV	0.06	1	110	NA	NA	129	50	50	50
CHLORODIBROMOMETHANE	124-48-1	OV	0.05	1	**0.13**	NA	NA	6400	11000	6400	**0.13**
CHLOROETHANE	75-00-3	OV	0.38	1	3.6	NA	NA	NA	NA	NA	3.6
CHLOROFORM	67-66-3	OV	0.07	1	**0.15**	NA	NA	NA	1240	1240	**0.15**
CHLOROMETHANE	74-87-3	OV	0.13	1	2.1	NA	NA	NA	NA	NA	2.1
CHROMIUM	7440-47-3	M	0.4	0.4	110	11	50	50	2	2	2
CHRYSENE	218-01-9	OS	0.69	5	9.2	NA	NA	300	NA	300	9.2
CIS-1,2-DICHLOROETHENE	156-59-2	OV	0.11	1	61	NA	NA	224000	11600	11600	61
CIS-1,3-DICHLOROPROPENE	10061-01-5	OV	0.09	1	**0.44**	NA	NA	790	244	244	**0.44**
COBALT	7440-48-4	M	0.2	0.2	730	NA	NA	NA	35000	35000	730
COPPER	7440-50-8	M	0.4	0.4	1500	9	3.1	2.9	6.5	2.9	2.9

TABLE 1-5

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MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL) (UG/L)	LABORATORY REPORTING LIMIT (RL) (UG/L)	EPA REGION 3 RBC-TAP WATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-FRESHWATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-SALTWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-FRESHWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-MARINE (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)	MINIMUM OVERALL CRITERIA (UG/L)
CYANIDE	57-12-5	M	3	3	730	5.2	1	1	5.2	1	1
CYCLOHEXANE	110-82-7	OV	NA	NA	NA	NA	NA	NA	NA	NA	NA
DELTA-BHC	319-86-8	PEST/PCB	0.00433	0.01	0.011	NA	NA	NA	NA	NA	0.011
DIBENZO(A,H)ANTHRACENE	53-70-3	OS	0.34	5	0.0092	NA	NA	300	NA	300	0.0092
DIBENZOFURAN	132-64-9	OS	0.68	5	24	NA	NA	NA	NA	NA	24
DICHLORODIFLUOROMETHANE	75-71-8	OV	NA	NA	350	NA	NA	6400	11000	6400	350
DIELDRIN	60-57-1	PEST/PCB	0.00057	0.02	**0.0042**	0.056	**0.0019**	**0.0019**	**0.0019**	**0.0019**	**0.0019**
DIESEL RANGE ORGANICS	TTNUS004	PET	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIETHYL ETHER	60-29-7	OV	NA	1	1200	NA	NA	NA	NA	NA	1200
DIETHYL PHTHALATE	84-66-2	OS	0.78	5	29000	NA	NA	**3.4**	**3**	**3**	**3**
DIMETHYL PHTHALATE	131-11-3	OS	0.6	5	370000	NA	NA	**3.4**	**3**	**3**	**3**
DI-N-BUTYL PHTHALATE	84-74-2	OS	0.7	5	3700	NA	NA	**3.4**	0.3	0.3	0.3
DI-N-OCTYL PHTHALATE	117-84-0	OS	0.73	5	730	NA	NA	**3.4**	0.3	0.3	0.3
DISSOLVED OXYGEN	TTNUS034	MISC	NA	NA	NA	NA	NA	NA	NA	NA	NA
ENDOSULFAN I	959-98-8	PEST/PCB	0.00021	0.01	220	0.056	**0.0087**	**0.0087**	0.056	**0.0087**	**0.0087**
ENDOSULFAN II	33213-65-9	PEST/PCB	0.00172	0.02	220	0.056	**0.0087**	**0.0087**	0.056	**0.0087**	**0.0087**
ENDOSULFAN SULFATE	1031-07-8	PEST/PCB	0.00114	0.02	220	NA	NA	NA	NA	NA	220
ENDRIN	72-20-8	PEST/PCB	0.00127	0.02	11	0.036	**0.0023**	**0.0023**	**0.0023**	**0.0023**	**0.0023**
ENDRIN ALDEHYDE	7421-93-4	PEST/PCB	0.00163	0.02	11	NA	NA	NA	NA	NA	11
ENDRIN KETONE	53494-70-5	PEST/PCB	0.00092	0.02	11	NA	NA	NA	NA	NA	11
ETHYLBENZENE	100-41-4	OV	0.05	1	3.3	NA	NA	430	32000	430	3.3
FLUORANTHENE	206-44-0	OS	0.58	5	1500	NA	NA	16	3980	16	16
FLUORENE	86-73-7	OS	0.79	5	240	NA	NA	300	430	300	240
FLUORIDE	16984-48-8	MISC	51	100	NA	NA	NA	NA	2000	2000	2000
GAMMA-BHC (LINDANE)	58-89-9	PEST/PCB	0.00168	0.01	0.052	NA	NA	0.16	0.08	0.08	0.052
GAMMA-CHLORDANE	5103-74-2	PEST/PCB	0.0002	0.01	0.19	NA	NA	NA	0.19	NA	NA
GASOLINE RANGE ORGANICS	TTNUS005	PET	NA	NA	NA	NA	NA	NA	NA	NA	NA
HARDNESS	TTNUS022	MISC	4000	5000	NA	NA	NA	NA	NA	NA	NA
HEPTACHLOR	76-44-8	PEST/PCB	0.00401	0.01	0.015	0.0038	0.0036	0.0036	0.0038	0.0036	0.0036
HEPTACHLOR EPOXIDE	1024-57-3	PEST/PCB	0.00027	0.01	**0.0074**	**0.0038**	**0.0036**	**0.0036**	**0.0038**	**0.0036**	**0.0036**
HEXACHLOROBENZENE	118-74-1	OS	0.76	5	0.042	NA	NA	129	**3.68**	**3.68**	0.042
HEXACHLOROBUTADIENE	87-68-3	OS	0.6	5	**0.86**	NA	NA	32	9.3	9.3	**0.86**
HEXACHLOROCYCLOPENTADIENE	77-47-4	OS	0.84	5	220	NA	NA	7	5.2	5.2	5.2
HEXACHLOROETHANE	67-72-1	OS	0.85	5	**4.8**	NA	NA	940	540	540	**4.8**
HMX	2691-41-0	EXP	0.068	0.1	1800	NA	NA	NA	NA	NA	330
INDENO(1,2,3-CD)PYRENE	193-39-5	OS	0.56	5	0.092	NA	NA	300	NA	300	0.092
IRON	7439-89-6	M	1	1	11000	1000	NA	NA	320	320	320

TABLE 1-5

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SURFACE WATER SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL) (UG/L)	LABORATORY REPORTING LIMIT (RL) (UG/L)	EPA REGION 3 RBC-TAP WATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-FRESHWATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-SALTWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-FRESHWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-MARINE (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)	MINIMUM OVERALL CRITERIA (UG/L)
ISOPHORONE	78-59-1	OS	0.7	5	70	NA	NA	12900	117000	12900	70
ISOPROPYLBENZENE	98-82-8	OV	NA	NA	660	NA	NA	NA	NA	NA	660
LEAD	7439-92-1	M	1.2	1.2	15	2.5	8.1	5.1	3.2	2.5	2.5
LOW MOLECULAR WEIGHT PAHS	TTNUS076	OS	NA	NA	NA	NA	NA	NA	NA	NA	NA
MAGNESIUM	7439-95-4	M	6	6	NA	NA	NA	NA	NA	NA	NA
MANGANESE	7439-96-5	M	0.1	0.1	730	NA	NA	10	14500	10	10
MERCURY	7439-97-6	M	0.1	0.1	11	0.77	0.94	0.025	0.012	0.012	0.012
METHOXYCHLOR	72-43-5	PEST/PCB	0.00661	0.1	180	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**	**0.03**
METHYL ACETATE	79-20-9	OV	NA	NA	6100	NA	NA	NA	NA	NA	6100
METHYL CYCLOHEXANE	108-87-2	OV	NA	NA	6300	NA	NA	NA	NA	NA	6300
METHYL TERT-BUTYL ETHER	1634-04-4	OV	NA	NA	2.6	NA	NA	NA	NA	NA	2.6
METHYLENE CHLORIDE	75-09-2	OV	0.25	2	4.1	NA	NA	6400	11000	6400	4.1
NAPHTHALENE	91-20-3	OS	0.75	5	6.5	NA	NA	2300	100	100	6.5
NICKEL	7440-02-0	M	0.2	0.2	730	52	8.2	8.3	160	8.2	8.2
NITRATE	14797-55-8	MISC	5	50	58000	NA	NA	NA	NA	NA	58000
NITRITE	14797-65-0	MISC	7	50	3700	NA	NA	NA	NA	NA	3700
NITROBENZENE	98-95-3	EXP	0.047	0.1	3.5	NA	NA	6680	27000	6680	3.5
NITROBENZENE	98-95-3	OS	3.8	5	3.5	NA	NA	6680	27000	6680	3.5
NITROCELLULOSE	9004-70-0	EXP	0.37	500	NA	NA	NA	NA	NA	NA	NA
NITROGLYCERIN	55-63-0	EXP	0.078	0.65	4.8	NA	NA	NA	NA	NA	4.8
NITROGUANIDINE	556-88-7	EXP	8	20	NA	NA	NA	NA	NA	NA	NA
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	OS	0.95	5	0.0096	NA	NA	NA	NA	NA	0.0096
N-NITROSODIPHENYLAMINE	86-30-6	OS	0.85	5	14	NA	NA	3300000	5850	5850	14
PENTACHLOROPHENOL	87-86-5	OS	0.69	20	0.56	**15**	**7.9**	**7.9**	**13**	**7.9**	0.56
PERCHLORATE	14797-73-0	MISC	2	4	**3.6**	NA	NA	NA	NA	NA	**3.6**
PH	TTNUS002	MISC	NA	NA	NA	6.5-9	6.5-8.5	NA	NA	6.5-8.5	6.5-8.5
PHENANTHRENE	85-01-8	OS	0.6	5	180	NA	NA	**4.6**	6.3	**4.6**	**4.6**
PHENOL	108-95-2	OS	0.55	5	11000	NA	NA	5800	79	79	79
POTASSIUM	7440-09-7	M	49.7	49.7	NA	NA	NA	NA	NA	NA	NA
PYRENE	129-00-0	OS	0.73	5	180	NA	NA	300	NA	300	180
RDX	121-82-4	EXP	0.026	0.1	0.61	NA	NA	NA	NA	NA	0.61
SALINITY	TTNUS036	MISC	NA	NA	NA	NA	NA	NA	NA	NA	NA
SELENIUM	7782-49-2	M	4.3	4.3	180	5	71	35	5	5	5
SILVER	7440-22-4	M	0.6	0.6	180	NA	NA	0.0001	0.0001	0.0001	0.0001
SODIUM	7440-23-5	M	95.2	95.2	NA	NA	NA	NA	NA	NA	NA
SPECIFIC CONDUCTANCE	TTNUS038	MISC	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE	100-42-5	OV	0.07	1	1600	NA	NA	NA	NA	NA	1600

TABLE 1-5

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SURFACE WATER SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL) (UG/L)	LABORATORY REPORTING LIMIT (RL) (UG/L)	EPA REGION 3 RBC-TAP WATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-FRESHWATER (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA-SALTWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-FRESHWATER (UG/L)	EPA REGION 3 BTAG SURFACE WATER CRITERIA-MARINE (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)	MINIMUM OVERALL CRITERIA (UG/L)
SULFATE	14808-79-8	MISC	500	1000	NA	NA	NA	NA	NA	NA	NA
TEMPERATURE	TTNUS047	MISC	NA	NA	NA	NA	NA	NA	NA	NA	NA
TETRACHLOROETHENE	127-18-4	OV	0.08	1	**0.63**	NA	NA	450	840	450	**0.63**
TETRYL	479-45-8	EXP	0.023	0.1	370	NA	NA	NA	NA	NA	370
THALLIUM	7440-28-0	M	3.9	3.9	2.6	NA	NA	2130	40	40	2.6
TOLUENE	108-88-3	OV	0.05	1	750	NA	NA	1050	17000	1050	750
TOTAL DISSOLVED SOLIDS	TTNUS040	MISC	10000	10000	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON	TTNUS003	MISC	5000	1000	NA	NA	NA	NA	NA	NA	NA
TOTAL PAHS	TTNUS072	OS	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL SUSPENDED SOLIDS	TTNUS044	MISC	10000	5000	NA	NA	NA	NA	NA	NA	NA
TOTAL XYLENES	1330-20-7	OV	0.19	1	12000	NA	NA	6000	6000	6000	6000
TOXAPHENE	8001-35-2	PEST/PCB	0.0259	1	**0.061**	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
TRANS-1,2-DICHLOROETHENE	156-60-5	OV	0.13	1	120	NA	NA	224000	11600	11600	120
TRANS-1,3-DICHLOROPROPENE	10061-02-6	OV	0.07	1	**0.44**	NA	NA	790	244	244	**0.44**
TRICHLOROETHENE	79-01-6	OV	0.06	1	0.026	NA	NA	2000	21900	2000	0.026
TRICHLOROFLUOROMETHANE	75-69-4	OV	NA	NA	1300	NA	NA	6400	11000	6400	1300
VANADIUM	7440-62-2	M	0.4	0.4	260	NA	NA	10000	10000	10000	260
VINYL CHLORIDE	75-01-4	OV	0.13	1	0.015	NA	NA	224000	11600	11600	0.015
ZINC	7440-66-6	M	0.7	0.7	11000	120	81	19	30	19	19

TABLE 1-6

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SURFACE WATER
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUQNTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC TAP WATER CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-TAP WATER CRITERIA (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)
	Volatile Organics										
71-55-6	1,1,1-TRICHLOROETHANE	UG/L	OV	0/38	0	0	1 - 10		1.94737	3200	9400
79-34-5	1,1,2,2-TETRACHLOROETHANE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.053	NA
79-00-5	1,1,2-TRICHLOROETHANE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.19	9400
76-13-1	1,1,2-TRICHLOROTRIFLUOROETHANE	UG/L	OV	0/4	0	0	10		10	59000	NA
75-34-3	1,1-DICHLOROETHANE	UG/L	OV	0/38	0	0	1 - 10		1.94737	800	160000
75-35-4	1,1-DICHLOROETHENE	UG/L	OV	0/38	0	0	1 - 10		1.94737	350	11600
120-82-1	1,2,4-TRICHLOROBENZENE	UG/L	OV	0/38	4	0	1 - 10		1.94737	7.2	50
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	UG/L	OV	0/10	10	0	1 - 10		1.97297	0.047	NA
106-93-4	1,2-DIBROMOETHANE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.00075	18000
95-50-1	1,2-DICHLOROBENZENE	UG/L	OV	0/38	0	0	1 - 10		1.94737	270	129
107-06-2	1,2-DICHLOROETHANE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.12	20000
78-87-5	1,2-DICHLOROPROPANE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.16	3040
541-73-1	1,3-DICHLOROBENZENE	UG/L	OV	0/38	0	0	1 - 10		1.94737	180	763
106-46-7	1,4-DICHLOROBENZENE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.47	129
78-93-3	2-BUTANONE	UG/L	OV	0/4	0	0	10		5.54054	1900	3220000
591-78-6	2-HEXANONE	UG/L	OV	0/38	0	0	5 - 10		5.52632	1500	428000
108-10-1	4-METHYL-2-PENTANONE	UG/L	OV	0/38	0	0	5 - 10		5.52632	140	460000
67-64-1	ACETONE	UG/L	OV	1/5	0	0	10	MTCSW00801	5.55556	610	9000000
71-43-2	BENZENE	UG/L	OV	5/38	33	0	1 - 10	MTCSW01001	2.09091	0.32	700
74-97-5	BROMOCHLOROMETHANE	UG/L	OV	0/34	0	0	1		1	NA	6400
75-27-4	BROMODICHLOROMETHANE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.17	6400
75-25-2	BROMOFORM	UG/L	OV	1/38	4	0	1 - 10	MTCSW00301	1.97297	8.5	1000
74-83-9	BROMOMETHANE	UG/L	OV	0/38	4	0	1 - 10		1.94737	8.5	NA
75-15-0	CARBON DISULFIDE	UG/L	OV	0/38	0	4	1 - 10		1.94737	1000	2
56-23-5	CARBON TETRACHLORIDE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.16	35200
108-90-7	CHLOROBENZENE	UG/L	OV	0/38	0	0	1 - 10		1.94737	110	50
124-48-1	CHLORODIBROMOMETHANE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.13	6400
75-00-3	CHLOROETHANE	UG/L	OV	0/38	4	0	1 - 10		1.94737	3.6	NA
67-66-3	CHLOROFORM	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.15	1240
74-87-3	CHLOROMETHANE	UG/L	OV	0/38	4	0	1 - 10		1.94737	2.1	NA
156-59-2	CIS-1,2-DICHLOROETHENE	UG/L	OV	1/38	0	0	1 - 10	MTCSW02101	1.97297	61	11600
10061-01-5	CIS-1,3-DICHLOROPROPENE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.44	244
110-82-7	CYCLOHEXANE	UG/L	OV	0/4	0	0	10		10	NA	NA
75-71-8	DICHLORODIFLUOROMETHANE	UG/L	OV	0/4	0	0	10		10	350	6400
60-29-7	DIETHYL ETHER	UG/L	OV	1/28	0	0	1 - 10	MTCSW02101	1.33333	1200	NA
100-41-4	ETHYLBENZENE	UG/L	OV	5/38	4	0	1 - 10	MTCSW01001	2.09091	3.3	430
98-82-8	ISOPROPYLBENZENE	UG/L	OV	0/4	0	0	10		10	660	NA
79-20-9	METHYL ACETATE	UG/L	OV	0/4	0	0	10		10	6100	NA
108-87-2	METHYL CYCLOHEXANE	UG/L	OV	0/4	0	0	10		10	6300	NA

TABLE 1-6

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SURFACE WATER
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUQNTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC TAP WATER CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-TAP WATER CRITERIA (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)
1634-04-4	METHYL TERT-BUTYL ETHER	UG/L	OV	1/4	3	0	10	IS11SW01	10	2.6	NA
75-09-2	METHYLENE CHLORIDE	UG/L	OV	0/38	4	0	1 - 10		2.68421	4.1	6400
100-42-5	STYRENE	UG/L	OV	0/38	0	0	1 - 10		1.94737	1600	NA
127-18-4	TETRACHLOROETHENE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.63	450
108-88-3	TOLUENE	UG/L	OV	8/38	0	0	1 - 10	MTCSW01501	2.2	750	1050
1330-20-7	TOTAL XYLENES	UG/L	OV	7/38	0	0	1 - 10	MTCSW01001	2.16129	12000	6000
156-60-5	TRANS-1,2-DICHLOROETHENE	UG/L	OV	0/38	0	0	1 - 10		1.94737	120	11600
10061-02-6	TRANS-1,3-DICHLOROPROPENE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.44	244
79-01-6	TRICHLOROETHENE	UG/L	OV	2/38	36	0	1 - 10	MTCSW02101	2	0.026	2000
75-69-4	TRICHLOROFLUOROMETHANE	UG/L	OV	0/4	0	0	10		10	1300	6400
75-01-4	VINYL CHLORIDE	UG/L	OV	0/38	38	0	1 - 10		1.94737	0.015	11600
	Semivolatile Organics										
92-52-4	1,1-BIPHENYL	UG/L	OS	0/4	0	0	10		10	300	NA
108-60-1	2,2'-OXYBIS(1-CHLOROPROPANE)	UG/L	OS	0/38	38	0	5 - 10		5.55263	0.26	NA
95-95-4	2,4,5-TRICHLOROPHENOL	UG/L	OS	0/38	0	38	20 - 25		20.60526	3700	11
88-06-2	2,4,6-TRICHLOROPHENOL	UG/L	OS	0/38	4	0	5 - 10		5.55263	6.1	970
120-83-2	2,4-DICHLOROPHENOL	UG/L	OS	0/38	0	0	5 - 10		5.55263	110	365
105-67-9	2,4-DIMETHYLPHENOL	UG/L	OS	0/38	0	0	5 - 10		5.55263	730	2120
51-28-5	2,4-DINITROPHENOL	UG/L	OS	0/34	0	0	20 - 22		20.60526	73	150
121-14-2	2,4-DINITROTOLUENE	UG/L	OS	0/6	0	0	5 - 6		5.16667	73	230
606-20-2	2,6-DINITROTOLUENE	UG/L	OS	0/6	0	0	5 - 6		5.16667	37	NA
91-58-7	2-CHLORONAPHTHALENE	UG/L	OS	0/38	0	4	5 - 10		5.55263	490	7.5
95-57-8	2-CHLOROPHENOL	UG/L	OS	0/38	0	0	5 - 10		5.55263	30	970
91-57-6	2-METHYLNAPHTHALENE	UG/L	OS	1/38	0	0	5 - 10	MTCSW01001	5.56757	120	300
95-48-7	2-METHYLPHENOL	UG/L	OS	0/38	0	0	5 - 10		5.55263	1800	NA
88-74-4	2-NITROANILINE	UG/L	OS	0/38	0	0	20 - 25		20.60526	NA	NA
88-75-5	2-NITROPHENOL	UG/L	OS	0/38	0	0	5 - 10		5.55263	290	NA
91-94-1	3,3'-DICHLOROBENZIDINE	UG/L	OS	0/38	38	0	5 - 10		5.55263	0.15	NA
99-09-2	3-NITROANILINE	UG/L	OS	0/38	38	0	20 - 25		20.60526	3.3	NA
534-52-1	4,6-DINITRO-2-METHYLPHENOL	UG/L	OS	0/38	38	0	20 - 25		20.60526	3.7	NA
101-55-3	4-BROMOPHENYL PHENYL ETHER	UG/L	OS	0/38	0	0	5 - 10		5.55263	NA	NA
59-50-7	4-CHLORO-3-METHYLPHENOL	UG/L	OS	0/38	0	0	5 - 10		5.55263	NA	NA
106-47-8	4-CHLOROANILINE	UG/L	OS	0/38	0	0	5 - 10		5.55263	150	29700
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	UG/L	OS	0/38	0	0	5 - 10		5.55263	NA	NA
106-44-5	4-METHYLPHENOL	UG/L	OS	0/38	0	0	5 - 10		5.55263	180	NA
100-01-6	4-NITROANILINE	UG/L	OS	0/38	38	0	20 - 25		20.60526	3.3	NA
100-02-7	4-NITROPHENOL	UG/L	OS	0/38	0	0	20 - 25		20.60526	290	150
83-32-9	ACENAPHTHENE	UG/L	OS	0/38	0	0	5 - 10		5.55263	370	520
208-96-8	ACENAPHTHYLENE	UG/L	OS	0/38	0	0	5 - 10		5.55263	370	300
98-86-2	ACETOPHENONE	UG/L	OS	0/4	4	0	10		10	0.042	NA

TABLE 1-6

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SURFACE WATER
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUQNTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC TAP WATER CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-TAP WATER CRITERIA (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)
120-12-7	ANTHRACENE	UG/L	OS	0/38	0	38	5 - 10		5.55263	1800	0.1
1912-24-9	ATRAZINE	UG/L	OS	0/4	4	0	10		10	0.3	NA
100-52-7	BENZALDEHYDE	UG/L	OS	0/4	0	0	10		10	3700	NA
56-55-3	BENZO(A)ANTHRACENE	UG/L	OS	0/38	38	4	5 - 10		5.55263	0.092	6.3
50-32-8	BENZO(A)PYRENE	UG/L	OS	0/38	38	38	5 - 10		5.55263	0.0092	0.21
205-99-2	BENZO(B)FLUORANTHENE	UG/L	OS	0/38	38	0	5 - 10		5.55263	0.092	300
191-24-2	BENZO(G,H,I)PERYLENE	UG/L	OS	0/38	0	0	5 - 10		5.55263	180	300
207-08-9	BENZO(K)FLUORANTHENE	UG/L	OS	0/38	38	0	5 - 10		5.55263	0.92	300
111-91-1	BIS(2-CHLOROETHOXY)METHANE	UG/L	OS	0/38	0	0	5 - 10		5.55263	NA	6400
111-44-4	BIS(2-CHLOROETHYL)ETHER	UG/L	OS	0/38	38	0	5 - 10		5.55263	0.0096	NA
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	IS11SW01	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	MTCSW00501	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	MTCSW02301-D	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	MTCSW02601	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	S39SW0020001	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	S39SW0040001	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	MTCSW02401	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	IS11SW01	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	MTCSW00501	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	MTCSW02301-D	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	MTCSW02601	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	S39SW0020001	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	S39SW0040001	5.48387	4.8	30
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	OS	7/38	31	0	5 - 10	MTCSW02401	5.48387	4.8	30
85-68-7	BUTYL BENZYL PHTHALATE	UG/L	OS	0/38	0	38	5 - 10		5.55263	7300	3
105-60-2	CAPROLACTAM	UG/L	OS	0/4	0	0	10		10	18000	NA
86-74-8	CARBAZOLE	UG/L	OS	0/4	4	0	10		10	3.3	NA
218-01-9	CHRYSENE	UG/L	OS	0/38	4	0	5 - 10		5.55263	9.2	300
84-74-2	DI-N-BUTYL PHTHALATE	UG/L	OS	0/38	0	38	3 - 14		5.76316	3700	0.3
117-84-0	DI-N-OCTYL PHTHALATE	UG/L	OS	0/38	0	38	5 - 10		5.55263	730	0.3
53-70-3	DIBENZO(A,H)ANTHRACENE	UG/L	OS	0/38	38	0	5 - 10		5.55263	0.0092	300
132-64-9	DIBENZOFURAN	UG/L	OS	0/38	0	0	5 - 10		5.55263	24	NA
84-66-2	DIETHYL PHTHALATE	UG/L	OS	0/38	0	38	5 - 10		5.55263	29000	3
131-11-3	DIMETHYL PHTHALATE	UG/L	OS	0/38	0	38	5 - 10		5.55263	370000	3
206-44-0	FLUORANTHENE	UG/L	OS	0/38	0	0	5 - 10		5.55263	1500	16
86-73-7	FLUORENE	UG/L	OS	0/38	0	0	5 - 10		5.55263	240	300
118-74-1	HEXACHLOROBENZENE	UG/L	OS	0/38	38	38	5 - 10		5.55263	0.042	3.68
87-68-3	HEXACHLOROBUTADIENE	UG/L	OS	0/38	38	4	5 - 10		5.55263	0.86	9.3
77-47-4	HEXACHLOROCYCLOPENTADIENE	UG/L	OS	0/38	0	5	5 - 10		5.55263	220	5.2
67-72-1	HEXACHLOROETHANE	UG/L	OS	0/38	38	0	5 - 10		5.55263	4.8	540

TABLE 1-6

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SURFACE WATER
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUQNTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC TAP WATER CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-TAP WATER CRITERIA (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)
193-39-5	INDENO(1,2,3-CD)PYRENE	UG/L	OS	0/38	38	0	5 - 10		5.55263	0.092	300
78-59-1	ISOPHORONE	UG/L	OS	0/38	0	0	5 - 10		5.55263	70	12900
TTNUS076	LOW MOLECULAR WEIGHT PAHS	UG/L	OS	1/1	0	0	0	MTCSW01001	0	NA	NA
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	UG/L	OS	0/38	38	0	5 - 10		5.55263	0.0096	NA
86-30-6	N-NITROSODIPHENYLAMINE	UG/L	OS	0/38	0	0	5 - 10		5.55263	14	5850
91-20-3	NAPHTHALENE	UG/L	OS	1/38	4	0	5 - 10	MTCSW01001	5.56757	6.5	100
98-95-3	NITROBENZENE	UG/L	OS	0/7	7	0	5 - 10		5.85714	3.5	6680
87-86-5	PENTACHLOROPHENOL	UG/L	OS	0/38	38	38	20 - 25		20.60526	0.56	7.9
85-01-8	PHENANTHRENE	UG/L	OS	0/38	0	38	5 - 10		5.55263	180	4.6
108-95-2	PHENOL	UG/L	OS	0/38	0	0	5 - 10		5.55263	11000	79
129-00-0	PYRENE	UG/L	OS	0/38	0	0	5 - 10		5.55263	180	300
TTNUS072	TOTAL PAHS	UG/L	OS	1/1	0	0	0	MTCSW01001	0	NA	NA
	Pesticides/PCBs										
72-54-8	4,4'-DDD	UG/L	PEST/PCB	0/28	0	0	0.02		0.02	0.28	0.6
72-55-9	4,4'-DDE	UG/L	PEST/PCB	0/28	0	0	0.02		0.02	0.2	14
50-29-3	4,4'-DDT	UG/L	PEST/PCB	0/28	0	28	0.02		0.02	0.2	0.001
309-00-2	ALDRIN	UG/L	PEST/PCB	0/28	28	0	0.01		0.01	0.0039	1.3
319-84-6	ALPHA-BHC	UG/L	PEST/PCB	0/28	0	0	0.01		0.01	0.011	0.34
5103-71-9	ALPHA-CHLORDANE	UG/L	PEST/PCB	0/28	0	28	0.01		0.01	0.19	0.004
12674-11-2	AROCLOR-1016	UG/L	PEST/PCB	0/28	0	28	0.2		0.2	0.96	0.014
11104-28-2	AROCLOR-1221	UG/L	PEST/PCB	0/28	28	28	0.4		0.4	0.033	0.014
11141-16-5	AROCLOR-1232	UG/L	PEST/PCB	0/28	28	28	0.2		0.2	0.033	0.014
53469-21-9	AROCLOR-1242	UG/L	PEST/PCB	0/28	28	28	0.2		0.2	0.033	0.014
12672-29-6	AROCLOR-1248	UG/L	PEST/PCB	0/28	28	28	0.2		0.2	0.033	0.014
11097-69-1	AROCLOR-1254	UG/L	PEST/PCB	0/28	28	28	0.2		0.2	0.033	0.014
11096-82-5	AROCLOR-1260	UG/L	PEST/PCB	0/28	28	28	0.2		0.2	0.033	0.014
319-85-7	BETA-BHC	UG/L	PEST/PCB	0/28	0	0	0.01		0.01	0.037	0.34
319-86-8	DELTA-BHC	UG/L	PEST/PCB	0/28	1	0	0.01 - 0.02		0.01018	0.011	NA
60-57-1	DIELDRIN	UG/L	PEST/PCB	0/28	28	28	0.02		0.02	0.0042	0.0019
959-98-8	ENDOSULFAN I	UG/L	PEST/PCB	0/28	0	28	0.01		0.01	220	0.0087
33213-65-9	ENDOSULFAN II	UG/L	PEST/PCB	0/28	0	28	0.02		0.02	220	0.0087
1031-07-8	ENDOSULFAN SULFATE	UG/L	PEST/PCB	0/28	0	0	0.02		0.02	220	NA
72-20-8	ENDRIN	UG/L	PEST/PCB	0/28	0	28	0.02		0.02	11	0.0023
7421-93-4	ENDRIN ALDEHYDE	UG/L	PEST/PCB	0/28	0	0	0.02		0.02	11	NA
53494-70-5	ENDRIN KETONE	UG/L	PEST/PCB	0/28	0	0	0.02		0.02	11	NA
58-89-9	GAMMA-BHC (LINDANE)	UG/L	PEST/PCB	0/28	0	0	0.01		0.01	0.052	0.08
5103-74-2	GAMMA-CHLORDANE	UG/L	PEST/PCB	0/28	0	0	0.01		0.01	0.19	NA
76-44-8	HEPTACHLOR	UG/L	PEST/PCB	0/28	0	28	0.01		0.01	0.015	0.0036
1024-57-3	HEPTACHLOR EPOXIDE	UG/L	PEST/PCB	0/28	28	28	0.01		0.01	0.0074	0.0036
72-43-5	METHOXYCHLOR	UG/L	PEST/PCB	0/28	0	15	0.01 - 0.1		0.05821	180	0.03

TABLE 1-6

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SURFACE WATER
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUQNTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC TAP WATER CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-TAP WATER CRITERIA (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)
8001-35-2	TOXAPHENE	UG/L	PEST/PCB	0/28	28	28	1		1	0.061	0.0002
	Explosives										
99-35-4	1,3,5-TRINITROBENZENE	UG/L	EXP	0/38	0	0	0.1 - 0.2		0.12658	1100	NA
99-65-0	1,3-DINITROBENZENE	UG/L	EXP	1/38	0	0	0.1 - 0.2	IS11SW01	0.12459	3.7	1200
118-96-7	2,4,6-TRINITROTOLUENE	UG/L	EXP	0/38	0	0	0.1 - 0.2		0.12658	2.2	NA
121-14-2	2,4-DINITROTOLUENE	UG/L	EXP	0/38	0	0	0.1 - 0.2		0.12658	73	230
606-20-2	2,6-DINITROTOLUENE	UG/L	EXP	0/38	0	0	0.1 - 0.2		0.12658	37	NA
35572-78-2	2-AMINO-4,6-DINITROTOLUENE	UG/L	EXP	0/38	0	0	0.1 - 0.2		0.12658	2.2	NA
88-72-2	2-NITROTOLUENE	UG/L	EXP	0/38	0	0	0.2 - 0.56		0.42263	61	NA
99-08-1	3-NITROTOLUENE	UG/L	EXP	0/38	0	0	0.2 - 0.56		0.42263	120	NA
19406-51-0	4-AMINO-2,6-DINITROTOLUENE	UG/L	EXP	0/38	0	0	0.1 - 0.2		0.12658	NA	NA
99-99-0	4-NITROTOLUENE	UG/L	EXP	1/38	0	0	0.2 - 0.56	IS17SW02	0.42865	61	NA
2691-41-0	HMX	UG/L	EXP	1/38	0	0	0.1 - 0.5	MTCSW01001	0.20838	1800	NA
98-95-3	NITROBENZENE	UG/L	EXP	0/37	0	0	0.1 - 0.2		0.12459	3.5	6680
9004-70-0	NITROCELLULOSE	UG/L	EXP	0/28	0	0	500		500	NA	NA
55-63-0	NITROGLYCERIN	UG/L	EXP	0/38	10	0	0.65 - 30		8.37553	4.8	NA
556-88-7	NITROGUANIDINE	UG/L	EXP	0/38	0	0	20		20	NA	NA
78-11-5	PETN	UG/L	EXP	0/10	0	0	2.5		2.5	NA	NA
121-82-4	RDX	UG/L	EXP	0/38	0	0	0.1 - 0.5		0.20526	0.61	NA
479-45-8	TETRYL	UG/L	EXP	0/38	0	0	0.1 - 0.2		0.12632	370	NA
	Inorganics										
7429-90-5	ALUMINUM	UG/L	M	23/44	0	17	4.6 - 190	S39SW0020001-D	88.50238	37000	25
7440-36-0	ANTIMONY	UG/L	M	0/44	0	0	2.4 - 4.3		2.86705	15	30
7440-38-2	ARSENIC	UG/L	M	7/44	37	0	3.3 - 4.2	MTCSW02101	3.89189	0.045	10
7440-39-3	BARIUM	UG/L	M	44/44	0	0	0	S39SW0050001	0	2600	10000
7440-41-7	BERYLLIUM	UG/L	M	1/44	0	0	0.1 - 0.42	MTCSW00601	0.12988	73	5.3
7440-43-9	CADMIUM	UG/L	M	3/44	0	16	0.1 - 0.4	MTCSW02301-D	0.20244	18	0.25
7440-70-2	CALCIUM	UG/L	M	44/44	0	0	0	S39SW0030001	0	NA	NA
7440-47-3	CHROMIUM	UG/L	M	2/44	0	0	0.4 - 2.4	MTCSW00401	1.15238	110	2
7440-48-4	COBALT	UG/L	M	1/44	0	0	0.4 - 4.4	S39SW0020001-D	1.32605	730	35000
7440-50-8	COPPER	UG/L	M	8/44	0	16	1.1 - 9.1	MTCSW02101	3.30556	1500	2.9
57-12-5	CYANIDE	UG/L	M	5/44	0	38	0.98 - 10.3	MTCSW00501	3.39436	730	1
57-12-5	CYANIDE	UG/L	M	5/44	0	38	0.98 - 10.3	IS17SW02	3.39436	730	1
7439-89-6	IRON	UG/L	M	44/44	0	0	32.3 (1)	S39SW0020001-D	0	11000	320
7439-92-1	LEAD	UG/L	M	9/44	0	2	1.2 - 4.1	IS11SW01	1.44	15	2.5
7439-92-1	LEAD	UG/L	M	9/44	0	2	1.2 - 4.1	IS11SW01	1.44	15	2.5
7439-95-4	MAGNESIUM	UG/L	M	44/44	0	0	0	S39SW0030001	0	NA	NA
7439-96-5	MANGANESE	UG/L	M	44/44	0	0	1.6 (1)	S39SW0020001-D	0	730	10
7439-97-6	MERCURY	UG/L	M	0/44	0	44	0.1 - 0.15		0.12307	11	0.012
7440-02-0	NICKEL	UG/L	M	11/44	0	0	1.9 - 8.2	S39SW0020001-D	2.97424	730	8.2

TABLE 1-6

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SURFACE WATER
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUQNTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC TAP WATER CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-TAP WATER CRITERIA (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)
7440-09-7	POTASSIUM	UG/L	M	44/44	0	0	0	S39SW0010001	0	NA	NA
7440-09-7	POTASSIUM	UG/L	M	44/44	0	0	0	S39SW0030001	0	NA	NA
7440-09-7	POTASSIUM	UG/L	M	44/44	0	0	0	S39SW0040001	0	NA	NA
7782-49-2	SELENIUM	UG/L	M	1/44	2	2	2.8 - 860	IS17SW05	33.9407	180	5
7440-22-4	SILVER	UG/L	M	1/44	0	43	0.6 - 3.1	S39SW0020001-D	1.25698	180	0.0001
7440-23-5	SODIUM	UG/L	M	44/44	0	0	0	S39SW0030001	0	NA	NA
7440-28-0	THALLIUM	UG/L	M	0/44	44	0	2.9 - 5.3		4.08182	2.6	40
7440-62-2	VANADIUM	UG/L	M	35/44	0	0	0.99 - 2.1	MTCSW02101	1.32444	260	10000
7440-66-6	ZINC	UG/L	M	6/44	0	7	0.7 - 53.5	S39SW0050001	12.53816	11000	19
	Filtered Inorganics										
7429-90-5	ALUMINUM,FILTERED	UG/L	MF	0/38	0	10	4.6 - 199		19.75132	37000	25
7440-36-0	ANTIMONY,FILTERED	UG/L	MF	0/38	0	0	2.4 - 4.3		2.94737	15	30
7440-38-2	ARSENIC,FILTERED	UG/L	MF	4/38	34	0	3.6 - 4.2	MTCSW01201-F	4.02353	0.045	10
7440-39-3	BARIUM,FILTERED	UG/L	MF	36/38	0	0	22.4 - 80.3	MTCSW01901-F	51.05	2600	10000
7440-41-7	BERYLLIUM,FILTERED	UG/L	MF	1/38	0	0	0.1 - 0.2	IS17SW01	0.12432	73	5.3
7440-43-9	CADMIUM,FILTERED	UG/L	MF	16/38	0	11	0.1 - 0.5	MTCSW02501-F	0.2525	18	0.25
7440-70-2	CALCIUM,FILTERED	UG/L	MF	38/38	0	0	0	MTCSW02101-F	0	NA	NA
7440-47-3	CHROMIUM,FILTERED	UG/L	MF	1/38	0	1	0.46 - 4.4	MTCSW00201-F-D	1.21838	110	2
7440-48-4	COBALT,FILTERED	UG/L	MF	0/38	0	0	0.47 - 2.2		1.27487	730	35000
7440-50-8	COPPER,FILTERED	UG/L	MF	5/38	0	13	1 - 29.7	MTCSW02101-F	5.08939	1500	2.9
7439-89-6	IRON,FILTERED	UG/L	MF	10/38	0	0	12.8 - 74.9	IS17SW01	39.73393	11000	320
7439-92-1	LEAD,FILTERED	UG/L	MF	4/38	0	0	1.2 - 1.6	MTCSW02401-F	1.23824	15	2.5
7439-95-4	MAGNESIUM,FILTERED	UG/L	MF	36/38	0	0	5960 - 6050	MTCSW00401-F	6005	NA	NA
7439-96-5	MANGANESE,FILTERED	UG/L	MF	14/38	0	0	0.81 - 11.6	IS17SW01	2.83417	730	10
7439-97-6	MERCURY,FILTERED	UG/L	MF	0/38	0	38	0.1 - 0.15		0.12724	11	0.012
7440-02-0	NICKEL,FILTERED	UG/L	MF	5/38	0	0	1.8 - 6.8	IS17SW01	2.91061	730	8.2
7440-09-7	POTASSIUM,FILTERED	UG/L	MF	38/38	0	0	0	MTCSW00401-F	0	NA	NA
7440-09-7	POTASSIUM,FILTERED	UG/L	MF	38/38	0	0	0	MTCSW02101-F	0	NA	NA
7782-49-2	SELENIUM,FILTERED	UG/L	MF	1/38	0	0	4.3	IS17SW04	4.3	180	5
7440-22-4	SILVER,FILTERED	UG/L	MF	0/38	0	38	0.6 - 3.1		1.29079	180	0.0001
7440-23-5	SODIUM,FILTERED	UG/L	MF	38/38	0	0	0	MTCSW01001-F	0	NA	NA
7440-28-0	THALLIUM,FILTERED	UG/L	MF	0/38	38	0	3.9 - 5.3		4.26842	2.6	40
7440-62-2	VANADIUM,FILTERED	UG/L	MF	26/38	0	0	0.4 - 1.4	MTCSW02101-F	1.25375	260	10000
7440-66-6	ZINC,FILTERED	UG/L	MF	1/38	0	11	5.3 - 119	IS17SW04	16.8027	11000	19
	Miscellaneous Parameters										
7790-98-9	AMMONIUM PERCHLORATE	UG/L	MISC	3/10	0	0	4	IS11SW04	4	NA	NA
16887-00-6	CHLORIDE	UG/L	MISC	28/28	0	0	0	MTCSW02301	0	NA	230000
TTNUS004	DIESEL RANGE ORGANICS	UG/L	MISC	4/4	0	0	0	IS11SW01	0	NA	NA
TTNUS004	DIESEL RANGE ORGANICS	UG/L	MISC	4/4	0	0	0	IS11SW02	0	NA	NA
16984-48-8	FLUORIDE	UG/L	MISC	28/28	0	0	0	MTCSW01301	0	NA	2000

TABLE 1-6

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SURFACE WATER
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUQNTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC TAP WATER CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-TAP WATER CRITERIA (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)
16984-48-8	FLUORIDE	UG/L	MISC	28/28	0	0	0	MTCSW01401	0	NA	2000
16984-48-8	FLUORIDE	UG/L	MISC	28/28	0	0	0	MTCSW02101	0	NA	2000
16984-48-8	FLUORIDE	UG/L	MISC	28/28	0	0	0	MTCSW02301	0	NA	2000
16984-48-8	FLUORIDE	UG/L	MISC	28/28	0	0	0	MTCSW02301-D	0	NA	2000
TTNUS005	GASOLINE RANGE ORGANICS	UG/L	MISC	0/4	0	0	100		100	NA	NA
TTNUS022	HARDNESS	UG/L	MISC	33/34	0	0	61000	MTCSW00101	61000	NA	NA
14797-55-8	NITRATE	UG/L	MISC	5/23	0	0	50	MTCSW02101	50	58000	NA
14797-65-0	NITRITE	UG/L	MISC	0/23	0	0	50 - 250		57.14286	3700	NA
14797-73-0	PERCHLORATE	UG/L	MISC	3/38	28	0	3.39 - 5	IS11SW04	4.678	3.6	NA
TTNUS002	PH	S.U.	MISC	28/28	0	0	0	MTCSW03001	0	NA	6.5
14808-79-8	SULFATE	UG/L	MISC	28/28	0	0	0	MTCSW01201	0	NA	NA
TTNUS040	TOTAL DISSOLVED SOLIDS	UG/L	MISC	27/27	0	0	0	MTCSW00401	0	NA	NA
TTNUS003	TOTAL ORGANIC CARBON	UG/L	MISC	27/27	0	0	0	MTCSW00901	0	NA	NA
TTNUS044	TOTAL SUSPENDED SOLIDS	UG/L	MISC	9/27	0	0	10000	MTCSW00501	10000	NA	NA
	Field Parameters										
TTNUS034	DISSOLVED OXYGEN,FIELD	UG/L	FIELD	28/28	0	0	0	MTCSW02601	0	NA	NA
TTNUS002	PH,FIELD	S.U.	FIELD	28/28	0	0	0	MTCSW00601	0	NA	6.5
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00101	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00201	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00301	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00401	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00501	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00601	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00701	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00801	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW00901	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01001	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01101	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01201	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01301	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01401	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01501	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01601	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01701	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01801	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW01901	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW02001	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW02101	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW02201	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW02301	0	NA	NA

TABLE 1-6

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SURFACE WATER
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUQNTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC TAP WATER CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-TAP WATER CRITERIA (UG/L)	MINIMUM ECOLOGICAL CRITERIA (UG/L)
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW02401	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW02501	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW02601	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW02901	0	NA	NA
TTNUS036	SALINITY,FIELD	%	FIELD	28/28	0	0	0	MTCSW03001	0	NA	NA
TTNUS038	SPECIFIC CONDUCTANCE,FIELD	MS/CM	FIELD	28/28	0	0	0	MTCSW00701	0	NA	NA
TTNUS047	TEMPERATURE,FIELD	C	FIELD	28/28	0	0	0	MTCSW00701	0	NA	NA

Footnotes:
1 One sample in the duplicate pair is a non-detect.

TABLE 1-7

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SEDIMENT SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	EPA REGION 3 RBC-SOIL RESIDENTIAL	UNITS	EPA REGION 3 BTAG SEDIMENT CRITERIA	UNITS	MINIMUM ECOLOGICAL CRITERIA	UNITS	MINIMUM OVERALL CRITERIA	UNITS
1,1,1-TRICHLOROETHANE	71-55-6	OV	0.11	10	UG/KG	22000000	UG/KG	31	UG/KG	31	UG/KG	31	UG/KG
1,1,2,2-TETRACHLOROETHANE	79-34-5	OV	0.61	10	UG/KG	3200	UG/KG	NA		NA		3200	UG/KG
1,1,2-TRICHLOROETHANE	79-00-5	OV	0.13	10	UG/KG	11000	UG/KG	31	UG/KG	31	UG/KG	31	UG/KG
1,1,2-TRICHLOROTRIFLUOROETHANE	76-13-1	OV	10	10	UG/KG	2300000000	UG/KG	NA		NA		2300000000	UG/KG
1,1-BIPHENYL	92-52-4	OS	330	330	UG/KG	3900000	UG/KG	NA		NA		3900000	UG/KG
1,1-DICHLOROETHANE	75-34-3	OV	0.05	10	UG/KG	7800000	UG/KG	NA		NA		7800000	UG/KG
1,1-DICHLOROETHENE	75-35-4	OV	0.15	10	UG/KG	3900000	UG/KG	NA		NA		3900000	UG/KG
1,2,4-TRICHLOROBENZENE	120-82-1	OV	0.41	10	UG/KG	780000	UG/KG	40	UG/KG	40	UG/KG	40	UG/KG
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8	OV	0.94	10	UG/KG	460	UG/KG	NA		NA		460	UG/KG
1,2-DIBROMOETHANE	106-93-4	OV	0.1	10	UG/KG	**7.5**	UG/KG	NA		NA		**7.5**	UG/KG
1,2-DICHLOROBENZENE	95-50-1	OV	0.12	10	UG/KG	7000000	UG/KG	35	UG/KG	35	UG/KG	35	UG/KG
1,2-DICHLOROETHANE	107-06-2	OV	0.12	10	UG/KG	7000	UG/KG	NA		NA		7000	UG/KG
1,2-DICHLOROPROPANE	78-87-5	OV	0.1	10	UG/KG	9400	UG/KG	NA		NA		9400	UG/KG
1,3,5-TRINITROBENZENE	99-35-4	EXP	15	250	UG/KG	2300000	UG/KG	2	UG/KG	2	UG/KG	2	UG/KG
1,3-DICHLOROBENZENE	541-73-1	OV	0.14	10	UG/KG	2300000	UG/KG	NA		NA		2300000	UG/KG
1,3-DINITROBENZENE	99-65-0	EXP	17	250	UG/KG	7800	UG/KG	7	UG/KG	7	UG/KG	7	UG/KG
1,4-DICHLOROBENZENE	106-46-7	OV	0.18	10	UG/KG	27000	UG/KG	110	UG/KG	110	UG/KG	110	UG/KG
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	OS	4.8	330	UG/KG	9100	UG/KG	NA		NA		9100	UG/KG
2,4,5-TRICHLOROPHENOL	95-95-4	OS	4.1	830	UG/KG	7800000	UG/KG	NA		NA		7800000	UG/KG
2,4,6-TRICHLOROPHENOL	88-06-2	OS	8.8	330	UG/KG	58000	UG/KG	NA		NA		58000	UG/KG
2,4,6-TRINITROTOLUENE	118-96-7	EXP	31	250	UG/KG	21000	UG/KG	**90**	UG/KG	**90**	UG/KG	**90**	UG/KG
2,4-DICHLOROPHENOL	120-83-2	OS	7.6	330	UG/KG	230000	UG/KG	NA		NA		230000	UG/KG
2,4-DIMETHYLPHENOL	105-67-9	OS	14	330	UG/KG	1600000	UG/KG	**29**	UG/KG	**29**	UG/KG	**29**	UG/KG
2,4-DINITROPHENOL	51-28-5	OS	36	830	UG/KG	160000	UG/KG	NA		NA		160000	UG/KG
2,4-DINITROTOLUENE	121-14-2	EXP	28	250	UG/KG	160000	UG/KG	NA		NA		160000	UG/KG
2,4-DINITROTOLUENE	121-14-2	OS	5.1	330	UG/KG	160000	UG/KG	NA		NA		160000	UG/KG
2,6-DINITROTOLUENE	606-20-2	EXP	70	250	UG/KG	78000	UG/KG	294	UG/KG	294	UG/KG	294	UG/KG
2,6-DINITROTOLUENE	606-20-2	OS	16	330	UG/KG	78000	UG/KG	**294**	UG/KG	**294**	UG/KG	**294**	UG/KG
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	EXP	65	250	UG/KG	4700	UG/KG	NA		NA		4700	UG/KG
2-BUTANONE	78-93-3	OV	1.1	10	UG/KG	47000000	UG/KG	9330	UG/KG	9330	UG/KG	9330	UG/KG
2-CHLORONAPHTHALENE	91-58-7	OS	3.3	330	UG/KG	6300000	UG/KG	NA		NA		6300000	UG/KG
2-CHLOROPHENOL	95-57-8	OS	6	330	UG/KG	390000	UG/KG	NA		NA		390000	UG/KG
2-HEXANONE	591-78-6	OV	8.2	10	UG/KG	3100000	UG/KG	NA		NA		3100000	UG/KG
2-METHYLNAPHTHALENE	91-57-6	OS	7.3	330	UG/KG	1600000	UG/KG	**70**	UG/KG	**70**	UG/KG	**70**	UG/KG
2-METHYLPHENOL	95-48-7	OS	5.2	330	UG/KG	3900000	UG/KG	**63**	UG/KG	**63**	UG/KG	**63**	UG/KG
2-NITROANILINE	88-74-4	OS	7.5	830	UG/KG	NA		NA		NA		NA	

TABLE 1-7

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SEDIMENT SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	EPA REGION 3 RBC-SOIL RESIDENTIAL	UNITS	EPA REGION 3 BTAG SEDIMENT CRITERIA	UNITS	MINIMUM ECOLOGICAL CRITERIA	UNITS	MINIMUM OVERALL CRITERIA	UNITS
2-NITROPHENOL	88-75-5	OS	15	330	UG/KG	630000	UG/KG	NA		NA		630000	UG/KG
2-NITROTOLUENE	88-72-2	EXP	68	250	UG/KG	780000	UG/KG	NA		NA		780000	UG/KG
3,3'-DICHLOROBENZIDINE	91-94-1	OS	7.2	330	UG/KG	1400	UG/KG	NA		NA		1400	UG/KG
3-NITROANILINE	99-09-2	OS	3.4	830	UG/KG	23000	UG/KG	NA		NA		23000	UG/KG
3-NITROTOLUENE	99-08-1	EXP	120	250	UG/KG	1600000	UG/KG	NA		NA		1600000	UG/KG
4,4'-DDD	72-54-8	PEST/PCB	0.13	3.3	UG/KG	2700	UG/KG	16	UG/KG	16	UG/KG	16	UG/KG
4,4'-DDE	72-55-9	PEST/PCB	0.041	3.3	UG/KG	1900	UG/KG	**2.2**	UG/KG	**2.2**	UG/KG	**2.2**	UG/KG
4,4'-DDT	50-29-3	PEST/PCB	0.32	3.3	UG/KG	1900	UG/KG	**1.58**	UG/KG	**1.58**	UG/KG	**1.58**	UG/KG
4,6-DINITRO-2-METHYLPHENOL	534-52-1	OS	33	830	UG/KG	7800	UG/KG	NA		NA		7800	UG/KG
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	EXP	98	250	UG/KG	NA	UG/KG	NA		NA		NA	UG/KG
4-BROMOPHENYL PHENYL ETHER	101-55-3	OS	8.3	330	UG/KG	NA		NA		NA		NA	
4-CHLORO-3-METHYLPHENOL	59-50-7	OS	5.2	330	UG/KG	NA		NA		NA		NA	
4-CHLOROANILINE	106-47-8	OS	7.8	330	UG/KG	310000	UG/KG	NA		NA		310000	UG/KG
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	OS	9.3	330	UG/KG	NA		NA		NA		NA	
4-METHYL-2-PENTANONE	108-10-1	OV	0.22	10	UG/KG	6300000	UG/KG	NA		NA		6300000	UG/KG
4-METHYLPHENOL	106-44-5	OS	2.1	330	UG/KG	390000	UG/KG	670	UG/KG	670	UG/KG	670	UG/KG
4-NITROANILINE	100-01-6	OS	5.2	830	UG/KG	32000	UG/KG	NA		NA		32000	UG/KG
4-NITROPHENOL	100-02-7	OS	8.1	830	UG/KG	630000	UG/KG	NA		NA		630000	UG/KG
4-NITROTOLUENE	99-99-0	EXP	120	250	UG/KG	780000	UG/KG	NA		NA		780000	UG/KG
ACENAPHTHENE	83-32-9	OS	5.9	330	UG/KG	4700000	UG/KG	**16**	UG/KG	**16**	UG/KG	**16**	UG/KG
ACENAPHTHYLENE	208-96-8	OS	5.6	330	UG/KG	4700000	UG/KG	**44**	UG/KG	**44**	UG/KG	**44**	UG/KG
ACETONE	67-64-1	OV	2.8	10	UG/KG	7800000	UG/KG	1000	UG/KG	1000	UG/KG	1000	UG/KG
ACETOPHENONE	98-86-2	OS	65	330	UG/KG	7800000	UG/KG	NA		NA		7800000	UG/KG
ACID VOLATILE SULFIDE	TTNUS010	AVS	NA	NA	UG/KG	NA		NA		NA		NA	
ALDRIN	309-00-2	PEST/PCB	0.044	1.7	UG/KG	38	UG/KG	NA		NA		38	UG/KG
ALPHA-BHC	319-84-6	PEST/PCB	0.03	1.7	UG/KG	100	UG/KG	NA		NA		100	UG/KG
ALPHA-CHLORDANE	5103-71-9	PEST/PCB	0.062	1.7	UG/KG	1800	UG/KG	NA		NA		1800	UG/KG
ALUMINUM	7429-90-5	M	0.92	0.92	MG/KG	78000	MG/KG	18000	MG/KG	18000	MG/KG	18000	MG/KG
AMMONIUM PERCHLORATE	7790-98-9	MISC	NA	NA	MG/KG	NA		NA		NA		NA	
ANTHRACENE	120-12-7	OS	4	330	UG/KG	23000000	UG/KG	**85.3**	UG/KG	**85.3**	UG/KG	**85.3**	UG/KG
ANTIMONY	7440-36-0	M	0.48	0.48	MG/KG	31	MG/KG	150	MG/KG	150	MG/KG	31	MG/KG
AROCLOR-1016	12674-11-2	PEST/PCB	2	33	UG/KG	5500	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG
AROCLOR-1221	11104-28-2	PEST/PCB	6.2	67	UG/KG	320	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG
AROCLOR-1232	11141-16-5	PEST/PCB	3.8	33	UG/KG	320	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG
AROCLOR-1242	53469-21-9	PEST/PCB	3.8	33	UG/KG	320	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG
AROCLOR-1248	12672-29-6	PEST/PCB	8.8	33	UG/KG	320	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG

TABLE 1-7

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SEDIMENT SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	EPA REGION 3 RBC-SOIL RESIDENTIAL	UNITS	EPA REGION 3 BTAG SEDIMENT CRITERIA	UNITS	MINIMUM ECOLOGICAL CRITERIA	UNITS	MINIMUM OVERALL CRITERIA	UNITS
AROCLOR-1254	11097-69-1	PEST/PCB	3.2	33	UG/KG	320	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG
AROCLOR-1260	11096-82-5	PEST/PCB	2	33	UG/KG	320	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG	**22.7**	UG/KG
ARSENIC	7440-38-2	M	0.84	0.84	MG/KG	0.43	MG/KG	8.2	MG/KG	8.2	MG/KG	0.43	MG/KG
ATRAZINE	1912-24-9	OS	10	330	UG/KG	2900	UG/KG	NA		NA		2900	UG/KG
BAP EQUIVALENT	TTNUS338	OS	NA	NA	UG/KG	NA		NA		NA		NA	
BARIUM	7440-39-3	M	0.06	0.06	MG/KG	5500	MG/KG	48	MG/KG	48	MG/KG	48	MG/KG
BENZALDEHYDE	100-52-7	OS	12	330	UG/KG	7800000	UG/KG	NA		NA		7800000	UG/KG
BENZENE	71-43-2	OV	0.05	10	UG/KG	12000	UG/KG	NA		NA		12000	UG/KG
BENZO(A)ANTHRACENE	56-55-3	OS	3.3	330	UG/KG	870	UG/KG	**261**	UG/KG	**261**	UG/KG	**261**	UG/KG
BENZO(A)PYRENE	50-32-8	OS	18	330	UG/KG	**87**	UG/KG	430	UG/KG	430	UG/KG	**87**	UG/KG
BENZO(B)FLUORANTHENE	205-99-2	OS	4.8	330	UG/KG	870	UG/KG	3200	UG/KG	3200	UG/KG	870	UG/KG
BENZO(G,H,I)PERYLENE	191-24-2	OS	6.2	330	UG/KG	2300000	UG/KG	670	UG/KG	670	UG/KG	670	UG/KG
BENZO(K)FLUORANTHENE	207-08-9	OS	6.3	330	UG/KG	8700	UG/KG	**240**	UG/KG	**240**	UG/KG	**240**	UG/KG
BERYLLIUM	7440-41-7	M	0.02	0.02	MG/KG	160	MG/KG	NA		NA		160	MG/KG
BETA-BHC	319-85-7	PEST/PCB	0.24	1.7	UG/KG	350	UG/KG	NA		NA		350	UG/KG
BIS(2-CHLOROETHOXY)METHANE	111-91-1	OS	7.7	330	UG/KG	NA		NA		NA		NA	
BIS(2-CHLOROETHYL)ETHER	111-44-4	OS	10	330	UG/KG	580	UG/KG	NA		NA		580	UG/KG
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	OS	54	330	UG/KG	46000	UG/KG	1300	UG/KG	1300	UG/KG	1300	UG/KG
BROMODICHLOROMETHANE	75-27-4	OV	0.08	10	UG/KG	10000	UG/KG	NA		NA		10000	UG/KG
BROMOFORM	75-25-2	OV	0.2	10	UG/KG	81000	UG/KG	NA		NA		81000	UG/KG
BROMOMETHANE	74-83-9	OV	0.28	10	UG/KG	110000	UG/KG	NA		NA		110000	UG/KG
BUTYL BENZYL PHTHALATE	85-68-7	OS	6.6	330	UG/KG	16000000	UG/KG	**63**	UG/KG	**63**	UG/KG	**63**	UG/KG
CADMIUM	7440-43-9	M	0.02	0.02	MG/KG	39	MG/KG	1.2	MG/KG	1.2	MG/KG	1.2	MG/KG
CADMIUM	7440-43-9	SEM	NA	NA	MG/KG	39	MG/KG	1.2	MG/KG	1.2	MG/KG	1.2	MG/KG
CALCIUM	7440-70-2	M	26.6	26.6	MG/KG	NA		NA		NA		NA	
CAPROLACTAM	105-60-2	OS	17	330	UG/KG	39000000	UG/KG	NA		NA		39000000	UG/KG
CARBAZOLE	86-74-8	OS	31	330	UG/KG	32000	UG/KG	NA		NA		32000	UG/KG
CARBON DISULFIDE	75-15-0	OV	0.2	10	UG/KG	7800000	UG/KG	**1.9**	UG/KG	**1.9**	UG/KG	**1.9**	UG/KG
CARBON TETRACHLORIDE	56-23-5	OV	0.12	10	UG/KG	4900	UG/KG	NA		NA		4900	UG/KG
CHLOROBENZENE	108-90-7	OV	0.07	10	UG/KG	1600000	UG/KG	NA		NA		1600000	UG/KG
CHLORODIBROMOMETHANE	124-48-1	OV	0.9	10	UG/KG	7600	UG/KG	NA		NA		7600	UG/KG
CHLOROETHANE	75-00-3	OV	0.32	10	UG/KG	220000	UG/KG	NA		NA		220000	UG/KG
CHLOROFORM	67-66-3	OV	0.14	10	UG/KG	780000	UG/KG	62.9	UG/KG	62.9	UG/KG	62.9	UG/KG
CHLOROMETHANE	74-87-3	OV	0.25	10	UG/KG	49000	UG/KG	NA		NA		49000	UG/KG
CHROMIUM	7440-47-3	M	0.08	0.08	MG/KG	230	MG/KG	81	MG/KG	81	MG/KG	81	MG/KG
CHRYSENE	218-01-9	OS	7.3	330	UG/KG	87000	UG/KG	384	UG/KG	384	UG/KG	384	UG/KG

TABLE 1-7

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SEDIMENT SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	EPA REGION 3 RBC-SOIL RESIDENTIAL	UNITS	EPA REGION 3 BTAG SEDIMENT CRITERIA	UNITS	MINIMUM ECOLOGICAL CRITERIA	UNITS	MINIMUM OVERALL CRITERIA	UNITS
CIS-1,2-DICHLOROETHENE	156-59-2	OV	0.2	10	UG/KG	780000	UG/KG	1030	UG/KG	1030	UG/KG	1030	UG/KG
CIS-1,3-DICHLOROPROPENE	10061-01-5	OV	0.7	10	UG/KG	6400	UG/KG	NA		NA		6400	UG/KG
COBALT	7440-48-4	M	0.04	0.04	MG/KG	1600	MG/KG	10	MG/KG	10	MG/KG	10	MG/KG
COPPER	7440-50-8	M	0.08	0.08	MG/KG	3100	MG/KG	34	MG/KG	34	MG/KG	34	MG/KG
COPPER	7440-50-8	SEM	NA	NA	MG/KG	3100	MG/KG	34	MG/KG	34	MG/KG	34	MG/KG
CYANIDE	57-12-5	M	0.15	0.15	MG/KG	1600	MG/KG	0.667	MG/KG	0.667	MG/KG	0.667	MG/KG
CYCLOHEXANE	110-82-7	OV	1.2	10	UG/KG	NA		NA		NA		NA	
DELTA-BHC	319-86-8	PEST/PCB	0.061	1.7	UG/KG	100	UG/KG	NA		NA		100	UG/KG
DI-N-BUTYL PHTHALATE	84-74-2	OS	5.8	330	UG/KG	7800000	UG/KG	1400	UG/KG	1400	UG/KG	1400	UG/KG
DI-N-OCTYL PHTHALATE	117-84-0	OS	2.4	330	UG/KG	1600000	UG/KG	6200	UG/KG	6200	UG/KG	6200	UG/KG
DIBENZO(A,H)ANTHRACENE	53-70-3	OS	4.3	330	UG/KG	**87**	UG/KG	**63.4**	UG/KG	**63.4**	UG/KG	**63.4**	UG/KG
DIBENZOFURAN	132-64-9	OS	5.5	330	UG/KG	310000	UG/KG	540	UG/KG	540	UG/KG	540	UG/KG
DICHLORODIFLUOROMETHANE	75-71-8	OV	0.22	10	UG/KG	16000000	UG/KG	NA		NA		16000000	UG/KG
DIELDRIN	60-57-1	PEST/PCB	0.044	3.3	UG/KG	40	UG/KG	NA		NA		40	UG/KG
DIESEL RANGE ORGANICS	TTNUS004	PET	NA	NA	UG/KG	NA		NA		NA		NA	
DIETHYL ETHER	60-29-7	OV	NA	5	UG/KG	16000000	UG/KG	NA		NA		16000000	UG/KG
DIETHYL PHTHALATE	84-66-2	OS	5.9	330	UG/KG	63000000	UG/KG	**200**	UG/KG	**200**	UG/KG	**200**	UG/KG
DIMETHYL PHTHALATE	131-11-3	OS	3.9	330	UG/KG	780000000	UG/KG	**71**	UG/KG	**71**	UG/KG	**71**	UG/KG
ENDOSULFAN I	959-98-8	PEST/PCB	0.053	1.7	UG/KG	470000	UG/KG	NA		NA		470000	UG/KG
ENDOSULFAN II	33213-65-9	PEST/PCB	0.073	3.3	UG/KG	470000	UG/KG	NA		NA		470000	UG/KG
ENDOSULFAN SULFATE	1031-07-8	PEST/PCB	0.33	3.3	UG/KG	470000	UG/KG	NA		NA		470000	UG/KG
ENDRIN	72-20-8	PEST/PCB	0.11	3.3	UG/KG	23000	UG/KG	NA		NA		23000	UG/KG
ENDRIN ALDEHYDE	7421-93-4	PEST/PCB	0.25	3.3	UG/KG	23000	UG/KG	NA		NA		23000	UG/KG
ENDRIN KETONE	53494-70-5	PEST/PCB	0.48	3.3	UG/KG	23000	UG/KG	NA		NA		23000	UG/KG
ETHYLBENZENE	100-41-4	OV	0.13	10	UG/KG	7800000	UG/KG	10	UG/KG	10	UG/KG	10	UG/KG
FLUORANTHENE	206-44-0	OS	7	330	UG/KG	3100000	UG/KG	600	UG/KG	600	UG/KG	600	UG/KG
FLUORENE	86-73-7	OS	5.9	330	UG/KG	3100000	UG/KG	**19**	UG/KG	**19**	UG/KG	**19**	UG/KG
GAMMA-BHC (LINDANE)	58-89-9	PEST/PCB	0.031	1.7	UG/KG	490	UG/KG	NA		NA		490	UG/KG
GAMMA-CHLORDANE	5103-74-2	PEST/PCB	0.11	1.7	UG/KG	1800	UG/KG	NA		NA		1800	UG/KG
GASOLINE RANGE ORGANICS	TTNUS005	PET	NA	NA	UG/KG	NA		NA		NA		NA	
HEPTACHLOR	76-44-8	PEST/PCB	0.048	1.7	UG/KG	140	UG/KG	NA		NA		140	UG/KG
HEPTACHLOR EPOXIDE	1024-57-3	PEST/PCB	0.25	1.7	UG/KG	70	UG/KG	NA		NA		70	UG/KG
HEXACHLOROBENZENE	118-74-1	OS	7.9	330	UG/KG	400	UG/KG	**22**	UG/KG	**22**	UG/KG	**22**	UG/KG
HEXACHLOROBUTADIENE	87-68-3	OS	10	330	UG/KG	8200	UG/KG	**11**	UG/KG	**11**	UG/KG	**11**	UG/KG
HEXACHLOROCYCLOPENTADIENE	77-47-4	OS	7.2	330	UG/KG	470000	UG/KG	NA		NA		470000	UG/KG
HEXACHLOROETHANE	67-72-1	OS	12	330	UG/KG	46000	UG/KG	NA		NA		46000	UG/KG

TABLE 1-7

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SEDIMENT SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	EPA REGION 3 RBC-SOIL RESIDENTIAL	UNITS	EPA REGION 3 BTAG SEDIMENT CRITERIA	UNITS	MINIMUM ECOLOGICAL CRITERIA	UNITS	MINIMUM OVERALL CRITERIA	UNITS
HIGH MOLECULAR WEIGHT PAHS	TTNUS077	OS	NA	NA	UG/KG	NA		1700	UG/KG	1700	UG/KG	1700	UG/KG
HMX	2691-41-0	EXP	14	250	UG/KG	3900000	UG/KG	5	UG/KG	5	UG/KG	5	UG/KG
INDENO(1,2,3-CD)PYRENE	193-39-5	OS	5.3	330	UG/KG	870	UG/KG	600	UG/KG	600	UG/KG	600	UG/KG
IRON	7439-89-6	M	0.2	0.2	MG/KG	23000	MG/KG	20000	MG/KG	20000	MG/KG	20000	MG/KG
ISOPHORONE	78-59-1	OS	7.5	330	UG/KG	670000	UG/KG	NA		NA		670000	UG/KG
ISOPROPYLBENZENE	98-82-8	OV	0.13	10	UG/KG	7800000	UG/KG	NA		NA		7800000	UG/KG
LEAD	7439-92-1	M	0.24	0.24	MG/KG	400	MG/KG	46.7	MG/KG	46.7	MG/KG	46.7	MG/KG
LEAD	7439-92-1	SEM	NA	NA	MG/KG	400	MG/KG	46.7	MG/KG	46.7	MG/KG	46.7	MG/KG
LOW MOLECULAR WEIGHT PAHS	TTNUS076	OS	NA	NA	UG/KG	NA		552	UG/KG	552	UG/KG	552	UG/KG
MAGNESIUM	7439-95-4	M	1.2	1.2	MG/KG	NA		NA		NA		NA	
MANGANESE	7439-96-5	M	0.02	0.02	MG/KG	1600	MG/KG	260	MG/KG	260	MG/KG	260	MG/KG
MERCURY	7439-97-6	M	0.05	0.05	MG/KG	23	MG/KG	0.15	MG/KG	0.15	MG/KG	0.15	MG/KG
METHOXYCHLOR	72-43-5	PEST/PCB	0.48	17	UG/KG	390000	UG/KG	NA		NA		390000	UG/KG
METHYL ACETATE	79-20-9	OV	2.2	10	UG/KG	78000000	UG/KG	NA		NA		78000000	UG/KG
METHYL CYCLOHEXANE	108-87-2	OV	1.1	10	UG/KG	NA		NA		NA		NA	
METHYL TERT-BUTYL ETHER	1634-04-4	OV	0.12	10	UG/KG	160000	UG/KG	NA		NA		160000	UG/KG
METHYLENE CHLORIDE	75-09-2	OV	0.23	10	UG/KG	85000	UG/KG	NA		NA		85000	UG/KG
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	OS	12	330	UG/KG	**91**	UG/KG	NA		NA		**91**	UG/KG
N-NITROSODIPHENYLAMINE	86-30-6	OS	4.3	330	UG/KG	130000	UG/KG	**28**	UG/KG	**28**	UG/KG	**28**	UG/KG
NAPHTHALENE	91-20-3	OS	7.8	330	UG/KG	1600000	UG/KG	**160**	UG/KG	**160**	UG/KG	**160**	UG/KG
NICKEL	7440-02-0	M	0.04	0.04	MG/KG	1600	MG/KG	20.9	MG/KG	20.9	MG/KG	20.9	MG/KG
NICKEL	7440-02-0	SEM	NA	NA	MG/KG	1600	MG/KG	20.9	MG/KG	20.9	MG/KG	20.9	MG/KG
NITROBENZENE	98-95-3	EXP	25	250	UG/KG	39000	UG/KG	NA		NA		39000	UG/KG
NITROBENZENE	98-95-3	OS	15	330	UG/KG	39000	UG/KG	NA		NA		39000	UG/KG
NITROCELLULOSE	9004-70-0	EXP	1300	1800	UG/KG	NA	UG/KG	NA		NA		NA	UG/KG
NITROGLYCERIN	55-63-0	EXP	70	500	UG/KG	46000	UG/KG	NA		NA		46000	UG/KG
NITROGUANIDINE	556-88-7	EXP	38	250	UG/KG	NA	UG/KG	NA		NA		NA	UG/KG
PENTACHLOROPHENOL	87-86-5	OS	30	830	UG/KG	5300	UG/KG	**360**	UG/KG	**360**	UG/KG	**360**	UG/KG
PERCENT CLAY	TTNUS287	MISC	NA	NA	%	NA		NA		NA		NA	
PERCENT GRAVEL	TTNUS365	MISC	NA	NA	%	NA		NA		NA		NA	
PERCENT MOISTURE	TTNUS288	MISC	NA	NA	%	NA		NA		NA		NA	
PERCENT SAND	TTNUS289	MISC	NA	NA	%	NA		NA		NA		NA	
PERCENT SILT	TTNUS290	MISC	NA	NA	%	NA		NA		NA		NA	
PERCENT SOLIDS	TTNUS291	MISC	NA	NA	%	NA		NA		NA		NA	
PERCHLORATE	7790-98-9	MISC	NA	NA	MG/KG	7800	UG/KG	NA		NA		7800	UG/KG
PETN	78-11-5	EXP	NA	NA	UG/KG	NA	UG/KG	NA		NA		NA	UG/KG

TABLE 1-7

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR SEDIMENT SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	EPA REGION 3 RBC-SOIL RESIDENTIAL	UNITS	EPA REGION 3 BTAG SEDIMENT CRITERIA	UNITS	MINIMUM ECOLOGICAL CRITERIA	UNITS	MINIMUM OVERALL CRITERIA	UNITS
PH	TTNUS002	MISC	NA	NA	S.U.	NA		NA		NA		NA	
PHENANTHRENE	85-01-8	OS	3.5	330	UG/KG	2300000	UG/KG	**240**	UG/KG	**240**	UG/KG	**240**	UG/KG
PHENOL	108-95-2	OS	3.3	330	UG/KG	23000000	UG/KG	420	UG/KG	420	UG/KG	420	UG/KG
POTASSIUM	7440-09-7	M	9.94	9.94	MG/KG	NA		NA		NA		NA	
PYRENE	129-00-0	OS	4.2	330	UG/KG	2300000	UG/KG	665	UG/KG	665	UG/KG	665	UG/KG
RDX	121-82-4	EXP	51	250	UG/KG	5800	UG/KG	NA		NA		5800	UG/KG
SELENIUM	7782-49-2	M	0.86	0.86	MG/KG	390	MG/KG	1	MG/KG	1	MG/KG	1	MG/KG
SILVER	7440-22-4	M	0.12	0.12	MG/KG	390	MG/KG	1	MG/KG	1	MG/KG	1	MG/KG
SODIUM	7440-23-5	M	19.04	19.04	MG/KG	NA		NA		NA		NA	
STYRENE	100-42-5	OV	0.05	10	UG/KG	16000000	UG/KG	NA		NA		16000000	UG/KG
TETRACHLOROETHENE	127-18-4	OV	0.17	10	UG/KG	12000	UG/KG	57	UG/KG	57	UG/KG	57	UG/KG
TETRYL	479-45-8	EXP	49	250	UG/KG	780000	UG/KG	NA		NA		780000	UG/KG
THALLIUM	7440-28-0	M	0.78	0.78	MG/KG	5.5	MG/KG	NA		NA		5.5	MG/KG
TOLUENE	108-88-3	OV	0.1	10	UG/KG	16000000	UG/KG	123	UG/KG	123	UG/KG	123	UG/KG
TOTAL 1,2-DICHLOROETHENE	540-59-0	OV	NA	NA	UG/KG	700000	UG/KG	NA		NA		700000	UG/KG
TOTAL ORGANIC CARBON	TTNUS003	MISC	76.8	100	MG/KG	NA		NA		NA		NA	
TOTAL PAHS	TTNUS072	OS	NA	NA	UG/KG	NA		4022	UG/KG	4022	UG/KG	4022	UG/KG
TOTAL SEM-AVS	CALC012	MISC	NA	NA	UG/KG	NA		NA		NA		NA	
TOTAL XYLENES	1330-20-7	OV	0.47	10	UG/KG	160000000	UG/KG	40	UG/KG	40	UG/KG	40	UG/KG
TOXAPHENE	8001-35-2	PEST/PCB	0.76	170	UG/KG	580	UG/KG	NA		NA		580	UG/KG
TRANS-1,2-DICHLOROETHENE	156-60-5	OV	0.16	10	UG/KG	1600000	UG/KG	NA		NA		1600000	UG/KG
TRANS-1,3-DICHLOROPROPENE	10061-02-6	OV	0.9	10	UG/KG	6400	UG/KG	NA		NA		6400	UG/KG
TRICHLOROETHENE	79-01-6	OV	0.1	10	UG/KG	1600	UG/KG	450	UG/KG	450	UG/KG	450	UG/KG
TRICHLOROFLUOROMETHANE	75-69-4	OV	0.26	10	UG/KG	23000000	UG/KG	NA		NA		23000000	UG/KG
VANADIUM	7440-62-2	M	0.08	0.08	MG/KG	550	MG/KG	57	MG/KG	57	MG/KG	57	MG/KG
VINYL CHLORIDE	75-01-4	OV	0.32	10	UG/KG	90	UG/KG	NA		NA		90	UG/KG
ZINC	7440-66-6	M	0.14	0.14	MG/KG	23000	MG/KG	150	MG/KG	150	MG/KG	150	MG/KG
ZINC	7440-66-6	SEM	NA	NA	MG/KG	23000	MG/KG	150	MG/KG	150	MG/KG	150	MG/KG

TABLE 1-8

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SEDIMENT
MATTAWOMAN CREEK
IH-DIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC SOIL CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-SOIL CRITERIA	MINIMUM ECOLOGICAL CRITERIA
	Volatile Organics										
71-55-6	1,1,1-TRICHLOROETHANE	UG/KG	OV	0/40	0	3	10 - 50		17.925	22000000	31
79-34-5	1,1,2,2-TETRACHLOROETHANE	UG/KG	OV	0/40	0	0	10 - 50		17.925	3200	NA
79-00-5	1,1,2-TRICHLOROETHANE	UG/KG	OV	0/40	0	3	10 - 50		17.925	11000	31
76-13-1	1,1,2-TRICHLOROTRIFLUOROETHANE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	2300000000	NA
75-34-3	1,1-DICHLOROETHANE	UG/KG	OV	0/40	0	0	10 - 50		17.925	7800000	NA
75-35-4	1,1-DICHLOROETHENE	UG/KG	OV	0/40	0	0	10 - 50		17.925	3900000	NA
120-82-1	1,2,4-TRICHLOROBENZENE	UG/KG	OV	0/32	0	1	10 - 50		18.09375	780000	40
96-12-8	1,2-DIBROMO-3-CHLOROPROPANE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	460	NA
106-93-4	1,2-DIBROMOETHANE	UG/KG	OV	0/32	32	0	10 - 50		18.09375	7.5	NA
95-50-1	1,2-DICHLOROBENZENE	UG/KG	OV	0/32	0	1	10 - 50		18.09375	7000000	35
107-06-2	1,2-DICHLOROETHANE	UG/KG	OV	0/40	0	0	10 - 50		17.925	7000	NA
78-87-5	1,2-DICHLOROPROPANE	UG/KG	OV	0/40	0	0	10 - 50		17.925	9400	NA
541-73-1	1,3-DICHLOROBENZENE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	2300000	NA
106-46-7	1,4-DICHLOROBENZENE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	27000	110
78-93-3	2-BUTANONE	UG/KG	OV	3/40	0	0	10 - 50	S39SD0070001	17.48649	47000000	9330
591-78-6	2-HEXANONE	UG/KG	OV	0/40	0	0	10 - 50		17.925	3100000	NA
108-10-1	4-METHYL-2-PENTANONE	UG/KG	OV	0/40	0	0	10 - 50		17.925	6300000	NA
67-64-1	ACETONE	UG/KG	OV	26/40	0	0	8.7 - 160	S39SD0070001	23.8	7800000	1000
71-43-2	BENZENE	UG/KG	OV	0/40	0	0	10 - 50		17.925	12000	NA
75-27-4	BROMODICHLOROMETHANE	UG/KG	OV	0/40	0	0	10 - 50		17.925	10000	NA
75-25-2	BROMOFORM	UG/KG	OV	0/40	0	0	10 - 50		17.925	81000	NA
74-83-9	BROMOMETHANE	UG/KG	OV	0/40	0	0	10 - 50		17.925	110000	NA
75-15-0	CARBON DISULFIDE	UG/KG	OV	26/40	0	14	10 - 16	MTCSD00901	12.46429	7800000	1.9
56-23-5	CARBON TETRACHLORIDE	UG/KG	OV	0/40	0	0	10 - 50		17.925	4900	NA
108-90-7	CHLOROBENZENE	UG/KG	OV	0/40	0	0	10 - 50		17.925	1600000	NA
124-48-1	CHLORODIBROMOMETHANE	UG/KG	OV	0/40	0	0	10 - 50		17.925	7600	NA
75-00-3	CHLOROETHANE	UG/KG	OV	0/40	0	0	10 - 50		17.925	220000	NA
67-66-3	CHLOROFORM	UG/KG	OV	2/40	0	0	10 - 50	MTCSD02301-D	17.86842	780000	62.9
74-87-3	CHLOROMETHANE	UG/KG	OV	1/40	0	0	10 - 50	IS11SD010001	18.02564	49000	NA
156-59-2	CIS-1,2-DICHLOROETHENE	UG/KG	OV	1/32	0	0	10 - 50	MTCSD02101	18.35484	780000	1030
10061-01-5	CIS-1,3-DICHLOROPROPENE	UG/KG	OV	0/40	0	0	10 - 50		17.925	6400	NA
110-82-7	CYCLOHEXANE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	NA	NA
75-71-8	DICHLORODIFLUOROMETHANE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	16000000	NA
60-29-7	DIETHYL ETHER	UG/KG	OV	2/28	0	0	10 - 50	MTCSD02101	19.42308	16000000	NA
100-41-4	ETHYLBENZENE	UG/KG	OV	0/40	0	34	10 - 50		17.925	7800000	10
98-82-8	ISOPROPYLBENZENE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	7800000	NA
79-20-9	METHYL ACETATE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	78000000	NA
108-87-2	METHYL CYCLOHEXANE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	NA	NA

TABLE 1-8

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SEDIMENT
MATTAWOMAN CREEK
IH-DIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC SOIL CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-SOIL CRITERIA	MINIMUM ECOLOGICAL CRITERIA
1634-04-4	METHYL TERT-BUTYL ETHER	UG/KG	OV	1/32	0	0	10 - 50	MTCSD02201	17.83871	160000	NA
75-09-2	METHYLENE CHLORIDE	UG/KG	OV	0/40	0	0	7 - 50		16.55	85000	NA
100-42-5	STYRENE	UG/KG	OV	0/40	0	0	10 - 50		17.925	16000000	NA
127-18-4	TETRACHLOROETHENE	UG/KG	OV	0/40	0	0	10 - 50		17.925	12000	57
108-88-3	TOLUENE	UG/KG	OV	4/40	0	0	10 - 50	MTCSD01901	17.86111	16000000	123
540-59-0	TOTAL 1,2-DICHLOROETHENE	UG/KG	OV	0/9	0	0	12 - 31		16.88889	700000	NA
1330-20-7	TOTAL XYLENES	UG/KG	OV	0/40	0	1	10 - 50		17.925	160000000	40
156-60-5	TRANS-1,2-DICHLOROETHENE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	1600000	NA
10061-02-6	TRANS-1,3-DICHLOROPROPENE	UG/KG	OV	0/40	0	0	10 - 50		17.925	6400	NA
79-01-6	TRICHLOROETHENE	UG/KG	OV	1/40	0	0	10 - 50	MTCSD02101	18.12821	1600	450
75-69-4	TRICHLOROFLUOROMETHANE	UG/KG	OV	0/32	0	0	10 - 50		18.09375	23000000	NA
75-01-4	VINYL CHLORIDE	UG/KG	OV	0/40	0	0	10 - 50		17.925	90	NA
	Semivolatile Organics										
92-52-4	1,1-BIPHENYL	UG/KG	OS	0/32	0	0	390 - 1600		784.375	3900000	NA
120-82-1	1,2,4-TRICHLOROBENZENE	UG/KG	OS	0/8	0	8	390 - 1000		570	780000	40
95-50-1	1,2-DICHLOROBENZENE	UG/KG	OS	0/8	0	8	390 - 1000		570	7000000	35
99-35-4	1,3,5-TRINITROBENZENE	UG/KG	OS	0/8	0	8	40.2	IS17SD020001	40.2	2300000	2
541-73-1	1,3-DICHLOROBENZENE	UG/KG	OS	0/8	0	0	390 - 1000		570	2300000	NA
106-46-7	1,4-DICHLOROBENZENE	UG/KG	OS	0/7	0	7	390 - 1000		570	27000	110
108-60-1	2,2'-OXYBIS(1-CHLOROPROPANE)	UG/KG	OS	0/40	0	0	390 - 1600		741.5	9100	NA
95-95-4	2,4,5-TRICHLOROPHENOL	UG/KG	OS	0/40	0	0	970 - 3900		1870	7800000	NA
88-06-2	2,4,6-TRICHLOROPHENOL	UG/KG	OS	0/40	0	0	390 - 1600		741.5	58000	NA
120-83-2	2,4-DICHLOROPHENOL	UG/KG	OS	0/40	0	0	390 - 1600		741.5	230000	NA
105-67-9	2,4-DIMETHYLPHENOL	UG/KG	OS	0/40	0	40	390 - 1600		741.5	1600000	29
51-28-5	2,4-DINITROPHENOL	UG/KG	OS	0/36	0	0	970 - 3900		1870	160000	NA
121-14-2	2,4-DINITROTOLUENE	UG/KG	OS	0/8	0	0	390 - 1000		570	160000	NA
606-20-2	2,6-DINITROTOLUENE	UG/KG	OS	0/8	0	8	390 - 1000	IS17SD030001	570	78000	294
91-58-7	2-CHLORONAPHTHALENE	UG/KG	OS	0/40	0	0	390 - 1600		741.5	6300000	NA
95-57-8	2-CHLOROPHENOL	UG/KG	OS	0/40	0	0	390 - 1600		741.5	390000	NA
91-57-6	2-METHYLNAPHTHALENE	UG/KG	OS	2/40	0	38	390 - 1600	MTCSD02101	753.68421	1600000	70
95-48-7	2-METHYLPHENOL	UG/KG	OS	0/40	0	40	390 - 1600		741.5	3900000	63
88-74-4	2-NITROANILINE	UG/KG	OS	0/40	0	0	970 - 3900		1870	NA	NA
88-75-5	2-NITROPHENOL	UG/KG	OS	0/40	0	0	390 - 1600		759.5	630000	NA
91-94-1	3,3'-DICHLOROBENZIDINE	UG/KG	OS	0/40	2	0	390 - 1600		741.5	1400	NA
99-09-2	3-NITROANILINE	UG/KG	OS	0/40	0	0	970 - 3900		1870	23000	NA
534-52-1	4,6-DINITRO-2-METHYLPHENOL	UG/KG	OS	0/40	0	0	970 - 3900		1870	7800	NA
101-55-3	4-BROMOPHENYL PHENYL ETHER	UG/KG	OS	0/40	0	0	390 - 1600		741.5	NA	NA
59-50-7	4-CHLORO-3-METHYLPHENOL	UG/KG	OS	0/40	0	0	390 - 1600		741.5	NA	NA
106-47-8	4-CHLOROANILINE	UG/KG	OS	0/40	0	0	390 - 1600		741.5	310000	NA

TABLE 1-8

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SEDIMENT
MATTAWOMAN CREEK
IH-DIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC SOIL CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-SOIL CRITERIA	MINIMUM ECOLOGICAL CRITERIA
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	UG/KG	OS	0/40	0	0	390 - 1600		741.5	NA	NA
106-44-5	4-METHYLPHENOL	UG/KG	OS	1/40	0	18	390 - 1600	MTCSD01201-D	747.17949	390000	670
100-01-6	4-NITROANILINE	UG/KG	OS	0/40	0	0	970 - 3900		1870	32000	NA
100-02-7	4-NITROPHENOL	UG/KG	OS	0/40	0	0	970 - 3900		1870	630000	NA
83-32-9	ACENAPHTHENE	UG/KG	OS	2/40	0	38	390 - 1600	MTCSD02101	753.68421	4700000	16
208-96-8	ACENAPHTHYLENE	UG/KG	OS	2/40	0	38	390 - 1600	MTCSD01201-D	751.57895	4700000	44
98-86-2	ACETOPHENONE	UG/KG	OS	0/32	0	0	390 - 1600		784.375	7800000	NA
120-12-7	ANTHRACENE	UG/KG	OS	4/40	0	36	390 - 1600	MTCSD01201-D	766.66667	23000000	85.3
1912-24-9	ATRAZINE	UG/KG	OS	0/32	0	0	390 - 1600		784.375	2900	NA
TTNUS338	BAP EQUIVALENT	UG/KG	OS	21/21	0	0	0	MTCSD01201-D	0	NA	NA
100-52-7	BENZALDEHYDE	UG/KG	OS	0/32	0	0	390 - 1600		784.375	7800000	NA
56-55-3	BENZO(A)ANTHRACENE	UG/KG	OS	11/40	14	29	390 - 1600	MTCSD01201-D	807.24138	870	261
50-32-8	BENZO(A)PYRENE	UG/KG	OS	11/40	29	21	390 - 1600	MTCSD01201-D	805.68966	87	430
205-99-2	BENZO(B)FLUORANTHENE	UG/KG	OS	21/40	7	0	390 - 1600	MTCSD01201-D	760.52632	870	3200
191-24-2	BENZO(G,H,I)PERYLENE	UG/KG	OS	6/40	0	18	390 - 1600	MTCSD01201-D	787.35294	2300000	670
207-08-9	BENZO(K)FLUORANTHENE	UG/KG	OS	7/40	0	33	390 - 1600	MTCSD02101	797.87879	8700	240
111-91-1	BIS(2-CHLOROETHOXY)METHANE	UG/KG	OS	0/40	0	0	390 - 1600		741.5	NA	NA
111-44-4	BIS(2-CHLOROETHYL)ETHER	UG/KG	OS	0/40	19	0	390 - 1600		741.5	580	NA
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	OS	6/40	0	1	50 - 1600	S39SD0040001	348.64706	46000	1300
85-68-7	BUTYL BENZYL PHTHALATE	UG/KG	OS	0/40	0	40	390 - 1600		741.5	16000000	63
105-60-2	CAPROLACTAM	UG/KG	OS	0/32	0	0	390 - 1600		784.375	39000000	NA
86-74-8	CARBAZOLE	UG/KG	OS	3/40	0	0	390 - 1600	MTCSD02101	760	32000	NA
218-01-9	CHRYSENE	UG/KG	OS	17/40	0	23	390 - 1600	MTCSD01201-D	799.56522	87000	384
84-74-2	DI-N-BUTYL PHTHALATE	UG/KG	OS	4/40	0	2	390 - 1600	S39SD0080001	741.38889	7800000	1400
117-84-0	DI-N-OCTYL PHTHALATE	UG/KG	OS	0/40	0	0	390 - 1600		741.5	1600000	6200
53-70-3	DIBENZO(A,H)ANTHRACENE	UG/KG	OS	4/40	36	36	390 - 1600	MTCSD01201-D	768.88889	87	63.4
132-64-9	DIBENZOFURAN	UG/KG	OS	2/40	0	20	390 - 1600	MTCSD02101	751.57895	310000	540
84-66-2	DIETHYL PHTHALATE	UG/KG	OS	3/40	0	37	390 - 1600	MTCSD01501	758.91892	63000000	200
131-11-3	DIMETHYL PHTHALATE	UG/KG	OS	0/40	0	40	390 - 1600		741.5	780000000	71
206-44-0	FLUORANTHENE	UG/KG	OS	21/40	0	8	390 - 1600	MTCSD01201-D	760.52632	3100000	600
86-73-7	FLUORENE	UG/KG	OS	3/40	0	37	390 - 1600	MTCSD02101	760	3100000	19
118-74-1	HEXACHLOROBENZENE	UG/KG	OS	0/40	37	40	390 - 1600		741.5	400	22
87-68-3	HEXACHLOROBUTADIENE	UG/KG	OS	0/40	0	40	390 - 1600		741.5	8200	11
77-47-4	HEXACHLOROCYCLOPENTADIENE	UG/KG	OS	0/40	0	0	390 - 1600		741.5	470000	NA
67-72-1	HEXACHLOROETHANE	UG/KG	OS	0/40	0	0	390 - 1600		741.5	46000	NA
TTNUS077	HIGH MOLECULAR WEIGHT PAHS	UG/KG	OS	22/22	0	0	0	MTCSD01201-D	0	NA	1700
193-39-5	INDENO(1,2,3-CD)PYRENE	UG/KG	OS	7/40	15	19	390 - 1600	MTCSD01201-D	797.87879	870	600
78-59-1	ISOPHORONE	UG/KG	OS	0/40	0	0	390 - 1600		741.5	670000	NA
TTNUS076	LOW MOLECULAR WEIGHT PAHS	UG/KG	OS	10/10	0	0	0	MTCSD01201-D	0	NA	552

TABLE 1-8

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SEDIMENT
MATTAWOMAN CREEK
IH-DIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC SOIL CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-SOIL CRITERIA	MINIMUM ECOLOGICAL CRITERIA
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	UG/KG	OS	0/40	40	0	390 - 1600		741.5	91	NA
86-30-6	N-NITROSODIPHENYLAMINE	UG/KG	OS	10/40	0	30	390 - 1600	MTCSD02101	731.83333	130000	28
91-20-3	NAPHTHALENE	UG/KG	OS	2/40	0	38	390 - 1600	MTCSD02101	753.68421	1600000	160
98-95-3	NITROBENZENE	UG/KG	OS	0/8	0	0	390 - 1000		570	39000	NA
87-86-5	PENTACHLOROPHENOL	UG/KG	OS	0/40	0	40	970 - 3900		1865	5300	360
85-01-8	PHENANTHRENE	UG/KG	OS	10/40	0	30	390 - 1600	MTCSD01201-D	775.16667	2300000	240
108-95-2	PHENOL	UG/KG	OS	0/40	0	30	390 - 1600		741.5	23000000	420
129-00-0	PYRENE	UG/KG	OS	22/40	0	7	390 - 1600	MTCSD01201-D	736.11111	2300000	665
TTNUS072	TOTAL PAHS	UG/KG	OS	22/22	0	0	0	MTCSD01201-D	0	NA	4022
	Pesticides/PCBs										
72-54-8	4,4'-DDD	UG/KG	PEST/PCB	2/36	0	0	3.7 - 16	S39SD0070001	7.73676	2700	16
72-55-9	4,4'-DDE	UG/KG	PEST/PCB	2/36	0	34	3.7 - 16	S39SD0070001	7.73676	1900	2.2
50-29-3	4,4'-DDT	UG/KG	PEST/PCB	0/36	0	36	3.7 - 16		7.84306	1900	1.58
309-00-2	ALDRIN	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	38	NA
319-84-6	ALPHA-BHC	UG/KG	PEST/PCB	1/36	0	0	1.9 - 8.1	S39SD0030001	4.04571	100	NA
5103-71-9	ALPHA-CHLORDANE	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	1800	NA
12674-11-2	AROCLOR-1016	UG/KG	PEST/PCB	0/36	0	36	37 - 160		78.43056	5500	22.7
11104-28-2	AROCLOR-1221	UG/KG	PEST/PCB	0/36	0	36	75 - 320		158.72222	320	22.7
11141-16-5	AROCLOR-1232	UG/KG	PEST/PCB	0/36	0	36	37 - 160		78.43056	320	22.7
53469-21-9	AROCLOR-1242	UG/KG	PEST/PCB	0/36	0	36	37 - 160		78.43056	320	22.7
12672-29-6	AROCLOR-1248	UG/KG	PEST/PCB	1/36	0	35	37 - 160	MTCSD00401	79.21429	320	22.7
11097-69-1	AROCLOR-1254	UG/KG	PEST/PCB	0/36	0	36	37 - 160		78.43056	320	22.7
11096-82-5	AROCLOR-1260	UG/KG	PEST/PCB	0/36	0	36	37 - 160		78.43056	320	22.7
319-85-7	BETA-BHC	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	350	NA
319-86-8	DELTA-BHC	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	100	NA
60-57-1	DIELDRIN	UG/KG	PEST/PCB	0/36	0	0	3.7 - 16		7.84306	40	NA
959-98-8	ENDOSULFAN I	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	470000	NA
33213-65-9	ENDOSULFAN II	UG/KG	PEST/PCB	0/36	0	0	3.7 - 16		7.84306	470000	NA
1031-07-8	ENDOSULFAN SULFATE	UG/KG	PEST/PCB	0/36	0	0	3.7 - 16		7.84306	470000	NA
72-20-8	ENDRIN	UG/KG	PEST/PCB	0/36	0	0	3.7 - 16		7.84306	23000	NA
7421-93-4	ENDRIN ALDEHYDE	UG/KG	PEST/PCB	0/36	0	0	3.7 - 16		7.84306	23000	NA
53494-70-5	ENDRIN KETONE	UG/KG	PEST/PCB	0/36	0	0	3.7 - 16		7.84306	23000	NA
58-89-9	GAMMA-BHC (LINDANE)	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	490	NA
5103-74-2	GAMMA-CHLORDANE	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	1800	NA
76-44-8	HEPTACHLOR	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	140	NA
1024-57-3	HEPTACHLOR EPOXIDE	UG/KG	PEST/PCB	0/36	0	0	1.9 - 8.1		3.98889	70	NA
72-43-5	METHOXYCHLOR	UG/KG	PEST/PCB	0/36	0	0	19 - 81		39.88889	390000	NA
8001-35-2	TOXAPHENE	UG/KG	PEST/PCB	0/36	7	0	190 - 810		398.88889	580	NA
	Explosives										

TABLE 1-8

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SEDIMENT
MATTAWOMAN CREEK
IH-DIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC SOIL CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-SOIL CRITERIA	MINIMUM ECOLOGICAL CRITERIA
99-35-4	1,3,5-TRINITROBENZENE	MG/KG	EXP	1/38	0	37	0.25	IS17SD020001	0.25	2300	0.002
99-65-0	1,3-DINITROBENZENE	MG/KG	EXP	1/46	0	45	0.0372 - 0.25	IS17SD020001	0.21217	7.8	0.007
118-96-7	2,4,6-TRINITROTOLUENE	MG/KG	EXP	2/46	0	36	0.0356 - 0.25	IS17SD020001	0.21102	21	0.09
121-14-2	2,4-DINITROTOLUENE	MG/KG	EXP	0/46	0	0	0.0516 - 0.25		0.2155	160	NA
606-20-2	2,6-DINITROTOLUENE	MG/KG	EXP	1/46	0	0	0.0476 - 0.25	IS17SD030001	0.21402	78	0.294
35572-78-2	2-AMINO-4,6-DINITROTOLUENE	MG/KG	EXP	1/46	0	0	0.0467 - 0.25	IS17SD050001	0.21386	4.7	NA
88-72-2	2-NITROTOLUENE	MG/KG	EXP	0/46	0	0	0.0814 - 0.25		0.22068	780	NA
99-08-1	3-NITROTOLUENE	MG/KG	EXP	2/46	0	0	0.0818 - 0.25	IS17SD020001	0.21942	1600	NA
19406-51-0	4-AMINO-2,6-DINITROTOLUENE	MG/KG	EXP	0/46	0	0	0.0409 - 0.25		0.21146	NA	NA
99-99-0	4-NITROTOLUENE	MG/KG	EXP	1/46	0	0	0.0872 - 0.25	IS11SD040001	0.21906	780	NA
2691-41-0	HMX	MG/KG	EXP	1/46	0	45	0.0705 - 0.5	MTCSD02401	0.27364	3900	0.005
98-95-3	NITROBENZENE	MG/KG	EXP	0/46	0	0	0.0352 - 0.25		0.20934	39	NA
9004-70-0	NITROCELLULOSE	MG/KG	EXP	30/36	0	0	0.52 - 16.4	MTCSD02101	6.00333	NA	NA
55-63-0	NITROGLYCERIN	MG/KG	EXP	0/46	0	0	0.5 - 10		2.31957	46	NA
556-88-7	NITROGUANIDINE	MG/KG	EXP	0/46	0	0	0.0625 - 0.25		0.18478	NA	NA
78-11-5	PETN	MG/KG	EXP	0/10	0	0	2.5		2.5	NA	NA
121-82-4	RDX	MG/KG	EXP	0/46	0	0	0.0509 - 0.5		0.26972	5.8	NA
479-45-8	TETRYL	MG/KG	EXP	0/40	0	0	0.163 - 0.65		0.32183	780	NA
	Inorganics										
7429-90-5	ALUMINUM	MG/KG	M	46/46	0	0	0	S39SD0070001	0	78000	18000
7440-36-0	ANTIMONY	MG/KG	M	8/46	0	0	0.4 - 5.2	IS11SD020001	1.33513	31	150
7440-38-2	ARSENIC	MG/KG	M	36/46	10	3	0.69 - 10.3	MTCSD02601	5.281	0.43	8.2
7440-39-3	BARIUM	MG/KG	M	46/46	0	0	0	IS11SD010001	0	5500	48
7440-41-7	BERYLLIUM	MG/KG	M	40/46	0	0	0.055 - 0.22	MTCSD01901	0.10667	160	NA
7440-43-9	CADMIUM	MG/KG	M	38/46	0	0	0.07 - 0.8	MTCSD02601	0.235	39	1.2
7440-70-2	CALCIUM	MG/KG	M	44/46	0	0	151 - 198	IS11SD020001	174.5	NA	NA
7440-47-3	CHROMIUM	MG/KG	M	46/46	0	0	0	IS11SD040001	0	230	81
7440-48-4	COBALT	MG/KG	M	44/46	0	0	1.4 - 5.1	S39SD0020001	3.25	1600	10
7440-50-8	COPPER	MG/KG	M	43/46	0	0	0.3 - 4.7	IS11SD010001	2.2	3100	34
57-12-5	CYANIDE	MG/KG	M	4/46	0	5	0.14 - 2.7	MTCSD00201	0.52214	1600	0.667
7439-89-6	IRON	MG/KG	M	46/46	0	0	0	IS11SD030001	0	23000	20000
7439-92-1	LEAD	MG/KG	M	46/46	0	0	0	IS11SD010001	0	400	46.7
7439-95-4	MAGNESIUM	MG/KG	M	43/46	0	0	56.2 - 106	IS11SD020001	88.73333	NA	NA
7439-96-5	MANGANESE	MG/KG	M	46/46	0	0	0	MTCSD01901	0	1600	260
7439-97-6	MERCURY	MG/KG	M	32/45	0	1	0.05 - 0.17	S39SD0070001	0.08143	23	0.15
7440-02-0	NICKEL	MG/KG	M	44/46	0	0	1.2 - 2	IS11SD040001	1.6	1600	20.9
7440-09-7	POTASSIUM	MG/KG	M	45/46	0	0	8.9 - 44.8	MTCSD00901	44.8	NA	NA
7782-49-2	SELENIUM	MG/KG	M	1/45	0	32	0.65 - 3.9	IS11SD030001	1.55822	390	1
7440-22-4	SILVER	MG/KG	M	33/46	0	0	0.099 - 0.82	S39SD0040001	0.40415	390	1

TABLE 1-8

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - SEDIMENT
MATTAWOMAN CREEK
IH-DIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC SOIL CRITERIA	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED MINIMUM ECOLOGICAL CRITERIA	RANGE OF NON DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	EPA REGION 3 RBC-SOIL CRITERIA	MINIMUM ECOLOGICAL CRITERIA
7440-23-5	SODIUM	MG/KG	M	4/46	0	0	34.9 - 607	MTCSD02601	292.32143	NA	NA
7440-28-0	THALLIUM	MG/KG	M	9/46	0	0	0.64 - 3.6	IS11SD010001	1.51919	5.5	NA
7440-62-2	VANADIUM	MG/KG	M	46/46	0	0	0	MTCSD02101	0	550	57
7440-66-6	ZINC	MG/KG	M	40/46	0	0	3.5 - 149	MTCSD02601	39.66667	23000	150
	AVS/SEM										
TTNUS010	ACID VOLATILE SULFIDE,AVS/SEM	UMO/G	AVS	31/36	0	0	0.0057 - 0.1567	S39SD0080001	0.01065	NA	NA
7440-43-9	CADMIUM,AVS/SEM	UMO/G	AVS	6/36	0	0	0.0004 - 0.0156	MTCSD02601	0.00555	39	1.2
7440-50-8	COPPER,AVS/SEM	UMO/G	AVS	33/36	0	0	0.0188 - 0.0491	MTCSD02601	0.02712	3100	34
7439-92-1	LEAD,AVS/SEM	UMO/G	AVS	35/36	0	0	0.0030	MTCSD02601-D	0.00295	400	46.7
7439-97-6	MERCURY,AVS/SEM	UMO/G	AVS	0/36	0	0	0.0000 - 0.0001		0.00004	23	0.15
7440-02-0	NICKEL,AVS/SEM	UMO/G	AVS	25/36	0	0	0.0205 - 0.2071	MTCSD01001	0.06882	1600	20.9
CALC012	TOTAL SEM-AVS,AVS/SEM	UMO/G	AVS	35/35	0	0	0	MTCSD02601-D	0	NA	NA
7440-66-6	ZINC,AVS/SEM	UMO/G	AVS	29/36	0	0	0.0425 - 1.2392	MTCSD02601-D	0.42511	23000	150
	Miscellaneous Parameters										
7790-98-9	AMMONIUM PERCHLORATE	UG/KG	MISC	0/10	0	0	86 - 230		130.6	NA	NA
TTNUS004	DIESEL RANGE ORGANICS	MG/KG	MISC	3/4	0	0	4.1	IS11SD030001	4.1	NA	NA
TTNUS005	GASOLINE RANGE ORGANICS	MG/KG	MISC	0/4	0	0	0.13 - 0.14		0.1325	NA	NA
TTNUS288	PERCENT MOISTURE	MG/KG	MISC	10/10	0	0	0	IS17SD060001	0	NA	NA
TTNUS291	PERCENT SOLIDS	MG/KG	MISC	6/6	0	0	0	IS17SD040001	0	NA	NA
7790-98-9	PERCHLORATE	UG/KG	MISC	0/10	0	0	72.88 - 194.92		110.677	7800	NA
TTNUS002	PH	S.U.	MISC	14/14	0	0	0	IS17SD060001	0	NA	NA
TTNUS003	TOTAL ORGANIC CARBON	MG/KG	MISC	39/42	0	0	123 - 133	MTCSD00801	127	NA	NA
	Field Parameters										
TTNUS287	PERCENT CLAY,FIELD	%	FIELD	17/17	0	0	0	MTCSD01401	0	NA	NA
TTNUS365	PERCENT GRAVEL,FIELD	%	FIELD	17/17	0	0	0	MTCSD01701	0	NA	NA
TTNUS289	PERCENT SAND,FIELD	%	FIELD	17/17	0	0	0	MTCSD02001	0	NA	NA
TTNUS290	PERCENT SILT,FIELD	%	FIELD	17/17	0	0	0	MTCSD00901	0	NA	NA

TABLE 1-9

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR FILET SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	REGION 3 RBC FOR FISH	UNITS
1,1-BIPHENYL	92-52-4	OS	330	330	UG/KG	68000	UG/KG
1,3,5-TRINITROBENZENE	99-35-4	EXP	15	250	UG/KG	41000	UG/KG
1,3-DINITROBENZENE	99-65-0	EXP	17	250	UG/KG	**140**	UG/KG
2,2'-OXYBIS(1-CHLOROPROPANE)	108-60-1	OS	4.8	330	UG/KG	**45**	UG/KG
2,4,5-TRICHLOROPHENOL	95-95-4	OS	4.1	830	UG/KG	140000	UG/KG
2,4,6-TRICHLOROPHENOL	88-06-2	OS	8.8	330	UG/KG	**290**	UG/KG
2,4,6-TRINITROTOLUENE	118-96-7	EXP	31	250	UG/KG	**110**	UG/KG
2,4-DICHLOROPHENOL	120-83-2	OS	7.6	330	UG/KG	4100	UG/KG
2,4-DIMETHYLPHENOL	105-67-9	OS	14	330	UG/KG	27000	UG/KG
2,4-DINITROPHENOL	51-28-5	OS	36	830	UG/KG	2700	UG/KG
2,4-DINITROTOLUENE	121-14-2	EXP	28	250	UG/KG	2700	UG/KG
2,4-DINITROTOLUENE	121-14-2	OS	5.1	330	UG/KG	2700	UG/KG
2,6-DINITROTOLUENE	606-20-2	EXP	70	250	UG/KG	1400	UG/KG
2,6-DINITROTOLUENE	606-20-2	OS	16	330	UG/KG	1400	UG/KG
2-AMINO-4,6-DINITROTOLUENE	35572-78-2	EXP	65	250	UG/KG	**81**	UG/KG
2-CHLORONAPHTHALENE	91-58-7	OS	3.3	330	UG/KG	110000	UG/KG
2-CHLOROPHENOL	95-57-8	OS	6	330	UG/KG	6800	UG/KG
2-METHYLNAPHTHALENE	91-57-6	OS	7.3	330	UG/KG	27000	UG/KG
2-METHYLPHENOL	95-48-7	OS	5.2	330	UG/KG	68000	UG/KG
2-NITROANILINE	88-74-4	OS	7.5	830	UG/KG	NA	
2-NITROPHENOL	88-75-5	OS	15	330	UG/KG	11000	UG/KG
2-NITROTOLUENE	88-72-2	EXP	68	250	UG/KG	14000	UG/KG
3,3'-DICHLOROBENZIDINE	91-94-1	OS	7.2	330	UG/KG	7	UG/KG
3-NITROANILINE	99-09-2	OS	3.4	830	UG/KG	**160**	UG/KG
3-NITROTOLUENE	99-08-1	EXP	120	250	UG/KG	27000	UG/KG
4,4'-DDD	72-54-8	PEST/PCB	0.13	3.3	UG/KG	13	UG/KG
4,4'-DDE	72-55-9	PEST/PCB	0.041	3.3	UG/KG	9.3	UG/KG
4,4'-DDT	50-29-3	PEST/PCB	0.32	3.3	UG/KG	9.3	UG/KG
4,6-DINITRO-2-METHYLPHENOL	534-52-1	OS	33	830	UG/KG	**140**	UG/KG
4-AMINO-2,6-DINITROTOLUENE	19406-51-0	EXP	98	250	UG/KG	81	UG/KG
4-BROMOPHENYL PHENYL ETHER	101-55-3	OS	8.3	330	UG/KG	NA	
4-CHLORO-3-METHYLPHENOL	59-50-7	OS	5.2	330	UG/KG	NA	
4-CHLOROANILINE	106-47-8	OS	7.8	330	UG/KG	5400	UG/KG
4-CHLOROPHENYL PHENYL ETHER	7005-72-3	OS	9.3	330	UG/KG	NA	
4-METHYLPHENOL	106-44-5	OS	2.1	330	UG/KG	6800	UG/KG
4-NITROANILINE	100-01-6	OS	5.2	830	UG/KG	**160**	UG/KG
4-NITROPHENOL	100-02-7	OS	8.1	830	UG/KG	11000	UG/KG

TABLE 1-9

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR FILET SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	REGION 3 RBC FOR FISH	UNITS
4-NITROTOLUENE	99-99-0	EXP	120	250	UG/KG	14000	UG/KG
ACENAPHTHENE	83-32-9	OS	5.9	330	UG/KG	81000	UG/KG
ACENAPHTHYLENE	208-96-8	OS	5.6	330	UG/KG	81000	UG/KG
ACETOPHENONE	98-86-2	OS	65	330	UG/KG	140000	UG/KG
ALDRIN	309-00-2	PEST/PCB	0.044	1.7	UG/KG	**0.19**	UG/KG
ALPHA-BHC	319-84-6	PEST/PCB	0.03	1.7	UG/KG	**0.5**	UG/KG
ALPHA-CHLORDANE	5103-71-9	PEST/PCB	0.062	1.7	UG/KG	9	UG/KG
ALUMINUM	7429-90-5	M	0.92	0.92	MG/KG	1400	MG/KG
ANTHRACENE	120-12-7	OS	4	330	UG/KG	410000	UG/KG
ANTIMONY	7440-36-0	M	0.48	0.48	MG/KG	0.54	MG/KG
AROCLOR-1016	12674-11-2	PEST/PCB	2	33	UG/KG	45	UG/KG
AROCLOR-1221	11104-28-2	PEST/PCB	6.2	67	UG/KG	1.6	UG/KG
AROCLOR-1232	11141-16-5	PEST/PCB	3.8	33	UG/KG	1.6	UG/KG
AROCLOR-1242	53469-21-9	PEST/PCB	3.8	33	UG/KG	1.6	UG/KG
AROCLOR-1248	12672-29-6	PEST/PCB	8.8	33	UG/KG	1.6	UG/KG
AROCLOR-1254	11097-69-1	PEST/PCB	3.2	33	UG/KG	1.6	UG/KG
AROCLOR-1260	11096-82-5	PEST/PCB	2	33	UG/KG	1.6	UG/KG
ARSENIC	7440-38-2	M	0.84	0.84	MG/KG	0.0021	MG/KG
ATRAZINE	1912-24-9	OS	10	330	UG/KG	**14**	UG/KG
BARIUM	7440-39-3	M	0.06	0.06	MG/KG	95	MG/KG
BENZALDEHYDE	100-52-7	OS	12	330	UG/KG	140000	UG/KG
BENZO(A)ANTHRACENE	56-55-3	OS	3.3	330	UG/KG	**4.3**	UG/KG
BENZO(A)PYRENE	50-32-8	OS	18	330	UG/KG	0.43	UG/KG
BENZO(B)FLUORANTHENE	205-99-2	OS	4.8	330	UG/KG	4.3	UG/KG
BENZO(G,H,I)PERYLENE	191-24-2	OS	6.2	330	UG/KG	41000	UG/KG
BENZO(K)FLUORANTHENE	207-08-9	OS	6.3	330	UG/KG	**43**	UG/KG
BERYLLIUM	7440-41-7	M	0.02	0.02	MG/KG	2.7	MG/KG
BETA-BHC	319-85-7	PEST/PCB	0.24	1.7	UG/KG	1.8	UG/KG
BIS(2-CHLOROETHOXY)METHANE	111-91-1	OS	7.7	330	UG/KG	NA	
BIS(2-CHLOROETHYL)ETHER	111-44-4	OS	10	330	UG/KG	2.9	UG/KG
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	OS	54	330	UG/KG	**230**	UG/KG
BUTYL BENZYL PHTHALATE	85-68-7	OS	6.6	330	UG/KG	270000	UG/KG
CADMIUM	7440-43-9	M	0.02	0.02	MG/KG	1.4	MG/KG
CADMIUM	7440-43-9	SEM	NA	NA	MG/KG	1.4	MG/KG
CALCIUM	7440-70-2	M	26.6	26.6	MG/KG	NA	
CAPROLACTAM	105-60-2	OS	17	330	UG/KG	680000	UG/KG
CARBAZOLE	86-74-8	OS	31	330	UG/KG	**160**	UG/KG

TABLE 1-9

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR FILET SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	REGION 3 RBC FOR FISH	UNITS
CHROMIUM	7440-47-3	M	0.08	0.08	MG/KG	4.1	MG/KG
CHRYSENE	218-01-9	OS	7.3	330	UG/KG	430	UG/KG
COBALT	7440-48-4	M	0.04	0.04	MG/KG	27	MG/KG
COPPER	7440-50-8	M	0.08	0.08	MG/KG	54	MG/KG
COPPER	7440-50-8	SEM	NA	NA	MG/KG	54	MG/KG
CYANIDE	57-12-5	M	0.15	0.15	MG/KG	27	MG/KG
DELTA-BHC	319-86-8	PEST/PCB	0.061	1.7	UG/KG	**0.5**	UG/KG
DI-N-BUTYL PHTHALATE	84-74-2	OS	5.8	330	UG/KG	140000	UG/KG
DI-N-OCTYL PHTHALATE	117-84-0	OS	2.4	330	UG/KG	27000	UG/KG
DIBENZO(A,H)ANTHRACENE	53-70-3	OS	4.3	330	UG/KG	0.43	UG/KG
DIBENZOFURAN	132-64-9	OS	5.5	330	UG/KG	5400	UG/KG
DIELDRIN	60-57-1	PEST/PCB	0.044	3.3	UG/KG	**0.2**	UG/KG
DIETHYL PHTHALATE	84-66-2	OS	5.9	330	UG/KG	1100000	UG/KG
DIMETHYL PHTHALATE	131-11-3	OS	3.9	330	UG/KG	14000000	UG/KG
ENDOSULFAN I	959-98-8	PEST/PCB	0.053	1.7	UG/KG	8100	UG/KG
ENDOSULFAN II	33213-65-9	PEST/PCB	0.073	3.3	UG/KG	8100	UG/KG
ENDOSULFAN SULFATE	1031-07-8	PEST/PCB	0.33	3.3	UG/KG	8100	UG/KG
ENDRIN	72-20-8	PEST/PCB	0.11	3.3	UG/KG	410	UG/KG
ENDRIN ALDEHYDE	7421-93-4	PEST/PCB	0.25	3.3	UG/KG	410	UG/KG
ENDRIN KETONE	53494-70-5	PEST/PCB	0.48	3.3	UG/KG	410	UG/KG
FLUORANTHENE	206-44-0	OS	7	330	UG/KG	54000	UG/KG
FLUORENE	86-73-7	OS	5.9	330	UG/KG	54000	UG/KG
GAMMA-BHC (LINDANE)	58-89-9	PEST/PCB	0.031	1.7	UG/KG	2.4	UG/KG
GAMMA-CHLORDANE	5103-74-2	PEST/PCB	0.11	1.7	UG/KG	9	UG/KG
HEPTACHLOR	76-44-8	PEST/PCB	0.048	1.7	UG/KG	**0.7**	UG/KG
HEPTACHLOR EPOXIDE	1024-57-3	PEST/PCB	0.25	1.7	UG/KG	**0.35**	UG/KG
HEXACHLOROBENZENE	118-74-1	OS	7.9	330	UG/KG	2	UG/KG
HEXACHLOROBUTADIENE	87-68-3	OS	10	330	UG/KG	**40**	UG/KG
HEXACHLOROCYCLOPENTADIENE	77-47-4	OS	7.2	330	UG/KG	8100	UG/KG
HEXACHLOROETHANE	67-72-1	OS	12	330	UG/KG	**230**	UG/KG
HMX	2691-41-0	EXP	14	250	UG/KG	68000	UG/KG
INDENO(1,2,3-CD)PYRENE	193-39-5	OS	5.3	330	UG/KG	4.3	UG/KG
IRON	7439-89-6	M	0.2	0.2	MG/KG	410	MG/KG
ISOPHORONE	78-59-1	OS	7.5	330	UG/KG	3300	UG/KG
LEAD	7439-92-1	M	0.24	0.24	MG/KG	NA	
LEAD	7439-92-1	SEM	NA	NA	MG/KG	NA	
LIPIDS		MISC	NA	NA	MG/KG	NA	

TABLE 1-9

SUMMARY OF HUMAN HEALTH AND ECOLOGICAL CRITERIA FOR FILET SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD MARYLAND

PARAMETER	CAS	FRACTION	METHOD DETECTION LIMIT (MDL)	LABORATORY REPORTING LIMIT (RL)	UNITS	REGION 3 RBC FOR FISH	UNITS
MAGNESIUM	7439-95-4	M	1.2	1.2	MG/KG	NA	
MANGANESE	7439-96-5	M	0.02	0.02	MG/KG	27	MG/KG
MERCURY	7439-97-6	M	0.05	0.05	MG/KG	0.14	MG/KG
METHOXYCHLOR	72-43-5	PEST/PCB	0.48	17	UG/KG	6800	UG/KG
N-NITROSO-DI-N-PROPYLAMINE	621-64-7	OS	12	330	UG/KG	0.45	UG/KG
N-NITROSODIPHENYLAMINE	86-30-6	OS	4.3	330	UG/KG	640	UG/KG
NAPHTHALENE	91-20-3	OS	7.8	330	UG/KG	27000	UG/KG
NICKEL	7440-02-0	M	0.04	0.04	MG/KG	27	MG/KG
NICKEL	7440-02-0	SEM	NA	NA	MG/KG	27	MG/KG
NITROBENZENE	98-95-3	EXP	25	250	UG/KG	680	UG/KG
NITROBENZENE	98-95-3	OS	15	330	UG/KG	680	UG/KG
NITROCELLULOSE	9004-70-0	EXP	1300	1800	UG/KG	NA	UG/KG
NITROGLYCERIN	55-63-0	EXP	70	500	UG/KG	**230**	UG/KG
NITROGUANIDINE	556-88-7	EXP	38	250	UG/KG	NA	UG/KG
PENTACHLOROPHENOL	87-86-5	OS	30	830	UG/KG	26	UG/KG
PERCHLORATE	7790-98-9	MISC	NA	NA	MG/KG	41	UG/KG
PHENANTHRENE	85-01-8	OS	3.5	330	UG/KG	41000	UG/KG
PHENOL	108-95-2	OS	3.3	330	UG/KG	410000	UG/KG
POTASSIUM	7440-09-7	M	9.94	9.94	MG/KG	NA	
PYRENE	129-00-0	OS	4.2	330	UG/KG	41000	UG/KG
RDX	121-82-4	EXP	51	250	UG/KG	29	UG/KG
SELENIUM	7782-49-2	M	0.86	0.86	MG/KG	6.8	MG/KG
SILVER	7440-22-4	M	0.12	0.12	MG/KG	6.8	MG/KG
SODIUM	7440-23-5	M	19.04	19.04	MG/KG	NA	
TETRYL	479-45-8	EXP	49	250	UG/KG	14000	UG/KG
THALLIUM	7440-28-0	M	0.78	0.78	MG/KG	0.095	MG/KG
TOXAPHENE	8001-35-2	PEST/PCB	0.76	170	UG/KG	**2.9**	UG/KG
VANADIUM	7440-62-2	M	0.08	0.08	MG/KG	9.5	MG/KG
ZINC	7440-66-6	M	0.14	0.14	MG/KG	410	MG/KG
ZINC	7440-66-6	SEM	NA	NA	MG/KG	410	MG/KG

TABLE 1-10

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - FISH
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC-FISH CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	REGION 3 RBC FISH CRITERIA
	Semivolatile Organics								
92-52-4	1,1-BIPHENYL	UG/KG	OS	0/26	0	330 - 9800		1049.61538	68000
108-60-1	2,2'-OXYBIS(1-CHLOROPROPANE)	UG/KG	OS	0/26	26	330 - 9800		1049.61538	45
95-95-4	2,4,5-TRICHLOROPHENOL	UG/KG	OS	0/26	0	820 - 25000		2790	140000
88-06-2	2,4,6-TRICHLOROPHENOL	UG/KG	OS	0/26	26	330 - 9800		1098.46154	290
120-83-2	2,4-DICHLOROPHENOL	UG/KG	OS	0/26	2	330 - 9800		1049.61538	4100
105-67-9	2,4-DIMETHYLPHENOL	UG/KG	OS	0/26	0	330 - 9800		1049.61538	27000
51-28-5	2,4-DINITROPHENOL	UG/KG	OS	0/26	4	820 - 25000		2790	2700
91-58-7	2-CHLORONAPHTHALENE	UG/KG	OS	0/26	0	330 - 9800		1098.46154	110000
95-57-8	2-CHLOROPHENOL	UG/KG	OS	0/26	1	330 - 9800		1049.61538	6800
91-57-6	2-METHYLNAPHTHALENE	UG/KG	OS	0/26	0	330 - 9800		1049.61538	27000
95-48-7	2-METHYLPHENOL	UG/KG	OS	2/26	0	330 - 9800	MTCGS003	1109.58333	68000
88-74-4	2-NITROANILINE	UG/KG	OS	0/26	0	820 - 25000		2790	NA
88-75-5	2-NITROPHENOL	UG/KG	OS	0/26	0	330 - 9800		1049.61538	11000
91-94-1	3,3'-DICHLOROBENZIDINE	UG/KG	OS	0/25	25	330 - 9800		1360.38462	7
99-09-2	3-NITROANILINE	UG/KG	OS	0/26	26	820 - 25000		2790	160
534-52-1	4,6-DINITRO-2-METHYLPHENOL	UG/KG	OS	0/26	26	820 - 25000		2885	140
101-55-3	4-BROMOPHENYL PHENYL ETHER	UG/KG	OS	0/26	0	330 - 9800		1135.76923	NA
59-50-7	4-CHLORO-3-METHYLPHENOL	UG/KG	OS	0/26	0	330 - 9800		1049.61538	NA
106-47-8	4-CHLOROANILINE	UG/KG	OS	0/5	0	330		1049.61538	5400
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	UG/KG	OS	0/26	0	330 - 9800		1098.46154	NA
106-44-5	4-METHYLPHENOL	UG/KG	OS	20/26	0	330	MTCCT00302	330	6800
100-01-6	4-NITROANILINE	UG/KG	OS	0/26	26	820 - 25000		2790	160
100-02-7	4-NITROPHENOL	UG/KG	OS	0/26	2	820 - 25000		2790	11000
83-32-9	ACENAPHTHENE	UG/KG	OS	0/26	0	330 - 9800		1098.46154	81000
208-96-8	ACENAPHTHYLENE	UG/KG	OS	0/26	0	330 - 9800		1098.46154	81000
98-86-2	ACETOPHENONE	UG/KG	OS	0/26	0	330 - 9800		1049.61538	140000
120-12-7	ANTHRACENE	UG/KG	OS	0/26	0	330 - 9800		1135.76923	410000
1912-24-9	ATRAZINE	UG/KG	OS	0/26	26	330 - 9800		1049.61538	14
100-52-7	BENZALDEHYDE	UG/KG	OS	8/26	0	330 - 9800	MTCLB005	1369.44444	140000
56-55-3	BENZO(A)ANTHRACENE	UG/KG	OS	0/25	25	330 - 9800		1360.38462	4.3
50-32-8	BENZO(A)PYRENE	UG/KG	OS	0/26	26	330 - 9800		1274.23077	0.43
205-99-2	BENZO(B)FLUORANTHENE	UG/KG	OS	0/26	26	330 - 9800		1274.23077	4.3

TABLE 1-10

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - FISH
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC-FISH CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	REGION 3 RBC FISH CRITERIA
191-24-2	BENZO(G,H,I)PERYLENE	UG/KG	OS	0/26	0	330 - 9800		1274.23077	41000
207-08-9	BENZO(K)FLUORANTHENE	UG/KG	OS	0/26	26	330 - 9800		1274.23077	43
111-91-1	BIS(2-CHLOROETHOXY)METHANE	UG/KG	OS	0/26	0	330 - 9800		1049.61538	NA
111-44-4	BIS(2-CHLOROETHYL)ETHER	UG/KG	OS	0/26	26	330 - 9800		1049.61538	2.9
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	OS	20/26	6	330 - 4900	MTCCT00403	1091.66667	230
85-68-7	BUTYL BENZYL PHTHALATE	UG/KG	OS	0/25	0	330 - 9800		1360.38462	270000
105-60-2	CAPROLACTAM	UG/KG	OS	0/26	0	330 - 9800		1049.61538	680000
86-74-8	CARBAZOLE	UG/KG	OS	0/26	26	330 - 9800		1135.76923	160
218-01-9	CHRYSENE	UG/KG	OS	0/25	7	330 - 9800		1360.38462	430
84-74-2	DI-N-BUTYL PHTHALATE	UG/KG	OS	0/26	0	330 - 9800		1098.46154	140000
117-84-0	DI-N-OCTYL PHTHALATE	UG/KG	OS	0/26	0	330 - 9800		1311.53846	27000
53-70-3	DIBENZO(A,H)ANTHRACENE	UG/KG	OS	0/26	26	330 - 9800		1274.23077	0.43
132-64-9	DIBENZOFURAN	UG/KG	OS	0/26	2	330 - 9800		1098.46154	5400
84-66-2	DIETHYL PHTHALATE	UG/KG	OS	0/26	0	330 - 9800		1098.46154	1100000
131-11-3	DIMETHYL PHTHALATE	UG/KG	OS	0/26	0	330 - 9800		1098.46154	14000000
206-44-0	FLUORANTHENE	UG/KG	OS	0/26	0	330 - 9800		1135.76923	54000
86-73-7	FLUORENE	UG/KG	OS	0/26	0	330 - 9800		1098.46154	54000
118-74-1	HEXACHLOROBENZENE	UG/KG	OS	0/26	26	330 - 9800		1135.76923	2
87-68-3	HEXACHLOROBUTADIENE	UG/KG	OS	0/26	26	330 - 9800		1049.61538	40
77-47-4	HEXACHLOROCYCLOPENTADIENE	UG/KG	OS	0/26	1	330 - 9800		1098.46154	8100
67-72-1	HEXACHLOROETHANE	UG/KG	OS	0/26	26	330 - 9800		1049.61538	230
193-39-5	INDENO(1,2,3-CD)PYRENE	UG/KG	OS	0/26	26	330 - 9800		1274.23077	4.3
78-59-1	ISOPHORONE	UG/KG	OS	0/26	2	330 - 9800		1049.61538	3300
621-64-7	N-NITROSO-DI-N-PROPYLAMINE	UG/KG	OS	0/26	26	330 - 9800		1049.61538	0.45
86-30-6	N-NITROSODIPHENYLAMINE	UG/KG	OS	0/26	5	330 - 9800		1135.76923	640
91-20-3	NAPHTHALENE	UG/KG	OS	0/26	0	330 - 9800		1049.61538	27000
87-86-5	PENTACHLOROPHENOL	UG/KG	OS	0/15	15	820 - 830		2885	26
85-01-8	PHENANTHRENE	UG/KG	OS	0/26	0	330 - 9800		1135.76923	41000
108-95-2	PHENOL	UG/KG	OS	6/26	0	330 - 9800	MTCCT005	1265.5	410000
129-00-0	PYRENE	UG/KG	OS	0/25	0	330 - 9800		1360.38462	41000
	Pesticides/PCBs								
72-54-8	4,4'-DDD	UG/KG	PEST/PCB	1/29	0	3.2 - 6.5	MTCSS004	3.71667	13
72-55-9	4,4'-DDE	UG/KG	PEST/PCB	19/31	0	3.2 - 6.5	MTCCT00301	3.55833	9.3

TABLE 1-10

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - FISH
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC-FISH CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	REGION 3 RBC FISH CRITERIA
50-29-3	4,4'-DDT	UG/KG	PEST/PCB	0/31	0	3.2 - 6.5		3.4	9.3
309-00-2	ALDRIN	UG/KG	PEST/PCB	0/31	31	1.7 - 3.4		1.75484	0.19
319-84-6	ALPHA-BHC	UG/KG	PEST/PCB	0/31	31	1.7 - 3.4		1.75484	0.5
5103-71-9	ALPHA-CHLORDANE	UG/KG	PEST/PCB	0/26	0	1.7 - 3.4		3.24194	9
12674-11-2	AROCLOR-1016	UG/KG	PEST/PCB	0/31	1	32 - 65		34	45
11104-28-2	AROCLOR-1221	UG/KG	PEST/PCB	0/31	31	66 - 130		68.77419	1.6
11141-16-5	AROCLOR-1232	UG/KG	PEST/PCB	0/31	31	32 - 65		34	1.6
53469-21-9	AROCLOR-1242	UG/KG	PEST/PCB	0/31	31	32 - 65		34	1.6
12672-29-6	AROCLOR-1248	UG/KG	PEST/PCB	0/31	31	32 - 65		34	1.6
11097-69-1	AROCLOR-1254	UG/KG	PEST/PCB	0/31	31	32 - 65		34	1.6
11096-82-5	AROCLOR-1260	UG/KG	PEST/PCB	18/31	13	32 - 65	MTCCT00301	35.38462	1.6
319-85-7	BETA-BHC	UG/KG	PEST/PCB	0/31	1	1.7 - 3.4		1.75484	1.8
319-86-8	DELTA-BHC	UG/KG	PEST/PCB	0/31	31	1.7 - 3.4		1.75484	0.5
60-57-1	DIELDRIN	UG/KG	PEST/PCB	1/30	29	3.2 - 6.5	MTCCT00301	3.42333	0.2
959-98-8	ENDOSULFAN I	UG/KG	PEST/PCB	1/31	0	1.7 - 3.4	MTCCT00102	1.75667	8100
33213-65-9	ENDOSULFAN II	UG/KG	PEST/PCB	0/31	0	3.2 - 6.5		3.4	8100
1031-07-8	ENDOSULFAN SULFATE	UG/KG	PEST/PCB	0/25	0	3.2 - 6.5		3.82258	8100
72-20-8	ENDRIN	UG/KG	PEST/PCB	1/31	0	3.2 - 6.5	MTCCT00402	3.40333	410
7421-93-4	ENDRIN ALDEHYDE	UG/KG	PEST/PCB	0/26	0	3.2 - 6.5		3.64194	410
53494-70-5	ENDRIN KETONE	UG/KG	PEST/PCB	0/31	0	3.2 - 6.5		3.4	410
58-89-9	GAMMA-BHC (LINDANE)	UG/KG	PEST/PCB	0/31	1	1.7 - 3.4		1.75484	2.4
5103-74-2	GAMMA-CHLORDANE	UG/KG	PEST/PCB	3/29	0	1.7 - 3.4	MTCCT00301	1.78929	9
76-44-8	HEPTACHLOR	UG/KG	PEST/PCB	0/31	31	1.7 - 3.4		1.75484	0.7
1024-57-3	HEPTACHLOR EPOXIDE	UG/KG	PEST/PCB	0/29	29	1.7 - 3.4		1.76452	0.35
72-43-5	METHOXYCHLOR	UG/KG	PEST/PCB	0/31	0	17 - 34		17.54839	6800
8001-35-2	TOXAPHENE	UG/KG	PEST/PCB	0/31	31	170 - 340		175.48387	2.9
	Explosives								
99-35-4	1,3,5-TRINITROBENZENE	UG/KG	EXP	0/26	0	250		250	41000
99-65-0	1,3-DINITROBENZENE	UG/KG	EXP	1/26	25	250	MTCCT005	250	140
118-96-7	2,4,6-TRINITROTOLUENE	UG/KG	EXP	0/26	26	250		250	110
121-14-2	2,4-DINITROTOLUENE	UG/KG	EXP	0/26	0	250		250	2700
606-20-2	2,6-DINITROTOLUENE	UG/KG	EXP	0/26	0	250		250	1400
35572-78-2	2-AMINO-4,6-DINITROTOLUENE	UG/KG	EXP	1/26	25	250	MTCCT00402	250	81

TABLE 1-10

FREQUENCY OF DETECTION AND EXCEEDANCE COUNTS OF NON-DETECTS - FISH
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC-FISH CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	REGION 3 RBC FISH CRITERIA
88-72-2	2-NITROTOLUENE	UG/KG	EXP	0/26	0	250		250	14000
99-08-1	3-NITROTOLUENE	UG/KG	EXP	0/26	0	250		250	27000
19406-51-0	4-AMINO-2,6-DINITROTOLUENE	UG/KG	EXP	0/26	26	250		250	81
99-99-0	4-NITROTOLUENE	UG/KG	EXP	0/26	0	250		250	14000
2691-41-0	HMX	UG/KG	EXP	1/26	0	250 - 700	MTCCT005	268	68000
98-95-3	NITROBENZENE	UG/KG	EXP	0/26	0	250		250	680
9004-70-0	NITROCELLULOSE	UG/KG	EXP	1/26	0	1200 - 3500	MTCCT00402	1832	NA
55-63-0	NITROGLYCERIN	UG/KG	EXP	4/26	22	500 - 1300	MTCSS005	536.36364	230
556-88-7	NITROGUANIDINE	UG/KG	EXP	3/26	0	250 - 3000	MTCLB00401	402.17391	NA
121-82-4	RDX	UG/KG	EXP	0/26	26	250		250	29
479-45-8	TETRYL	UG/KG	EXP	0/26	0	250		250	14000
	Inorganics								
7429-90-5	ALUMINUM	MG/KG	M	21/31	0	1.4 - 6	MTCVG003	3.34	1400
7440-36-0	ANTIMONY	MG/KG	M	0/31	1	0.32 - 0.71		0.42516	0.54
7440-38-2	ARSENIC	MG/KG	M	18/31	13	0.57 - 0.93	MTCFS003	0.72615	0.0021
7440-39-3	BARIUM	MG/KG	M	19/31	0	0.06 - 0.42	MTCVG004	0.17792	95
7440-41-7	BERYLLIUM	MG/KG	M	3/31	0	0.013 - 0.02	MTCVG003	0.01714	2.7
7440-43-9	CADMIUM	MG/KG	M	16/31	0	0.014 - 0.14	MTCVG003	0.04187	1.4
7440-70-2	CALCIUM	MG/KG	M	31/31	0	0	MTCLB005	0	NA
7440-47-3	CHROMIUM	MG/KG	M	7/31	0	0.17 - 0.74	MTCGS002	0.30458	4.1
7440-48-4	COBALT	MG/KG	M	0/31	0	0.027 - 1.1		0.14387	27
7440-50-8	COPPER	MG/KG	M	1/31	0	0.3 - 1.6	MTCCT005	0.74233	54
57-12-5	CYANIDE	MG/KG	M	4/26	0	0.3 - 0.43	MTCLB00201	0.35591	27
7439-89-6	IRON	MG/KG	M	23/31	0	3 - 7.5	MTCVG003	5.2375	410
7439-92-1	LEAD	MG/KG	M	6/31	0	0.16 - 0.99	MTCLB00202	0.3492	NA
7439-95-4	MAGNESIUM	MG/KG	M	31/31	0	0	MTCLB005	0	NA
7439-96-5	MANGANESE	MG/KG	M	30/31	0	0.34	MTCVG004	0.34	27
7439-97-6	MERCURY	MG/KG	M	2/30	0	0.04 - 0.05	MTCLB005	0.04417	0.14
7440-02-0	NICKEL	MG/KG	M	3/31	0	0.042 - 1.2	MTCVG004	0.29836	27
7440-09-7	POTASSIUM	MG/KG	M	31/31	0	0	MTCLB005	0	NA
7782-49-2	SELENIUM	MG/KG	M	0/30	0	0.57 - 1.1		0.74516	6.8
7440-22-4	SILVER	MG/KG	M	0/31	0	0.08 - 0.16		0.10384	6.8
7440-23-5	SODIUM	MG/KG	M	28/31	0	311 - 403	MTCCT005	369	NA

TABLE 1-10

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CAS	PARAMETER	UNITS	FRACTION	FREQUENCY OF DETECTION	QUANTITY OF NON-DETECTS (SQLs) THAT EXCEED REGION 3 RBC-FISH CRITERIA	RANGE OF NON-DETECTS (SQLs)	SAMPLE CONTAINING MAXIMUM CONCENTRATION	AVERAGE OF NON-DETECTS	REGION 3 RBC FISH CRITERIA
7440-28-0	THALLIUM	MG/KG	M	0/31	31	0.52 - 0.78		0.66935	0.095
7440-62-2	VANADIUM	MG/KG	M	10/31	0	0.054 - 0.08	MTCVG003	0.06752	9.5
7440-66-6	ZINC	MG/KG	M	20/31	0	5.1 - 11.9	MTCSS005	7.28182	410
	Miscellaneous Parameters								
TTNUS024	LIPIDS	%	MISC	26/26	0	0	MTCCT00101	0	NA
14797-73-0	PERCHLORATE	UG/KG	MISC	1/26	25	2500 - 5000	MTCLB00201	4000	41

APPENDIX B-7

ECOLOGICAL CRITERIA

CALCULATION OF SEDIMENT SCREENING LEVELS

Table 1 lists the sediment ecological screening levels that were used to select chemicals of potential concern in this report. Region III BTAG screening levels were selected first, and then were supplemented with other values in the literature, as necessary. Table 1 indicates the literature sources for these other values. In addition to the values derived in the literature, an equilibrium partitioning or a complementary technique was used to develop sediment screening levels. EPA's (September 1993) equilibrium partitioning (EqP) approach was used for some of the organic compounds in sediment, based on the formula:

$$WQG \times K_{oc} = SQG_{EP}$$

Where WQG = water quality guideline, mg/L

K_{oc} = organic carbon–water partition coefficient

SQG_{EP} = sediment quality guideline from EqP, mg/kg organic carbon in sediment

The equation indicates that the sediment guideline is based on the water quality guideline as an equilibrium concentration in the pore water of the sediment. As K_{oc} increases, less of the contaminant is dissolved in the pore water (more is associated with the solid phase) and the SQC_{EP} increases. K_{oc} was derived from the octanol-water partition coefficient (K_{ow}) using EPA's formula:

$$LOG_{10}K_{oc} = 0.00028+0.983*LOG_{10}(K_{ow}), \text{ or}$$

$$K_{oc} = 10^{0.00028+0.983*LOG10(Kow)}$$

Finally, the SQG_{EP} was put on a (dry) bulk sediment basis the average fraction of organic carbon in sediment (0.026, or 2.6%):

$$SQG_{EP}\ (mg/kg) = SQG_{EP}\ (mg/kg\ OC) \times 0.026$$

EqP has been applied by the EPA to organochlorine pesticides and PAHs, but not to the compounds from Mattawoman Creek in Table 2. The EqP model was designed for nonionic organic compounds and it may produce less reliable results as the K_{ow} values for organic compounds decrease or as polarity increases. Bioaccumulation can be predicted from K_{ow} when $\log_{10}K_{ow}$ is between 2 and 6 (EPA, 2000), indicating that there is less confidence in predicting bioavailability at $\log_{10}K_{ow}$ values much less than 2. Several of the compounds in Table 2 are characterized by low K_{ow} values. Therefore, a check was performed on the EqP results. The check was done using the complementary approach, an extension of EqP theory. As K_{ow} gets lower, more and more of the organic compound is expected to be in the pore water. For a compound with a very low K_{ow}, such as acetone, it may be reasonable to assume that all of the compound is in pore water. Following the logic of the EqP approach, this is a conservative assumption. If the fraction of water in the wet sediment is known, the mass of material in the pore water at the WQG can be assigned to the solid fraction (water-to-sediment assignation), as explained below.

The average fraction of solids in sediments sampled in Mattawoman Creek is 0.6. Therefore, the average fraction of water is 1 - 0.6 = 0.4. Because the specific gravity of water is one, the volume of water in a kg of Mattawoman Creek sediment will be:

$$0.4\ kg / 1\ kg/L = 0.4\ L$$

The total mass of contaminant in a kg of sediment at the water quality guideline is:

Contaminant mass (mg) = WQG (mg/L) x 0.4 L

This mass, when divided by the mass of solid material, 0.6 kg, becomes a dry sediment concentration of:

$SQG_{w\text{-}s}$ (mg/kg) = Contaminant mass (mg) / 0.6 kg

Therefore, the $SQG_{w\text{-}s}$ for sediment is equivalent to 0.4 / 0.6, or 0.667 times the guideline for surface water, as long as equivalent units are maintained.

The SQGs derived using both approaches are compared in Table 2. The $SQG_{w\text{-}s}$ values vary directly with WQGs, at 0.667 times the WQG. The SQG_{EP} values change with K_{ow} as well as WQG. For compounds with $\log_{10}K_{ow}$ greater than 1.4, the effect of K_{ow} is to increase the SQG_{EP} relative to the $SQG_{w\text{-}s}$. This is expected from EqP theory, because a higher K_{ow} increases the fraction associated with the solid phase. This allows a higher SQG_{EP} while, theoretically, pore water concentrations remain below the WQG. Therefore, the assumption of all the chemical being in pore water is conservative, probably overly conservative, relative to EqP for these compounds. The EqP value will be used for these compounds in this assessment, because their K_{ow} values are close to, or within, the range expected to be useful for applying EqP.

For 4-methyl-2-pentanone, methylene chloride, 2-butanone and acetone, their lower K_{ow}s have the effect of decreasing SQG_{EP} relative to the $SQG_{w\text{-}s}$ (Table 2). Because the $SQG_{w\text{-}s}$ values represent a most conservative case in terms of the amount of chemical in porewater, the appropriateness of the SQG_{EP} values for these compounds is doubtful. As stated before, the fact that EqP is designed for nonionic organic chemicals suggests that its predictive capacity may be curtailed at low values of K_{ow} ($\log_{10}K_{ow} << 2$). Because the $SQG_{w\text{-}s}$ values are simple and

conservative, they were used to assess risk to sediment-dwelling organisms from 4-methyl-2-pentanone, methylene chloride, 2-butanone and acetone.

TABLE 1

SUMMARY OF ECOLOGICAL CRITERIA FOR SEDIMENT SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

PARAMETER	ECOLOGICAL CRITERIA			
	EPA REGION 3 BTAG SEDIMENT CRITERIA	UNITS	MINIMUM ECOLOGICAL CRITERIA[1]	UNITS
1,3,5-TRINITROBENZENE	NA		2[2]	UG/KG
1,3-DINITROBENZENE	NA		7[2]	UG/KG
2,4,6-TRINITROTOLUENE	NA		90[2]	UG/KG
2,6-DINITROTOLUENE	NA		294[3]	UG/KG
2-AMINO-4,6-DINITROTOLUENE	NA		NA	
2-BUTANONE	NA		9330[3]	UG/KG
2-METHYLNAPHTHALENE	70	UG/KG	70	UG/KG
3-NITROTOLUENE	NA		NA	
4,4'-DDD	16	UG/KG	16	UG/KG
4,4'-DDE	2.2	UG/KG	2.2	UG/KG
4-METHYLPHENOL	670	UG/KG	670	UG/KG
4-NITROTOLUENE	NA		NA	
ACENAPHTHENE	16	UG/KG	16	UG/KG
ACENAPHTHYLENE	44	UG/KG	44[3]	UG/KG
ACETONE	NA		1000[3]	UG/KG
ACID VOLATILE SULFIDE	NA		NA	
ALPHA-BHC	NA		NA	
ALUMINUM	NA		18000[4]	MG/KG
ANTHRACENE	85.3	UG/KG	85.3	UG/KG
ANTIMONY	150	MG/KG	150	MG/KG
AROCLOR-1248	22.7	UG/KG	22.7	UG/KG
ARSENIC	8.2	MG/KG	8.2	MG/KG
BAP EQUIVALENT	NA		NA	
BARIUM	NA		48[4]	MG/KG
BENZO(A)ANTHRACENE	261	UG/KG	261	UG/KG
BENZO(A)PYRENE	430	UG/KG	430	UG/KG
BENZO(B)FLUORANTHENE	3200	UG/KG	3200[3]	UG/KG
BENZO(G,H,I)PERYLENE	670	UG/KG	670	UG/KG
BENZO(K)FLUORANTHENE	NA		240[5]	UG/KG
BERYLLIUM	NA		NA	
BIS(2-ETHYLHEXYL)PHTHALATE	1300	UG/KG	1300	UG/KG
CADMIUM	1.2	MG/KG	1.2	MG/KG
CALCIUM	NA		NA	
CARBAZOLE	NA		NA	
CARBON DISULFIDE	NA		1.9[3]	UG/KG
CHLOROFORM	NA		62.9[3]	UG/KG
CHLOROMETHANE	NA		NA	
CHROMIUM	81	MG/KG	81	MG/KG
CHRYSENE	384	UG/KG	384[3]	UG/KG
CIS-1,2-DICHLOROETHENE	NA		1030[3]	UG/KG
COBALT	NA		10[4]	MG/KG
COPPER	34	MG/KG	34	MG/KG
CYANIDE	NA		0.667[3]	MG/KG
DIBENZO(A,H)ANTHRACENE	63.4	UG/KG	63.4	UG/KG
DIBENZOFURAN	540	UG/KG	540	UG/KG
DIESEL RANGE ORGANICS	NA		NA	
DIETHYL ETHER	NA		NA	
DIETHYL PHTHALATE	200	UG/KG	200	UG/KG
DI-N-BUTYL PHTHALATE	1400	UG/KG	1400	UG/KG
FLUORANTHENE	600	UG/KG	600[3]	UG/KG
FLUORENE	19	UG/KG	19	UG/KG
HIGH MOLECULAR WEIGHT PAHS	NA		1700[6]	UG/KG
HMX	NA		5[2]	UG/KG
INDENO(1,2,3-CD)PYRENE	600	UG/KG	600	UG/KG
IRON	NA		20000[5]	MG/KG
LEAD	46.7	MG/KG	46.7	MG/KG
LOW MOLECULAR WEIGHT PAHS	NA		552[6]	UG/KG

TABLE 1

SUMMARY OF ECOLOGICAL CRITERIA FOR SEDIMENT SAMPLES
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

PARAMETER	ECOLOGICAL CRITERIA			
	EPA REGION 3 BTAG SEDIMENT CRITERIA	UNITS	MINIMUM ECOLOGICAL CRITERIA[1]	UNITS
MAGNESIUM	NA		NA	
MANGANESE	NA		260[4]	MG/KG
MERCURY	0.15	MG/KG	0.15	MG/KG
METHYL TERT-BUTYL ETHER	NA		NA	
NAPHTHALENE	160	UG/KG	160	UG/KG
NICKEL	20.9	MG/KG	20.9	MG/KG
NITROCELLULOSE	NA		NA	
N-NITROSODIPHENYLAMINE	28	UG/KG	28	UG/KG
PERCENT CLAY	NA		NA	
PERCENT GRAVEL	NA		NA	
PERCENT MOISTURE	NA		NA	
PERCENT SAND	NA		NA	
PERCENT SILT	NA		NA	
PERCENT SOLIDS	NA		NA	
PH	NA		NA	
PHENANTHRENE	240	UG/KG	240	UG/KG
POTASSIUM	NA		NA	
PYRENE	665	UG/KG	665	UG/KG
SELENIUM	NA		1[4]	MG/KG
SILVER	1	MG/KG	1	MG/KG
SODIUM	NA		NA	
THALLIUM	NA		NA	
TOLUENE	NA		123[3]	UG/KG
TOTAL ORGANIC CARBON	NA		NA	
TOTAL PAHS	NA		4022[6]	UG/KG
TOTAL SEM-AVS	NA		NA	
TRICHLOROETHENE	NA		450[3]	UG/KG
VANADIUM	NA		57[4]	MG/KG
ZINC	150	MG/KG	150	MG/KG

Footnotes:

1 The Combined Ecological Criteria are the EPA Region 3 BTAG Sediment Criteria, supplemented with criteria from other sources, where no BTAG criteria exist for a particular analyte.
2 Criteria presented are from Talmage, Sylvia S., Dennis M. Opresko, Christopher J. Maxwell, Christopher J.E. Welsh, F. Michael Cretella, Patricia H. Reno, and F. Bernard Daniel, 1999. "Nitroaromatic Munition Compounds: Environmental Effects and Screening Values." Rev. Environmen. Contam. Toxicol. 161:1-156.
3 Sediment criteria calculated by equilibrium partitioning.
4 Criteria presented are from Buchman, M. F., 1999. NOAA Screening Quick Reference Tables, NOAA HAZMAT Report 99-1, Seattle, WA, Coastal Protection and Restoration Division, National Oceanic and Atmospheric Administration. http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html
5 Criteria presented are from OMOE, 1993. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Ontario Ministry of Environment and Energy. August.
6 Criteria presented are from Long, Edward, R., D.D. MacDonald, S.L. Smith, F.D. Calder. 1995. Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments. 1995.

EPA = Environmental Protection Agency
BTAG = Biological Technical Assistance Group

TABLE 2

SEDIMENT SCREENING LEVELS FOR ORGANIC COMPOUNDS FROM EQUILIBRIUM PARTITIONING AND WATER-TO-SEDIMENT ASSIGNATION
DRAFT ECOLOGICAL RISK ASSESSMENT
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Chemical	$\log_{10}K_{ow}$ [1]	K_{ow}	K_{oc}	WQG (mg/L)	SQG_{EP} (mg/kg)	SQG_{w-s} (mg/kg)
1,1,2,2-Tetrachloroethane	2.66	457	412	0.610	6.54	0.407
1,1-Biphenyl	4.01	10233	8752	0.0140	3.19	0.0093
1,1-Dichloroethane	1.79	61.7	57.5	0.0470	0.0703	0.0313
1,1-Dichloroethene	2.13	135	124	0.0250	0.0807	0.0167
1,2-Dibromoethane	1.96	91.2	84.5	6.40	14.1	4.27
1,2-Dichloroethane	1.48	30.2	28.5	0.91	0.675	0.607
1,3-Dichlorobenzene	3.53	3388	2953	0.0710	5.45	0.0473
2,4,5-Trichlorophenol	3.72	5248	4540	0.0110	1.30	0.0073
2,4,6-Trichlorophenol	3.69	4898	4242	0.970	107	0.647
2,4-Dinitrophenol	1.67	46.8	43.8	0.15	0.171	0.100
2,6-Dinitrotoluene	1.72	52.5	49.1	0.230	0.294	0.153
2-Butanone	0.29	1.95	1.93	14	0.702	9.33
2-Chlorophenol	2.15	141	130	4.38	14.8	2.92
2-Nitrophenol	1.79	61.7	57.5	0.150	0.224	0.100
4-Methyl-2-pentanone	1.31	20.4	19.4	0.17	0.0858	0.113
4-Nitrophenol	1.91	81.3	75.5	0.300	0.589	0.200
Acetone	-0.24	0.575	0.581	1.5	0.0227	1.00
Benzene	2.13	135	124	0.130	0.420	0.0867
Carbon Disulfide	1.94	87.1	80.8	0.0009	0.0019	0.0006
Carbon Tetrachloride	2.83	676	606	0.0098	0.154	0.0065
Chlorobenzene	2.89	776	694	0.0640	1.15	0.0427
Chloroform	1.97	93.3	86.5	0.0280	0.0629	0.0187
Cis-1,2-Dichloroethene	1.86	72.4	67.4	0.590	1.03	0.393
Cyanide						0.667
Dichlorodifluoromethane	2.16	145	133	6.40	22.1	4.27
Hexachloroethane	4.14	13804	11746	0.0120	3.66	0.0080
Isophorone	1.7	50.1	46.9	12.9	15.7	8.60
Methylene Chloride	1.25	17.8	16.9	2.20	0.969	1.47
Toluene	2.73	537	483	0.0098	0.123	0.0065
Total 1,2-Dichloroethene	1.96	91.2	84.5	0.590	1.30	0.393
Trans-1,2-Dichloroethene	2.06	115	106	0.590	1.63	0.393
Trichloroethene	2.61	407	368	0.0470	0.450	0.0313
Trichlorofluoromethane	2.53	339	307	6.40	51.1	4.27

APPENDIX B-8

TIE AND SPAWAR DATA

APPENDIX B-8.1

TIE DATA

Measured sediment concentrations of chemicals for the Indian Head TIE study.

Class	Analyte	IH-01-CMP	IH-02-CMP	IH-03-CMP	IH-04-CMP	IH-05-CMP	IH-06-CMP	IH-07-CMP	IH-08-CMP	IH-09-CMP	IH-10-CMP	IH-11-CMP	IH-12-CMP	IH-13-CMP	IH-14-CMP	IH-15-CMP
MET	Aluminum, total	766	1020	1090	9120	9000	9170	9060	9480	7530	6270	6190	4280	2870	4280	1480
MET	Arsenic	0.83 B	0.37 B	0.57 B	4.5	6.1	6.0	3.6 B	4.6	5.0	2.1 B	2.7	3.5	2.2	2.0	53.6
MET	Cadmium	0.030 U	0.060 B	0.020 U	0.15 B	0.31 B	0.45 B	0.21 B	0.32 B	1.8 B	0.87 B	0.050 U	0.73 B	0.87	0.11 B	32.1
MET	Chromium	4.2	4.8	5.6	21.5	18.9	21.4	20.7	21.8	15.6	14.1	14.7	10.2	9.5	8.3	5.3
MET	Copper	4.8 EN	3.6 EN	1.6 EN	20.3 EN	20.9 EN	20.5 EN	19.2 EN	19.3 EN	28.6 EN	32.1 EN	14.0 EN	10.6 EN	13.9 EN	6.6 EN	100 EN
MET	Iron	4330 E	3690 E	4690 E	25500 E	21100 E	26400 E	24600 E	25000 E	32300 E	36100 E	17800 E	20000 E	13500 E	11100 E	6860 E
MET	Lead	20.1 E	12.7 E	3.8 E	32.2 E	30.9 E	32.7 E	31.2 E	32.4 E	28.6 E	26.8 E	21.8 E	20.8 E	28.5 E	17.6 E	1010 E
MET	Manganese	56.9	73.0	23.7	1040	587	1090	852	1070	435	542	571	262	153	209	75.8
MET	Nickel	5.6	3.6 B	4.4 B	22.9	22.9	23.1	21.8	23.9	20.5	16.9	15.3	12.7	6.5	10.2	17.7
MET	Silver	5.1	203	0.20 U	2.4 B	1.3 B	2.4 B	1.3 B	1.5 B	12.2	25.3	1.1 B	24.9	4.8	4.1	0.29 U
MET	Zinc	67.9 E	24.9 E	11.1 E	145 E	138 E	142 E	144 E	150 E	265 E	152 E	70.0 E	89.8 E	120 E	41.8 E	21600 E
MET	SEM-AVS	0.9	0.5	-2.3E-1	2.4	-1.4E+1	1.7	-1.7E+2	-1.0E+0	784	-9.3E+0	-2.9E+0	-9.2E+0	1.8	0.3	270
PAH	1-Methylnaphthalene	2.8 U	6.1	2.6 U	6.0 J	5.7 J	25.0 U	4.2 J	5.0 J	7.4 J	13.0 U	4.8 U	4.3 U	7.7	2.4 J	1.5 J
PAH	1-Methylphenanthrene	2.8 J	14.0	2.6 U	7.7 J	81.0	13.0 J	8.1	9.7	13.0	15.0	4.0 J	5.7	54.0	5.9	13.0
PAH	2,3,5 Trimethylnaphthalene	2.8 U	2.6 J	2.6 U	8.3 U	9.8	25.0 U	3.9 J	4.0 J	9.5 U	13.0 U	4.8 U	2.8 J	4.9	2.1 J	2.0 J
PAH	2,6 Dimethylnaphthalene	2.8 U	4.2	2.6 U	6.2 J	9.3	25.0 U	5.6 J	6.3 J	10.0	13.0 U	3.0 J	3.0 J	6.9	2.2 J	2.0 J
PAH	2-Methylnaphthalene	2.8 U	9.6	2.6 U	11.0	9.6	25.0 U	7.5	8.8	6.1 J	13.0 U	3.2 J	2.5 J	9.0	2.4 J	1.8 J
PAH	Acenaphthene	1.9 J	35.0	2.6 U	8.3 U	13.0	25.0 U	7.1 U	3.9 J	39.0	40.0	4.8 U	16.0	82.0	13.0	8.6
PAH	Acenaphthylene	2.8 U	2.9	2.6 U	8.3 U	30.0	25.0 U	7.1 U	5.4 J	22.0	7.5 J	4.8 U	4.3 U	15.0	2.1 J	2.2 J
PAH	Anthracene	8.7	55.0	2.6 U	9.0	99.0	16.0 J	10.0	13.0	50.0	50.0	7.9	16.0	270 E	15.0	25.0
PAH	Benzo(a)anthracene	30.0	260 E	1.5 J	54.0	840 E	88.0	54.0	78.0	220	240	40.0	78.0	1400 E	97.0	65.0
PAH	Benzo[a]pyrene	37.0	200 E	2.6 U	62.0	540 E	99.0	61.0	92.0	220	280	45.0	74.0	1600 E	87.0	60.0
PAH	Benzo[b]fluoranthene	34.0	230 E	1.7 J	73.0	670 E	110	69.0	100	290	440	43.0	97.0	1700 E	98.0	77.0
PAH	Benzo[e]pyrene	26.0	170 E	2.6 U	53.0	410 E	79.0	48.0	70.0	160	290	32.0	61.0	1000 E	70.0	54.0
PAH	Benzo[ghi]perylene	34.0	140 E	2.6 U	58.0	280	85.0	54.0	79.0	120	200	42.0	56.0	910 E	63.0	42.0
PAH	Benzo[k]fluoranthene	30.0	190 E	1.6 J	63.0	590 E	91.0	52.0	76.0	220	290	37.0	73.0	1200 E	70.0	61.0
PAH	Biphenyl	2.8 U	2.6 J	2.6 U	8.3 U	3.0 J	25.0 U	7.1 U	7.4 U	9.5 U	13.0 U	4.8 U	4.3 U	3.3 J	3.9 U	3.0 U
PAH	Chrysene	34.0	240 E	2.0 J	71.0	720 E	110	66.0	98.0	250	350	44.0	88.0	1400 E	98.0	99.0
PAH	Dibenzothiophene	1.7 J	13.0	2.6 U	8.3 U	16.0	25.0 U	7.1 U	3.9 J	6.5 J	14.0	4.8 U	5.2	40.0	3.8 J	13.0
PAH	Dibenz[a,h]anthracene	17.0	98.0	2.6 U	27.0	220	51.0	28.0	41.0	66.0	96.0	14.0	25.0	470 E	34.0	22.0
PAH	Fluoranthene	87.0	340 E	1.6 J	100	2100 E	170	99.0	150	430	440	70.0	160	1900 E	180	360 E
PAH	Fluorene	2.8 U	29.0	2.6 U	7.6 J	30.0	13.0 J	8.5	11.0	34.0	48.0	4.8 J	18.0	66.0	10.0	17.0
PAH	Indeno[1,2,3-cd]pyrene	31.0	160 E	2.6 U	57.0	360 E	84.0	52.0	79.0	150	210	38.0	58.0	1100 E	66.0	43.0
PAH	Naphthalene	2.8 U	12.0	2.6 U	9.7	7.8	25.0 U	5.3 J	6.4 J	7.3 J	13.0 U	2.7 J	2.7 J	15.0	3.5 J	2.2 J
PAH	Perylene	12.0	83.0	2.6 U	380	550 E	490	440 E	440 E	66.0	300	110	240 E	380 E	460 E	32.0
PAH	Phenanthrene	33.0	210 E	2.6 U	33.0	520 E	56.0	34.0	45.0	78.0	130	18.0	57.0	780 E	55.0	200 E
PAH	Pyrene	78.0	280 E	1.3 J	97.0	1500 E	170	94.0	140	360	420	64.0	140	1400 E	160	250 E
PAH	Total LMW (L) PAHs	54.8	354	18.2	86.9	709	185	79.5	93.5	236	302	46.2	117	1237	101	257
PAH	Total HMW (H) PAHs	283	1418	11.6	411	5920	688	402	599	1546	1826	277	565	8170	656	856
PAH	Total LMW+HMW PAHs	338	1772	29.8	498	6629	873	482	693	1782	2128	323	682	9407	757	1113

Units: metals = mg/kg; PCBs, Pesticides (PST), PAHs, Explosives (EXP) = ng/g;
SEM-AVS= µM/g.
LMW PAH = sum of 7 2-ring & 3-ring PAHs included in NOAA ER-L/ER-M benchmarks (Long et al. 1995);
(methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, phenanthrene)
HMW PAH = sum of 6 4-ring and 5-ring PAHs included in NOAA ER-L/ER-M benchmarks (Long et al. 1995);
(benzo(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, pyrene)
Total PAHs - sum of LMW & HMW PAHs; Total PCBs - Sum of individual PCB congeners x 2
Data Qualifiers: "U"=Undetected, "J"=Estimated, "B"=also present in method blank, "E"=exceeds calibration range,
C=manual spectrophotometric method, "D"=value from secondary dilution, "M"=duplicate precision not met,
N=presumptive evidence of compound, "P"=>25% difference between GC columns, "B"=<reporting limit.

Source of Table:

SAIC (Science Applications International Corporation). 2001. Sediment Toxicity Identification Evaluation Demonstration: Indian Head Naval Surface Warfare Center. Naval Facilities Engineering Service Center, Port Hueneme, CA.

Appendix A-1-1. continued.

Class	Analyte	IH-01-CMP	IH-02-CMP	IH-03-CMP	IH-04-CMP	IH-05-CMP	IH-06-CMP	IH-07-CMP	IH-08-CMP	IH-09-CMP	IH-10-CMP	IH-11-CMP	IH-12-CMP	IH-13-CMP	IH-14-CMP	IH-15-CMP
PCB	PCB 101	0.5 P	6.6	0.3 P	0.4 P	1.1 P	0.8 P	1.1 P	0.3 P	2.3 P	6.2	0.5 P	3.4 P	43.0 E	1.6 P	0.5 P
PCB	PCB 105	0.2 U	2.5 BP	0.2 U	0.4 U	0.7 BP	0.4 U	0.3 U	0.3 U	1.0 BP	2.3 BP	0.2 U	1.1 BP	16.0 BEF	0.7 BP	0.2 U
PCB	PCB 118	0.1 U	6.1 P	0.1 U	0.5 P	0.8 P	0.8 P	1.1 P	0.3 P	2.7	5.2 P	0.4 P	3.0	34.0 EP	1.5	0.1 P
PCB	PCB 126	0.3 P	0.7	0.0 U	0.1 P	0.3 P	0.2 P	0.5 P	0.1 U	0.4 P	0.8	0.1 U	0.5 P	3.8 P	0.7	0.3 P
PCB	PCB 128	0.2 P	1.8 P	0.1 P	0.5 P	0.5 P	0.7 P	0.8 P	0.3 P	1.2 P	1.5 P	0.3 P	1.0 P	7.0 P	0.7 P	0.3
PCB	PCB 138	0.3 P	6.4	0.0 U	0.7 P	1.9 P	1.2 P	1.3 P	0.4 P	3.1	5.7	0.5 P	3.3	28.0 E	1.8	0.2 P
PCB	PCB 153	0.4 P	4.8 P	0.0 U	1.0 P	1.9 P	1.5 P	1.4 P	0.6 P	2.6 P	4.9 P	0.6 P	40.0 P	23.0 P	1.5 P	0.2 P
PCB	PCB 156	0.1 U	1.1	0.1	0.4 P	0.3 P	0.5 P	0.5 P	0.3 P	0.6 P	1.0 P	0.2 P	0.6	5.5 P	0.3 P	0.2 P
PCB	PCB 169	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB	PCB 170	0.1 U	0.9	0.1 J	0.5 P	0.6 P	0.6 P	0.9 P	0.3 P	0.5	0.9	0.2 P	0.6	2.6	0.3	0.1
PCB	PCB 18	0.1 U	1.4 BP	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.5 BP	0.1 U	0.1 U	9.3 BP	0.1 U	0.1 BP
PCB	PCB 180	0.3 P	1.1 P	0.1 U	0.7	1.1 P	0.9 P	1.3	0.4 P	0.7 P	1.3	0.3 P	0.8 P	0.1 U	0.5 P	0.2 P
PCB	PCB 183	0.1 U	0.5 P	0.1 U	0.2 P	0.4 P	0.2 P	0.4 P	0.2 P	0.6 P	0.7 P	0.1 U	0.5	1.4 P	0.3 P	0.2 P
PCB	PCB 184	0.1 U	1.0 P	0.1 U	0.5	0.3 P	0.8	0.6 P	0.4	0.8 P	1.1 P	0.6 P	2.2 P	2.4 P	0.7	0.2
PCB	PCB 187	0.1 U	0.6 BP	0.1 U	0.1 U	0.7 BP	0.1 U	0.1 U	0.1 U	0.1 U	8.4 BP	0.1 U	0.1 U	2.0 BP	0.1 U	0.1 U
PCB	PCB 195	0.1 U	0.1 U	0.1 U	0.4 P	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
PCB	PCB 206	0.1 U	0.2	0.1 U	0.9 P	0.2 U	0.3 U	0.2 U	0.3 U	0.3 U	0.2 U	0.2 U	0.2 P	0.4 P	0.1 U	0.3 P
PCB	PCB 209	0.2 U	0.2 U	0.2 U	0.3 U	0.3 U	0.4 U	0.3 U	0.3 U	0.3 U	0.3 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2
PCB	PCB 28	0.0 U	1.8 P	0.1 P	0.1 U	0.1 U	0.1 U	0.4	0.1 U	0.1 U	2.2 P	0.3 P	0.0 U	26.0 E	0.7 P	0.0 U
PCB	PCB 44	0.3 P	2.2 P	0.1 P	0.4 P	0.6 P	0.8 P	0.7 P	0.4 P	1.2 P	2.4 P	0.7	1.4 P	18.0 EP	0.9 P	0.1 P
PCB	PCB 49	0.2 U	2.2	0.2 U	0.4 U	0.3	0.4 U	0.4 P	0.3 U	0.7	2.5	0.4 P	0.3 P	11.0 EP	0.4 P	0.2 U
PCB	PCB 52	0.1 U	4.0 P	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	3.9 P	0.1 U	2.6 P	35.0 EP	1.2 P	0.1 U
PCB	PCB 66	0.3	2.9 P	0.1	0.6 P	0.7 P	0.9	0.9 P	0.4 P	1.6 P	3.0 P	0.8 P	1.0 P	21.0 EP	1.0 P	0.3
PCB	PCB 77	0.1 U	10.0	0.1 U	0.4 P	1.4 P	0.4 P	1.9	0.2 U	4.2	9.8	0.8 P	5.3 P	103 E	3.1	0.2 P
PCB	PCB 8	0.2 P	0.6 P	0.2	0.2 U	0.4 P	0.6	0.2 U	0.2 U	0.2 U	0.6 P	0.3 P	0.1 U	7.7 P	0.3 P	0.1 U
PCB	PCB 87	0.0 U	3.2 P	0.0 U	0.3 P	0.6 P	0.4 P	0.5 P	0.2 P	1.4 P	3.0 P	0.4 P	2.4	28.0 E	0.9 P	0.0 U
PCB	Total (Sumx2) PCBs	8.6	126	5.3	21.1	31.8	27.6	33.3	13.7	54.5	137	16.9	141	857	39.3	9.5
PST	2,4'-DDD	0.7 U	0.7 U	0.7 U	1.5 U	1.2 U	1.6 U	1.3 U	1.4 U	1.5 U	1.1 U	0.9 P	1.1 P	50.0 P	1.3 P	0.7 U
PST	2,4'-DDE	0.6 U	0.6 U	0.6 U	1.2 U	0.9 U	1.3 U	1.0 U	1.1 U	1.2 U	0.9 U	0.7 U	0.9 P	7.9 P	0.6 U	0.6 U
PST	2,4'-DDT	1.5	6.6 P	0.3 U	1.0 P	0.5 U	0.7 U	0.6 U	0.6 U	0.7 U	0.5 U	0.4 U	0.8 P	0.3 U	0.3 U	0.3 U
PST	4,4'-DDD	0.4 U	1.8 P	0.4 U	0.9 U	0.7 U	1.0 U	0.8 U	1.0 P	0.9 U	0.7 U	0.6 P	0.4 U	0.4 U	0.4 U	0.4 U
PST	4,4'-DDE	0.4 U	4.8 P	0.4 U	0.8 U	0.7 P	0.9 U	0.7 U	0.8	0.8 U	0.6 U	0.5 U	0.8 P	17.0 P	1.5	0.4 U
PST	4,4'-DDT	0.7 U	3.3 P	0.7 U	1.4 U	1.1 U	1.5 U	1.2 U	1.3 U	1.4 U	1.1 U	0.8 U	0.7 U	7.1 P	0.7 U	0.7 U
PST	Aldrin	0.5 U	0.5 U	0.5 U	1.1 U	0.9 U	1.2 U	1.0 U	1.0 U	1.1 U	0.8 U	0.6 U	0.5 U	10.0 P	0.5 U	0.5 U
PST	alpha-BHC	0.4 U	0.4 U	0.4 U	0.8 U	0.6 U	0.9 U	0.7 U	0.7 U	0.8 U	0.6 U	0.5 U	0.4 U	0.9 P	0.4 U	0.4 U
PST	alpha-Chlordane	0.7 U	44.0 EP	0.7 U	2.4 P	1.2 U	1.6 U	1.3 U	1.4 U	1.5 U	1.1 U	0.9 U	0.7 U	1.0 P	0.7 U	0.7 U
PST	beta-BHC	2.5	9171 P	0.5 U	295 EP	0.8 U	26.0 P	4.1 P	0.9 U	1.0 U	1.4 P	0.8 P	0.5 U	2.0 P	0.5 U	0.7 P
PST	delta-BHC	0.5 U	0.5 U	0.5 U	1.0 U	0.8 U	1.1 U	0.9 U	0.9 U	1.0 U	0.8 U	0.6 U	0.5 U	0.5 U	0.5 U	0.5 U
PST	Dieldrin	0.4 U	0.7 P	0.4 U	0.9 U	0.7 U	1.0 U	0.8 U	0.8 U	0.9 U	0.7 U	0.5 U	0.4 U	10.0 P	0.4 U	0.4 U
PST	Endosulfan I	0.7 U	0.7 U	0.7 U	1.5 U	1.2 U	1.6 U	1.3 U	1.4 U	1.5 U	1.2 U	0.9 U	0.7 U	1.1 P	0.7 U	0.7 U
PST	Endosulfan II	0.4 U	1.0 P	0.4 U	0.8 U	0.6 U	0.8 U	0.7 U	0.7	0.8 U	0.6 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
PST	Endosulfan sulfate	0.8 U	0.8 U	0.8 U	1.7 U	1.4 U	1.9 U	1.6 U	1.6 U	1.8 U	1.4 U	1.0 U	0.9 U	2.0 P	0.8 U	0.8 U
PST	Endrin	1.5 U	1.1 J	1.5 U	3.1 U	2.5 U	3.4 U	2.8 U	2.9 U	3.1 U	2.4 U	1.8 U	1.5 U	1.5 U	1.5 U	1.5 U
PST	Endrin aldehyde	0.9 U	1.4 P	0.9 U	2.0 U	1.6 U	2.1 U	1.7 U	1.8 U	2.0 U	1.6 P	1.1 U	1.0 U	4.1 P	0.9 U	0.9 U
PST	Endrin ketone	0.7 U	0.7 U	0.7 U	1.5 U	1.2 U	1.6 U	1.3 U	1.4 U	1.5 U	1.1 U	0.9 U	0.7 U	1.8 P	0.7 U	0.7 U
PST	gamma-BHC	0.5 U	0.5 U	0.5 U	0.9 U	0.8 U	1.0 U	0.8 U	0.9 U	0.9 U	0.7 U	0.6 U	0.5 U	0.4 U	0.5 U	0.5 U
PST	gamma-Chlordane	0.4 U	5.7 P	0.4 U	0.7 U	0.6 U	0.8 U	0.7 U	0.7 U	0.7 U	0.6 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
PST	Heptachlor	0.6 U	0.6 U	0.6 U	1.2 U	1.0 U	1.4 U	1.1 U	1.2 U	1.3 U	1.0 U	0.7 U	0.6 U	0.6 U	0.6 U	0.6 U
PST	Heptachlor epoxide	0.9	18.0 P	0.8 U	1.7 U	1.4 U	1.8 U	1.5 U	1.6 U	1.7 U	1.3 U	1.0 U	0.8 U	22.0	0.8 U	1.2 P
PST	Hexachlorobenzene	0.8 U	0.8 U	0.8 U	1.7 U	1.4 U	1.9 U	1.6 U	1.6 U	1.8 U	1.4 U	1.0 U	0.9 U	0.8 U	0.8 U	0.8 U
PST	Methoxychlor	14.0 P	2.6 U	2.6 U	5.4 U	4.3 U	5.9 U	4.8 U	5.0 U	5.4 U	4.2 U	3.2 U	2.6 U	2.6 U	2.6 U	2.6 U
PST	Mirex	3.3 U	3.3 U	3.3 U	6.9 U	5.5 U	7.5 U	6.2 U	6.4 U	6.9 U	5.4 U	4.0 U	3.4 U	3.4 P	3.3 U	3.3 U
PST	Toxaphene	14.0 U	14.0 U	14.0 U	29.0 U	23.0 U	32.0 U	26.0 U	27.0 U	29.0 U	23.0 U	17.0 U	14.0 U	14.0 U	14.0 U	14.0 U

Appendix A-1-1. continued.

Class	Analyte	IH-01-CMP	IH-02-CMP	IH-03-CMP	IH-04-CMP	IH-05-CMP	IH-06-CMP	IH-07-CMP	IH-08-CMP	IH-09-CMP	IH-10-CMP	IH-11-CMP	IH-12-CMP	IH-13-CMP	IH-14-CMP	IH-15-CMP
EXP	1,3,5-Trinitrobenzene	84.0 U	82.0 U	82.0 U	173 U	138 U	169 U	154 U	160 U	173 U	134 U	101 U	85.0 U	79.0 U	84.0 U	84.0 U
EXP	1,3-Dinitrobenzene	73.0 U	72.0 U	72.0 U	152 U	122 U	166 U	135 U	140 U	152 U	118 U	89.0 U	75.0 U	69.0 U	74.0 U	74.0 U
EXP	2,4,6-Trinitrotoluene	181 U	179 U	78.0 U	375 U	300 U	409 U	333 U	346 U	375 U	290 U	220 U	184 U	170 U	182 U	182 U
EXP	2,4-Dinitrotoluene	87.0 U	85.0 U	85.0 U	179 U	143 U	195 U	159 U	165 U	179 U	139 U	105 U	88.0 U	81.0 U	87.0 U	87.0 U
EXP	2,6-Dinitrotoluene	201 U	198 U	198 U	417 U	333 U	455 U	370 U	385 U	417 U	323 U	244 U	204 U	189 U	202 U	202 U
EXP	2-Amino-4,6-dinitrotoluene	141 U	139 U	138 U	292 U	233 U	318 U	259 U	269 U	292 U	226 U	171 U	143 U	133 U	141 U	141 U
EXP	2-Nitrotoluene	151 U	149 U	148 U	313 U	250 U	341 U	278 U	288 U	313 U	242 U	183 U	153 U	142 U	152 U	152 U
EXP	3-Nitrotoluene	231 U	228 U	227 U	479 U	383 U	523 U	426 U	442 U	479 U	371 U	280 U	235 U	218 U	232 U	232 U
EXP	4-Amino-2,6-dinitrotoluene	221 U	218 U	217 U	458 U	367 U	500 U	407 U	423 U	458 U	355 U	268 U	224 U	208 U	222 U	222 U
EXP	4-Nitrotoluene	121 U	119 U	119 U	250 U	200 U	273 U	222 U	231 U	250 U	194 U	146 U	122 U	114 U	121 U	121 U
EXP	HMX	191 U	188 U	188 U	396 U	317 U	432 U	352 U	365 U	396 U	306 U	232 U	1916	180 U	192 U	192 U
EXP	Nitrobenzene	111 U	1056	109 U	229 U	183 U	250 U	204 U	212 U	229 U	177 U	134 U	112 U	104 U	111 U	111 U
EXP	RDX	181 U	179 U	178 U	375 U	300 U	409 U	333 U	346 U	375 U	290 U	220 U	184 U	170 U	182 U	182 U
EXP	Tetryl	241 U	238 U	237 U	500 U	400 U	545 U	444 U	462 U	500 U	387 U	293 U	245 U	227 U	242 U	242 U
TOC	TOC(%)	0.5	0.5	0.7	17.6	12.6	18.1	13.8	14.6	26.3	11.8	5.1	5.9	1.4	3.2	1.7

APPENDIX B-8.2

SPAWAR RAPID SCREENING RESULTS

Pilot Study for Indian Head Mattawoman Creek

Introduction

Very little historical data have been collected anywhere in Mattawoman Creek, thus making the development of a quantitative survey design to support human health and ecological risk assessment very subjective without numerous difficult-to-support assumptions regarding the site conceptual model. The Pilot Study for Mattawoman Creek was intended to select several chemical constituents of potential ecological concern (COPC) that are potential risk drivers associated with historical site operations at Indian Head and use these COPCs as surrogates for the other likely Indian Head COPCs. The benefit of this strategy is that the rapid sediment analysis methods developed by SPAWAR can quickly, accurately and cost-effectively generate spatial concentration data for several COPCs across the Mattawoman Creek. These, in turn, can help identify historical COPC releases and accumulation areas, locations where possible releases did not occur or, locations where natural attenuation has reduced their concentration to below Region 3 screening levels. This approach requires two important assumptions. First, that the SPAWAR rapid sediment analytical methods can attain adequate detection or sensitivity limits for the selected COPCs in the pilot study; and second, that the accuracy of these methods for chemical identification and quantification can be demonstrated to be defensibly correlated with the findings of analytical results in an offsite laboratory using more traditional analytical methods and instrumentation. This pilot study resulted in values reported from the rapid sediment analytical methods, as well as values reported from more traditional analytical methods and instruments at offsite laboratories. These fixed laboratory analyses were performed on aliquots from a subset of samples analyzed from the rapid sediment analysis method. The following report presents a statistical and graphical analysis of the relationship demonstrated between the concentrations reported from the rapid sediment analysis and the fixed laboratory analysis of the paired sediment samples from Mattawoman Creek. Regression/correlation analysis was used to quantify the relationship between rapid sediment analysis and fixed lab results. Bivariate plots have been included to visually present the raw data as well as the statistical relationship between the paired results, as defined by the regression coefficients.

A. Data Preparation

Samples were collected for rapid sediment analysis at 44 sampling locations on Mattawoman Creek and 4 locations on Nanjemoy Creek according to the published Mattawoman Creek Pilot Study sampling and analysis plan. Field duplicate samples were collected at 6 of the Mattawoman Creek locations and 1 of the Nanjemoy Creek locations. Of these, 15 samples and 2 field duplicate samples from Mattawoman Creek and 2 samples from Nanjemoy Creek were sent out for fixed laboratory analysis. Analytical results from the rapid sediment analysis study were provided by SPAWAR and compiled into a Microsoft® Excel spreadsheet (MTC_Draft2.xls). Confirmation fixed laboratory data were provided by Battelle in Microsoft® Excel spreadsheets (Metals data.xls, s01-457 values ms.xls, and S01457ECD_Final.xls). Analytical data from these two sources were prepared for data analysis in the following manner:

- Data structure was made consistent across data sources.
- Information regarding sampling location and sample type (i.e., field data or field QC data) was made consistent across data sources.

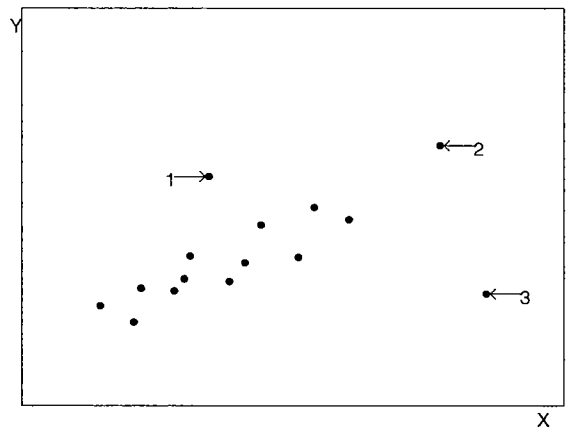
- Analyte name and units were made consistent across data sources, if necessary.
- Fixed lab individual PAH results were summed to attain a value comparable to the rapid sediment analysis result. The 16 PAH analytes used in the summation were: acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene. Non-detects were summed as 0.
- Fixed lab individual PCB congener results were summed and the sum multiplied by 2 to attain a value comparable to the rapid sediment analysis result. The 20 PCB congeners used in the summation were: Cl2(08), Cl3(18), Cl3(28), Cl4(44), Cl4(52), Cl4(66), Cl5(101), Cl5(105), Cl5(110), Cl5(118), Cl6(128), Cl6(129), Cl6(138), Cl6(153), Cl7(170), Cl7(180), Cl7(187), Cl8(195), Cl9(206), and Cl10(209). Non-detects were summed as 0.
- Field duplicate samples were included as individual samples in this study because they are analyses of two independent samples taken from locations separated by a small distance. Because sampling is done from a boat that is not stationary, the distance between original samples and field duplicates is not fixed. Therefore, differences between measurements are representative of heterogeneity on a small spatial scale.
- If replicate analyses were performed using the rapid sediment analysis method, the mean of the replicate results was used in the analyses.

B. Data Analysis

Simple linear regression analysis was performed to assess the relationship between fixed lab analytical results and rapid sediment analysis results for metals (chromium, copper, lead, and zinc), total PAHs and total PCBs. Bivariate plots were also generated to visually examine the nature and strength of these relationships. Regression analysis provides estimates of the intercept and slope of the line fitted to the observed data pairs. These estimates describe the nature of the relationship. In addition the regression analysis provides an F statistic to determine whether the relationship is statistically significant. This is the statistic associated with a test of whether the slope of the regression model is equal to zero. A slope of zero would indicate no linear association between the fixed lab and rapid sediment analysis results. The probability-value (p-value) of the F-statistic indicates the probability of obtaining data that produce as extreme a value as that observed (as large, or even larger, F-statistic than the one calculated from the observed data) if there is no linear association between the fixed lab and rapid sediment results. Finally, an r^2 value is calculated which quantifies the strength of the correlation or linear association between the two measurements; $r^2$is referred to as the coefficient of determination. Simply put, the r^2 value is the proportion of the overall variability in one measurement that is "explained" or accounted for by the other measurement. If the rapid sediment analysis produces results identical to those from fixed lab analysis, the intercept of the fitted line will be 0, the slope will be 1, the relationship will be statistically significant and the r^2 will be 1. An equality line (a line with an intercept of 0 and a slope of 1) has been plotted on the bivariate plots as a comparison between the "ideal" relationship and the fitted regression line.

Initially, a regression analysis was performed for each analyte using all data pairs. Follow-up analyses were run to examine the influence of removing extreme data points and/or dividing the rapid sediment analysis results by a constant. Extreme points which are well outside the range of other points can exert undo influence on a regression analysis and their inclusion causes the regression results to misrepresent a consistent pattern observed in the bulk of the data. The regression results are presented with and without the extreme points.

An observation may be outlying or extreme with respect to its *Y* value, its *X* value, or both. In the scatter plot, observation 1 is extreme with respect to its *Y* value. Note that this point falls far outside the scatter, although its *X* value is near the middle of the range of the observations of the independent variable. Observations 2 and 3 are extreme with respect to their *X* values, since they have much larger *X* values than those for the other observations; observation 3 is also extreme with respect to its *Y* value. Not all outlying observations have a strong influence on the fitted regression function. Observation 1 may not be too influential because there are a number of other observations that have similar *X* values, which will keep the fitted regression function from being displaced too far by the extreme observation. Likewise, observation 2 may not be too influential because its *Y* value is consistent with the regression relation displayed by the non-extreme observations. Observation 3, on the other hand, is likely to be very influential in affecting the fit of the regression function, because it is extreme with regard to its *X* value, and its *Y* value is not consistent with the regression relation for the other observations. The influence of the observations can be measured by a number of distance measures. Cook's distance measure reflects the aggregate of the differences between the fitted values for each observation when all n observations are used in the database and the fitted values when the ith observation is deleted. This distance can be compared to an F-statistic with 2 and n degrees of freedom. Comparing the fitted value of the ith observation when all observations are used to the fitted value when the ith observation is deleted gives a simple insight about the extent of the influence of a point. By presenting the regression equations both with and without the influential point, the viewer can make the comparison using the regression equation and the *X* value of the influential point in terms of the percent difference in the fitted values.



I. Metals

Upon examination of the metals bivariate plots, one extreme value was identified for each of the metals, except chromium. All of these values were associated with sampling location MTC077. Given that these values for MTC077 were well outside the range of the points for all other sampling locations, plots were regenerated and regression analyses rerun with the data for MTC077 removed. A summary of the regression analyses are presented in Table 1 and the associated bivariate plots are presented in Figures 1 through 8. When the regression analyses were run without MTC077 data:

- All relationships between the rapid sediment analysis result and the fixed lab result **are statistically significant at the 0.05 level (p-value of the F-statistic is less than 0.05)**.

- The intercepts are **not distinguishable from 0** and **all slopes, except for lead, are not distinguishable from 1**. The confidence interval for the slope of the fitted line for lead is 1.09 to 1.62, indicating that rapid sediment analysis result would underestimate the fixed lab result.
- The r^2 is **copper (0.79), lead (0.88) and zinc (0.68) which indicates a reasonably good explanation of variance**. The r^2 for chromium is 0.52 indicating that slightly over 50% of the variability in fixed lab results was explained by the rapid sediment analysis results. The "noise" in this relationship can be seen in the bivariate plot.

II. Total PCBs

One extreme point was identified in the total PCBs plot. This point was associated with sampling location MTC023. Given that this point was well outside the range of the points for all other sampling locations, plots were regenerated and regression analyses rerun with the data for MTC023 removed. Upon examination of the bivariate plot and the paired results, it appeared that the rapid sediment analysis results were a factor of 5 times greater than the fixed lab results. The analysis and plot were rerun/regenerated after dividing the rapid sediment analysis results by 5. It should be noted that rapid sediment analysis results reported below 50 µg/kg (ppb) are considered non-detects and those reported below 100 µg/kg (ppb) are considered to be estimated. Thus, 15 of 18 reported results are below the range where the rapid sediment analysis method can provide reliable estimates of concentration. A summary of the regression analyses are presented in Table 1 and the associated bivariate plots are presented in Figures 9 through 11. The regression analysis indicated:

- There is a **statistically significant relationship at the 0.05 level between the fixed lab results and the rapid sediment analysis results (divided by 5).**
- The slope and intercept are **not different from 1 and 0,** respectively.
- The r^2 is **0.34 indicating that a large amount of variability (66%) in fixed lab results** is not explained by the rapid sediment analysis results.

III. Total PAHs

On examination of the bivariate plot and a tabulation of the paired results, it appeared that the rapid sediment analysis results were a factor of 10 times greater than the fixed lab results. Since the rapid sediment analysis method reports total PAHs in phenanthrene equivalents, it is not surprising that a conversion factor is necessary to make the rapid sediment analysis and fixed lab results comparable. In a study conducted by SPAWAR at Oakland Inner Harbor, Alameda Point, California a similar conversion factor was used to predict fixed lab results from the rapid sediment analysis result (Jim Leather, personal conversation 10/31/2001). After dividing the rapid sediment analysis results by 10, the regression analysis and plot were rerun/regenerated. One extreme point was identified as well as a point that appeared suspect. The extreme point was associated with sampling location MTC068. The suspect point was associated with the field duplicate sample for MTC063. The results for fixed lab and rapid sediment analysis methods for the duplicate pair of samples were:

	Fixed Lab µg/kg (ppb)	Rapid Sediment Analysis µg/kg (ppb)
Primary Sample	338	3535
Field Duplicate Sample	430	52356

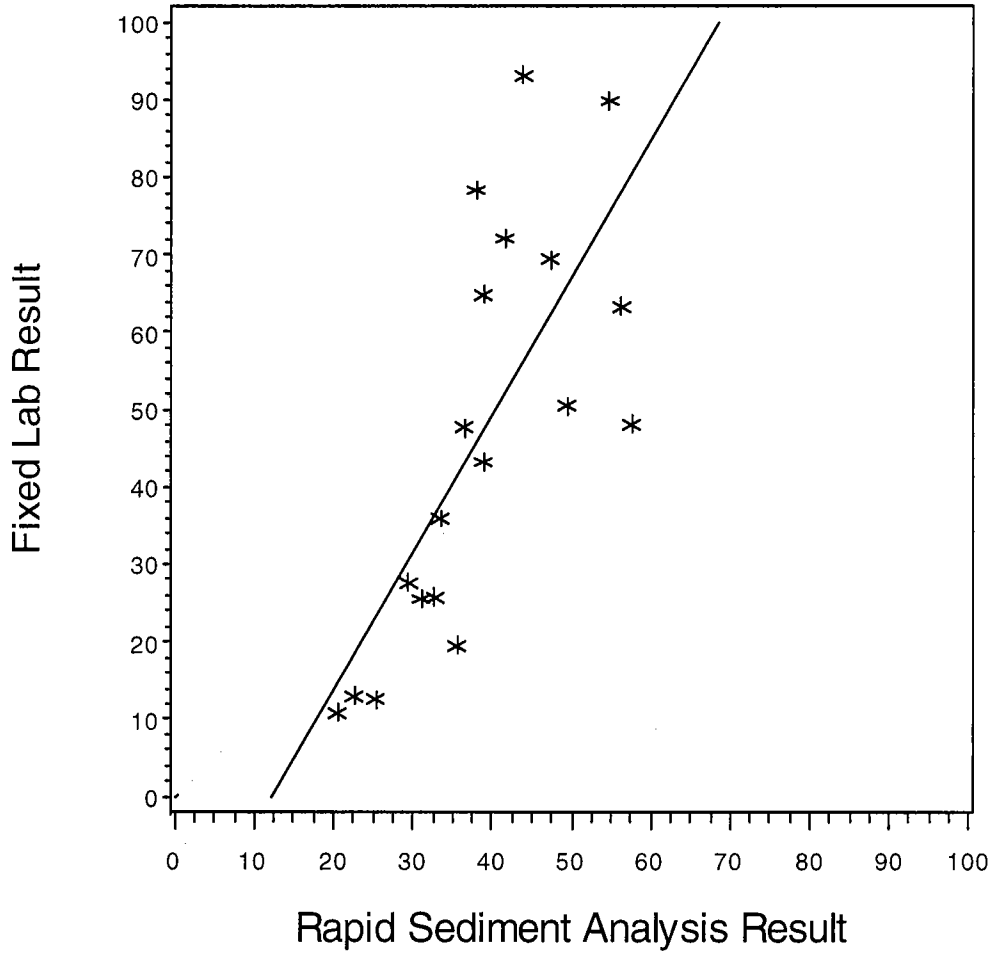
Given that the rapid sediment analysis result for suspect field duplicate point was an order of magnitude greater than its original rapid sediment analysis result, this point was removed from any further analysis. The extreme value was also well outside the range of the points for all other sampling locations. Therefore, the plots were regenerated and regression analyses rerun with these 2 points removed . A summary of the regression analyses are presented in Table 1 and the associated bivariate plots are presented in Figures 12 through 14. The regression analysis indicated:

- There **is a statistically significant relationship at 0.05 level between the fixed lab results and the rapid sediment analysis results** (divided by 10).
- The **intercept is not different from 0**.
- The **slope is different from 1**. The confidence interval around the estimate is 1.1 to 1.6, indicating rapid sediment analysis result would underestimate the fixed lab result.
- The r^2 is **0.90 indicating a good explanation of variance** of the fixed lab results by the rapid sediment analysis.

In summary:

Table 1				
Analyte	**Relationship**	**Intercept**	**Slope**	**r^2**
Chromium	Statistically significant*	Not different**from 0	Not different from 1	0.54
Chromium (MTC077 removed)	Statistically significant	Not different from 0	Not different from 1	0.53
Copper	Statistically significant	Different from 0	Different from 1	0.66
Copper (MTC077 removed)	Statistically significant	Not different from 0	Not different from 1	0.79
Lead	Statistically significant	Different from 0	Different from 1	0.98
Lead (MTC077 removed)	Statistically significant	Not different from 0	Different from 1	0.88
Zinc	Statistically significant	Different from 0	Different from 1	1.00
Zinc (MTC077 removed)	Statistically significant	Not different from 0	Not different from 1	0.68
Total PCBs	Statistically significant	Different from 0	Not different from 1	0.67
Total PCBs (MTC023 removed)	Statistically significant	Not different from 0	Different from 1	0.34
Total PCBs (MTC023 removed) Rapid sediment analysis results divided by 5	Statistically significant	Not different from 0	Not different from 1	0.34
Total PAHs	Statistically significant	Not different from 0	Different from 1	0.75
Total PAHs Rapid sediment analysis results divided by 10	Statistically significant	Not different from 0	Different from 1	0.75
Total PAHs (MTC068 and MTC063 DUP removed) Rapid sediment analysis results divided by 10	Statistically significant	Not different from 0	Different from 1	0.90
* = slope statistically significantly different from 0 at p=0.05 ** "Different" = statistically significantly different at p=0.05				

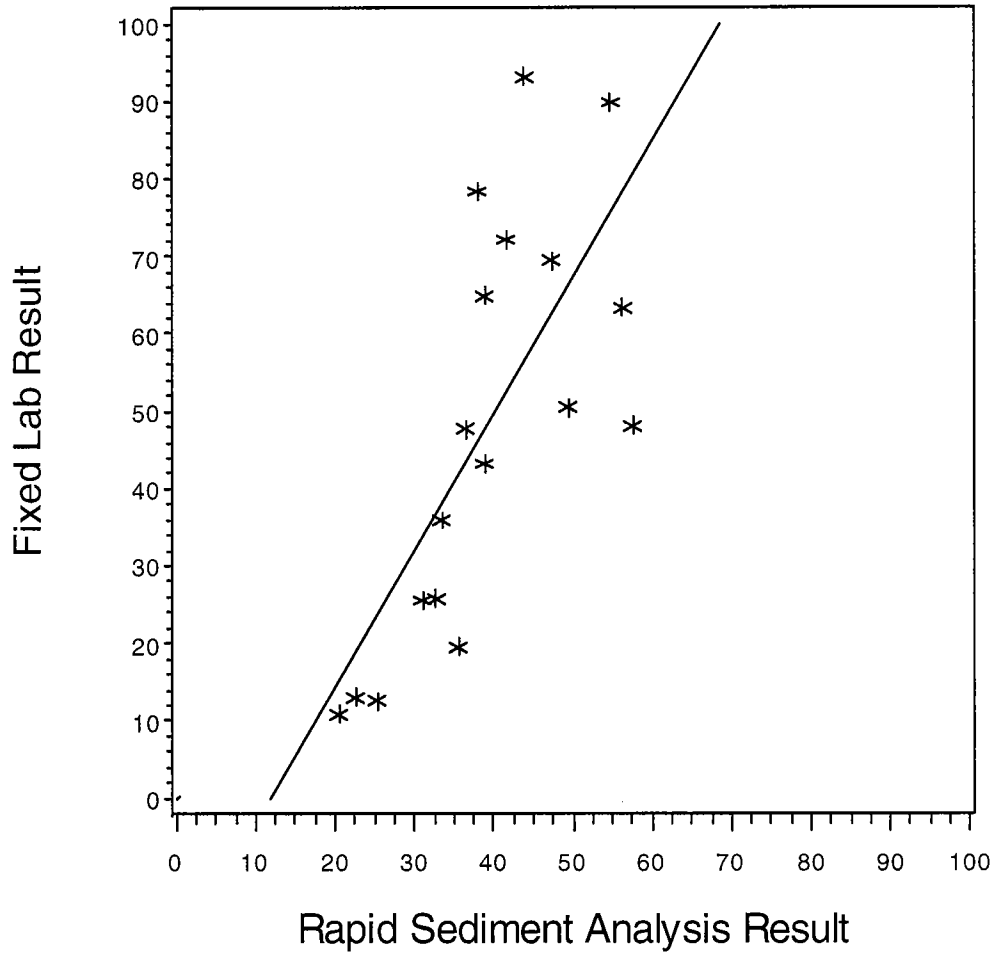
Figure1. Chromium (mg/kg)



PLOT *** Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-21.723+1.777*Rapid Sediment Analysis
Model F Value=19.946, Prob. F=34E-5
R2=0.540

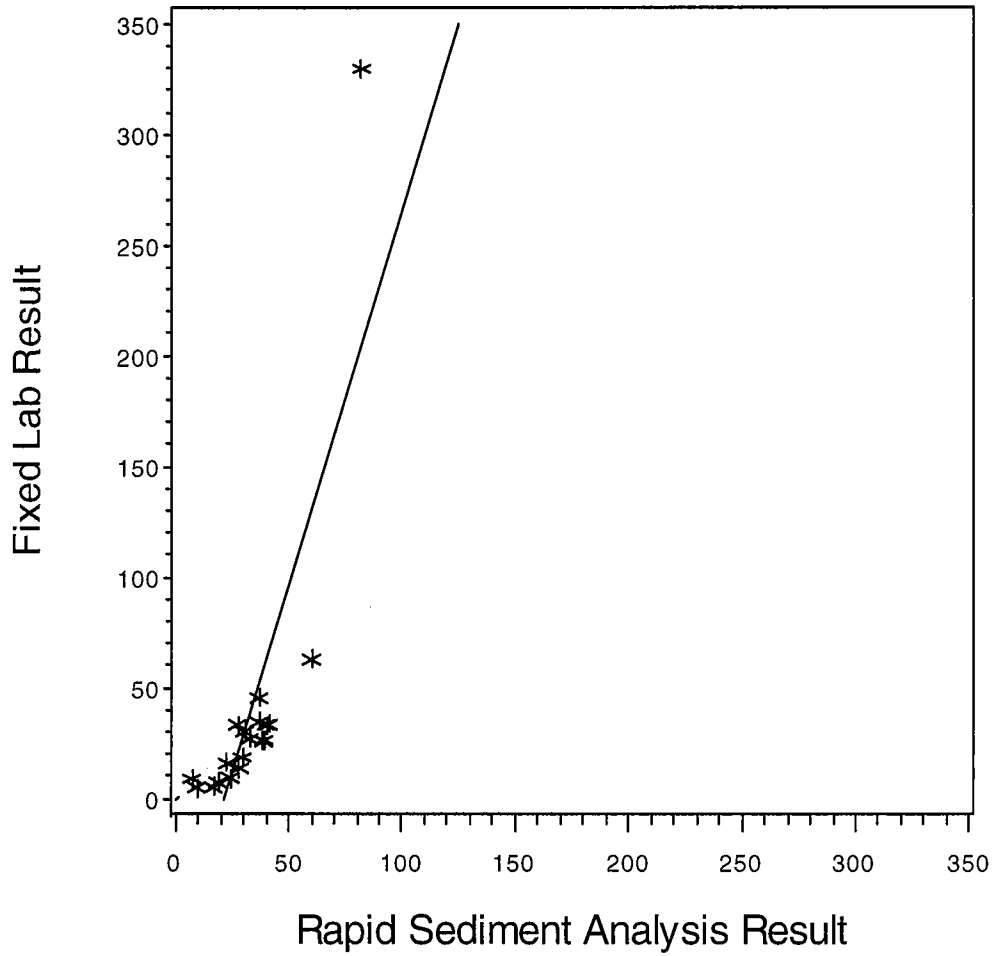
Figure 2. Chromium (mg/kg) [MTC077 removed]



PLOT ✱✱✱ Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-21.014+1.763*Rapid Sediment Analysis
Model F Value=17.738, Prob. F=66E-5
R2=0.526

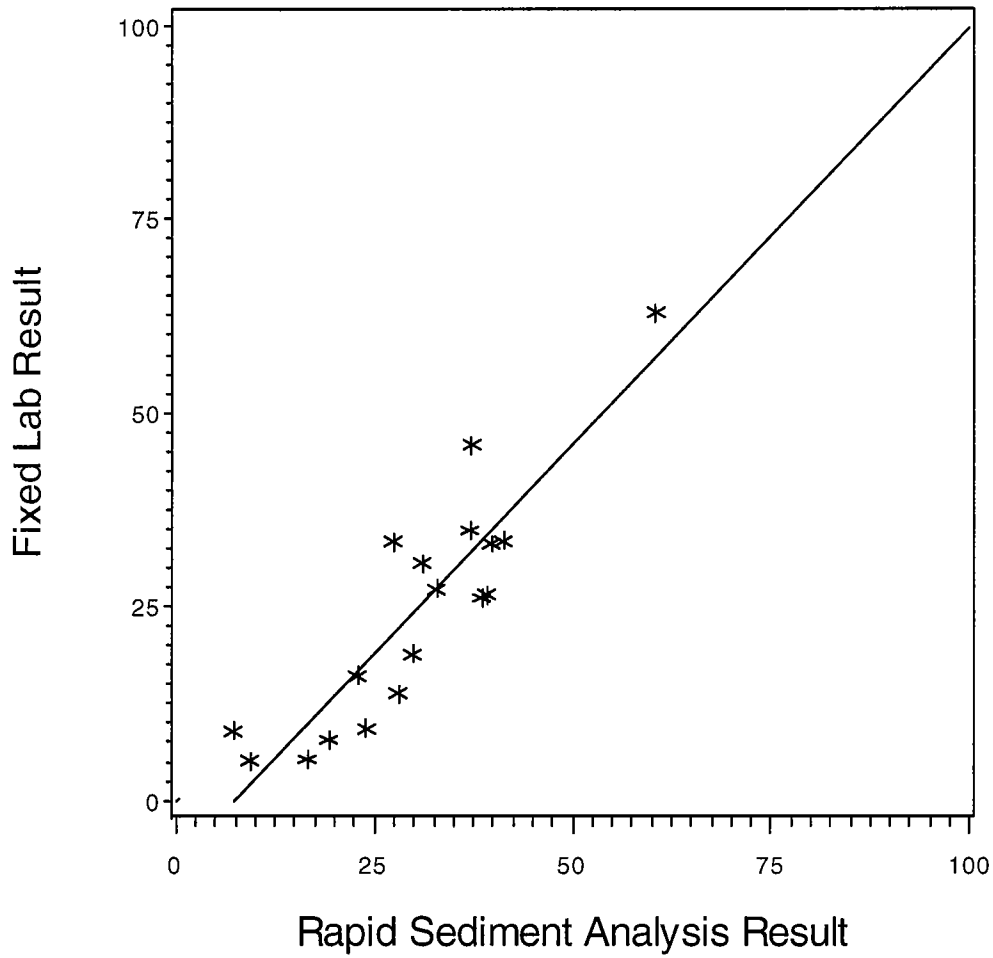
Figure 3. Copper (mg/kg)



PLOT ✱✱✱ Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-70.792+3.384*Rapid Sediment Analysis
Model F Value=32.499, Prob. F=26E-6
R2=0.657

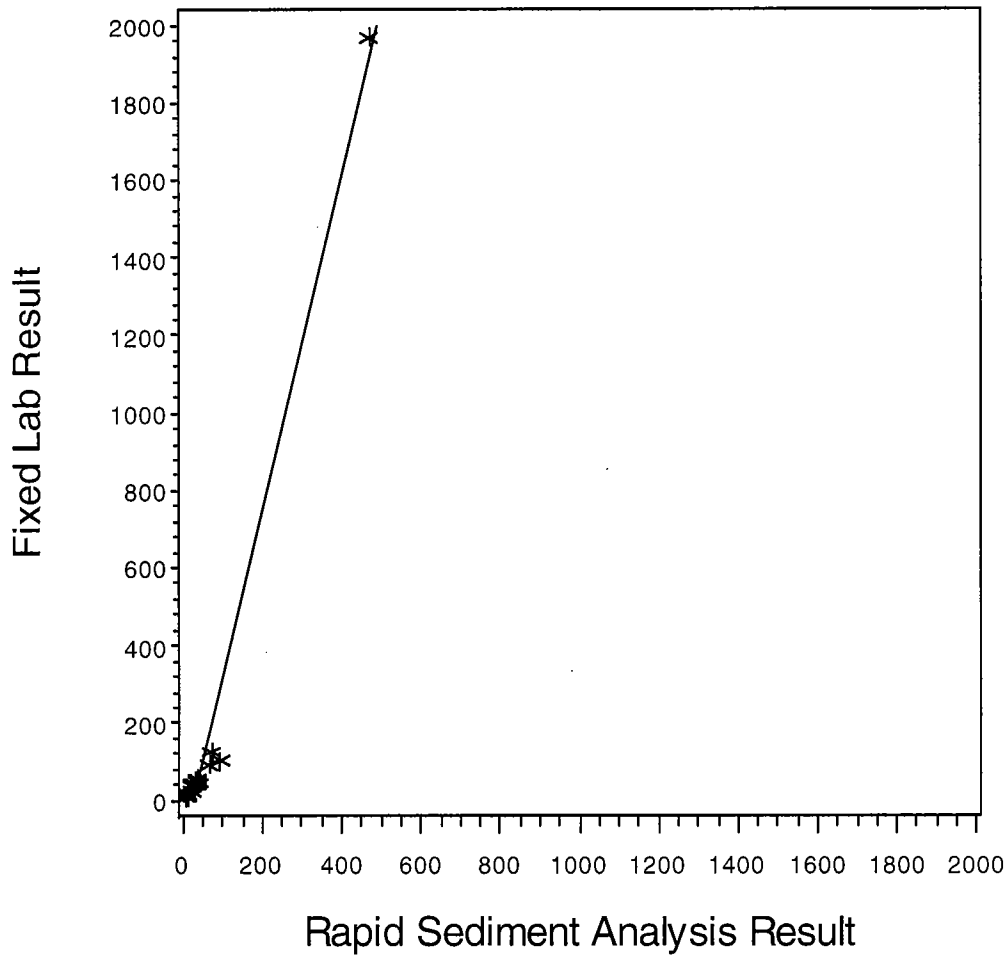
Figure 4. Copper (mg/kg) [MTC077 removed]



PLOT ✱✱✱ Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-7.976+1.076*Rapid Sediment Analysis
Model F Value=61.231, Prob. F=74E-8
R2=0.793

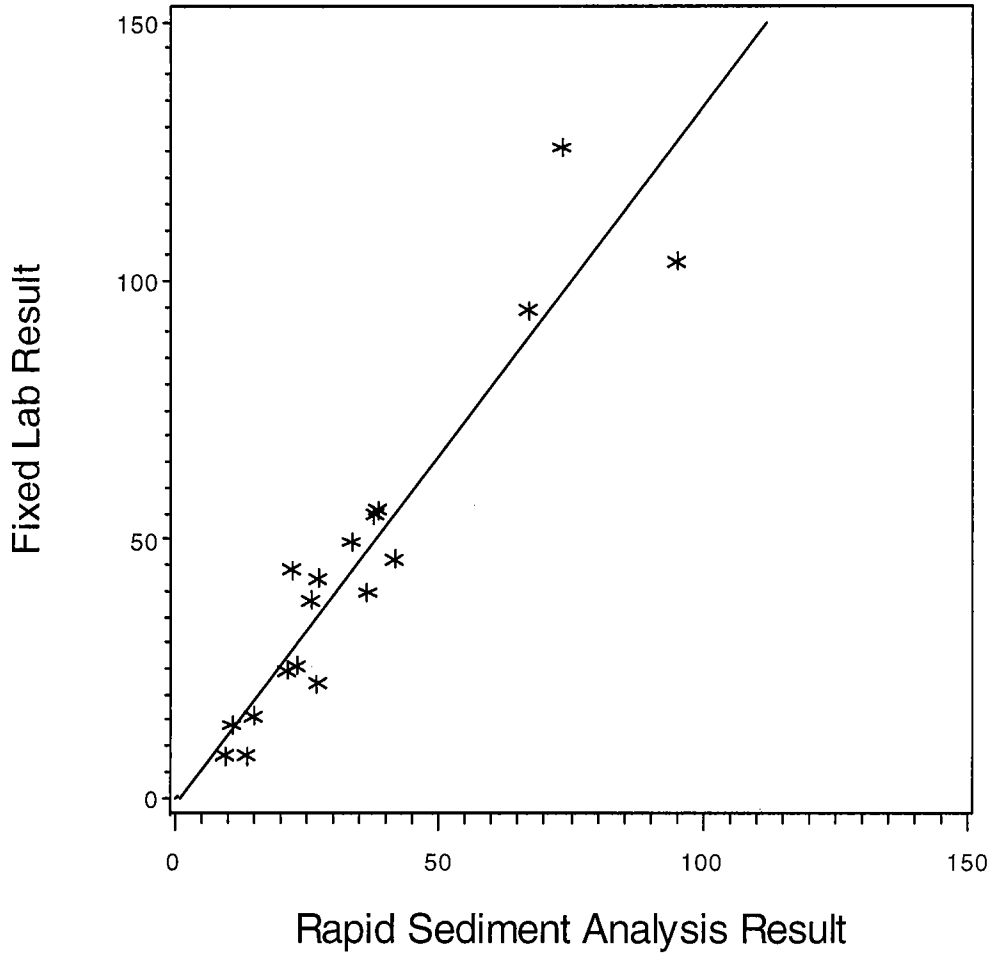
Figure 5. Lead (mg/kg)



PLOT ✱✱✱ Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-98.006+4.263*Rapid Sediment Analysis
Model F Value=718.112, Prob. F=2E-15
R2=0.977

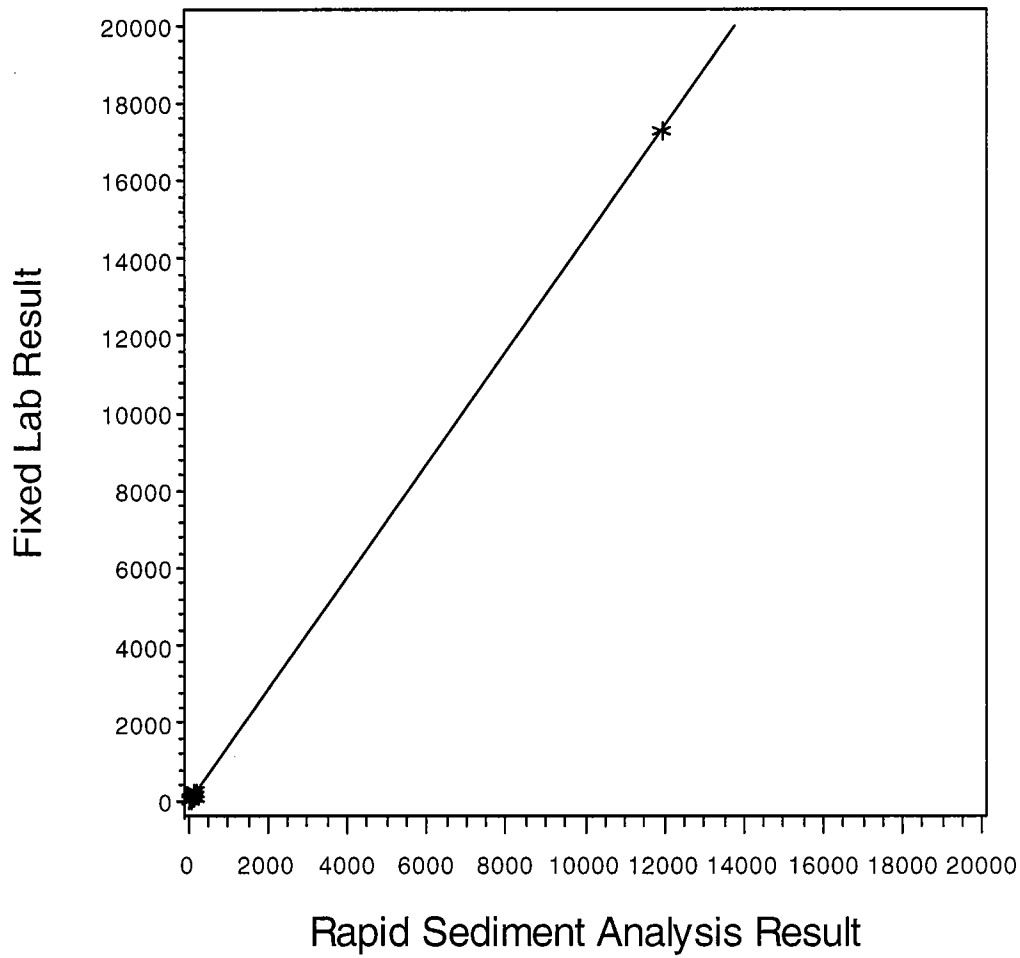
Figure 6. Lead (mg/kg) [MTC077 removed]



PLOT *** Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-1.327+1.355*Rapid Sediment Analysis
Model F Value=119.643, Prob. F=8E-9
R2=0.882

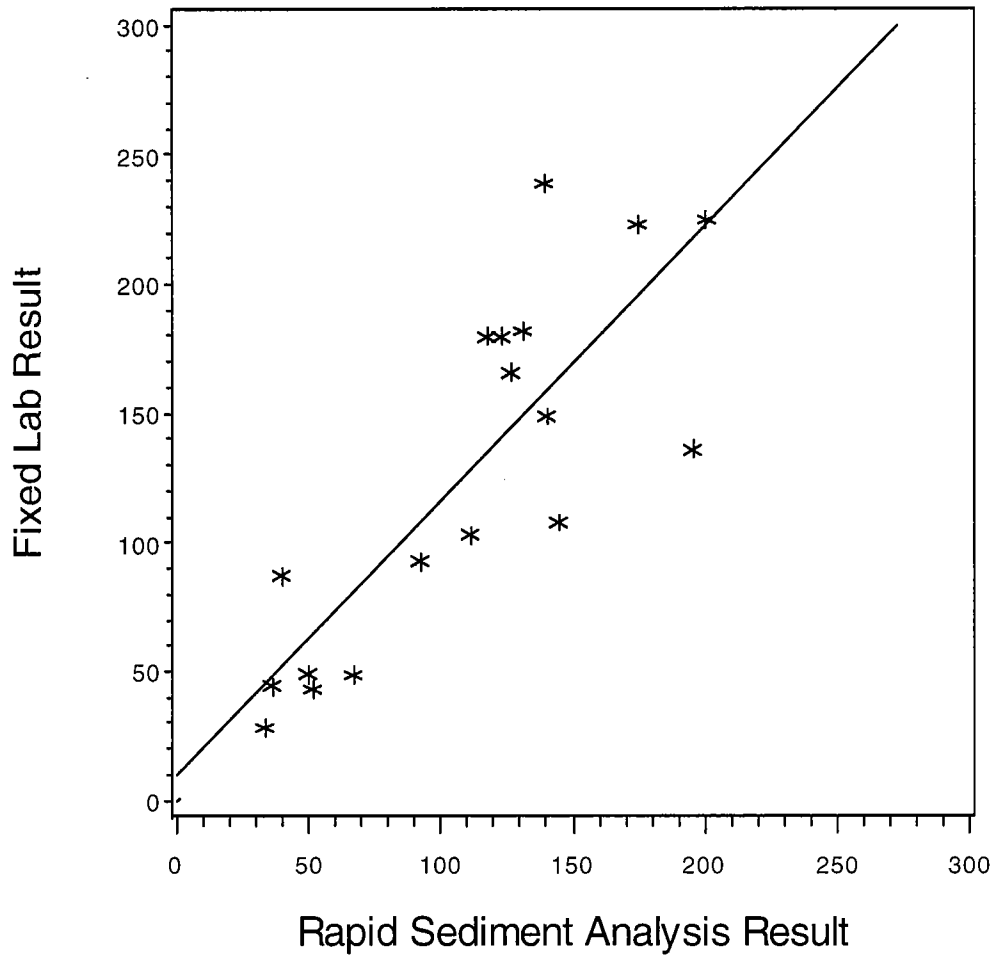
Figure 7. Zinc (mg/kg)



PLOT ✱✱✱ Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-32.476+1.453*Rapid Sediment Analysis
Model F Value=140828.708, Prob. F=2E-33
R2=1.000

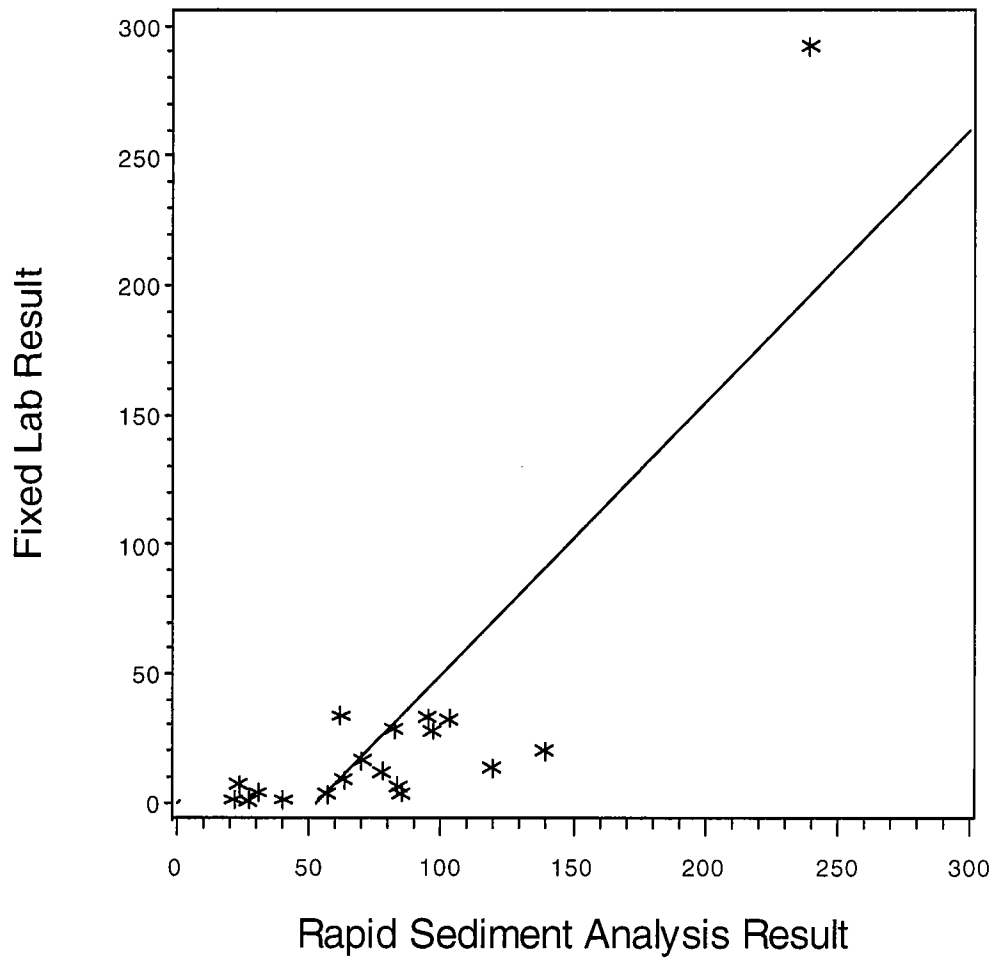
Figure 8. Zinc (mg/kg) [MTC077 removed]



PLOT ✱✱✱ Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=10.333+1.062*Rapid Sediment Analysis
Model F Value=33.712, Prob. F=27E-6
R2=0.678

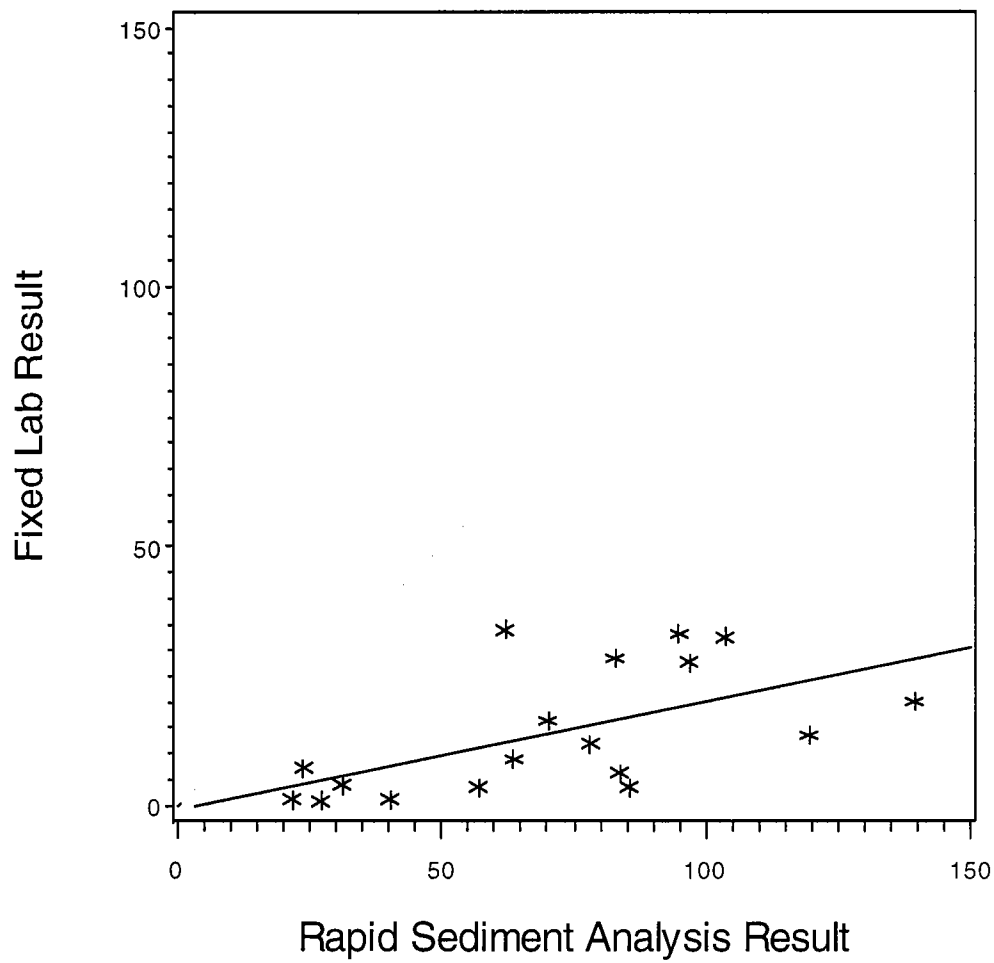
Figure 9. Total PCBs (ug/kg)



PLOT ✱✱✱ Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-55.130+1.049*Rapid Sediment Analysis
Model F Value=34.329, Prob. F=19E-6
R2=0.669

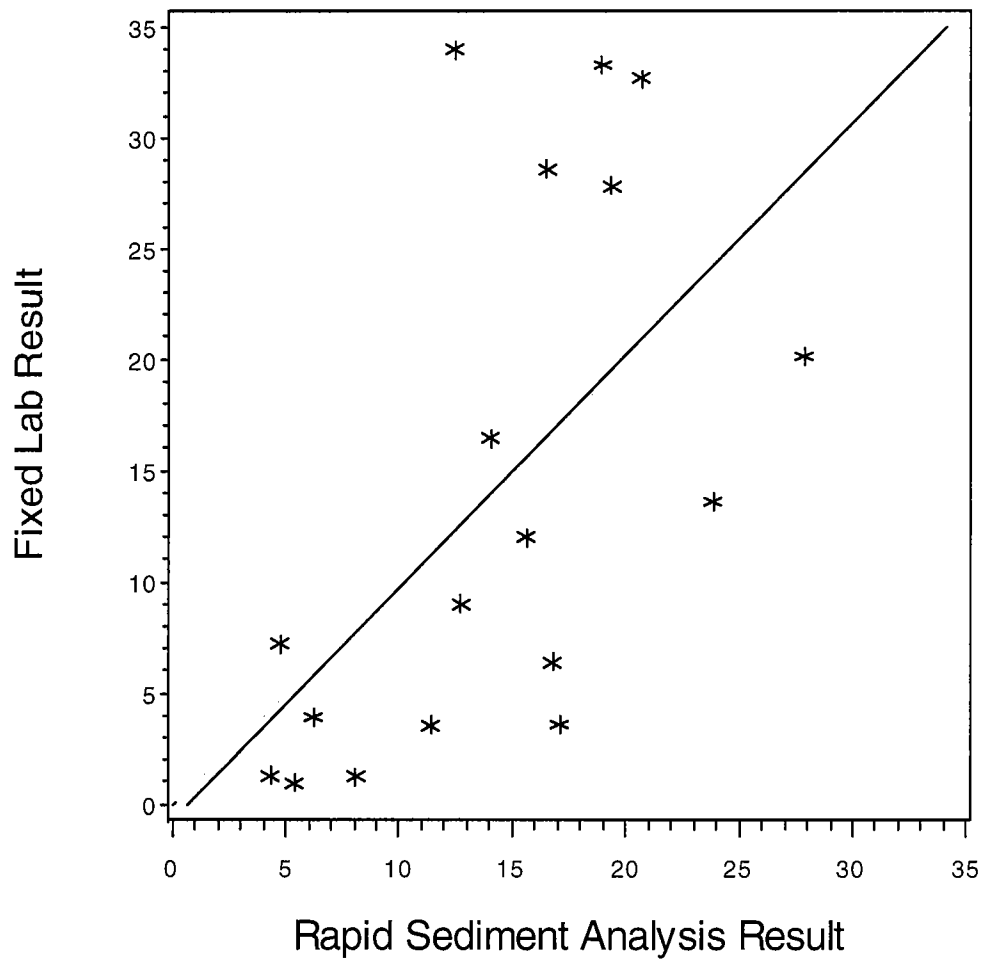
Figure 10. Total PCBs (ug/kg) [MTC023 removed]



PLOT ***** Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-0.670+0.209*Rapid Sediment Analysis
Model F Value=8.132, Prob. F=0.012
R2=0.337

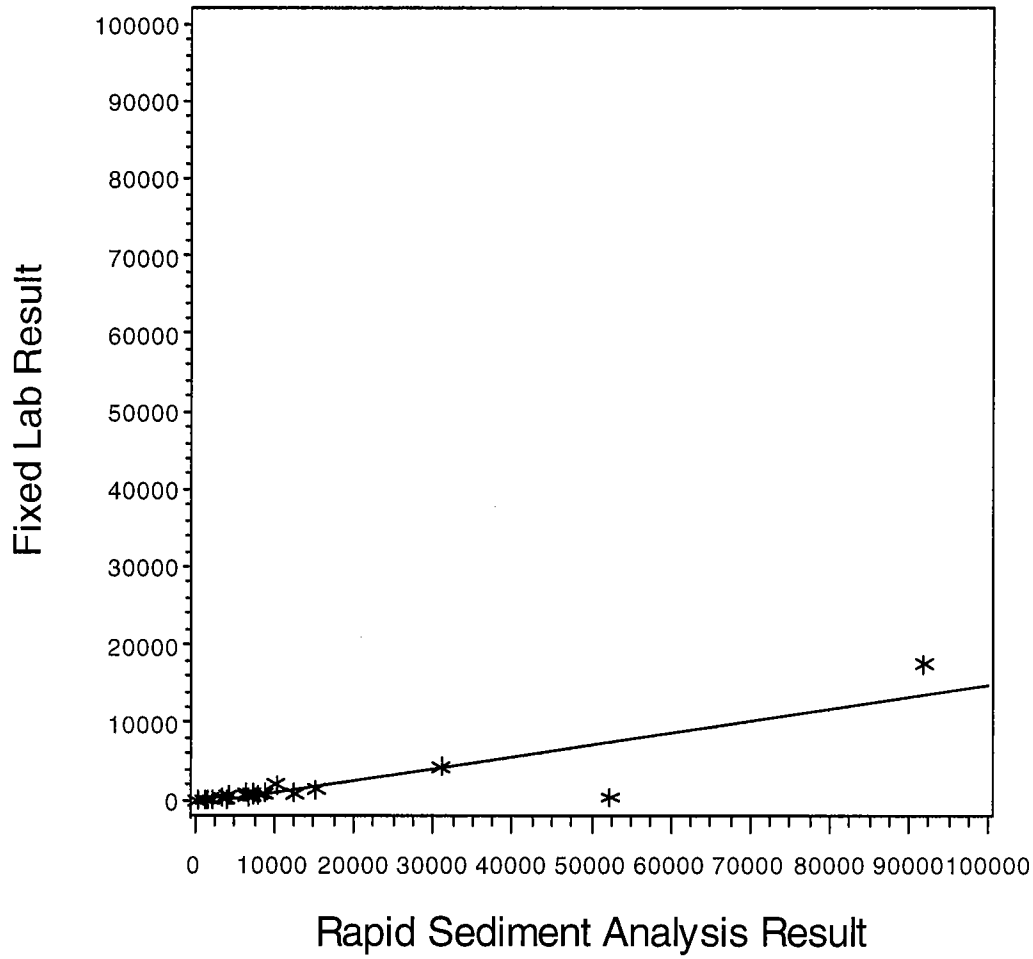
Figure 11. Total PCBs (ug/kg) [RSA/5] [MTC023 removed]



PLOT *** Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-0.670+1.047*Rapid Sediment Analysis
Model F Value=8.132, Prob. F=0.012
R2=0.337

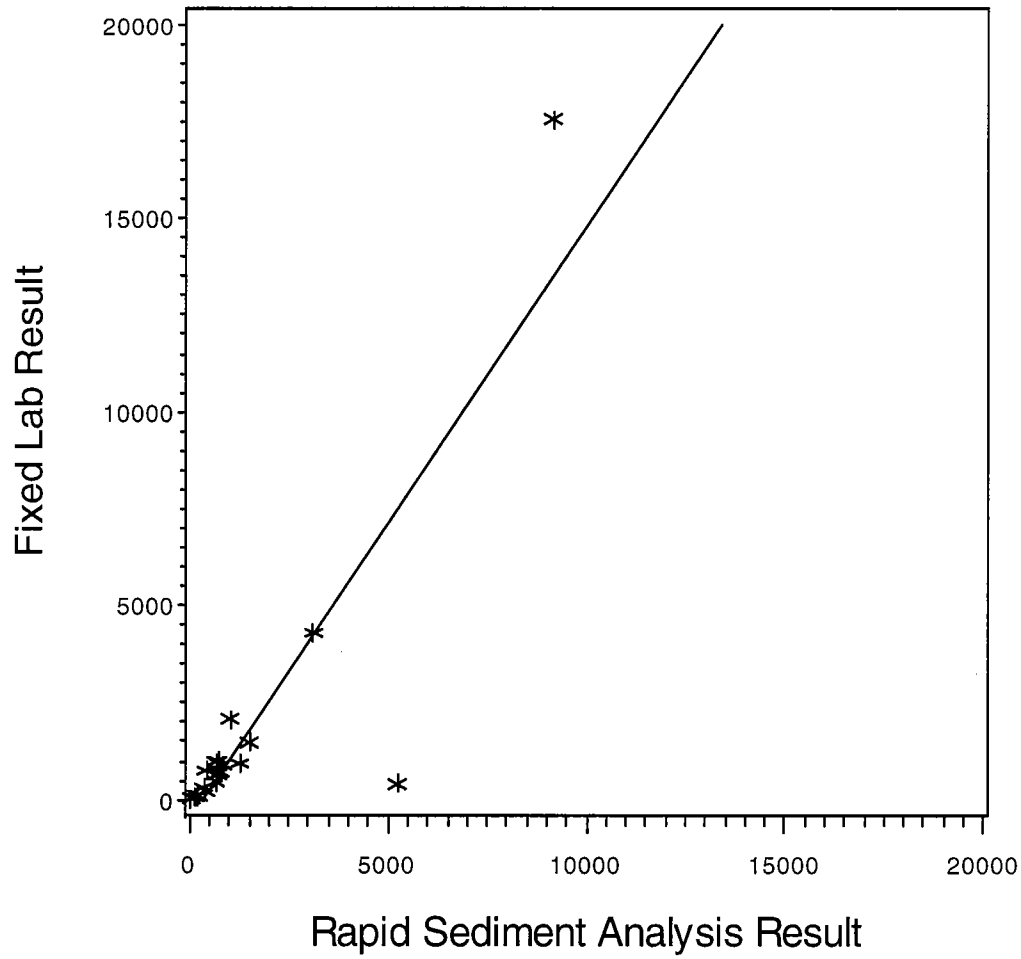
Figure 12. Total PAHs (ug/kg)



PLOT *** Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-461.487+0.153*Rapid Sediment Analysis
Model F Value=52.278, Prob. F=14E-7
R2=0.755

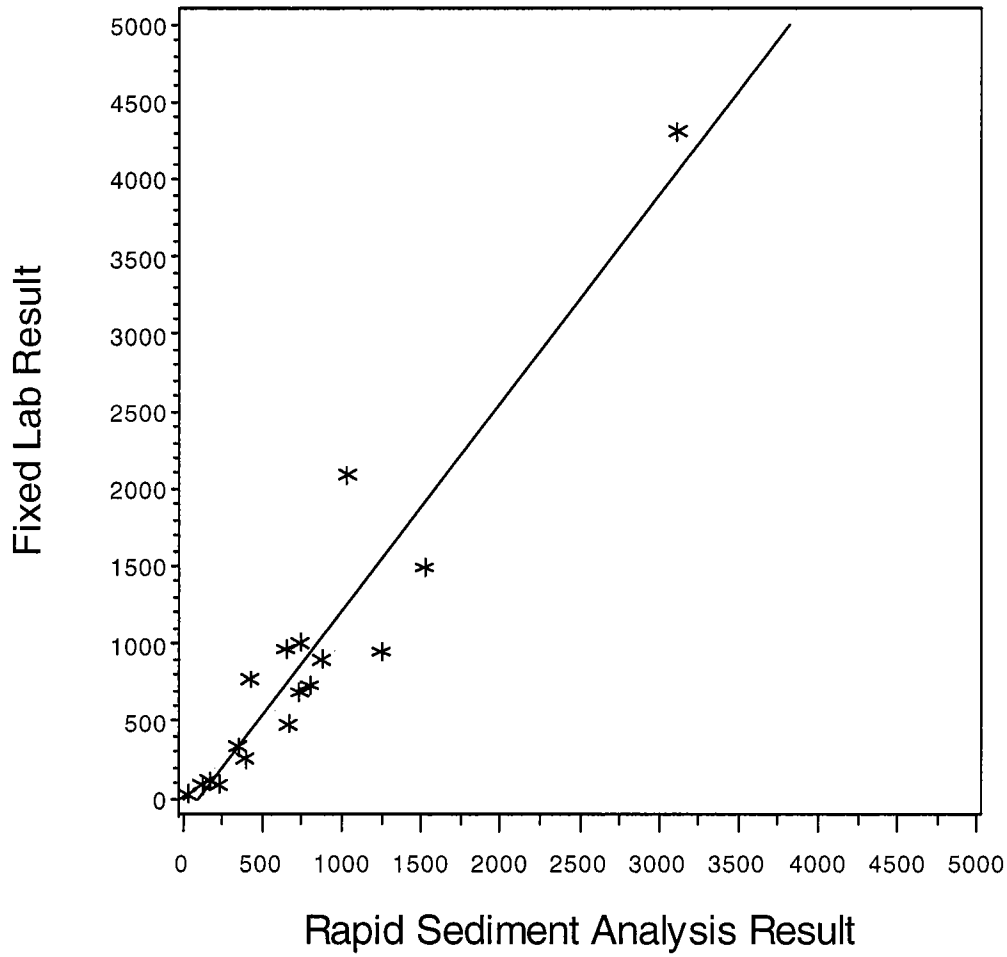
Figure 13. Total PAHs (ug/kg) [RSA/10]



PLOT ✱✱✱ Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-461.487+1.530*Rapid Sediment Analysis
Model F Value=52.278, Prob. F=14E-7
R2=0.755

Figure 14. Total PAHs (ug/kg) [RSA/10] [MTC068 & MTC063 DUP removed]



PLOT *** Black Line: Fitted Reg. Line Dotted Line: Equality Line

Model: FixedLab=-134.335+1.346*Rapid Sediment Analysis
Model F Value=135.143, Prob. F=7E-9
R2=0.900

RESULTS OF THE RAPID SCREENING

SAMPLE	Fe (%)	Cu (ppm)	Zn (ppm)	Pb (ppm)	Ni (ppm)	Cr (ppm)	Hg (ppm)	Ag (ppm)
MTC007	1.80	7	36	11	ND	31	ND	ND
MTC011	1.83	24	46	12	ND	24	ND	ND
MTC013	2.51	30	111	21	ND	58	ND	ND
MTC015	2.50	31	116	33	ND	43	ND	ND
MTC017	3.01	41	140	33	ND	56	ND	ND
MTC019	2.75	40	152	36	ND	49	ND	ND
MTC020	2.54	39	131	45	ND	49	ND	ND
MTC023	2.49	61	200	95	ND	49	ND	5.6J
MTC026	1.83	31	61	14	ND	45	ND	ND
MTC028	0.57	16	28	6	ND	16	ND	ND
MTC030	2.88	43	133	23	ND	54	ND	ND
MTC032	1.48	20	78	14	ND	32	ND	ND
MTC038	2.69	37	140	38	ND	44	ND	ND
MTC039	1.68	16	42	54	ND	36	ND	ND
MTC040	2.66	40	175	38	ND	47	ND	ND
MTC042	2.60	37	147	34	ND	51	ND	ND
MTC045	2.72	39	129	28	ND	55	ND	ND
MTC047	1.63	19	50	15	ND	34	ND	ND
MTC055	4.54	33	52	18	ND	62	ND	ND
MTC056	0.88	40	31	4	ND	20	ND	ND
MTC057	2.62	37	123	27	ND	38	ND	ND
MTC058	2.13	40	108	25	ND	39	ND	ND
MTC059	2.65	41	142	33	ND	48	ND	ND
MTC060	0.81	4	22	6	ND	11	ND	4.2J
MTC062	2.69	38	133	27	ND	45	ND	5.0J
MTC063	1.21	23	52	73	ND	23	ND	3.7J
MTC064	2.62	40	135	21	ND	50	ND	ND
MTC065	2.42	25	96	19	ND	54	ND	ND
MTC066	2.31	26	105	19	ND	44	ND	ND
MTC067	1.18	21	27	13	ND	30	ND	ND
MTC068	2.90	39	92	23	ND	39	ND	ND
MTC070	1.91	31	111	26	ND	34	ND	ND
MTC071	2.35	31	127	42	ND	39	ND	ND
MTC072	1.21	16	34	6	ND	34	ND	ND
MTC073	3.34	28	73	20	ND	61	ND	ND
MTC075	2.24	36	90	22	ND	41	ND	ND
MTC076	0.74	6	62	25	ND	22	ND	ND
MTC077	1.35	82	11930	471	ND	29	ND	ND
MTC077B	1.37	88	12330	355	ND	36	ND	ND
MTC078	2.09	33	131	26	ND	42	ND	ND
MTC079	2.52	22	65	19	ND	51	ND	ND
MTC080	1.98	21	66	7	ND	39	ND	ND
MTC081	1.31	17	67	10	ND	25	ND	ND
MTC082	1.32	28	145	27	ND	33	ND	ND
MTC083	2.13	25	76	14	ND	50	ND	ND
MTCDUP001	2.30	39	195	36	ND	37	ND	ND
MTCDUP002	0.63	9	16	4	ND	11	ND	ND
MTCDUP003	0.94	24	40	67	ND	20	ND	4.2J
MTCDUP004	2.74	35	161	42	ND	40	ND	ND
MTCDUP005	2.13	32	111	28	ND	36	ND	ND
MTCDUP006	1.40	27	27	10	ND	24	ND	ND

RESULTS OF THE RAPID SCREENING

SAMPLE	Fe (%)	Cu (ppm)	Zn (ppm)	Pb (ppm)	Ni (ppm)	Cr (ppm)	Hg (ppm)	Ag (ppm)
NJC001	2.83	28	118	22	ND	55	ND	ND
NJC002	2.70	25	121	22	ND	48	ND	ND
NJC003	2.73	39	98	25	ND	38	ND	ND
NJC004	1.22	9	33	14	ND	36	ND	ND
NJCDUP001(1)	2.81	31	114	25	ND	52	ND	ND
HP III-9	3.78	150	121	26	149	167	7.0	0.2
HGSTD	3.58	65	115	42	40	102	63.8	4.7
HGSTD	3.57	59	124	48	27	104	54.8	5.0
HGSTD	3.56	58	109	42	19	101	65.4	2.2
HGSTD	3.58	56	112	45	30	109	57.3	4.4
HGSTD	3.62	55	119	36	36	110	54.1	4.2
HGSTD (certified)							50.0	
PACS1	4.58	409	710	384	ND	101	9.4	2.3
PACS1	4.55	389	703	388	6	106	8.8	2.5
PACS1	4.56	389	717	395	ND	100	2.4	1.8
PACS1	4.56	386	719	396	ND	101	9.2	2.9
PACS1	4.60	381	723	379	ND	112	8.9	2.9
PACS1 (certified)		452	824	404	44		4.6	0.0
					ND<50		ND<15	ND<15

Notes:
ND = Not detected

RESULTS OF THE RAPID SCREENING

Samples	PCB (mg/Kg) Results[1]			Statistical Results			PAH (mg/Kg) Results[1]			Statistical Results		
	1	2	3	Mean	Stdev	%RSD	1	2	3	Mean	Stdev	%RSD
MTC07	22			22			334			334		
MTC11	80			80			6129			6129		
MTC13	63	69	59	64	5	7.23%	4199	7314	8347	6620	2159	32.61%
MTC15	69			69			4868			4868		
MTC17	97			97			8037			8037		
MTC19	90			90			9656			9656		
MTC20	95			95			8033			8033		
MTC23	253	237	228	239	12	5.09%	10739	9332	10957	10342	882	8.53%
MTC26	43			43			1646			1646		
MTC28	22			22			229			229		
MTC30	94			94			6283			6283		
MTC32	33			33			2461			2461		
MTC38	97	98	90	95	4	4.74%	4223			4223		
MTC39	23	25	28	25	3	10.83%	1266	1410	1647	1441	192	13.36%
MTC40	83			83			11033	14496	12109	12546	1773	14.13%
MTC42	63			63			4436			4436		
MTC45	88			88			5026			5026		
MTC47	40			40			28663	34178	30669	31170	2792	8.96%
MTC55	16			16			106			106		
MTC56	19	28	27	25	5	19.39%	2289	2229	2636	2385	220	9.21%
MTC57	62			62			6515			6515		
MTC58	73			73			7082			7082		
MTC59	66			66			5937			5937		
MTC60	22			22			168			168		
MTC62	79	82	84	82	2	2.82%	5757	7427	7427	6871	964	14.03%
MTC63	64	58	49	57	7	13.09%	3014	4120	3471	3535	556	15.72%
MTC64	76	81	90	83	7	8.61%	3661			3661		
MTC65	84			84			5102			5102		
MTC66	67			67			4478			4478		
MTC67	6			6			218			218		
MTC68	141	139	139	139	1	0.87%	69212	108384	98071	91889	20305	22.10%
MTC70	65			65			3106			3106		
MTC71	78			78			6385	7238	8480	7368	1054	14.30%
MTC72	29			29			2860			2860		
MTC73	52			52			3498			3498		
MTC75	64			64			4669			4669		
MTC76	13			13			1971			1971		
MTC77	22	26	23	24	2	8.09%	1113	1067	1334	1171	142	12.16%
MTC78	84			84			3923			3923		
MTC79	39			39			2825			2825		
MTC80	46			46			2601			2601		
MTC81	31			31			2228			2228		
MTC82	107	94	110	104	8	8.19%	10217	17133	18549	15300	4458	29.14%
MTC83	44			44			2996			2996		
MTC71DUP	120			120			8715			8715		
MTC67DUP	0			0			154			154		
MTC63DUP	85			85			52356			52356		
MTC40DUP	87			87			9110			9110		
MTC20DUP	83			83			5518			5518		
MTC11DUP	40			40			303			303		
NJC01	70			70			7339			7339		
NJC02	86	71	79	78	7	9.50%	3128	2940		3034	133	4.38%
NJC03	60			60			3633			3633		
NJC04	27			27			1633			1633		
NJCDUP1	61			61			6320			6320		

Notes:
1 - All samples were analyzed at least once for PCBs and PAHs. Select samples were analyzed three times for statistical analyses.
For PCBs: U qualified below 50 ppb, J qualified below 100 ppb.
For PAHs: U qualified below 500 ppb, J qualified below 2000 ppb.

APPENDIX B-8.3

CONFIRMATION OF RAPID SCREENING RESULTS

Battelle
. . . Putting Technology To Work

Duxbury Operations
397 Washington Street
Duxbury, Massachusetts 02332
Telephone: 781-934-0571
Fax: 781-934-2124

October 15, 2001

Mr. Neal Parker
EFA Chesapeake
1314 Harwood Street SE
Washington Navy Yard
Washington, DC 20374-5018

Dear Mr. Parker:

Enclosed please find two copies (one bound, one unbound) of the analytical chemistry data report presenting the results of the chemical analyses of 19 sediments from Mattawoman Creek. Target analyses included:

Target Analyte(s)	Analytical Laboratory	Base Analytical Method
Metals	Battelle Marine Sciences	EPA 200.7, 200.8, 200.9, 245.5, 7000 series, 6010B, and 6020, modified
PAH	Battelle Duxbury Operations	NS&T
PCB and Pesticides	Battelle Duxbury Operations	NS&T
Energetics and Nitroguanidine	STL – Knoxsville	EPA 8330 and 8330 mod
TPH	STL – Los Angeles	EPA 8015B
TOC	STL – Sacramento	EPA 9060
Grain size	STL – Burlington	ASTM D422

Included in this data report are custody information, detection limits, and summary of results including a data/QC narrative describing any issues related to the analyses of these samples. Full raw data packages will be archived at the analytical laboratories and can be provided upon request.

All procedures performed by Battelle were carried out following our analytical Standard Operating Procedures (SOPs). All data were audited by our independent Quality Assurance Unit to verify accuracy.

Battelle's standard operation includes the monitoring of oven and refrigerator temperatures during normal business hours (5 days/week). This procedure assumes that any deviations, on the weekends, would be detected and sample integrity would be maintained because during the off days the refrigerators would remain closed and ovens would not be used for sample treatment. The Navy QAPP requires 7day/week monitoring of ovens and refrigerators. During the performance of the Mattawoman Creek/Indian Head project the Navy requirements were not met and monitoring was performed on a 5-day basis. There was no indication that any problems occurred with temperatures during the period samples were being analyzed and no impact on the final data is expected.

Please call me at (781) 952-5232, or Dr. Bob Beimer at (781) 952-5332 if you have any questions regarding these data or our analytical procedures.

Sincerely,

Carole S. Peven McCarthy

Carole S. Peven McCarthy
Principal Research Scientist

MATTAWOMAN CREEK/INDIAN HEAD SEDIMENT ANALYSIS STUDY

FINAL DATA REPORT

Prepared for:

MR. NEAL PARKER
EFA CHESAPEAKE
1314 Harwood Street, SE
Washington Navy Yard
Washington, D.C. 20374-5018

Prepared by:

BATTELLE
397 Washington St.
Duxbury, MA 02332
(781) 934-0571

October 15, 2001

CUSTODY

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ATTACHMENT 4a
Battelle Duxbury Operations
Sample Receipt Form

US Navy - (Indian Head) CJM 8/31/01

Project Number: 6486007-TO70UX Client: ~~TESTA~~ TECH
Received by: JDH Date/Time Received: 8/20/01 10:00AM
No. of Shipping Containers 5

SHIPMENT

Method of Delivery: FED EX Commercial Carrier (Air bill No. 8163343 3735)
_____ Hand Delivered
_____ US Mail (RPS No. _____)

COC Forms: ✓ Shipped with samples _____ No forms

Cooler(s)\Box(es) were sealed with: ✓ Tape _____ Custody Seals _____ (Other specify)
Were the seals intact for each shipping container? ✓ Yes _____ No _____ NA
If NO, see Sample Custody Corrective Action Form

SAMPLES

Sample Labels: ✓ Sample labels agree with COC forms
_____ Discrepancies (see Sample Custody Corrective Action Form)*

Container Seals: ✓ Tape _____ Custody Seals _____ (Other specify)
✓ Seals intact for each shipping container
_____ Seal broken (list impacted samples):

Condition of Samples: _____ Sample containers intact
✓ Sample containers broken/leaking (see Sample Custody Corrective Action Form)*

Temperature upon receipt (°C): 6 Temperature blank used _____ Yes ✓ No
(Note: If temperature upon receipt differs from required conditions, list impacted samples):

Samples Acidified? ___ Yes ✓ No ___ Unknown

Initial pH 5 - 9? (Y/N): NA *If no, individual sample adjustments on the Auxiliary Sample Receipt Form.*

Total Residual Chlorine Present? (water) (Y/N): NA
If yes, individual sample adjustments on the Auxiliary Sample Receipt Form.

Head Space <1% in samples for water VOC analysis NA Yes _____ No
Individual sample deviations listed below.

Sample Containers:
Samples returned in PC-grade jars? ✓ Yes ___ No ___ Unknown / Lot No. _____

Storage Location: WALK-IN FREEZER JDH 8/22/01 ~~SECOND FLOOR COLD ROOM~~ BDO IDs Assigned: W6194 - W6232

Holding Times:	Water -	Sediment -	Tissue -

Additional Comments: ① SEE COOLER TEMPERATURE FORM

Samples logged in by: [signature] Date/Time: 8/20/01 12:00PM
* Must also be noted on the C-O-C.

ATTACHMENT 3
Battelle Duxbury Operations
Sample Custody Corrective Action Form

Project Number G48600T-T070.02 Client ~~TETRA TECH~~ Navy

Description of Problem:			Explanation:
Client ID: *		Jars and C-O-C do not have matching IDs	
		Extra samples not listed on the C-O-C	
		Missing samples listed on the C-O-C	
		Either label or C-O-C cannot be verified	
Temperature and Preservation:	X	Receipt temperature outside of acceptability	SEE COOLER TEMPERATURE FORM
		Preservation discrepancy on C-O-C	
		Not documented as being compliant with the SOP	
VOA Analysis:		Water VOA samples >1% headspace or bubbles	
		No trip blank included	
Sample Container Integrity:		Sample Broken	CRACKED CAP MTCSDFS 079 073 / BROKEN MTCSDFS 045 074 031
		Cap broken	
		Sample Leaking	
		Custody Seal broken	
Custody: *		Jars and C-O-C do not match for time/date	
		Samples received outside of holding time	
		Samples not relinquished from sender	
		Sample Collector not identified	
		Incomplete Sample Custody Forms	
Other:			

* The C-O-C must reference this form for each sample issue

Project Manager and Laboratory Manager must be notified upon receipt of the samples when problems are identified

Documentation of project manager notification:

	Signature	Date
Sample Custodian:	[illegible]	8/20/01
Laboratory Manager:	[illegible]	8/21/01
Project Manager	[illegible]	8/21/02

Documentation of client notification (should be completed by project manager within 24 hrs):

On _____ I contacted _____ at _____
Date — Name of client contact — Name of client organization

Results of communication with client (Describe any corrective action directed by the client):

R. Blumer will contact client.

Date this form was received back to the custodian: 8/21/01

Cooler Temperature Form

Project name: TEGRA TEZW

Project#: 6486007-TOTDUX

Thermometer#: 570070

Date\Time: 8/20/01 10:00

Cooler Temps	Cooler Temps	Cooler Temps	Cooler Temps	Cooler Temps
#1 11.0	#20	#35	#50	#65
#2 13.1	#21	#36	#51	#66
#3 9.7	#22	#37	#52	#67
#4	#23	#38	#53	#68
#5	#24	#39	#54	#69
#6	#25	#40	#55	#70
#7	#26	#41	#56	#71
#8	#27	#42	#57	#72
#9	#28	#43	#58	#73
#10	#29	#44	#59	#74
#11	#30	#45	#60	#75
#12	#31	#46	#61	#76
#13	#32	#47	#62	#77
#14	#33	#48	#63	#78
#19	#34	#49	#64	#79

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: Tetra Tech NUS

ADDRESS: Foster Plaza 7, 661 Anderson Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latulippe

PHONE: 800-245-2730 FAX:

PROJECT INFORMATION

PROJECT NAME: Mattawoman Creek

PROJECT NO.: N0530 (CTO 320)

PROJECT MANAGER: G. Latulippe

LOCATION: Same as client

PHONE: FAX:

BILLING INFORMATION

BILL TO: Same as client PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: DAYS *

~~HARD COPY~~: DAYS *

~~EDD~~: DAYS *

* TO BE APPROVED BY CHEMTECH

** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

- ☒ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE:
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT:
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1 energetics, 2 metals, 3 PAHs, 4 PCBs, 5 pesticides, 6, 7, 8, 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1. W6194	MTCSDFSDUP005	SD		✓	8-17-01		2	✓	✓	✓	✓	✓					
2. W6195	MTCSDFSDUP006	SD		✓	8-17-01		2	✓	✓	✓	✓	✓					
3. W6196	MTCSDFSDUP003	SD		✓	8-17-01		2	✓	✓	✓	✓	✓					
4. W6197	MTCSDFS004	SD		✓	8-17-01		2	✓	✓	✓	✓	✓					
5. W6198	MTCSDFS007	SD		✓	8-17-01		2	✓	✓	✓	✓	✓					
6. W6199	MTCSDFS011	SD		✓	8-17-01		2	✓	✓	✓	✓	✓					
7. W6200	MTCSDFS013	SD		✓	8-17-01		2	✓	✓	✓	✓	✓					
8. W6201	MTCSDFS015	SD		✓	8-17-01		2	✓	✓	✓	✓	✓					

PRESERVATIVES: ← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. K. CUBBAGE	8-18-01 12:00 p.m.	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3. [signature] 8/20/01

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler

Comments:

Page 1 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15729

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: see pg. 1

ADDRESS:

CITY: STATE: ZIP:

ATTENTION:

PHONE: FAX:

PROJECT INFORMATION

PROJECT NAME:

PROJECT NO.:

PROJECT MANAGER:

LOCATION:

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: DAYS *
HARD COPY: DAYS *
EDD: DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☒ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE:
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT:

ANALYSIS

1 energetics 2 metals 3 PCBs 4 PAHs 5 pesticides 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1. W6202	MTC SDFS017	SD		✓	8/17/01		2	—	—	—	—	—					
2. W6203	MTC SDFS019	SD		✓	8/17/01		2	—	—	—	—	—					
3. W6204	MTC SDFS020	SD		✓	8/17/01		2	—	—	—	—	—					
4. W6205	MTC SDFS023	SD		✓	8/17/01		2	—	—	—	—	—					
5. W6206	MTC SDFS026	SD		✓	8/17/01		2	—	—	—	—	—					
6. W6207	MTC SDFS028	SD		✓	8/17/01		2	—	—	—	—	—					
7.	~~MTC SDFS030~~ KTC 8/16/01	SD		✓	8/17/01		2	—	—	—	—	—					
8.	~~SDFS~~	SD		✓			2	—	—	—	—	—					

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. K. CWABATOE	8-18-01 12:00 p.m.	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3. 8/20/01

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler
Comments:

Page 2 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15730

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: Tetra Tech NUS

ADDRESS: Foster Plaza 7, 661 Andersen Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latulippe

PHONE: 800-245-2730 FAX:

PROJECT INFORMATION

PROJECT NAME: Mattawoman Creek

PROJECT NO.: N0530 (CTO 320)

PROJECT MANAGER: George Latulippe

LOCATION: same as client

PHONE: FAX:

BILLING INFORMATION

BILL TO: same as client PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *

~~HARD COPY~~ _____ DAYS *

EDD _____ DAYS *

* TO BE APPROVED BY CHEMTECH

** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☒ RESULTS ONLY ☐ NY STATE CATEGORY A

☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B

☐ REGULATORY FORMAT, STATE: _____

☐ NEW JERSEY REDUCED DELIVERABLES

☐ CLP

☐ EDD FORMAT: _____

ANALYSIS

1 energetics 2 metals 3 PCBs 4 PAHs 5 pesticides 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1. W6208	MTCSDFSD000001	SD		✓	8/16/01		2	✓	—	—	—	—					
2. W6209	MTCSDFS070	SD		✓	8/16/01		2	—	—	—	—	—					
3. W6210	MTCSDFS077	SD		✓	8/16/01		2	—	—	—	—	—					
4. W6211	MTCSDFS073	SD		✓	8/16/01		2	—	—	—	—	—					
5. W6212	MTCSDFS072	SD		✓	8/16/01		2	—	—	—	—	—					
6. W6213	MTCSDFS076	SD		✓	8/16/01		2	—	—	—	—	—					
7. W6214	MTCSDFS079	SD		✓	8/16/01		2	—	—	—	—	—					
8. W6215	MTCSDFS075	SD		✓	8/16/01		2	—	—	—	—	—					

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. K. Cubbage 8-17-01	→ 12:00 pm	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3. [signature] 8/20/01

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:

Page 1 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

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CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: See page 1

ADDRESS:

CITY: STATE: ZIP:

ATTENTION:

PHONE: FAX:

PROJECT INFORMATION

PROJECT NAME:

PROJECT NO.:

PROJECT MANAGER:

LOCATION:

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: DAYS *

~~HARD COPY~~: DAYS *

~~EDD~~: DAYS *

* TO BE APPROVED BY CHEMTECH

** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☒ RESULTS ONLY ☐ NY STATE CATEGORY A

☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B

☐ REGULATORY FORMAT, STATE:

☐ NEW JERSEY REDUCED DELIVERABLES

☐ CLP

☐ EDD FORMAT:

ANALYSIS

1 SVOC-CARS 2 VOCs 3 PCBs 4 PAHs 5 pesticides 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1	2	3	4	5	6	7	8	9	COMMENTS
1. W6216	MTC SDFS 081	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					
2. W6217	MTC SDFS 082	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					
3. W6218	MTC SDFS 080	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					
4.	SDFS	SD		✓			2	✓	✓	✓	✓	✓					
5.	SDFS	SD		✓			2	✓	✓	✓	✓	✓					
6.	SDFS	SD		✓			2	✓	✓	✓	✓	✓					
7.	SDFS	SD		✓			2	✓	✓	✓	✓	✓					
8.	SDFS	SD		✓			2	✓	✓	✓	✓	✓					

PRESERVATIVES

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

KTC 8-18-01

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. K. CUBBAGE	8-18-01 12:00 pm	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3. 8/20/01

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler

Comments:

Page 2 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

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CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: Tetra Tech NUS

ADDRESS: Foster Plaza 7, 661 Andersen Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latulippe

PHONE: 800-245-2730 FAX:

PROJECT INFORMATION

PROJECT NAME: Mattawoman Creek

PROJECT NO.: ND530 (CTO 320)

PROJECT MANAGER: G. Latulippe

LOCATION: Same as client

PHONE: FAX:

BILLING INFORMATION

BILL TO: same as client PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *

HARD COPY: _____ DAYS *

EDD: _____ DAYS *

* TO BE APPROVED BY CHEMTECH

** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

- ☒ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE: _____
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT: _____
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1	2	3	4	5	6	7	8	9
energetics	metals	VOCs	PAHs	pesticides				

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1. W6219	MTC SDFS 039	SD		✓	8/17/01		2	✓	✓	✓	✓	✓					
2. W6220	MTC SDFS 030	SD		✓	8/17/01		2	✓	✓	✓	✓	✓					
3. W6221	MTC SDFS 032	SD		✓	8/17/01		2	✓	✓	✓	✓	✓					
4. W6222	MTC SDFS 036	SD		✓	8/17/01		2	✓	✓	✓	✓	✓					
5. W6223	MTC SDFS 040	SD		✓	8/17/01		2	✓	✓	✓	✓	✓					
6. W6224	MTC SDFS 042	SD		✓	8/17/01		2	✓	✓	✓	✓						
7. W6225	MTC SDFS 045	SD		✓	8/17/01		2	✓	✓	✓	✓	✓					
8. W6226	MTC SDFS 047	SD		✓	8/17/01		2	✓	✓	✓	✓	✓					

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. K. Cubbage	8-18-01 12:00 pm	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3. [signature] 8/20/01

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:

Page 1 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

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CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: See pg. 1

ADDRESS:

CITY: STATE: ZIP:

ATTENTION:

PHONE: FAX:

PROJECT INFORMATION

PROJECT NAME:

PROJECT NO.:

PROJECT MANAGER:

LOCATION:

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: DAYS *

~~HARD COPY~~: DAYS *

~~EDD~~: DAYS *

* TO BE APPROVED BY CHEMTECH

** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☒ RESULTS ONLY ☐ NY STATE CATEGORY A

☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B

☐ REGULATORY FORMAT, STATE:

☐ NEW JERSEY REDUCED DELIVERABLES

☐ CLP

☐ EDD FORMAT:

ANALYSIS

1	2	3	4	5	6	7	8	9
PCBs	PAHs	metals		energetics		pesticides		

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1. W6227	MTC SDFS 063	SD		X	8/17/01		2										
2. W6228	NJC SDFS 001	SD		X	8/17/01		2										
3. W6229	NJC SDFS 002	SD		X	8/17/01		2										
4. W6230	NJC SDFS 003	SD		X	8/17/01		2										
5. W6231	NJC SDFS 004	SD		X	8/17/01		2										
6. W6232	NJC SDFS DUP 001	SD		X	8/17/01		2										
7.	FTC SDFS 8/18/01																
8.	SDFS																

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. K. CUBBAGE	8-18-01 12:00 pm	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3. 8/20/01

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler

Comments:

Page 2 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15733

ATTACHMENT 4a
Battelle Duxbury Operations
Sample Receipt Form

Navy (Indian Head)

Project Number: G486007-TOTDUX Client: ~~TETRA TECH~~ CRM 8/31/01
Received by: GDP Date/Time Received: 8/20/01 4:00PM
No. of Shipping Containers 1

SHIPMENT
Method of Delivery: FED EX Commercial Carrier (Air bill No. 816934336702)
_____ Hand Delivered
_____ US Mail (RPS No. _____)

COC Forms: ✓ Shipped with samples _____No forms

Cooler(s)\Box(es) were sealed with: ✓ Tape _____ Custody Seals_____(Other specify)
Were the seals intact for each shipping container? ✓ Yes_____No_____NA
If NO, see Sample Custody Corrective Action Form

SAMPLES
Sample Labels: ✓ Sample labels agree with COC forms
_____ Discrepancies (see Sample Custody Corrective Action Form)*

Container Seals: ✓ Tape _____ Custody Seals_____(Other specify)
✓ Seals intact for each shipping container
_____ Seal broken (list impacted samples):

Condition of Samples: _____ Sample containers intact
_____ Sample containers broken/leaking (see Sample Custody Corrective Action Form)*

Temperature upon receipt (°C): 12.2 Temperature blank used _____Yes ✓ No
(Note: If temperature upon receipt differs from required conditions, list impacted samples):

Samples Acidified? ___Yes ✓ No ___Unknown

Initial pH 5 - 9? (Y/N): NA *If no, individual sample adjustments on the Auxiliary Sample Receipt Form.*

Total Residual Chlorine Present? (water) (Y/N): NA
If yes, individual sample adjustments on the Auxiliary Sample Receipt Form.

Head Space <1% in samples for water VOC analysis NA Yes_____No
Individual sample deviations listed below.

Sample Containers:
Samples returned in PC-grade jars? ✓ Yes ___No ___Unknown / Lot No._____

Storage Location: Refrigerator ~~WALK IN FREEZER~~ BDO IDs Assigned: W6245 - W6259

Holding Times:	Water	Sediment	Tissue

Additional Comments:

Samples logged in by: [signature] Date/Time: 8/20/01 5:00 PM
* Must also be noted on the C-O-C.

Jim Hatch.

ATTACHMENT 3
Battelle Duxbury Operations
Sample Custody Corrective Action Form

Project Number 6486007-T070UX Client ~~TETRA TECH~~ Navy

Description of Problem:			Explanation:
Client ID:*		Jars and C-O-C do not have matching IDs	
		Extra samples not listed on the C-O-C	
		Missing samples listed on the C-O-C	
		Either label or C-O-C cannot be verified	
Temperature and Preservation:	X	Receipt temperature outside of acceptability	SEE RECIEPT FORM 4
		Preservation discrepancy on C-O-C	
		Not documented as being compliant with the SOP	
VOA Analysis:		Water VOA samples > 1% headspace or bubbles	
		No trip blank included	
Sample Container Integrity:	X	Sample Broken	CAP CRACKED: MTCSDFS 058, 064, 056 — BROKEN: MTCSDFS056, 060, 002
	X	Cap broken	
		Sample Leaking	
		Custody Seal broken	
Custody:*		Jars and C-O-C do not match for time/date	
		Samples received outside of holding time	
		Samples not relinquished from sender	
		Sample Collector not identified	
		Incomplete Sample Custody Forms	
Other:			

* The C-O-C must reference this form for each sample issue

Project Manager and Laboratory Manager must be notified upon receipt of the samples when problems are identified

Documentation of project manager notification:

	Signature	Date
Sample Custodian:	[signature]	8/21/01
Laboratory Manager:	[signature]	8/21/01
Project Manager	[signature]	8/21/01

Documentation of client notification (should be completed by project manager within 24 hrs):

On 8/24/01 (Date) I contacted Jim LEATHER (Name of client contact) at SPAWAR (NAVY) (Name of client organization)

Results of communication with client (Describe any corrective action directed by the client):

R. Brimer will contact client. He will not select any of the broken samples for analysis.

Date this form was received back to the custodian: 8/21/01

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: Tetra Tech NUS

ADDRESS: Foster Plaza 7, 661 Andersen Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latulippe

PHONE: 800-245-2730 FAX:

PROJECT INFORMATION

PROJECT NAME: Mattawoman Creek

PROJECT NO.: N0530 (CTO 320)

PROJECT MANAGER: George Latulippe

LOCATION: same as client

PHONE: FAX:

BILLING INFORMATION

BILL TO: Same as clients PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *

HARD COPY: _____ DAYS *

EDD: _____ DAYS *

* TO BE APPROVED BY CHEMTECH

** NORMAL TURNAROUND TIME 14 DAYS

DATA DELIVERABLE INFORMATION

- ☒ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE: _____
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT: _____
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1 energetics, 2 metals, 3 PAHs, 4 PCBs, 5 pesticides, 6, 7, 8, 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS (← Specify Preservatives A – HCl, B – HNO_3, C – H_2SO_4, D – NaOH, E – ICE, F – Other)
1. ~~W6233~~	MTCSDFS056	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					W6245
2. ~~W6234~~	MTCSDFS055	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					W6246
3. ~~W6235~~	MTCSDFS059	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					W6247
4. ~~W6236~~	MTCSDFS058	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					W6248
5. ~~W6237~~	MTCSDFS057	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					W6249
6. ~~W6238~~	MTCSDFS083	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					W6250
7. ~~W6239~~	MTCSDFS062	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					W6251
8. ~~W6240~~	MTCSDFS064	SD		✓	8/16/01		2	✓	✓	✓	✓	✓					W6252

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. K. CUBBATE	8/18/01 12:00 p.m.	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3. [signature] 8/20/01 4:20

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:

Page 1 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15766

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: See page 1

ADDRESS:

CITY: STATE: ZIP:

ATTENTION:

PHONE: FAX:

PROJECT INFORMATION

PROJECT NAME:

PROJECT NO.:

PROJECT MANAGER:

LOCATION:

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: DAYS *

HARD COPY: DAYS *

EDD: DAYS *

* TO BE APPROVED BY CHEMTECH

* NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

- ☒ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE:
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT:
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1 energetics 2 metals 3 PCBs 4 PAHs 5 pesticides 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS ← Specify Preservatives A – HCl B – HNO_3 C – H_2SO_4 D – NaOH E – ICE F – Other
1. ~~W6241~~	MTCSDFS 067	SD		✓	8/16/01		2										W6253
2. ~~W6242~~	MTCSDFS 060	SD		✓	8/16/01		2										W6254
3. ~~W6243~~	MTCSDFS 076	SD		✓	8/16/01		2										W6255
4. ~~W6244~~	MTCSDFS 071	SD		✓	8/16/01		2										W6256
5.	MTCSDFS DUP002	SD		✓	8/16/01		2										W6257
6.	MTCSDFS 066	SD		✓	8/16/01		2										W6258
7. KTC	MTCSDFS 066	SD		✓	8/16/01		2										W6259
8.	~~MTCSDFS~~	SD		✓			~~2~~										

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. K. CHABART	8-18-01 12:00 p.m.	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3. [signature] 8/22/01 4:00

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:

Page 2 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

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Sample Split and Transfer Log

Project Number: GAB6007-T07DUX
Date of Work: 8/29/01
Project Title: INDIAN HEAD - NAVY
Analysis Type(s):
Splitting Procedure: APPROXIMATELY 50 GRAMS IN SPEX JAR
(include description of amount or weight of split, packaging, storage)
Name: JAMES D. HATZU
Date: 8/29/01

	Sample ID	Sample ID	Sample ID	Sample ID	Sample ID	Sample ID
1704-1	W6196	W6223	1704-11			
2	W6198	W6226	-12			
3	W6200	W6227	-13			
4	W6202	W6228	-14			
5	W6205	W6231	-15			
6	W6208	W6249	-16			
7	W6210	W6255	1704-17			
8	W6216					
9	W6217	W6256	1704-18	not listed on original COC		
1704-10	W6222	W6258	1704-19			

Released	Received
Signature/Date: 8/29/01	Signature/Date: 8/30/01
Storage Location/Conditions: COOLER W/BLUE ICE	Storage Location/Conditions: Cooler temp 10.1°
Released	**Received**
Signature/Date:	Signature/Date:
Storage Location/Conditions:	Storage Location/Conditions:

ORIGINAL

cc: Project Manager/Central File
Login File

SAMPLE LOGIN

(SOP# MSL-A-001)

Project Manager: Barrows
Date Received: 8/30/01
Batch: 1

PROJECT: Indian Head

SPONSOR CODE	BATTELLE CODE	MATRIX	STORAGE LOCATION	PARAMETERS REQUESTED	COLLECTION DATE	INITIALS
W6196	1704-1	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6198	1704-2	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6200	1704-3	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6202	1704-4	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6205	1704-5	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W62080	1704-6	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6210	1704-7	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6216	1704-8	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6217	1704-9	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6222	1704-10	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6223	1704-11	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6226	1704-12	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6227	1704-13	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6228	1704-14	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6231	1704-15	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6249	1704-16	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6255	1704-17	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6256	1704-18	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS
W6258	1704-19	SED	Refrigerator, Rm 223	Metals, Hg	Unknown	CS

Comments:

LOG-IN CHECKLIST

Reference SOP# MSL-A-001

Central File #: 1704 - Indian Head Project Manager: Barrows

TO BE COMPLETED BY PROJECT MANAGER (prior to arrival when possible)

Matrix: SEDS WP#

Yes	No	
		Navy-type Project (requires high-level sample tracking procedures)
		Filter Samples: Amount: Entire sample Half of sample
		Freeze dry sample(s) - samples will be weighed and placed in ultralow temp freezer (Lab# 130)
		Special instructions:

Sample Preservation Instructions:

Date To Archive: Date To Dispose:

TO BE COMPLETED UPON SAMPLE ARRIVAL/LOG-IN

Yes	No	N/A	Indicate in Appropriate Box
✓			Was a custody seal present?
✓			Was the custody seal intact?
	✓		Was cooler(s) temperature(s) within acceptable range of 4±2°C? 10.1°C °C (if multiple coolers, note temp. of each) °C
✓			Was Project Manager notified of any custody/login discrepancies (cooler temp, sponsor codes, etc)? Comment/Remedy: e-mail
✓			Were all chain of custody forms signed and dated?
		✓	Were samples filtered at MSL?

Sample condition(s): Acceptable Other (explain): Cooler temp

Container type: Teflon Poly Glass Spex Other:

Notes:

Completed By: [signature] Date/Time: 8/30/01 1445

SAMPLE PRESERVATION

- [ ] Sample(s) were preserved at MSL
- [ ] Sample(s) were preserved upon arrival at MSL (noted on CoC / Sample / per PM Instruction)
- [ ] Random pH checked for ~10% of samples (use dip paper) Sample IDs:
- [ ] Complete pH check required for project (use pH meter and record on pH Record form)

If preservation necessary, record Acid Lot#

Type:			Notes:
		0.2% HNO3	
		0.5% HCl (Hg samples)	
	✓	Refrigerate/Freeze	After weighing
		Other	

Completed By: [signature] Date/Time: 8/30/01 1600

DETECTION LIMITS

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Detection Limits and Reporting Limits for Mattawoman -- Indian Head Project

Target Analyte	MDL	units	RL	units
Inorganics				
Ag	0.03	ug/g dry wt.	0.1	ug/g dry wt.
As	0.07	ug/g dry wt.	0.22	ug/g dry wt.
Cd	0.02	ug/g dry wt.	0.06	ug/g dry wt.
Cr	0.5	ug/g dry wt.	1.6	ug/g dry wt.
Cu	0.2	ug/g dry wt.	0.64	ug/g dry wt.
Hg	0.002	ug/g dry wt.	0.006	ug/g dry wt.
Mn	0.07	ug/g dry wt.	0.22	ug/g dry wt.
Ni	0.04	ug/g dry wt.	0.13	ug/g dry wt.
Pb	0.2	ug/g dry wt.	0.64	ug/g dry wt.
Se	0.1	ug/g dry wt.	0.32	ug/g dry wt.
V	0.3	ug/g dry wt.	0.95	ug/g dry wt.
Zn	0.1	ug/g dry wt.	0.32	ug/g dry wt.
Energetics and Nitroguanidine				
1,3,5-Trinitrobenzene	0.09	mg/kg wet wt.	0.25	mg/kg wet wt.
1,3-Dinitrobenzene	0.03	mg/kg wet wt.	0.25	mg/kg wet wt.
2,4,6-Trinitrotoluene	0.045	mg/kg wet wt.	0.5	mg/kg wet wt.
2,4-Dinitrotoluene	0.045	mg/kg wet wt.	0.25	mg/kg wet wt.
2,6-Dinitrotoluene	0.09	mg/kg wet wt.	0.5	mg/kg wet wt.
2-Amino-4,6-dinitrotoluene	0.09	mg/kg wet wt.	0.5	mg/kg wet wt.
2-Nitrotoluene	0.14	mg/kg wet wt.	0.5	mg/kg wet wt.
3-Nitrotoluene	0.14	mg/kg wet wt.	0.5	mg/kg wet wt.
4-Amino-2,6-dinitrotoluene	0.09	mg/kg wet wt.	0.5	mg/kg wet wt.
4-Nitrotoluene	0.09	mg/kg wet wt.	0.5	mg/kg wet wt.
HMX	0.18	mg/kg wet wt.	0.5	mg/kg wet wt.
Nitrobenzene	0.045	mg/kg wet wt.	0.25	mg/kg wet wt.
RDX	0.17	mg/kg wet wt.	0.5	mg/kg wet wt.
Tetryl	0.38	mg/kg wet wt.	0.75	mg/kg wet wt.
Nitroguanidine	0.02	mg/kg wet wt.	0.1	mg/kg wet wt.
Total Petroleum Hydrocarbons				
TPH (C10 - C25)	6	mg/kg dry wt.	10	mg/kg dry wt.
Total Organic Carbon				
TOC	76.8	mg/kg wet wt.	100	mg/kg wet wt.
Polynuclear Aromatic Hydrocarbons				
Acenaphthene	0.016	ug/kg dry wt.	1	ug/kg dry wt.
Acenaphthylene	0.026	ug/kg dry wt.	1	ug/kg dry wt.
Anthracene	0.024	ug/kg dry wt.	1	ug/kg dry wt.
Benzo[a]anthrancene	0.017	ug/kg dry wt.	1	ug/kg dry wt.
Benzo[a]pyrene	0.021	ug/kg dry wt.	1	ug/kg dry wt.
Benzo[e]pyrene	0.012	ug/kg dry wt.	1	ug/kg dry wt.
Benzo[b]fluoranthene	0.018	ug/kg dry wt.	1	ug/kg dry wt.
Benzo[k]fluoranthene	0.013	ug/kg dry wt.	1	ug/kg dry wt.
Benzo[g,h,i]perylene	0.013	ug/kg dry wt.	1	ug/kg dry wt.
Chrysene	0.013	ug/kg dry wt.	1	ug/kg dry wt.
Dibenz[a,h]anthracene	0.018	ug/kg dry wt.	1	ug/kg dry wt.
Fluoranthene	0.025	ug/kg dry wt.	1	ug/kg dry wt.
Fluorene	0.023	ug/kg dry wt.	1	ug/kg dry wt.
Indeno[1,2,3-c,d]pyrene	0.01	ug/kg dry wt.	1	ug/kg dry wt.
Naphthalene	1.49	ug/kg dry wt.	1	ug/kg dry wt.
Phenanthrene	0.03	ug/kg dry wt.	1	ug/kg dry wt.
Pyrene	0.02	ug/kg dry wt.	1	ug/kg dry wt.
Perylene	0.015	ug/kg dry wt.	1	ug/kg dry wt.

Target Analyte	MDL	units	RL	units
Organochlorine Pesticides				
4,4'-DDD	0.045	ug/kg dry wt.	0.4	ug/kg dry wt.
2,4'-DDD	0.049	ug/kg dry wt.	0.4	ug/kg dry wt.
4,4'-DDE	0.041	ug/kg dry wt.	0.4	ug/kg dry wt.
2,4'-DDE	0.061	ug/kg dry wt.	0.4	ug/kg dry wt.
4,4'-DDT	0.042	ug/kg dry wt.	0.4	ug/kg dry wt.
2,4'-DDT	0.057	ug/kg dry wt.	0.4	ug/kg dry wt.
a-Chlordane (cis-chlordane)	0.033	ug/kg dry wt.	0.4	ug/kg dry wt.
g-Chlordane	0.035	ug/kg dry wt.	0.4	ug/kg dry wt.
technical chlordane	NA	ug/kg dry wt.	12	ug/kg dry wt.
Dieldrin	0.044	ug/kg dry wt.	0.4	ug/kg dry wt.
Endrin	0.04	ug/kg dry wt.	0.4	ug/kg dry wt.
Heptachlor	0.037	ug/kg dry wt.	0.4	ug/kg dry wt.
Heptachlor epoxide	0.035	ug/kg dry wt.	0.4	ug/kg dry wt.
alpha-BHC	0.024	ug/kg dry wt.	0.4	ug/kg dry wt.
gamma-BHC (lindane)	0.03	ug/kg dry wt.	0.4	ug/kg dry wt.
delta-BHC	0.041	ug/kg dry wt.	0.4	ug/kg dry wt.
Polychorinated Biphenyls				
Cl_2(8)	0.037	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_3(18)	0.075	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_3(28)	0.052	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_4(44)	0.046	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_4(52)	0.049	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_4(66)	0.054	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_4(77)/Cl_5(110)	.076/.052	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_5(101)	0.047	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_5(105)	0.041	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_5(118)	0.053	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_5(126)/Cl_6(129)	0.066	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_6(128)	0.087	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_6(138)	0.044	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_6(153)	0.066	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_7(170)	0.044	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_7(180)	0.047	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_7(187)	0.043	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_8(195)	0.04	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_9(206)	0.04	ug/kg dry wt.	0.4	ug/kg dry wt.
Cl_{10}(209)	0.043	ug/kg dry wt.	0.4	ug/kg dry wt.
Aroclors				
Aroclor 1016	NA	ug/kg dry wt.	6	ug/kg dry wt.
Aroclor 1221	NA	ug/kg dry wt.	6	ug/kg dry wt.
Aroclor 1232	NA	ug/kg dry wt.	6	ug/kg dry wt.
Aroclor 1242	NA	ug/kg dry wt.	6	ug/kg dry wt.
Aroclor 1248	NA	ug/kg dry wt.	6	ug/kg dry wt.
Aroclor 1254	NA	ug/kg dry wt.	6	ug/kg dry wt.
Aroclor 1260	NA	ug/kg dry wt.	6	ug/kg dry wt.

METALS

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QA/QC NARRATIVE

PROJECT: Indian Head Mattawoman Creek
PARAMETER: Metals
LABORATORY: Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX: Sediment

SAMPLE CUSTODY AND PROCESSING: Nineteen sediment samples for metals analysis were received on 8/30/01. All samples were received in good condition (i.e., no sample containers were broken). The cooler temperature was measured and recorded. The cooler temperature was 10.1°C, which exceeded the recommended range of 4°C± 2 °C. Samples were refrigerated immediately after log-in. It is unlikely that exceeding the recommended temperature range during a portion of the time the samples were in transit between laboratories had any effect of results of analysis for total metals. Samples were assigned a Battelle Central File (CF) identification number (1704) and were entered into Battelle's log-in system.

The following lists information on sample receipt and processing activities:

Lab Sample IDs:	1701-1 through –19
Description:	Sediment samples
Sample collection date	8/17/01*
Laboratory arrival date	8/30/01
Cooler temp. on arrival	10.1°C
Digestion ($HNO_3/H_2O_2/HF$, wet wt. basis)	9/7/01
FIAS analysis (Se)	9/12/01
GFAA analysis (Ag)	9/12/01
CVAA analysis (Hg)	9/13/01
ICP-MS analysis (As, Cd, Cr, Cu, Ni, Pb, V, Zn)	9/19/01
ICP-AES analysis (Mn, verification of Zn)	10/10/01

*Sample collection date cannot be validated by information received with sample custody forms; date is taken from e-mail correspondence (in file).

DATA QUALITY OBJECTIVES:

Analyte	Analytical Method	Range of Recovery	Relative Precision	Target Detection Limits (µg/g dry wt.)	Achieved Detection Limits (µg/g dry wt.)
Ag	GFAA	70-130%	<20%	0.04	0.04
As	ICP-MS	70-130%	<20%	0.4	0.068
Cd	ICP-MS	70-130%	<20%	0.2	0.0175
Cr	ICP-MS	70-130%	<20%	0.4	0.284
Cu	ICP-MS	70-130%	<20%	0.1	0.25
Hg	CVAA	70-130%	<20%	0.002	0.002
Mn	ICP-AES	70-130%	<20%	0.1	0.04
Ni	ICP-MS	70-130%	<20%	0.3	0.195
Pb	ICP-MS	70-130%	<20%	0.05	0.198
Se	FIAS	70-130%	<20%	0.4	0.126
V	ICP-MS	70-130%	<20%	0.2	0.345
Zn	ICP-MS	70-130%	<20%	0.4	0.591

METHODS: Twelve metals were analyzed: arsenic (As), cadmium (Cd), chromium (Cr) copper (Cu), lead (Pb), mercury (Hg), nickel (Ni), and zinc (Zn). Sediment samples were digested according to Battelle SOP MSL-I-004 *Sediment*

QA/QC NARRATIVE

Evaporation Digestion. An approximately 500-mg (wet weight) aliquot of each sample was combined with nitric acid, and hydrogen peroxide, and hydrofluoric acid in a Teflon bomb and heated in an oven at 130ºC (±10ºC) overnight. A portion of the digestate is removed and weighed for Hg analysis. The remaining digestate is weighed and heated to dryness on a hotplate. The residue then undergoes a series of steps where it is combined with nitric acid, then evaporated to dryness. After heating and cooling, deionized water was added to the sediment digestate to achieve analysis volume, and the digestates were submitted for analysis.

Sample digestates were analyzed for Se using hydride atomic absorption (HGAA) with flow injection atomic spectroscopy (FIAS) following Battelle SOP MSL-I-030, *Determination of Metals in Aqueous and Digestate Samples by HGAA-FIAS.*

Sample digestates were analyzed for Ag by graphite furnace atomic absorption (GFAA) according to Battelle SOP MSL-I-029, *Determination of Metals in Aqueous and Digestate Samples by GFAA.*

Hg was analyzed using cold-vapor atomic absorption spectroscopy (CVAA) according to Battelle SOP MSL-I-016, *Total Mercury in Tissues and Sediments by Cold Vapor Atomic Absorption.*

Sample digestates were analyzed for As, Cd, Cr, Cu, Mn, Ni, Pb, V, and Zn using inductively coupled plasma-mass spectrometry (ICP-MS) according to Battelle SOP MSL-I-022, *Determination of Elements in Aqueous and Digestate Samples by ICP/MS.*

Because results of most samples for Mn analysis and one sample for Zn analysis by IPC-MS exceeded the linear calibration range of the instrument for those metals, sample digestates were analyzed for Mn and Zn by inductively coupled plasma-atomic emission spectrometry (ICP-AES) following Battelle SOP MSL-I-027, *Determination of Metals in Aqueous and Digestate Samples by ICP/AES.* Results of the reanalysis are reported for Mn. Note that the ICP-AES reanalysis results for Zn were essentially identical to the original analysis results by ICP-MS. Therefore, the ICP-MS results were reported and the ICP-AES results confirm the analysis.

Sample analyses were conducted on a wet-weight basis. All results were reported in units of µg/g on a dry-weight basis using sample dry weights determined by the Battelle-Duxbury organics laboratory.

HOLDING TIMES: The recommended holding times for metals analyses are 28 days from sample collection for Hg analysis and 6 months for analysis of all other metals. Sediment samples were analyzed for Hg 27 days from sample collection. Sediment samples were analyzed for all other metals within 6 months of collection.

DETECTION LIMITS: Achieved detection limits were less than or equal to target detection limits for all metals except Cu, Pb, V, and Zn. Concentrations of each of these metals in the samples ranged from one to five orders of magnitude greater than the laboratory-achieved detection limits, therefore, there was no effect on the data.

METHOD BLANKS: A method blank was analyzed with the set of sediment sample digestions. All metals were undetected in the blank with the exception of As, Hg, and Pb. As and Hg were detected at concentrations less than 5 times their achieved

detection limits and at least 10 times lower than all sample concentrations. Pb was detected at a concentration approximately 10 times greater than the achieved detection limit, and approximately 10 times lower than the concentrations of Pb in the samples.

LABORATORY CONTROL SAMPLE/BLANK SPIKE ACCURACY:

A laboratory control sample (LCS) or blank spike was analyzed with the set of sample digestions. LCS were spiked at three concentrations: 1 µg/g for Hg; 10 µg/g for Ag, As, Cd, Ni, and Se; and 100 µg/g for Cr, Cu, Mn, Pb, V, and Zn. LCS recoveries among all metals analyzed were within the QC acceptance criteria of 70% to 130%.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE ACCURACY AND PRECISION:

One sediment sample was selected and spiked in duplicate at three concentrations. Spiking standards were added to wet weight samples. When calculated to present results on a dry weight basis, spike levels were as follows: 4.14 µg/g for Hg; 41.4 to 42.1 µg/g for Ag, As, Cd, Pb, and Se; and 415 to 417 µg/g for Cr, Cu, Mn, Ni, V, and Zn. Matrix spike recoveries for all metals analyzed were within QC acceptance criteria of 70%-130% recovery with the exception of Mn in one MS. However, the native concentration of Mn in the sample selected for spiking was too high relative to the spike level to obtain acceptable recovery. The sample results were flagged with an "SL" qualifier to indicate that an insufficient spike level had been used.

Precision of the MS/MSD analysis, expressed as the relative percent difference (RPD) between the duplicate analyses, was within QC acceptance criteria of ±20% RPD for all metals.

REPLICATE PRECISION:

Replicate precision was assessed by analysis of duplicate sample analysis. Precision of duplicate analyses, expressed as the RPD of replicate results was within the QC limits of ± 20% for all metals.

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Sequim, Washington 98382-9099
360/681-3643

INDIAN HEAD MATTAWOMAN CREEK
METALS IN SEDIMENT
(Samples Received 8/30/01)

MSL Code	Sponsor ID	Percent Dry Wt. [a]	Ag	As	Cd	Cr	Cu	Hg
			(concentrations in µg/g dry wt - not blank corrected)					
		Analytical Method:	*GFAA*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*CVAA*
1704-1	W6196	69.8	3.53	1.09	0.435	10.9	9.29	0.0963
1704-2	W6198	79.4	0.0876	1.52	0.0797	25.6	9.05	0.0205
1704-3	W6200	44.7	0.789	5.11	0.486	48.2	19.0	0.135
1704-4	W6202	35.5	1.24	6.74	0.545	63.4	33.6	0.212
1704-5	W6205	61.2	6.08	6.56	1.22	50.5	63.0	0.349
1704-6	W62080	26.9	0.799	6.52	1.19	47.8	26.6	0.409
1704-7	W6210	85.5	0.503	72.0	16.8	27.7	330 [b]	0.122
1704-8	W6216	60.6	0.215	1.82	0.380	12.6	5.36	0.0553
1704-9	W6217	67.2	0.322	6.03	0.411	25.8	13.9	0.186
1704-10 r1	W6222	24.0	1.77	10.7	1.09	93.2	45.9	0.338
1704-10 r2	W6222	24.0	1.77	10.1	1.10	91.4	45.2	0.325
1704-11	W6223	31.9	1.05	14.2	0.993	69.5	33.2	0.736
1704-12	W6226	80.5	0.0559	5.43	0.139	36.0	7.86	0.0195
1704-13	W6227	74.9	2.17	1.64	0.0175 U	13.1	16.2	0.128
1704-14	W6228	34.2	0.597	9.80	0.654	89.9	33.5	0.208
1704-15	W6231	78.9	0.116	2.15	0.130	19.6	5.15	0.0389
1704-16	W6249	31.8	2.21	9.08	0.894	78.4	34.9	0.273
1704-17	W6255	27.1	1.62	8.03	1.78	72.2	27.4	0.313
1704-18	W6256	31.8	2.07	10.0	1.43	64.9	30.7	0.450
1704-19	W6258	70.2	0.326	18.9	0.478	43.3	26.2	0.290
Method Blank			0.04 U	0.0997	0.0175 U	0.284 U	0.25 U	0.0078
DETECTION LIMITS								
Target Detection Limits (dry wt.)			0.04	0.4	0.2	0.4	0.1	0.002
Achieved Detection Limits (dry wt.)			0.04	0.068	0.0175	0.284	0.25	0.002
LABORATORY CONTROL SAMPLE/BLANK SPIKE ACCURACY								
Concentration Spiked			10	10	10	100	100	1.0
Blank			0.04 U	0.0997	0.0175 U	0.284 U	0.25 U	0.0078
Blank Spike			12.3	9.66	10.1	89.4	99.7	1.07
Concentration Recovered			12.3	9.56	10.1	89.4	99.7	1.06
Percent Recovery			123%	96%	101%	89%	100%	106%

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INDIAN HEAD MATTAWOMAN CREEK
METALS IN SEDIMENT
(Samples Received 8/30/01)

MSL Code	Sponsor ID	Percent Dry Wt. [a]	(concentrations in µg/g dry wt - not blank corrected)					
			Ag	**As**	**Cd**	**Cr**	**Cu**	**Hg**
		Analytical Method:	*GFAA*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*ICP-MS*	*CVAA*
MS/MSD ACCURACY AND PRECISION								
Concentration Spiked			41.4	41.4	41.4	415	415	4.14
1704-10 mean	W6222	24.0	1.77	10.4	1.10	92.3	45.6	0.332
1704-10 MS	W6222	24.0	48.6	51.5	41.8	492	443	4.73
Concentration Recovered			46.8	41.1	40.7	400	397	4.40
Percent Recovery			113%	99%	98%	96%	96%	106%
Concentration Spiked			42.1	42.1	42.1	417	417	4.21
1704-10 mean	W6222	24.0	1.77	10.4	1.10	92.3	45.6	0.332
1704-10 MSD	W6222	24.0	52.2	52.4	42.4	509	447	4.72
Concentration Recovered			50.4	42.1	41.3	417	401	4.39
Percent Recovery			120%	100%	98%	100%	96%	104%
	Relative percent difference		**6%**	**1%**	**0%**	**4%**	**1%**	**2%**
REPLICATE PRECISION								
1704-10 r1	W6222	24.0	1.77	10.7	1.09	93.2	45.9	0.338
1704-10 r2	W6222	24.0	1.77	10.1	1.10	91.4	45.2	0.325
	Mean		*1.77*	*10.4*	*1.10*	*92.3*	*45.6*	*0.332*
	Relative percent difference		**0%**	**6%**	**0%**	**2%**	**1%**	**4%**

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INDIAN HEAD MATTAWOMAN CREEK
METALS IN SEDIMENT
(Samples Received 8/30/01)

MSL Code	Sponsor ID	Percent Dry Wt. [a]	(concentrations in µg/g dry wt - not blank corrected) Mn	Ni	Pb	Se	V	Zn
		Analytical Method:	*ICP-AES*	*ICP-MS*	*ICP-MS*	*FIAS*	*ICP-MS*	*ICP-MS*
1704-1	W6196	69.8	112	4.42	94.4	0.0970 J	13.3	87.4
1704-2	W6198	79.4	349	5.83	14.1	0.0679 J	49.1	44.4
1704-3	W6200	44.7	393	18.9	24.7	0.397	59.5	103
1704-4	W6202	35.5	752	30.4	49.6	0.485	83.4	149
1704-5	W6205	61.2	582	21.3	104	0.308	44.6	225
1704-6	W62080	26.9	524	22.0	39.8	0.639	60.5	136
1704-7	W6210	85.5	679	7.35	1970 [b]	0.0770 J	24.6	17300 [b]
1704-8	W6216	60.6	128	5.12	8.30	0.107 J	14.3	48.8
1704-9	W6217	67.2	367	6.66	22.3	0.274	46.2	108
1704-10 r1	W6222	24.0	1230	46.4	54.9	0.958	123	239
1704-10 r2	W6222	24.0	1110	46.5	53.7	0.984	117	230
1704-11	W6223	31.9	510	34.6	55.7	0.754	93.4	223
1704-12	W6226	80.5	189	7.52	15.8	0.159	34.8	49.2
1704-13	W6227	74.9	152	5.74	126	0.155	18.9	43.1
1704-14	W6228	34.2	948	37.5	44.2	0.725	113	180
1704-15	W6231	78.9	273	5.31	8.16	0.0849 J	18.5	28.2
1704-16	W6249	31.8	859	37.4	42.5	0.666	103	180
1704-17	W6255	27.1	687	30.2	38.3	0.854	84.5	182
1704-18	W6256	31.8	685	27.1	46.1	0.692	80.3	166
1704-19	W6258	70.2	234	31.2	25.6	0.433	76.4	93.0
Procedural Blank			0.04 U	0.195 U	1.13	0.126 U	0.345 U	0.591 U
DETECTION LIMITS								
Target Detection Limits (dry wt.)			0.1	0.3	0.05	0.4	0.2	0.4
Achieved Detection Limits (dry wt.)			0.04	0.195	0.198	0.126	0.345	0.591
LABORATORY CONTROL SAMPLE/BLANK SPIKE ACCURACY								
Concentration Spiked			100	10	100	10	100	100
Blank			0.04 U	0.195 U	1.13	0.126 U	0.345 U	0.591 U
Blank Spike			99.7	10.2	102	10.0	97.8	101
Concentration Recovered			99.7	10.2	100	10.0	97.8	101
Percent Recovery			100%	102%	100%	100%	98%	101%

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INDIAN HEAD MATTAWOMAN CREEK
METALS IN SEDIMENT
(Samples Received 8/30/01)

MSL Code	Sponsor ID	Percent Dry Wt. [a]	Mn	Ni	Pb	Se	V	Zn
			(concentrations in µg/g dry wt - not blank corrected)					
		Analytical Method:	*ICP-AES*	*ICP-MS*	*ICP-MS*	*FIAS*	*ICP-MS*	*ICP-MS*
MS/MSD ACCURACY AND PRECISION								
Concentration Spiked			415	415	41.4	41.4	415	415
1704-10 mean	W6222	24.0	1170	46.4	54.3	0.971	120	234
1704-10 MS	W6222	24.0	1460	445	94.0	42.6	524	622
Concentration Recovered			290	399	39.7	41.6	404	388
Percent Recovery			70% **SL**	96%	96%	101%	97%	93%
Concentration Spiked			417	417	42.1	42.1	417	417
1704-10 mean	W6222	24.0	1170	46.4	54.3	0.971	120	234
1704-10 MSD	W6222	24.0	1490	461	95.3	42.6	544	624
Concentration Recovered			320	414	41.0	41.6	424	390
Percent Recovery			77%	99%	97%	99%	102%	94%
	Relative percent difference		**9%**	**3%**	**2%**	**2%**	**4%**	**0%**
REPLICATE PRECISION								
1704-10 r1	W6222	24.0	1230	46.4	54.9	0.958	123	239
1704-10 r2	W6222	24.0	1110	46.5	53.7	0.984	117	230
	Mean		*1170*	*46.4*	*54.3*	*0.971*	*120*	*234*
	Relative percent difference		**10%**	**0%**	**2%**	**3%**	**5%**	**4%**

[a] Dry weights determined by Battelle-Duxbury Organics Laboratory
[b] Concentration outside calculated linear range of ICP-MS; value confirmed by ICP-AES analysis
U Not detected at or above DL shown
J Concentration reported below DL; estimated value
SL Spike level insufficient relative to native concentration of analyte in sample; results should not be used for data quality assessment.

PAH

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PAH – SEDIMENT QA/QC SUMMARY
Batch 01-457

PROJECT:	Mattawoman Creek – Indian Head
PARAMETER:	PAH
LABORATORY:	Battelle, Duxbury, MA
MATRIX:	Sediment
SAMPLE CUSTODY:	Sediment samples were collected as part of the Mattawoman Project between August 16 and 17, 2001. Samples were received at Battelle Duxbury on August 20. All coolers (4 total) exceeded temperature criteria; cooler temperatures ranged from 9.7 to 13.1 ° C. Additionally, selected sample jars and/or caps arrived broken. This information is provided in the custody records. Samples were stored at 4° C until the samples intended for chemical analysis were identified. At this point they were split for the selected target analyses using non-contaminating apparatus (Teflon), and shipped on blue ice to the appropriate analytical laboratories.

METHOD: Sediment samples were extracted for PAH following general NS&T methods. Approximately 30g of sediment was extracted three times with three separate aliquots of dichloromethane using shaker table techniques. The three extracts associated with each sample were combined in a single Erlenmeyer flask and dried over anhydrous sodium sulfate. This combined extract was dried over anhydrous sodium sulfate, concentrated, processed through alumina cleanup column, concentrated, and further purified by GPC/HPLC. The post-HPLC extract was concentrated, fortified with RIS and split for analysis. PAH extracts were analyzed using gas chromatography/mass spectrometry detection (GC/MS) with the MS operated in the selected ion monitoring (SIM) mode, following general NS&T methods. Sample data were quantified by the method of internal standards, using the Recovery Internal Standard (RIS) compounds. Final data are reported in units of ug/kg, dry weight. Any manually integrated peaks are clearly identified on the sample quantitation reports.

HOLDING TIMES: Sediment samples for PAH were stored refrigerated until extraction. Sample holding time is fourteen days from collection.

Samples were prepared for analysis within 14-days of collection. The extracts were analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
01-457	08/30/2001	09/21/2001 – 09/24/2001

BLANKS: A procedural blank (PB) was prepared with each analytical batch. Blanks were analyzed to ensure the sample extraction and analysis methods were free of contamination.

01-457 – Very low levels of naphthalene, 2-methylnaphthalene, pyrene, and benzo[g,h,i]perylene were detected in the blank, all at concentrations less than the reporting limit, and therefore are qualified with "J."

Comments – The concentrations of most individual PAH detected in the blanks were "J" qualified, indicating that the concentrations were very low. The concentrations were significantly higher in the majority of field samples in the batch, with concentrations 20 or more times higher in most samples than the blank.

PAH – SEDIMENT QA/QC SUMMARY
Batch 01-457

LABORATORY CONTROL SAMPLE (Blank Spike)	A laboratory control sample (LCS) was prepared with each analytical batch. The percent recoveries of PAH were calculated to measure data quality in terms of accuracy. **01-457** – All PAH in the LCS were recovered within the laboratory control limits specified by the method (40 – 120%). **Comments** – None.
MATRIX SPIKE/MATRIX SPIKE DUPLICATE:	A matrix spike (MS)/matrix spike duplicate (MSD) pair was prepared with each analytical batch. The percent recoveries of PAH were calculated to measure data quality in terms of accuracy; relative percent differences between the MS and MSD were calculated to measure data quality in terms of precision. **01-457** – Percent recoveries for all PAH compounds were within the laboratory control limits specified by the method (40 – 120% recovery). RPDs between the pairs were with laboratory control limits (<30%). **Comments** – None.
DUPLICATES:	Duplicate aliquots of a single field sample were extracted with each analytical batch. The relative percent difference (RPD) between the duplicates was calculated to quantify data in terms of precision. **01-457** – The RPDs between the duplicates of sample MTC SDFS 068were outside the control limits (<30%) for acenaphthylene, acenaphthene, fluorene, fluoranthene, anthracene, and phenanthrene. **Comments** – Data reviewed. No mathematical errors; no sample preparation issues. The concentration of PAH were significantly higher in the original sample than in the duplicate for the mid-range PAH. It was noted by the sample preparation technician that the two raw sample extracts did not look similar. One was significantly darker than the other. The likely cause was sample inhomogeneity. Surrogate recoveries were good, and almost identical between the two samples, indicating good extraction efficiency and reproducibility. Additionally, the MS and MSD precision was good.
SURROGATES:	Three surrogate compounds were added prior to extraction, including Naphthalene-d8, Phenanthrene-d10, and Chrysene-d12. The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency). **01-457** – All surrogate recoveries were within laboratory control limits (40 – 120%) with the exception of naphthalene-d8 in samples MTC SDFS 013 and MTC SDFS 063. **Comments** – The naphthalene-d8 recoveries were just below the 40% control limit in both samples. This is the most volatile of the surrogates, and is the most easily lost during sample processing. All data were reviewed and chromatography checked. The recovery of this surrogate in all field samples were lower than in the QC samples, indicating that there may be some characteristic of the matrix itself causing lower recoveries.

Procedural Blank Data

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Project Name:	US Navy / Indian Head Mattawoman Creek
Project Number:	G486007-T05DUX

Client ID:	NA
Battelle ID:	ZH19PB
Batch ID:	01-457
Collection Date:	NA
Reciept Date:	NA
% Moisture	NA
Sample Dry wt. (g):	16.00
Units:	ug/kg, dry wt.
Naphthalene	0.35 J
2-Methylnaphthalene	0.08 J
Acenaphthylene	0.05 U
Acenaphthene	0.03 U
Fluorene	0.04 U
Phenanthrene	0.06 U
Anthracene	0.05 U
Fluoranthene	0.05 U
Pyrene	0.36 J
Benz(a)anthracene	0.03 U
Chrysene	0.02 U
Benzo(b)fluoranthene	0.03 U
Benzo(k)fluoranthene	0.02 U
Benzo(a)pyrene	0.04 U
Indeno(1,2,3-c,d)pyrene	0.02 U
Dibenz(a,h)anthracene	0.03 U
Benzo(g,h,i)perylene	0.31 J
Surrogate Recovery (%)	
Naphthalene-d8	68
Phenanthrene-d10	60
Chrysene-d12	74

B - Analyte found in both sample and blank, but only samples are qualified.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below RL.
U - Not detected, ssMDL reported.
M - Duplicate recovery not within correct range.
N - Spiked sample recovery not within control limits.
& - Data QC value outside the accuracy or precision criteria goals.

Laboratory Control Spike Data

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Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T05DUX

Client ID:		NA	
Battelle ID:		ZH20LCS	
Batch ID:		01-457	
Collection Date:		NA	
Reciept Date:		NA	
% Moisture	Amount	NA	Percent
Sample Dry wt. (g):	Spiked	NA	Recovery
Units:	(ng)	ng	(%)
Naphthalene	2004.00	1390.19	69
2-Methylnaphthalene	2002.00	1445.87	72
Acenaphthylene	2008.40	1369.63	68
Acenaphthene	2008.10	1378.01	69
Fluorene	2009.40	1289.56	64
Phenanthrene	2014.10	1357.55	67
Anthracene	2010.50	1274.68	63
Fluoranthene	2008.40	1487.77	74
Pyrene	2005.80	1464.80	73
Benz(a)anthracene	2010.60	1462.07	73
Chrysene	2009.20	1554.81	77
Benzo(b)fluoranthene	2007.40	1472.21	73
Benzo(k)fluoranthene	2005.10	1472.60	73
Benzo(a)pyrene	2012.60	1237.50	61
Indeno(1,2,3-c,d)pyrene	2006.60	1338.14	67
Dibenz(a,h)anthracene	2005.10	1351.97	67
Benzo(g,h,i)perylene	2007.30	1002.22	50

Surrogate Recovery (%)	
Naphthalene-d8	76
Phenanthrene-d10	64
Chrysene-d12	79

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below RL.
U - Not detected, ssMDL reported.
M - Duplicate recovery not within correct range.
N - Spiked sample recovery not within control limits.
& - Data QC value outside the accuracy or precision criteria goals.

Independent Control Sample Data

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Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T05DUX

Client ID:		NA	
		SQB788\B6564	
Battelle ID:		ICC -FP83	
Batch ID:		01-457	
Collection Date:		NA	
Reciept Date:		NA	
% Moisture	Amount	NA	Percent
Sample Dry wt. (g):	Spiked	NA	Recovery
Units:	(ng)	ng	(%)
Naphthalene	1.00	0.98	98
2-Methylnaphthalene	1.00	1.04	104
Acenaphthylene	1.00	1.00	99
Acenaphthene	1.00	1.00	99
Fluorene	1.00	0.94	94
Phenanthrene	1.01	0.96	95
Anthracene	1.01	0.98	98
Fluoranthene	1.00	0.98	98
Pyrene	1.00	0.98	98
Benz(a)anthracene	1.01	0.97	97
Chrysene	1.00	1.01	100
Benzo(b)fluoranthene	1.00	0.98	97
Benzo(k)fluoranthene	1.00	0.96	96
Benzo(a)pyrene	1.01	0.93	93
Indeno(1,2,3-c,d)pyrene	1.00	0.93	93
Dibenz(a,h)anthracene	1.00	0.93	93
Benzo(g,h,i)perylene	1.00	0.95	95

Surrogate Recovery (%)	
Naphthalene-d8	107
Phenanthrene-d10	93
Chrysene-d12	104

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below RL.
U - Not detected, ssMDL reported.
M - Duplicate recovery not within correct range.
N - Spiked sample recovery not within control limits.
& - Data QC value outside the accuracy or precision criteria goals.

Matrix Spike/Duplicate Data

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Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T05DUX

Client ID:		MTCSDFS007	MTCSDFS007	MTCSDFS007			
Battelle ID:		W6198	ZH21MS	ZH22MSD	ZH21MS	ZH22MSD	
Batch ID:		01-457	01-457	01-457			
Collection Date:		8/17/01	8/17/01	8/17/01			
Reciept Date:		8/20/01	8/20/01	8/20/01			Relative
% Moisture	Amount	20.62	20.62	20.62	Percent	Percent	Percent
Sample Dry wt. (g):	Spiked	23.79	12.41	12.21	Recovery	Recovery	Difference
Units:	(ng)	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	(%)	(%)	(RPD, %)
Naphthalene	2004.00	0.69	72.58	84.90	45	51	14.1
2-Methylnaphthalene	2002.00	0.54	77.32	90.64	48	55	14.3
Acenaphthylene	2008.40	0.31	79.09	90.51	49	55	11.8
Acenaphthene	2008.10	0.13	84.94	95.78	52	58	10.3
Fluorene	2009.40	0.43	88.07	97.43	54	59	8.5
Phenanthrene	2014.10	1.90	111.36	118.62	67	71	4.7
Anthracene	2010.50	0.53	104.75	111.54	64	67	4.6
Fluoranthene	2008.40	4.53	131.80	142.40	79	84	6.3
Pyrene	2005.80	4.38	130.49	140.54	78	83	6.0
Benz(a)anthracene	2010.60	2.11	130.19	139.66	79	84	5.5
Chrysene	2009.20	3.32	135.85	145.71	82	87	5.5
Benzo(b)fluoranthene	2007.40	3.42	130.24	138.41	78	82	4.6
Benzo(k)fluoranthene	2005.10	3.32	129.49	139.91	78	83	6.3
Benzo(a)pyrene	2012.60	2.36	115.92	123.44	70	73	4.7
Indeno(1,2,3-c,d)pyrene	2006.60	2.34	113.96	120.30	69	72	3.8
Dibenz(a,h)anthracene	2005.10	0.36	112.71	119.18	70	72	3.9
Benzo(g,h,i)perylene	2007.30	2.86	91.57	95.33	55	56	2.5

Surrogate Recovery (%)			
Naphthalene-d8	52	49	56
Phenanthrene-d10	69	64	66
Chrysene-d12	80	82	86

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below RL.
U - Not detected, ssMDL reported.
M - Duplicate recovery not within correct range.
N - Spiked sample recovery not within control limits.
& - Data QC value outside the accuracy or precision criteria goals.

Sample Duplicate Data

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Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T05DUX

Client ID:	MTCSDFS068	MTCSDFS068	
Battelle ID:	W6258-D	W6258DUP	
Batch ID:	01-457	01-457	Relative
Collection Date:	8/16/01	8/16/01	
Reciept Date:	8/20/01	8/20/01	
% Moisture	29.83	29.83	Percent
Sample Dry wt. (g):	19.84	19.61	Difference
Units:	ug/kg, dry wt.	ug/kg, dry wt.	(RPD, %)
Naphthalene	124.54	94.51	27.4
2-Methylnaphthalene	173.75	151.16	13.9
Acenaphthylene	22.73	67.76	99.5 M
Acenaphthene	297.94	35.60	157.3 M
Fluorene	393.73	58.87	148.0 M
Phenanthrene	3133.24	504.28	144.5 M
Anthracene	688.21	226.86	100.8 M
Fluoranthene	2890.11	925.76	103.0 M
Pyrene	2470.27	2049.60	18.6
Benz(a)anthracene	1427.13	1398.83	2.0
Chrysene	1584.80	1980.16	22.2
Benzo(b)fluoranthene	1198.53	1464.39	20.0
Benzo(k)fluoranthene	1059.12	1185.44	11.3
Benzo(a)pyrene	1090.98	1056.91	3.2
Indeno(1,2,3-c,d)pyrene	626.52	558.55	11.5
Dibenz(a,h)anthracene	155.80	148.57	4.8
Benzo(g,h,i)perylene	391.07	356.43	9.3
Surrogate Recovery (%)			
Naphthalene-d8	45	43	
Phenanthrene-d10	58	66	
Chrysene-d12	67	75	

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below RL.
U - Not detected, ssMDL reported.
M - Duplicate recovery not within correct range.
N - Spiked sample recovery not within control limits.
& - Data QC value outside the accuracy or precision criteria goals.

Sample Data

Battelle
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Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T05DUX

Client ID:	MTCSDFSDUP003	MTCSDFS007	MTCSDFS013	MTCSDFS017	MTCSDFS023
Battelle ID:	W6196	W6198	W6200	W6202	W6205
Batch ID:	01-457	01-457	01-457	01-457	01-457
Collection Date:	8/17/01	8/17/01	8/17/01	8/17/01	8/17/01
Reciept Date:	8/20/01	8/20/01	8/20/01	8/20/01.	8/20/01
% Moisture	30.18	20.62	55.32	64.50	38.76
Sample Dry wt. (g):	20.35	23.79	13.42	10.41	17.93
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Naphthalene	5.94	0.69 J	3.74	9.89	37.24
2-Methylnaphthalene	7.15	0.54 J	2.59	9.08	25.63
Acenaphthylene	0.88	0.31 J	5.18	6.59	14.80
Acenaphthene	1.15	0.13 J	1.57	3.37	23.16
Fluorene	4.82	0.43 J	3.90	9.41	28.77
Phenanthrene	29.26	1.90	22.74	50.02	114.63
Anthracene	6.29	0.53 J	8.33	15.68	27.51
Fluoranthene	74.83	4.53	79.19	107.33	292.40
Pyrene	55.37	4.38	81.14	108.22	327.92
Benz(a)anthracene	26.45	2.11	38.42	54.96	119.72
Chrysene	75.68	3.32	57.04	77.91	251.11
Benzo(b)fluoranthene	43.63	3.42	44.22	70.98	300.19
Benzo(k)fluoranthene	25.61	3.32	44.15	67.48	217.10
Benzo(a)pyrene	19.67	2.36	38.00	59.07	159.05
Indeno(1,2,3-c,d)pyrene	20.39	2.34	27.05	48.30	88.08
Dibenz(a,h)anthracene	13.63	0.36 J	5.38	8.78	25.75
Benzo(g,h,i)perylene	26.86	2.86	19.76	36.60	67.00
Surrogate Recovery (%)					
Naphthalene-d8	55	52	34 &	47	45
Phenanthrene-d10	72	69	44	67	54
Chrysene-d12	80	80	50	74	43

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below RL.
U - Not detected, ssMDL reported.
M - Duplicate recovery not within correct range.
N - Spiked sample recovery not within control limits.
& - Data QC value outside the accuracy or precision criteria goals.

Sample Data

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Project Name:
Project Number:

Client ID:	MTCSDFSDUP001	MTCSDFS077	MTCSDFS081	MTCSDFS082	MTCSDFS038
Battelle ID:	W6208	W6210	W6216	W6217	W6222
Batch ID:	01-457	01-457	01-457	01-457	01-457
Collection Date:	8/16/01	8/16/01	8/16/01	8/16/01	8/17/01
Reciept Date:	8/20/01	8/20/01	8/20/01	8/20/01	8/20/01
% Moisture	73.10	14.49	39.41	32.75	76.03
Sample Dry wt. (g):	7.97	25.95	18.08	19.62	7.24
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Naphthalene	6.10	1.39	1.22	6.37	9.47
2-Methylnaphthalene	3.78	0.59 J	0.73 J	10.62	10.46
Acenaphthylene	7.06	0.96	0.81 J	14.72	4.17
Acenaphthene	2.24	0.52 J	0.40 J	3.82	4.47
Fluorene	7.64	0.03 U	1.27	6.40	11.73
Phenanthrene	46.09	5.79	4.97	107.62	47.80
Anthracene	14.21	2.26	1.55	22.00	14.05
Fluoranthene	150.65	13.18	15.91	232.32	116.16
Pyrene	144.65	12.62	15.35	247.73	112.25
Benz(a)anthracene	78.10	6.39	6.33	112.66	52.29
Chrysene	101.75	10.99	10.82	154.70	86.39
Benzo(b)fluoranthene	79.27	8.15	8.53	148.60	72.83
Benzo(k)fluoranthene	79.56	8.12	8.55	126.84	68.42
Benzo(a)pyrene	73.95	5.83	6.23	104.95	58.89
Indeno(1,2,3-c,d)pyrene	54.26	5.14	5.55	98.81	51.75
Dibenz(a,h)anthracene	11.52	1.08	0.95	19.58	9.69
Benzo(g,h,i)perylene	47.46	5.43	5.98	89.78	54.14
Surrogate Recovery (%)					
Naphthalene-d8	54	59	55	51	57
Phenanthrene-d10	75	74	72	75	69
Chrysene-d12	85	84	82	85	80

B - Analyte found in both sar
D - Dilution run.
E - Estimate, outside linear ra
J - Estimate, below RL.
U - Not detected, ssMDL repx
M - Duplicate recovery not v
N - Spiked sample recovery r
& - Data QC value outside the :

Sample Data

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Project Name:
Project Number:

Client ID:	MTCSDFS040	MTCSDFS047	MTCSDFS063	NJCSDFS001	NJCSDFS004
Battelle ID:	W6223	W6226	W6227	W6228	W6231
Batch ID:	01-457	01-457	01-457	01-457	01-457
Collection Date:	8/17/01	8/17/01	8/17/01	8/17/01	8/17/01
Reciept Date:	8/20/01	8/20/01	8/20/01	8/20/01	8/20/01
% Moisture	68.07	19.50	25.14	65.84	21.13
Sample Dry wt. (g):	9.19	24.71	21.47	9.99	24.34
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Naphthalene	5.12	20.13	3.39	6.05	0.96
2-Methylnaphthalene	5.34	5.25	3.89	5.58	0.62 J
Acenaphthylene	7.74	32.16	1.96	6.62	0.80
Acenaphthene	4.78	2.37	0.78	1.42 J	0.13 J
Fluorene	9.12	7.21	3.36	5.63	0.56 J
Phenanthrene	43.73	140.31	21.69	33.43	6.01
Anthracene	15.53	42.52	3.81	10.11	1.17
Fluoranthene	153.37	721.49	50.16	111.90	22.48
Pyrene	140.62	780.85	45.43	110.40	20.43
Benz(a)anthracene	66.05	402.38	30.80	56.92	9.75
Chrysene	104.00	418.18	38.26	71.75	13.25
Benzo(b)fluoranthene	103.76	353.15	32.39	64.97	9.05
Benzo(k)fluoranthene	93.41	351.43	30.40	61.76	9.87
Benzo(a)pyrene	73.76	418.91	29.49	58.16	8.74
Indeno(1,2,3-c,d)pyrene	61.37	288.90	20.25	43.12	6.54
Dibenz(a,h)anthracene	12.51	53.78	5.13	8.97	1.03
Benzo(g,h,i)perylene	58.19	279.49	20.77	38.09	5.90
Surrogate Recovery (%)					
Naphthalene-d8	45	58	38 &	46	42
Phenanthrene-d10	66	68	68	66	60
Chrysene-d12	74	80	77	76	72

B - Analyte found in both sar
D - Dilution run.
E - Estimate, outside linear ra
J - Estimate, below RL.
U - Not detected, ssMDL rep
M - Duplicate recovery not v
N - Spiked sample recovery r
& - Data QC value outside the

Sample Data

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Project Name:
Project Number:

Client ID:	MTCSDFS057	MTCSDFS078	MTCSDFS071	MTCSDFS068
Battelle ID:	W6249	W6255	W6256	W6258-D
Batch ID:	01-457	01-457	01-457	01-457
Collection Date:	8/16/01	8/16/01	8/16/01	8/16/01
Reciept Date:	8/20/01	8/20/01	8/20/01	8/20/01
% Moisture	68.19	72.86	68.22	29.83
Sample Dry wt. (g):	9.44	8.12	9.76	19.84
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
Naphthalene	7.92	2.91	5.78	124.54
2-Methylnaphthalene	6.92	2.22	4.75	173.75
Acenaphthylene	8.83	2.31	12.11	22.73
Acenaphthene	2.92	1.41 J	5.67	297.94
Fluorene	8.90	3.57	8.39	393.73
Phenanthrene	43.20	13.88	59.00	3133.24
Anthracene	16.44	3.84	20.66	688.21
Fluoranthene	151.44	43.29	162.97	2890.11
Pyrene	145.46	42.91	165.87	2470.27
Benz(a)anthracene	85.70	17.44	84.92	1427.13
Chrysene	109.21	28.25	116.30	1584.80
Benzo(b)fluoranthene	92.28	21.04	84.17	1198.53
Benzo(k)fluoranthene	96.61	23.81	88.63	1059.12
Benzo(a)pyrene	85.67	20.58	84.01	1090.98
Indeno(1,2,3-c,d)pyrene	63.44	14.61	59.24	626.52
Dibenz(a,h)anthracene	12.19	2.77	11.91	155.80
Benzo(g,h,i)perylene	40.36	15.68	41.01	391.07
Surrogate Recovery (%)				
Naphthalene-d8	50	48	53	45
Phenanthrene-d10	74	70	79	58
Chrysene-d12	84	79	92	67

B - Analyte found in both sar
D - Dilution run.
E - Estimate, outside linear ra
J - Estimate, below RL.
U - Not detected, ssMDL rep
M - Duplicate recovery not v
N - Spiked sample recovery r
& - Data QC value outside the

PCB AND PESTICIDES

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PCB/PESTICIDE – SEDIMENT QA/QC SUMMARY
Batch 01-457

PROJECT: Mattawoman Creek – Indian Head
PARAMETER: PCB and Pesticides
LABORATORY: Battelle, Duxbury, MA
MATRIX: Sediment
SAMPLE CUSTODY: Sediment samples were collected as part of the Mattawoman Project between August 16 and 17, 2001. Samples were received at Battelle Duxbury on August 20. All coolers (4 total) exceeded temperature criteria; cooler temperatures ranged from 9.7 to 13.1 ° C. Additionally, selected sample jars and/or caps arrived broken. This information is provided in the custody records. Samples were stored at 4° C until the samples intended for chemical analysis were identified. At this point they were split for the selected target analyses using non-contaminating apparatus (Teflon), and shipped on blue ice to the appropriate analytical laboratories.

METHOD: Sediment samples were extracted for PCB and chlorinated pesticides following general NS&T methods. Approximately 30g of sediment was extracted three times with three separate aliquots of dichloromethane using shaker table techniques. The three extracts associated with each sample were combined in a single Erlenmeyer flask and dried over anhydrous sodium sulfate. This combined extract was dried over anhydrous sodium sulfate, concentrated, processed through alumina cleanup column, concentrated, and further purified by GPC/HPLC. The post-HPLC extract was concentrated, fortified with RIS and split for analysis. PCB/pesticide extracts were solvent exchanged into hexane and analyzed using gas chromatography/electron capture detection (GC/ECD) following general NS&T methods. Sample data were quantified by the method of internal standards, using the Recovery Internal Standard (RIS) compounds. Final data are reported in units of ug/kg, dry weight.

HOLDING TIMES: Sediment samples for PCB/pesticide analysis were stored refrigerated until extraction. Sample holding time is fourteen days from collection.

Samples were prepared for analysis within 14-days of collection. The extracts were analyzed within 40 days of extraction.

Batch	Extraction Date	Analysis Date
01-457	08/30/2001	10/05/2001 – 10/08/2001

BLANKS: A procedural blank (PB) was prepared with each analytical batch. Blanks were analyzed to ensure the sample extraction and analysis methods were free of contamination.

01-457 – No target analytes were detected in the blank associated with this batch.

Comments – None.

PCB/PESTICIDE – SEDIMENT QA/QC SUMMARY
Batch 01-457

LABORATORY CONTROL SAMPLE (Blank Spike)	A laboratory control sample (LCS) was prepared with each analytical batch. The percent recoveries of PCB/pesticides were calculated to measure data quality in terms of accuracy. **01-457** – All target analytes in the LCS were recovered within the laboratory control limits specified by the method (40 – 120%). **Comments** – None.
MATRIX SPIKE/MATRIX SPIKE DUPLICATE:	A matrix spike (MS)/matrix spike duplicate (MSD) pair was prepared with each analytical batch. The percent recoveries of PCB/pesticides were calculated to measure data quality in terms of accuracy; relative percent differences between the MS and MSD were calculated to measure data quality in terms of precision. **01-457** – Percent recoveries for all target compounds were within the laboratory control limits specified by the method (40 – 120% recovery). RPDs between the pairs were with laboratory control limits (<30%). **Comments** – None.
DUPLICATES:	Duplicate aliquots of a single field sample were extracted with each analytical batch. The relative percent difference (RPD) between the duplicates was calculated to quantify data in terms of precision. **01-457** – The RPDs between the duplicates of sample MTC SDFS 068were within the control limits (<30%) for all analytes except 4,4'-DDE. **Comments** – Data reviewed. No mathematical errors; no sample preparation issues. It was noted by the sample preparation technician that the two raw sample extracts did not look similar; one was significantly darker than the other. The likely cause was sample inhomogeneity. Surrogate recoveries were good for both samples, indicating good extraction efficiency and reproducibility. Additionally, the MS and MSD precision was good.
SURROGATES:	Two surrogate compounds were added prior to extraction, including Cl3(34) and Cl5(112). The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency). **01-457** – All surrogate recoveries were within laboratory control limits (40 – 120%). **Comments** – None.

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Procedural Blank Data

Project Name	US Navy / Indian Head Mattawoman Creek
Project Number	G486007-T07DUX

Client ID:	NA
Battelle ID:	ZH19PB
Batch ID:	01-457
Collection Date:	NA
Reciept Date:	NA
Matrix:	Sediment
Extraction Date:	08/30/01
Analysis Date:	10/05/01
% Moisture	NA
Sample Dry wt. (g):	16.00
Units:	ug/kg, dry wt.

4,4 DDD	0.09 U
2,4 DDD	0.10 U
4,4 DDE	0.08 U
2,4 DDE	0.12 U
4,4 DDT	0.09 U
2,4 DDT	0.12 U
cis Chlordane	0.07 U
g-Chlordane	0.07 U
a-BHC	0.05 U
b-BHC	0.10 U
d-BHC	0.08 U
g-BHC	0.06 U
Dieldrin	0.09 U
Aldrin	0.06 U
Endrin	0.08 U
Technical Chlordane	20.84 U
Heptachlor	0.08 U
Heptachlor epoxide	0.07 U
Cl2(08)	0.15 U
Cl3(18)	0.07 U
Cl3(28)	0.11 U
Cl4(44)	0.09 U
Cl4(52)	0.10 U
Cl4(66)	0.11 U
Cl4(77)	0.16 U
Cl5(101)	0.10 U
Cl5(105)	0.08 U
Cl5(110)	0.11 U
Cl5(118)	0.11 U
Cl5(126)	0.13 U
Cl6(128)	0.18 U
Cl6(129)	0.08 U
Cl6(138)	0.09 U
Cl6(153)	0.14 U
Cl7(170)	0.09 U
Cl7(180)	0.10 U
Cl7(187)	0.09 U
Cl8(195)	0.08 U
Cl9(206)	0.08 U
Cl10(209)	0.09 U
Aroclor 1016	10.42 U
Aroclor 1221	10.42 U
Aroclor 1232	10.42 U
Aroclor 1242	10.42 U
Aroclor 1248	10.42 U
Aroclor 1254	10.42 U
Aroclor 1260	10.42 U
Aroclor 1248/1254	10.42 U

Surrogate Recoveries:	
Cl3(34)	67
Cl5(112)	77

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below ssMDL.
U - Not detected, ssMDL reported. RL used for Aroclor Non-detects.
N - Spiked sample recovery not within control limits
* - Duplicate analysis not within control limits.

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Laboratory Control Spike Data

Project Name	US Navy / Indian Head Mattawoman Creek
Project Number	G486007-T07DUX

Client ID:		NA	
Battelle ID:		ZH20LCS	
Batch ID:		01-457	
Collection Date:		NA	
Reclept Date:		NA	
Matrix:		Sediment	
Extraction Date:		08/30/01	
Analysis Date:		10/05/01	
% Moisture		NA	
Sample Dry wt. (g):		NA	
Units:		ng	%
	FN73		Recovery
4,4 DDD	60.01	50.56	84
2,4 DDD	60.02	49.02	82
4,4 DDE	60.00	47.85	80
2,4 DDE	60.19	49.07	82
4,4 DDT	60.00	49.12	82
2,4 DDT	60.19	27.53	46
cis Chlordane	60.30	47.68	79
g-Chlordane	60.01	29.91	50
a-BHC	60.00	36.60	61
b-BHC	60.00	44.02	73
d-BHC	60.01	41.01	68
g-BHC	60.00	39.61	66
Dieldrin	60.00	47.92	80
Aldrin	60.02	40.95	68
Endrin	60.01	50.58	84
Technical Chlordane	NA	333.40 U	NA
Heptachlor	60.00	41.24	69
Heptachlor epoxide	60.00	26.03	43
Cl2(08)	60.12	40.89	68
Cl3(18)	60.12	28.58	48
Cl3(28)	60.00	43.92	73
Cl4(44)	60.00	46.81	78
Cl4(52)	60.36	45.59	76
Cl4(66)	60.00	48.20	80
Cl4(77)	60.24	50.61	84
Cl5(101)	60.24	50.77	84
Cl5(105)	60.00	51.45	86
Cl5(110)	60.00	54.26	90
Cl5(118)	60.12	50.85	85
Cl5(126)	60.00	53.52	89
Cl6(128)	60.36	52.17	86
Cl6(129)	60.24	51.12	85
Cl6(138)	60.12	55.20	92
Cl6(153)	60.12	52.88	88
Cl7(170)	60.24	53.72	89
Cl7(180)	60.24	54.25	90
Cl7(187)	60.00	53.06	88
Cl8(195)	60.24	53.28	88
Cl9(206)	60.12	41.52	69
Cl10(209)	60.00	53.57	89
Aroclor 1016	NA	166.70 U	NA
Aroclor 1221	NA	166.70 U	NA
Aroclor 1232	NA	166.70 U	NA
Aroclor 1242	NA	166.70 U	NA
Aroclor 1248	NA	166.70 U	NA
Aroclor 1254	NA	166.70 U	NA
Aroclor 1260	NA	166.70 U	NA
Aroclor 1248/1254	NA	166.70 U	NA

Surrogate Recoveries:	
Cl3(34)	67
Cl5(112)	77

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below ssMDL.
U - Not detected, ssMDL reported. RL used for Aroclor Non-detects.
N - Spiked sample recovery not within control limits
* - Duplicate analysis not within control limits.

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Matrix Spike Data

Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T07DUX

Client ID:		MTCSDFS007	MTCSDFS007		MTCSDFS007		
Battelle ID:		W6198	ZH21MS		ZH22MSD		
Batch ID:		01-457	01-457		01-457		
Collection Date:		08/17/01	08/17/01		08/17/01		
Reciept Date:		08/20/01	08/20/01		08/20/01		
Matrix:		Sediment	Sediment		Sediment		
Extraction Date:		08/30/01	08/30/01		08/30/01		
Analysis Date:		10/06/01	10/06/01		10/06/01		
% Moisture		20.62	20.62		20.62		
Sample Dry wt. (g):		23.79	12.41		12.21		
Units:	FN73	ug/kg, dry wt.	ug/kg, dry wt.	% Recovery	ug/kg, dry wt.	% Recovery	% RPD
4,4 DDD	60.01	0.06 U	4.26	88	4.53	92	4.5
2,4 DDD	60.02	0.07 U	3.98	82	4.08	83	0.7
4,4 DDE	60.00	0.15 J	4.01	80	4.03	79	0.9
2,4 DDE	60.19	0.08 U	4.38	90	4.42	90	0.7
4,4 DDT	60.00	0.06 U	4.15	86	4.35	89	3.0
2,4 DDT	60.19	0.08 U	2.37	49	2.31	47	4.0
cis Chlordane	60.30	0.03 J	4.00	82	4.32	87	6.2
g-Chlordane	60.01	0.05 U	2.55	53	2.70	55	4.1
a-BHC	60.00	0.03 U	2.75	57	3.28	67	15.8
b-BHC	60.00	0.07 U	3.60	74	4.02	82	9.4
d-BHC	60.01	0.06 U	3.37	70	3.88	79	12.5
g-BHC	60.00	0.04 U	3.15	65	3.58	73	11.2
Dieldrin	60.00	0.06 U	3.76	78	3.87	79	1.3
Aldrin	60.02	0.04 U	3.23	67	3.55	72	7.8
Endrin	60.01	0.05 U	4.20	87	4.17	85	2.3
Technical Chlordane	NA	14.01 U	26.86 U	NA	27.31 U	NA	NA
Heptachlor	60.00	0.05 U	3.33	69	3.66	74	7.9
Heptachlor epoxide	60.00	0.05 U	2.11	44	2.20	45	2.4
Cl2(08)	60.12	0.10 U	3.12	64	3.59	73	12.3
Cl3(18)	60.12	0.05 U	2.23	46	2.39	49	5.2
Cl3(28)	60.00	0.07 U	3.61	75	3.94	80	7.0
Cl4(44)	60.00	0.06 U	3.86	80	4.11	84	4.4
Cl4(52)	60.36	0.07 U	3.87	80	4.09	83	3.8
Cl4(66)	60.00	0.07 U	4.25	88	4.72	96	8.8
Cl4(77)	60.24	0.10 U	4.13	85	4.32	87	2.6
Cl5(101)	60.24	0.09 J	4.26	86	4.58	91	5.7
Cl5(105)	60.00	0.03 J	4.22	87	4.44	90	3.4
Cl5(110)	60.00	0.05 J	4.46	91	4.45	89	1.8
Cl5(118)	60.12	0.08 J	4.21	85	4.40	88	2.8
Cl5(126)	60.00	0.09 U	4.08	84	4.86	99	15.6
Cl6(128)	60.36	0.12 U	4.32	89	4.62	93	5.0
Cl6(129)	60.24	0.05 U	4.51	93	4.42	90	3.7
Cl6(138)	60.12	0.17 J	4.43	88	4.68	92	4.0
Cl6(153)	60.12	0.17 J	4.36	87	4.65	91	4.9
Cl7(170)	60.24	0.06 U	4.39	90	4.93	100	9.8
Cl7(180)	60.24	0.06 U	4.50	93	4.99	101	8.5
Cl7(187)	60.00	0.06 U	4.53	94	4.55	93	1.4
Cl8(195)	60.24	0.06 U	4.33	89	4.96	101	11.9
Cl9(206)	60.12	0.04 J	3.38	69	3.96	80	14.2
Cl10(209)	60.00	0.03 J	4.32	89	4.92	100	11.5
Aroclor 1016	NA	7.01 U	13.43 U	NA	13.65 U	NA	NA
Aroclor 1221	NA	7.01 U	13.43 U	NA	13.65 U	NA	NA
Aroclor 1232	NA	7.01 U	13.43 U	NA	13.65 U	NA	NA
Aroclor 1242	NA	7.01 U	13.43 U	NA	13.65 U	NA	NA
Aroclor 1248	NA	7.01 U	13.43 U	NA	13.65 U	NA	NA
Aroclor 1254	NA	7.01 U	13.43 U	NA	13.65 U	NA	NA
Aroclor 1260	NA	7.01 U	13.43 U	NA	13.65 U	NA	NA
Aroclor 1248/1254	NA	7.01 U	13.43 U	NA	13.65 U	NA	NA
Surrogate Recoveries:							
Cl3(34)		77	71		74		
Cl5(112)		77	76		74		

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below ssMDL.
U - Not detected, ssMDL reported. RL used for Aroclor Non-detects.
N - Spiked sample recovery not within control limits
* - Duplicate analysis not within control limits.

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Sample Duplicate Data

Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T07DUX

Client ID:	MTCSDFS068	MTCSDFS068	
Battelle ID:	W6258	W6258DUP	
Batch ID:	01-457	01-457	
Collection Date:	08/16/01	08/16/01	
Reciept Date:	08/20/01	08/20/01	
Matrix:	Sediment	Sediment	
Extraction Date:	08/30/01	08/30/01	
Analysis Date:	10/08/01	10/08/01	
% Moisture	29.83	29.83	
Sample Dry wt. (g):	19.84	19.61	%
Units:	ug/kg, dry wt.	ug/kg, dry wt.	RPD
4,4 DDD	3.46	2.99	14.6
2,4 DDD	0.08 U	0.08 U	NA
4,4 DDE	4.68	1.91	84.0 *
2,4 DDE	0.10 U	0.10 U	NA
4,4 DDT	1.53	1.24	21.0
2,4 DDT	0.09 U	0.09 U	NA
cis Chlordane	0.44 J	0.34 J	25.2
g-Chlordane	0.06 U	2.94	NA
a-BHC	0.04 U	0.04 U	NA
b-BHC	0.08 U	0.08 U	NA
d-BHC	0.07 U	0.07 U	NA
g-BHC	0.05 U	0.05 U	NA
Dieldrin	0.07 U	0.07 U	NA
Aldrin	0.05 U	0.05 U	NA
Endrin	0.07 U	0.07 U	NA
Technical Chlordane	16.80 U	17.01 U	NA
Heptachlor	0.06 U	0.06 U	NA
Heptachlor epoxide	0.06 U	0.06 U	NA
Cl2(08)	0.12 U	0.12 U	NA
Cl3(18)	0.06 U	0.06 U	NA
Cl3(28)	0.09 U	0.09 U	NA
Cl4(44)	0.86	0.08 U	NA
Cl4(52)	0.08 U	0.08 U	NA
Cl4(66)	0.09 U	0.09 U	NA
Cl4(77)	0.13 U	0.13 U	NA
Cl5(101)	1.67	1.55	7.6
Cl5(105)	0.84	0.89	5.5
Cl5(110)	0.09 U	0.09 U	NA
Cl5(118)	0.55 J	0.52 J	6.8
Cl5(126)	0.11 U	0.11 U	NA
Cl6(128)	0.14 U	0.14 U	NA
Cl6(129)	0.06 U	0.06 U	NA
Cl6(138)	1.28	1.04	20.8
Cl6(153)	3.40	2.61	26.4
Cl7(170)	0.07 U	0.07 U	NA
Cl7(180)	0.08 U	0.08 U	NA
Cl7(187)	1.48	1.19	21.3
Cl8(195)	0.07 U	0.07 U	NA
Cl9(206)	0.07 U	0.07 U	NA
Cl10(209)	0.07 U	0.07 U	NA
Aroclor 1016	8.40 U	8.50 U	NA
Aroclor 1221	8.40 U	8.50 U	NA
Aroclor 1232	8.40 U	8.50 U	NA
Aroclor 1242	8.40 U	8.50 U	NA
Aroclor 1248	8.40 U	8.50 U	NA
Aroclor 1254	8.40 U	8.50 U	NA
Aroclor 1260	8.40 U	8.50 U	NA
Aroclor 1248/1254	8.40 U	8.50 U	NA

Surrogate Recoveries:		
Cl3(34)	97	82
Cl5(112)	69	57

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below ssMDL.
U - Not detected, ssMDL reported. RL used for Aroclor Non-detects.
N - Spiked sample recovery not within control limits
* - Duplicate analysis not within control limits.

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Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T07DUX
Field Sample Data

Client ID:	MTCSDFSDUP003	MTCSDFS007	MTCSDFS013	MTCSDFS017	MTCSDFS023
Battelle ID:	W6196	W6198	W6200	W6202	W6205
Batch ID:	01-457	01-457	01-457	01-457	01-457
Collection Date:	08/17/01	08/17/01	08/17/01	08/17/01	08/17/01
Reciept Date:	08/20/01	08/20/01	08/20/01	08/20/01	08/20/01
Matrix:	Sediment	Sediment	Sediment	Sediment	Sediment
Extraction Date:	08/30/01	08/30/01	08/30/01	08/30/01	08/30/01
Analysis Date:	10/06/01	10/06/01	10/06/01	10/06/01	10/07/01
% Moisture	30.18	20.62	55.32	64.50	38.76
Sample Dry wt. (g):	20.35	23.79	13.42	10.41	17.93
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
4,4 DDD	0.38 J	0.06 U	0.48 J	1.34	8.61
2,4 DDD	0.08 U	0.07 U	0.12 U	0.15 U	0.09 U
4,4 DDE	0.36 J	0.15 J	0.96 J	2.01	3.66
2,4 DDE	0.10 U	0.08 U	0.15 U	0.19 U	0.11 U
4,4 DDT	0.07 U	0.06 U	0.07 J	0.15 J	0.29 J
2,4 DDT	0.09 U	0.08 U	0.14 U	0.18 U	0.10 U
cis Chlordane	0.05 J	0.03 J	0.17 J	0.33 J	0.96
g-Chlordane	0.06 U	0.05 U	0.09 U	0.11 U	0.06 U
a-BHC	0.04 U	0.03 U	0.06 U	0.08 U	0.04 U
b-BHC	0.08 U	0.07 U	0.12 U	0.16 U	0.09 U
d-BHC	0.26 J	0.06 U	0.10 U	0.13 U	0.07 U
g-BHC	0.05 U	0.04 U	0.07 U	0.09 U	0.05 U
Dieldrin	0.07 U	0.06 U	0.11 U	0.14 U	0.99
Aldrin	0.05 U	0.04 U	0.07 U	0.09 U	0.05 U
Endrin	0.06 U	0.05 U	0.10 U	0.13 U	0.07 U
Technical Chlordane	16.38 U	14.01 U	24.85 U	32.02 U	18.60 U
Heptachlor	0.06 U	0.05 U	0.09 U	0.12 U	0.07 U
Heptachlor epoxide	0.06 U	0.05 U	0.08 U	0.11 U	0.06 U
Cl2(08)	0.12 U	0.10 U	0.18 U	0.23 U	7.79
Cl3(18)	0.06 U	0.05 U	0.09 U	0.11 U	12.80
Cl3(28)	0.08 U	0.07 U	0.19 J	1.07 J	26.38
Cl4(44)	0.13 J	0.06 U	0.21 J	0.68 J	18.35
Cl4(52)	0.08 U	0.07 U	0.12 U	0.96 J	22.80
Cl4(66)	0.06 J	0.07 U	0.23 J	1.02 J	22.10
Cl4(77)	0.12 U	0.10 U	0.19 U	0.24 U	0.14 U
Cl5(101)	0.25 J	0.09 J	0.55 J	1.43	0.09 U
Cl5(105)	0.12 J	0.03 J	0.16 J	0.55 J	0.07 U
Cl5(110)	0.08 U	0.05 J	0.45 J	1.48	11.42
Cl5(118)	0.18 J	0.08 J	0.48 J	1.30	9.43
Cl5(126)	0.11 U	0.09 U	0.16 U	0.21 U	0.12 U
Cl6(128)	0.14 U	0.12 U	0.21 U	0.27 U	1.37
Cl6(129)	0.06 U	0.05 U	0.09 U	0.12 U	0.07 U
Cl6(138)	0.28 J	0.17 J	0.86 J	1.92	5.03
Cl6(153)	0.56 J	0.17 J	1.06	2.30	5.36
Cl7(170)	0.07 U	0.06 U	0.11 U	0.14 U	0.08 U
Cl7(180)	0.24 J	0.06 U	0.11 U	0.15 U	1.94
Cl7(187)	0.07 U	0.06 U	0.10 U	0.72 J	0.94
Cl8(195)	0.06 U	0.06 U	0.10 U	0.13 U	0.07 U
Cl9(206)	0.06 U	0.04 J	0.18 J	0.25 J	0.31 J
Cl10(209)	0.07 U	0.03 J	0.15 J	0.24 J	0.24 J
Aroclor 1016	8.19 U	7.01 U	12.42 U	16.01 U	9.30 U
Aroclor 1221	8.19 U	7.01 U	12.42 U	16.01 U	9.30 U
Aroclor 1232	8.19 U	7.01 U	12.42 U	16.01 U	9.30 U
Aroclor 1242	8.19 U	7.01 U	12.42 U	16.01 U	9.30 U
Aroclor 1248	8.19 U	7.01 U	12.42 U	16.01 U	9.30 U
Aroclor 1254	8.19 U	7.01 U	12.42 U	16.01 U	9.30 U
Aroclor 1260	8.19 U	7.01 U	12.42 U	16.01 U	9.30 U
Aroclor 1248/1254	8.19 U	7.01 U	12.42 U	16.01 U	408.05
Surrogate Recoveries:					
Cl3(34)	85	77	60	86	101
Cl5(112)	76	77	50	75	77

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below ssMDL.
U - Not detected, ssMDL reported. RL used for Aroclor Non-detects.
N - Spiked sample recovery not within control limits
* - Duplicate analysis not within control limits.

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Project Name US Navy / Indian Head Mattawoman Creek
Project Number G486007-T07DUX
Field Sample Data

Client ID:	MTCSDFSDUP001	MTCSDFS077	MTCSDFS081	MTCSDFS082	MTCSDFS038
Battelle ID:	W6208	W6210	W6216	W6217	W6222
Batch ID:	01-457	01-457	01-457	01-457	01-457
Collection Date:	08/16/01	08/16/01	08/16/01	08/16/01	08/17/01
Reciept Date:	08/20/01	08/20/01	08/20/01	08/20/01	08/20/01
Matrix:	Sediment	Sediment	Sediment	Sediment	Sediment
Extraction Date:	08/30/01	08/30/01	08/30/01	08/30/01	08/30/01
Analysis Date:	10/07/01	10/07/01	10/07/01	10/07/01	10/07/01
% Moisture	73.10	14.49	39.41	32.75	76.03
Sample Dry wt. (g):	7.97	25.95	18.08	19.62	7.24
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
4,4 DDD	0.72 J	0.22 J	0.22 J	4.99	1.33 J
2,4 DDD	0.20 U	0.06 U	0.09 U	2.15	0.22 U
4,4 DDE	1.33 J	0.97	0.42 J	6.22	2.89
2,4 DDE	0.25 U	0.08 U	0.11 U	0.10 U	0.27 U
4,4 DDT	0.17 U	0.05 U	0.08 U	0.06 J	0.13 J
2,4 DDT	0.23 U	0.07 U	0.10 U	0.09 U	0.26 U
cis Chlordane	0.49 J	0.11 J	0.18 J	2.24	0.77 J
g-Chlordane	0.14 U	0.07 J	0.09 J	2.46	0.38 J
a-BHC	0.10 U	0.03 U	0.04 U	0.04 U	0.11 U
b-BHC	0.21 U	0.06 U	0.09 U	0.08 U	0.23 U
d-BHC	0.17 U	0.05 U	0.07 U	0.28 J	0.18 U
g-BHC	0.12 U	0.04 U	0.05 U	0.05 U	0.13 U
Dieldrin	0.18 U	0.06 U	0.08 U	0.07 U	0.20 U
Aldrin	0.12 U	0.04 U	0.05 U	0.05 U	0.13 U
Endrin	0.16 U	0.05 U	0.07 U	0.07 U	0.18 U
Technical Chlordane	41.83 U	12.85 U	18.44 U	16.99 U	46.04 U
Heptachlor	0.15 U	0.05 U	0.07 U	0.06 U	0.17 U
Heptachlor epoxide	0.14 U	0.04 U	0.06 U	0.06 U	0.16 U
Cl2(08)	0.31 U	0.09 U	0.13 U	0.12 U	0.34 U
Cl3(18)	0.15 U	0.04 U	0.06 U	0.06 U	0.16 U
Cl3(28)	0.21 U	0.07 U	0.09 U	0.09 U	0.68 J
Cl4(44)	0.23 J	0.06 U	0.05 J	1.50	0.73 J
Cl4(52)	0.20 U	0.06 U	0.09 U	1.61	0.83 J
Cl4(66)	0.22 J	0.05 J	0.06 J	0.67 J	0.86 J
Cl4(77)	0.31 U	0.10 U	0.14 U	0.13 U	0.34 U
Cl5(101)	0.79 J	0.19 J	0.22 J	2.50	1.75 J
Cl5(105)	0.21 J	0.07 J	0.08 J	0.66 J	0.63 J
Cl5(110)	0.71 J	0.18 J	0.16 J	2.16	1.72 J
Cl5(118)	0.61 J	0.15 J	0.20 J	2.00	1.49 J
Cl5(126)	0.27 U	0.08 U	0.12 U	0.11 U	0.30 U
Cl6(128)	0.36 U	0.11 U	0.16 U	0.14 U	0.39 U
Cl6(129)	0.15 U	0.05 U	0.07 U	0.06 U	0.17 U
Cl6(138)	2.05	0.34 J	0.56 J	1.60	2.94
Cl6(153)	1.13 J	0.67	0.39 J	2.16	3.49
Cl7(170)	0.18 U	0.06 U	0.08 U	0.07 U	0.20 U
Cl7(180)	0.19 U	0.06 U	0.08 U	0.08 U	0.21 U
Cl7(187)	0.55 J	0.74	0.13 J	0.19 J	0.76 J
Cl8(195)	0.17 U	0.28 J	0.07 U	0.07 U	0.18 U
Cl9(206)	0.18 J	0.75	0.06 J	0.30 J	0.36 J
Cl10(209)	0.14 J	0.20 J	0.07 J	1.00	0.41 J
Aroclor 1016	20.92 U	6.42 U	9.22 U	8.50 U	23.02 U
Aroclor 1221	20.92 U	6.42 U	9.22 U	8.50 U	23.02 U
Aroclor 1232	20.92 U	6.42 U	9.22 U	8.50 U	23.02 U
Aroclor 1242	20.92 U	6.42 U	9.22 U	8.50 U	23.02 U
Aroclor 1248	20.92 U	6.42 U	9.22 U	8.50 U	23.02 U
Aroclor 1254	20.92 U	6.42 U	9.22 U	31.41	23.02 U
Aroclor 1260	20.92 U	6.42 U	9.22 U	8.50 U	23.02 U
Aroclor 1248/1254	20.92 U	6.42 U	9.22 U	8.50 U	23.02 U
Surrogate Recoveries:					
Cl3(34)	94	73	82	92	82
Cl5(112)	81	73	76	83	75

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below ssMDL.
U - Not detected, ssMDL reported. RL used for Aroclor Non-detects.
N - Spiked sample recovery not within control limits
* - Duplicate analysis not within control limits.

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Project Name US Navy / Indian Head Mattawoman Creek
Project Number G486007-T07DUX
Field Sample Data

Client ID:	MTCSDFS040	MTCSDFS047	MTCSDFS063	NJCSDFS001	NJCSDFS004
Battelle ID:	W6223	W6226	W6227	W6228	W6231
Batch ID:	01-457	01-457	01-457	01-457	01-457
Collection Date:	08/17/01	08/17/01	08/17/01	08/17/01	08/17/01
Reciept Date:	08/20/01	08/20/01	08/20/01	08/20/01	08/20/01
Matrix:	Sediment	Sediment	Sediment	Sediment	Sediment
Extraction Date:	08/30/01	08/30/01	08/30/01	08/30/01	08/30/01
Analysis Date:	10/07/01	10/07/01	10/08/01	10/08/01	10/08/01
% Moisture	68.07	19.50	25.14	65.84	21.13
Sample Dry wt. (g):	9.19	24.71	21.47	9.99	24.34
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
4,4 DDD	3.81	2.68	0.28 J	0.87 J	0.12 J
2,4 DDD	0.17 U	0.06 U	0.07 U	0.16 U	0.07 U
4,4 DDE	6.24	3.61	0.32 J	1.36	0.11 J
2,4 DDE	0.22 U	0.08 U	0.09 U	0.20 U	0.08 U
4,4 DDT	0.90 J	5.57	0.06 U	0.14 U	0.06 U
2,4 DDT	0.20 U	0.08 U	0.09 U	0.19 U	0.08 U
cis Chlordane	0.75 J	0.04 U	0.04 J	0.19 J	0.04 U
g-Chlordane	0.30 J	0.05 U	0.05 U	0.12 U	0.05 U
a-BHC	0.09 U	0.03 U	0.04 U	0.08 U	0.03 U
b-BHC	0.18 U	0.07 U	0.08 U	0.16 U	0.07 U
d-BHC	0.15 U	0.05 U	0.21 J	0.13 U	0.05 U
g-BHC	0.11 U	0.04 U	0.04 U	0.10 U	0.04 U
Dieldrin	0.16 U	0.06 U	0.07 U	0.14 U	0.06 U
Aldrin	0.10 U	0.04 U	0.04 U	0.09 U	0.04 U
Endrin	0.14 U	0.05 U	0.06 U	0.13 U	0.05 U
Technical Chlordane	36.28 U	13.49 U	15.53 U	33.37 U	13.70 U
Heptachlor	0.13 U	0.05 U	0.06 U	0.12 U	0.05 U
Heptachlor epoxide	0.12 U	0.05 U	0.05 U	0.11 U	0.05 U
Cl2(08)	0.27 U	0.10 U	0.11 U	0.24 U	0.10 U
Cl3(18)	0.13 U	0.05 U	0.05 U	0.12 U	0.05 U
Cl3(28)	0.18 U	0.07 U	0.08 U	0.36 J	0.07 U
Cl4(44)	0.45 J	0.06 U	0.11 J	0.28 J	0.06 U
Cl4(52)	0.83 J	0.06 U	0.07 U	0.16 U	0.07 U
Cl4(66)	0.78 J	0.07 U	0.05 J	0.23 J	0.07 U
Cl4(77)	0.27 U	0.10 U	0.12 U	0.25 U	0.10 U
Cl5(101)	1.77	0.06 U	0.15 J	0.73 J	0.06 U
Cl5(105)	0.62 J	0.12 J	0.11 J	0.24 J	0.03 J
Cl5(110)	1.34 J	0.07 U	0.08 U	0.45 J	0.07 U
Cl5(118)	1.32 J	0.06 J	0.13 J	0.62 J	0.04 J
Cl5(126)	0.23 U	0.09 U	0.10 U	0.22 U	0.09 U
Cl6(128)	0.31 U	0.11 U	0.13 U	0.28 U	0.12 U
Cl6(129)	0.13 U	0.05 U	0.06 U	0.12 U	0.05 U
Cl6(138)	2.56	0.14 J	0.25 J	1.69	0.13 J
Cl6(153)	3.30	0.09 U	0.46 J	1.82	0.14 J
Cl7(170)	0.16 U	0.06 U	0.07 U	0.14 U	0.06 U
Cl7(180)	0.17 U	0.06 U	0.20 J	0.80 J	0.07 J
Cl7(187)	0.79 J	0.31 J	0.20 J	0.62 J	0.06 J
Cl8(195)	0.14 U	0.05 U	0.06 U	0.13 U	0.05 U
Cl9(206)	0.25 J	0.05 U	0.06 J	0.22 J	0.05 U
Cl10(209)	0.30 J	0.06 U	0.07 J	0.19 J	0.03 J
Aroclor 1016	18.14 U	6.75 U	7.76 U	16.69 U	6.85 U
Aroclor 1221	18.14 U	6.75 U	7.76 U	16.69 U	6.85 U
Aroclor 1232	18.14 U	6.75 U	7.76 U	16.69 U	6.85 U
Aroclor 1242	18.14 U	6.75 U	7.76 U	16.69 U	6.85 U
Aroclor 1248	18.14 U	6.75 U	7.76 U	16.69 U	6.85 U
Aroclor 1254	18.14 U	6.75 U	7.76 U	16.69 U	6.85 U
Aroclor 1260	18.14 U	6.75 U	7.76 U	16.69 U	6.85 U
Aroclor 1248/1254	18.14 U	6.75 U	7.76 U	16.69 U	6.85 U
Surrogate Recoveries:					
Cl3(34)	82	92	78	77	69
Cl5(112)	71	72	75	72	71

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below ssMDL.
U - Not detected, ssMDL reported. RL used for Aroclor Non-detects.
N - Spiked sample recovery not within control limits
* - Duplicate analysis not within control limits.

Battelle
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Project Name: US Navy / Indian Head Mattawoman Creek
Project Number: G486007-T07DUX
Field Sample Data

Client ID:	MTCSDFS057	MTCSDFS078	MTCSDFS071	MTCSDFS068
Battelle ID:	W6249	W6255	W6256	W6258
Batch ID:	01-457	01-457	01-457	01-457
Collection Date:	08/16/01	08/16/01	08/16/01	08/16/01
Reciept Date:	08/20/01	08/20/01	08/20/01	08/20/01
Matrix:	Sediment	Sediment	Sediment	Sediment
Extraction Date:	08/30/01	08/30/01	08/30/01	08/30/01
Analysis Date:	10/08/01	10/08/01	10/08/01	10/08/01
% Moisture	68.19	72.86	68.22	29.83
Sample Dry wt. (g):	9.44	8.12	9.76	19.84
Units:	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.	ug/kg, dry wt.
4,4 DDD	1.19 J	0.51 J	0.55 J	3.46
2,4 DDD	0.17 U	0.20 U	0.16 U	0.08 U
4,4 DDE	2.73	0.85 J	1.28 J	4.68
2,4 DDE	0.21 U	0.24 U	0.20 U	0.10 U
4,4 DDT	0.15 U	0.17 U	0.14 U	1.53
2,4 DDT	0.20 U	0.23 U	0.19 U	0.09 U
cis Chlordane	0.55 J	0.35 J	0.46 J	0.44 J
g-Chlordane	0.12 U	0.14 U	0.12 U	0.06 U
a-BHC	0.08 U	0.10 U	0.08 U	0.04 U
b-BHC	0.17 U	0.20 U	0.17 U	0.08 U
d-BHC	0.14 U	0.16 U	0.14 U	0.07 U
g-BHC	0.10 U	0.12 U	0.10 U	0.05 U
Dieldrin	0.15 U	0.18 U	0.15 U	0.07 U
Aldrin	0.10 U	0.12 U	0.10 U	0.05 U
Endrin	0.14 U	0.16 U	0.13 U	0.07 U
Technical Chlordane	35.32 U	41.07 U	34.17 U	16.80 U
Heptachlor	0.13 U	0.15 U	0.13 U	0.06 U
Heptachlor epoxide	0.12 U	0.14 U	0.12 U	0.06 U
Cl2(08)	0.26 U	0.30 U	0.25 U	0.12 U
Cl3(18)	0.12 U	0.14 U	0.12 U	0.06 U
Cl3(28)	0.39 J	0.21 U	0.17 U	0.09 U
Cl4(44)	0.54 J	0.19 U	0.15 U	0.86
Cl4(52)	0.72 J	0.20 U	0.16 U	0.08 U
Cl4(66)	0.64 J	0.22 U	0.18 U	0.09 U
Cl4(77)	0.26 U	0.31 U	0.25 U	0.13 U
Cl5(101)	1.75	0.19 U	0.84 J	1.67
Cl5(105)	0.62 J	0.16 U	0.21 J	0.84
Cl5(110)	1.51	0.31 J	0.52 J	0.09 U
Cl5(118)	1.33 J	0.21 U	0.45 J	0.55 J
Cl5(126)	0.23 U	0.27 U	0.22 U	0.11 U
Cl6(128)	0.30 U	0.35 U	0.29 U	0.14 U
Cl6(129)	0.13 U	0.15 U	0.12 U	0.06 U
Cl6(138)	2.84	1.19 J	1.72	1.28
Cl6(153)	3.10	0.89 J	1.14 J	3.40
Cl7(170)	0.15 U	0.18 U	0.15 U	0.07 U
Cl7(180)	1.95	0.19 U	0.16 U	0.08 U
Cl7(187)	0.83 J	0.41 J	0.40 J	1.48
Cl8(195)	0.14 U	0.16 U	0.14 U	0.07 U
Cl9(206)	0.36 J	0.20 J	0.44 J	0.07 U
Cl10(209)	0.42 J	0.21 J	0.29 J	0.07 U
Aroclor 1016	17.66 U	20.54 U	17.08 U	8.40 U
Aroclor 1221	17.66 U	20.54 U	17.08 U	8.40 U
Aroclor 1232	17.66 U	20.54 U	17.08 U	8.40 U
Aroclor 1242	17.66 U	20.54 U	17.08 U	8.40 U
Aroclor 1248	17.66 U	20.54 U	17.08 U	8.40 U
Aroclor 1254	17.66 U	20.54 U	17.08 U	8.40 U
Aroclor 1260	17.66 U	20.54 U	17.08 U	8.40 U
Aroclor 1248/1254	17.66 U	20.54 U	17.08 U	8.40 U
Surrogate Recoveries:				
Cl3(34)	85	77	83	97
Cl5(112)	78	71	69	69

B - Analyte found in both sample and blank.
D - Dilution run.
E - Estimate, outside linear range.
J - Estimate, below ssMDL.
U - Not detected, ssMDL reported. RL used for Aroclor Non-detects.
N - Spiked sample recovery not within control limits
* - Duplicate analysis not within control limits.

ENERGETICS AND NITROGUANIDINE

Battelle

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QC Summary

Target Analyte(s): Energetics and Nitroguanidine

Analytical Laboratory: STL-Knoxville

Technical Note: No explosives or nitroguanidine were detected in any of the field samples.

Holding time: All samples were extracted within 15 days of collection. The laboratory received samples on day 14 of the holding time and was unable to meet the 14-day holding time on a subset of the samples. This should not impact the quality of the data.

Blank: No explosives or nitroguanidine were detected in the blank sample associated with these sediments.

LCS/LCSD: LCS and LCSD recoveries ranged from 74% to 111%; within the laboratory control limits for all target analytes (as defined by the method). The RPDs between the samples were within laboratory control limits, ranging from 0.2 to 4.4%.

MS/MSD: MS and MSD recoveries ranged from 78% to 106%; within the laboratory control limits. The RPD between these duplicate samples ranged from 0.25% to 22%; within the laboratory control limits.

Surrogate Recoveries: All surrogate recoveries associated with the explosives analyses were within the laboratory control criteria of 74% to 124%. All surrogate recoveries associated with the nitroguanadine analyses were outside of these criteria due to matrix interference with the exception of the LCS, LCSD, and blank sample.

Mattawoman - Indian Head
Energetics and Nitroguanidine
Quality Control Sample Data

SAMP_ID	W6196	W6196			
SAMP_TYPE	MS	MSD	LCS	LCSD	PB
ANALYSIS_DATE	9/20/01	9/20/01	9/21/01	9/21/01	9/21/01
LAB_SAMP_ID	H1H300206001S	H1H300206001D	H1I010000101C	H1I010000101L	H1I010000101B
EXTRACT_DATE	8/31/01	8/31/01	8/31/01	8/31/01	8/31/01
SAMP_WGT_VOL	2	2	2	2	2
SAMP_WGT_VOL_UNIT	G	G	G	G	G
DILUTION	1	1	1	1	1
UNITS	Percent Recovery	Percent Recovery	Percent Recovery	Percent Recovery	mg/kg wet weight
1,3,5-Trinitrobenzene	100	99	95	96	0.09 U
1,3-Dinitrobenzene	99	96	96	95	0.03 U
2,4,6-Trinitrotoluene	99	79	99	98	0.045 U
2,4-Dinitrotoluene	102	98	99	99	0.045 U
2,6-Dinitrotoluene	98	95	95	95	0.09 U
2-Amino-4,6-dinitrotoluene	100	98	100	100	0.09 U
2-Nitrotoluene	95	94	94	93	0.14 U
3-Nitrotoluene	95	99	96	94	0.14 U
4-Amino-2,6-dinitrotoluene	100	101	111	110	0.09 U
4-Nitrotoluene	97	96	94	92	0.09 U
HMX	106	106	101	97	0.18 U
Nitrobenzene	94	94	94	94	0.045 U
RDX	99	99	99	98	0.17 U
Tetryl	86	78	74	74	0.38 U
Nitroguanidine	68	61	102	104	0.02 U
Surrogate Recovery: Explosive Analysis					
1-Chloro-3-nitrobenzene	89	87	85	84	85
Surrogate Recovery: Nitroguanidine Analysis					
1-Chloro-3-nitrobenzene	1030 *	1120 *	65	65	67

U - Not detected. MDL reported
* - Surrogate recovery is outside control limits (60 - 140%).

Mattawoman - Indian Head
Energetics and Nitroguanidine
Field Sample Data

Field Sample ID	MTC SDFS DUP 003	MTC SDFS 007	MTC SDFS 013	MTC SDFS 017	MTC SDFS 023
Battelle ID	W6196	W6198	W6200	W6202	W6205
Sample Type	SA	SA	SA	SA	SA
Analysis Date	9/20/01	9/20/01	9/20/01	9/20/01	9/20/01
STL Sample ID	H1H300206001	H1H300206002	H1H300206003	H1H300206004	H1H300206005
Extraction Date	8/31/01	8/31/01	8/31/01	8/31/01	8/31/01
Sample Weight (g)	2	2	2	2	2
Dilution Factor	1	1	1	1	1
Units	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.
1,3,5-Trinitrobenzene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
1,3-Dinitrobenzene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
2,4,6-Trinitrotoluene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
2,4-Dinitrotoluene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
2,6-Dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
2-Amino-4,6-dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
2-Nitrotoluene	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
3-Nitrotoluene	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
4-Amino-2,6-dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
4-Nitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
HMX	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Nitrobenzene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
RDX	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Tetryl	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Nitroguanidine	0.02 U	0.02 U	0.02 UG	0.02 UG	0.02 UG
Surrogate Recovery: Explosive Analysis					
1-Chloro-3-nitrobenzene	95	89	94	89	83
Surrogate Recovery: Nitroguanidine Analysis					
1-Chloro-3-nitrobenzene	1030 *	889 *	1190 *	1050 *	1680 *

U - Not detected. MDL reported
G - Elevated reporting limit. The reporting limit is elevated due to matrix interference.
* - Surrogate recovery is outside control limits (60 - 140%).

Mattawoman - Indian Head
Energetics and Nitroguanidine
Field Sample Data

Field Sample ID	MTC SDFS DUP 001	MTC SDFS 077	MTC SDFS 081	MTC SDFS 082	MTC SDFS 038
Battelle ID	W6208	W6210	W6216	W6217	W6222
Sample Type	SA	SA	SA	SA	SA
Analysis Date	9/20/01	9/20/01	9/20/01	9/21/01	9/21/01
STL Sample ID	H1H300206006	H1H300206007	H1H300206008	H1H300206009	H1H300206010
Extraction Date	8/31/01	8/31/01	8/31/01	8/31/01	8/31/01
Sample Weight (g)	2	2	2	2	2
Dilution Factor	1	1	1	1	1
Units	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.
1,3,5-Trinitrobenzene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
1,3-Dinitrobenzene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
2,4,6-Trinitrotoluene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
2,4-Dinitrotoluene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
2,6-Dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
2-Amino-4,6-dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
2-Nitrotoluene	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
3-Nitrotoluene	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
4-Amino-2,6-dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
4-Nitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
HMX	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Nitrobenzene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
RDX	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Tetryl	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Nitroguanidine	0.02 UG	0.02 UG	0.02 UG	0.02 U	0.02 UG
Surrogate Recovery: Explosive Analysis					
1-Chloro-3-nitrobenzene	78	87	90	87	76
Surrogate Recovery: Nitroguanidine Analysis					
1-Chloro-3-nitrobenzene	1500 *	244 *	907 *	2050 *	836 *

U - Not detected. MDL reported
G - Elevated reporting limit. The reporting limit is elevated due to matrix interference.
* - Surrogate recovery is outside control limits (60 - 140%).

Mattawoman - Indian Head
Energetics and Nitroguanidine
Field Sample Data

Field Sample ID	MTC SDFS 040	MTC SDFS 047	MTC SDFS 063	NJC SDFS 001	NJC SDFS 004
Battelle ID	W6223	W6226	W6227	W6228	W6231
Sample Type	SA	SA	SA	SA	SA
Analysis Date	9/21/01	9/21/01	9/21/01	9/21/01	9/21/01
STL Sample ID	H1H300206011	H1H300206012	H1H300206013	H1H300206014	H1H300206015
Extraction Date	8/31/01	8/31/01	8/31/01	8/31/01	8/31/01
Sample Weight (g)	2	2	2	2	2
Dilution Factor	1	1	1	1	1
Units	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.
1,3,5-Trinitrobenzene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
1,3-Dinitrobenzene	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
2,4,6-Trinitrotoluene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
2,4-Dinitrotoluene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
2,6-Dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
2-Amino-4,6-dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
2-Nitrotoluene	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
3-Nitrotoluene	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
4-Amino-2,6-dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
4-Nitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
HMX	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Nitrobenzene	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
RDX	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U
Tetryl	0.38 U	0.38 U	0.38 U	0.38 U	0.38 U
Nitroguanidine	0.02 UG	0.02 UG	0.02 UG	0.02 UG	0.02 U
Surrogate Recovery: Explosive Analysis					
1-Chloro-3-nitrobenzene	79	87	88	76	84
Surrogate Recovery: Nitroguanidine Analysis					
1-Chloro-3-nitrobenzene	1080 *	1330 *	1320 *	687 *	940 *

U - Not detected. MDL reported
G - Elevated reporting limit. The reporting limit is elevated due to matrix interference.
* - Surrogate recovery is outside control limits (60 - 140%).

Mattawoman - Indian Head
Energetics and Nitroguanidine
Field Sample Data

Field Sample ID	MTC SDFS 057	MTC SDFS 078	MTC SDFS 071	MTC SDFS 068
Battelle ID	W6249	W6255	W6256	W6258
Sample Type	SA	SA	SA	SA
Analysis Date	9/24/01	9/24/01	9/21/01	9/21/01
STL Sample ID	H1H300206016	H1H300206017	H1H300206018	H1H300206019
Extraction Date	8/31/01	8/31/01	8/31/01	8/31/01
Sample Weight (g)	2	2	2	2
Dilution Factor	1	1	1	1
Units	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.	mg/kg wet wt.
1,3,5-Trinitrobenzene	0.09 U	0.09 U	0.09 U	0.09 U
1,3-Dinitrobenzene	0.03 U	0.03 U	0.03 U	0.03 U
2,4,6-Trinitrotoluene	0.045 U	0.045 U	0.045 U	0.045 U
2,4-Dinitrotoluene	0.045 U	0.045 U	0.045 U	0.045 U
2,6-Dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U
2-Amino-4,6-dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U
2-Nitrotoluene	0.14 U	0.14 U	0.14 U	0.14 U
3-Nitrotoluene	0.14 U	0.14 U	0.14 U	0.14 U
4-Amino-2,6-dinitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U
4-Nitrotoluene	0.09 U	0.09 U	0.09 U	0.09 U
HMX	0.18 U	0.18 U	0.18 U	0.18 U
Nitrobenzene	0.045 U	0.045 U	0.045 U	0.045 U
RDX	0.17 U	0.17 U	0.17 U	0.17 U
Tetryl	0.38 U	0.38 U	0.38 U	0.38 U
Nitroguanidine	0.02 UG	0.02 UG	0.02 UG	0.02 UG
Surrogate Recovery: Explosive Analysis				
1-Chloro-3-nitrobenzene	95	94	78	87
Surrogate Recovery: Nitroguanidine Analysis				
1-Chloro-3-nitrobenzene	1020 *	835 *	1630 *	1890 *

U - Not detected. MDL reported
G - Elevated reporting limit. The reporting limit is elevated due to matrix interference.
* - Surrogate recovery is outside control limits (60 - 140%).

TPH

Battelle
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QC Summary

Target Analyte(s): Total Petroleum Hydrocarbons

Analytical Laboratory: STL-Los Angeles

Holding time: All samples were extracted within 15 days of collection. The laboratory received samples on day 14 of the holding time and was unable to meet the 14 day holding time on a subset of the samples. This should not impact the quality of the data.

Blank: No TPH was detected in the blank sample associated with these sediments.

LCS: LCS recovery was 86%; within the laboratory control limits of 60 to 130%.

MS/MSD: MS and MSD recoveries were 88% and 71%, respectively; within the laboratory control limits of 60 to 130%. The RPD between these duplicate samples was 18%; within the laboratory control limits of 0 to 35%.

Surrogate Recoveries: All recoveries of benzo[a]pyrene (surrogate for TPH analysis) were within laboratory control limits of 60 to 130%.

Mattawoman -- Indian Head
TPH (C10 - C25)
Quality Control Sample Data

Field Sample ID			MTS SDFS 077	MTS SDFS 077
Battelle ID			W6210	W6210
Sample Type	PB	LCS	MS	MSD
Analysis Date	9/1/01	9/1/01	9/1/01	9/1/01
STL Sample ID	E1H310000368B	E1H310000368C	E1H300216007S	E1H300216007D
Extraction Date	8/31/01	8/31/01	8/31/01	8/31/01
Sample Weight (g)	20	20	20	20
Percent Moisture	0	0	19	19
Dilution Factor	1	1	1	1
Units	mg/kg dry wt.	Percent Recovery	Percent Recovery	Percent Recovery
TPH (C10 - C25)	6 U	86	88	71
Surrogate Recovery:				
Benzo(a)pyrene	91	93	91	87

U - Not detected. MDL reported

Mattawoman -- Indian Head
TPH (C10 - C25)
Field Sample Data

Field Sample ID	MTS SDFS DUP 003		MTS SDFS 007		MTS SDFS 013		MTS SDFS 017		MTS SDFS 023
Battelle ID	W6196		W6198		W6200		W6202		W6205
Sample Type	SA		SA		SA		SA		SA
Analysis Date	9/1/01		9/1/01		9/1/01		9/1/01		9/1/01
STL Sample ID	E1H300216001		E1H300216002		E1H300216003		E1H300216004		E1H300216005
Extraction Date	8/31/01		8/31/01		8/31/01		8/31/01		8/31/01
Sample Weight (g)	20		20		20		20		20
Percent Moisture	34		30		59		68		48
Dilution Factor	1		1		1		1		1
Units	mg/kg dry wt.		mg/kg dry wt.		mg/kg dry wt.		mg/kg dry wt.		mg/kg dry wt.
TPH (C10 - C25)	9.2	U	8.6	U	15	U	19	U	73
Surrogate Recovery:									
Benzo(a)pyrene	88		74		91		90		103

U - Not detected. MDL reported

Mattawoman -- Indian Head
TPH (C10 - C25)
Field Sample Data

Field Sample ID	MTS SDFS DUP 001	MTS SDFS 077	MTS SDFS 081	MTS SDFS 082	MTS SDFS 038
Battelle ID	W6208	W6210	W6216	W6217	W6222
Sample Type	SA	SA	SA	SA	SA
Analysis Date	9/1/01	9/1/01	9/1/01	9/1/01	9/1/01
STL Sample ID	E1H300216006	E1H300216007	E1H300216008	E1H300216009	E1H300216010
Extraction Date	8/31/01	8/31/01	8/31/01	8/31/01	8/31/01
Sample Weight (g)	20	20	20	20	20
Percent Moisture	75	19	41	43	77
Dilution Factor	1	1	1	1	1
Units	mg/kg dry wt.	mg/kg dry wt.	mg/kg dry wt.	mg/kg dry wt.	mg/kg dry wt.
TPH (C10 - C25)	40	32	10 U	29	26 U
Surrogate Recovery:					
Benzo(a)pyrene	78	91	83	91	91

U - Not detected. MDL reported

Mattawoman -- Indian Head
TPH (C10 - C25)
Field Sample Data

Field Sample ID	MTS SDFS 040	MTS SDFS 047	MTS SDFS 063	NJC SDFS 001	NJC SDFS 004	
Battelle ID	W6223	W6226	W6227	W6228	W6231	
Sample Type	SA	SA	SA	SA	SA	
Analysis Date	9/1/01	9/1/01	9/1/01	9/1/01	9/1/01	
STL Sample ID	E1H300216011	E1H300216012	E1H300216013	E1H300216014	E1H300216015	
Extraction Date	8/31/01	8/31/01	8/31/01	8/31/01	8/31/01	
Sample Weight (g)	20	20	20	20	20	
Percent Moisture	71	31	38	70	30	
Dilution Factor	1	1	1	1	1	
Units	mg/kg dry wt.	mg/kg dry wt.	mg/kg dry wt.	mg/kg dry wt.	mg/kg dry wt.	
TPH (C10 - C25)	67	37	55	54	8.5	U
Surrogate Recovery:						
Benzo(a)pyrene	105	98	88	90	76	

U - Not detected. MDL reported

Mattawoman -- Indian Head
TPH (C10 - C25)
Field Sample Data

Field Sample ID	MTS SDFS 057	MTS SDFS 078	MTS SDFS 071	MTS SDFS 068
Battelle ID	W6249	W6255	W6256	W6258
Sample Type	SA	SA	SA	SA
Analysis Date	9/1/01	9/1/01	9/1/01	9/1/01
STL Sample ID	E1H300216016	E1H300216017	E1H300216018	E1H300216019
Extraction Date	8/31/01	8/31/01	8/31/01	8/31/01
Sample Weight (g)	20	20	20	20
Percent Moisture	71	74	71	38
Dilution Factor	1	1	1	1
Units	mg/kg dry wt.	mg/kg dry wt.	mg/kg dry wt.	mg/kg dry wt.
TPH (C10 - C25)	63	24 U	20 U	81
Surrogate Recovery:				
Benzo(a)pyrene	91	96	94	105

U - Not detected. MDL reported

TOC

Battelle
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QC Summary

Target Analyte(s): Total Organic Carbon

Analytical Laboratory: STL-Sacramento

Technical note: STL-Sacramento reported no anomalies associated with this project.

Holding time: All samples were processed and analyzed within 28 days of collection.

Blank: No TOC was detected in the method blank associated with these samples.

LCS: The recovery of TOC in the LCS was 97%; within the laboratory control limits of 75% to 125% recovery.

Mattawoman - Indian Head
Total Organic Carbon
Field Sample Data

Field Sample ID	Battelle ID	Sample Type	Analysis Date	Results (mg/kg)
		Blank	9/7/01	ND
		LCS	9/7/01	97%
MTC SDFS DUP 003	W6196	SA	9/7/01	8760
MTC SDFS 007	W6198	SA	9/7/01	1760
MTC SDFS 013	W6200	SA	9/7/01	20900
MTC SDFS 013	W6200	SA DUP	9/10/01	19600
MTC SDFS 017	W6202	SA	9/10/01	24500
MTC SDFS 023	W6205	SA	9/10/01	39400
MTC SDFS DUP 001	W6208	SA	9/10/01	79000
MTC SDFS 077	W6210	SA	9/10/01	3700
MTC SDFS 081	W6216	SA	9/10/01	13000
MTC SDFS 082	W6217	SA	9/10/01	15000
MTC SDFS 038	W6222	SA	9/10/01	51300
MTC SDFS 040	W6223	SA	9/10/01	48600
MTC SDFS 047	W6226	SA	9/10/01	5490
MTC SDFS 063	W6227	SA	9/11/01	9260
NJC SDFS 001	W6228	SA	9/11/01	39500
NJC SDFS 004	W6231	SA	9/11/01	3750
MTC SDFS 057	W6249	SA	9/11/01	36000
MTC SDFS 078	W6255	SA	9/11/01	74000
MTC SDFS 071	W6256	SA	9/11/01	60800
MTC SDFS 068	W6258	SA	9/11/01	60000

GRAIN SIZE

Battelle
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QC Summary

Target Analyte(s): Grain Size

Analytical Laboratory: STL-Burlington

Holding Time: Not applicable for grain size analysis.

Laboratory Duplicate: For all fractions constituting greater than 5% of the total, RPDs were <30%. As described by the analytical laboratory, "There was generally good correlation of the results of these analyses in the interanalysis comparison, although there was some variability within the coarse and medium grain sand distributions."

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

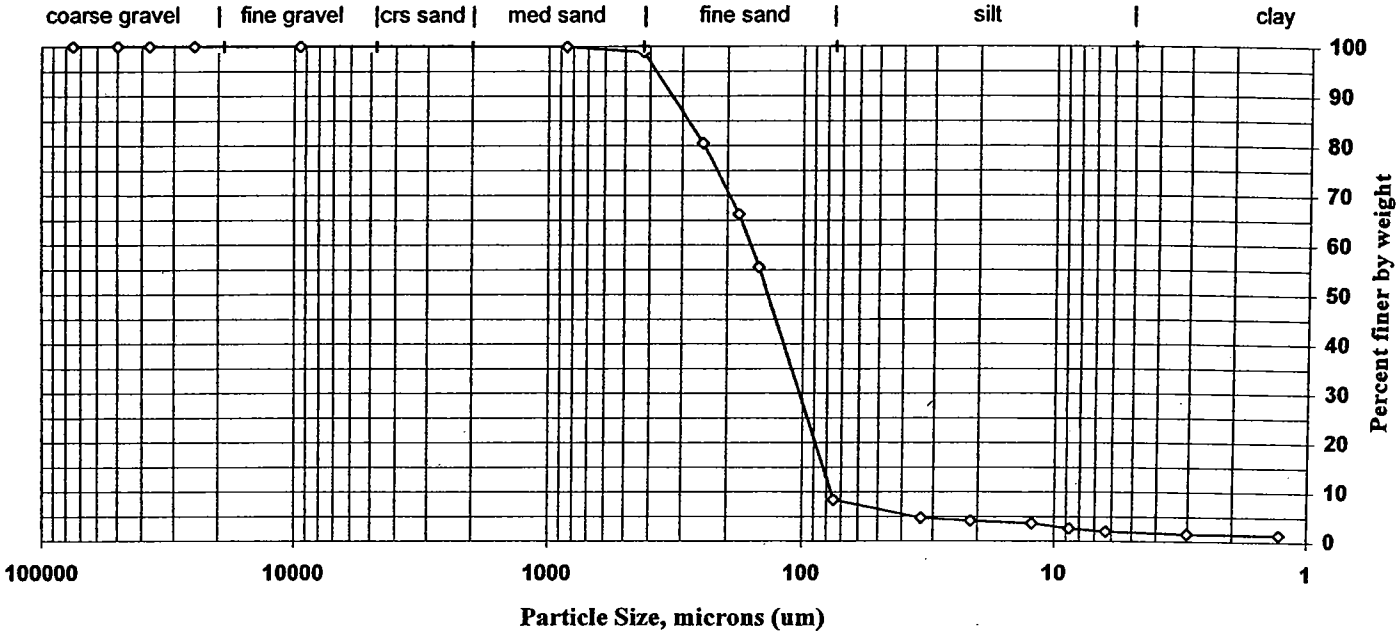
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463783 **Sample ID:** W6198

Field ID
MTC SDFS 007

Percent Solids: 75.9%
Specific Gravity: 2.65

Maximum Particle Size: Med sand
Shape (> #10): N/A
Hardness (> #10): N/A



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.9	0.1
#40	425	98.8	1.1
#60	250	80.5	18.3
#80	180	66.2	14.3
#100	150	55.5	10.7
#200	75	8.4	47.1
Hydrometer	33.5	4.7	3.7
I	21.3	4.1	0.5
I	12.2	3.6	0.5
I	8.7	2.6	1.1
I	6.3	2.0	0.5
I	3.0	1.5	0.5
V	1.3	1.4	0.1

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

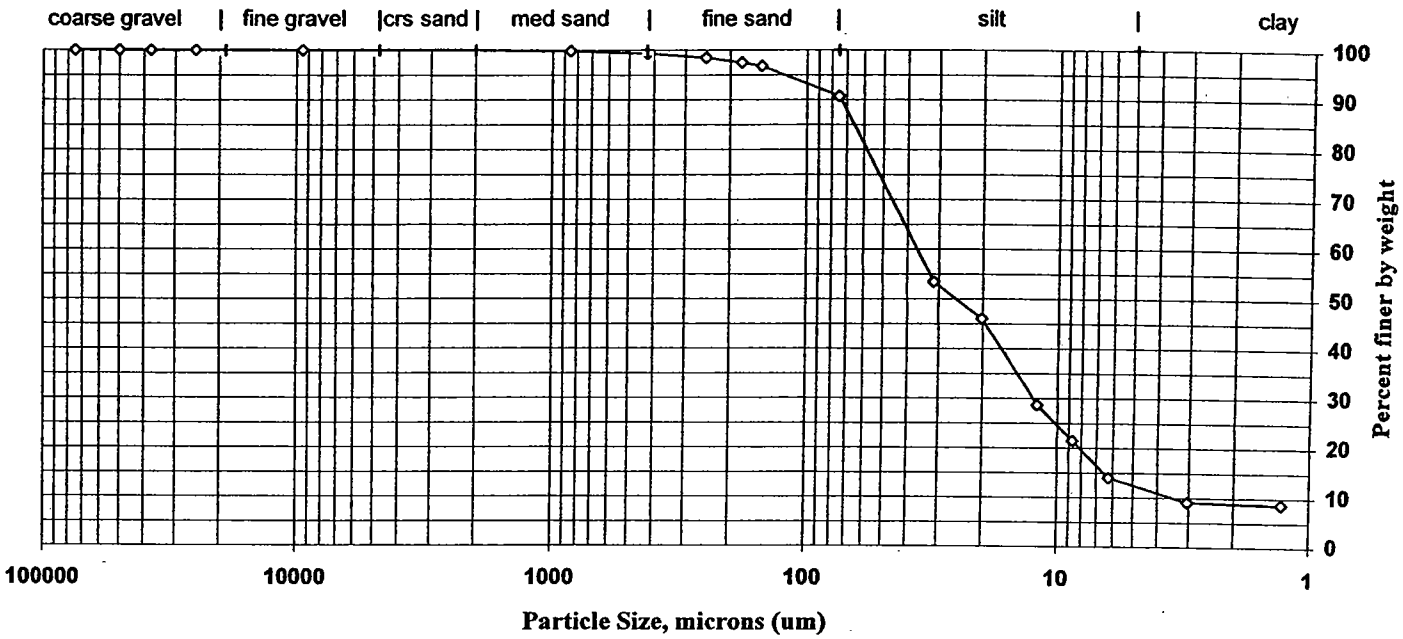
Sample preparation by: D2217

Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463784 **Sample ID:** W6200

Field ID
MTC SDFS 013

Percent Solids: 44.5% **Maximum Particle Size:** Med sand
Specific Gravity: 2.65 **Shape (> #10):** N/A
Hardness (> #10): N/A



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.8	0.2
#40	425	99.3	0.5
#60	250	98.4	0.8
#80	180	97.5	1.0
#100	150	96.8	0.7
#200	75	90.7	6.1
Hydrometer	31.4	53.4	37.3
|	20.2	46.0	7.4
|	12.1	28.7	17.3
|	8.7	21.5	7.2
|	6.3	14.0	7.4
|	3.0	9.1	5.0
V	1.3	8.7	0.4

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

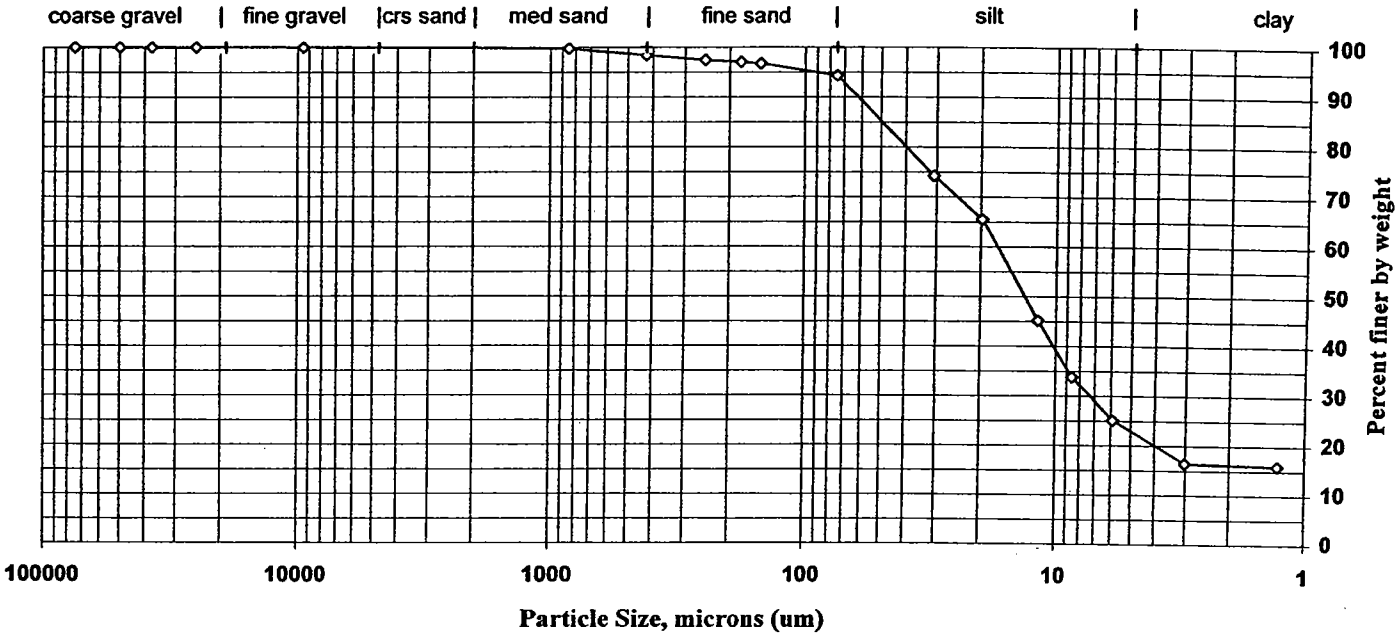
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463785 **Sample ID:** W6202

Field ID
MTC SDFS 017

Percent Solids: 36.2%
Specific Gravity: 2.65

Maximum Particle Size: Crs sand
Shape (> #10): angular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.7	0.2
#40	425	98.4	1.3
#60	250	97.4	1.0
#80	180	97.0	0.4
#100	150	96.7	0.3
#200	75	94.3	2.4
Hydrometer	30.7	74.2	20.2
|	19.8	65.5	8.7
|	11.8	45.2	20.3
|	8.6	33.8	11.4
|	5.9	25.1	8.7
|	3.0	16.4	8.7
V	1.3	15.9	0.5

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

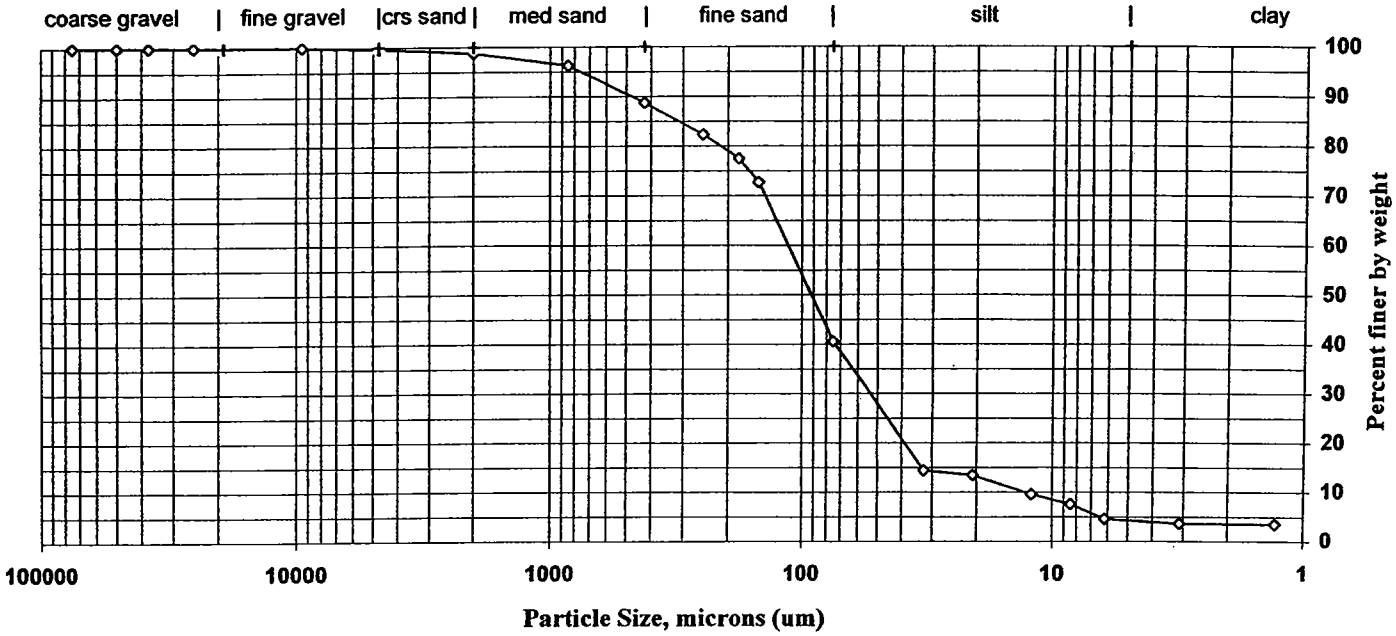
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463786 **Sample ID:** W6205

Field ID:
MTC SDFS 023

Percent Solids: 59.2%
Specific Gravity: 2.65

Maximum Particle Size: 9.5 mm
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.7	0.3
#10	2000	98.8	0.9
#20	850	96.3	2.5
#40	425	88.7	7.6
#60	250	82.3	6.4
#80	180	77.5	4.8
#100	150	72.7	4.8
#200	75	40.6	32.1
Hydrometer	32.5	14.4	26.2
|	20.7	13.4	1.0
|	12.1	9.5	3.9
|	8.5	7.6	2.0
|	6.2	4.6	3.0
|	3.1	3.6	1.0
V	1.3	3.5	0.2

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

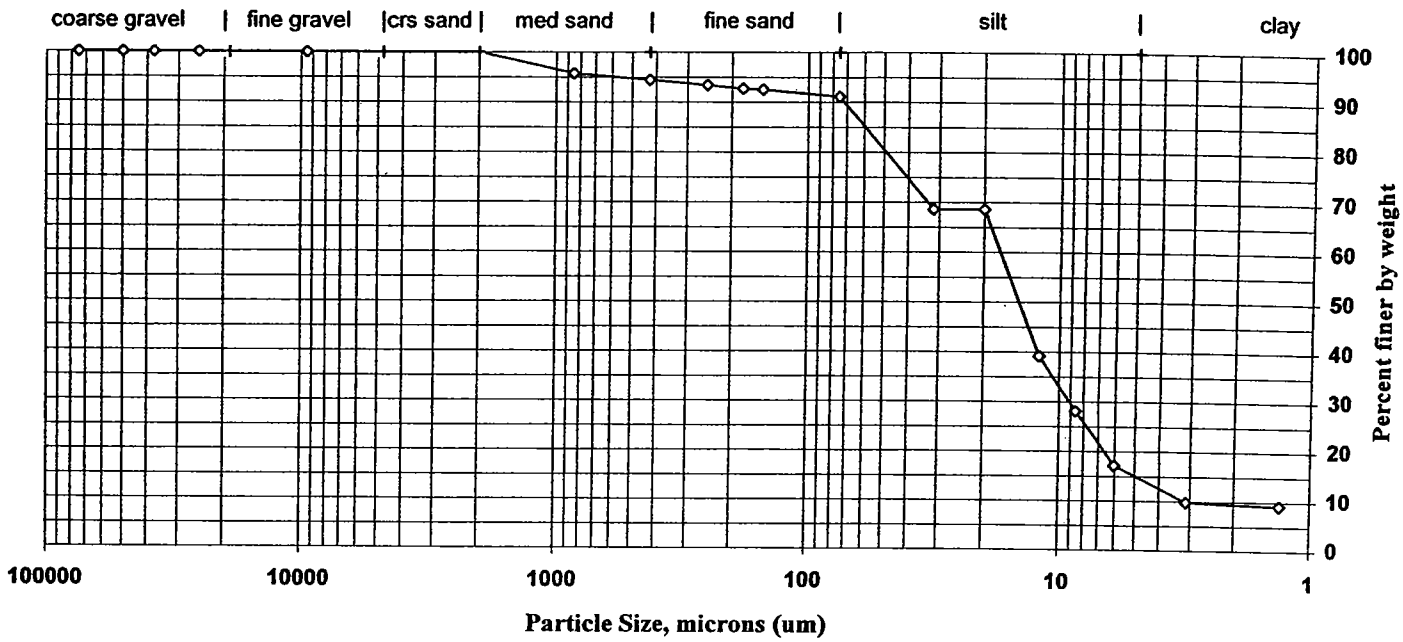
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463791 **Sample ID:** W6222

Field ID:
mtc sdfs 038

Percent Solids: 24.9%
Specific Gravity: 2.65

Maximum Particle Size: Med sand
Shape (> #10): N/A
Hardness (> #10): N/A



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	95.7	4.3
#40	425	94.5	1.3
#60	250	93.4	1.1
#80	180	92.7	0.7
#100	150	92.5	0.2
#200	75	91.1	1.5
Hydrometer	31.7	68.6	22.5
|	20.0	68.6	0.0
|	12.0	39.2	29.4
|	8.6	28.2	11.0
|	6.0	17.1	11.0
|	3.1	9.8	7.3
V	1.3	9.2	0.6

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

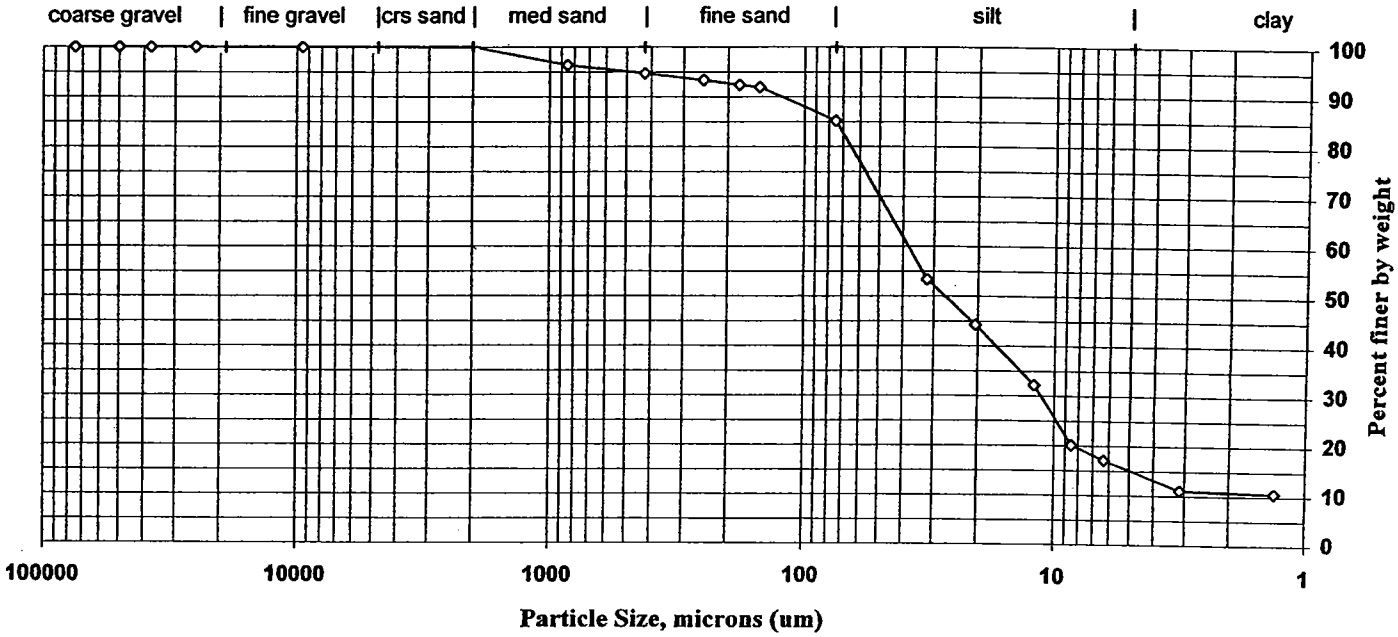
Lab ID: 463792 **Sample ID:** W6223

Field ID: MTC SDFS 040

Percent Solids: 32.3% **Maximum Particle Size:** Med sand

Specific Gravity: 2.65 **Shape (> #10):** N/A

Hardness (> #10): N/A



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	96.4	3.6
#40	425	94.7	1.7
#60	250	93.4	1.3
#80	180	92.4	1.0
#100	150	91.9	0.5
#200	75	85.2	6.7
Hydrometer	31.8	53.3	31.8
|	20.4	44.3	9.1
|	12.0	32.2	12.1
|	8.5	20.1	12.1
|	6.3	17.1	3.0
|	3.1	11.1	6.0
V	1.3	10.6	0.5

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

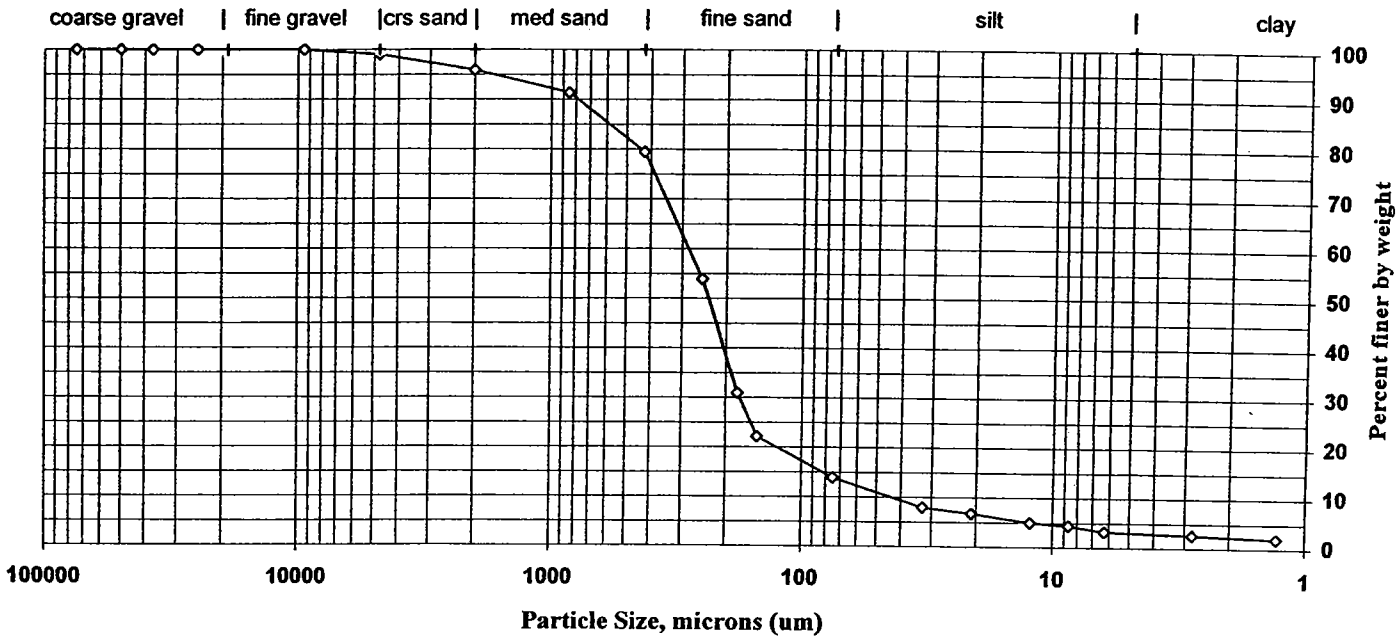
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463793 **Sample ID:** W6226

Field ID:
MTC SDFS 047

Percent Solids: 76.4%
Specific Gravity: 2.65

Maximum Particle Size: 9.5 mm
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.0	1.0
#10	2000	95.9	3.2
#20	850	91.4	4.5
#40	425	79.4	11.9
#60	250	53.9	25.6
#80	180	30.9	23.0
#100	150	22.1	8.8
#200	75	13.8	8.3
Hydrometer	32.7	7.9	5.9
|	20.9	6.7	1.2
|	12.2	5.0	1.7
|	8.7	4.4	0.6
|	6.2	3.2	1.2
|	2.8	2.7	0.6
V	1.3	2.0	0.7

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514BPS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

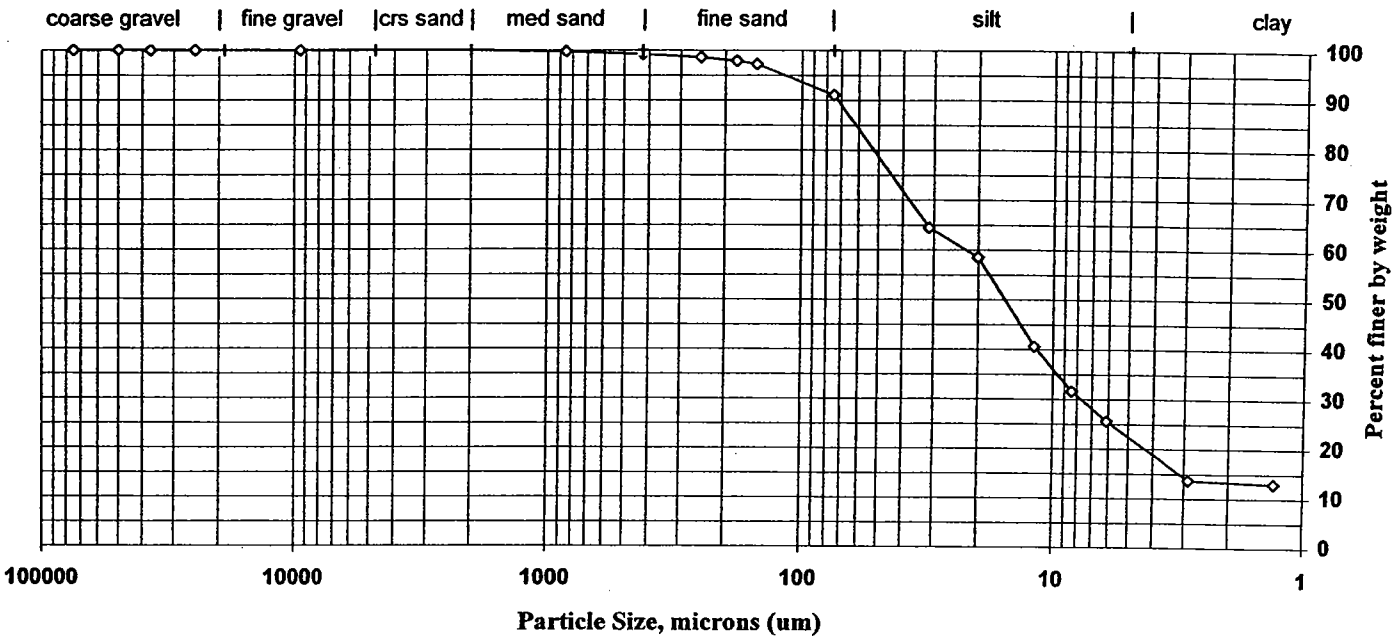
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463797 **Sample ID:** W6249

Field ID:
MTC SDFS 057

Percent Solids: 32.5%
Specific Gravity: 2.65

Maximum Particle Size: Med sand
Shape (> #10): N/A
Hardness (> #10): N/A



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.7	0.3
#40	425	99.2	0.5
#60	250	98.6	0.6
#80	180	97.9	0.7
#100	150	97.2	0.6
#200	75	91.0	6.2
Hydrometer	31.4	64.5	26.6
|	20.1	58.5	6.0
|	11.9	40.6	17.9
|	8.4	31.6	9.0
|	6.1	25.6	6.0
|	2.9	13.7	12.0
V	1.3	12.9	0.7

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514BPS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

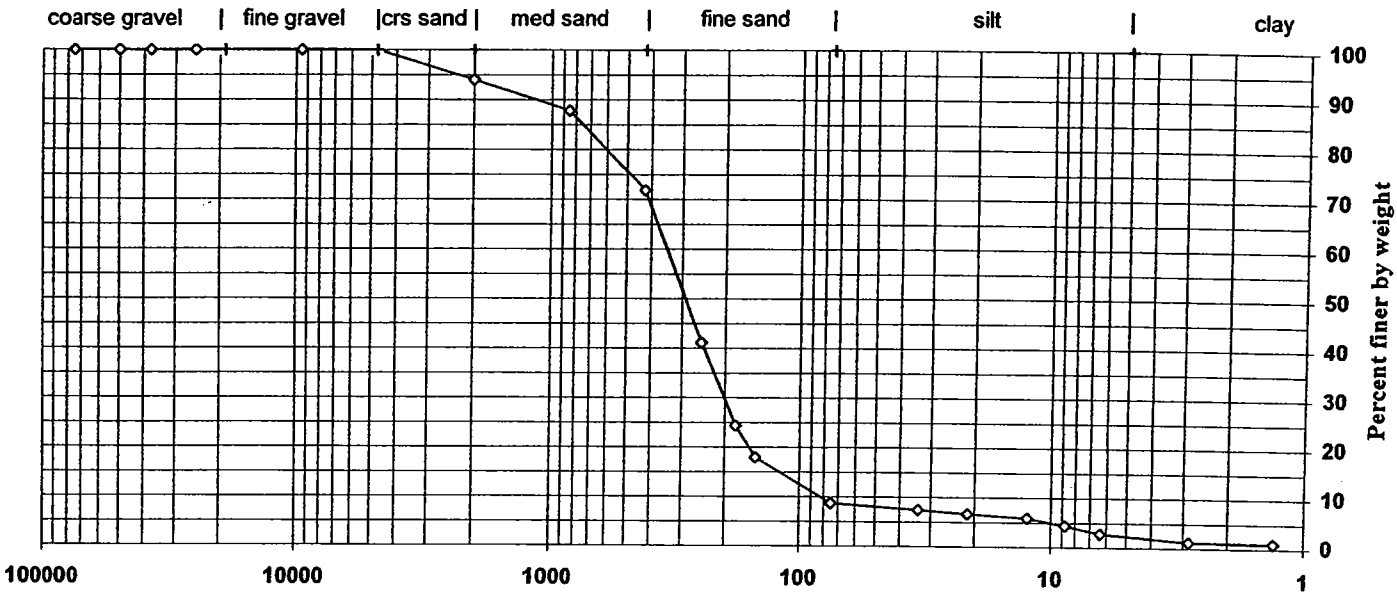
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463794 **Sample ID:** W6227

Field ID:
MTC SDFS 063

Percent Solids: 66.2%
Specific Gravity: 2.65

Maximum Particle Size: Crs sand
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	94.0	6.0
#20	850	87.8	6.3
#40	425	71.8	16.0
#60	250	41.1	30.7
#80	180	24.3	16.7
#100	150	17.9	6.4
#200	75	8.7	9.2
Hydrometer	33.6	7.4	1.3
|	21.3	6.6	0.8
|	12.4	5.9	0.8
|	8.8	4.4	1.5
|	6.4	2.8	1.6
|	2.8	1.2	1.6
V	1.3	1.0	0.2

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514BPS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

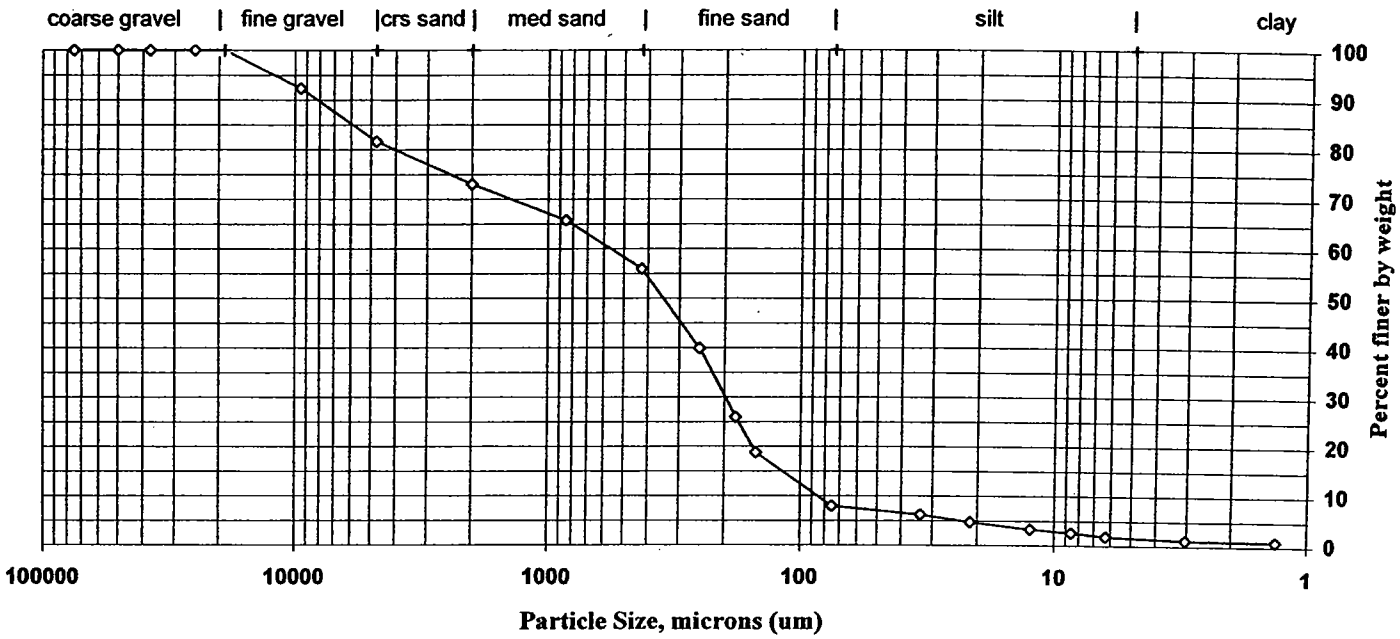
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463800 **Sample ID:** W6258

Field ID:
MTC SDFS 068

Percent Solids: 67.2%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): angular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	92.4	7.6
#4	4750	81.6	10.7
#10	2000	73.0	8.6
#20	850	65.7	7.3
#40	425	56.0	9.8
#60	250	39.8	16.1
#80	180	25.9	13.9
#100	150	18.8	7.2
#200	75	7.9	10.9
Hydrometer	33.5	6.2	1.7
|	21.4	4.7	1.4
|	12.5	3.3	1.4
|	8.6	2.6	0.7
|	6.3	1.9	0.7
|	3.0	1.1	0.7
V	1.3	1.0	0.2

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514BPS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

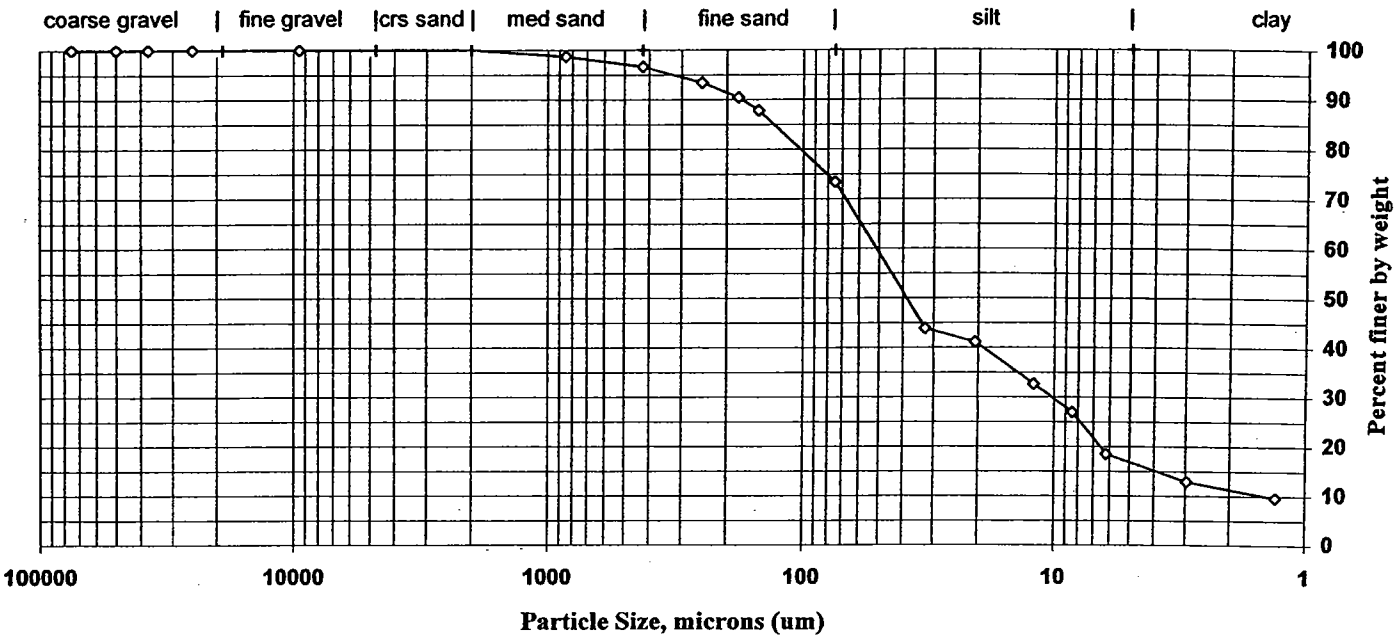
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463799 **Sample ID:** W6256

Field ID:
MTC SDFS 071

Percent Solids: 33.1%
Specific Gravity: 2.65

Maximum Particle Size: Med sand
Shape (> #10): angular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	98.7	1.3
#40	425	96.7	2.0
#60	250	93.4	3.2
#80	180	90.5	3.0
#100	150	87.8	2.6
#200	75	73.4	14.4
Hydrometer	32.4	43.9	29.5
I	20.6	41.1	2.8
I	12.1	32.6	8.4
I	8.5	27.0	5.6
I	6.2	18.5	8.4
I	3.0	12.9	5.6
V	1.3	9.6	3.3

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514BPS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

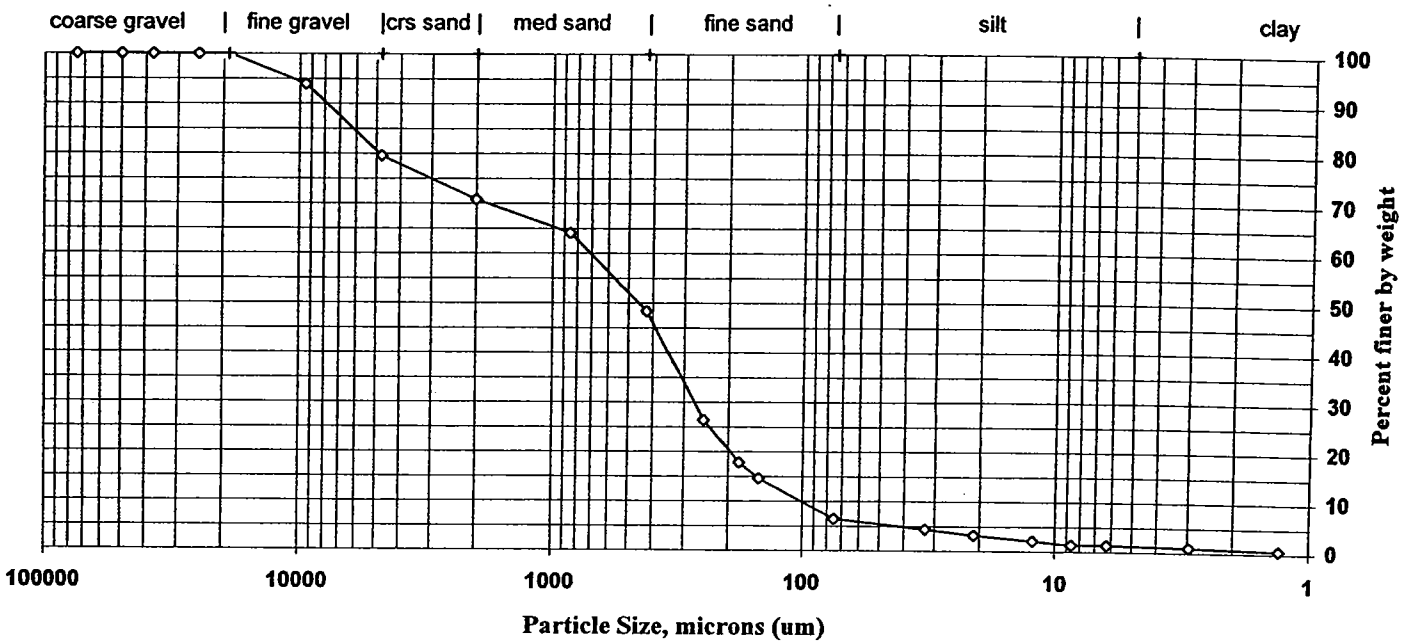
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463801 **Sample ID:** W6210

Field ID
MTC SDFS 077

Percent Solids: 81.6%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	93.9	6.1
#4	4750	79.6	14.4
#10	2000	70.8	8.8
#20	850	64.0	6.8
#40	425	48.3	15.7
#60	250	26.4	21.9
#80	180	17.8	8.6
#100	150	14.6	3.2
#200	75	6.4	8.1
Hydrometer	32.8	4.4	2.1
|	21.0	3.3	1.1
|	12.3	2.1	1.1
|	8.6	1.4	0.8
|	6.3	1.4	0.0
|	3.0	1.0	0.4
V	1.3	0.6	0.4

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

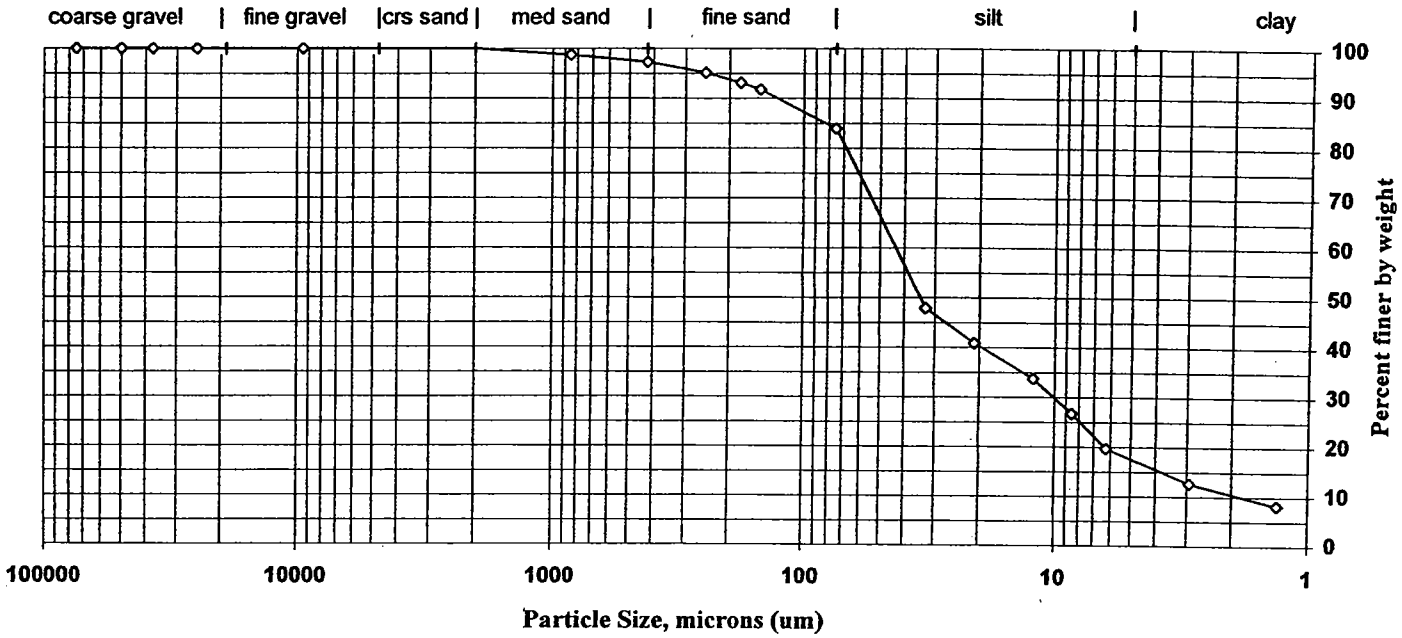
Sample preparation by: D2217

Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463798 **Sample ID:** W6255

Field ID:
MTC BBFS 078

Percent Solids: 28.2% **Maximum Particle Size:** Med sand
Specific Gravity: 2.65 **Shape (> #10):** N/A
Hardness (> #10): N/A



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	98.7	1.3
#40	425	97.3	1.4
#60	250	95.1	2.2
#80	180	93.1	2.0
#100	150	91.8	1.4
#200	75	83.9	7.8
Hydrometer	32.7	47.9	36.1
|	20.9	40.8	7.0
|	12.2	33.8	7.0
|	8.5	26.7	7.0
|	6.2	19.7	7.0
|	2.9	12.6	7.0
V	1.3	8.2	4.4

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514BPS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

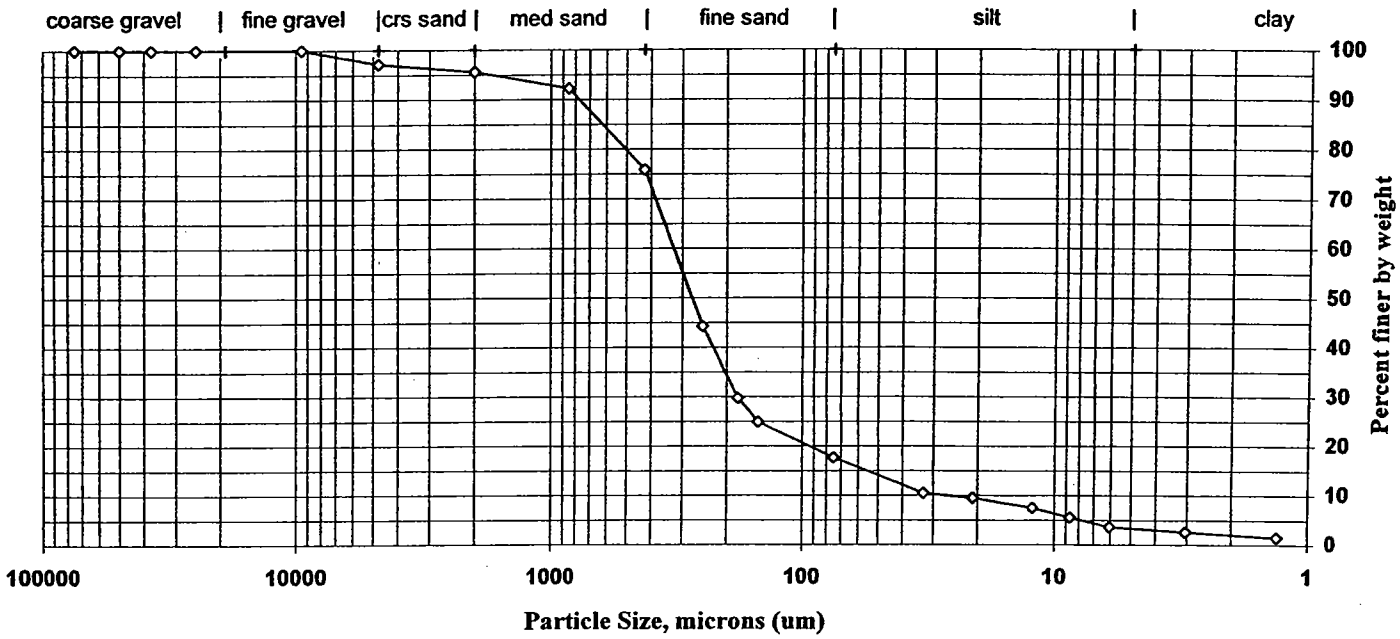
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463789 **Sample ID:** W6216

Field ID:
mtc sdfs 081

Percent Solids: 64.9%
Specific Gravity: 2.65

Maximum Particle Size: 9.5 mm
Shape (> #10): subrounded
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	97.1	2.9
#10	2000	95.6	1.5
#20	850	92.2	3.4
#40	425	75.9	16.3
#60	250	44.3	31.6
#80	180	29.7	14.5
#100	150	24.9	4.8
#200	75	17.7	7.2
Hydrometer	32.9	10.4	7.2
|	20.9	9.5	1.0
|	12.2	7.5	2.0
|	8.7	5.5	2.0
|	6.1	3.6	2.0
|	3.0	2.6	1.0
V	1.3	1.5	1.1

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

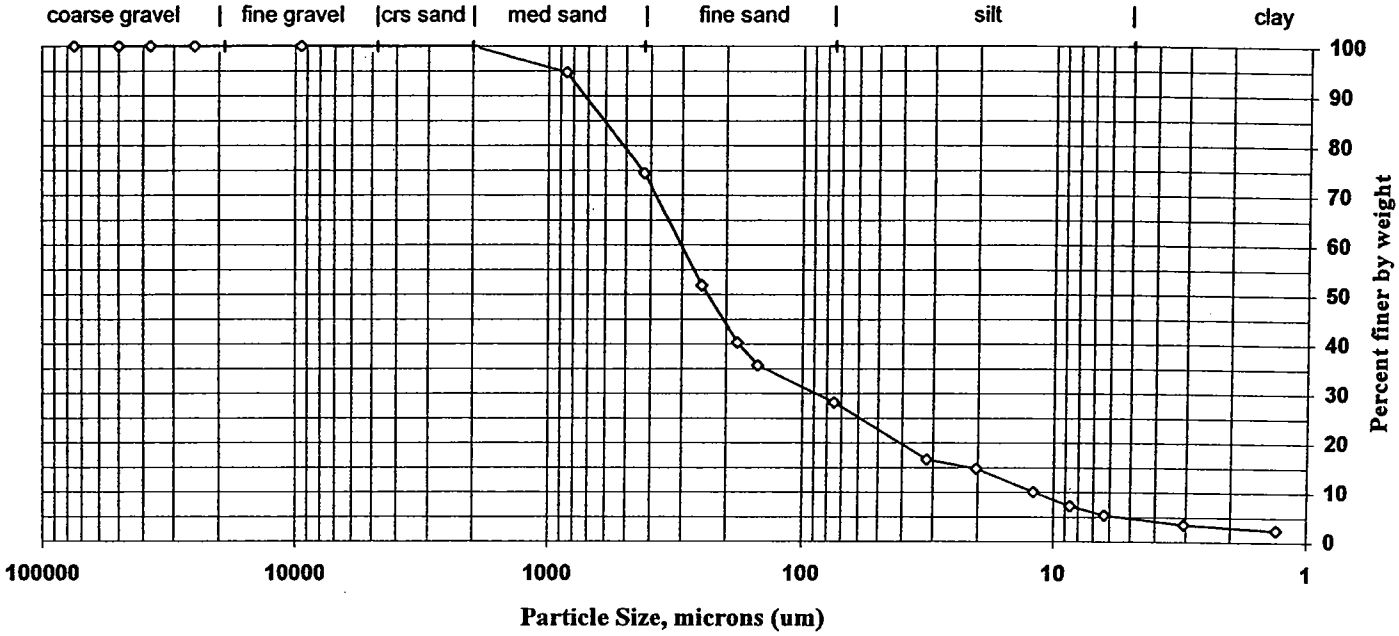
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463790 **Sample ID:** W6217

Field ID:
MTC SDFS 082

Percent Solids: 64.5%
Specific Gravity: 2.65

Maximum Particle Size: Med sand
Shape (> #10): subangulr
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	94.7	5.3
#40	425	74.4	20.3
#60	250	51.8	22.6
#80	180	40.3	11.5
#100	150	35.7	4.6
#200	75	28.2	7.5
Hydrometer	31.8	16.7	11.5
|	20.3	14.8	1.9
|	12.0	10.1	4.7
|	8.6	7.2	2.8
|	6.3	5.3	1.9
|	3.1	3.5	1.9
V	1.3	2.4	1.1

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

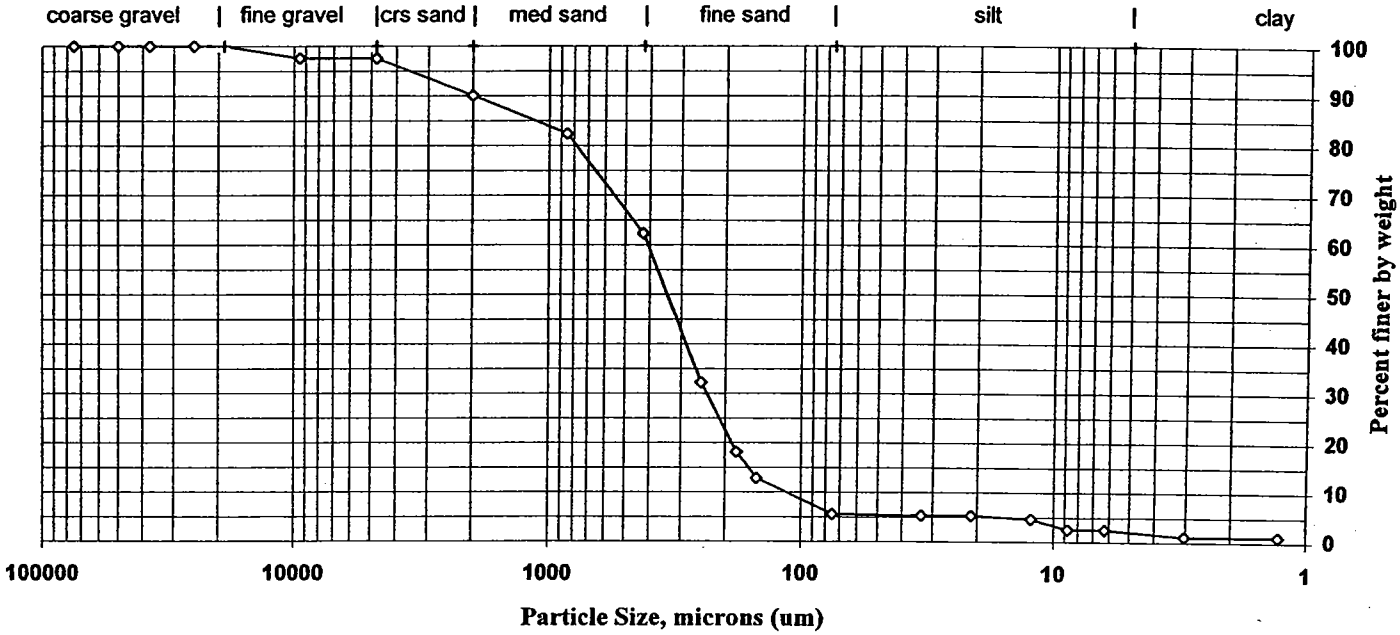
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463782 **Sample ID:** W6196

Field ID:
MTC SDFS DUP 003

Percent Solids: 69.3%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	97.5	2.5
#4	4750	97.5	0.0
#10	2000	90.0	7.5
#20	850	82.4	7.6
#40	425	62.3	20.1
#60	250	32.2	30.1
#80	180	18.2	14.0
#100	150	12.9	5.3
#200	75	5.6	7.3
Hydrometer	33.4	5.3	0.2
|	21.1	5.3	0.0
|	12.2	4.6	0.7
|	8.8	2.5	2.1
|	6.3	2.5	0.0
|	3.0	1.2	1.4
V	1.3	1.1	0.1

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

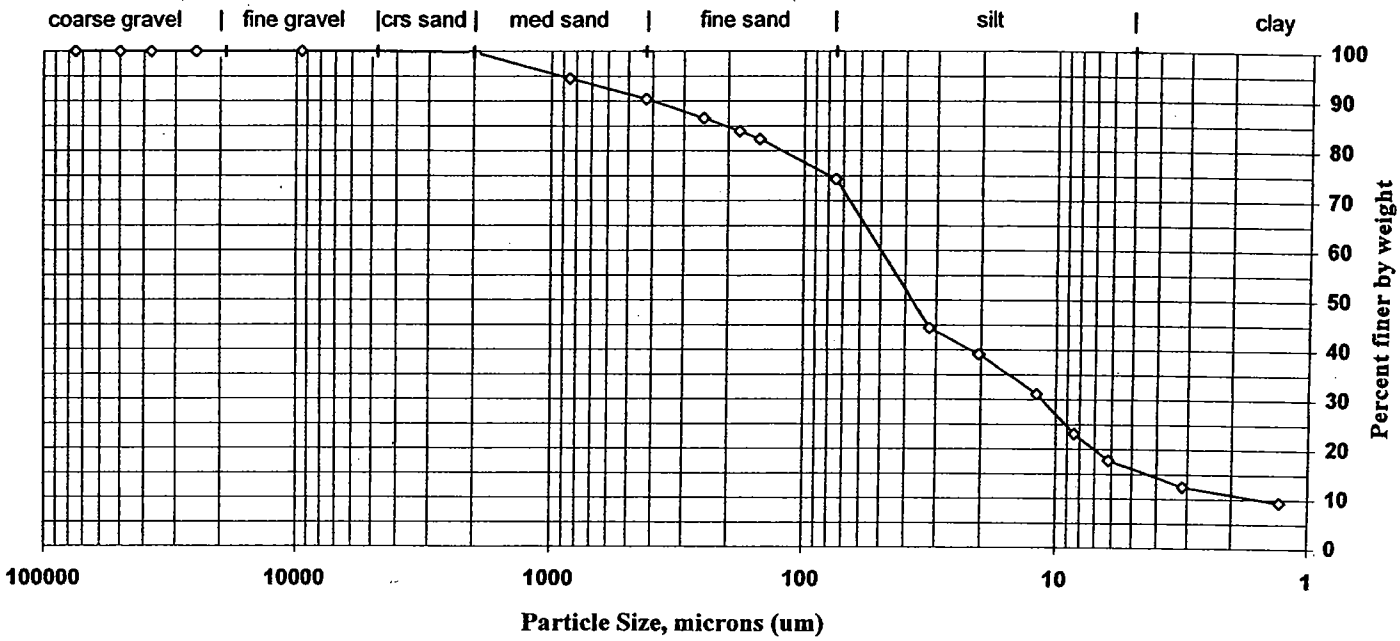
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463787 **Sample ID:** W6208

Field ID:
MTC SDFS DUP 001

Percent Solids: 29.2%
Specific Gravity: 2.65

Maximum Particle Size: Crs sand
Shape (> #10): angular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	99.8	0.2
#20	850	94.5	5.3
#40	425	90.4	4.1
#60	250	86.5	3.9
#80	180	83.9	2.6
#100	150	82.4	1.6
#200	75	74.3	8.1
Hydrometer	32.0	44.4	29.9
|	20.4	39.1	5.3
|	12.0	31.1	8.0
|	8.4	23.1	8.0
|	6.2	17.8	5.3
|	3.1	12.4	5.3
V	1.3	9.3	3.1

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

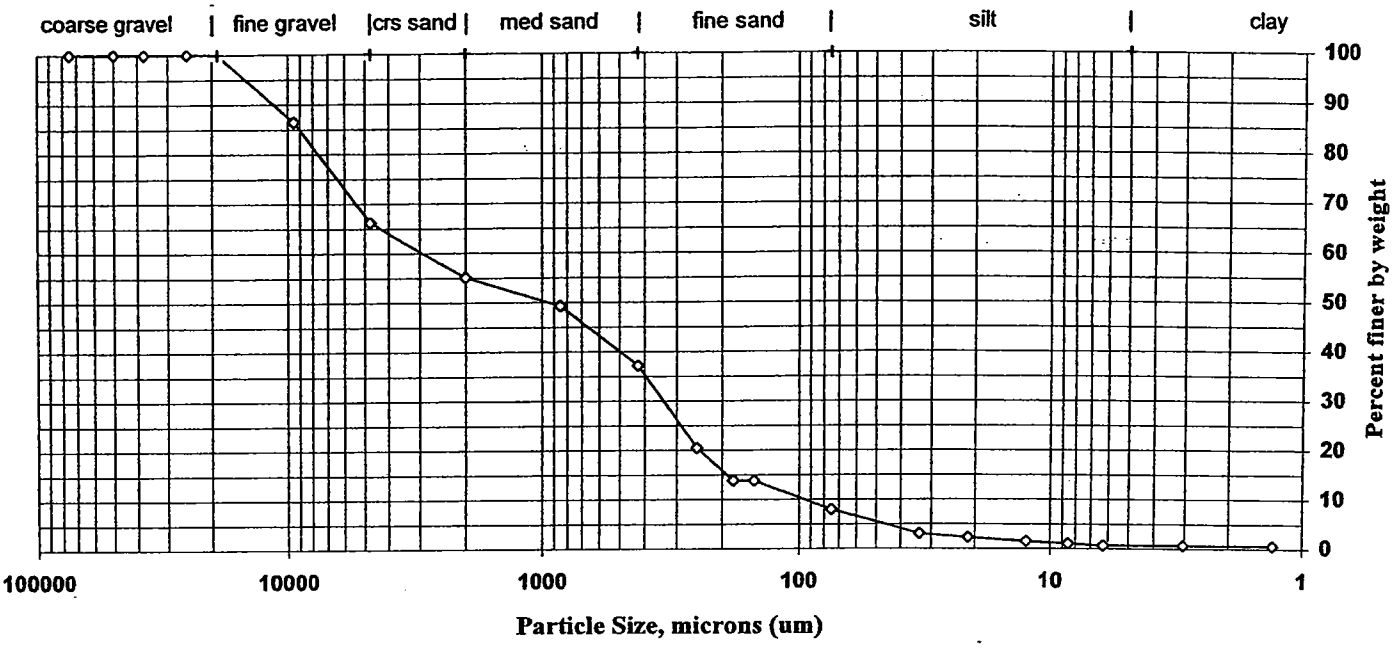
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463801DP **Sample ID:** W6210REP

Field ID:
MTC SDFS 077

Percent Solids: 85.6%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	86.5	13.5
#4	4750	66.3	20.2
#10	2000	55.1	11.2
#20	850	49.3	5.8
#40	425	37.1	12.2
#60	250	20.4	16.7
#80	180	13.8	6.6
#100	150	13.8	0.0
#200	75	7.9	5.9
Hydrometer	33.4	3.0	4.9
|	21.3	2.2	0.8
|	12.4	1.5	0.8
|	8.5	1.1	0.4
|	6.3	0.7	0.4
|	3.0	0.6	0.0
V	1.3	0.6	0.0

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514APS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

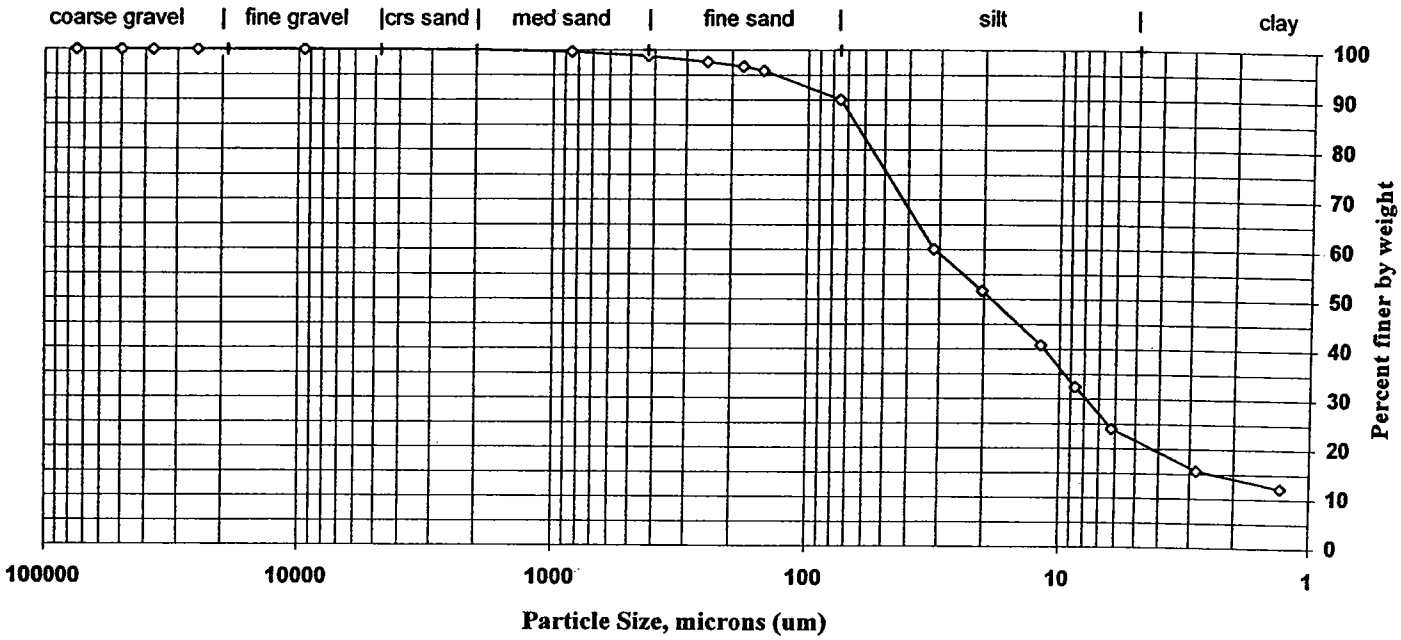
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463795 **Sample ID:** W6228

Field ID
NJC SDFS 001

Percent Solids: 32.5%
Specific Gravity: 2.65

Maximum Particle Size: Med sand
Shape (> #10): N/A
Hardness (> #10): N/A



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.6	0.4
#40	425	98.8	0.8
#60	250	97.6	1.1
#80	180	96.7	0.9
#100	150	95.9	0.8
#200	75	90.1	5.8
Hydrometer	31.6	60.1	30.0
|	20.3	51.7	8.4
|	11.9	40.7	10.9
|	8.7	32.4	8.4
|	6.2	24.0	8.4
|	2.8	15.6	8.4
V	1.3	12.1	3.5

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514BPS.xls::Report**

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

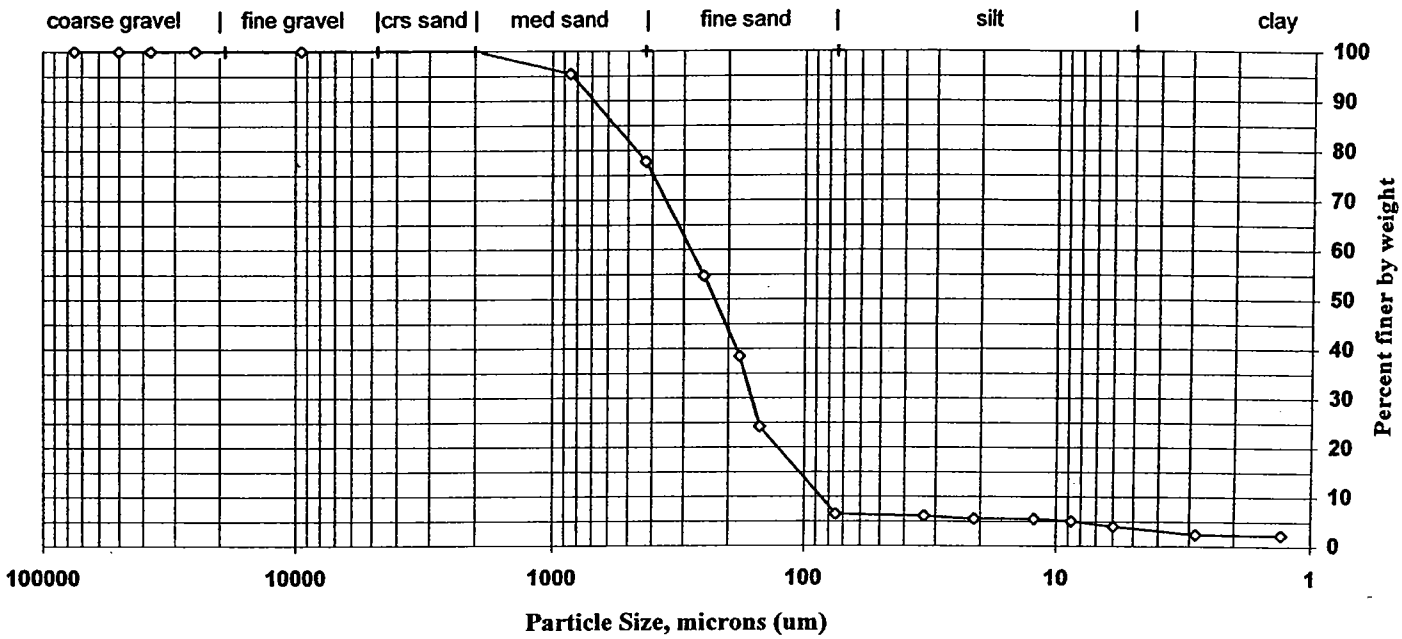
Client:	BATTEL	**Project No.:**	21000	**ETR(s) #:**	84514
Client Code:	BATTEL	**Job No.:**	N/A	**SDG(s):**	84514
Date Received:	30-Aug-01	**Start Date:**	11-Sep-01	**End Date:**	17-Sep-01

Lab ID: 463796 **Sample ID:** W6231

Field ID:
NJC SDFS 004

Percent Solids: 77.3%
Specific Gravity: 2.65

Maximum Particle Size: Med sand
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	95.4	4.6
#40	425	77.7	17.7
#60	250	54.7	23.0
#80	180	38.5	16.2
#100	150	24.2	14.3
#200	75	6.4	17.7
Hydrometer	33.3	6.0	0.4
I	21.1	5.5	0.5
I	12.2	5.5	0.0
I	8.8	5.0	0.5
I	6.0	4.0	1.0
I	2.8	2.4	1.6
V	1.3	2.3	0.1

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

Submitted By: _____ **Date:** 09/20/01 **STL - Burlington** **84514BPS.xls::Report**

APPENDIX B-9

PAHS ANTHROPOGENIC LITERATURE

TOXICOLOGICAL PROFILE FOR

POLYCYCLIC AROMATIC HYDROCARBONS

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

August 1995

Gordon, 1989). These values are up to an order of magnitude lower than those obtained in 1975 by Fox and Staley (1976), which ranged from 66 ng/m^3 for benzo[a]pyrene to 120 ng/m^3 for pyrene. Benner and Gordon (1989) postulated that the observed decrease in PAH concentrations over the 1975-85 decade resulted from the increasing use of catalytic converters in U.S. automobiles over that period, These authors also reported concentrations of PAHs in a typical vapor-phase sample from the Boston Harbor Tunnel for four PAHs included in this profile: anthracene (32.3 ng/m^3), fluoranthene (25.6 ng/m^3), phenanthrene (184 ng/m^3), and pyrene (28.3 ng/m^3). They emphasized that the vapor-phase samples included PAHs inherently present in the vapor phase as well as the more volatile 3- and 4-ring PAHs that may be desorbed from particles during sampling. These results underscore the need to evaluate both particle- and vapor-phase samples to obtain more reliable estimates of total atmospheric PAH concentrations.

5.4.2 Water

PAHs have been detected in surface waters of the United States. In an assessment of STORET data covering the period 1980-82, Staples et al. (1985) reported median concentrations in ambient water of <10 μg/L for 15 PAHs (acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, chrysene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene,. and pyrene). The number of samples ranged from 630 (naphthalene) to 926 (fluoranthene); the percentage of samples in which these PAHs were detected ranged from 1.0 (benzo[g,h,i]perylene) to 5.0 (phenanthrene) and 7.0 (naphthalene).

Basu and Saxena (1978a) reported concentrations of selected PAHs in surface waters used as drinking water sources in four U.S. cities (Huntington, West Virginia; Buffalo, New York; and Pittsburgh and Philadelphia, Pennsylvania). Total concentrations of PAHs ranged from 4.7 ng/L in Buffalo to 600 ng/L in Pittsburgh. Mean concentrations of benzo[a]pyrene in the Great Lakes have been detected at levels between 0.03 and 0.7 ppt (ng/L) (Environment Canada 1991).

DeLeon et al. (1986) analyzed surface water from 11 locations in the Mississippi River. Seventeen PAHs were identified in the samples at levels ranging from 1 ng/L for 6 compounds to a high of 34 ng/L for phenanthrene. The highest concentration of phenanthrene was detected in a sample

collected near New Orleans, Louisiana, near an industrial area, implicating industrial effluent or surface runoff from this area as a possible source.

During April and May 1990, Hall et al. (1993) analyzed 48-hour composite samples from three locations in the Potomac River and three locations in the upper Chesapeake Bay for eight PAHs: perylene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benz[a]anthracene, and chrysene. Pyrene was the.only PAH found (0.42 μg/L) in these samples; it was detected in only one of nine Chesapeake Bay samples and not detected in any of the Potomac River samples (detection limit, 0.04 μg/L).

In a more recent study by Pham et al. (1993), raw water samples from 5 areas in the St. Lawrence River and its tributaries were analyzed for 12 PAHs. The highest mean total PAH concentrations were observed in samples collected in the spring (27.3 ng/L) and autumn (21.03 ng/L), which was attributed to snow melt and increased runoff during these respective seasons. The lowest mean total PAH concentration was observed in summer (14.63 ng/L). High molecular weight PAHs were detected more frequently in the spring and autumn samples. Phenanthrene, benzo[b]fluoranthene, fluoranthene, and pyrene were predominant, comprising on average 33.8%, 17.4%, 17.1%, and 12.8% of the total PAHs, respectively: With the exception of anthracene and benzo[b]fluoranthene, a general decrease in concentration with increasing molecular weight was observed.

PAHs have been detected in urban runoff generally at concentrations much higher than those reported for surface water. Data collected as part of the Nationwide Urban Runoff Program indicate concentrations of individual PAHs in the range of, 300-10,000 ng/L, with the concentrations of most PAHs above 1,000 ng/L (Cole et al. 1984). In a recent study by Pitt et al. (1993) which involved the collection and analysis of approximately 140 urban runoff samples from a number of different source areas in Birmingham, Alabama, and under various rain conditions, fluoranthene was one of two organic compounds detected most frequently (23% of samples). The highest frequencies of detection occurred in roof runoff, urban creeks, and combined sewer overflow samples. The maximum reported concentration of fluoranthene in these samples was 130 μg/L.

Industrial effluents also have elevated PAH levels. Morselli and Zappoli (1988) reported elevated PAH levels in refinery waste waters, with concentrations for most PAHs in the range of 400 ng/L (benzo[b]fluoranthene) to 16,000 ng/L (phenanthrene). In an analysis of STORET data covering the

period 1980-88, Staples et al. (1985) reported median concentrations in industrial effluents of <10 μg/L (10,000 ng/L) for 15 PAHs. The number of samples ranged from 1,182 (benzo-[blfluoranthene) to 1,288 (phenanthrene); the percentage of samples in which PAHs were detected ranged from 1.5 (benzo[g,h,i]perylene) to 7.0 (fluoranthene).

Few data are available on the concentrations of PAHs in U.S. groundwater. Basu and Saxena (1978b) reported total PAH concentrations in groundwater from three sites in Illinois, Indiana, and Ohio to be in the range of 3-20 ng/L. Groundwater levels of PAHs near a coal and oil gasification plant and U.S. wood treatment facilities have been found to be elevated. Groundwater samples from the site of a Seattle coal and oil gasification plant which ceased operation in 1956 were found to contain acenaphthylene, acenaphthene, fluorene, phenanthrene, fluoranthene, pyrene, and chrysene at concentrations ranging from not detected (detection limit 0.005 mg/L) to 0.25, 0.18, 0.14, 0.13, 0.05, 0.08, and 0.01 mg/L, respectively (Tumey and Goerlitz 1990). Individual PAHs in the groundwater from 5 U.S. wood treatment facilities were reported at average concentrations of 57 ppb (0.057 mg/L) for benzo[a]pyrene to 1,825 ppb (1.8 mg/L) for phenanthrene (Rosenfeld and Plumb 1991).

An evaluation of the analytical data from 358 hazardous waste sites with over 5,000 wells indicated that anthracene, fluoranthene, and naphthalene were detected (practical quantitation limit, 10-200 μg/L) in groundwater from at least 0.1% of the sites in three of the ten EPA Regions into which the United States is divided (Garman et al. 1987). A review of groundwater monitoring data from 479 waste disposal sites (178 CERCLA or Super-fund sites, 173 RCRA sites, and 128 sanitary/municipal landfill sites) located throughout the United States indicated that 14 of the PAHs included in this profile were detected at frequencies ranging from 2 detections at one site in one EPA Region for indeno[l,2,3-c,d]pyrene, to 85 detections at 16 sites in 4 EPA Regions for fluorene (Plumb 1991). Benzo[a]pyrene was detected 13 times at 6 sites in 6 EPA Regions. Concentrations were not reported.

Data summarized by Sorrel et al. (1980) indicate low levels of PAHs in finished drinking waters of the United States. Reported maximum concentrations for total PAHs (based on measurement of 15 PAHs) in the drinking water of 10 cities ranged from 4 to 24 ng/L; concentrations in untreated water ranged from 6 to 125 ng/L. The low concentrations of PAHs in finished drinking water were attributed to efficient water treatment processes. Shiraishi et al. (1985) found PAHs in tap water at concentrations of 0.1-1.0 ng/L, primarily as chlorinated derivatives of naphthalene, phenanthrene, fluorene, and fluoranthene. The significance to human health of these compounds is not known (Eisler 1987).

5.4.3 Sediment and Soil

PAHs are ubiquitous in soil. Because anthropogenic combustion processes are a major source of PAHs in soils, soil concentrations have tended to increase over the last 100-150 years, especially in urban areas (Jones et al. 1989a, 1989b). Background concentrations for rural, agricultural, and urban soils (from the United States and other countries) are given in Table 5-3. In general, concentrations ranked as follows: urban > agricultural > rural. Evidence of the global distribution of PAHs was given by Thomas (1986) who detected benzo[g,h,i]perylene and fluoranthene at concentrations above 150 μg/kg in arctic soils. Soil samples collected from remote wooded areas of Wyoming contained total PAH concentrations of up to 210 μg/kg.

Recent data on PAH concentrations in soil at contaminated sites are summarized in Table 5-4. Because of the different sampling methods and locations at each site, this tabulation does not provide a reliable inter-site comparison. Additional studies indicate significantly elevated concentrations of PAHs at contaminated sites. Soil samples collected from the Fountain Avenue Landfill in New York City contained PAH concentrations ranging from 400 to 10,000 μg/kg (Black et al. 1989). In a 1988 study at a hazardous waste land treatment site for refinery process wastes, which had been operative since 1958, average PAH concentrations in surface soils (0-30 cm) ranged from not detected (detection limits 0.1-2.0 mg/kg dry weight) for acenaphthylene, acenaphthene, anthracene, benz[a]anthracene, and benzo[k]fluoranthene to 340 mg/kg dry weight for dibenz[a,h]anthracene (Loehr et al. 1993). In addition to dibenz[a,h]anthracene, the three most prevalent compounds at this depth were benzo[a]pyrene (204 mg/kg), benzo[b]fluoranthene (130 mg/kg), and chrysene (100 mg/kg). PAH concentrations decreased with increasing depth and the majority of PAHs were not detected at depths below 60 cm. At 90-135 cm, only phenanthrene (1.4 mg/kg), pyrene (4.0 mg/kg), chrysene (0.9 mg/kg), and dibenz[a,h]anthracene (0.8 mg/kg) were found.

Sediments are major sinks for PAHs, primarily because of the low solubility of these compounds and their strong affinity for organic carbon in particulate matter. PAH concentrations in sediment are generally much higher than those detected in surface water, i.e., in the range of μg/kg (ppb) rather than ng/kg (ppt) .

In an assessment of STORET data covering the period 1980-1982, Staples et al. (1985) reported median concentrations in sediment of ≤500 μg/kg dry weight for 15 PAHs (acenaphthene,

TABLE 5-3. Background Soil Concentrations of Polycyclic Aromatic Hydrocarbons (PAHs)

Compound	Concentrations (μg/kg)		
	Rural soil	Agricultural Soil	Urban Soil
Acenaphthene	1.7	6	
Acenaphthylene		5	
Anthracene		11–13	
Benzo(a)anthracene	5–20	56–110	169–59,000
Benzo(a)pyrene	2–1,300	4.6–900	165–220
Benzo(b)fluoranthene	20–30	58–220	15,000–62,000
Benzo(e)pyrene		53–130	60–14,000
Benzo(g,h,i)perylene	10–70	66	900–47,000
Benzo(k)fluoranthene	10–110	58–250	300–26,000
Chrysene	38.3	78–120	251–640
Fluoranthene	0.3–40	120–210	200–166,000
Fluorene		9.7	
Ideno(1,2,3-c,d)pyrene	10–15	63–100	8,000–61,000
Phenanthrene	30.0	48–140	
Pyrene	1–19.7	99–150	145–147,000

[a]Derived from:

IARC 1973
White and Vanderslice 1980
Windsor and Hites 1979
Edwards 1983
Butler et al. 1984
Vogt et al. 1987
Jones et al. 1987

TABLE 5-4. Soil Concentrations (mg/kg dry weight) Polycyclic Aromatic Hydrocarbons (PAHs) at Contaminated Sites[a]

Compound	Wood-preserving[b]		Creosote production[c]		Wood treatment[d]	Coking plant[d]	Coking plant[e]	Gas works[f]		Gas works[g]
	Surface-soil	Subsoil	mean	range				mean	range	range
Acenaphthene	7	1,368					29	2	0–11	nd–3.0
Acenaphthylene	5	49	33	6–77			187			nd–3.0
Anthracene	10	3,037	334	15–693	766	6	130	156	57–295	nd–3.1
Benz(*a*)anthracene	12	171			356	16	200	317	155–397	nd–8.6
Benzo(*a*)pyrene	28	82			94	14		92	45–159	nd–15
Benzo(*e*)pyrene										nd–12[i]
Benzo(*b*)fluoranthene	38	140						260	108–552	nd–19
Benzo(*k*)fluoranthene								238	152–446	
Benzo(*j*)fluoranthene										nd–1.2[i]
Benzo(*g,h,i*)perylene										nd–16
Chrysene	38	481	614	8–1,586	321	11	135	345	183–597	nd–12
Dibenz(*a,h*)anthracene					101	2		2,451	950–3,836	nd–2.0
Fluoranthene	35	1,629	682	21–1,464	1,350	34		2,174	614–3,664	nd–2.6
Fluorene	3	1,792	650	49–1,294	620	7	245	225	113–233	nd–6.5
Indeno(1,2,3-*c,d*)pyrene	10	23						207	121–316	nd–13
Naphthalene	1	3,925	1,313	<1–5,769	92	56	59			nd[h]–46
Phenanthrene	11	4,434	1,595	76–3,402	1,440	27	277	379	150–716	nd–26
Pyrene	49	1,016	642	19–1,303	983	28	285	491	170–833	nd–4.3

[a]Modified from Wilson and Jones 1993
[b]Mueller et al. 1991—composite samples
[c]Ellis et al. 1991—samples are 1·5 m or 3·5 m
[d]Weissenfels et al. 1990a—no range or sampling details provided
[e]Werner et al. 1988—no range or sampling details provided
[f]Bewley et al. 1989—samples taken from prototype treatment bed
[g]Turney and Goerlitz 1990—samples taken in 1986 from plant inoperative since 1956.
[h]nd = not detected (no detection limit given)
[i]estimated value

acenaphthylene, anthracene, benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, chrysene, fluoranthene, fluorene, indenopyrene, naphthalene, phenanthrene, and pyrene). The number of samples ranged from 236 (anthracene) to 360 (benzo-[alpyrene, fluoranthene); the percentage of samples in which these PAHs were detected ranged from 6.0 (acenaphthene, benzo[b]fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-c,d]pyrene) to 22.0 (fluoranthene, pyrene).

Eadie et al. (1982) analyzed surficial sediments in southwestern Lake Erie near a large coal-fired power plant. Sediment concentrations for total PAHs were generally in the range of 530-700 μg/kg, although concentrations in river and near-shore sediments reached nearly 4,000 μg/kg (4 ppm). Heit et al. (1981) reported total concentrations of PAHs (3-7 ring PAHs) from two lakes in the Adirondack acid lake region of 2,660 μg/kg and 770 μg/kg (calculated from data presented). Average concentrations of total PAHs in sediments from three coastal South Carolina marinas were reported to range from 35.6 to 352.3 μg/kg (Marcus et al. 1988). Benzo[a]pyrene levels in bottom sediments of the Great Lakes have been reported to range from 34 to 490 ppb (μg/kg) (Environment Canada 1991). Concentrations of PAHs in sediments from Cape Cod and Buzzards Bay in Massachusetts and the Gulf of Maine have been reported to be in the range of 540-1,300 μg/kg (Hites et al. 1980). Concentrations of low molecular weight PAHs (naphthalene, acenaphthylene, fluorene, phenanthrene, anthracene, and 2-methylnaphthalene) and high molecular weight PAHs (fluoranthene, pyrene, benz[a]anthracene, chrysene, benzofluoranthenes, benzo[a]pyrene, indeno[l,2,3-c,d]pyrene, dibenz[a,h]anthracene, and benzo[g,h,i]perylene) in sediment from the highly polluted Boston Harbor have been reported to range from approximately 100 to 11,000 μg/kg dry wt, and 800 to 23,000 μg/kg dry wt, respectively (Demuth et al. 1993).

Total PAH concentrations in bottom sediments from the main stem of the Chesapeake Bay were reported to range from 45 to 8,920 μg/kg for samples collected from 16 stations in 1986 (Huggett et al. 1988). At least 14 PAHs were found to be dominant among pollutants of surface sediments from the Elizabeth River, a subestuary of the James River in Virginia, with a maximum total PAH concentration of 170,000 μg/g (ppm) observed in one sample from a site of two large wood preservative spills (Bieri et al. 1986). In a more recent study, surface sediment samples from the highly contaminated Elizabeth River were found to contain total concentrations of 14 PAHs ranging from 1.5 to 4,230 μg/g (ppm) dry weight (Halbrook et al. 1992). Significantly lower concentrations,

ranging from 0.34 to 0.95 μg/g (340-950 μg/kg) dry weight, were found in sediment samples from the nearby Nansemond River which served as a clean reference site.

Two-thirds of 105 sediment samples collected throughout Florida during the summers of 1989 and 1990 from sites known or suspected to be contaminated with priority pollutants were found to contain at least one of 15 PAH target analytes (Jacobs et al. 1993). Pyrene was detected most frequently (61% of samples); dibenz[a,h]anthracene and naphthalene were detected least frequently (4% of samples). Total PAH concentrations ranged from below the detection limit to 1,090 mg/kg. Mean concentrations for individual PAHs ranged from 0.87 mg/kg (dibenz[a,h]anthracene and naphthalene) to 30.8 mg/kg (acenaphthene).

Drainage stream sediments from a wood-preserving facility near Pensacola, Florida, were found to be highly contaminated with creosote-derived PAHs, with maximum concentrations from two sampling sites ranging from 300 μg/kg for naphthalene to 12,000 μg/kg for phenanthrene and 140,000 μg/kg for anthracene (Elder and Dresler 1988). Fluoranthene, pyrene, benz[a]anthracene, chrysene, acenaphthene, and fluorene were other dominant PAHs. PAHs were not detected in water samples from the drainage stream. Furthermore, no significant PAH contamination was found in surface sediments from estuarine sites adjacent to the drainage stream; PAHs were detected in sediment samples from only one of seven estuarine sites at concentrations ranging from 75 μg/kg for benz[a]anthracene to 190 μg/kg for fluoranthene.

In 1991, Kennicutt et al. (1994) found that sediment samples from Casco Bay in Maine contained total PAH concentrations ranging from 16 to 20,800 μg/kg dry weight. PAHs were found at all 65 locations sampled. PAHs with four or more rings accounted for more than 60% of Casco Bay sedimentary PAHs. The predominance of PAHs with highly condensed ring structures with few alkylations indicated a pyrogenic or combustion source as the major contributor.

Mean total PAH concentrations of sediments collected in 1985-87 from Moss Landing Harbor, Elkhom Slough, and nearshore Monterey Bay, California, were found to range from 1,470 to 3,080, 157 to 375, and 24 to 114 μg/kg dry weight, respectively (Rice et al. 1993). The Moss Landing Harbor and nearshore Monterey Bay ecosystems are subject to PAH contamination from various local industries, harbor-related activities, power generation, municipal waste treatment, and agricultural runoff. The largest Pacific Coast fossil-fueled power plant is located at Moss Landing. Elkhom

Slough is a seasonal estuary which receives freshwater runoff. Combustion PAHs (i.e., benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, benzo[e]pyrene, chrysene, fluoranthene, and pyrene) were predominant, with mean total concentration at these 3 sites ranging from 1,250 to 2,710, to 335, and 11 to 59 ug/kg dry weight, respectively.

Median concentrations of PAHs in sediment coves collected in 1991 from three northern New Jersey waterways (Arthur Kill, Hackensack River, and Passaic River) highly contaminated with petroleum hydrocarbons ranged from 0.47 mg (470 ug/kg) (acenaphthylene) to 5.10 mg (5,100 μg/kg) (pyrene) (Huntley et al. 1993). In addition to pyrene, fluoranthene, chrysene, and benzo[a]pyrene were the most frequently detected PAHs, with median concentrations at the three sites ranging from 2.40 to 4.10, 1.35 to 2.85, and 0.86 to 2.30 mg/kg, respectively. Mean total PAH concentrations at the 29 sampling stations ranged from 0 to 161 mg/kg. A mean total PAH concentration of 139 mg/kg was found at a sampling station downstream from a chemical control Superftmd site. At most sampling stations, PAH concentrations increased with sample depth up to approximately 45-50 cm, indicating a decline in recent loadings relative to historic inputs.

5.4.4 Other Environmental Media

PAHs have been detected in many food products including cereal, potatoes, grain, flour, bread, vegetables, fruits, oils, and smoked or broiled meat and fish. The concentrations in uncooked foods largely depend on the source of the food. For example, vegetables and fruits obtained from a polluted environment may contain higher PAH concentrations than those obtained from nonpolluted environments. Benzo[a]pyrene, dibenz[a,h]anthracene, and chrysene have been detected in vegetables grown near a heavily traveled road (Wang and Meresz 1982). The method of cooking can also influence the PAH content of food; the time of cooking, the distance from the heat source, and the drainage of fat during cooking (e.g., cooking in a pan versus on a grill) all influence PAH content. For example, charcoal broiling increases the amounts of PAHs in meat. In a composite sample characterized to be typical of the U.S. diet, Howard (1979) found that PAH concentrations in all food groups were less than 2 ppb (μg/g). The following ranges of benzo[a]pyrene concentrations (wet or dry weight not specified) were summarized by Santodonato et al. (1981) from studies conducted in many countries:

- cooking oils: 0.5-S ppb (μg/g)
- margarine: 0.2-6.8 ppb

Bureau of Waste Site Cleanup

DRAFT Proposal to Address Anthropogenic Background Levels of PAHs

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Issue

Polycyclic Aromatic Hydrocarbons (PAHs) are ubiquitous and consistently present in the environment and are typically formed during the incomplete burning of organic material including coal, oil, gasoline and garbage. PAHs are also found in crude oil, coal tar, creosote and asphalt. Historically, PAHs have been associated with human activities such as cooking, heating homes and industries and fuel for operating automobiles. Their presence in the environment is an artifact of habitation and is due to the widespread practice of emptying fireplaces, stoves, boilers, garbage, etc. in rural and urban areas over the past several hundred years. As a result, it is very common to detect "background" levels of PAHs in soils.

A significant issue with addressing the presence of PAHs at these rural and urban areas is determining how to best account for background levels of PAHs in soil in the Method 1 Soil Cleanup Standards. The intent would be to minimize the routine site-specific determinations at sites in the statewide cleanup program.

Proposal

DEP has obtained background data from various sources documenting the concentrations of PAHs (and other chemicals) in soil affected by human activities, particularly soil associated with wood and coal ash. The levels of PAHs typically found in soil in can be addressed generically by incorporating this data into the Method 1 Soil Cleanup Standards, consistent with the current DEP practice for developing MCP standards. That is, DEP would not set Method 1 Cleanup Standards at concentrations less than the background concentration for a particular compound. Background would be used as the default cleanup standard *when the calculated risk-based value is less than the background concentration for an individual PAH compound.*

Basis of the Soil Background Levels

The soil background levels were selected following an analysis of several

datasets, including:

- Data (30-140 samples) collected to represent background at c.21E sites, gathered from a review of DEP files,
- Site-specific background samples generated for locations in Worcester (68 samples) and Watertown (17 samples),
- Data (750-1,000 samples) collected by Mass Highway Department as part of the Central Artery/Tunnel (CA/T) project and presented in a draft document *Background Soil Contaminant Assessment* (CDM, April 1996),
- Preliminary data compiled by the Massachusetts Licensed Site professional Association from background data submitted by its members,
- Published data (62 samples) from ENSR from 3 New England locations, and
- Generic background data published by ATSDR.

Based upon a qualitative analysis of this data, "*anthropogenic*" levels were identified. A lower (more stringent) level was chosen for residential (S-1) soils, while a higher percentile value was applied to commercial/industrial (S-2/S-3) soils. These levels are intended to be representative of typical concentrations found in inhabited areas, not pristine conditions.

Points for discussion:

- These generic PAH numbers may not be representative of background concentrations at all sites but would balance the usefulness and efficiency of using generic cleanup standards versus additional cleanup at specific sites.

- These numbers would streamline the assessment and remediation of 21E sites (including, but not limited to Brownfield properties undergoing development) l minimizing the site-specific assessment required to document "background conditions" and thus allowing anthropogenic background levels of PAHs to remain onsite.

Table 1 - Proposed Soil Background Levels

Anthropogenic Background Levels	S-1 Background	S-2, S-3 Background
OIL OR HAZARDOUS MATERIAL	mg/kg	mg/kg
ACENAPHTHENE	0.5	1.9
ACENAPHTHYLENE	0.5	1
ANTHRACENE	1	3.8
ANTIMONY	7	7
ARSENIC	17	17
BARIUM	45	45
BENZO(a)ANTHRACENE	2	8.5
BENZO(a)PYRENE	2	7.4

BENZO(b) FLUORANTHENE	2	8.4
BENZO(g,h,i)PERYLENE	1	3.1
BENZO(k) FLUORANTHENE	1	4
BERYLLIUM	0.88	0.88
CADMIUM	3	3
CHROMIUM (TOTAL)	39	39
CHROMIUM(III)	39	39
CHROMIUM(VI)	39	39
CHRYSENE	2	7.3
DIBENZO(a,h) ANTHRACENE	0.5	1.1
FLUORANTHENE	4	14
FLUORENE	1	2.3
INDENO(1,2,3-cd)PYRENE	1	2.8
LEAD	99	570
MERCURY	1.4	1.4
METHYLNAPHTHALENE, 2-	0.5	1
NAPHTHALENE	0.5	1.4
NICKEL	31	31
PHENANTHRENE	3	15
PYRENE	4	16
SELENIUM	1	1
SILVER	5	5
TCDD, 2,3,7,8- (equivalents)	6.40E-05	6.40E-05
THALLIUM	5	5
VANADIUM	29	29
ZINC	340	340

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Background Levels of Polycyclic Aromatic Hydrocarbons (PAH) and Selected Metals in New England Urban Soils

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ABSTRACT: Polycyclic aromatic hydrocarbons (PAH) are byproducts of combustion and are ubiquitous in the urban environment. They are also present in industrial chemical wastes, such as coal tar, petroleum refinery sludges, waste oils and fuels, and wood-treating residues. Thus, PAHs are chemicals of concern at many waste sites. Risk assessment methods will yield risk-based cleanup levels for PAHs that range from 0.1 to 0.7 mg/kg. Given their universal presence in the urban environment, it is important to compare risk-based cleanup levels with typical urban background levels before utilizing unrealistically low cleanup targets. However, little data exist on PAH levels in urban, nonindustrial soils. In this study, 60 samples of surficial soils from urban locations in three New England cities were analyzed for PAH compounds. In addition, all samples were analyzed for total petroleum hydrocarbons (TPH) and seven metals. The upper 95% confidence interval on the mean was 3 mg/kg for benzo(*a*)pyrene toxic equivalents, 12 mg/kg for total potentially carcinogenic PAH, and 25 mg/kg for total PAH. The upper 95% confidence interval was 373 mg/kg for TPH, which exceeds the target level of 100 mg/kg used by many state regulatory agencies. Metal concentrations were similar to published background levels for all metals except lead. The upper 95% confidence interval for lead was 737 mg/kg in Boston, 463 mg/kg in Providence, and 376 mg/kg in Springfield.

KEY WORDS: background, PAH, metals, urban, anthropogenic, soil.

I. INTRODUCTION

Polycyclic aromatic hydrocarbons (PAHs) are byproducts of combustion and are naturally occurring chemicals in the environment. Forest fires and volcanoes are major natural sources of PAHs, but there are anthropogenic sources as well due to burning of fossil fuels, including automobile and industrial emissions. PAHs are chemicals of concern in many waste site investigations that are undertaken pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), and state

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hazardous waste programs. Risk assessments performed according to federal guidance for former manufactured gas plant sites, wood treating facilities, petroleum refineries, and other sites generally conclude that PAHs pose unreasonable risks to human health and that remedial actions must be taken to reduce risks to acceptable levels. The majority of the risk posed by PAHs is generally due to benzo(*a*)pyrene and the other PAHs that have been shown to cause cancer in laboratory animals after repeated dosings. The U.S. EPA (1993a) currently identifies seven PAHs as "probable human (B2) carcinogens": benzo(*a*)pyrene, benzo(*a*)anthracene, benzo(*b*)fluoranthene, benzo(*k*)fluoranthene, chrysene, dibenz(*a,h*)anthracene, and indeno(1,2,3-c,d)pyrene.

Because of the very health-protective assumptions used in regulatory risk assessments, very low risk-based clean-up levels for PAHs are derived for such sites. In Michigan, residential soil cleanup levels of 0.33 mg/kg for each carcinogenic PAH have been set (MDNR, 1993). In New Jersey, proposed residential soil cleanup levels are 0.66 mg/kg for benzo(*a*)pyrene (New Jersey *Register*, 1992). The use of standard CERCLA risk assessment guidance (U.S. EPA, 1993b) results in the derivation of a risk-based cleanup level for benzo(*a*)pyrene of 0.4 mg/kg.

All of these risk-based soil cleanup levels are below the urban, nonindustrial background soil concentrations presently reported in the literature. However, the availability of such data is very limited. Blumer (1961) reports that benzo(*a*)pyrene concentrations in Cape Cod, MA, soils range from 0.04 to 1.3 mg/kg. Menzie et al. (1992) report that urban background soil levels of total carcinogenic PAH range from 0.06 to 5.8 mg/kg. Butler et al. (1984) report that total PAH levels in soils alongside roadways in England range from 4 to 20 mg/kg, and potentially carcinogenic PAH range from 0.8 to 11.5 mg/kg. Blumer et al. (1977) report that total PAH levels in soils in a Swiss town range from 6 to 300 mg/kg.

It is very difficult to compare the data from these studies to the results of site risk assessments due to the limited dataset and the nonuniformity of the PAH compounds evaluated. Clearly, more data are required from nonindustrial urban locations to define the urban background level for PAH and to critically evaluate the role of risk assessment in setting remedial goals for PAH in soils. Accordingly, we have collected 60 samples of surficial soils from urban locations in three New England cities and analyzed them for all 17 PAH compounds present on the EPA's Target Compound List, which is used in the Superfund program. In addition, all samples were analyzed for total petroleum hydrocarbons (TPH) and for seven metals: arsenic, barium, cadmium, chromium, lead, mercury, and selenium.

II. METHODS

A. Sample Collection

Samples of surficial soils from urban locations in three New England cities were collected: Boston, MA; Providence, RI; and Springfield, MA. Twenty independent

samples and duplicates of two samples were collected in each city. The samples were collected on July 21, 22, and 23, 1992, respectively. The samples were taken at a depth of 0 to 6 in. in areas considered to be not directly affected by industrial sites. Generally, the locations were along roads and sidewalks, and in parks and open lots. Each location was characterized in writing, including a soil description, and photographically documented. The samples were collected following standard environmental sampling protocols (U.S. EPA, 1986).

B. Sample Analysis

Chemical analysis of the samples was performed by AnalytiKEM, Inc. (Cherry Hill, NJ). The samples were analyzed by GC-MS for the 17 PAH compounds present on the EPA's Target Compound List using the methods required by EPA Method 8270 for the analysis of semivolatile compounds. In addition, the samples were analyzed for the eight RCRA metals, total petroleum hydrocarbons (TPH; EPA Method 418.1), and total solids. The complete analyte list is given in Table 1.

C. Data Validation

Validation of the data received from AnalytiKEM was performed according to U.S. EPA (1991) guidelines. The data were reviewed for completeness, holding times, GC-MS tuning and system performance, initial and continuing calibrations, laboratory method blank analysis, surrogate recoveries, matrix spike and matrix spike duplicate analysis, field duplication precision, and compound quantitation and detection limits.

D. Data Analysis

The analytical data were summarized in accordance with U.S. EPA (1989) risk assessment guidance. If a compound was detected at least once in surface soil, one half the sample quantitation limit (SQL) was used as a proxy concentration for all samples reported as "below detection limit" in the estimation of exposure point concentrations. However, if a compound was not detected in any sample, that compound was omitted from further consideration. In addition, when a proxy concentration (i.e., one half the detection limit) was greater than the highest actual detected value for a compound in any sample, that concentration was considered to be an aberration and was omitted from the database. This is consistent with U.S. EPA (1989) guidance, which recognizes that high sample quantitation limits can lead to unrealistic concentration estimates.

TABLE 1
Chemical Analyses of Urban Soils

Semivolatile Organics, EPA Target Compound List
Naphthalene
Acenaphthylene
Acenaphthene
Fluorene
Phenanthrene
Anthracene
Fluoranthene
Pyrene
Benzo(*a*)anthracene
Chrysene
Benzo(*b*)fluoranthene
Benzo(*k*)fluoranthene
Benzo(*a*)pyrene
Indeno(1,2,3-cd)pyrene
Dibenzo(*a,h*)anthracene
Benzo(*g,h,i*)perylene
2-Methylnaphthalene
Metals
Arsenic, total
Barium, total
Cadmium, total
Chromium, total
Lead, total
Mercury, total
Selenium, total
Silver, total
Other
Total petroleum hydrocarbons
Solids

A slightly different method of analysis was used to evaluate PAH. Because PAH are generally found in groups, it was conservatively assumed that if one PAH was detected in a sample, other compounds in that class might also be present in that sample. Therefore, if one PAH was detected in a sample, all undetected PAH were assigned a proxy concentration equal to one half the SQL. If a sample had no detected PAH, no PAH were assumed to be present in the sample, and a concentration of zero was used for all nondetects.

Summary statistics (minimum, maximum, arithmetic mean, upper 95% confidence limit on the arithmetic mean, and frequency of detection) were generated for each compound for each city and for all three cities combined.

The data for PAH were summarized in several different ways. Of the 17 PAH analyzed in each sample, seven are considered to be probable human carcinogens (Group B2) by the U.S. EPA (1993a). The U.S. EPA has derived a cancer slope factor, which is a measure of the carcinogenic potency of a compound, only for benzo(*a*)pyrene (B(*a*)P) (U.S. EPA, 1993a). Review of the literature indicates that not all PAH are equally potent with respect to tumor induction. Several researchers have proposed toxic equivalency schemes that relate the tumorigenic potency of each PAH to that of B(*a*)P (ICF-Clement Associates, 1988; Woo, 1989). B(*a*)P toxic equivalency factors (B(*a*)P-TEFs) can be used to adjust either the B(*a*)P dose-response value to provide a compound-specific dose-response value, or the concentration of each PAH in a sample to be expressed in terms of B(*a*)P toxic equivalents (B(*a*)P-TE). The latter method was used here. B(*a*)P-TE were calculated using the B(*a*)P toxic equivalency factors recommended for use by the U.S. EPA (1993c), as shown in Table 2. For each sample, PAH concentrations were reported for each of the 17 PAH on the analyte list, for total PAH (tPAH), for total carcinogenic PAH (cPAH), and for B(*a*)P-TE, and these values were used to generate the summary statistics for each group of samples.

III. RESULTS

Analysis of the laboratory results for the PAH indicates that quality control criteria were acceptable. The data were analyzed to determine if any statistically significant differences existed between the datasets for the three cities. A Hartley test for homogeneity of variances (Mendenhall, 1979) and a one-factor analysis of variance to test for equality of the means (Mendenhall, 1979) indicated no statistically significant differences. The results indicate that the PAH data can be pooled and treated as one dataset for further statistical analyses.

TABLE 2
Benzo(*a*)Pyrene Toxic Equivalent Factors (BAP-TEF)

Compound	EPA TEF
Benzo(*a*)pyrene	1.0
Benz(*a*)anthracene	0.1
Benzo(*b*)fluoranthene	0.1
Benzo(*k*)fluoranthene	0.1
Chrysene	0.001
Dibenzo(*a,h*)anthracene	1.0
Indeno(1,2,3-c,d)pyrene	0.1

The results of the PAH analyses are presented in Table 3 for all cities combined. A summary of the PAH results by city and for all cities combined is presented in Table 4, which reports for each: tPAH, total cPAH, and total B(*a*)P-TE. The arithmetic mean and the upper 95% confidence limit concentration are reported for each. Table 4 provides a summary of the data by city, and the results are graphically presented in Figure 1.

Table 5 presents a summary of the metals, TPH, and solids data by city. A Hartley test for homogeneity of variances and a one-factor analysis of variance to test for equality of the means indicated that the metals and TPH data from the three cities cannot be combined. This is due to the fact that the concentrations in each city are not normally distributed and did not have equal variances. The concentrations of the metals are compared to the arithmetic mean concentrations in the eastern U.S. (ATSDR, 1992) in Table 5. Most notably, lead concentrations are much higher than background concentrations. This is most likely due to the effects of automobile exhaust.

In order to determine if sample location significantly affected PAH concentration results, individual samples were classified based on the sample location's

TABLE 3
Summary Statistics for PAH — All Areas Combined

Compound	Minimum detect (mg/kg)	Maximum detect (mg/kg)	Arithmetic mean	Upper 95% interval (mg/kg)	Frequency of detection[a]	
2-Methylnaphthalene	0.017	0.64	0.151	0.173	19	62
Acenaphthene	0.024	0.34	0.201	0.306	30	62
Acenaphthylene	0.018	1.10	0.173	0.208	24	62
Anthracene	0.029	5.70	0.351	0.535	54	62
Benzo(*a*)anthracene	0.048	15.00	1.319	1.658	58	62
Benzo(*a*)pyrene	0.040	13.00	1.323	1.816	57	62
Benzo(*b*)fluoranthene	0.049	12.00	1.435	1.973	55	62
Benzo(*g,h,i*)perylene	0.200	5.90	0.891	1.195	36	62
Benzo(*k*)fluoranthene	0.043	25.00	1.681	2.522	59	62
Chrysene	0.038	21.00	1.841	2.693	60	62
Dibenzo(*a,h*)anthracene	0.020	2.90	0.388	0.521	32	62
Fluoranthene	0.110	39.00	3.047	4.444	60	62
Fluorene	0.022	3.30	0.214	0.317	35	62
Indeno(1,2,3-c,d)pyrene	0.093	6.00	0.987	1.293	43	62
Naphthalene	0.018	0.66	0.125	0.149	35	62
Phenanthrene	0.071	36.00	1.838	2.982	61	62
Pyrene	0.082	11.00	2.398	2.945	61	62
Total BAP-TE	0.257	21.31	2.437	3.324	62	62
Total carcinogenic PAH	0.680	77.70	8.973	12.423	62	62
Total PAH	2.292	166.65	18.361	24.819	62	62

[a] Frequency of detection = number detected: number samples.

TABLE 4
Background PAH Concentrations in Urban Surface Soils[a]

Compound	Boston (n = 20)		Providence (n = 20)		Springfield (n = 20)		All cities (n = 60)	
	Arithmetic mean (ppm)	Upper 95% CI (ppm)	Arithmetic mean (ppm)	Upper 95% CI (ppm)	Arithmetic mean (ppm)	Upper 95% CI (ppm)	Arithmetic mean (ppm)	Upper 95% CI (ppm)
Total B(*a*)P-TE	2.4	4.6	2.1	2.9	2.8	4.5	2.4	3.3
Total cPAH	8.4	16.0	7.8	11.0	10.6	18.3	9.0	12.4
Total PAH	18.7	35.9	16.8	23.5	19.1	29.9	18.4	24.8
TPH	474.9	652.6	267.4	338.2	184.4	233.3	306.2	372.8

[a] 0 to 6 in.

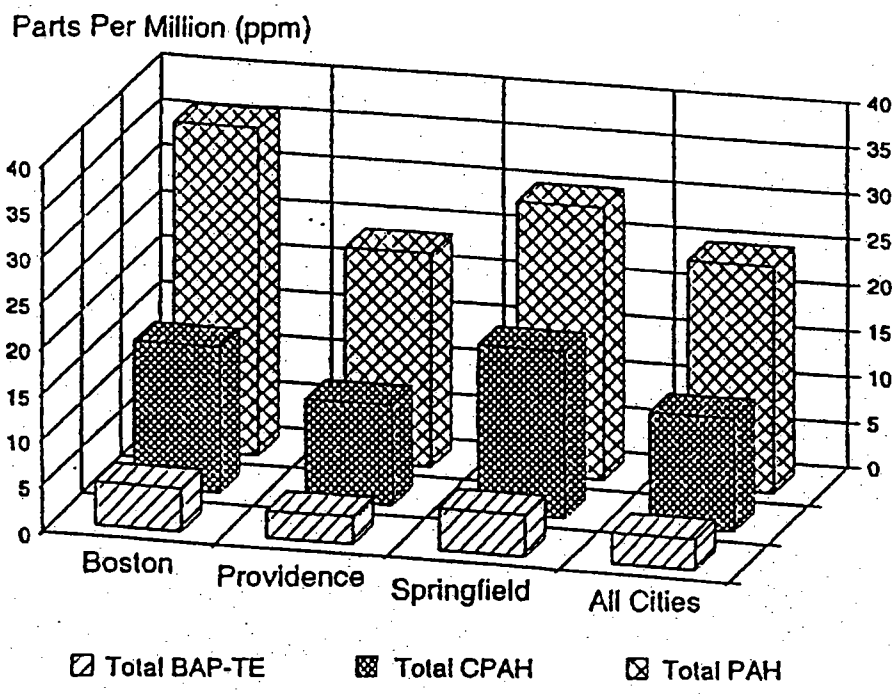

FIGURE 1. Background concentrations of PAH in urban soils. Data presented are the upper 95% confidence interval on the arithmetic mean. Data are presented numerically in Table 4.

proximity to asphalt pavement, based on both written and photographic documentation of sample location. Generally, samples collected within 4 to 6 ft of a road were considered to be near pavement. Of the 60 separate locations, 42 were considered to be near pavement and 18 were not. When tested for equality of variance and means as above, the two populations were determined to be significantly different. The mean total PAH concentration near pavement was 22 ppm compared to 8 ppm not near pavement. These results are shown in Table 6.

Similar analyses were performed to see if TPH or total organic carbon concentrations could be used as surrogates for PAH concentrations. The results showed that there is no correlation between PAH and TPH concentrations, nor between PAH and total organic carbon concentrations (data not shown).

The highest total PAH concentration detected was 166 mg/kg, taken from a street corner in Boston. The next highest PAH concentration was 109 mg/kg, taken at the base of a telephone pole. Four of the 60 samples were taken at the bases of telephone poles, with widely varying results. The total PAH concentrations in the other three locations were 62, 4, and 45 mg/kg.

TABLE 5
Summary Statistics for Metals, TPH, and Soils by City

Compound	Boston (n = 20) Arithmetic mean (mg/kg)	Boston (n = 20) Upper 95% interval (mg/kg)	Providence (n = 20) Arithmetic mean (mg/kg)	Providence (n = 20) Upper 95% interval (mg/kg)	Springfield (n = 20) Arithmetic mean (mg/kg)	Springfield (n = 20) Upper 95% interval (mg/kg)	Arithmetic mean in U.S. soils[a] (mg/kg)
Arsenic, total	4.20	5.59	3.53	4.27	5.63	9.23	7.4
Barium, total	53.95	66.25	45.29	59.43	45.17	51.03	420
Cadmium, total	1.55	2.79	ND	ND	ND	ND	0.25[b]
Chromium, total	23.00	27.69	12.08	14.35	12.62	14.45	52
Lead, total	398.70	737.44	305.76	462.98	261.69	377.76	17
Mercury, total	0.29	0.39	0.19	0.24	0.20	0.25	0.12
Selenium, total	0.51	0.57	0.39	0.48	0.53	0.55	0.45
Total petroleum hydrocarbons	474.90	652.62	267.43	338.19	184.38	233.27	—
Total solids	90%	93%	93%	95%	90%	92%	—

[a] ATSDR. 1992. *Public Health Assessment Guidance Manual.* PB92-147164. U.S. Department of Health and Human Services.
[b] ATSDR. 1991. *Toxicological Profile for Cadmium.* PB92-147164. Draft. U.S. Department of Health and Human Services.

TABLE 6
Comparison of Background PAH Concentrations in Urban Soils: The Effects of Proximity to Pavement

					Results of statistical analysis					
					Test for homogeneity of variances			Test of equality of means		
	Near pavement		Not near pavement							
Compound	Arithmetic mean (ppm)	Standard deviation	Arithmetic mean (ppm)	Standard deviation	Sample F-statistics	Associated degrees of freedom	Statistically significant at 0.05 level of significance	Sample Student's *t*	Associated degrees of freedom	Statistically significant at 0.05 level of significance
Total B(*a*)P-TE	2.9	4.2	1.1	0.92	21.3	41, 17	Yes	2.69	50	Yes
Total PAH	21.9	30.7	8.3	7.2	18.4	41, 17	Yes	2.69	50	Yes

IV. CONCLUSION

In this study, 20 surface soil samples were collected from each of three New England cities and analyzed for PAH, TPH, and metals. The results of the statistical analyses described in the previous section show that, with respect to cPAH, the three datasets are not significantly different and can be considered as one dataset representative of urban environments. The samples were taken in typical urban areas but not near known industrial sites. Therefore, these data are considered to be representative of the generalized effects of urban activities.

It is clear from the results presented here that common regulatory target cleanup levels for cPAH and B(*a*)P-TE (0.1 to 0.66 mg/kg) are much below the background concentrations of these compounds in urban surface soils (upper 95% confidence interval of 5.9 and 12.4 mg/kg for total B(*a*)P-TE and total cPAH, respectively). Figure 2 graphically compares the "bright line" target cleanup level for B(*a*)P of 0.1 mg/kg with the total B(*a*)P-TE (upper 95% confidence interval on the arithmetic mean) measured in urban environments.

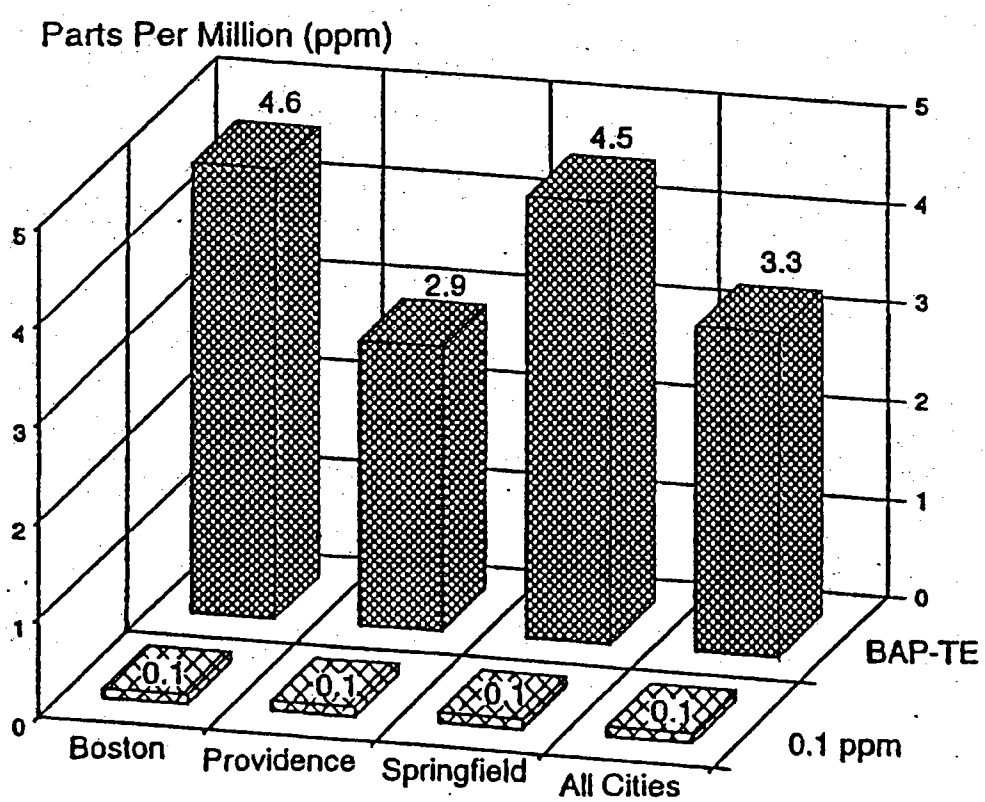

FIGURE 2. Comparison of B(*a*)P-TE with U.S. EPA Region III[4] risk-based concentration for B(*a*)P. B(*a*)P data presented are the upper 95% confidence interval on the arithmetic mean.

Upper 95% confidence intervals are compared because this is the statistic preferred by EPA and many states for risk assessment. Moreover, the State of Massachusetts defines its background concentrations of metals based on the upper 95% confidence limit on the arithmetic mean concentration (Massachusetts Department of Environmental Protection, 1992). For all cities combined, the background level of B(*a*)P-TE of 3.3 mg/kg is approximately ten times greater than the target cleanup level of 0.33 mg/kg and approximately 30 times higher than the target cleanup level of 0.1 mg/kg. For those regulatory situations in which the use of B(*a*)P-TEFs in determining site risk is not allowed, the background level of cPAH is approximately 40 to 100 times greater than these target cleanup levels.

An analysis of the data comparing samples taken near pavement with those determined to be not near pavement indicated that those samples designated near pavement had significantly higher, approximately threefold higher, PAH concentrations for both total PAH and total B(*a*)P-TE. This is most likely due to the presence of diesel and automobile exhaust particles, perhaps influenced by the presence of asphalt and runoff of vehicular oil from the roads.

Total petroleum hydrocarbons (TPH) were also found at consistently high levels in each city. The commonly applied regulatory cleanup level for TPH is 100 mg/kg. This cleanup level is not risk based and is three times lower than the background concentration of TPH found in this study (arithmetic mean of 306 mg/kg and upper 95% confidence interval on the mean of 373 mg/kg).

It is incumbent upon the regulatory agencies to recognize that substantial background levels of PAH and TPH exist in our urban environments and to acknowledge this information in the development of realistic target cleanup levels. The use of these background data in setting more realistic target cleanup levels may result in better allocation of remedial and regulatory dollars in site investigations.

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APPENDIX C

SUPPORTING INFORMATION FOR ECOLOGICAL RISK ASSESSMENT

C-1 TOXICITY DATA

C-2 RECEPTOR PROFILES

C-3 SOURCES OF THE TOXICITY REFERENCE VALUES AND FOOD CHAIN MODEL RESULTS

C-4 ALTERNATIVE BENCHMARKS

C-5 TOXICITY TEST LABORATORY REPORT

C-6 STATISTICAL ANALYSIS OF THE TOXICITY TEST DATA

C-7 TOXICITY TEST CORRELATION PLOTS

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C-9 SCORING SYSTEM FOR BENTHIC MACROINVERTEBRATES

C-10 FISH TISSUE TOXICITY REFERENCE VALUES

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APPENDIX C-1

TOXICITY DATA

DIVALENT METALS

Numerous studies have demonstrated that the concentration of acid-volatile sulfides (AVS) present in sediments represents a major factor in influencing the pore water concentration and bioavailability of divalent metals (cadmium, copper, nickel, lead, and zinc; silver to a lesser extent) in sediments. Sediments with concentrations of AVS in excess of the concentration of those metals will have very low metal activity in the interstitial water (Ankley et al., 1996); AVS metals present in these sediments are unlikely to bioaccumulate or elicit toxic effects. The fate and transport of divalent metals are discussed below.

CADMIUM

Cadmium is a soft, blue-white, malleable metal or gray-blue powder. Cadmium is used for electroplating, in pigment production, and in the manufacture f plastic stabilizers and batteries. Sources of cadmium include smelter fumes and dusts, incineration products from cadmium-containing materials, fertilizer, and municipal wastewater and sludge discharges. It also is an industrial by-product of the manufacture of zinc, copper, and lead (ASTDR, 1991a).

Cadmium compounds have varying degrees of solubility ranging from very soluble (cadmium salts) to nearly insoluble (cadmium metal) (ASTDR, 1991a). Cadmium may exist in water as a hydrated ion or as metal inorganic complexes and it is more mobile in aquatic environments than most heavy metals (Eisler, 1985).

Adsorption and desorption rates of cadmium are rapid on mud solids and particles of clay, silica, humic material, and other naturally occurring solids. Changes in the physical chemistry of a waterbody (especially pH and redox potential) influence the suspension of cadmium from the sediments into the water column. During anaerobic conditions, cadmium is more likely to release from the sediments into the water column (ASTDR, 1991a).

Cadmium exists in soil as free cadmium compounds. Cadmium released to soils may leach into water, especially under acidic conditions (ASTDR, 1991a).

Freshwater and marine aquatic organisms accumulate cadmium from water at levels that may not be hazardous to aquatic life (Eisler, 1985). However, the evidence for cadmium transfer through various trophic levels suggests that only the lower trophic levels exhibit biomagnification (Eisler, 1985).

Cadmium is not essential for plant growth. If present in available form, cadmium is readily taken up by plant roots and tranlocated through the plant and accumulated.

COPPER

Copper is a reddish-colored metal that occurs naturally in rock, soil, water, sediment, air, plants, and animals. Copper is used primarily as a metal or alloy in the manufacture of wire, sheet metals, pipe, and other metal products. Copper compounds are used in agriculture to treat plant diseases, for water treatment, and as preservatives for wood, leather, and fabrics (ATSDR, 1989a).

Copper is released to water through natural weathering of soil and discharges from industries and sewage treatment plants. Copper released into water will most likely take the form of copper (II). Most copper in water is bound to organic matter; little is present in the free or readily exchangeable form. The concentration of dissolved copper in water is dependent on such factors as pH, the oxidation-reduction potential of the water, the presence of competing cations and anions of soluble cupric salts, and the presence of organic/inorganic complexing agents (ATSDR, 1989a).

Copper released into water tends to bind to the bottom sediments. Organics and iron oxides are the most important contributor to binding of copper by aerobic sediments. However, copper is typically associated with carbonates. In anaerobic sediment, copper (II) will be reduced to copper (I) and insoluble cuprous salts will form (ATSDR, 1989a).

Copper released to soil will be strongly adsorbed and remain in the upper few centimeters of soil. In most soils, the pH, organic matter, and ionic strength of the soil solutions are the key factors affected adsorption. Copper will adsorb to organic matter, carbonate minerals, clay minerals, or hydrous iron and manganese oxides. Sandy soils with low pH have the greatest potential for leaching (ATSDR, 1989a).

Copper is a micronutrient essential for plant nutrition. Copper can be transported in the xylem and phloem of plants complexed with amino acids.

LEAD

Lead is ubiquitous and is a characteristic trace constituent in rocks, soils, water, plants, animals, and air. Lead is used in the manufacture of storage batteries, gasoline additives, pigments, alloys, and ammunition (Eisler, 1988).

Lead compounds are extremely persistent in water and soil. Lead readily combines with hydroxide, carbonate, and sulfate ions to form insoluble compounds. These compounds precipitate and settle in the

bottom sediment. Lead is not volatile; therefore, volatilization is not an important transport process from the aquatic environment (EPA, 1985).

In water, lead is most soluble and bioavailable under conditions of low pH, low organic content, low concentrations of suspended sediments and low concentrations of the salts of calcium, cadmium, iron, manganese, and zinc. Lead tends to concentrate in the water surface microlayer (the upper 0.3 mm of water), especially when surface organic matter is present in thin films. However, most lead entering natural waters will precipitate to the sediment bottom as carbonates or hydroxides. Migration and speciation of lead in water are influenced by the water flow rate; increased flow rate results in increased concentrations of particulate and labile lead and a decrease in bound forms. At low stream flow, lead is rapidly removed from the water column by sedimentation (Eisler, 1988).

Sorption is a dominant effect on the distribution of lead in soil. Lead readily adsorbs to inorganic solids, organic material and hydrous iron and manganese oxides. Because of leads affinity for other materials, and its solubility characteristics, the mobility of lead in soil is low (EPA, 1985). Most lead is retained in soil and not transported via leaching or runoff to surface water (ATSDR, 1990).

Lead does not appear to significantly bioaccumulate in most fish (ATSDR, 1990). Microcosm studies indicate that lead is not biomagnified through the food chain (EPA, 1985). Lead concentrations tended to decrease markedly with increasing trophic level in both detritus-based and grazing aquatic food chains. However, lead is toxic to all phyla of aquatic biota, though effects are modified significantly by various biological and abiotic conditions (Eisler, 1988).

Lead is considered a nonessential element to plants (CCME, 1997). Lead is taken up passively by roots and translocation to shoots is limited.

NICKEL

Nickel released into water will exist in both soluble and insoluble forms depending on the chemical and physical properties of the water. Nickel is significantly bioaccumulated in some but not all aquatic species (ATSDR, 1988). Nickel is extremely persistent in soil; however, it still has the potential to leach through soil into groundwater. The sorption of nickel into soils has found to correlate with suspension pH, total iron, and surface area. Organic complexing agents in soil tend to restrict the movement and availability of nickel in soil by forming organo-nickel complexes.

ZINC

Zinc is bluish-white metal that dissolves readily in strong acids. Zinc compounds are found naturally in air, soil, and water and are present in all foods. It is commonly used as a protective coating for other metals. Zinc also is used in alloys such as bronze and brass, for electrical apparatus in many common goods, and in organic chemical extractions and reductions. Zinc chloride is used by the military to create smoke bombs. In pharmaceuticals, salts of zinc are used as solubilizing agents in many drugs. In addition, zinc is used with copper to make United States pennies (ATSDR, 1989b).

Zinc released into surface water primarily settles into the bottom sediments. Zinc can be present in water as either suspended or dissolved compounds. Suspended (undissolved) zinc may be dissolved following minor changes in the water chemistry or may be sorbed to suspended matter. Zinc tends to be more absorbed at higher pH concentration (>7). Desorption of zinc from sediments occurs as salinity increases (ATSDR, 1989b).

Zinc released onto soil is likely to be strongly absorbed. The mobility of zinc in soil is dependent upon the solubility of the speciated forms of the compound and on the soil properties (sorption potential, pH, and salinity; anaerobic). Little land-disposed zinc is in a soluble form; therefore, mobility is limited by a slow dissolution. Consequently, zinc is not likely to migrate into groundwater (ATSDR, 1989b).

Zinc is actively accumulated in aquatic systems. However, biota appear to represent a minor sink for zinc compared with the sediments (ATSDR, 1989b). Zinc bioavailability and toxicity to aquatic organisms are highest under conditions of low pH, low alkalinity, low dissolved oxygen, and elevated temperatures. Soluble species of zinc are the most bioavailable and most toxic (Eisler, 1993).

Zinc is an essential element for plant growth. Zinc is actively taken up by roots and is fairly uniformly distributed between roots and shoots.

MISCELLANEOUS METALS

ALUMINUM

Although present in food in varying amounts, aluminum is not an essential element for mammals. The lack of accumulation of aluminum in animals with age or of any increase in tissue levels of aluminum following fairly high dietary intake suggests that mammals possess a homeostatic mechanism for this element. For most terrestrial organisms, aluminum compounds are generally not harmful and are considered to be toxicologically inert, except in cases of high experimental doses or prolonged inhalation (Venugopal and Luckey, 1978).

Data on the toxicity of aluminum to aquatic organisms are somewhat limited. EPA (1988) stated that freshwater organisms should not be adversely affected if aluminum concentrations do not exceed 87 µg/L when pH is between 6.5 and 9.0. Some studies have shown that the acute toxicity of aluminum increases with pH, whereas other studies found the opposite to be true (EPA, 1988).

ANTIMONY

Antimony is used in metal alloys for producing fireproofing chemicals, ceramics, glassware, and pigments. Along with its industrial uses, it is used to medicinally treat people infected with parasites (ATSDR, 1995).

Antimony is considered a nonessential metal and is easily taken up by plants if present in a soluble form (Kabata-Pendias and Pendias, 1992). Plants growing in soils contaminated by industrial emissions contain elevated tissue concentrations of this metal. However, there are no reports of plant toxicity resulting from uptake of antimony (Kabata-Pendias and Pendias, 1992).

ARSENIC

Arsenic in the environment may undergo a complex cycle of chemical interconversions and transfers among media. Arsenic in water may undergo either reduction or oxidation, depending on pH, the electrochemical oxidation-reduction potential (Eh), and other ions present. Soluble forms of arsenic tend to be quite mobile in water, and less soluble species adsorb to clay or soil particles (ATSDR, 1989c).

BARIUM

Barium chloride and nitrate are soluble in water. The carbonate is much less soluble in water and the sulfate is one of the least soluble compounds in any medium (Friberg, 1986). Barium is relatively abundant in nature and is found in plant and animal tissue. Plants accumulate barium from the soil (Klaassen et al., 1986). The free ion is readily absorbed from the lung or gastrointestinal tract, but barium sulfate remains essentially unabsorbed. After absorption, barium accumulates in the skeleton. An accumulation also takes place in the pigmented parts of the eye (Friberg, 1986).

BERYLLIUM

Beryllium occurs as a chemical component of certain rocks, soils, and volcanic dust. Beryllium is naturally emitted to the atmosphere by windblown dust and volcanic particles (ATSDR, 1991b). The major emission source to the environment is the combustion of coal and fuel oil, which release particulates and fly ash that contain beryllium into the atmosphere.

Sediment is the ultimate sink for beryllium in water, and its association with sediment would decrease the mobility in water. Beryllium does not bioconcentrate to high levels in aquatic animals, although the bioconcentration in bottom-dwelling animals may be higher than nonbottom-dwelling animals. There is no evidence of biomagnification of beryllium within terrestrial or aquatic food chains (ATSDR, 1991b). Soluble forms of beryllium are easily taken up by plant roots, but it is not easily translocated from the roots to the shoots.

CHROMIUM

This metallic element naturally occurs in rocks, animals, plants, soil, and volcanic dust and gases (USDHHS, 1993). However, the toxic forms of the metal are mostly produced from anthropogenic activities, particularly chromite ore mining (Irwin et al., 1997). Since the trivalent (Cr^{3+}) and hexavalent (Cr^{6+}) forms have been found to be more stable than other ionic forms, these are the forms mostly found in the environment (Eisler, 1986). Cr^{6+} is more toxic because it has a high oxidizing potential and can easily penetrate biological membranes, thus causing cellular damage (Eisler, 1986; Irwin et al., 1997). Although not as toxic as Cr^{6+}, Cr^{3+} can impose damage by inhibiting different enzyme systems or reacting with organic molecules (Irwin et al., 1997).

Chromium toxicity is not prevalent in mammals because normal stomach pH converts Cr^{6+} to Cr^{3+}, which has low membrane permeability (Irwin et al., 1997). However, plants are adversely affected by chromium because it interferes with uptake translocation and iron metabolism (Irwin et al., 1997). For aquatic organisms, the pH, salinity, hardness, organic matter content, species and temperature are some of the factors that affect chromium toxicity (Eisler, 1986; Irwin et al., 1997). It has been found that Cr^{6+} is more toxic to freshwater species in soft and acidic waters (Eisler, 1986).

Chromium is not an essential element in plants. The (VI) form is more soluble and available to plants that the (III) form and is considered the more toxic form. After plant uptake, chromium generally remains in the roots (Efroymson, et al., 1997a). In fact, concentrations of chromium in the edible portions of the plant remain low, even when growing on contaminated chromium soil (CCME, 1997). Symptoms of plant toxicity include stunted growth, poorly developed roots, and leaf curling (Efroymson, et al., 1997a).

COBALT

Cobalt released into water is expected to take a soluble form. The mobility of cobalt is controlled by its characteristic of adsorbing to the clay minerals and hydrous oxides of iron, manganese, and aluminum available in sediments and soils. Chelation of cobalt is possible in sediments and soil.

IRON

Iron is the fourth most abundant (by weight) of the elements that compose the earth's crust and is a major constituent of clay soils. The bivalent and trivalent are the primary forms of concern in the aquatic environment. The ferrous or bivalent form is soluble in waters void of dissolved oxygen, and the ferric or trivalent form is insoluble. Iron can exist in natural organometallic or humic compounds and colloidal forms. Black or brown swamp waters may contain iron concentrations of several milligrams per liter, but this iron form has little effect on aquatic life. The majority of iron entering water bodies is likely to partition into the bottom sediments (EPA, 1985). Iron released into soil has relatively low mobility potential.

MANGANESE

Manganese is a brittle silvery metal that usually occurs as a complex with other metals such as iron. Manganese and its compounds are used in the making of steel alloys, dry-cell batteries, electrical coils, and other metallic fabrication applications (Klaassen et al., 1986; Hawley, 1987).

Manganese can occur in soil, water, or air. Although manganese can be transported in dusts or in water, the main source of routine manganese exposure is through ingestion of food. Vegetables, the germinal portions of grains, fruits, nuts, tea, and some spices are rich in manganese (Klaassen et al., 1986).

In the soil, the concentrations and chemical form in which manganese can occur are affected by pH, cation exchange capacity, drainage, and other factors. Lower pH and reducing conditions tend to favor solubility and, hence, the mobility of manganese. Manganese often occurs at higher concentrations in the bottom of stratified lakes as a result of its release from bottom sediments as manganese ion under reducing conditions (EPA, 1985).

Manganese is essential for plant growth. Toxicity symptoms include marginal chlorosis and necrosis of leaves and root browning. It is fairly uniformly distributed between the roots and shoots (Efroymson, et al., 1997a). Oak Ridge National Laboratory (ORNL) (1998) calculated mean and 90th percentile reported soil-to-plant bioaccumulation factors (BAFs) of 0.113 and 0.234, respectively. They must be multiplied by the percent dry weight of a plant (about 30 percent) for use in exposure equations to yield BAFs of 0.0339 (mean) and 0.070 (90 percentile) (Sample et al., 1997).

MERCURY

Mercury is a silvery, heavy liquid that exists as insoluble elemental mercury, organic species, and inorganic species. Solubility depends upon the reduction-oxidation potential and the pH of the environment (EPA, 1985). Mercury is commonly used for amalgams, catalysts, electrical apparatuses,

instruments such as thermometers and barometers, and neutron absorbers in nuclear power plants (Hawley, 1987).

Mercury released to the environment will remain there indefinitely. The form that mercury exists in (organic or inorganic) may change with time. Chemical speciation is probably the most important variable influencing the ecotoxicology of mercury (Eisler, 1987). Inorganic mercury can be methylated by microorganisms indigenous to soils, freshwater, and salt water. This process is mediated by various microbial populations under both aerobic and anaerobic conditions. Methyl mercury is the most hazardous mercury species due to its high stability, its lipid solubility, and its possession of ionic properties that create a high ability to penetrate membranes in living organisms. Methylmercury in surface waters is rapidly accumulated by aquatic organisms. The top-level predator species usually contain the highest concentrations of methyl mercury (Eisler, 1987).

Volatile forms of mercury present in surface water are expected to evaporate into the air; whereas, solid forms of mercury partition to particulates or are transported in the water column, depending on their solubility. The two most important transformation processes in the fate of mercury in surface waters are biotransformation and bioaccumulation. Photolysis of organomercurials also may occur in surface waters (ATSDR, 1988).

Mercury released into soils may undergo the same chemical and biological transformations as mercury released into surface waters. Mercuric mercury usually forms complexes with chloride and hydroxide ions in soils. The specific compounds is dependent on pH, salt content, and composition of the soil solution (ATSDR, 1988).

Freshwater plants exhibit a wide range of sensitivity to mercury; however, the most sensitive aquatic plant is less sensitive than the most sensitive freshwater animal. Fish tend to be more resistant to mercury than mollusks and crustaceans (Eisler, 1987).

Mercury and its compounds taken up by roots are translocated to only a limited extent in plants. Organic forms of mercury may be translocated to a greater degree than inorganic forms in some plants (Efroymson, et al., 1997a).

SELENIUM

Selenium is essential in amounts from trace to part-per-billion concentrations for humans and certain plants and animals but toxic at some concentrations present in the environment. Selenium is widely distributed in nature, being especially abundant with sulfide minerals of various metals, such as iron, lead, and copper. Selenium was used in the early 1900s as a pesticide to control plant pests and is still used

sparingly to control pests of greenhouse chrysanthemums and carnations. It has been used to control cotton pests, mites and spiders that attack citrus, and mites that damage apples. Selenium is used extensively in the manufacture and production of glass, pigments, rubber, metal alloys, textiles, petroleum, medical therapeutic agents, and photographic emulsions (ATSDR, 1989d).

Selenium metabolism and degradation are significantly modified by interaction with heavy metals, agricultural chemicals, microorganisms, and a variety of physicochemical factors. In addition, anthropogenic activities (including fossil fuel combustion and metal smelting) and naturally seleniferous areas pose the greatest hazards to fish and wildlife (ATSDR, 1989d).

Selenium is not proven to be essential for plant growth. Selenium is translocated to all parts of the plant, including the seed, in low molecular weight compounds.

VANADIUM

Vanadium released into surface water is expected to exist primarily in the tetravalent and pentavalent forms (HSDB, 2000). Both species are known to bind strongly to mineral or biogenic surfaces by adsorption or complexing. Adsorption to organic matter as well as to manganese oxide and ferric hydroxide results in precipitation of dissolved vanadium. Some marine organisms bioconcentrate vanadium. In soil, vanadium's mobility is expected to be dictated by soil pH; mobility is expected to be lower in acidic soils.

SILVER

Numerous studies have indicated that free soluble silver (Ag) is among the most toxic metals to freshwater organisms. In most natural waters, the monovalent form of silver is of greatest concern. Silver may exist as a simple hydrated monovalent ion, or it may exist in various degrees of association with inorganic ions such as sulfate, bicarbonate, or nitrate (EPA 1980). Silver is more toxic in soft water than in hard water (EPA 1980). Although elemental silver and silver salts have relatively high aquatic toxicity, high concentrations of iron sulfides in natural sediments favor the formation of silver sulfide (Hirsch, 1998). Silver sulfide is, in general, toxicologically inert. Moreover, silver sulfide is a breakdown product of silver thiosulfate, which is a major source of silver discharged from human activities.

Silver exhibits a limited ability to bioconcentrate. Bioconcentration factors for freshwater species reported by EPA (1980) ranged from <1 for bluegill sunfish (*Lepomis macrochirus*) to 240 for a mayfly (*Ephemeralla grandis)* with a geometric mean bioconcentration factor of 57.

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SVOCs

PAHs

The PAHs are a diverse group of compounds consisting of two or more substituted and unsubstituted polycyclic aromatic rings formed by the incomplete combustion of carbonaceous materials. They include the following compounds: acenaphthylene, acenaphthene, anthracene, benzo(a)anthracene, benz(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, carbozole, chrysene, dibenzofuran, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, 2-methylnaphthalene, phenanthrene, pyrene, (ATSDR, 1989).

PAHs are ubiquitous in the modern environment and commonly are constituents of coal tar, soot, vehicular exhausts, cigarette smoke, certain petroleum products, road tar, mineral oils, creosote, and many cooked foods. PAHs also are released to the environment through natural sources such as volcano and forest fire emissions. However, most of the emissions result from anthropogenic sources, largely wood burning for homes. Vehicular emissions are another primary source of PAHs. Hazardous waste sites can be a concentrated source on a local scale. Examples of such sites include former manufactured gas sites (i.e., sources of coal tar) and abandoned wood treatment plants (i.e., sources of creosote) (ATSDR, 1989).

PAHs are transferred from surface water by volatilization and sorption to settling particles. The compounds are transformed in surface water by photooxidation, chemical oxidation, and microbial metabolism (ATSDR, 1989).

In soil and sediments, microbial metabolism is the major process for degradation of PAHs (ATSDR, 1989). Although PAHs accumulate in terrestrial and aquatic plants, many organisms are able to metabolize and eliminate these compounds. Vertebrates can readily metabolize PAHs whereas lower forms (insects and worms) cannot metabolize PAHs as quickly. Food-chain uptake does not appear to be a major exposure source to PAHs for aquatic animals (ATSDR, 1989).

Plants and vegetables can absorb PAHs from soils through their roots and translocate them to other plant parts such as developing shoots. Lower molecular weight PAHs are absorbed by plants more readily than higher molecular weight PAHs. The biomagnification potential of vegetation in terrestrial and aquatic food chains has not been measured. Finally, many higher plants can catabolize benzo(a)pyrene and possible other PAHs, (Eisler, 1987).

PAHs vary substantially in their toxicity to aquatic organisms. In general, toxicity increases as molecular weight increases, with the exception of some high molecular weight PAHs that have low acute toxicity.

Most species of aquatic organisms rapidly accumulate PAHs from low concentrations in the ambient medium. However, uptake of PAHs is highly species specific, being higher in algae, mollusks, and other species that are incapable of metabolizing PAHs (Eisler, 1987). The ability of fish to metabolize PAHs may explain why benzo(a)pyrene is frequently not detected or is found at only very low levels in fish from environments heavily contaminated with PAHs (ASTDR, 1989).

PHTHALATES

Bis(2-ethylhexyl) phthalate (BEHP) is a colorless liquid used in the production of polyvinyl chloride, which provides flexibility to plastics (ATSDR, 1993).

Because BEHP is likely to be released to air and water during production of plastics, it can be carried long distances. In aquatic environments, BEHP adsorbs to sediment and bioconcentrates in organisms (Spectrum Laboratories, 1999). In terrestrial habitats, BEHP will not evaporate or leach into groundwater. It may biodegrade under aerobic conditions following acclimation in soil (Spectrum Laboratories, 1999).

Butylbenzyl phthalate (BBP) is used as a plasticizer for polyvinyl and cellulose resins, primarily in polyvinyl chloride. Possible sources of BBP release to the environment are from its manufacture and distribution and from PVC blending operations. Diffusion of BBP from consumer products is expected to be minimal, (Howard, 1989).

If BBP is released to land, it will sorb to soil and should not leach appreciably. The most significant fate process in soil will be biodegradation. BBP in surface waters will partition to solids such as sediment and biota (Howard, 1989).

Bluegill sunfish exposed to BBP for 21 days at a mean BBP concentration of 9.73 mg/L had a bioconcentration factor of 663 (Howard, 1989).

Di-n-butyl-phthalate is an odorless and colorless oily liquid. It is a man-made chemical that is used mostly to help make plastics soft and flexible (ASTDR, 1989).

Di-n-butyl-phthalate is poorly soluble in water. Adsorption onto soil and sediments appears to be a significant sink for this chemical. Microorganisms in soil and sediment appear to be capable of degrading di-n-butyl-phthalate rapidly (ASTDR, 1989).

Data indicate that di-n-butyl-phthalate can be taken up by and accumulate in a variety of organisms. It was reported that bioconcentration factors (BCFs) in six species of invertebrates ranged from 1,900 to 6,600. BCFs for oysters, shrimp, and fish were reported to be 42, 31, and 12 (ASTDR, 1989).

Greenhouse studies have demonstrated dose-dependent uptake of di-n-butyl-phthalate from soils into corn, soybean, and wheat seedlings (ASTDR, 1989). It may be produced in plants and it is metabolically degraded by plants and animals.

Diethyl-phthalate (DEP) may enter the environment in air emissions, aqueous effluent, and solid waste products from manufacturing and plastics processing. Volitalization and leaching from disposed plastic materials are potential modes of transport into air, water, and soil. If released to soil or water, DEP is expected to undergo aerobic biodegradation, (Howard, 1989).

The measured bioconcentration factor for DEP in bluegill sunfish is 117 and it is 15 to 16 in mullet. BCFs of 12 and 44 have been calculated from Log (K_{ow}s). These BCFs indicate that bioaccumulation in aquatic organisms would not be significant (Howard, 1989).

Dimethyl phthalate (DMP) is released into the environment principally in industrial wasterwater from its production and use as a plasticizer and mosquito repellent. If spilled on land, it should weakly sorb to most soils unless the soil has a very high organic content. Therefore, leaching to groundwater is expected. If released to water, it will remain in the water column because it weakly sorbs to sediment (Howard, 1989).

The mean bioconcentration factors of DMP in brown shrimp and sheepshead minnows were 4.7 and 5.4 after 24 hours, which indicated a very low bioconcentration. Bluegill sunfish showed a bioconcentration of 57, which may be elevated due to experimental measurements (Howard, 1989).

Other Organics

No fate and transport information was available for N-nitrosodiphenylamine and 1,2,4-trichlorobenzene.

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ORGANOCHLRORINE PESTICIDES

CHLORDANE

Pure chlordane is a mixture composed of primarily cis-chlordane and trans-chlordane. It is a white crystalline solid with a mild, pungent odor. Chlordane is an insecticide that was used from 1948 to 1988 on food crops (specifically corn) and to control household termites. Consequently, it was intentionally applied to soils both in agricultural and urban settings. Due to its persistence indoors, its use as a termicide was stopped (ATSDR, 1989a).

Chlordane is expected to persist for more than 20 years in some soils. Volatilization appears to be the only major removal mechanism from soil. Leaching to groundwater from soil is not a likely removal mechanism. Adsorption to sediments and volatilization are significant removal mechanisms in water. In air, chlordane will degrade by photolysis and hydroxyl radical reaction (ATSDR, 1989a).

Chlordane will bioconcentrate in both marine and freshwater species, as well as in bacteria (ATSDR, 1989). In living organisms, chlordane concentrations are usually highest in samples collected near areas where chlordane was used to control termites or other pests, in predatory species, and in tissues with high lipid content. Food-chain biomagnification is low except in certain marine mammals (Eisler, 1990).

DDT, DDE, DDD

Historically, DDT was released to the environment during its formulation and extensive use as a pesticide in agricultural and vector control applications. Its primary metabolites are DDE and DDD. Although DDT was banned for use in this country in 1972, it is still being used in several areas in the world, particularly tropical countries. DDT and its primary metabolites do not occur naturally in the environment. However, due to the extensive past use of DDT worldwide and the persistence of DDT and its metabolites, these compounds are virtually ubiquitous and are continually being transformed and redistributed in the environment. DDT and its metabolites have been detected in virtually all media (ATSDR, 1989b).

DDT and its metabolites may be transported among media by the processes of solubilization, adsorption, bioaccumulation or volatilization. DDT, DDE, and DDD in the atmosphere are subject to photodegradation or redeposition by rain or dry deposition (ATSDR, 1989b).

DDT and its environmental degradation products preferentially bind to soil and sediment, where they may be subject to photodegradation on the surface and biodegradation in the subsurface. Under certain conditions, DDT may persist for long periods of time or may be converted to DDE, which persists for an even longer duration. Consequently, these compounds are not easily displaced from their site of

application, whether by runoff or leaching to groundwater. However, volatilization of DDT and DDE from soil accounts for considerable losses of these compounds. The tendency of DDD to volatilize is approximately one-third that of DDT or DDE (ATSDR, 1989b).

When DDT is released to water, it quickly absorbs to particles and is subject to sedimentation, volatilization, photodegradation, and uptake into the food chain. Similar to soil, volatilization accounts for loss of these compounds from water. One study found that DDE volatilizes from seawater 10 to 20 times faster than from freshwater (ATSDR, 1989b).

DDT, DDE, and DDD are highly lipid soluble. This lipophilic property, combined with an extremely long half-life, results in bioaccumulation. When present in ambient water, DDT and its metabolites are concentrated in freshwater and marine plankton, insects, mollusks, and other invertebrates and fish. As these organisms become part of the food chain, a progressive accumulation of residues may result in high levels of residues in organisms at the top of the food chain (ATSDR, 1989b).

DIELDRIN

Dieldrin is an organochlorine pesticide that was used extensively in the past as an insecticide for corn and termite control. Dieldrin released to soils will persist for extremely long periods of time. Its low water solubility and strong adsorption to soil make leaching into groundwater unlikely. In surface water, dieldrin will adsorb to sediment and bioconcentrate in aquatic organisms (Howard, 1991).

Moderate to significant bioconcentration in aquatic species has been reported, with bioconcentration factors (BCFs) ranging from 100 to 10,000 (Howard, 1991).

HEPTACHLOR

Heptachlor is a white powder that smells somewhat like camphor. It was used in the past (but is no longer permitted) for killing insects in homes, buildings, and on food crops. It is approved by EPA for killing fire ants in power transformers (ASTDR, 1991).

Heptachlor is expected to adsorb strongly to soil, making leaching into groundwater unlikely. Volatilization from soil particles to the atmosphere is possible. In surface water, the heptachlor will adsorb to the sediments (Howard, 1991).

Heptachlor has been reported to bioconcentrate in aquatic species. BCFs for several fish species are as follows: spot (5,744 to 8,282–whole body, 4,686-fillet); fathead minnow (9,500-19,952); mosquito fish

(3,600-3,800); and sheepshead minnow (21,379). The BCFs in snails, alga, and oysters are 37,000, 21,000, and 18,000, respectively (Howard, 1991).

POLYCHLORINATED BIPHENYLS (AROCLOR 1254, AROCLOR 1260)

The term polychlorinated biphenyls (PCBs) commonly refers to a variety of mixtures of individual biphenyl isomers, each consisting of two joined benzene rings and up to 10 chlorine atoms. Mixtures of these isomers are known by their commercial designation of Aroclor. This trade name is followed by a four-digit number: the first two numbers indicate the type of isomer mixture and the last two numbers indicate the approximate weight percent of chlorine in the mixture (EPA, 1985).

PCBs are man-made chemicals that were used widely in transformers and electrical equipment and as lubricants (ATSDR, 1989c). PCBs are inert, thermally and chemically stable compounds with dielectric properties. Because of their persistence and toxicity in the environment, their manufacture was discontinued in the United States in 1977 (EPA, 1985). However, PCB equipment manufactured before 1977 is currently still being used in the United States and this use is regulated by EPA.

PCBs released into water adsorb to sediments and other organic matter. Typically, PCB concentrations are greater in the sediment and suspended material than in the water column. Substantial quantities of PCBs in aquatic sediments can act as an environmental reservoir from which PCBs may be released slowly over a long period of time (ATSDR, 1989c). For PCBs that exist in the dissolved state in water, volatilization becomes the primary fate process. Therefore, the volatilization process is the major removal mechanism of PCBs from water sources. However, the rate of volatilization is dependent upon PCB adsorption to sediment (ATSDR, 1989c). PCBs have the capability to bioaccumulate and biomagnify (EPA, 1985).

Degradation of PCBs in the environment is dependent upon the degree of chlorination. Generally, the more chlorinated the PCB molecule, the more persistent it will be in the environment. Factors that determine biodegradability include the amount of chlorination, concentration, type of microbial population, available nutrients, and the temperature (ATSDR, 1989c).

PCBs are expected to be highly immobile in the soil due to rapid and strong sorption. Accumulation of PCBs in terrestrial vegetation can occur by uptake from soil through the root and by deposition of atmospheric particulates on aerial plant surfaces. However, the transfer of vapor-phase PCBs from air to aerial plant parts may be the main source of vegetation contamination (ATSDR, 1989c).

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MISCELLANEOUS COMPOUNDS

Cyanide

Hydrocyanic acid (HCN) is very reactive and occurs only rarely in nature. The cyanide ion (CN^-) is highly water soluble and readily forms complexes with a variety of metal ions, especially those of the transition series. Compounds containing cyanide are often associated with steel, petroleum, plastics, synthetic fibers, metal plating, and chemical industries. The toxicity to aquatic organisms of most simple cyanides and metallocyanide complexes is due mostly to the presence of HCN as derived from ionization, dissociation, and photodecomposition of cyanide-containing compounds, although the cyanide ion is also toxic. All available evidence suggests that cyanide is neither mutagenic, teratogenic, nor carcinogenic. Moreover, there are no reports of cyanide biomagnification or cycling in living organisms, probably owing to its rapid detoxification. Cyanide seldom persists in surface waters and soils owing to complexation or sedimentation, microbial metabolism, and loss from volatilization (ATSDR, 1991).

Total Petroleum Hydrocarbons

See PAH fate and transport profile.

Ammonium Perchlorate

Little information was available regarding the fate and transport of ammonium perchlorate. An ammonium perchlorate study is currently ongoing at NSWC Indian Head. Data and information from that study, when available, will be used to obtain fate and transport information.

ENERGETICS

For this ERA, the term "energetics" will be used to describe the broad class of compounds used as propellants and explosives and similar compounds used in the processes associated with propellants and explosives. As a matter of note, available fate and transport information for these compounds suggests that they have limited persistence in aquatic media.

In general, energetics are distinguished by one or more nitro- groups on the compound molecule. Nitro compounds released to soils and sediments are reduced to amino compounds and covalently bounded to soil organic matter (Roberts, 1992). A recent study has indicated that it may not be sufficient to look only for expected ordnance compounds in sediments due to breakdown of parent compounds and the possibility of degredation product toxicity.

2,4,6-Trinitrotoluene (TNT)

2,4,6-Trinitrotoluene (TNT) is used as a high explosive in military armaments and as a chemical intermediate in the manufacture of dyestuffs and photographic chemicals. TNT is least impact- and friction-sensitive of the high explosives, and the impurities formed during its production (except for tetranitromethane) do not affect its sensitivity. TNT is likely to enter the environment in wastewater effluent from production facilities and from leachate at waste disposal sites. Mobility in soil may be limited by strong adsorption to soil particles (Roberts, 1992). Several studies have indicated that sediment adsorption and volatilization are not likely to be a significant fate processes. Degradation via photolysis and biotransformation, but not hydrolysis, is considered significant. Adsorption in soil is important process affecting the migration of TNT, with the cation exchange capacity and organic carbon content most critical in determining the degree of adsorption. Molecular diffusion also is considered an important factor and is related largely to percolation rate, but vapor phase diffusion would only be significant in arid climates where soil clay content is low (Roberts, 1992).

In general, TNT binds strongly to sediments (Talmage et al., 1999). In contrast, another study showed that sorption to TNT to pond sediment is measurable but not extensive, is correlated to time and concentration, and is strongly, perhaps irreversibly, bound. Sorption of TNT to sediment is also directly related to pH and temperature. The degradation products of TNT also appear to be adsorbed to sediment. Slow biotransformation of TNT in natural water, even in the presence of small quantities of organic nutrients, has been demonstrated. The major process of transformation is via nitro-group reduction with no ring cleavage. The 2-amino and 4-aminodinitrotoluenes are the major biotransformation products. The volatilization of TNT is very slow and actual rates are consistently lower than those estimated by physical and chemical properties (Roberts, 1992).

Studies by Shugart et al. (1990) on the presence of TNT and its metabolite concentrations in the tissues of wildlife taken from the Alabama Army Ammunition Plant suggest that these materials do not accumulate; no TNT-related compounds were detected in these samples. No published literature was located regarding the metabolism of TNT isomers. Studies specifically describing release, fate, and transport of energetic compounds within aquatic ecosystems are scarce as well. Results of these studies indicate that long distance transportation TNT, RDX and DNT in aquatic systems and their degradation products is unlikely. Photolytic degradation of TNT proceeds fairly rapidly and limits the persistence of this munition in the water column (Etnier, 1987).

2,4-Dinitrotoluene (2,4-DNT) and 2,6-Dinitrotoluene (2,6-DNT)

2,4-Dinitrotoluene (2,4-DNT) and 2,6-Dinitrotoluene (2,6-DNT) are pale yellow solids and are two of six possible forms of DNT. DNT is made by mixing toluene with nitric acid. Etnier (1987) reported that

biodegradation of 2,4 DNT and 2,6 DNT occurs under anaerobic conditions in the presence of exogenous carbon source; a slight biodegradation of 2,6 DNT was found to occur under aerobic conditions. There is a potential for transport of DNT via surface water and groundwater due to the moderate solubility of DNT and the low K_{ow} value. DNT is not expected to bioacumulate in animal tissues. Photolysis is considered the major degradation route of DNTs released into oxygenated water (Robers, 1992). When released into the atmosphere, DNTs are subject to side chain oxidation, decarboxylation, ring oxidation, and/or nitroreductin in air and sunlight. Indirect photoysis also may occur (Roberts, 1992).

Nitrocellulose

Because of its fibrous nature, nitrocellulose blankets benthic habitats (limiting available oxygen) and can fill in interstitial spaces used as cover for benthic organisms. This habitat alteration is compounded by the resistance of nitrocellulose to environmental degradation.

HMX

HMX, a colorless, crystalline solid, is a completely N-nitrated, eight-member heterocyclic ring compound. HMX is used to implode fissionable material to achieve critical mass in nuclear devices and as a component in plastic-bonded explosives, solid-fuel rocket propellants, and military munitions with such applications as burster chargers. HMX has approximately 130% of the explosive power of trinitrotoluene (TNT). Environmental HMX pollution may result from propellant formulation manufacture. Photolysis is the dominant fate process for HMX in the aquatic environment. A concentration of 0.5 ppm HMX is reported to have a half-life of 4 to 5 days when exposed to natural sunlight. Major photolytic transformation products are nitrate, nitrite, and formaldehyde. Photolytic processes are inhibited in waste disposal lagoon water with poor light transmission (Roberts, 1992). Biotransformation was also identified as an important fate process for HMX in the aquatic environment. Aerobic biotransformation of HMX occurs rapidly in HMX waste stream waters but not in river or lagoon waters. Anaerobic biotransformation occurs very slowly but is accelerated in the presence of excess organic nutrients. The metabolites resulting from both aerobic and anaerobic transformation are the mono- through tetranitroso derivatives of HMX that are metabolized to 1,1-dimethylhydrazine. Hydrolysis, oxidation, and abiotic reduction are not considered major transformation processes for HMX, nor are volatilization, sediment sorption, and biosorption (Roberts, 1992). Hydrazines are ephemeral in the aquatic environment (Amidei, 2000).

RDX

RDX, a white crystalline solid, is a completely N-nitrated, six-member heterocyclic ring compound. It has been used extensively as a high-impact explosive in military munitions formulations since World War II. RDX also is used as a rat poison. RDX is usually manufactured by the nitration of hexamethylene

tetramine. RDX can enter the aquatic environment through wastewater discharges from the manufacture and loading of RDX, and migration from settling ponds into soil, with subsequent leaching to groundwater. Direct photochemical degradation is the major removal process in translucent waters. Atmospheric releases may occur from incineration of RDX-containing mixtures, with dry or wet deposition as major atmospheric removal processes. Sediment deposits in army ammunition plants may also pose an environmental problem, since seepage into the groundwater may occur (Roberts, 1992). Sediment absorption will not lead to a significant loss in the aquatic environment (Roberts, 1992). Lotufo (unpublished data) has also shown that cyclonitramines (HMX and RDX) have low affinity for sediment.

Miscellaneous Energetics

Little fate and transport information was available for nitrobenzene, nitroguanidine, PETN, and nitrate esters. Nitrate esters are a class of compounds that include triethylene glycol dinitrate, nitroglycerin, propylene glycol dinitrate, butanetriol trinitrate, trimethylolethane trinitrate.

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APPENDIX C-2

RECEPTOR PROFILES

The following presents the receptor profiles for the mallard duck, great blue heron, and mink. These species were used as part of the food chain model calculations estimating risk to terrestrial wildlife at Mattawoman Creek. The majority of the information for the profiles was obtained from the Wildlife Exposure Factors Handbook (USEPA, 1993). The data for the incidental sediment ingestion rates were obtained from the Estimates of Soil Ingestion by Wildlife (Beyer, 1994).

The food and water ingestion rates are presented in g/g (of body weight)-day on a wet weight basis. The home ranges are presented in hectares in USEPA (1993), but were converted to acres in the SERA by multiplying the number of hectares by 2.471. Also, note that the estimated percent of soil in the diets is listed in dry weight, while the other exposure factors are in wet weight. The soil dry weight was not converted to a wet weight in this SERA because the percent moisture of the soils is not known. This results in an overestimate of soil in the diet. However, incidental soil ingestion is only a small portion of the overall diet (3.3% for the mallard). Incidental soil ingestion rates are not available for the heron and mink and so 3.3% (for the mallard) was used in the calculation. This is conservative when assuming a diet of 100% fish for the heron and mink because very little sediment (i.e., likely to be less than 3.3%) will actually be consumed.

The attached table presents the calculation of the exposure parameters. Note that in this table the ingestion rates listed in g/g-day were converted to kg/day (or L/day) for the conservative and average scenarios for use in the food chain models. The ingestion rates were calculated differently (depending on the information available) as indicated on the table. The mink conservative ingestion rates were calculated by multiplying the highest ingestion rates by the average body weights. In calculating the ingestion rates for the heron, the highest body weight was multiplied by the only listed rate in g/g-day. The food ingestion rate for the mallard was calculated by Nagy's equation, using the maximum listed body weight for the conservative scenario and the average body weight for the average scenario. The water ingestion rate for the mallard was calculated in the same manner as the mink. The highest ingestion rate was multiplied by the average body weight in the derivation of the conservative scenario. Typically, a minimum body weight is used in the conservative models. However, using the minimum body weight to calculate the maximum ingestion rate sometimes causes the conservative ingestion rate to be lower that the average ingestion rate. Therefore, the average body weight was selected to ensure that the ingestion rate for the conservative scenario was higher than the ingestion rate for the average scenario. All other average scenario ingestion rates were calculated by multiplying the average body weight from the study means by the average ingestion rates.

Mallard Duck *(Anas platyrhynchos)*

The mallard duck is a surface-feeding duck in that it feeds in shallow water, sifting and filtering through soft mud for food. Mallards are found in freshwater and saltwater wetlands nesting in areas that are dense with grassy vegetation approximately a half meter high. The mallard feeds mostly on seeds and grains of aquatic plants and aquatic invertebrates depending on the season, foraging and dabbling through sediment.

The male mallard duck is generally heavier than the female mallard duck with the average body weights ranging from 1.043 kg to 1.225 kg. The maximum test body weight (1.246 kg) was used however, in the derivation of the conservative food ingestion rate. Food ingestion rates were calculated in kg/day based on this information and Nagy's equation (USEPA, 1993): $FI = (0.0582)(BW^{0.651})$. Nagy's equation was further divided by 0.13 to account for the percent water in macrophytes. The conservative food ingestion rate of 0.517 kg/day and the average food ingestion rate of 0.495 kg/day were calculated.

The water ingestion rate for the mallard duck is estimated at 0.055 g/g-day (male) and 0.058 g/g-day (female). The conservative and average ingestion rates used for the food chain model were 0.068 L/day and 0.066 L/day, respectively. The incidental soil ingestion rates (0.01706 kg/day and 0.008481 kg/day for the conservative and average scenarios, respectively) were obtained by multiplying the food ingestion rate by the percentage of sediment incidentally ingested (3.3 percent).

Based on data from Minnesota wetlands/river, mallard ducks have home ranges from 98.84 acres to 3558 with an average home range of 1433 acres.

Great Blue Heron (*Ardea herodias*)

Great blue herons inhabit a variety of freshwater and marine areas, including lakes, rivers, marshes, and coastal wetlands, particularly where small fish are plentiful in shallow areas. Fish are the preferred prey, but they also eat amphibians, reptiles, crustaceans, insects, birds, and mammals. The majority of the fish they consume are less than 25 cm (10 inches) in length.

The adult body weights range from 2.204 to 2.576 kg with an average body weight of 2.31 kg. The food ingestion rate is listed as 0.18 g/g-day with calculated ingestion rates of 0.464 kg/day for the conservative scenario and 0.416 for the average scenario. The water ingestion rate is listed as 0.045 g/g-day with calculated ingestion rates of 0.116 L/day and 0.104 L/day for the conservative and average scenarios, respectively. The incidental soil ingestion rates are calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (3.3 percent) based on information from the mallard (Beyer, 1994). The sediment ingestion rates were calculated at 0.0153 kg/day and 0.0137 kg/day for the conserative and average scenarios, respectively.

The range of feeding range sizes for the heron is 1.5 to 21 acres for an average feeding range of 11 acres.

Mink (Mustela vison)

Minks are the most abundant and widespread carnivorous mammals in North America. They are found associated with aquatic habitats of all kinds including waterways such as rivers, streams, lakes, ditches, as

well as swamps, marshes, and backwater areas. They prefer irregular shorelines, and tend to use brushy or wooded cover adjacent to the water, where prey is abundant and where downfall and debris provide den sites. Mammals are the mink's most important prey throughout all seasons of the year in many parts of their range, but they also hunt aquatic prey such as fish, amphibians, and crustaceans.

The adult body weight for the mink in various habitats ranges from 0.55 to 1.734 kg with an average of 1.103 kg. The listed food ingestion rates for minks range from 0.12 to 0.22 g/g-day, with calculated ingestion rates of 0.243 kg/day and 0.18 kg/day for the conservative and average exposure scenarios, respectivley. The water ingestion rates range from 0.028 to 0.11 g/g-day. Calculated water ingestion rates were 0.121 L/day for the conservative scenario and 0.073 L/day for the average exposure scenario. The incidental soil ingestion rate was calculated by multiplying the ingestion rate by the percentage of soil that is incidentally ingested (3.3 percent based on the mallard), as presented in Beyer (1993). The home range for the mink in riverine areas ranges from 19.3 to 50.4 acres.

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DERIVATION OF BODY WEIGHT, FOOD INTAKE, AND WATER INTAKE FACTORS FOR TERRESTRIAL FOOD CHAIN MODELS
MATTAWOMAN CREEK
INDIANHEAD, MARYLAND

	Data from EPA (1993)			Derivation of Factors for Modeling				
Species	Factor	Age/Sex/ Cond./Seas.	Mean	Factor	Study Mean	Conser-vative	Average	Notes
Mink								
	Body Weight (g)	A M spring	1734	Body Weight (kg)	1.354			Average BW is from study means
		A F spring	974					
		A M summer	1040		0.852			
		A M fall	1233					
		A F summer	550			0.550	1.103	
		A F fall	586					
	Food Inges-tion Rate (g/g-day)	A M summer	0.13	Food Inges-tion Rate (kg/day)	0.130			Highest ingestion rate and average body weight used for conservative rate while the average of the ingestion rates and average body weight were used for the average rate
		A M winter	0.12		0.140			
		A F winter	0.16					
		A M yr-round	0.22		0.220	0.243	0.180	
	Water In-gestion Rate (g/g-day)	A F	0.11	Water In-gestion Rate (L/day)	0.105	0.121	0.073	Highest ingestion rate and average body weight used for conservative rate while the average ingestion rate and average body weight were used for the average
		A M	0.099					
		A F	0.028		0.028			
Great Blue Heron								
	Body Weight (g)	A B	2229	Body Weight (kg)	2.229			Average BW is from study means
		A F	2204		2.39	2.20	2.31	
		A M	2576					
	Food Inges-tion Rate (g/g-day)	A B	0.18	Food Inges-tion Rate (kg/day)		0.464	0.416	Highest body weight used for conservative rate
	Water In-gestion Rate (g/g-day)	A B	0.045	Water In-gestion Rate (L/day)		0.116	0.104	Highest body weight used for conservative rate while the average body weight was used for the average rate
Mallard								
	Body Weight (kg)	A M	1.225	Body Weight (kg)	1.134			Average BW is from study means
		A F	1.043					
		A M	1.246		1.171			
		A F	1.095					
		A M	1.237		1.163			
		A F	1.088					
		A F	1.197		1.197			
		Min (kg)	1.043			1.043	1.166	
		Max (kg)	1.246					
		Avg (kg)	1.166					
	Food Inges-tion Rate (g/g-day)			Food Inges-tion Rate (kg/day)		0.517	0.495	Food ingestion rates calculated from Nagy's equations (EPA, 1993), using maximum body weight for conservative estimate (value divided by 0.13 to account for percent water in macrophytes)
	Water In-gestion Rate (g/g-day)	A M	0.058	Water In-gestion Rate (L/day)	0.0565			Highest ingestion rate and average body weight used for conservative rate while the average was used for the average rate
		A F	0.055			0.068	0.066	

Notes:
-Data shown are for adults
-Entries on adjacent rows are from the same study

Definitions:
A = Adult
F = Female, M = Male, B = Both
FIR = Food Ingestion Rate
BW = Body Weight
Cns = Conservative; Avg = Average

APPENDIX C-3

SOURCES OF THE TOXICITY REFERENCE VALUES AND FOOD CHAIN MODEL RESULTS

SOURCES AND ENDPOINTS FOR NOAELS AND LOAELS FOR TERRESTRIAL WILDLIFE

Parameters	Concentration (mg/kg-day)	Endpoint	Effect	Chronic/ Subchronic	Species	Primary Reference	Source of Reference
Semivolatiles Organics							
Acenaphthene	175	NOAEL	systemic	subchronic	mouse	USEPA, 1989a	IRIS, 2001
Acenaphthene	350	LOAEL	systemic	subchronic	mouse	USEPA, 1989a	IRIS, 2001
Acenaphthylene	700	NOAEL	mortality/BW	subchronic	mouse	USEPA, 1989a	PRC, 1996
Anthracene	1000	NOAEL	systemic	subchronic	mouse	USEPA, 1989b	IRIS, 2001
Anthracene	1000	NOAEL	reproductive	subchronic	mouse	USEPA, 1989b	IT Corp, 1997
Benzo(a)anthracene	17.1	NOAEL	carcinogenic	subchronic	mouse	Clayson et al., 1968	PRC, 1996
Benzo(a)pyrene	10	LOAEL	reproductive	chronic	mouse	Mackenzie and Angevine, 1981	Sample et.al., 1996
Benzo(b)fluoranthene	40	LOAEL	carcinogenic	chronic	rodent	Lo and Sandi, 1978	PRC, 1996
Benzo(g,h,I)perylene	72	LOAEL	carcinogenic	chronic	rodent	Simms and Overcash, 1983	PRC, 1996
Benzo(k)fluoranthene	72	LOAEL	carcinogenic	chronic	rodent	Lo and Sandi, 1978	PRC, 1996
Bis(2-ethylhexyl)phthalate	18.33	NOAEL	reproductive	chronic	mouse	Lamb et al., 1987	Sample et.al., 1996
Bis(2-ethylhexyl)phthalate	183.3	LOAEL	reproductive	chronic	mouse	Lamb et al., 1987	Sample et.al., 1996
Bis(2-ethylhexyl)phthalate	1.11	NOAEL	reproductive	chronic	ringed dove	Peakall, 1974	Sample et.al., 1996
Chrysene	17.1	NOAEL	carcinogenic	subchronic	mouse	Clayson et al., 1968	PRC, 1996
Dibenzo(a,h)anthracene	13.3	LOAEL	carcinogenic	chronic	mouse	Lorenz and Stewart, 1948	PRC, 1996
Diethyl phthalate	4583	NOAEL	reproductive	chronic	mouse	Lamb et al., 1987	Sample et.al., 1996
Di-n-butylphthalate	550	NOAEL	reproductive	chronic	mouse	Lamb et al., 1987	Sample et.al., 1996
Di-n-butylphthalate	1833	LOAEL	reproductive	chronic	mouse	Lamb et al., 1987	Sample et.al., 1996
Di-n-butylphthalate	1.11	LOAEL	reproductive	chronic	ringed dove	Peakall, 1974	Sample et.al., 1996
Fluoranthene	125	NOAEL	systemic	subchronic	mouse	USEPA, 1988	IRIS, 2001
Fluoranthene	250	LOAEL	systemic	subchronic	mouse	USEPA, 1988	IRIS, 2001
Fluorene	125	NOAEL	systemic	subchronic	mouse	USEPA, 1988	IRIS, 2001
Fluorene	250	LOAEL	systemic	subchronic	mouse	USEPA, 1988	IRIS, 2001
Fluorene	125		systemic		mouse	USEPA, 1989c	PRC, 1996
Indeno(1,2,3-cd)pyrene	72	LOAEL	carcinogenic	chronic	rodent	Simms and Overcash, 1983	PRC, 1996
2-Methylnaphthalene	41	NOAEL	mortality	chronic	rat	Schmahl, 1955	Used naphthalene value
2-Methylphenol	50	NOAEL	neurotoxicity	subchronic	rat	USEPA, 1996 and 1997	IRIS, 2002
2-Methylphenol	150	LOAEL	neurotoxicity	Subchronic	rat	USEPA, 1996 and 1997	IRIS, 2002
Naphthalene	71	NOAEL	systemic	subchronic	rat	BCL, 1980	IRIS, 2001
Naphthalene	142	LOAEL	systemic	subchronic	rat	BCL, 1980	IRIS, 2001
Phenol	60	NOAEL	body weight	subchronic	rat	NTP, 1983	IRIS, 2001
Phenol	120	LOAEL	body weight	subchronic	rat	NTP, 1983	IRIS, 2001
Pyrene	75	NOAEL	systemic	subchronic	mouse	USEPA, 1989c	IRIS, 2001
Pyrene	125	LOAEL	systemic	subchronic	mouse	USEPA, 1989c	IRIS, 2001
Pesticides/PCBs							
Aroclor-1248	0.1	LOAEL	reproductive	chronic	rhesus monkey	Barsotti et al., 1976	Sample et.al., 1996
Explosives							
1,3-Dinitrobenzene	1.07	NOAEL	reproductive	subchronic	rat	Cody et al., 1981	IRIS, 2001
m, o, and p-Nitrotoluene	200	LOAEL	systemic	chronic	rat	Ciss et al., 1980	USEPA, 1997 (HEAST)
HMX	30	NOAEL	mortality	subchronic	mouse	Everett and Maddock, 1985	Talmage et al., 1999
HMX	75	LOAEL	mortality	subchronic	mouse	Everett and Maddock, 1985	Talmage et al., 1999
1,3,5-Trinitrobenzene	2.64	NOAEL	systemic	chronic	rat	Reddy et al, 1996	IRIS, 2001
1,3,5-Trinitrobenzene	13.31	LOAEL	systemic	chronic	rat	Reddy et al, 1996	IRIS, 2001
2,4,6-Trinitrotoluene	160	LOAEL	reproductive	subchronic	rat	Dilley et al., 1982	Talmage et al., 1999
Inorganics							
Aluminum	109.7	NOAEL	reproductive	chronic	ringed dove	Carriere et al., 1986	Sample et.al., 1996
Aluminum	19.3	LOAEL	reproductive	chronic	mouse	Ondreicka et al., 1966	Sample et.al., 1996
Antimony	1.25	LOAEL	lifespan	chronic	mouse	Schroeder et al., 1968b	Sample et.al., 1996
Arsenic	1.261	LOAEL	reproductive	chronic	mouse	Schroeder and Mitchner, 1971	Sample et.al., 1996
Arsenic	2.46	NOAEL	mortality	chronic	brown-headed cowbird	USFWS, 1969	Sample et.al., 1996
Arsenic	7.38	LOAEL	mortality	chronic	brown-headed cowbird	USFWS, 1969	Sample et.al., 1996
Barium	5.1	NOAEL	growth	chronic	rat	Perry et al., 1983	Sample et.al., 1996
Barium	198	LOAEL	mortality	subchronic	rat	Borzelleca et al., 1988	Sample et.al., 1996
Barium	208.26	NOAEL	mortality	subchronic	chicks	Johnson et al., 1960	Sample et.al., 1996
Barium	416.53	LOAEL	mortality	subchronic	chicks	Johnson et al., 1960	Sample et.al., 1996
Beryllium	0.66	NOAEL	systemic	chronic	rat	Schroeder and Mitchner, 1975	Sample et.al., 1996
Cadmium	1	NOAEL	reproductive	chronic	rat	Sutou et al., 1980b	Sample et.al., 1996
Cadmium	10	LOAEL	reproductive	chronic	rat	Sutou et al., 1980b	Sample et.al., 1996
Cadmium	1.45	NOAEL	reproductive	chronic	mallard duck	White and Finely, 1978	Sample et.al., 1996
Cadmium	20	LOAEL	reproductive	chronic	mallard duck	White and Finely, 1978	Sample et.al., 1996
Chromium(III)	1	NOAEL	reproductive	chronic	black duck	Haseltine et al., unpubl.	Sample et.al., 1996
Chromium(III)	5	LOAEL	reproductive	chronic	black duck	Haseltine et al., unpubl.	Sample et.al., 1996
Chromium(VI)	3.28	NOAEL	BW/food cons.	chronic	rat	Mackenzie, 1958	Sample et.al., 1996
Chromium(VI)	131.4	LOAEL	mortality	subchronic	rat	Steven et al., 1976	Sample et.al., 1996
Cobalt	12	LOAEL	growth	chronic	rat	Domingo et al., 1985	Eng. Field Activity,1998
Copper	11.71	NOAEL	reproductive	chronic	mink	Aulerich et al., 1982	Sample et.al., 1996
Copper	15.14	LOAEL	reproductive	chronic	mink	Aulerich et al., 1982	Sample et.al., 1996

SOURCES AND ENDPOINTS FOR NOAELS AND LOAELS FOR TERRESTRIAL WILDLIFE

Parameters	Concentration (mg/kg-day)	Endpoint	Effect	Chronic/ Subchronic	Species	Primary Reference	Source of Reference
Copper	46.97	NOAEL	mortality	chronic	chicks	Mehring et al., 1960	Sample et.al., 1996
Copper	61.72	LOAEL	mortality	chronic	chicks	Mehring et al., 1960	Sample et.al., 1996
Cyanide	68.7	NOAEL	reproductive	chronic	rat	Tewe and Maner, 1981	Sample et.al., 1996
Iron	500	LOAEL	unknown	chronic	rabbit	NAS, 1980	
Iron	1000	LOAEL	unknown	chronic	poultry	NAS, 1980	
Lead	8	NOAEL	reproductive	chronic	rat	Azar et al., 1973	Sample et.al., 1996
Lead	80	LOAEL	reproductive	chronic	rat	Azar et al., 1973	Sample et.al., 1996
Lead	1.13	NOAEL	reproductive	chronic	Japanese quail	Edens et al., 1982	Sample et.al., 1996
Lead	11.3	LOAEL	reproductive	chronic	Japanese quail	Edens et al., 1982	Sample et.al., 1996
Manganese	997	NOAEL	growth	chronic	Japanese quail	Laskey and Edens, 1985	Sample et.al., 1996
Manganese	88	NOAEL	reproductive	chronic	rat	Laskey et al., 1982	Sample et.al., 1996
Manganese	284	LOAEL	reproductive	chronic	rat	Laskey et al., 1982	Sample et.al., 1996
Mercury	0.064	LOAEL	reproductive	chronic	mallard duck	Heinze, 1979	Sample et.al., 1996
Mercury	0.032	NOAEL	reproductive	chronic	rat	Verschuuren et al., 1976	Sample et.al., 1996
Mercury	0.16	LOAEL	reproductive	chronic	rat	Verschuuren et al., 1976	Sample et.al., 1996
Nickel	40	NOAEL	reproductive	chronic	rat	Ambrose et al., 1976	Sample et.al., 1996
Nickel	80	LOAEL	reproductive	chronic	rat	Ambrose et al., 1976	Sample et.al., 1996
Nickel	77.4	NOAEL	mortality	chronic	mallard duck	Cain and Pafford, 1981	Sample et.al., 1996
Nickel	107	LOAEL	mortality	chronic	mallard duck	Cain and Pafford, 1981	Sample et.al., 1996
Selenium	0.5	NOAEL	reproductive	chronic	mallard duck	Heinz, et al., 1987	Sample et.al., 1996
Selenium	1	LOAEL	reproductive	chronic	mallard duck	Heinz, et al., 1987	Sample et.al., 1996
Selenium	0.2	NOAEL	reproductive	chronic	rat	Rosenfeld and Beath, 1954	Sample et.al., 1996
Selenium	0.33	LOAEL	reproductive	chronic	rat	Rosenfeld and Beath, 1954	Sample et.al., 1996
Silver	18.1	NOAEL	systemic	subchronic	mouse	Rungby, 1984	ATSDR, 1989
Silver	54.4	LOAEL	survival	chronic	chicks	Petersen and Jensen, 1975	
Silver	23.81	LOAEL	weight loss		mouse	Rungby and Danscher, 1984	
Thallium	0.74	LOAEL	reproductive	subchronic	rat	Formigli et al., 1986	Sample et.al., 1996
Vanadium	2.1	LOAEL	reproductive	chronic	rat	Domingo et al., 1986	Sample et.al., 1996
Vanadium	11.38	NOAEL	mortality,BW	chronic	mallard duck	White and Dieter, 1978	Sample et.al., 1996
Zinc	160	NOAEL	reproductive	chronic	rat	Schlicker and Cox, 1986	Sample et.al., 1996
Zinc	320	LOAEL	reproductive	chronic	rat	Schlicker and Cox, 1986	Sample et.al., 1996
Zinc	14.49	NOAEL	reproductive	chronic	white leghorn hen	Stahl et al., 1990	Sample et.al., 1996
Zinc	130.9	LOAEL	reproductive	chronic	white leghorn hen	Stahl et al., 1990	Sample et.al., 1996

Notes: The NOAELS and LOAELS for the PAHs that do not have values are based on the benzo(a)pyrene values

The NOAELS and LOAELS for the PAHs for birds were based on a study by Trust et.al., 1995 that was referenced in an ecological risk assessment prepared by USEPA Environmental Response Team for the AVTEX Fibers Site in Front Royal, Virginia

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE 1 OF 1

CLIENT: Hattaoman Creek	JOB NUMBER:
SUBJECT: Calculation of Ag NOAEL and LOAEL.	
BASED ON: Runeby and Danscher, 1984 and Sample et al., 1996.	DRAWING NUMBER:
BY: R. Haynie / CHECKED BY: A. Berkhardt	APPROVED BY: / DATE: 5-9-02

$0.015\ \%\ AgNO_3^{(1)} = 150\ \frac{mg}{L}$

For LOAEL:

$150\ \frac{mg}{L} \left(\frac{0.0075\ L^{(2)}}{day} \Big/ 0.030\ kg^{(3)} \right) 0.635$

$= 23.81\ \frac{mg\ Ag}{kg\text{-}day}$

For NOAEL:

$23.81\ \frac{mg\ Ag}{kg\text{-}day} \Big/ 10 = 2.38\ \frac{mg\ Ag}{kg\text{-}day}$

(1) Concentration at which female mice experienced hypoactivity without weight loss or change in physical appearance derived from a study taken from: Runeby, J. and Danscher, G., 1984. Hypoactivity in Silver Exposed Mice. Acta Pharmacologica et Toxicologica, Vol. 55, pp. 398-401.

(2) mouse ingestion rate taken from Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. Oak Ridge National Laboratory. June. ES/ER/TM-86/R3

(3) mouse body weight taken from Sample et al., 1996.

Body Weight = (BW)	2.20E+00	kg
Food Ingestion Rate = (If)	4.64E-01	kg/day
Water Ingestion Rate = (Iw)	1.16E-01	L/day
Sediment Ingestion Rate = (Is)	1.53E-02	kg/day
Home Range = (HR)	Assume equal to contaminated area	
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Dose=[(If*Ci+Is*Cs+Iw*Cw)H]/BW

Great Blue Heron

Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Ci = Contaminant conc. in fish:
Metals = sediment concentration * BAF
Pesticides = (sediment concentration * BSAF * %lipids)/(% TOC)

MATTAWOMAN CREEK
TERRESTRIAL WILDLIFE MODEL HAZARD QUOTIENT CALCULATION
GREAT BLUE HERON - CONSERVATIVE INPUTS
NSWC, INDIAN HEAD, MARLYAND

Parameters	Max Sed Concentration (mg/kg)	Max SW Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILES								
2-Methylphenol	0.00E+00	0.00E+00	1.70E-01	3.59E-02	NV	NV	#VALUE!	#VALUE!
4-Methylphenol	8.00E-02	0.00E+00	3.90E+01	8.23E+00	NV	NV	#N/A	#N/A
Acenaphthene	1.20E-01	0.00E+00	0.00E+00	8.35E-04	2.00E+00	2.00E+01	4.18E-04	4.18E-05
Acenaphthylene	3.40E-01	0.00E+00	0.00E+00	2.37E-03	2.00E+00	2.00E+01	1.18E-03	1.18E-04
Anthracene	5.40E-01	0.00E+00	0.00E+00	3.76E-03	2.00E+00	2.00E+01	1.88E-03	1.88E-04
Benzo(a)anthracene	1.70E+00	0.00E+00	0.00E+00	1.18E-02	2.00E+00	2.00E+01	5.92E-03	5.92E-04
Benzo(a)pyrene	1.80E+00	0.00E+00	0.00E+00	1.25E-02	2.00E+00	2.00E+01	6.26E-03	6.26E-04
Benzo(b)fluoranthene	2.00E+00	0.00E+00	0.00E+00	1.39E-02	2.00E+00	2.00E+01	6.96E-03	6.96E-04
Benzo(g,h,i)perylene	1.10E+00	0.00E+00	0.00E+00	7.66E-03	2.00E+00	2.00E+01	3.83E-03	3.83E-04
Benzo(k)fluoranthene	1.50E+00	0.00E+00	0.00E+00	1.04E-02	2.00E+00	2.00E+01	5.22E-03	5.22E-04
Bis(2-ethylhexyl)phthalate	4.10E-01	1.00E-03	1.90E+00	4.04E-01	1.10E+00	1.10E+01	3.67E-01	3.67E-02
Chrysene	1.70E+00	0.00E+00	0.00E+00	1.18E-02	2.00E+00	2.00E+01	5.92E-03	5.92E-04
Fluoranthene	4.00E+00	0.00E+00	0.00E+00	2.78E-02	2.00E+00	2.00E+01	1.39E-02	1.39E-03
Fluorene	2.00E-01	0.00E+00	0.00E+00	1.39E-03	2.00E+00	2.00E+01	6.96E-04	6.96E-05
Indeno(1,2,3-cd)pyrene	1.10E+00	0.00E+00	0.00E+00	7.66E-03	2.00E+00	2.00E+01	3.83E-03	3.83E-04
Phenanthrene	2.60E+00	0.00E+00	0.00E+00	1.81E-02	2.00E+00	2.00E+01	9.05E-03	9.05E-04
Phenol	0.00E+00	0.00E+00	1.40E-01	2.95E-02	2.00E+00	2.00E+01	1.48E-02	1.48E-03
Pyrene	4.00E+00	0.00E+00	0.00E+00	2.78E-02	2.00E+00	2.00E+01	1.39E-02	1.39E-03
PESTICIDES/PCBS								
4,4'-DDD	7.70E-03	0.00E+00	3.90E-03	8.76E-04	2.80E-03	2.80E-02	3.13E-01	3.13E-02
4,4'-DDE	6.00E-03	0.00E+00	1.70E-02	3.63E-03	2.80E-03	2.80E-02	1.30E+00	1.30E-01
Alpha-BHC	7.00E-04	0.00E+00	0.00E+00	4.87E-06	5.60E-01	2.25E+00	8.70E-06	2.17E-06
Aroclor-1248	1.70E-01	0.00E+00	0.00E+00	1.18E-03	1.80E-01	1.80E+00	6.57E-03	6.57E-04
INORGANICS								
Arsenic	7.07E+01	8.30E-03	2.00E+00	9.14E-01	2.46E+00	7.38E+00	3.72E-01	1.24E-01
Cadmium	1.16E+02	2.10E-04	2.50E-02	8.13E-01	1.45E+00	2.00E+01	5.60E-01	4.06E-02
Chromium	6.97E+01	3.40E-03	6.60E+00	1.88E+00	1.00E+00	5.00E+00	1.88E+00	3.75E-01
Copper	7.57E+02	2.81E-02	0.00E+00	5.27E+00	4.70E+01	6.17E+01	1.12E-01	8.54E-02
Lead	7.64E+04	3.84E-02	4.10E-01	5.32E+02	1.13E+00	1.13E+01	4.71E+02	4.71E+01
Mercury	8.70E+00	0.00E+00	0.00E+00	6.06E-02	6.40E-03	6.40E-02	9.46E+00	9.46E-01
Nickel	4.64E+01	4.00E-03	0.00E+00	3.23E-01	7.74E+01	1.07E+02	4.18E-03	3.02E-03
Selenium	1.70E+00	5.80E-03	0.00E+00	1.21E-02	4.00E-01	8.00E-01	3.03E-02	1.52E-02
Silver	3.08E+02	6.00E-03	0.00E+00	2.14E+00	5.44E+00	5.44E+01	3.94E-01	3.94E-02
Zinc	7.10E+04	9.04E-02	2.49E+01	4.99E+02	1.45E+01	1.31E+02	3.45E+01	3.82E+00

Notes:
Cells are shaded if the EEQ is greater than 1.0
Surface water inorganics data from unfiltered samples
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Effects Level
TOC - Total Organic Carbon

Body Weight = (BW)	2.31E+00 kg	Dose=[(If*Ci+Is*Cs+Iw*Cw)H]/BW	**Great Blue Heron**
Food Ingestion Rate = (If)	4.16E-01 kg/day		
Water Ingestion Rate = (Iw)	1.04E-01 L/day	Cs = Contaminant concentration in sediment	
Sediment Ingestion Rate = (Is)	1.37E-02 kg/day	Cw = Contaminant concentration in water	
Home Range = (HR)	1.10E+01 acres	Ci = Contaminant conc. in fish:	
Contaminated Area = (CA)	Assume equal to home range	Metals = sediment concentration * BAF	
H=HR/CA (Assume = to 1 for maximum exposure)		Pesticides = (sediment concentration * BSAF * %lipids)/(% TOC)	

MATTAWOMAN CREEK
TERRESTRIAL WILDLIFE MODEL HAZARD QUOTIENT CALCULATION
GREAT BLUE HERON - AVERAGE INPUTS
NSWC, INDIAN HEAD, MARLYAND

Parameters	Average Sed Concentration (mg/kg)	Average SW Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
PESTICIDES/PCBS								
4,4'-DDE	3.90E-03	0.00E+00	5.60E-03	1.03E-03	2.80E-03	2.80E-02	3.68E-01	3.68E-02
INORGANICS								
Chromium	2.01E+01	6.00E-04	8.90E-01	2.80E-01	1.00E+00	5.00E+00	2.80E-01	5.60E-02
Lead	1.83E+03	2.00E-03	1.70E-01	1.09E+01	1.13E+00	1.13E+01	9.66E+00	9.66E-01
Mercury	3.90E-01	0.00E+00	0.00E+00	2.32E-03	6.40E-03	6.40E-02	3.62E-01	3.62E-02
Zinc	1.56E+03	1.06E-02	2.49E+01	1.38E+01	1.45E+01	1.31E+02	9.50E-01	1.05E-01

Notes:
Cells are shaded if the EEQ is greater than 1.0
Surface water inorganics data from unfiltered samples
EEQ - Ecological Effects Quotient
LOAEL - Lowest Observed Effects Level
TOC - Total Organic Carbon

Body Weight = (BW)	1.04E+00	kg
Food Ingestion Rate = (If)	5.17E-01	kg/day
Water Ingestion Rate = (Iw)	6.80E-02	L/day
Soil/Sediment Ingestion Rate = (Is)	1.71E-02	kg/day
Home Range = (HR)	Assume equal to contaminated area	
Contaminated Area = (CA)	Assume equal to home range	

H=HR/CA (Assume = to 1 for maximum exposure)

Dose=[(If*Ci+Is*Cs+Iw*Cw)H]/BW **Mallard Duck**

Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Ci = Contaminant conc. in fish:
Metals = sediment concentration * BAF
Pesticides = (sediment concentration * BSAF * %lipids)/(% TOC)

MATTAWOMAN CREEK
TERRESTRIAL WILDLIFE MODEL HAZARD QUOTIENT CALCULATION
MALLARD DUCK - CONSERVATIVE INPUTS
NSWC, INDIAN HEAD, MARLYAND

Parameters	Max Sed Concentration (mg/kg)	Max SW Concentration (mg/L)	Plant Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILES								
Acenaphthene	1.20E-01	0.00E+00	0.00E+00	1.96E-03	2.00E+00	2.00E+01	9.81E-04	9.81E-05
Acenaphthylene	3.40E-01	0.00E+00	0.00E+00	5.56E-03	2.00E+00	2.00E+01	2.78E-03	2.78E-04
Anthracene	5.40E-01	0.00E+00	0.00E+00	8.83E-03	2.00E+00	2.00E+01	4.42E-03	4.42E-04
Benzo(a)anthracene	1.70E+00	0.00E+00	0.00E+00	2.78E-02	2.00E+00	2.00E+01	1.39E-02	1.39E-03
Benzo(a)pyrene	1.80E+00	0.00E+00	0.00E+00	2.94E-02	2.00E+00	2.00E+01	1.47E-02	1.47E-03
Benzo(b)fluoranthene	2.00E+00	0.00E+00	0.00E+00	3.27E-02	2.00E+00	2.00E+01	1.64E-02	1.64E-03
Benzo(g,h,i)perylene	1.10E+00	0.00E+00	0.00E+00	1.80E-02	2.00E+00	2.00E+01	9.00E-03	9.00E-04
Benzo(k)fluoranthene	1.50E+00	0.00E+00	0.00E+00	2.45E-02	2.00E+00	2.00E+01	1.23E-02	1.23E-03
Chrysene	1.70E+00	0.00E+00	0.00E+00	2.78E-02	2.00E+00	2.00E+01	1.39E-02	1.39E-03
Fluoranthene	4.00E+00	0.00E+00	0.00E+00	6.54E-02	2.00E+00	2.00E+01	3.27E-02	3.27E-03
Fluorene	2.00E-01	0.00E+00	0.00E+00	3.27E-03	2.00E+00	2.00E+01	1.64E-03	1.64E-04
Indeno(1,2,3-cd)pyrene	1.10E+00	0.00E+00	0.00E+00	1.80E-02	2.00E+00	2.00E+01	9.00E-03	9.00E-04
Phenanthrene	2.60E+00	0.00E+00	0.00E+00	4.25E-02	2.00E+00	2.00E+01	2.13E-02	2.13E-03
Pyrene	4.00E+00	0.00E+00	0.00E+00	6.54E-02	2.00E+00	2.00E+01	3.27E-02	3.27E-03
PESTICIDES/PCBS								
4,4'-DDD	7.70E-03	0.00E+00	0.00E+00	1.26E-04	2.80E-03	2.80E-02	4.50E-02	4.50E-03
4,4'-DDE	6.00E-03	0.00E+00	0.00E+00	9.81E-05	2.80E-03	2.80E-02	3.51E-02	3.51E-03
Alpha-BHC	7.00E-04	0.00E+00	0.00E+00	1.15E-05	5.60E-01	2.25E+00	2.04E-05	5.09E-06
Aroclor-1248	1.70E-01	0.00E+00	0.00E+00	2.78E-03	1.80E-01	1.80E+00	1.54E-02	1.54E-03
INORGANICS								
Arsenic	7.07E+01	8.30E-03	0.00E+00	1.16E+00	2.46E+00	7.38E+00	4.70E-01	1.57E-01
Cadmium	1.16E+02	2.10E-04	1.30E-01	1.96E+00	1.45E+00	2.00E+01	1.35E+00	9.81E-02
Chromium	6.97E+01	3.40E-03	9.00E-01	1.59E+00	1.00E+00	5.00E+00	1.59E+00	3.17E-01
Copper	7.57E+02	2.81E-02	0.00E+00	1.24E+01	4.70E+01	6.17E+01	2.64E-01	2.01E-01
Lead	7.64E+04	3.84E-02	0.00E+00	1.25E+03	1.13E+00	1.13E+01	1.11E+03	1.11E+02
Mercury	8.70E+00	0.00E+00	0.00E+00	1.42E-01	6.40E-03	6.40E-02	2.22E+01	2.22E+00
Nickel	4.64E+01	4.00E-03	1.70E+00	1.60E+00	7.74E+01	1.07E+02	2.07E-02	1.50E-02
Selenium	1.70E+00	5.80E-03	0.00E+00	2.82E-02	4.00E-01	8.00E-01	7.05E-02	3.52E-02
Silver	3.08E+02	6.00E-03	0.00E+00	5.04E+00	5.44E+00	5.44E+01	9.26E-01	9.26E-02
Zinc	7.10E+04	9.04E-02	2.49E+01	1.17E+03	1.45E+01	1.31E+02	8.10E+01	8.97E+00

Notes:
Cells are shaded if the EEQ is greater than 1.0
Surface water inorganics data from unfiltered samples
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Effects Level
TOC - Total Organic Carbon

Body Weight = (BW) 1.17E+00 kg
Food Ingestion Rate = (If) 4.95E-01 kg/day
Water Ingestion Rate = (Iw) 6.60E-02 L/day
Soil/Sediment Ingestion Rate = (Is) 1.63E-02 kg/day
Home Range = (HR) 1.43E+03
Contaminated Area = (CA) Assume equal to home range
H=HR/CA (Assume = to 1 for maximum exposure)

Dose=[(If*Ci+Is*Cs+Iw*Cw)H]/BW

Mallard D

Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Ci = Contaminant conc. in fish:
Metals = sediment concentration * BAF
Pesticides = (sediment concentration * BSAF * %lipids)/(% TOC)

MATTAWOMAN CREEK
TERRESTRIAL WILDLIFE MODEL HAZARD QUOTIENT CALCULATION
MALLARD DUCK - AVERAGE INPUTS
NSWC, INDIAN HEAD, MARLYAND

Parameters	Average Sed Concentration (mg/kg)	Average SW Concentration (mg/L)	Plant Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
INORGANICS								
Cadmium	3.45E+00	1.00E-04	7.00E-02	7.81E-02	1.45E+00	2.00E+01	5.38E-02	3.90E-03
Chromium	2.01E+01	6.00E-04	4.00E-01	4.51E-01	1.00E+00	5.00E+00	4.51E-01	9.03E-02
Lead	1.83E+03	2.00E-03	0.00E+00	2.57E+01	1.13E+00	1.13E+01	2.27E+01	2.27E+00
Mercury	3.90E-01	0.00E+00	0.00E+00	5.46E-03	6.40E-03	6.40E-02	8.54E-01	8.54E-02
Zinc	1.56E+03	1.06E-02	8.10E+00	2.53E+01	1.45E+01	1.31E+02	1.75E+00	1.93E-01

Notes:
Cells are shaded if the EEQ is greater than 1.0
Surface water inorganics data from unfiltered samples
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Effects Level
TOC - Total Organic Carbon

Body Weight = (BW)	5.50E-01	kg	Dose=[(If*Ci+Is*Cs+Iw*Cw)H]/BW	**Mink**
Food Ingestion Rate = (If)	2.43E-01	kg/day		
Water Ingestion Rate = (Iw)	1.21E-01	L/day	Cs = Contaminant concentration in sediment	
Soil/Sediment Ingestion Rate = (Is)	8.02E-03	kg/day	Cw = Contaminant concentration in water	
Home Range = (HR)	Assume equal to contaminated area		Ci = Contaminant conc. in fish:	
Contaminated Area = (CA)	Assume equal to home range		Metals = sediment concentration * BAF	
H=HR/CA (Assume = to 1 for maximum exposure)			Pesticides = (sediment concentration * BSAF * %lipids)/(% TOC)	

MATTAWOMAN CREEK
TERRESTRIAL WILDLIFE MODEL HAZARD QUOTIENT CALCULATION
MINK - CONSERVATIVE INPUTS
NSWC, INDIAN HEAD, MARLYAND

Parameters	Max Sed Concentration (mg/kg)	Max SW Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILES								
2-Methylphenol	0.00E+00	0.00E+00	1.70E-01	7.51E-02	5.00E+00	1.50E+01	1.50E-02	5.01E-03
4-Methylphenol	8.00E-02	0.00E+00	3.90E+01	1.72E+01	#N/A	#N/A	#N/A	#N/A
Acenaphthene	1.20E-01	0.00E+00	0.00E+00	1.75E-03	1.75E+01	3.50E+01	1.00E-04	5.00E-05
Acenaphthylene	3.40E-01	0.00E+00	0.00E+00	4.96E-03	7.00E+01	7.00E+02	7.08E-05	7.08E-06
Anthracene	5.40E-01	0.00E+00	0.00E+00	7.87E-03	1.00E+02	1.00E+03	7.87E-05	7.87E-06
Benzo(a)anthracene	1.70E+00	0.00E+00	0.00E+00	2.48E-02	1.70E-01	1.70E+00	1.46E-01	1.46E-02
Benzo(a)pyrene	1.80E+00	0.00E+00	0.00E+00	2.62E-02	1.00E+00	1.00E+01	2.62E-02	2.62E-03
Benzo(b)fluoranthene	2.00E+00	0.00E+00	0.00E+00	2.92E-02	4.00E+00	4.00E+01	7.29E-03	7.29E-04
Benzo(g,h,i)perylene	1.10E+00	0.00E+00	0.00E+00	1.60E-02	7.20E+00	7.20E+01	2.23E-03	2.23E-04
Benzo(k)fluoranthene	1.50E+00	0.00E+00	0.00E+00	2.19E-02	7.20E+00	7.20E+01	3.04E-03	3.04E-04
Bis(2-ethylhexyl)phthalate	4.10E-01	1.00E-03	1.90E+00	8.46E-01	1.83E+01	1.83E+02	4.62E-02	4.62E-03
Chrysene	1.70E+00	0.00E+00	0.00E+00	2.48E-02	1.70E-01	1.70E+00	1.46E-01	1.46E-02
Dibenzo(a,h)anthracene	2.20E-01	0.00E+00	0.00E+00	3.21E-03	1.33E+00	1.33E+01	2.41E-03	2.41E-04
Fluoranthene	4.00E+00	0.00E+00	0.00E+00	5.83E-02	1.25E+01	2.50E+01	4.67E-03	2.33E-03
Fluorene	2.00E-01	0.00E+00	0.00E+00	2.92E-03	1.25E+01	2.50E+01	2.33E-04	1.17E-04
Indeno(1,2,3-cd)pyrene	1.10E+00	0.00E+00	0.00E+00	1.60E-02	7.20E+00	7.20E+01	2.23E-03	2.23E-04
Phenanthrene	2.60E+00	0.00E+00	0.00E+00	3.79E-02	1.00E+00	1.00E+01	3.79E-02	3.79E-03
Phenol	0.00E+00	0.00E+00	1.40E-01	6.19E-02	6.00E+00	1.20E+01	1.03E-02	5.15E-03
Pyrene	4.00E+00	0.00E+00	0.00E+00	5.83E-02	7.50E+00	1.25E+01	7.78E-03	4.67E-03
PESTICIDES/PCBS								
4,4'-DDD	7.70E-03	0.00E+00	3.90E-03	1.84E-03	8.00E-01	4.00E+00	2.29E-03	4.59E-04
4,4'-DDE	6.00E-03	0.00E+00	1.70E-02	7.60E-03	8.00E-01	4.00E+00	9.50E-03	1.90E-03
Alpha-BHC	7.00E-04	0.00E+00	0.00E+00	1.02E-05	1.40E-02	1.40E-01	7.29E-04	7.29E-05
Aroclor-1248	1.70E-01	0.00E+00	0.00E+00	2.48E-03	1.00E-02	1.00E-01	2.48E-01	2.48E-02
INORGANICS								
Arsenic	7.07E+01	8.30E-03	2.00E+00	1.92E+00	1.26E-01	1.26E+00	1.52E+01	1.52E+00
Cadmium	1.16E+02	2.10E-04	2.50E-02	1.70E+00	1.00E+00	1.00E+01	1.70E+00	1.70E-01
Chromium	6.97E+01	3.40E-03	6.60E+00	3.93E+00	3.28E+00	1.31E+01	1.20E+00	2.99E-01
Copper	7.57E+02	2.81E-02	0.00E+00	1.10E+01	1.17E+01	1.54E+01	9.43E-01	7.17E-01
Lead	7.64E+04	3.84E-02	4.10E-01	1.11E+03	8.00E+00	8.00E+01	1.39E+02	1.39E+01
Mercury	8.70E+00	0.00E+00	0.00E+00	1.27E-01	1.50E-02	2.50E-02	8.46E+00	5.07E+00
Nickel	4.64E+01	4.00E-03	0.00E+00	6.77E-01	4.00E+01	8.00E+01	1.69E-02	8.47E-03
Selenium	1.70E+00	5.80E-03	0.00E+00	2.61E-02	2.00E-01	3.30E-01	1.30E-01	7.90E-02
Silver	3.08E+02	6.00E-03	0.00E+00	4.49E+00	2.38E+00	2.38E+01	1.89E+00	1.89E-01
Zinc	7.10E+04	9.04E-02	2.16E+01	1.04E+03	1.60E+02	3.20E+02	6.53E+00	3.26E+00

Notes:
Cells are shaded if the EEQ is greater than 1.0
Surface water inorganics data from unfiltered samples
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Effects Level
TOC - Total Organic Carbon

Body Weight = (BW)	1.10E+00 kg	
Food Ingestion Rate = (If)	1.80E-01 kg/day	
Water Ingestion Rate = (Iw)	7.30E-02 L/day	
Soil/Sediment Ingestion Rate = (Is)	5.94E-03 kg/day	
Home Range = (HR)	5.04E+01 feet	
Contaminated Area = (CA)	Assume equal to home range	
H=HR/CA (Assume = to 1 for maximum exposure)		

Dose=[(If*Ci+Is*Cs+Iw*Cw)H]/BW **Mink**

Cs = Contaminant concentration in sediment
Cw = Contaminant concentration in water
Ci = Contaminant conc. in fish:
Metals = sediment concentration * BAF
Pesticides = (sediment concentration * BSAF * %lipids)/(% TOC)

MATTAWOMAN CREEK
TERRESTRIAL WILDLIFE MODEL HAZARD QUOTIENT CALCULATION
MINK - AVERAGE INPUTS
NSWC, INDIAN HEAD, MARLYAND

Parameters	Average Sed Concentration (mg/kg)	Average SW Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
INORGANICS								
Arsenic	8.70E+00	2.50E-03	1.40E+00	2.75E-01	1.26E-01	1.26E+00	2.19E+00	2.19E-01
Cadmium	3.45E+00	1.00E-04	2.00E-02	2.18E-02	1.00E+00	1.00E+01	2.18E-02	2.18E-03
Chromium	2.01E+01	6.00E-04	8.90E-01	2.54E-01	3.28E+00	1.31E+01	7.73E-02	1.93E-02
Lead	1.83E+03	2.00E-03	1.70E-01	9.89E+00	8.00E+00	8.00E+01	1.24E+00	1.24E-01
Mercury	3.90E-01	0.00E+00	0.00E+00	2.10E-03	1.50E-02	2.50E-02	1.40E-01	8.40E-02
Silver	1.06E+01	6.90E-04	0.00E+00	5.71E-02	2.38E+00	2.38E+01	2.40E-02	2.40E-03
Zinc	1.56E+03	1.06E-02	1.56E+01	1.10E+01	1.60E+02	3.20E+02	6.85E-02	3.42E-02

Notes:
Cells are shaded if the EEQ is greater than 1.0
Surface water inorganics data from unfiltered samples
EEQ - Ecological Effects Quotient
NOAEL - No Observed Adverse Effects Level
LOAEL - Lowest Observed Effects Level
TOC - Total Organic Carbon

APPENDIX C-4

ALTERNATIVE BENCHMARKS

The following sections present the additional benchmarks/toxicity data that were used to evaluate the chemicals, which were retained as COPCs after the initial screening, to determine if the concentrations warrant further evaluation.

Surface Water

USEPA has established recommended WQC for several contaminants (USEPA, 1999). In addition, other nonregulatory surface water screening values are used to evaluate the surface water data that do not have WQC. The following surface water screening levels (SWSLs) are used to further evaluate potential risks to aquatic receptors in this ERA:

- Recommended Water Quality Criteria (USEPA, 1999a)
- Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota, 1996 Revision (Suter and Tsao, 1996)
- USEPA Region IV Surface Water Screening Values (USEPA, Region IV, 2001)

The Recommended Water Quality Criteria were developed by U.S. EPA to provide states with guidance for developing their own criteria (USEPA, 1999). These values are set to protect the majority of aquatic organisms from adverse impacts from contaminants in the surface water. The recommended Water Quality Criteria for most metals are based on the dissolved portion of the metals.

The publication "ECO Update-Ecotox Thresholds" was prepared by USEPA for use as benchmark screening values in the first step of a baseline risk assessment (USEPA, 1996). Most of the surface water thresholds for the contaminants that are evaluated in this SERA are based on Suter and Mabrey, (1994) in the Ecotox Thresholds. Because Suter and Mabrey (1994) has been updated, Suter and Tsao (1996) values will be used when the Ecotox Thresholds were based on the Suter and Mabrey (1994) data. The Suter and Tsao (1996) benchmarks were calculated using Tier II methodology as described in the U.S. EPA's Proposed Water Quality Guidance for the Great Lakes System (USEPA, 1993). Tier II values are developed so that aquatic benchmarks could be established with fewer data than are required for the U.S. EPA AWQC.

EPA Region IV has developed screening values for many contaminants that do not have AWQC (USEPA, 2001). They were derived using the lowest reported effect level with the application of a safety factor of ten to protect for a more sensitive species. A safety factor of ten also was used to derive a chronic value if only acute information was available.

Both the acute and chronic SWSLs are used to evaluate the COPCs to determine potential impacts in a lines-of-evidence approach, when necessary.

Sediment

Several of the sediment risk screening levels (i.e., ER-Ls, and LELs), that are used to select COPCs, are conservative because chemicals detected at concentrations below these levels are not expected to cause any adverse impacts to the benthic community. Because they are conservative, the sediment risk-screening levels are frequently less than background sediment concentrations. Since the objective of the risk screening is to determine if the chemicals at the site are causing a risk to ecological receptors, alternate benchmarks (i.e., ER-Ms and PELs) were used to further evaluate the risk associated with chemicals that exceeded the conservative screening levels. The following bullets list the alternate benchmarks that were used to further evaluate chemicals retained as COPCs after the initial screening as they are commonly referred to in ERAs. The paragraphs following the bullets discuss each of the benchmarks in more detail. The table at the end of this Appendix presents the sediment benchmarks that are discussed in this ERA. Note that the freshwater and saltwater sediment benchmarks are often used interchangably because some studies have indicated that the relative sensitivities of saltwater and freshwater benthic invertebrates are similar.

- USEPA Ecotox Thresholds (USEPA, 1996)
- Ontario Sediment Screening [Ontario Ministry of Environment and Energy (OMOE), 1993]
- Long et al., 1995 Sediment Screening Levels (Long et al., 1995)
- Florida Sediment Screening Levels (MacDonald, 1994)
- Apparent Effects Thresholds (Cubbage et al., 1997).
- USEPA Great Lakes ARCS Program (USEPA, 1996 as cited in Jones, et al., 1997).

USEPA Ecotox Thresholds

The sediment Ecotox Thresholds include draft USEPA Sediment Quality Criteria (SQC) that have been established for five contaminants (acenaphthene, dieldrin, endrin, fluoranthene, and phenanthrene); Sediment Quality Benchmarks (SQBs) that have been established using equilibrium partitioning; and Effects Range-Low values from Long et al. (1995). SQC and SQBs Ecotox Thresholds are based on an

assumption of 1 percent organic carbon [10,000 mg/kg total organic carbon (TOC)]. The three polycyclic aromatic hydrocarbon (PAH) SQC documents (acenaphthene, fluoranthene, and phenanthrene) soon will be withdrawn in favor of a total PAH SQC document (Riley, 2000). Therefore, the SQC values for the three individual PAHs were only used in this report when other levels were not available. The SQBs calculated in USEPA (1996) are based on freshwater data and therefore were used for freshwater sediments.

Ontario Sediment Screening Levels

The Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario (OMOE, 1993) are based on freshwater studies. OMOE (1993) establishes three effects levels, as follows:

- *No Effect Level (NEL):* Sediment will not affect fish or sediment-dwelling organisms. In addition, no transfer through the food chain and no effect on water quality are expected.

- *Lowest Effect Level (LEL):* Sediment is considered marginally polluted but will not affect the majority of sediment-dwelling organisms.

- *Severe Effect Level (SEL):* Sediment is considered highly polluted and likely to affect the health of sediment-dwelling organisms.

LEL values were used as the freshwater risk screening levels, when available.

Long et al., 1995 Sediment Screening Levels

The Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments (Long et al., 1995) are based on marine and estuarine studies. Long et al. (1995) establishes three effects levels, as follows:

- *Below Effects Range-Low (ER-L):* Minimal-effects range (adverse effects would be rarely observed);

- *Between ER-L and Effects Range-Median (ER-M):* Possible-effects range (adverse effects would occasionally occur); and

- *Above the ER-M:* Probable-effects range (adverse effects would probably occur).

ER-L values were used as the saltwater risk screening levels, when available.

Florida Sediment Screening Levels

The Florida Department of Environmental Protection (MacDonald, 1994) has developed screening values in a manner similar to Long et al. (1995), except that the Florida values also incorporate chemical concentrations observed or predicted to be associated with no adverse biological effects (no effects data). Both sets of screening values were developed for estuarine and marine waters to protect aquatic organisms, including benthic macroinvertebrates, fish, and shellfish (Long et al., 1995). These guidelines establish the following two effects levels:

Threshold Effects Level (TEL): The TEL is the geometric mean of the 15th percentile in the effects data set and the 50th percentile in the no effects data set. It represents the upper limit of the range of sediment contaminant concentrations that are dominated by no effects data.

Probable Effects Level (PEL): The PEL is the geometric mean of the 50th percentile in the effects data set and the 85th percentile in the no effects data set. It represents the lower limit of the range of sediment contaminant concentrations that are usually or always associated with adverse biological effects.

Apparent Effects Thresholds

The sediment screening level for a few of the chemicals is the Apparent Effects Threshold (AET), as presented in the Creation and Analysis of Freshwater Sediment Quality Values in Washington State (Cubbage et al., 1997). The AET is defined as the concentration of a given chemical above which statistically significant ($p<0.05$) biological effects are always expected to occur (Cubbage et al., 1997). The study also generates Probable AETs (PAETs), which were defined as the 95th percentile of values from all stations with no significant biological effects and concentrations greater that the lowest hit level (Cubbage et al., 1997). The AETs and PAETs in Cubbage et al. (1997) are based on Microtox® bioassays or bioassays using amphipods, *Hyalella azteca*. The AETs/PAETs based on Microtox® bioassays are typically lower than the AETs based on amphipods. However, because one of the assessment endpoints for this SERA are benthic macroinvertebrates, the AETs/PAETs based on amphipods are more appropriate screening levels for determining the need for further evaluation of the chemicals at the sites. Table B-3 presents the AETs and PAETs based on amphipods.

AETs also were developed for the Puget Sound (Tetra Tech, 1986). For selenium, the AET for amphipods was listed as greater than 1.0, and the AET for benthic invertabrates was listed as greater than 63. AETs could not be developed for selenium because there were no impacted stations with chemical concentrations above the highest concentration among non-impacted stations.

USEPA Great Lakes ARCS Program

The National Biological Service produced a set of benchmarks for the USEPA Great Lakes National Program Office as part of the Assessment and Remediation of Contaminated Sediment (ARCS) Project (USEPA, 1996 as cited in Jones, et al., 1997). The benchmarks were developed with the same procedures that were used to develop the ER-Ls and ER-Ms (Long et al., 1995), the TELs and PELs (MacDonald, 1994), and the AETs (Cubbage et al., 1997). The ARCS Threshold Effect Level (TEL) is similar to the ER-L and TEL. The ARCS Probable Effect Level (PEL) is similar to the ER-M and PEL. Finally, the high No Effect Concentration (NEC) is similar to the AET.

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SEDIMENT ECOLOGICAL EFFECTS LEVELS
MASTER TABLE

	Long et al., 1995		OMOE, 1993		Cubbage et al., 1997				ARCS, 1996			McDonald, 1994	
Chemical	**ER-L**	**ER-M**	**LEL**	**SEL[1]**	**AET**	**PAET**	**LAET**	**FSQV**	**TEC**	**PEC**	**NEC**	**TEL**	**PEL**
Semivolatiles (mg/kg)													
Acenaphthene	0.016	0.5			100	77	4.1	3.5				0.00671	0.0889
Acenaphthylene	0.044	0.64			2.6	2	2.2	1.9				0.00587	0.128
Anthracene	0.0853	1.1	0.22	3.7	41	28	2.8	2.1	0.03	0.548	1.7	0.0469	0.245
Benzo(a)anthracene	0.261	1.6	0.32	14.8	33	14	7.7	5	0.26	4.2	3.5	0.0748	0.693
Benzo(b)fluoranthene							16						
Benzo(k)fluoranthene			0.24	13.4			16						
Total Benzofluoranthenes					34	20		11					
Benzo(g,h,i)perylene			0.17	3.2	21	4.9	1.4	1.2	0.29	6.3	3.8		
Benzo(a)pyrene	0.43	1.6	0.37	14.4	25	9.7	11	7	0.35	0.394	0.44	0.0888	0.763
Chrysene	0.384	2.8	0.34	4.6	39	19	11	7.4	0.5	5.2	4	0.108	0.846
Dibenzo(a,h)anthracene	0.0634	0.26	0.06	1.3	3.5	2.2	0.23	0.23		0.028	0.87	0.00622	0.135
Fluoranthene	0.6	5.1	0.75	10.2	130	75	21	11	0.06	0.834	7.5	0.113	1.494
Fluorene	0.019	0.54	0.19	1.6	96	73	4.2	3.6	0.03	0.652	1.8	0.0212	0.144
Indeno(1,2,3-cd)pyrene			0.2	3.2	15	4.1	0.76	0.73	0.08	0.837	3.8		
2-Methylnaphthalene	0.07	0.67										0.0202	0.201
Naphthalene	0.16	2.1			140	47	46	37	0.03	0.687	0.29	0.0346	0.391
Phenanthrene	0.24	1.5	0.56	9.5	210	110	15	5.7				0.0867	0.544
Pyrene	0.665	2.6	0.49	8.5	85	46	23	9.6	0.57	3.225	6.1	0.153	1.398
Low MW PAHs	0.552	3.16			440	330		27	0.79	3.369	3.04	0.312	1.442
High MW PAHs	1.7	9.6			310	170		36	2.9	4.354	51	0.655	6.676
Total PAHs	4.022	44.79	4	100	700	400		60	3.55	13.66	84.6	1.684	16.77
Bis(2-ethylhexyl)phthalate							0.75	0.64				0.182	2.647
Di-n-butyl phthalate					0.043	0.042	0.043						
Carbazole					1.8	1.6	0.14	0.14					
Dibenzofuran					32	2.4	32						
Pesticides/PCBs (mg/kg)													
4,4'-DDD			0.008	0.06								0.00122	0.00781
4,4'-DDE	0.0022	0.027	0.005	0.19								0.00207	0.374
Aroclor-1248			0.03	1.5				0.021					
Total PCBs	0.0227	0.18	0.07	5.3	0.82	0.45		0.021	0.03	0.245	0.194	0.0216	0.189
BHC			0.003	0.12									
alpha-BHC			0.006	0.1									

SEDIMENT ECOLOGICAL EFFECTS LEVELS
MASTER TABLE

	Long et al., 1995		OMOE, 1993		Cubbage et al., 1997				ARCS, 1996			McDonald, 1994	
Chemical	**ER-L**	**ER-M**	**LEL**	**SEL[1]**	**AET**	**PAET**	**LAET**	**FSQV**	**TEC**	**PEC**	**NEC**	**TEL**	**PEL**
Inorganics (mg/kg)													
Aluminum										58030	73160		
Antimony					64	35	3						
Arsenic	8.2	70	6	33	150	19	40	0.057	12.1	57	92.9	7.24	41.6
Cadmium	1.2	9.6	0.6	10	12	9.3	7.6	0.0051	0.59	11.7	41.1	0.68	4.21
Chromium	81	370	26	110	280	110	280	0.26	56	159	312	52.3	160
Copper	34	270	16	110	840	340	840	0.39	28	77.7	54.8	18.7	108
Cyanide													
Iron			20000	40000									
Lead	46.7	218	31	250	720	490	260	0.45	34.2	396	68.7	30.2	112
Manganese			460	1100	1800	1400	1800		1673	1081	819		
Mercury	0.15	0.71	0.2	2	2.7	1.6	0.56	0.0004				0.13	0.7
Nickel	20.9	51.6	16	75			46		39.6	38.5	37.9	15.9	42.8
Silver	1	3.7			4.5	3.9	4.5	0.0061				0.73	1.77
Zinc	150	410	120	820	3200	1000	520	0.41	159	1532	541	124	271

Notes:

1 Values assume 1% organic carbon.

APPENDIX C-5

TOXICITY TEST LABORATORY REPORT

Results of 10 day Sediment Toxicity Tests with *Hyalella azteca* for NSWC, Indian Head, Maryland

Submitted to:
Mr. George Latulippe
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, PA 15220
Phone: 412-921-8684

Prepared by:
Tetra Tech, Inc.
10045 Red Run Boulevard
Owings Mills, Maryland 21117

October 24, 2001

SUMMARY

CLIENT:	Tetra Tech NUS
TEST FACILITY:	NSWC, Indian Head, Maryland
TEST MATERIAL:	Sediment from 28 sites, plus control
DATE(S) COLLECTED:	5 - 9 September, 2001
DATE(S) RECEIVED:	7, 11 September, 2001
COLLECTED BY:	Client
CONTROL/DILUTION WATER:	Moderately Hard Reconstituted Water
TYPE OF TEST(S):	10-Day Sediment Toxicity using *Hyalella azteca*
TEST DATE(S):	18 - 28 September, 2001 22 September - 2 October, 2001

TEST RESULTS:
TABLE 1. SUMMARY OF TEST RESULTS

Site	Mean % Survival	Mean Weight of Survivors (mg)	Mean Individual Weight based on 10 Organisms per Chamber (mg)
9/18 Control	86.25	0.59	0.52
9/22 Control	86.25	0.66	0.58
NJCSD00101*	61.25	0.19	0.12
NJCSD00201*	50	0.48	0.23
MTCSDFD001	0	0.0	0.0
MTCSDFD002	51.25	0.16	0.08
MTCSDFD003	81.25	0.35	0.28
MTCSDFD004	85.0	0.23	0.19
MTCSD00101	23.75	0.21	0.05
MTCSD00201	80.0	0.22	0.18
MTCSD00301	14.28	0.32	0.06
MTCSD00401	46.25	0.20	0.09
MTCSD00901	18.75	0.20	0.05
MTCSD01001	10.0	0.33	0.09
MTCSD01101	20.0	0.06	0.03
MTCSD01201	75.0	0.28	0.21
MTCSD01301	75.0	0.43	0.33
MTCSD01401	36.25	0.28	0.09
MTCSD01501	20.0	0.48	0.12
MTCSD01601	26.25	0.31	0.08
MTCSD01701	0.0	0.0	0.0
MTCSD01801	27.5	0.20	0.06
MTCSD01901	16.25	0.14	0.03
MTCSD02001	50.0	0.24	0.12
MTCSD02301	33.75	0.31	0.11
MTCSD02401	31.25	0.46	0.12
MTCSD02501	22.5	0.42	0.10
MTCSD02601	0.0	0.0	0.0
MTCSD02701	31.25	0.39	0.11
MTCSD02801	40.0	0.28	0.11

* Reference Site

MATERIALS AND METHODS

TEST MATERIAL

One gallon of sediment for each of 28 sites was collected by Tetra Tech NUS personnel. The samples were transported in one gallon plastic ziploc bags on ice to Tetra Tech's Biological Research Facility. Upon arrival, the sample identification, collection date and time were recorded on the sample chain-of-custody sheet (see "Chain-of-Custody" section of this report). Temperature of sediment was recorded upon arrival by measuring the temperature blank (water) packed with sediment. Temperature in all blanks was < 4° C and was recorded on the chain-of-custody sheet.

CONTROL/DILUTION WATER

The control/dilution water used for the *Hyalella azteca* 10-day sediment toxicity test was moderately hard reconstituted water with a hardness of 74 - 104 mg/L as $CaCO_3$ and an alkalinity of 48 - 76 mg/L as $CaCO_3$. This is Tetra Tech's standard culture and testing water.

TEST ORGANISMS/AGE

Hyalella azteca, 7 to 14 days old (all within a 24 hour range in age), were obtained from ABS (Aquatic BioSystems Inc.) and Chesapeake Cultures. All organisms appeared healthy and disease free.

TEST METHODS

Samples were thoroughly homogenized in the lab in a stainless steel bowl with a Teflon spoon. During homogenization, the sediments were inspected for indigenous organisms and if found they were removed.

U.S. Environmental Protection Agency. 2000. "Methods for Measuring the Toxicity and Bioaccumulation of Sediment-Associated Contaminants with Freshwater Invertebrates." 2nd edition. EPA/600/R-94/024. U.S. EPA, ORD, Duluth, MN.

ASTM. 2000. Standard test methods for measuring the toxicity of sediment-associated contaminants with freshwater invertebrates. E1706-95b. In Annual Book of ASTM Standards, Vol. 11.05, Philadelphia, PA.

Tetra Tech Standard Operating Procedure 028/01.23.97. 10-day *Chironomus tentans* Sediment Toxicity Test. Revised January, 1997. (Internal document prepared by Tetra Tech, Inc.)

TEST CONDITIONS

A summary of the test conditions for the *H. azteca* 10-day sediment toxicity test is on page 6.

AERATION OF TEST

Slow aeration was provided on day 3 in test initiated on September 18, and on Day 0 in tests initiated September 22. Although aeration was provided, dissolved oxygen continued to fall below 4.0 mg/L overnight. Dissolved oxygen levels were sufficient for the hours between renewals. Therefore dissolved oxygen levels were suboptimal only for a few hours before morning test renewals.

MODIFICATIONS TO PROTOCOLS

None

COMMENTS CONCERNING TEST

Sediment avoidance was observed in some site test containers, but it was not uniform for all replicates within those sites.

TABLE 2. Summary of Test Conditions for *Hyalella azteca* 10-day Whole Sediment Toxicity Test.

PARAMETER		CONDITIONS
1.	Test type	Whole-sediment toxicity test with renewal of overlying water
2.	Test duration	10-D
3.	Temperature	23°C ± 1°C daily mean temperature, 23 ± 3°C instantaneous temperature
4.	Light quality	Wide-spectrum fluorescent lights
5.	Light intensity	~ 500-1000 lux
6.	Photoperiod	16h light, 8h darkness
7.	Test chamber size	500 mL high-form lipless beaker
8.	Sediment volume	100 mL
9.	Overlying water volume	175 mL
10.	Renewal of overlying water	2 volume additions/d (i.e., one volume addition every 12 h)
11.	Age of test organisms:	7 - 14 days old
12.	No. organisms per test chamber	10
13.	No. replicate chambers per sample	8
14.	No. organisms per sample	80
15.	Feeding regime	Fed 1.0 mL YTC daily to each test chamber
16.	Test chamber cleaning	If screens become clogged during a test, gently brush the outside of the screen
17.	Aeration	Slow aeration was provided as per USEPA guidelines.
18.	Overlying water	Moderately Hard Reconstituted Water
19.	Overlying water quality	Hardness, alkalinity, conductivity, pH, and ammonia at the beginning and end of a test. Temperature and dissolved oxygen daily.
20.	Endpoint	Survival and growth (dry weight)
21.	Sampling and sample holding requirements	Samples used within 14 days of receipt. Samples stored in the dark at 4°C in sealed containers with no air space.
22.	Sample volume required	one gallon
23.	Test acceptability	Minimum mean control survival of 80% and measurable growth of test organisms in the control sediment. Performance-based criteria specifications outlined in Tetra Tech SOP 028.

RESULTS

OVERLYING WATER PHYSICAL/CHEMICAL RESULTS

The physical/chemical results of the overlying water including: alkalinity and hardness (as mg $CaCO_3$), ammonia, dissolved oxygen, pH, temperature, and conductivity, are summarized in Table 3. Overlying water quality was similar among all sites. See "Laboratory Bench Sheets" section of this report for all physicochemical data.

HYALELLA AZTECA RESULTS

Hyalella azteca survival in site sediments ranged between 0% (MTCSD01701, MTCSD02601, MTCSDFD00101) to 85.0% (MTCSDFD00401). Survival in all test sites was significantly different from that in the reference site, NJCSDOO201 (Table 1; Statistics Appendix, ANOVA, Duncan Multiple Range Test, $p<0.1$) except for sites MTCSDFD002, MTCSD02601, MTCSD01701, MTCSD01301, MTCSD00401, and SDFD00101. Survival in all test sites was significantly different from that in the reference site, NJCSDOO101 (Table 1; Statistics Appendix, ANOVA, Duncan Multiple Range Test, $p<0.1$) except, sites MTCSDFD002, MTCSD01701, MTCSD01301, MTCSD01801, and SDFD00301. Several sites including MTCSD00201, MTCSDFD00301, MTCSDFD00401, MTCSD01201, MTCSD01301, and both Controls were all significantly higher than at least one and sometimes both of the reference site samples. The results of the statistical analysis along with significance levels is included in the Statistics Appendix.

Mean weight of survivors in all test sites was not significantly different from that in reference site NJCSD00101, except for site MTCSD02401 (Table 2; Statistics Appendix, ANOVA, Duncan Mutlitple Range Test, $p<0.1$). However, thirteen out of 28 test sites had significantly different survivor weights when compared to reference site NJCSD00201 (Table 2; Statistics Appendix, ANOVA, Duncan Multiple Range Test, $p<0.1$). The results of the statistical analysis along with significance levels is included in Table 2 in the Statistics Appendix.

Biomass or the weight of the survivors divided by the original number of organisms placed in the test chambers yielded similar results as the survival weight analysis. In twenty-one sites out of the twenty eight tests sites, biomass was significantly different than that in reference site NJCSD00201 (Table 3; Statistics Appendix, ANOVA, Duncan Multiple Range Test, $p<0.05$). Only eight sites out of the twenty eight test sites yielded a significant difference in comparison with reference site NJCSD00101 (Table 3; Statistics Appendix, ANOVA, Duncan Multiple Range Test, $p<0.1$). Thus reference site NJCSD00201 appeared to be a higher quality reference sediment than NJCSD00101. The results of the statistical analysis along with significance levels is included in Table 3 in the Statistics Appendix.

COMMENTS CONCERNING TEST RESULTS

Test acceptability criteria were met for *H. azteca* for this test as evidenced by >80% survival in the controls and measurable weight

TABLE 3. SUMMARY OF WATER QUALITY AND TEST DATA FOR *Hyalella azteca* 10-DAY SEDIMENT TOXICITY TEST

Client: Tetra Tech NUS		
Experiment ID: Tt NUS 9/18/01 *H. azteca*	Start Test	9-18-01
Sample Tested: NSWC, Indian Head, MD	End Test	9-28-01

RESULTS

WATER CHEMISTRY ANALYSIS (RANGE)							
Site	Cond. (µmhos)	D.O. (mg/L)	pH	Temp. (°C) Instantaneous	Alkalinity (mg/L as $CaCO_3$))	Hardness (mg/L as $CaCO_3$))	Ammonia (mg/L)
Control	400 - 585	3.8 - 6.9	7.3 - 7.7	21.2 - 23.1	80 - 118	100 - 128	0.25 - 7.0
NJCSD00101*	492 - 935	3.0 - 6.6	6.7 - 6.9	21.4 - 22.9	88 - 102	90 - 124	0.75 - 1.25
NJCSD00201*	386 - 1164	3.4 - 6.6	7.3 - 7.5	20.9 - 23.0	60 - 70	84 - 146	0.25 - 1.5
MTCSDFD00101	347 - 412	4.3 - 6.8	7.0 - 7.1	21.5 - 23.0	56 - 68	86 - 106	0.25
MTCSDFD00201	333 - 411	1.5 - 6.1	7.2 - 7.3	21.5 - 23.4	46 - 60	78	0.0 - 3.0
MTCSD01401	333 - 418	2.1 - 5.3	7.2 - 7.4	21.3 - 23.1	66 - 72	80 - 106	0.25 - 2.25
MTCSD01501	335 - 425	2.0 - 5.3	7.2 - 7.4	21.0 - 23.2	68 - 76	80 - 96	0.25 - 1.50
MTCSD01701	327 - 402	3.5 - 6.0	7.1 - 7.4	21.1 - 23.1	62 - 64	80 - 98	0.50
MTCSD01901	324 - 473	1.0 - 5.5	7.2 - 7.3	21.3 - 23.2	70 – 86	84 - 90	0.75 - 10.0
MTCSD02301	336 - 412	1.6 - 6.8	7.1 - 7.2	21.3 - 23.0	46 - 62	74 - 76	0.0 - 4.0
MTCSD02401	334 - 396	1.3 - 6.4	7.2 - 7.5	21.3 - 23.1	50 - 68	80 - 82	0.0 - 2.5
MTCSD02501	327 - 422	2.3 - 6.1	7.1 - 7.3	21.5 - 23.3	54 - 60	80 - 94	0.0 - 0.5
MTCSD02601	346 -407	3.9 - 6.6	7.1 - 7.4	21.2 - 22.9	58 - 64	94 - 106	0.0 - 0.75
MTCSD02701	329 - 402	2.8 - 53	7.2 - 7.4	21.2 - 23.0	48 - 66	78 - 88	0.0 - 2.25
MTCSD02801	330 - 400	2.7 - 6.8	7.1 - 7.4	21.4 - 23.1	30 - 66	82 - 88	0.0 - 1.75

* Reference Site

TABLE 3. SUMMARY OF WATER QUALITY AND TEST DATA FOR *Hyalella azteca* 10-DAY SEDIMENT TOXICITY TEST

Client: Tetra Tech NUS		
Experiment ID: Tt NUS 9/22/01 *H. azteca*	Start Test	9-22-01
Sample Tested: NSWC, Indian Head, MD	End Test	10-2-01

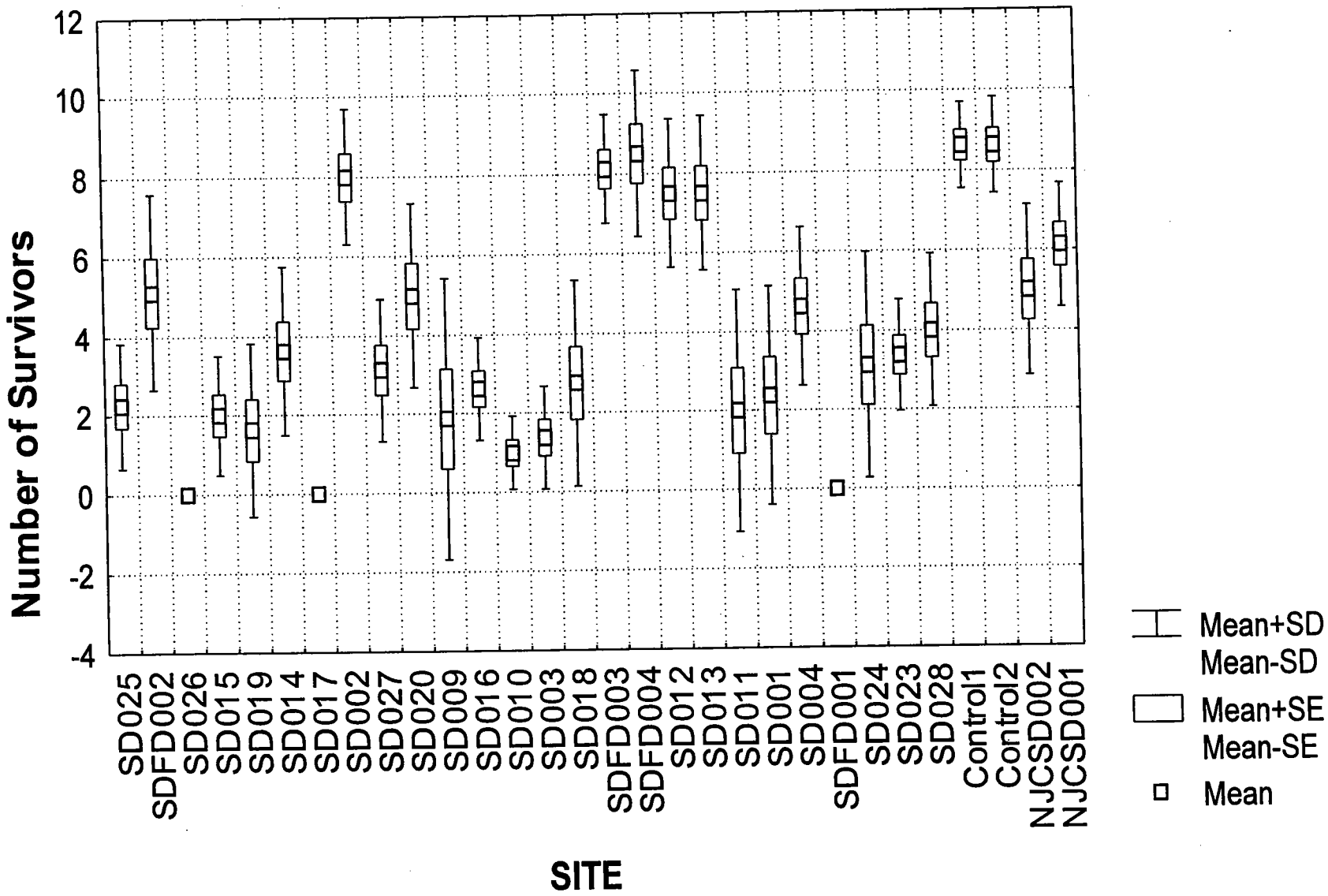
RESULTS

WATER CHEMISTRY ANALYSIS (RANGE)							
Site	Cond. (µmhos)	D.O. (mg/L)	pH	Temp. (°C) Instantaneous	Alkalinity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)	Ammonia (mg/L)
Control	381 - 474	4.4 - 7.3	7.3 - 7.4	21.6 - 22.9	80 - 84	106 -108	0.25 - 1.5
MTCSDFD00301	334 - 355	2.4 - 5.7	7.2	21.3 - 22.8	54 - 76	78 - 80	0.25
MTCSDFD00401	342 - 365	2.9 - 6.7	7.1 - 7.2	21.4 - 22.7	48 - 68	80 - 86	0.25 - 0.5
MTCSD00101	345 - 385	2.6 - 6.0	7.0 - 7.2	21.4 - 22.8	48 - 80	76 - 82	0.25 - 1.25
MTCSD00201	341 - 372	2.7 - 5.9	7.1 - 7.2	21.4 - 22.8	46 - 66	78 - 84	0.0 - 0.25
MTCSD00301	333 - 338	0.7 - 6.3	7.1	21.5 - 22.7	46 - 88	78 - 80	0.5 - 1.0
MTCSD00401	339 - 369	3.1 - 6.4	7.3 - 7.4	21.6 - 22.6	56 - 68	82 - 94	0.0 - 0.5
MTCSD00901	338 - 354	0.9 - 6.0	7.2	21.6 - 23.0	52 - 84	76 - 78	0.25 - 1.75
MTCSD01001	333 - 375	1.0 - 6.0	7.1 - 7.7	21.4 - 22.8	62 - 70	76 - 90	0.50 - 2.50
MTCSD01101	331 - 356	1.0 - 6.4	7.0 - 7.2	21.5 - 22.8	46 - 74	74 - 76	0.25 - 2.0
MTCSD01201	332 - 349	3.4 - 7.2	7.1 - 7.2	21.4 - 22.8	48 - 74	78 -84	0.25 - 0.5
MTCSD01301	343 - 360	4.2 - 7.5	7.1 - 7.3	21.5 - 22.8	46 - 82	72 - 86	0.0 - 0.25
MTCSD01601	333 - 347	1.6 - 5.8	7.2 - 7.3	21.7 - 23.0	44 - 64	64 - 76	0.0 - 3.75
MTCSD01801	334 - 376	0.8 - 5.7	7.1	21.6 - 22.8	54 - 82	64 - 86	0.27 - 7.0
MTCSD02001	331 - 359	2.8 - 6.9	7.2 - 7.4	21.5 - 23.4	40 - 68	82 - 92	0.5 - 0.74

A. STATISTICAL ANALYSIS

Survival of *Hyalella azteca* in 10-Day Sediment Toxicity Tests

Tetra Tech, NUS - Indian Head, Maryland



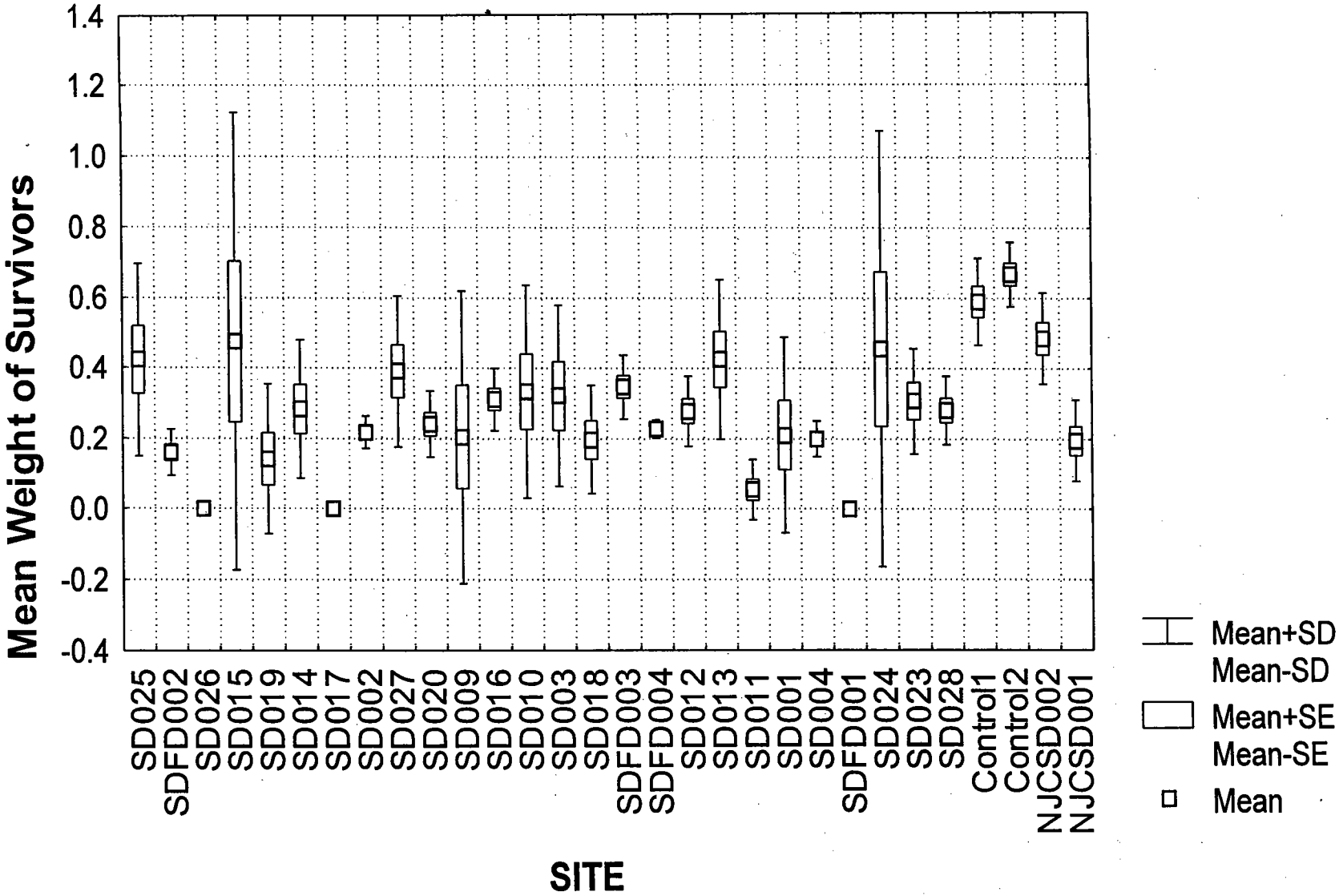
Duncan Test for Analysis of Survival Variance

Marked differences are significant at 0.1>p>.05=(*), 0.05>p>.01 (**) p<.01 (***)

	{1}	{2}	{3}	{4}	{5}	{6}	{7}	{8}	{9}	{10}	{11}	{12}	{13}	{14}	{15}	{16}	{17}	{18}	{19}	{20}	{21}	{22}	{23}	{24}	{25}	{26}	{27}	{28}	{29}	{30}
SD025 {1}		***	**	**	*		*	***		**						***	***	***	***			**	**			**	***	***	**	***
SDFD002 {2}	**		***	***	***		***	*	*		***	**	***	***	**	***	***	**	**	***	**		***	**	*		***	***		
SD026 {3}	**	***		**		***		***	***	***	***	**			**	***	***	***	***	*	**	***		***	*	*	***	***	***	***
SD015 {4}		***	*				*	***		***	*					***	***	***	***			**	***			***	***	***	***	***
SD019 {5}		***				*		***		***						***	***	***	***			***				**	***	***	***	***
SD014 {6}			***		*		***	***					**	*		***	***	***	***				***				***	***		**
SD017 {7}	**	***		*		***		***	***	***	*	**			**	***	***	***	***	*	**	***		***	***	***	***	***	***	***
SD002 {8}	***	***	***	***	***	***	***		***	***	***	***	***	***	***					***	***	***	***	***	***	***			***	*
SD027 {9}		*	***				***	***		*			*			***	***	***	***				***				***	***	*	***
SD020 {10}	**		***	***	***		***	***	*		***	**	***	***	**	***	***	**	**	***	**		***				***	***		
SD009 {11}		***	*				*	***		***						***	***	***	***			**	*			*	***	***	***	***
SD016 {12}		**	**				**	***		**						***	***	***	***			*	**				***	***	**	***
SD010 {13}		***				**		***	*	***						***	***	***	***			***		*	**	***	***	***	***	***
SD003 {14}		***				*		***		***						***	***	***	***			***				**	***	***	***	***
SD018 {15}		**	**				**	***		*						***	***	***	***			*	**				***	***	**	***
SDFD003 {16}	***	***	***	***	***	***	***		***	***	***	***	***	***	***					***	***	***	***	***	***	***			***	*
SDFD004 {17}	***	***	***	***	***	***	***		***	***	***	***	***	***	***					***	***	***	***	***	***	***			***	**
SD012 {18}	***	**	***	***	***	***	***		***	**	***	***	***	***	***					***	***	***	***	***	***	***			**	
SD013 {19}	***	**	***	***	***	***	***		***	**	***	***	***	***	***					***	***	***	***	***	***	***			**	
SD011 {20}		***	*				*	***		***						***	***	***	***			**	*			*	***	***	***	***
SD001 {21}		**	**				**	***		**						***	***	***	***			*	**				***	***	**	***
SD004 {22}	**		***	**	***		***	***			**	*	***	***	*	***	***	***	***	**	*		***				***	***		
SDFD001 {23}	**	***		*		***		***	***	***	*	**			**	***	***	***	***	*	**	***		***	***	***	***	***	***	***
SD024 {24}		*	***				***	***					*			***	***	***	***				***				***	***	*	***
SD023 {25}			***				***	***					**			***	***	***	***				***				***	***		**
SD028 {26}			***	*	**		***	***			*		***	**		***	***	***	***	*			***				***	***		*
Control1 {27}	***	***	***	***	***	***	***		***	***	***	***	***	***	***					***	***	***	***	***	***	***			***	**
Control2 {28}	***	***	***	***	***	***	***		***	***	***	***	***	***	***					***	***	***	***	***	***	***			***	**
NJCSD002 {29}	**		***	***	***		***	***	*		***	**	***	***	**	***	***	**	**	***	**		***	*			***	***		
NJCSD001 {30}	***		***	***	***	**	***	*	*		***	***	***	***	***	*	**			***	***		***	***	**	**	**	**		

Weight of Surviving *Hyalella azteca* in 10-Day Sediment Toxicity Test

Tetra Tech, NUS - Indian Head, Maryland



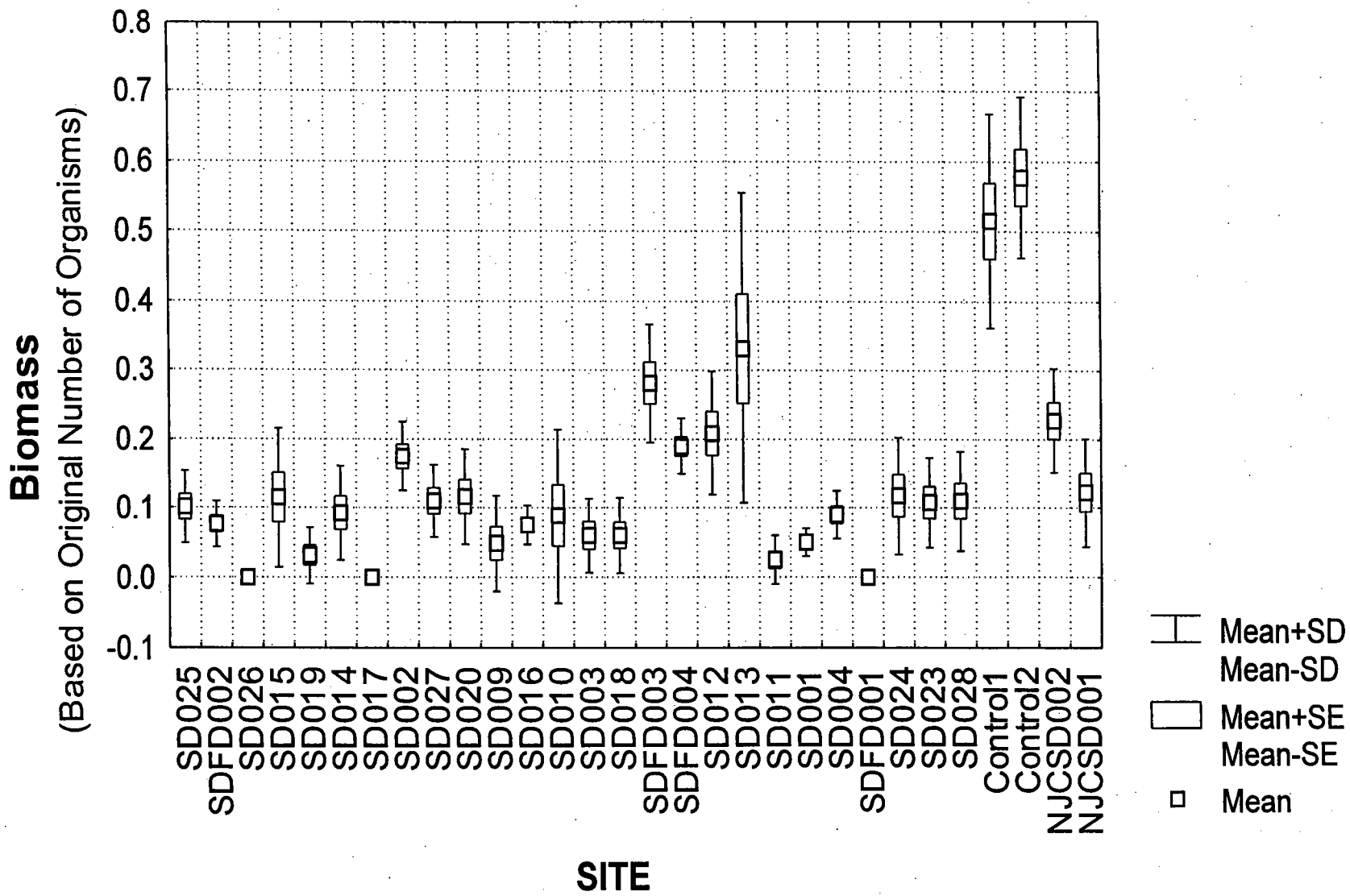
Duncan Test for Analysis of Growth Variance

Marked differences are significant at 0.1>p>.05 = (*), 0.05>p>.01 (**) p<.01 (***)

	{1}	{2}	{3}	{4}	{5}	{6}	{7}	{8}	{9}	{10}	{11}	{12}	{13}	{14}	{15}	{16}	{17}	{18}	{19}	{20}	{21}	{22}	{23}	{24}	{25}	{26}	{27}	{28}	{29}	{30}
SD025 {1}		*	***		*		***													***			***					*		
SDFD002 {2}				**															*					**			***	***	**	
SD026 {3}	***			***		**			***	*		**	**	**		**		**	***					***	**	**	***	***	***	
SD015 {4}		*	***		**		***	*			*				*		*			***	*	*	***							*
SD019 {5}	*			**					*										*					**			***	***	**	
SD014 {6}			**				**																**				**	***		
SD017 {7}	***			***		**			***	*		**	**	**		**		*	**					***	**	*	***	***	***	
SD002 {8}				*																							***	***	*	
SD027 {9}			***		*		***													**			***					**		
SD020 {10}			*				*																*				*	***	*	
SD009 {11}				*																				*			***	***	*	
SD016 {12}			**				**													*			**				**	***		
SD010 {13}			**				**													*			**				*	**		
SD003 {14}			**				**													*			**				*	**		
SD018 {15}				*																				*			***	***	**	
SDFD003 {16}			**				**													**			**				*	**		
SDFD004 {17}				*																							***	***	*	
SD012 {18}			**				*																*				**	***		
SD013 {19}		*	***		*		***													***			***					*		
SD011 {20}	***			**					**			*	*	*		**			***					***	*		***	***	***	
SD001 {21}				*																				*			***	***	*	
SD004 {22}				*																				*			***	***	*	
SDFD001 {23}	***			***		**			*	*		**	**	**		**		*	***					***	**	**	***	***	***	
SD024 {24}		**	***		**		***				*				*					***	*	*	***							*
SD023 {25}			**				**													*			**				**	***		
SD028 {26}			**				*																**				**	***		
Control1 {27}		***	***		***	**	***	***		**	***	**	*	*	***	*	***	**		***	***	***	***		**	**				***
Control2 {28}	*	***	***		***	***	***	***	**	***	***	***	**	**	***	**	***	***	*	***	***	***	***		***	***				***
NICSD002 {29}		**	***		**		***	*		*	*				**		*			***	*	*	***							
NICSD001 {30}																								*			***	***	**	

Biomass of *Hyalella azteca* in 10-Day Sediment Toxicity Test

Tetra Tech, NUS - Indian Head, Maryland



Duncan Test for Analysis of Biomass Variance

Marked differences are significant at 0.1>p>.05 = (*), 0.05>p>.01 (**) p<.01 (***)

	{1}	{2}	{3}	{4}	{5}	{6}	{7}	{8}	{9}	{10}	{11}	{12}	{13}	{14}	{15}	{16}	{17}	{18}	{19}	{20}	{21}	{22}	{23}	{24}	{25}	{26}	{27}	{28}	{29}	{30}
SD025 {1}			**				**									***	**	**	***				**				***	***	***	
SDFD002 {2}								**								***	**	***	***								***	***	***	
SD026 {3}	**			**		*		***	**	**			*			***	***	***	***			*		**	**	**	***	***	***	**
SD015 {4}			**		*		**									***		**	***	*			**				***	***	**	
SD019 {5}				*				***		*						***	***	***	***					*			***	***	***	*
SD014 {6}			*				*	*								***	**	**	***				*				***	***	***	
SD017 {7}	**			**		*		***	**	**			*			***	***	***	***			*		**	**	**	***	***	***	**
SD002 {8}		**	***		***	*	***				***	**	*	**	**	**			***	***	***	*	***				***	***		
SD027 {9}			**				**									***	*	**	***	*			**				***	***	**	
SD020 {10}			**		*		**									***		**	***	*			**				***	***	**	
SD009 {11}								***								***	***	***	***								***	***	***	
SD016 {12}								**								***	**	***	***								***	***	***	
SD010 {13}			*				*	*								***	**	**	***				*				***	***	***	
SD003 {14}								**								***	***	***	***								***	***	***	
SD018 {15}								**								***	***	***	***								***	***	***	
SDFD003 {16}	***	***	***	***	***	***	***	**	***	***	***	***	***	***	***		**	*		***	***	***	***	***	***	***	***	***		***
SDFD004 {17}	*	**	***		***	**	***		*		***	**	**	***	***	**			***	***	***	**	***		*	*	***	***		
SD012 {18}	**	***	***	**	***	**	***		**	**	***	***	**	***	***	*			***	***	***	**	***	**	**	**	***	***		**
SD013 {19}	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***		***	***		***	***	***	***	***	***	***	***	***	**	***
SD011 {20}				*				***	*	*						***	***	***	***					*	*	*	***	***	***	*
SD001 {21}								***								***	***	***	***								***	***	***	
SD004 {22}			*				*	*								***	**	**	***				*				***	***	***	
SDFD001 {23}	**			**		*		***	**	**			*			***	***	***	***			*		**	**	**	***	***	***	**
SD024 {24}			**		*		**									***		**	***	*			**				***	***	**	
SD023 {25}			**				**									***	*	**	***	*			**				***	***	**	
SD028 {26}			**				**									***	*	**	***	*			**				***	***	**	
Control1 {27}	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***			***	***
Control2 {28}	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***			***	***
NUCSD002 {29}	***	***	***	**		***	***		**	**	***	***	***	***	***				**	***	***	***	***	**	**	**	***	***		**
NUCSD001 {30}			**		*		**									***		**	***	*			**				***	***	**	

B. LABORATORY BENCH SHEETS

Hyallela azteca Survival and Growth Test

Test No. NUS-9-18-01-SD001NSC Start Date 9/18/01 End Date 9/28/01 Client: Tt NUS

Organism H. azteca Batch No. CC-9/18/01 Age 7-14 days Scientists: MD, CEB, CD, CM

Water Type/Location Indian Head Sediment Samples No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
NUCSD001	0	10	10	10	10	10	10	10	10	22.5	5.5	935	1.25	6.7	102	124	✓	✓	✓	MD
	1									22.4	4.3						✓	✓	✓	MD
	2									22.0	3.5						✓	✓	✓	MD
	3									22.0	3.3						✓	✓	✓	MD
	4									22.9	3.6						✓	✓	✓	MD
	5									-	-	-	-	-	-	-				
	6									22.9	3.5						✓	✓	✓	CEB
	7									21.9	3.0						✓	✓	✓	CEB
	8									21.8	6.6						✓	✓	✓	CEB
	9									21.7	3.1	492	0.75	6.9	88	90	✓	✓	✓	CD
	10	4	6	6	8	8	7	6	4	21.9	4.4									

Test No. NUS-9-18-01-SD028NSC Start Date 9/18/01 End Date 9/28/01 Client: Tt NUS

Organism H. azteca Batch No. CC-9/18/01 Age 7-14 days Scientists: MD, CEB, CD, CM

Water Type/Location Indian Head Sediment Samples No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD028	0	10	10	10	10	10	10	10	10	22.1	5.6	400	1.75	7.4	30	82	✓	✓	✓	MD
	1									22.3	4.7						✓	✓	✓	MD
	2									21.9	3.0						✓	✓	✓	MD
	3									22.0	3.7						✓	✓	✓	MD
	4									23.1	5.6						✓	✓	✓	CM
	5									-	-	-	-	-	-	-	-	-	-	-
	6									22.7	2.7						✓	✓	✓	MD
	7									21.7	2.7						✓	✓	✓	MD
	8									21.5	6.8						✓	✓	✓	MD
	9									21.5	4.5	330	0.0	7.1	66	88	✓	✓	✓	CD
	10	4	2	5	2	4	3	8	4	21.4	3.6									

Test No. NUS-9-18-01-SD025-Ha Start Date 9/18/01 End Date 9/28/01 Client: Tt NUS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head Sediment Samples No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed	Fed	Initial
SD025	0	10	10	10	10	10	10	10	10	22.2	5.8	422	0.50	7.3	54	94	✓	✓	✓	MD
	1									22.4	4.7						✓	✓	✓	MD
	2									22.1	3.2						✓	✓	✓	MD
	3									22.0	3.6						✓	✓	✓	MD
	4									23.3	3.6						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									22.4	2.3						✓	✓	✓	MD
	7									21.9	2.7						✓	✓	✓	MD
	8									21.9	6.1						✓	✓	✓	MD
	9									21.8	3.3	327	0.0	7.1	60	80	✓	✓	✓	CD
	10	4	5	1	2	0	2	2	2	21.5	2.6									CED

Test No. NUS-9-18-01-SDFD002-Ha Start Date 9/18/01 End Date 9/28/01 Client: Tt NUS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head Sediment Samples No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed	Fed	Initial
SDFD002	0	10	10	10	10	10	10	10	10	22.3	5.4	411	3.0	7.3	46	78	✓	✓	✓	MD
	1									22.5	4.1						✓	✓	✓	MD
	2									22.1	1.5						✓	✓	✓	MD
	3									22.1	1.8						✓	✓	✓	MD
	4									23.4	2.9						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									22.9	2.2						✓	✓	✓	MD
	7									21.9	4.2						✓	✓	✓	MD
	8									21.8	6.1						✓	✓	✓	MD
	9									21.8	3.4	333	0.0	7.2	60	78	✓	✓	✓	CD
	10	2	4	4	8	4	8	8	3	21.5	3.9									CED

Hyallela azteca Survival and Growth Test

Test No. NVS-9-18-01-SDFD001-HA Start Date 9/18/01 End Date 9/28/01 Client: TE NVS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MD CED CB CM

Water Type/Location Indian Head Sediment Samples No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SDFD001	0	10	10	10	10	10	10	10	10	22.0	6.3	412	0.25	7.0	68	106	✓	✓	✓	MD
	1									22.7	5.6						✓	✓	✓	MD
	2									22.3	4.5						✓	✓	✓	MD
	3									22.3	4.4						✓	✓	✓	MD
	4									23.0	4.9						✓	✓	✓	MD
	5									-	-	-	-	-	-	-				CM
	6									23.0	4.5						✓	✓	✓	MD
	7									22.0	4.3						✓	✓	✓	MD
	8									22.0	6.8						✓	✓	✓	MD
	9	Found many bodies								21.5	5.4	347	0.25	7.1	56	86	✓	✓	✓	CD
	10	0	0	0	0	0	0	0	0	21.7	5.1									CDD

Test No. NVS-9-18-01-SD023-HA Start Date 9/18/01 End Date 9/28/01 Client: TE NVS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MD CED CD CM

Water Type/Location Indian Head Sediment Samples No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD023	0	10	10	10	10	10	10	10	10	22.1	5.3	412	4.0	7.2	46	74	✓	✓	✓	MD
	1									22.7	3.3						✓	✓	✓	MD
	2									22.3	1.6						✓	✓	✓	MD
	3									22.2	1.8						✓	✓	✓	MD
	4									23.0	2.7						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									23.0	3.1						✓	✓	✓	MD
	7									22.0	4.0						✓	✓	✓	MD
	8									21.8	6.8						✓	✓	✓	MD
	9									21.3	3.7	336	0.0	7.1	62	76	✓	✓	✓	CD
	10	3	3	3	6	3	4	1	4	21.5	4.5									CDD

Hyallela azteca Survival and Growth Test

Test No. NUS-9-18-01-SD024-HA Start Date 9/18/01 End Date 9/28/01 Client: TE NUS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MB, CEB, CD, CM

Water Type/Location Indian Head Sed. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD024	0	10	10	10	10	10	10	10	10	21.9	5.4	346	2.5	7.5	50	80	✓	✓	✓	MD
	1									22.8	3.9						✓	✓	✓	MD
	2									22.4	1.8						✓	✓	✓	MD
	3									22.4	1.3						✓	✓	✓	MD
	4									23.1	4.1						✓	✓	✓	MD
	5									-	-	-	-	-	-					
	6									22.9	4.4						✓	✓	✓	CM
	7									21.9	4.5						✓	✓	✓	MD
	8									21.7	6.4						✓	✓	✓	MD
	9									21.6	3.5	334	0.0	7.2	68	82	✓	✓	✓	MD
	10	0	1	3	6	6	7	2	0	21.3	3.8									CD

Test No. NUS-9-18-01-NJCSD002-HA Start Date 9/18/01 End Date 9/28/01 Client: TE NUS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MB, CEB, CD, CM

Water Type/Location Indian Head Sed. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
NJCSD002	0	10	10	10	10	10	10	10	10	22.4	6.6	1164	1.5	7.5	70	146	✓	✓	✓	MD
	1									22.7	5.0						✓	✓	✓	MD
	2									22.3	4.6						✓	✓	✓	MD
	3									22.3	4.6						✓	✓	✓	MD
	4									23.0	5.1						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									22.9	4.5						✓	✓	✓	MD
	7									21.8	4.6						✓	✓	✓	MD
	8									21.2	5.8						✓	✓	✓	MD
	9									21.6	5.0	386	0.25	7.3	60	84	✓	✓	✓	CD
	10	2	4	4	5	7	5	4	9	22.9	3.4									CD

Test No. NVS-9-18-01-SD026-Ha Start Date 9/18/01 End Date 9/28/01 Client: TE NVS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MB, CED, CD, CM

Water Type/Location Indian Head No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD026	0	10	10	10	10	10	10	10	10	22.1	6.6	407	0.75	7.4	64	106	✓	✓	✓	MB
	1									22.7	5.5						✓	✓	✓	MB
	2									22.3	4.9						✓	✓	✓	MB
	3									22.3	4.9						✓	✓	✓	MB
	4									22.9	5.9						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									22.9	3.9						✓	✓	✓	MB
	7									21.8	4.2						✓	✓	✓	MB
	8									21.2	5.8						✓	✓	✓	MB
	9	Found many babies								21.5	6.5	346	0.0	7.1	58	94	✓	✓	✓	CD
	10	0	0	0	0	0	0	0	0	21.2	6.6									CED

Test No. NVS-9-18-01-SD027-Ha Start Date 9/18/01 End Date 9/28/01 Client: TE NVS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MB, CED, CD, CM

Water Type/Location Indian Head Sed. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD027	0	10	10	10	10	10	10	10	10	22.2	5.3	402	2.25	7.4	48	88	✓	✓	✓	MB
	1									22.6	3.2						✓	✓	✓	MB
	2									22.2	3.1						✓	✓	✓	MB
	3									22.3	3.0						✓	✓	✓	MB
	4									23.0	3.6						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									22.9	3.5									
	7									21.8	3.8									
	8									21.1	5.1									
	9									21.7	2.8	329	0.0	7.2	66	78	✓	✓	✓	CD
	10	3	3	2	3	1	2	4	7	21.2	5.2									CED

Test No. NVS-9-18-01-SD015-Hn Start Date 9/18/01 End Date 9/28/01 Client: Tt NVS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MD, CDD, CD, CM

Water Type/Location Indian Head No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD015	0	10	10	10	10	10	10	10	10	22.2	5.3	425	1.50	7.4	68	96	✓	✓	✓	MD
	1									22.6	3.7						✓	✓	✓	MD
	2									22.2	2.0						✓	✓	✓	MD
	3									22.3	3.2						✓	✓	✓	MD
	4									23.2	5.1						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									23.0	3.8						✓	✓	✓	CM
	7									21.9	4.6						✓	✓	✓	MD
	8									21.1	4.8						✓	✓	✓	MD
	9									21.7	3.0	335	0.25	7.2	76	80	✓	✓	✓	CD
	10	2	3	0	0	4	3	3	1	21.0	4.9									CDD

Test No. NVS-9-18-01-SD017-Hn Start Date 9/18/01 End Date 9/28/01 Client: Tt NVS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MD, CDD, CD, CM

Water Type/Location Indian Head No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD017	0	10	10	10	10	10	10	10	10	22.1	5.9	402	0.50	7.4	62	98	✓	✓	✓	MD
	1									22.7	5.0						✓	✓	✓	MD
	2									22.2	4.4						✓	✓	✓	MD
	3									22.3	4.2						✓	✓	✓	MD
	4									23.1	6.0						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									22.9	4.0						✓	✓	✓	MD
	7									21.7	4.0						✓	✓	✓	MD
	8									21.1	4.2						✓	✓	✓	MD
	9									21.5	4.0	327		7.1	64	80	✓	✓	✓	CD
	10	0	0	0	0	0	0	0	0	21.1	3.5									CDD

Test No. NUS-9-18-01-SD014-Ha Start Date 9/18/01 End Date 9/28/01 Client: TE NUS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD014	0	10	10	10	10	10	10	10	10	22.2	5.3	418	2.25	7.4	66	106	✓	✓	✓	MD
	1									22.7	2.4						✓	✓	✓	MD
	2									22.3	2.1						✓	✓	✓	MD
	3									22.4	2.8						✓	✓	✓	MD
	4									23.1	5.0						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									22.4	3.5						✓	✓	✓	MD
	7									21.7	4.4						✓	✓	✓	MD
	8									21.1	4.8						✓	✓	✓	MD
	9									21.8	3.4	333	0.25	7.2	72	80	✓	✓	✓	MD
	10	6	2	1	3	5	3	2	7	21.3	4.3									CED

Test No. NUS-9-18-01-SD019-Ha Start Date 9/18/01 End Date 9/28/01 Client: TE NUS

Organism H. azteca Batch No. Cc-9/18/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD019	0	10	10	10	10	10	10	10	10	22.0	5.5	473	10.0	7.3	86	90	✓	✓	✓	MD
	1									22.7	3.7						✓	✓	✓	MD
	2									22.3	1.0						✓	✓	✓	MD
	3									22.4	1.0						✓	✓	✓	MD
	4									23.2	3.5						✓	✓	✓	CM
	5									-	-	-	-	-	-	-				
	6									22.9	3.1						✓	✓	✓	MD
	7									21.8	3.8						✓	✓	✓	MD
	8									21.3	4.3						✓	✓	✓	MD
	9									21.8	2.9	324	0.75	7.2	70	84	✓	✓	✓	CD
	10	0	0	0	2	0	5	5	1	21.3	5.3									CMD

Hyallela azteca Survival and Growth Test

Test No. NUS-9/18/01-Control-Ha Start Date 9-18-01 End Date 9-28-01 Client: Tt NUS

Organism H. azteca Batch No. Cc 9/18/01 Age 7-14 days Scientists: MB, CEB, CB, CM

Water Type/Location Indian Head Sediment No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
Control	0	10	10	10	10	10	10	10	10	22.3	6.9	585	2.0	7.7	118	128	✓		✓	CEB
	1									22.7	4.5						✓	✓	✓	MB
	2									22.3	3.9						✓	✓	✓	MB
	3									22.4	5.1						✓	✓	✓	MB
	4									23.1	5.4						✓	✓	✓	MB
	5									-	-	-	-	-	-	-	✓		✓	CB
	6									23.0	3.8						✓	✓	✓	CEB
	7									21.9	4.0						✓	✓	✓	CEB
	8									21.2	5.4						✓	✓	✓	CEB
	9									21.7	4.2	400	0.25	7.3	80	100	✓	✓	✓	CEB
	10	8	7	9	10	10	9	8	8	21.3	3.8									CEB

Test No. NUS-9-22-01-Control-Ha Start Date 9/22/01 End Date 10/02/01 Client: Tt NUS

Organism H. azteca Batch No. AOS 9/21/01 Age 7-14 days Scientists: CB, CEB, MB, CM

Water Type/Location Indian Head Sediment No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
Control	0	10	10	10	10	10	10	10	10	22.9	7.2	474	1.5	7.4	84	106	✓		✓	MB
	1									-	-	-	-	-	-	-	✓		✓	CM
	2									22.9	4.4						✓	✓	✓	CB
	3									21.8	6.0						✓	✓	✓	CEB
	4									21.6	7.1						✓	✓	✓	CEB
	5									22.6	7.3	381					✓	✓	✓	CB
	6									22.5	6.7						✓	✓	✓	CEB
	7									-	-	-	-	-	-	-	✓		✓	CB
	8									22.4	6.2						✓	✓	✓	CEB
	9									22.6	5.3	426	0.25	7.3	80	108	✓	✓	✓	CB
	10	10	9	8	9	9	10	7	7	21.9	6.9						✓	✓	✓	CEB

Hyallela azteca Survival and Growth Test

Test No. NUS-SD016-9-22-01-HA Start Date 09/22/01 End Date 10/02/01 Client: TE NUS

Organism H. azteca Batch No. ABS 9/21/01 Age 7-14 days Scientists: MD, CGD, CB, CM

Water Type/Location Indian Head Sediment No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD016	0	10	10	10	10	10	10	10	10	22.8	5.8	347	3.75	7.3	44	64	✓		✓	MD
	1									-	-	-	-	-	-	-	✓		✓	CB
	2									23.0	1.6						✓	✓	✓	CGD
	3									21.9	2.3						✓	✓	✓	CGD
	4									21.7	5.8						✓	✓	✓	CGD
	5									22.2	5.5	336					✓	✓	✓	CB
	6									22.2	4.6						✓	✓	✓	CGD
	7									-	-	-	-	-	-	-	✓		✓	CB
	8									22.4	3.5						✓	✓	✓	CGD
	9									22.3	1.7	333	0.0	7.2	64	76	✓	✓	✓	CB
	10	1	4	2	5	2	2	2	3	21.9	3.1									CGD

Test No. NUS-SD010-09-22-01-HA Start Date 09/22/01 End Date 10/02/01 Client: TE NUS

Organism H. azteca Batch No. ABS 09/21/01 Age 7-14 days Scientists: MD, CGD, CB, CM

Water Type/Location Indian Head Sediment No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD010	0	10	10	10	10	10	10	10	10	22.6	5.7	375	2.5	7.1	62	76	✓		✓	MD
	1									-	-	-	-	-	-	-	✓		✓	CM
	2									22.8	1.2						✓	✓	✓	CGD
	3									21.6	3.2						✓	✓	✓	CGD
	4									21.4	5.9						✓	✓	✓	CGD
	5									22.9	6.0	333					✓	✓	✓	CB
	6									22.2	5.4						✓	✓	✓	CGD
	7									-	-	-	-	-	-	-	✓		✓	CB
	8									22.6	2.4						✓	✓	✓	CGD
	9									22.2	1.0	342	0.50	7.7	70	90	✓	✓	✓	CB
	10	0	1	1	3	1	1	1	0	22.8	3.2									CGD

Hyallela azteca Survival and Growth Test

Test No. NUS-SD020-9-22-01-HA Start Date 9/22/01 End Date 10/02/01 Client: TtNUS

Organism H. azteca Batch No. ABS 9/21/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head Sed. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD020	0	10	10	10	10	10	10	10	10	22.9	5.9	359	0.5	7.4	40	82	✓	✓	✓	MD
	1																✓	✓		CM
	2									22.8	3.5						✓	✓	✓	CED
	3									21.7	5.2						✓	✓	✓	CED
	4									21.5	6.9						✓	✓	✓	CED
	5									23.4	6.1	331					✓	✓	✓	CD
	6									22.4	3.8						✓	✓	✓	CED
	7																			CD
	8									22.4	4.0						✓	✓	✓	CED
	9									22.3	2.8	350	0.75	7.2	68	92	✓	✓	✓	CD
	10	5	1	6	3	5	5	6	9	21.7	3.4									CM

Test No. NUS-SD009-9-22-01-HA Start Date 09/22/01 End Date 10/02/01 Client: TtNUS

Organism H. azteca Batch No. ABS 9/21/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD009	0	10	10	10	10	10	10	10	10	23.0	5.8	354	1.75	7.2	52	76	✓	✓	✓	MD
	1																			
	2									22.9	1.3						✓	✓	✓	CM
	3									21.9	2.9						✓	✓	✓	CED
	4									21.6	6.0						✓	✓	✓	CED
	5									22.3	5.4	338					✓	✓	✓	CD
	6									22.4	5.9						✓	✓	✓	CED
	7																			CD
	8									22.4	2.7						✓	✓	✓	CED
	9									22.3	0.9	338	0.25	7.2	84	78	✓	✓	✓	CD
	10	1	0	4	0	0	0	10	0	22.0	3.0						✓	✓	✓	CM

Hyallela azteca Survival and Growth Test

Test No. NUS-SD003-09-22-01-Ha Start Date 09/22/01 End Date 10/02/01 Client: TE NUS

Organism H. azteca Batch No. ADS 09/21/01 Age 7-14 days Scientists: MD, CED, CB, CM

Water Type/Location Indian Head No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD003	0	10	10	10	10	10	10	10	10	22.7	5.5	338	1.0	7.1	46	78	✓		✓	MD
	1																✓		✓	CM
	2									22.9	2.8						✓	✓	✓	CED
	3									21.7	3.3						✓	✓	✓	CED
	4									21.5	6.3						✓	✓	✓	CED
	5									22.2	6.3	336					✓	✓	✓	CED
	6									22.3	4.4						✓	✓	✓	CED
	7																✓		✓	CD
	8									22.5	3.1						✓	✓	✓	CED
	9									22.3	0.7	333	0.50	7.1	88	80	✓	✓	✓	CD
	10	1	4	0	1	0	2	2	1	21.9	3.7									CED

Test No. NUS-SD011-09-22-01-Ha Start Date 09/22/01 End Date 10/02/01 Client: TE NUS

Organism H. azteca Batch No. ADS 09/21/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD011	0	10	10	10	10	10	10	10	10	22.6	5.9	356	2.0	7.0	46	74	✓		✓	MD
	1																✓		✓	CM
	2									22.8	1.0						✓	✓	✓	CED
	3									21.6	3.5						✓	✓	✓	CED
	4									21.5	6.0						✓	✓	✓	CED
	5									22.4	6.4	331					✓	✓	✓	CD
	6									22.3	6.0						✓	✓	✓	CED
	7																✓		✓	CD
	8									22.5	4.5						✓	✓	✓	CED
	9									22.2	1.3	343	0.25	7.2	74	76	✓	✓	✓	CD
	10	0	0	0	0	3	0	3	5	22.0	4.1									CED

Hyallela azteca Survival and Growth Test

Test No. NUS-SDFD003-09-22-01 Start Date 09-22-01 End Date 10-02-01 Client: TtNUS

Organism H. azteca Batch No. ABS 09/21/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head Sed. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SDFD003	0	10	10	10	10	10	10	10	10	22.8	5.7	348	0.25	7.2	54	78	✓		✓	MD
	1																✓		✓	CM
	2									22.4	7.4						✓	✓	✓	CM
	3									21.6	4.4						✓	✓	✓	CM
	4									21.3	5.5						✓	✓	✓	CM
	5									22.5	5.6	334					✓	✓	✓	CD
	6									22.5	4.1						✓	✓	✓	CD
	7																✓		✓	CD
	8									22.4	4.8						✓	✓	✓	CD
	9									22.5	2.7	355	0.25	7.2	76	80	✓	✓	✓	CD
	10	6	8	10	8	10	8	8	7	21.7	7.2									CED

Test No. NUS-SDFD004-09-22-01 Start Date 09/22/01 End Date 10/02/01 Client: TtNUS

Organism H. azteca Batch No. ABS 09/21/01 Age 7-14 days Scientists: MD, CED, CD, CM

Water Type/Location Indian Head Sed. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SDFD004	0	10	10	10	10	10	10	10	10	22.8	5.5	365	0.25	7.1	48	80	✓		✓	MD
	1																✓		✓	CM
	2									22.8	7.9						✓	✓	✓	CD
	3									21.8	7.7						✓	✓	✓	CD
	4									21.4	4.9						✓	✓	✓	CD
	5									22.7	4.7	342					✓	✓	✓	CD
	6									22.3	6.7						✓	✓	✓	CD
	7																✓		✓	CD
	8									22.5	4.7						✓	✓	✓	CD
	9									22.2	3.3	351	0.50	7.2	68	86	✓	✓	✓	CD
	10	10	10	10	10	8	4	8	8	22.7	4.8									CD

Hyallela azteca Survival and Growth Test

Test No. NUS-SD001-09-22-01-1h Start Date 09/22/01 End Date 10/02/01 Client: TtNUS

Organism H. azteca Batch No. ABS 09/21/01 Age 7-14 days Scientists: MD CCD CD.CM

Water Type/Location Indian Head Sediment No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD001	0	10	10	10	10	10	10	10	10	22.7	5.3	385	1.28	7.0	48	76	✓		✓	MD
	1									-	-	-	-	-	-	-	✓		✓	CM
	2									22.8	2.0						✓	✓	✓	CD
	3									21.7	5.0						✓	✓	✓	CD
	4									21.4	6.0						✓	✓	✓	CD
	5									22.2	5.3	345					✓	✓	✓	CD
	6									22.3	3.6						✓	✓	✓	CM
	7									-	-	-	-	-	-	-	✓		✓	CD
	8									22.6	4.8						✓	✓	✓	CD
	9									22.2	2.8	352	0.25	7.7	66	82	✓	✓	✓	CD
	10	5	2	2	0	1	1	0	8	21.9	4.9									CD

Test No. NUS-SD018-09-22-01-1h Start Date 09/22/01 End Date 10/02/01 Client: TtNUS

Organism H. azteca Batch No. ABS 09/21/01 Age 7-14 days Scientists: MD CCD CD.CM

Water Type/Location Indian Head Sediment No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD018	0	10	10	10	10	10	10	10	10	22.6	5.7	376	7.0	7.1	54	64	✓		✓	MD
	1									-	-						✓		✓	CM
	2									22.8	1.4						✓	✓	✓	CD
	3									21.6	2.6						✓	✓	✓	CD
	4									21.6	5.8						✓	✓	✓	CD
	5									22.2	4.7	338					✓	✓	✓	CD
	6									22.5	4.5						✓	✓	✓	CCD
	7									-	-						✓		✓	CD
	8									22.6	2.2						✓	✓	✓	CD
	9									22.2	0.8	334	0.25	7.1	82	86	✓	✓	✓	CD
	10	1	0	0	4	1	4	7	5	21.9	3.7									CD

Hyallela azteca Survival and Growth Test

Test No. NVS-SD002-09-22-01-14a Start Date 09/22/01 End Date 10/02/01 Client: TtNVS

Organism H. azteca Batch No. BAS 09/21/01 Age 7-14 days Scientists: MB, CGD, CB, CM

Water Type/Location Indian Head Spd. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD002	0	10	10	10	10	10	10	10	10	22.7	5.9	372	0	7.1	46	78	✓		✓	MB
	1																✓		✓	CM
	2									22.8	2.7						✓	✓	✓	CGD
	3									21.6	3.8						✓	✓	✓	CGD
	4									21.4	5.0						✓	✓	✓	CGD
	5									22.3	4.7	341					✓	✓	✓	CB
	6									22.1	4.8						✓	✓	✓	CGD
	7																✓		✓	CB
	8									22.4	4.8						✓	✓	✓	CGD
	9									22.2	3.4	353	0.25	7.2	66	84	✓	✓	✓	CB
	10	7	10	7	6	9	7	10	6	21.9	4.9									CGD

Test No. NVS-SD004-09-22-01-14a Start Date 09/22/01 End Date 10/02/01 Client: TtNVS

Organism H. azteca Batch No. BAS 09/21/01 Age 7-14 days Scientists: MB, CGD, CB, CM

Water Type/Location No. Organisms/Conc.

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD004	0	10	10	10	10	10	10	10	10	22.8	5.4	346	0	7.4	56	82	✓		✓	MB
	1																✓		✓	CM
	2									22.8	3.1						✓	✓	✓	CGD
	3									21.7	5.2						✓	✓	✓	CGD
	4									21.6	6.4						✓	✓	✓	CGD
	5									22.6	4.7	339					✓	✓	✓	CB
	6									22.3	5.4						✓	✓	✓	CGD
	7																✓		✓	CB
	8									22.5	5.2						✓	✓	✓	CGD
	9									22.2	3.7	369	0.50	7.3	68	94	✓	✓	✓	CB
	10	6	8	2	4	6	5	3	3	22.0	4.4									CGD

Hyallela azteca Survival and Growth Test

Test No. NVS-SD012-09-22-01-Ha Start Date 09/22/01 End Date 10-02-01 Client: TE NVS

Organism H. azteca Batch No. ABS 09/21/01 Age 7-14 days Scientists: MB, CED, CB, CM

Water Type/Location Indian Head Sed. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD012	0	10	10	10	10	10	10	10	10	22.7	6.0	333	0.5	7.1	48	84	✓		✓	MB
	1																✓		✓	CM
	2									22.8	3.5						✓	✓	✓	CED
	3									21.5	5.4						✓	✓	✓	CED
	4									21.4	7.1						✓	✓	✓	CED
	5									22.4	7.2	332					✓	✓	✓	CB
	6									22.1	5.5						✓	✓	✓	CED
	7																✓		✓	CB
	8									22.5	3.4						✓	✓	✓	CED
	9									22.2	3.4	349	0.25	7.2	74	78	✓	✓	✓	CB
	10	9	7	7	10	5	5	8	9	21.9	3.6									CED

Test No. NVS-SD013-09-22-01-Ha Start Date 09/22/01 End Date 10/02/01 Client: TE NVS

Organism H. azteca Batch No. ABS 09/21/01 Age 7-14 days Scientists: MB, CED, CB, CM

Water Type/Location Indian Head Sed. No. Organisms/Conc. 80

Site	Day	Replicate 1	2	3	4	5	6	7	8	Temp. °C	DO mg/L	Cond umhos	Ammonia mg/L	pH SU	Alkalinity	Hardness	Renewed		Fed	Initial
SD013	0	10	10	10	10	10	10	10	10	22.7	6.1	351	0	7.1	46	72	✓		✓	MB
	1																✓		✓	CM
	2									22.8	4.2						✓	✓	✓	CED
	3									21.6	6.0						✓	✓	✓	CED
	4									21.5	7.2						✓	✓	✓	CED
	5									22.4	7.5	343					✓	✓	✓	CB
	6									22.2	6.2						✓	✓	✓	CED
	7																✓		✓	CB
	8									22.6	6.7						✓	✓	✓	CED
	9									22.2	5.5	360	0.25	7.3	82	86	✓	✓	✓	CB
	10	9	10	7	7	6	8	4	9	21.9	6.2									CED

Weight Data for Hyalella azteca Survival and Growth Test

Test ID: NUS-9/18/01-Hq-Sediment Acute **Start Date:** 9/18/01 **End Date:** 9/28/01

Drying Temp: 100°C **Drying Time:** 72hrs. **Weighing Date:** 10/1/01

Analyst: NB, CB, CEB, CM **Client:** TE NUS

Site	Replicate	A Wgt. Of boat (~~mg~~)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
CONTROL	1	1.0574	1.0612	3.8	8	0.475	10	0.38	
	2	1.0784	1.082	3.6	7	0.51	10	0.36	
	3	1.0753	1.0797	4.4	~~10~~ 9	0.49	10	0.44	
	4	1.0806	1.0873	6.7	10	0.67	10	0.67	
	5	1.0662	1.0737	7.5	~~9~~ 10	0.75	10	0.75	
	6	1.0738	1.0797	5.9	9	0.66	10	0.59	
	7	1.0697	1.0755	5.8	8	0.725	10	0.58	
	8	1.0537	1.0572	3.5	8	0.44	10	0.35	
SDFA09	1	1.0627	1.0628	0.1	0	—	10	—	
	2	1.0788	1.0789	0.1	0	—	10	—	
	3	1.0588	1.0589	0.1	0	—	10	—	
	4	1.0814	1.0813	-0.1	0	—	10	—	
	5	1.0949	1.0950	0.1	0	—	10	—	
	6	1.0484	1.0483	-0.1	0	—	10	—	
	7	1.0596	1.0599	0.3	0	—	10	—	
	8	1.0515	1.0516	0.1	0	—	10	—	
SD024	1	1.0677	1.0678	0.1	0	—	10	—	
	2	1.0399	1.0418	0.19	1	1.9	10	0.19	
	3	1.0705	1.0712	0.7	3	0.23	10	0.07	
	4	1.0558	1.0573	1.5	6	0.25	10	0.15	
	5	1.0745	1.0767	2.2	6	0.37	10	0.22	
	6	1.0635	1.0652	1.7	7	0.24	10	0.17	
	7	1.0579	1.0592	1.3	2	0.65	10	0.13	
	8	1.0521	1.0523	0.2	0	—	10	—	

Test ID: NUS-9/18/01-Ha-Solitox-Acute Start Date: 9/18/01 End Date: 9/28/01

Drying Temp: 100°C Drying Time: 72 hrs. Weighing Date: 10/1/01

Analyst: MB, CB, CEB, CM Client: TT NUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
SD023	1	1.0521	1.0540	1.9	3	0.63	10	0.19	
	2	1.0900	1.0906	0.6	3	0.20	10	0.06	
	3	1.0567	1.0574	0.7	3	0.23	10	0.07	
	4	1.0778	1.0797	1.9	6	0.31	10	0.19	
	5	1.0568	1.0574	0.6	3	0.20	10	0.06	
	6	1.0906	1.0917	1.1	4	0.275	10	0.11	
	7	1.0496	1.0498	0.2	1	0.2	10	0.02	
	8	1.0737	1.0753	1.6	4	0.4	10	0.16	
SD028	1	1.0590	1.0599	0.9	4	0.225	10	0.09	
	2	1.0635	1.0643	0.8	2	0.40	10	0.08	
	3	1.0826	1.0838	1.2	5	0.24	10	0.12	
	4	1.0620	1.0627	0.7	2	0.35	10	0.07	
	5	1.0697	1.0701	0.4	4	0.1	10	0.04	
	6	1.0849	1.0859	1.0	3	0.33	10	0.10	
	7	1.0476	1.0504	2.8	8	0.35	10	0.28	
	8	1.0641	1.0651	1.0	4	0.25	10	0.10	
NSL SD001	1	1.0585	1.0590	0.5	4	0.125	10	0.05	
	2	1.0660	1.0679	1.9	6	0.316	10	0.19	
	3	1.0791	1.0796	0.5	6	0.083	10	0.05	
	4	1.0551	1.0572	2.1	8	0.2625	10	0.21	
	5	1.0535	1.0546	1.1	8	0.1375	10	0.11	
	6	1.0566	1.0574	0.8	7	0.114	10	0.08	
	7	1.0597	1.0621	2.4	6	0.4	10	0.24	
	8	1.0560	1.0565	0.5	4	0.125	10	0.05	

Weight Data for *Hyalella azteca* Survival and Growth Test

Test ID: NUS-9/18/01-Ha-Sed Tox-Acute **Start Date:** 9/18/01 **End Date:** 9/28/01

Drying Temp: 100°C **Drying Time:** 72 hrs **Weighing Date:** 10/01/01

Analyst: NB, CED, CD, CM **Client:** Tenus

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
SD025	1	1.0447	1.0461	0.0014	4	0.350 / 0.00035	10	0.00014	
	2	1.0707	1.0710	0.0009	5	0.180 / 0.00018	10	0.00009	
	3	1.0912	1.0921	0.0009	1	0.900 / 0.00090	10	0.00009	
	4	1.0699	1.0712	0.0013	2	0.650 / 0.00065	10	0.00013	
	5	1.0536	1.0534	-0.0002	0	0.00000	10	0.00000	
	6	1.0874	1.0883	0.0009	2	0.450 / 0.00045	10	0.00009	
	7	1.0919	1.0928	0.0009	2	0.450 / 0.00045	10	0.00009	
	8	1.0787	1.0805	0.0018	2	0.900 / 0.0009	10	0.00018	
SDFD002	1	1.0681	1.0683	0.0002	2	0.100 / 0.0001	10	0.00002	
	2	1.0647	1.0652	0.0005	4	0.125 / 0.00013	10	0.00005	
	3	1.0679	1.0688	0.0009	4	0.225 / 0.00023	10	0.00009	
	4	1.0690	~~1.0699~~ 1.0700	0.0010	8	0.125 / 0.00013	10	0.00010	
	5	1.0831	1.0839	0.0008	4	0.200 / 0.00020	10	0.00008	
	6	1.0788	1.0794	0.0006	8	0.075 / 0.00008	10	0.00006	
	7	1.0908	1.0921	0.0013	8	0.163 / 0.00016	10	0.00013	
	8	1.0651	1.0659	0.0008	3	0.267 / 0.00027	10	0.00008	
SD02C	1	1.0843	1.0841	-0.0002	0	0	10	0	
	2	1.0630	1.0632	0.0002	0	0	10	0	
	3	1.0735	1.0736	0.0001	0	0	10	0	
	4	1.0722	1.0720	-0.0002	0	0	10	0	
	5	1.0494	1.0490	-0.0004	0	0	10	0	
	6	1.0587	1.0587	0.0000	0	0	10	0	
	7	1.0660	1.0660	0.0000	0	0	10	0	
	8	1.0694	1.0692	-0.0002	0	0	10	0	

Weight Data for *Hyalella azteca* Survival and Growth Test

Test ID: NUS-9/18/01-HA-Sediment-Acute **Start Date:** 9/18/01 **End Date:** 9/28/01

Drying Temp: 100°C **Drying Time:** 72 hrs. **Weighing Date:** 10/1/01

Analyst: NB, CB, CEB, CM **Client:** TENUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
SD015	1	1.0789	1.0801	0.0012	2	0.600 / 0.0006	10	0.00012	
	2	1.0860	1.0872	0.0012	3	0.400 / 0.0004	10	0.00012	
	3	1.0651	1.0653	0.0002	0	0.0000	10	0.00002	
	4	1.0518	1.0519	0.0001	0	0.0000	10	0.00001	
	5	1.0611	1.0623	0.0012	4	0.300 / 0.0003	10	0.00012	
	6	1.0474	1.0480	0.0006	3	0.200 / 0.0002	10	0.00006	
	7	1.0514	1.0523	0.0009	3	0.300 / 0.0003	10	0.0003	
	8	1.0942	1.0962	0.0020	1	2.000 / 0.0020	10	0.00020	
SD019	1	1.0567	1.0567	0.0000	0	0.00000	10	0.0000	
	2	1.0668	1.0672	0.0004	0	0.00000	10	0.00004	
	3	1.0723	1.0724	0.0001	0	0.00000	10	0.00001	
	4	1.0732	1.0737	0.0005	2	0.250 / 0.00025	10	0.00005	
	5	1.0594	1.0602	0.0008	0	0.00000	10	0.00008	
	6	1.0860	1.0871	0.0011	5	0.220 / 0.00022	10	0.00011	
	7	1.0738	1.0741	0.0003	5	0.060 / 0.00006	10	0.00003	
	8	1.0972	1.0978	0.0006	1	0.600 / 0.0006	10	0.00006	
SD014	1	1.0673	1.0685	0.0012	6	0.200 / 0.0002	10	0.00012	
	2	1.0661	1.0669	0.0008	2	0.400 / 0.0004	10	0.00008	
	3	1.0657	1.0661	0.0004	1	0.400 / 0.0004	10	0.00004	
	4	1.0976	1.0996	0.0020	3	0.667 / 0.00067	10	0.00020	
	5	1.0868	1.0875	0.0007	5	0.14 / 0.00014	10	0.00007	
	6	1.0667	1.0670	0.0003	3	0.100 / 0.0001	10	0.00003	
	7	1.0699	~~1.0728~~ 1.0701	0.0002	2	0.100 / 0.0001	10	0.00002	
	8	1.0662	1.0680	0.0018	7	0.257 / 0.00026	10	0.00018	

Weight Data for Hyalella azteca Survival and Growth Test

Test ID: NUS-9/18/01-Hn-Sediment-Acute **Start Date:** 9/18/01 **End Date:** 9/28/01

Drying Temp: 100°C **Drying Time:** 72 hrs **Weighing Date:** 10/1/01

Analyst: MB, CB, CBB, CM **Client:** TT NUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
SD017	1	1.0787	1.0788	0.1	0	–	10	–	
	2	1.0820	1.0822	0.2	0	–	10	–	
	3	1.0542	1.0543	0.1	0	–	10	–	
	4	1.0789	1.0789	0.0	0	–	10	–	
	5	1.0699	1.0700	0.1	0	–	10	–	
	6	1.0748	1.0750	0.2	0	–	10	–	
	7	1.0657	1.0658	0.1	0	–	10	–	
	8	1.0719	1.0721	0.2	0	–	10	–	
NJC SD002	1	1.0571	1.0584	1.3	2	0.65	10	0.13	
	2	1.0650	1.0670	2.0	4	0.5	10	0.20	
	3	1.0737	1.0756	1.9	4	0.475	10	0.19	
	4	1.0692	1.0709	1.7	5	0.34	10	0.17	
	5	1.0495	1.0527	3.2	7	0.46	10	0.32	
	6	1.0665	1.0684	1.9	5	0.38	10	0.19	
	7	1.0630	1.0658	2.8	4	0.70	10	0.28	
	8	1.0738	1.0772	3.4	9	0.38	10	0.34	
SD027	1	1.0790	1.0797	0.7	3	0.23	10	0.07	
	2	1.0439	1.0456	1.7	3	0.567	10	0.17	
	3	1.0728	1.0735	0.7	2	0.35	10	0.07	
	4	1.0944	1.0954	1.0	3	0.33	10	0.10	
	5	1.0793	1.0746	0.3	1	0.30	10	0.03	
	6	1.0755	1.0772	1.7	2	0.85	10	0.17	
	7	1.0765	1.0776	1.1	4	0.275	10	0.11	
	8	1.0798	1.0814	1.6	7	0.224	10	0.16	

Weight Data for Hyalella azteca Survival and Growth Test

Test ID: NUS-9/22/01-Ha-SedTox-Acute Start Date: 9/22/01 End Date: 10/2/01

Drying Temp: 100°C Drying Time: 24 hr Weighing Date: 10/3/01

Analyst: NR, CM, CEB, CB Client: TE NUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
Control	1	1.0709	1.0777	6.8	10	0.68	10	0.68	
	2	1.0896	1.095	5.4	9	0.60	10	0.54	
	3	1.0530	1.0583	5.3	8	0.6625	10	0.53	
	4	1.0531	1.058	4.9	9	0.54	10	0.49	
	5	1.0529	1.0602	7.3	9	0.81	10	0.73	
	6	1.0627	1.0698	7.1	10	0.71	10	0.71	
	7	1.0565	1.0618	5.3	7	0.76	10	0.53	
	8	1.0866	1.0907	4.1	7	0.58	10	0.41	
SD020	1	1.0766	1.0774	0.8	5	0.160 / 0.00016	10	0.08 / 0.00008	
	2	1.0615	1.0619	0.4	1	0.400 / 0.00040	10	0.04 / 0.00004	
	3	1.0522	1.0534	1.2	6	0.200 / 0.00020	10	0.12 / 0.00012	
	4	1.0882	1.0886	0.4	3	0.133 / 0.00013	10	0.04 / 0.00004	
	5	1.0847	1.0862	1.5	5	0.300 / 0.00030	10	0.15 / 0.00015	
	6	1.0750	1.0758	0.8	5	0.160 / 0.00016	10	0.08 / 0.00008	
	7	1.0503	1.0522	1.9	6	0.317 / 0.00031	10	0.19 / 0.00019	
	8	1.0633	1.0656	2.3	9	0.256 / 0.00026	10	0.23 / 0.00023	
SD009	1	1.0775	1.0787	1.2	1	1.200 / 0.00120	10	0.12 / 0.00012	
	2	1.0729	1.0730	0.1	0	0.00000	10	0.00 / 0.00000	
	3	1.0771	1.0782	1.1	4	0.275 / 0.00027	10	0.11 / 0.00011	
	4	1.0670	1.0672	0.2	0	0.00000	10	0.00 / 0.00000	
	5	1.0693	1.0696	0.3	0	0.00000	10	0.00 / 0.00000	
	6	1.0754	1.0756	0.2	0	0.00000	10	0.0000	
	7	1.0661	1.0677	1.6	10	0.160 / 0.00016	10	0.16 / 0.00016	
	8	1.0632	1.0634	0.2	0	0.00000	10	0.0000	

Weight Data for Hyalella azteca Survival and Growth Test

Test ID: NUS-9/22/01 **Start Date:** 9/22/01 **End Date:** 10/2/01

Drying Temp: 100°C **Drying Time:** 24 h **Weighing Date:** 10/3/01

Analyst: MB, CM, CB, CEB **Client:** TE NUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
SD016	1	1.0760	1.0764	0.0004	1	0.400 / 0.00041	10	0.00004	
	2	1.0496	1.0505	0.0009	4	0.225 / 0.00023	10	0.00009	
	3	1.0512	1.0519	0.0007	2	0.350 / 0.00035	10	0.00007	
	4	1.0633	1.0642	0.0009	5	0.180 / 0.00018	10	0.00009	
	5	1.0670	1.0677	0.0007	2	0.350 / 0.00035	10	0.00007	
	6	1.0731	1.0736	0.0005	2	0.250 / 0.00025	10	0.00005	
	7	1.0638	1.0644	0.0006	2	0.300 / 0.0003	10	0.00006	
	8	1.0537	1.0550	0.0013	3	0.433 / 0.00043	10	0.00013	
SD01D	1	1.0691	1.0693	0.0002	0	0.00000	10	0.00002	
	2	1.0549	1.0553	0.0004	1	0.400 / 0.00040	10	0.00004	
	3	1.0562	1.0564	0.0002	1	0.200 / 0.00020	10	0.00002	
	4	1.0669	1.0677	0.0008	3	0.267 / 0.00027	10	0.00008	
	5	1.0559	1.0568	0.0009	1	0.900 / 0.00090	10	0.00009	
	6	1.0632	1.0635	0.0003	1	0.300 / 0.00030	10	0.00003	
	7	1.0882	1.0888	0.0006	1	0.600 / 0.00060	10	0.00006	
	8	1.0678	1.0717	0.0039	0	0.00000	10	0.00039	
SD003	1	1.0627	1.0633	0.0006	1	0.600 / 0.0006	10	0.00006	
	2	1.0566	1.0578	0.0012	4	0.300 / 0.0003	10	0.00012	
	3	1.0713	1.0712	-0.0001	0	0.0000	10	0.00000	
	4	1.0598	1.0800	0.0202	1	20.2 / 0.0202	10	0.00202	
	5	1.0634	1.0638	0.0004	0	0.0000	10	0.00004 ~~0.00000~~	CBD
	6	1.0595	1.0603	0.0008	2	0.400 / 0.0004	10	0.00008	
	7	1.0946	1.0859	0.0013	2	0.650 / 0.00065	10	0.00013	
	8	1.0867	1.0870	0.0003	1	0.300 / 0.0003	10	0.00003	

Weight Data for *Hyalella azteca* Survival and Growth Test

Test ID: NUS - 9/22/01 **Start Date:** 9/22/01 **End Date:** 10/2/01

Drying Temp: 100°C **Drying Time:** 24h **Weighing Date:** 10/3/01

Analyst: MB/CM/CB/CEB **Client:** TZ NUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
SD018	1	1.0661	1.0665	0.0004	1	0.400 / 0.00040	10	0.00004	
	2	1.0510	1.0513	0.0003	0	0.00000	10	~~0.00003~~ 0.0	
	3	1.0637	1.0638	0.0001	0	0.00000	10	~~0.00001~~ 0.0	
	4	1.0661	1.0668	0.0007	4	0.175 / 0.00018	10	0.00007	
	5	1.0806	1.0810	0.0004	1	0.400 / 0.00040	10	0.00004	
	6	1.0593	1.0599	0.0006	4	0.150 / 0.00015	10	0.00006	
	7	1.0791	1.0807	0.0016	7	0.229 / 0.00023	10	0.00016	
	8	1.0731	1.0742	0.0011	5	0.220 / 0.00022	10	0.00011	
SDFD003	1	1.0445	1.0469	0.0024	6	0.400 / 0.00040	10	0.00024	
	2	1.0808	1.0828	0.0020	8	0.250 / 0.00025	10	0.00020	
	3	1.0547	1.0579	0.0032	10	0.320 / 0.00032	10	0.00032	
	4	1.0691	1.0730	0.0039	8	0.4875 / 0.00049	10	0.00039	
	5	1.0542	1.0580	0.0038	10	0.380 / 0.00038	10	0.00038	
	6	1.0475	1.0494	0.0019	8	0.238 / 0.00024	10	0.00019	
	7	1.0763	1.0797	0.0034	8	0.425 / 0.00043	10	0.00034	
	8	1.0625	1.0644	0.0019	7	0.271 / 0.00027	10	0.00019	
SDFD004	1	1.0588	1.0608	0.0020	10	0.200 / 0.00020	10	0.00020	
	2	1.0926	1.0948	0.0022	10	0.220 / 0.00022	10	0.00022	
	3	1.0651	1.0671	0.0020	10	0.200 / 0.00020	10	0.00020	
	4	1.0781	1.0806	0.0025	10	0.250 / 0.00025	10	0.00025	
	5	1.0682	1.0700	0.0018	8	0.225 / 0.00023	10	0.00018	
	6	1.0852	1.0863	0.0011	4	0.275 / 0.00028	10	0.00011	
	7	1.0601	1.0620	0.0019	8	0.238 / 0.00024	10	0.00019	
	8	1.0815	1.0832	0.0017	8	0.213 / 0.00021	10	0.00017	

*. Some sample(s) had large amt of sediment dried. CEB

Weight Data for *Hyalella azteca* Survival and Growth Test

Test ID: NUS-9/22/01 **Start Date:** 9/22/01 **End Date:** 10/2/01

Drying Temp: 100°C **Drying Time:** 24h **Weighing Date:** 10/3/01

Analyst: MB/CM/CB/CEB **Client:** TZ NUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
SD012	1	1.0552	1.0573	0.0021	9	0.233 / 0.00023	10	0.00021	
	2	1.0571	1.0586	0.0015	7	0.214 / 0.00021	10	0.00015	
	3 *	1.0601	1.0633	0.0032	7	0.457 / 0.00046	10	0.00032	
	4 *	1.0802 CB	1.0834	0.0032	10	0.320 / 0.00032	10	0.00032	
	5	1.0769	1.0783	0.0014	5	0.280 / 0.00028	10	0.00014	
	6	1.0452 CB	1.0462	0.0010	5	0.200 / 0.00020	10	0.00010	
	7 *	1.0824	1.0853	0.0029	8	0.363 / 0.00036	10	0.00029	
	8	1.0708	1.0722	0.0014	9	0.155 / 0.00016	10	0.00014	
SD013	1	1.0839	1.0870	CEB 0.0031	9	0.344 / 0.00034	10	0.00031	
	2	1.0632	1.0667	0.0035	10	0.350 / 0.00035	10	0.00035	
	3	1.0561	1.0598	0.0037	7	0.529 / 0.00053	10	0.00037	
	4	1.0618	1.0636	0.0018	7	0.257 / 0.00026	10	0.00018	
	5	1.0668	1.0695	0.0027	6	0.450 / 0.00045	10	0.00027	
	6	1.0844	1.0867	0.0023	8	0.288 / 0.00029	10	0.00023	
	7	1.0621	1.0631	0.0010	4	0.250 / 0.00025	10	0.00010	
	8 *	1.0645	1.0729	0.0084	9	0.933 / 0.00093	10	0.00084	
SD011	1	1.0760	1.0762	0.0002	0	0.00000	10	0.0 ~~0.00002~~	
	2	1.0508	1.0510	0.0002	0	0.00000	10	0.0 ~~0.00002~~	
	3	1.0403	1.0404	0.0001	0	0.00000	10	0.0 ~~0.00001~~	
	4	1.0537	1.0540	0.0003	0	0.00000	10	0.0 ~~0.00003~~	
	5	1.0919	1.0926	0.0007	3	0.233 / 0.00023	10	0.00007	
	6	1.0822	1.0826	0.0004	0	0.00000	10	0.00004	
	7	1.0780	1.0787	0.0007	8	0.088 / 0.00009	10	0.00007	
	8	1.0857	1.0863	0.0006	5	0.120 / 0.00012	10	0.00006	

*. Large amount of solids on pan(3) + pan(4) + pan(7)

* Large amount of solids on pan(8). CEB

Weight Data for Hydroid sized Survival and Growth

Test ID: NUS - 9/22/01 **Start Date:** 9/22/01 **End Date:** 10/2/01

Drying Temp: 100°C **Drying Time:** 24h **Weighing Date:** 10/3/01

Analyst: MB/CM/CB/CEB **Client:** Ft NUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
SD001	1	1.0428	1.0434	0.0006	5	0.120 / 0.00012	10	0.00006	
	2	1.0609	1.0616	0.0007	2	0.350 / 0.00035	10	0.00007	
	3	1.0800	1.0803	0.0003	2	0.150 / 0.00015	10	0.00003	
	4	1.0559	1.0562	0.0003	0	0.00000	10	0.0 ~~0.00003~~	
	5	1.0532	1.0538	0.0006	1	0.600 / 0.00060	10	0.00006	
	6	1.0786	1.0793	0.0007	1	0.700 / 0.00070	10	0.00007	
	7	1.0509	1.0511	0.0002	0	0.00000	10	0.0 ~~0.00002~~	
	8	1.0702	1.0708	0.0006	8	0.075 / 0.00008	10	0.00006	
SD002	1	1.0797							
	2	1.0835							
	3	1.0771							
	4	1.0791							
	5	1.0793							
	6	1.0904							
	7	1.0824							
	8	1.0722							
SD004	1	1.0876	1.0886	0.0010	6	0.167 / 0.00017	10	0.00010	
	2	1.0676	1.0691	0.0015	8	0.188 / 0.00019	10	0.00015	
	3	1.0674	1.0677	0.0003	2	0.150 / 0.00015	10	0.00003	
	4	1.0800	1.0810	0.0010	4	0.250 / 0.00025	10	0.00010	
	5	1.0659	1.0669	0.0010	6	0.167 / 0.00017	10	0.00010	
	6	1.0807	1.0816	0.0009	5	0.180 / 0.00018	10	0.00009	
	7	1.0795	1.0801	0.0006	3	0.200 / 0.00002	10	0.00006	
	8	1.0603	1.0612	0.0009	3	0.300 / 0.00003	10	0.00009	

CB

Weight Data for *Hyalella azteca* Survival and Growth Test

Page #1 of 1

Test ID: NUS-9/22/01 **Start Date:** 9/22/01 **End Date:** 10/2/01

Drying Temp: 100°C **Drying Time:** 24h **Weighing Date:** 10/3/01

Analyst: MB, CM, CB, CEB **Client:** TE NUS

Site	Replicate	A Wgt. Of boat (mg)	B Dry Wgt. foil and larvae	B-A Total dry wgt. of larvae (mg)	C No. Of surviving larvae	(B-A)/C Mean Dry Wgt. of Surviving	D No. of original larvae	(B-A)/D Average individ. dry wgt.	Remarks
S D 0 0 2	1	1.0842	1.0862	0.0020	7	0.286 / 0.00029	10	0.00020	
	2	1.0532	1.0556	0.0024	10	0.240 / 0.00024	10	0.00024	
	3	1.0886	1.0903	0.0017	7	0.243 / 0.00024	10	0.00017	
	4	1.0512	1.0526	0.0014	6	0.233 / 0.00023	10	0.00014	
	5	1.0686	1.0702	0.0016	9	0.178 / 0.00018	10	0.00016	
	6	1.0490	1.0509	0.0019	9	0.211 / 0.00021	10	0.00019	
	7	1.0755	1.0777	0.0022	10	0.220 / 0.00022	10	0.00022	
	8	1.0753	1.0761	0.0008	6	0.133 / 0.00013	10	0.00008	
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								
	1								
	2								
	3								
	4								
	5								
	6								
	7								
	8								

C. CHAIN-OF-CUSTODY

MITKEM CORPORATION
175 Metro Center Boulevard
Warwick, Rhode Island 02886-1755
(401) 732-3400 • Fax (401) 732-3499
email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS 661 Anderson Dr Foster Plaza 7		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP Pittsburgh PA 15220		CITY/ST/ZIP		

CLIENT PROJECT NAME: | CLIENT PROJECT #: | CLIENT P.O.#:

REQUESTED ANALYSES: 10-Hydride Arsenic

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	10-Hydride Arsenic	COMMENTS
MTCSD001701	9-7-01 1240								X	
MTCSD02401	9-6-01 1450									
MTCSD02501	9-6-01 1425									
MTCSD001501	9-7-01 1410									
NJCSD00101	9-5-01 1630									
MTCSD002001	9-7-01 945									
MTCSDFD012	9-6-01 1515									
MTCSD02701	9-6-01 1000									
MTCSDFD001	9-6-01 1200									
MTCSD0[illegible]01	9-6-01 1515									
MTCSD004D1	9-7-01 930									
MTCSD00301	9-7-01 1155									

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Ellen Hirsch	9-10-01 0800	Maureen Bowman	9/11/01 9:45
2		/		/
3		/		/

ADDITIONAL REMARKS:

COOLER TEMP:

WHITE: LABORATORY COPY YELLOW: REPORT COPY PINK: CLIENT'S COPY

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email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra tech NUS	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME George Latulippe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME:	CLIENT PROJECT #:	CLIENT P.O.#:

REQUESTED ANALYSES: 10-day Hydrolab test

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	10-day Hydrolab test	COMMENTS
MTCSD00[illegible]1101	9-8-01 1120								X	
MTCSD01001	9-8-01 1210									
MTCSD00901	9-8-01 1235									
MTCSD01201	9-8-01 930									
MTCSD01601	9-7-01 1335									
MTCSDFD003	9-8-01 930									
MTCSD01801	9-7-01 1210									
MTCSD02601	9-6-01 1200									
MTCSD01401	9-7-01 1440									
MTCSD02801	9-6-01 1025									
MTCSD01901	9-7-01 1210									
MTCSD00[illegible]02	9-5-01 1730									

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Ellen [illegible]	9/10/01 0800	[illegible]	9/11/01 9:45
2		/		/
3		/		/

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email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra Tech NUS	PHONE	COMPANY	PHONE	LAB PROJECT #:
NAME G. Latulippe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME: | CLIENT PROJECT #: | CLIENT P.O.#:

REQUESTED ANALYSES: 16-Hydrocarbons

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	16-Hydrocarbons	COMMENTS
✓ MTCSD00201	9-9-01 1235								X	
✓ MTCSD00101	9-9-01 1330								X	
✓ MTCSDFD001	9-9-01 1235								X	
	/									
	/									
	/									
	/									
	/									
	/									
	/									
	/									
	/									

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	Joellen Street	9-10-01 0800	Marcus Brown	9/11/01 9:45
2		/		/
3		/		/

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email: mitkem@mitkem.com

CHAIN-OF-CUSTODY RECORD

REPORT TO		INVOICE TO		
COMPANY Tetra tech	PHONE 412-921-7090	COMPANY	PHONE	LAB PROJECT #:
NAME George Latdlipe	FAX	NAME	FAX	
ADDRESS		ADDRESS		TURNAROUND TIME:
CITY/ST/ZIP		CITY/ST/ZIP		

CLIENT PROJECT NAME: Indian Head Multinomial Lake
CLIENT PROJECT #:
CLIENT P.O.#:

REQUESTED ANALYSES: 10 day Hydrolic

SAMPLE IDENTIFICATION	DATE/TIME SAMPLED	COMPOSITE	GRAB	WATER	SOIL	OTHER	LAB ID	# OF CONTAINERS	10 day Hydrolic	COMMENTS
NJLSD0020 ✓	9/5/01 / 1730		X		X			1	X	Change sample number to NJLSD0020
NJLSD00101 ✓	9/5/01 / 1630									
MTLSD02501 ✓	9/6/01 / 1425									
MTLSDFD002 ✓	9/6/01 / 1515									
MTLSDFD001 ✓	9/6/01 / 1200									Temperature = 2.4°C
MTLSD02301 ✓	9/6/01 / 1515									
MTLSD02401 ✓	9/6/01 / 1450									
MTLSD02601 ✓	9/6/01 / 1025									
MTLSD02601 ✓	9/6/01 / 1200									
MTLSD02701 ✓	9/6/01 / 1000									
	/									
	/									

TSF#	RELINQUISHED BY	DATE/TIME	ACCEPTED BY	DATE/TIME
1	[illegible]	9/6/01 / 1800	[illegible]	9/7/01 / 3:00 pm
2		/		/
3		/		/

ADDITIONAL REMARKS:

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APPENDIX C-6

STATISTICAL ANALYSIS OF THE TOXICITY TEST DATA

An ANOVA is a simple hypothesis test to check whether or not groups of observations have the same mean. The Tukey HSD Test for post-hoc pair-wise comparisons in ANOVA can be used to determine which particular groups have statistically significant differences in mean. The 'Honestly Significantly Different' (HSD) test proposed by the statistician John Tukey is based on what is called the 'studentized range distribution'. To test all pairwise comparisons among means using the Tukey HSD, compute t_s for each pair of means using the formula:

$$t_s = \frac{M_i - M_j}{\sqrt{\frac{MSE}{n_h}}}$$

where M_i - M_j is the difference between the ith and jth means, *MSE* is the Mean Square Error (an estimate of the population variance), and n_h is the harmonic mean of the sample sizes of groups i and j, i.e.,:

$$n_h = \frac{2}{\frac{1}{n_i} + \frac{1}{n_j}}$$

The critical value of t_s is determined from the distribution of the studentized range. The number of means in the experiment is used in the determination of the critical value, and this critical value is used for all comparisons among means. Typically, the largest mean is compared with the smallest mean first. If that difference is not significant, no other comparisons will be significant either, so the computations for these comparisons can be skipped.

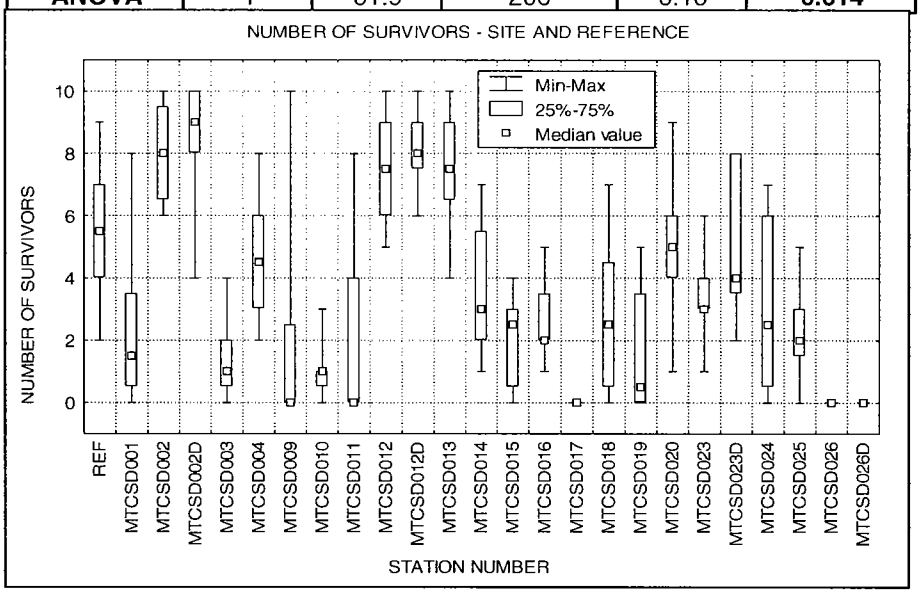
A type I error is the error of rejecting the null hypothesis when it is true -- of saying a group mean is statistically different when it is not. The Tukey HSD procedure keeps the probability of a Type I error at the specified significance level. This is a great advantage. Generally, when you do multiple significance tests, the chance of finding a "significant" difference just by chance increases. Tukey's HSD test is one method of ensuring that the chance of finding a significant difference in any comparison is maintained at the alpha level of the test, 5%.

Since the Tukey HSD test requires an equal number of samples, the Unequal N HSD (Spotvoll/Stoline test) was performed for the mass per survivor post hoc tests. The Unequal N HSD test is a modification of the Tukey HSD test, and it provides a reasonable test of differences in group means if group sample numbers are not too discrepant.

Number of Surviviors

Analysis #1 : Site vs. Reference

	df Effect	MS Effect	df Error	F	p-level
ANOVA	1	61.9	206	6.16	**0.014**



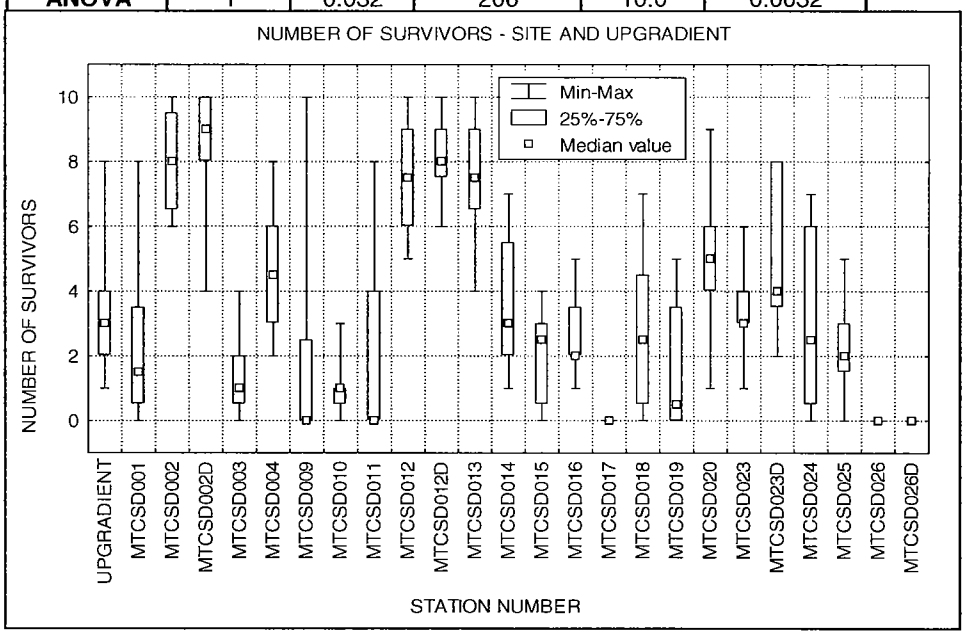
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
MTCSD001	2.38	8	SITE	0.046	*
MTCSD002	8.00	8	SITE	0.444	
MTCSD002-D	8.50	8	SITE	0.114	
MTCSD003	1.38	8	SITE	4.04E-04	*
MTCSD004	4.63	8	SITE	1.000	
MTCSD009	1.88	8	SITE	0.005	*
MTCSD010	1.00	8	SITE	5.47E-05	*
MTCSD011	2.00	8	SITE	0.009	*
MTCSD012	7.50	8	SITE	0.866	
MTCSD012-D	8.13	8	SITE	0.337	
MTCSD013	7.50	8	SITE	0.866	
MTCSD014	3.63	8	SITE	0.866	
MTCSD015	2.00	8	SITE	0.009	*
MTCSD016	2.63	8	SITE	0.114	
MTCSD017	0.00	8	SITE	1.85E-05	*
MTCSD018	2.75	8	SITE	0.171	
MTCSD019	1.63	8	SITE	1.46E-03	*
MTCSD020	5.00	8	SITE	1.000	
MTCSD023	3.38	8	SITE	0.676	
MTCSD023-D	5.13	8	SITE	1.000	
MTCSD024	3.13	8	SITE	0.444	
MTCSD025	2.25	8	SITE	0.028	*
MTCSD026	0.00	8	SITE	1.85E-05	*
MTCSD026-D	0.00	8	SITE	1.85E-05	*
NJCSD001	6.13	8	REFERENCE	---	---
NJCSD002	5.00	8	REFERENCE	---	---
All Groups	3.67	208	---	---	---

Number of Surviviors

Analysis #2 : Site vs. Upgradient

	df Effect	MS Effect	df Error	MS Error	F
ANOVA	1	0.032	206	10.0	0.0032



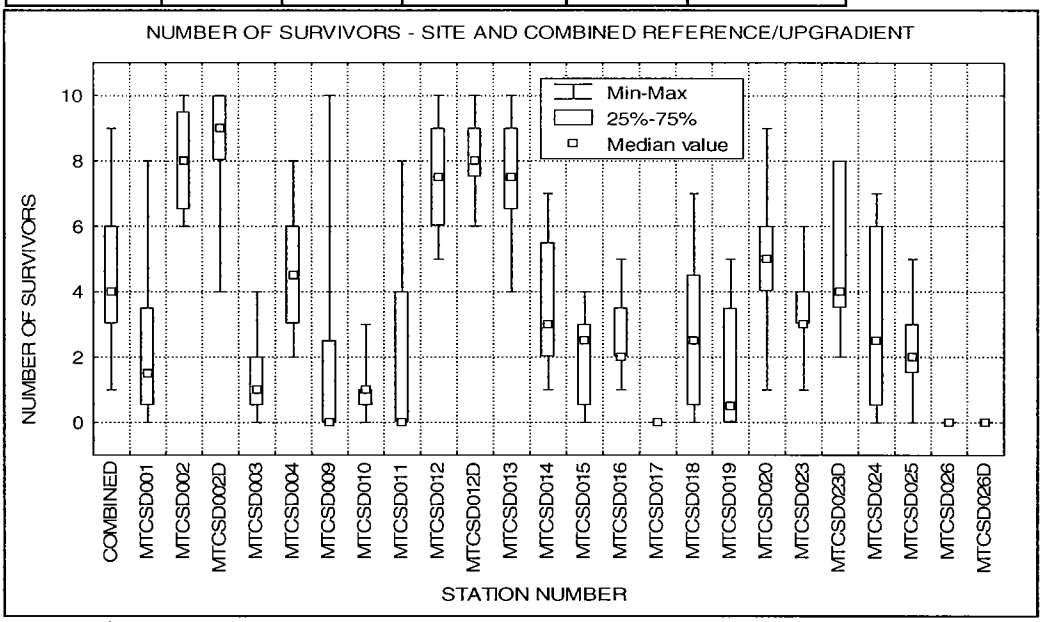
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
MTCSD001	2.38	8	SITE	1.00	
MTCSD002	8.00	8	SITE	9.57E-05	
MTCSD02D	8.50	8	SITE	2.12E-05	
MTCSD003	1.38	8	SITE	0.67	
MTCSD004	4.63	8	SITE	1.00	
MTCSD009	1.88	8	SITE	0.97	
MTCSD010	1.00	8	SITE	0.33	
MTCSD011	2.00	8	SITE	0.99	
MTCSD012	7.50	8	SITE	1.42E-03	
MTCSD12D	8.13	8	SITE	5.34E-05	
MTCSD013	7.50	8	SITE	1.42E-03	
MTCSD014	3.63	8	SITE	1.00	
MTCSD015	2.00	8	SITE	0.99	
MTCSD016	2.63	8	SITE	1.00	
MTCSD017	0.00	8	SITE	0.01	*
MTCSD018	2.75	8	SITE	1.00	
MTCSD019	1.63	8	SITE	0.86	
MTCSD020	5.00	8	SITE	1.00	
MTCSD023	3.38	8	SITE	1.00	
MTCSD23D	5.13	8	SITE	0.99	
MTCSD024	3.13	8	SITE	1.00	
MTCSD025	2.25	8	SITE	1.00	
MTCSD026	0.00	8	SITE	0.01	*
MTCSD26D	0.00	8	SITE	0.01	*
MTCSD027	3.13	8	UPGRADIENT	---	---
MTCSD028	4.00	8	UPGRADIENT	---	---
All Groups	3.52	208	---	---	---

Number of Surviviors

Analysis #3 : Site vs. Combined Reference & Upgradient

	df Effect	MS Effect	df Error	MS Error	F
ANOVA	1	30.1	222	9.70	3.10



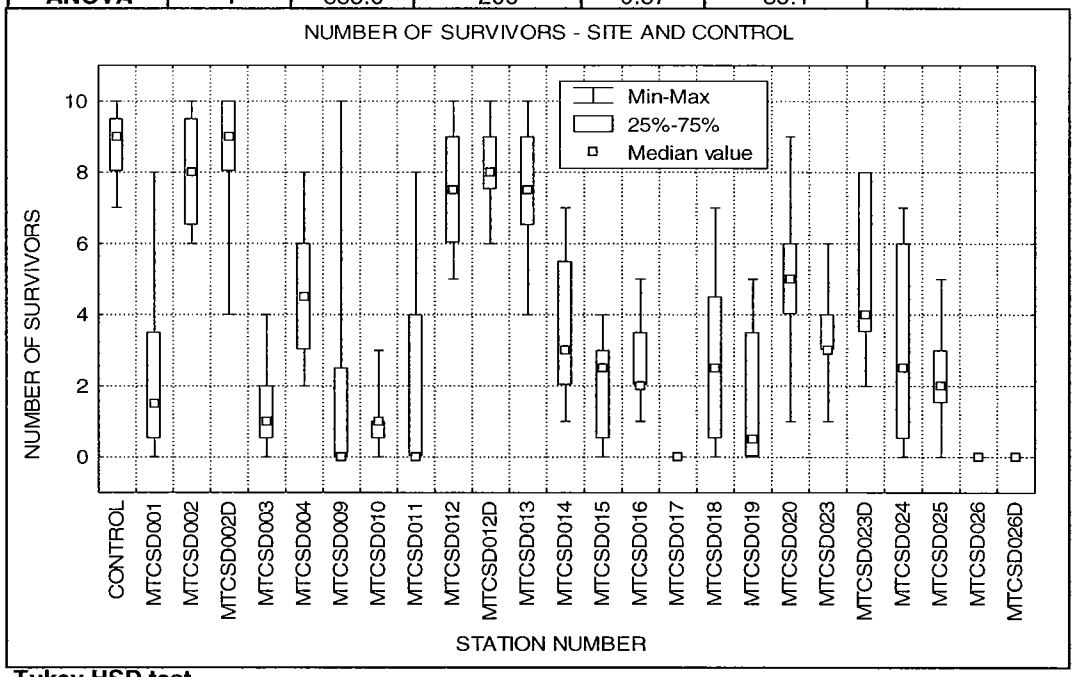
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
MTCSD001	2.38	8	SITE	0.52	
MTCSD002	8.00	8	SITE	0.01	
MTCSD02D	8.50	8	SITE	3.51E-04	
MTCSD003	1.38	8	SITE	1.78E-02	*
MTCSD004	4.63	8	SITE	0.95	
MTCSD009	1.88	8	SITE	0.14	
MTCSD010	1.00	8	SITE	2.72E-03	*
MTCSD011	2.00	8	SITE	0.20	
MTCSD012	7.50	8	SITE	0.05	
MTCSD12D	8.13	8	SITE	0.00	
MTCSD013	7.50	8	SITE	0.05	
MTCSD014	3.63	8	SITE	1.00	
MTCSD015	2.00	8	SITE	0.20	
MTCSD016	2.63	8	SITE	0.76	
MTCSD017	0.00	8	SITE	0.00	*
MTCSD018	2.75	8	SITE	8.54E-01	
MTCSD019	1.63	8	SITE	0.05	
MTCSD020	5.00	8	SITE	1.00E+00	
MTCSD023	3.38	8	SITE	1.00	
MTCSD23D	5.13	8	SITE	1.00	
MTCSD024	3.13	8	SITE	9.87E-01	
MTCSD025	2.25	8	SITE	0.40	
MTCSD026	0.00	8	SITE	0.00	*
MTCSD26D	0.00	8	SITE	0.00	*
NJCSD001	6.13	8	REFERENCE	---	---
NJCSD002	5.00	8	REFERENCE	---	---
MTCSD027	3.13	8	UPGRADIENT	---	---
MTCSD028	4.00	8	UPGRADIENT	---	---
All Groups	3.66	224	---	---	---

Number of Surviviors

Analysis #4 : Site vs. Control

	df Effect	MS Effect	df Error	MS Error	F
ANOVA	1	385.6	206	9.87	39.1



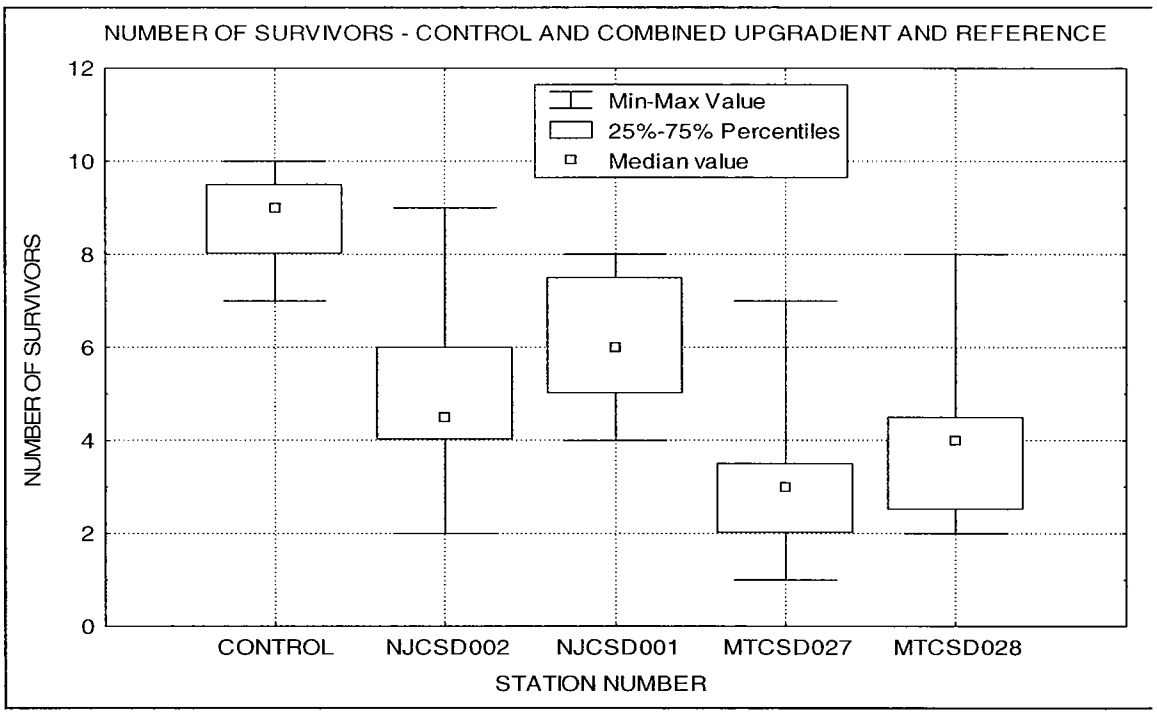
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
MTCSD001	2.38	8	SITE	1.85E-05	*
MTCSD002	8.00	8	SITE	1.00	
MTCSD02D	8.50	8	SITE	1.00	
MTCSD003	1.38	8	SITE	1.85E-05	*
MTCSD004	4.63	8	SITE	8.11E-04	*
MTCSD009	1.88	8	SITE	1.85E-05	*
MTCSD010	1.00	8	SITE	1.85E-05	*
MTCSD011	2.00	8	SITE	1.85E-05	*
MTCSD012	7.50	8	SITE	1.00	
MTCSD12D	8.13	8	SITE	1.00	
MTCSD013	7.50	8	SITE	0.96	
MTCSD014	3.63	8	SITE	1.97E-05	*
MTCSD015	2.00	8	SITE	1.85E-05	*
MTCSD016	2.63	8	SITE	1.85E-05	*
MTCSD017	0.00	8	SITE	1.85E-05	*
MTCSD018	2.75	8	SITE	1.85E-05	*
MTCSD019	1.63	8	SITE	1.85E-05	*
MTCSD020	5.00	8	SITE	0.01	*
MTCSD023	3.38	8	SITE	1.87E-05	*
MTCSD23D	5.13	8	SITE	0.01	*
MTCSD024	3.13	8	SITE	1.85E-05	*
MTCSD025	2.25	8	SITE	1.85E-05	*
MTCSD026	0.00	8	SITE	1.85E-05	*
MTCSD26D	0.00	8	SITE	1.85E-05	*
9/18Control	8.63	8	CONTROL	---	---
9/22Control	8.63	8	CONTROL	---	---
All Groups	3.91	208	---	---	---

Number of Surviviors

Analysis #5 : Combined Reference & Upgradient vs. Control

	df Effect	MS Effect	df Error	MS Error	F
ANOVA	1	176	46	3.38	52.0



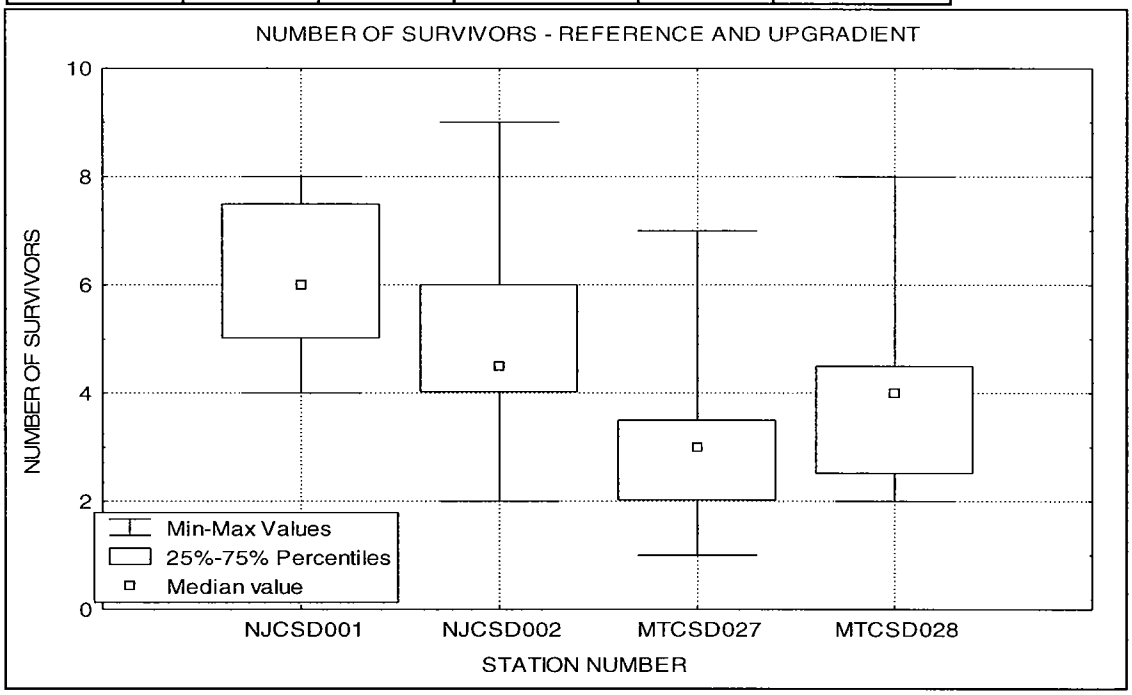
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
9/18Control	8.63	8	CONTROL	---	---
9/22Control	8.63	8	CONTROL	---	---
NJCSD001	6.13	8	REFERENCE	0.01	*
NJCSD002	5.00	8	REFERENCE	2.05E-04	*
MTCSD027	3.13	8	UPGRADIENT	1.32E-04	*
MTCSD028	4.00	8	UPGRADIENT	1.32E-04	*
All Groups	5.92	48	---	---	---

Number of Surviviors

Analysis #6 : Upgradient vs. Reference

	df Effect	MS Effect	df Error	MS Error	F
ANOVA	1	32.0	30	3.53	9.07



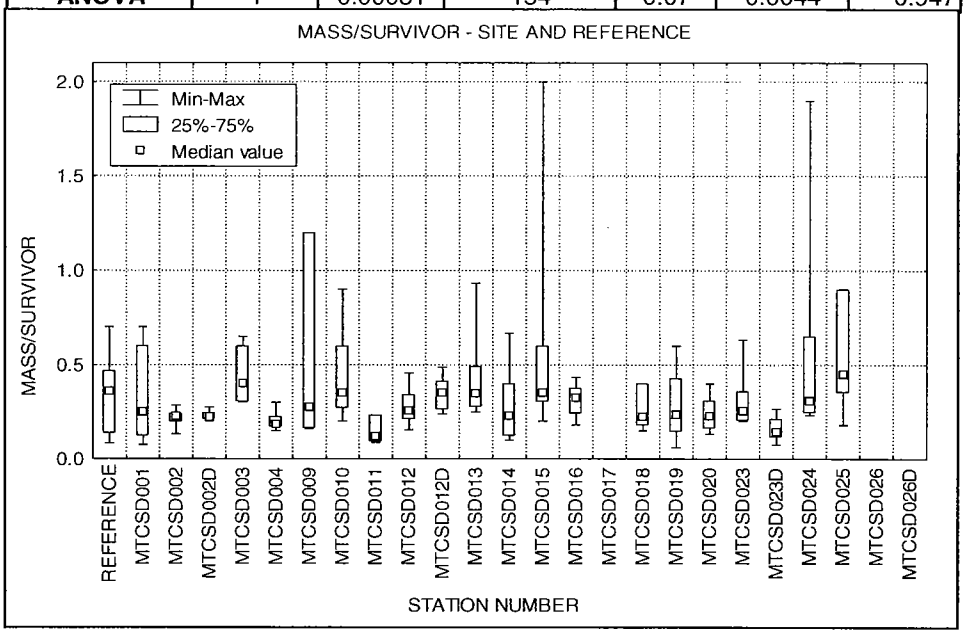
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
NJCSD001	6.13	8	REFERENCE	0.010	
NJCSD002	5.00	8	REFERENCE	0.194	
MTCSD027	3.13	8	UPGRADIENT	1.52E-02	*
MTCSD028	4.00	8	UPGRADIENT	0.152	
All Groups	4.56	32	---	---	---

Mass/Survivior

Analysis #1 : Site vs. Reference

	df Effect	MS Effect	df Error	MS Error	F	p-level
ANOVA	1	0.00031	154	0.07	0.0044	0.947



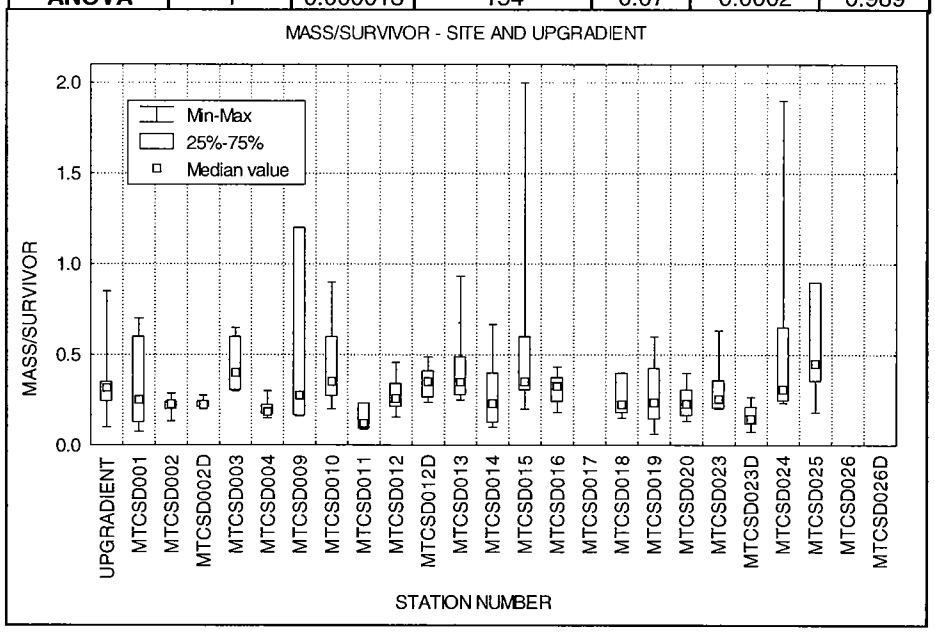
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
MTCSD001	0.33	6	SITE	1.00	
MTCSD002	0.22	8	SITE	0.93	
MTCSD002-D	0.23	8	SITE	0.95	
MTCSD003	0.45	5	SITE	1.00	
MTCSD004	0.20	8	SITE	0.88	
MTCSD009	0.55	3	SITE	0.99	
MTCSD010	0.44	6	SITE	0.99	
MTCSD011	0.15	3	SITE	1.00	
MTCSD012	0.28	8	SITE	0.99	
MTCSD012-D	0.35	8	SITE	1.00	
MTCSD013	0.43	8	SITE	0.98	
MTCSD014	0.28	8	SITE	1.00	
MTCSD015	0.63	6	SITE	0.46	
MTCSD016	0.31	8	SITE	1.00	
MTCSD017	0.00	0	SITE		*
MTCSD018	0.26	6	SITE	1.00	
MTCSD019	0.28	4	SITE	1.00	
MTCSD020	0.24	8	SITE	0.97	
MTCSD023	0.31	8	SITE	1.00	
MTCSD023-D	0.16	8	SITE	0.72	
MTCSD024	0.61	6	SITE	0.57	
MTCSD025	0.55	7	SITE	0.67	
MTCSD026	0.00	0	SITE		*
MTCSD026-D	0.00	0	SITE		*
NJCSD001	0.20	8	REFERENCE	---	---
NJCSD002	0.48	8	REFERENCE	---	---
All Groups	0.25	156	---	---	---

Mass/Survivior

Analysis #2 : Site vs. Upgradient

	df Effect	MS Effect	df Error	MS Error	F	p-level
ANOVA	1	0.000013	154	0.07	0.0002	0.989



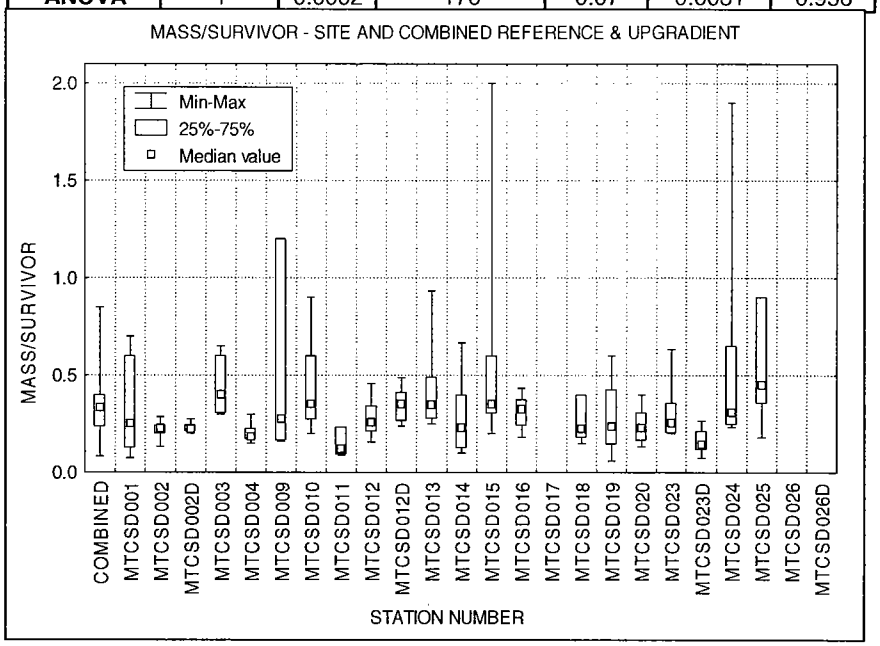
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
MTCSD001	0.33	6	SITE	1.00	
MTCSD002	0.22	8	SITE	1.00	
MTCSD002D	0.23	8	SITE	1.00	
MTCSD003	0.45	5	SITE	1.00	
MTCSD004	0.20	8	SITE	1.00	
MTCSD009	0.55	3	SITE	1.00	
MTCSD010	0.44	6	SITE	1.00	
MTCSD011	0.15	3	SITE	1.00	
MTCSD012	0.28	8	SITE	1.00	
MTCSD012D	0.35	8	SITE	1.00	
MTCSD013	0.43	8	SITE	1.00	
MTCSD014	0.28	8	SITE	1.00	
MTCSD015	0.63	6	SITE	0.82	
MTCSD016	0.31	8	SITE	1.00	
MTCSD017	0.00	0	SITE		*
MTCSD018	0.26	6	SITE	1.00	
MTCSD019	0.28	4	SITE	1.00	
MTCSD020	0.24	8	SITE	1.00	
MTCSD023	0.31	8	SITE	1.00	
MTCSD023D	0.16	8	SITE	0.98	
MTCSD024	0.61	6	SITE	0.90	
MTCSD025	0.55	7	SITE	0.96	
MTCSD026	0.00	0	SITE		*
MTCSD026D	0.00	0	SITE		*
MTCSD027	0.39	8	UPGRADIENT	---	---
MTCSD028	0.28	8	UPGRADIENT	---	---
All Groups	0.34	156	---	---	---

Mass/Survivior

Analysis #3 : Site vs. Combined Reference & Upgradient

	df Effect	MS Effect	df Error	MS Error	F	p-level
ANOVA	1	0.0002	170	0.07	0.0031	0.956



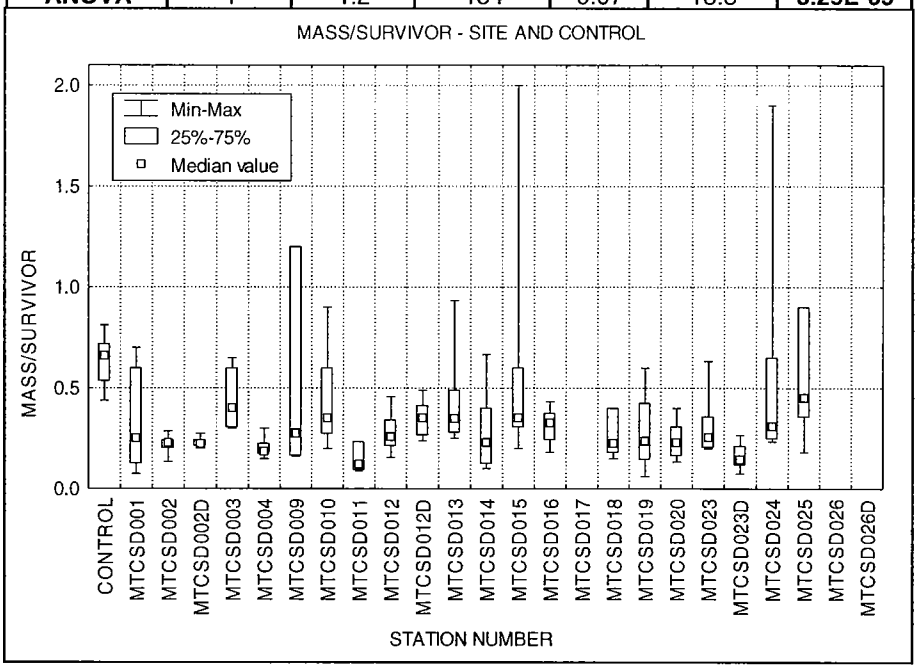
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
MTCSD001	0.33	6	SITE	1.00	
MTCSD002	0.22	8	SITE	1.00	
MTCSD002D	0.23	8	SITE	1.00	
MTCSD003	0.45	5	SITE	1.00	
MTCSD004	0.20	8	SITE	1.00	
MTCSD009	0.55	3	SITE	1.00	
MTCSD010	0.44	6	SITE	1.00	
MTCSD011	0.15	3	SITE	1.00	
MTCSD012	0.28	8	SITE	1.00	
MTCSD012D	0.35	8	SITE	1.00	
MTCSD013	0.43	8	SITE	1.00	
MTCSD014	0.28	8	SITE	1.00	
MTCSD015	0.63	6	SITE	0.88	
MTCSD016	0.31	8	SITE	1.00	
MTCSD017	0.00	0	SITE		*
MTCSD018	0.26	6	SITE	1.00	
MTCSD019	0.28	4	SITE	1.00	
MTCSD020	0.24	8	SITE	1.00	
MTCSD023	0.31	8	SITE	1.00	
MTCSD023D	0.16	8	SITE	1.00	
MTCSD024	0.61	6	SITE	0.95	
MTCSD025	0.55	7	SITE	0.99	
MTCSD026	0.00	0	SITE		*
MTCSD026D	0.00	0	SITE		*
NJCSD001	0.20	8	REFERENCE	---	---
NJCSD002	0.48	8	REFERENCE	---	---
MTCSD027	0.39	8	UPGRADIENT	---	---
MTCSD028	0.28	8	UPGRADIENT	---	---
All Groups	0.34	172	---	---	---

Mass/Survivior

Analysis #4 : Site vs. Control

	df Effect	MS Effect	df Error	MS Error	F	p-level
ANOVA	1	1.2	154	0.07	18.3	**3.29E-05**



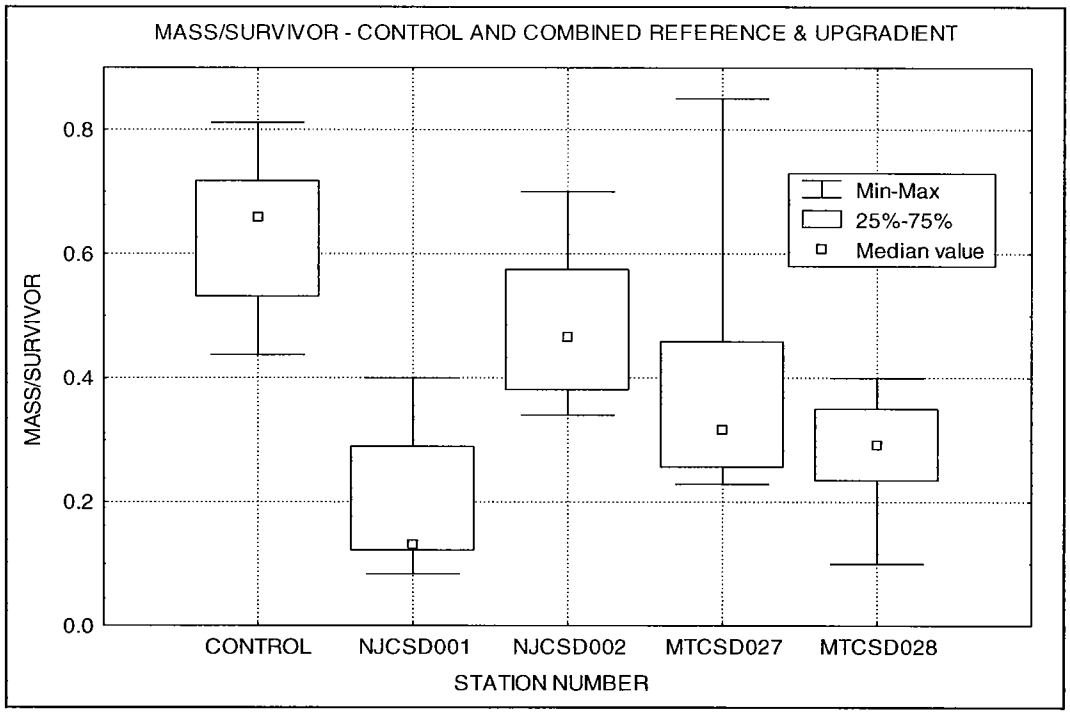
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
MTCSD001	0.33	6	SITE	0.88	
MTCSD002	0.22	8	SITE	0.09	
MTCSD002D	0.23	8	SITE	0.12	
MTCSD003	0.45	5	SITE	0.88	
MTCSD004	0.20	8	SITE	0.09	
MTCSD009	0.55	3	SITE	0.88	
MTCSD010	0.44	6	SITE	0.09	
MTCSD011	0.15	3	SITE	0.88	
MTCSD012	0.28	8	SITE	0.09	
MTCSD012D	0.35	8	SITE	0.76	
MTCSD013	0.43	8	SITE	0.99	
MTCSD014	0.28	8	SITE	0.36	
MTCSD015	0.63	6	SITE	1.00	
MTCSD016	0.31	8	SITE	0.53	
MTCSD017	0.00	0	SITE		*
MTCSD018	0.26	6	SITE	0.54	
MTCSD019	0.28	4	SITE	0.92	
MTCSD020	0.24	8	SITE	0.16	
MTCSD023	0.31	8	SITE	0.51	
MTCSD023D	0.16	8	SITE	0.02	*
MTCSD024	0.61	6	SITE	1.00	
MTCSD025	0.55	7	SITE	1.00	
MTCSD026	0.00	0	SITE		*
MTCSD026D	0.00	0	SITE		*
9/18Control	0.59	8	CONTROL	---	---
9/22Control	0.67	8	CONTROL	---	---
All Groups	0.37	156	---	---	---

Mass/Survivior

Analysis #5 : Combined Reference & Upgradient vs. Control

	df Effect	MS Effect	df Error	MS Error	F	p-level
ANOVA	1	1	46	0.03	35.5	**0.00E+00**



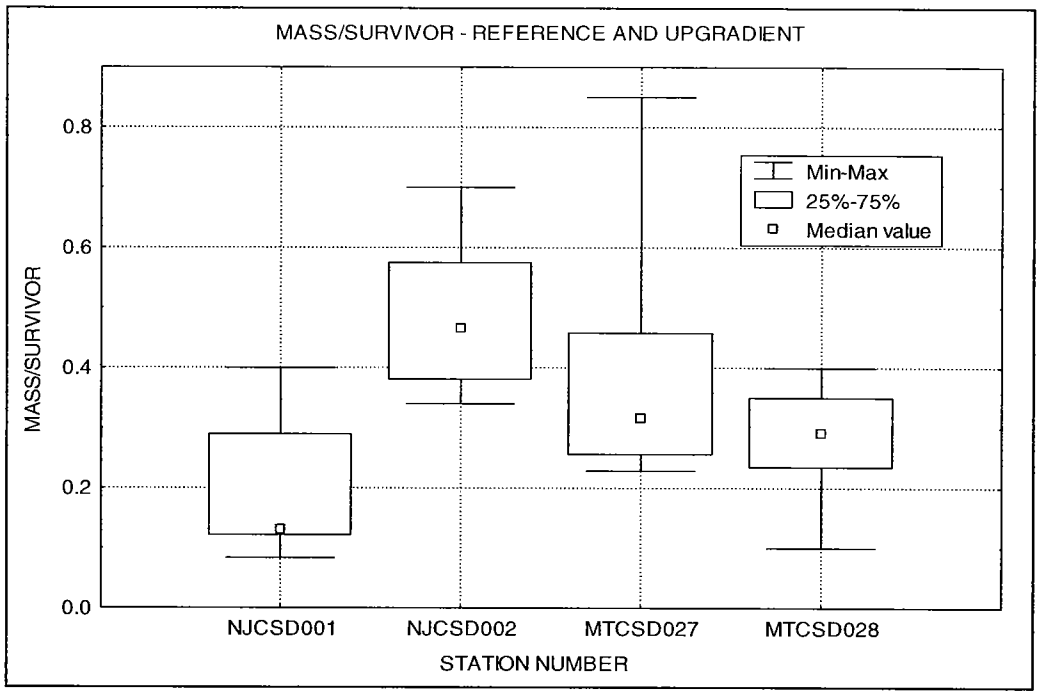
Tukey HSD test

	MEAN	Valid N	TYPE	p Value	Significant
9/18Control	0.59	8	CONTROL	---	---
9/22Control	0.67	8	CONTROL	---	---
NJCSD001	0.20	8	REFERENCE	1.33E-04	*
NJCSD002	0.48	8	REFERENCE	0.22	
MTCSD027	0.39	8	UPGRADIENT	9.09E-03	*
MTCSD028	0.28	8	UPGRADIENT	1.97E-04	*
All Groups	0.44	48	---	---	---

Mass/Survivior

Analysis #6 : Upgradient vs. Reference

	df Effect	MS Effect	df Error	MS Error	F	p-level
ANOVA	1	0.0	30	0.03	0.0033	0.9544

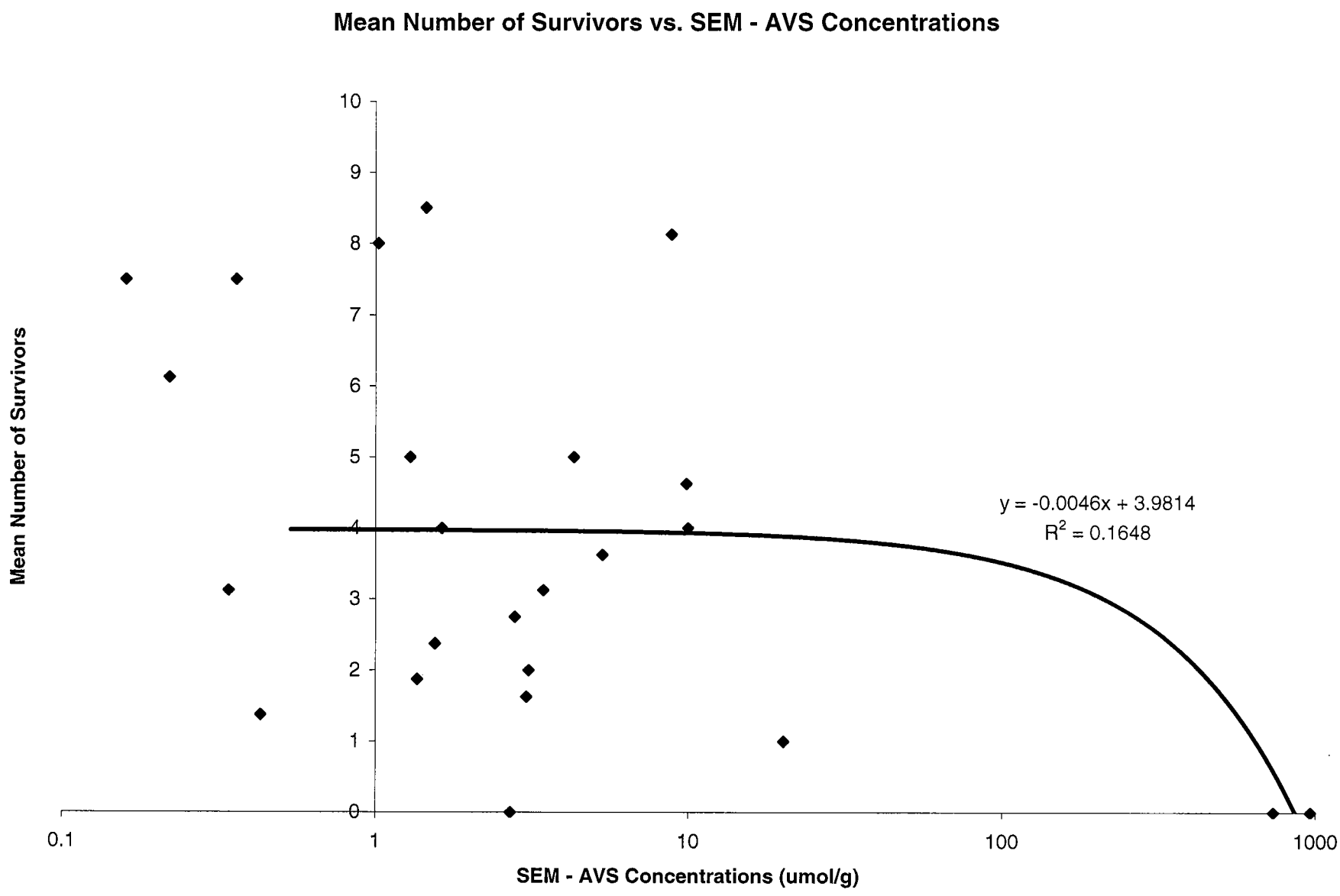


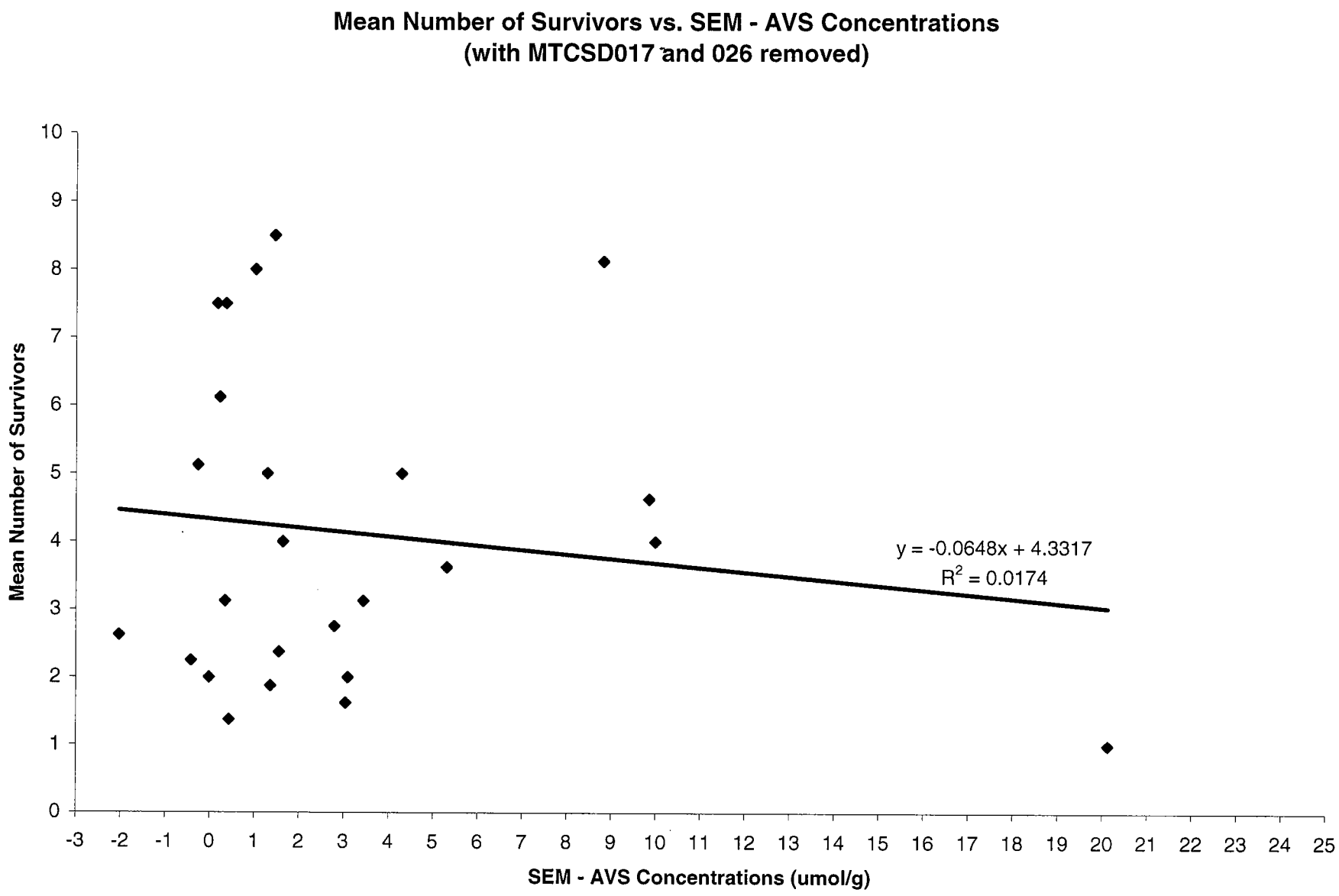
Tukey HSD test

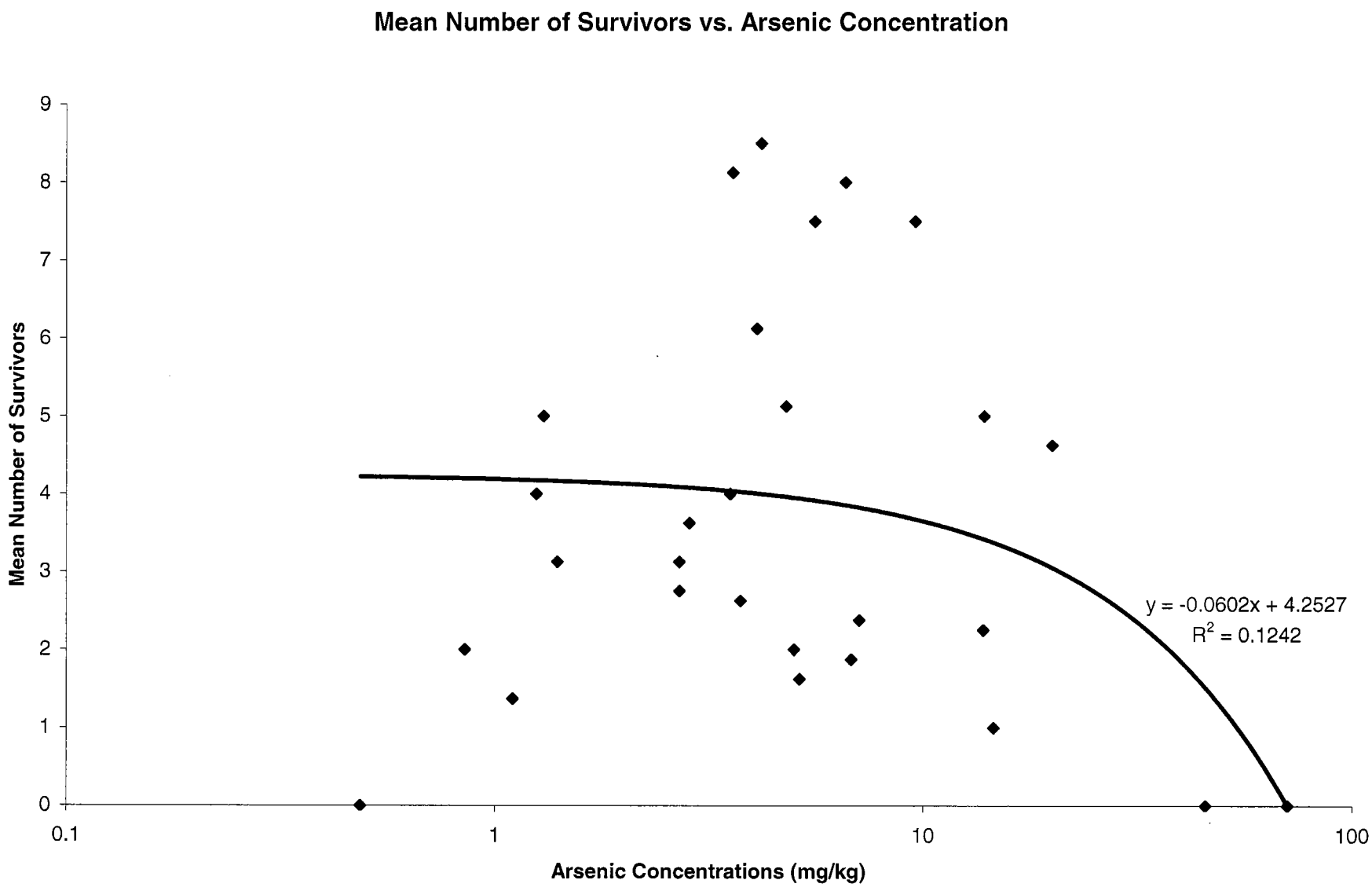
	MEAN	Valid N	TYPE	p Value	Significant
NJCSD001	0.20	8	REFERENCE	0.19	
NJCSD002	0.48	8	REFERENCE	0.16	
MTCSD027	0.39	8	UPGRADIENT	0.18	
MTCSD028	0.28	8	UPGRADIENT	0.17	
All Groups	0.34	32	---	---	---

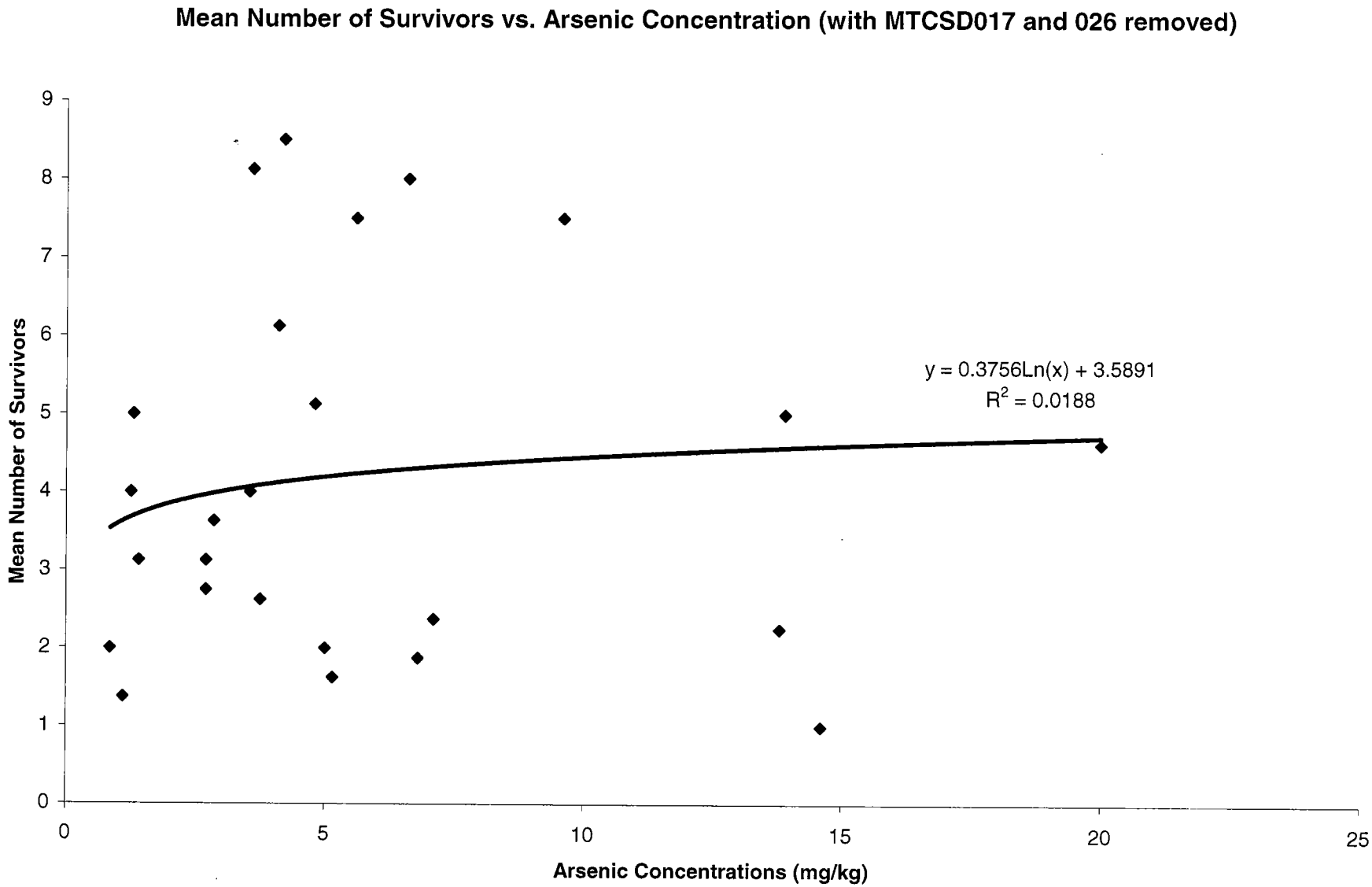
APPENDIX C-7

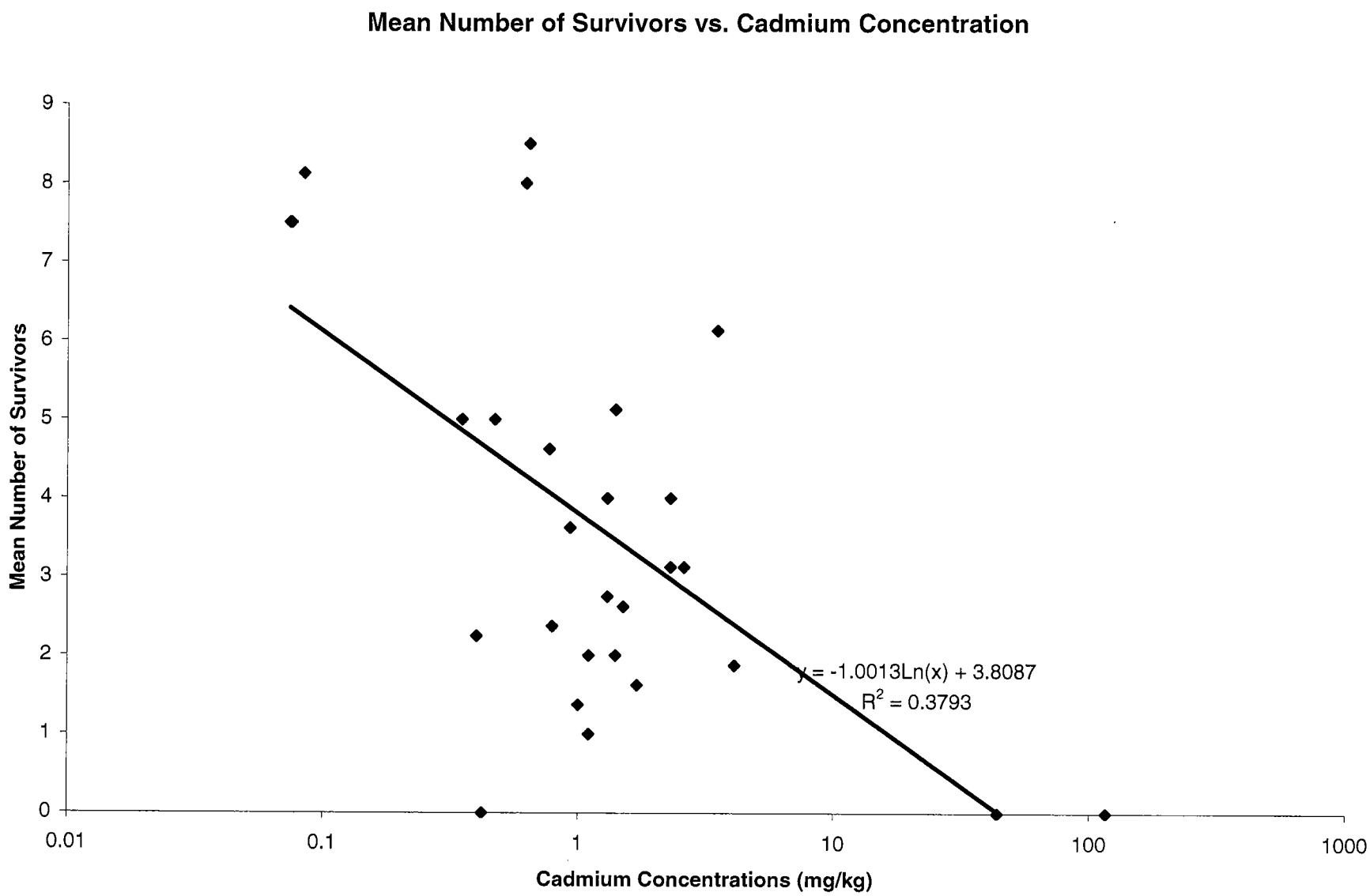
TOXICITY TEST CORRELATION PLOTS

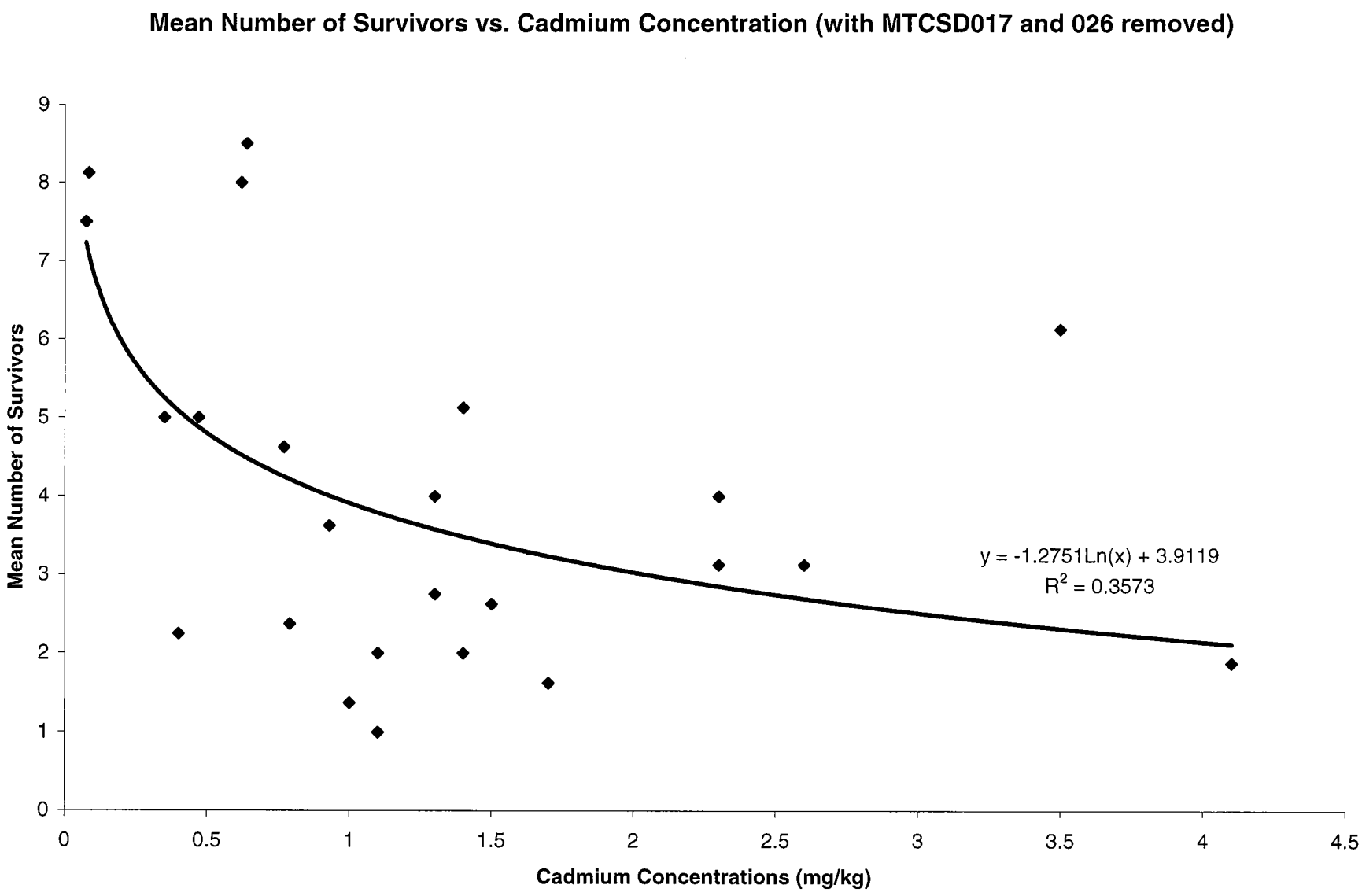

Mean Number of Survivors vs. SEM - AVS Concentrations
Mean Number of Survivors
SEM - AVS Concentrations (umol/g)
y = -0.0046x + 3.9814
R2 = 0.1648
0
1
2
3
4
5
6
7
8
9
10
0.1
1
10
100
1000

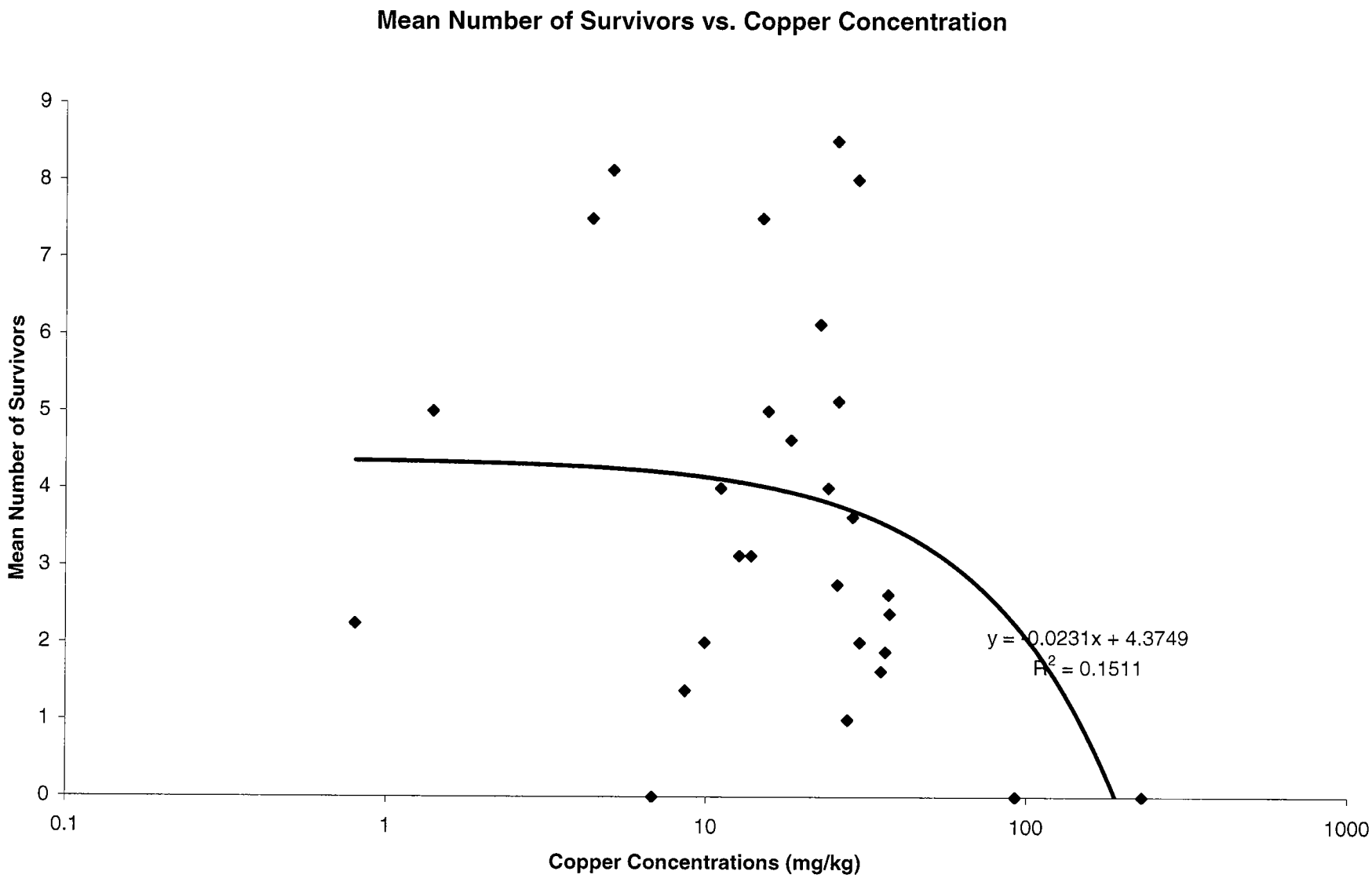

Mean Number of Survivors vs. SEM - AVS Concentrations
(with MTCSD017 and 026 removed)
Mean Number of Survivors
SEM - AVS Concentrations (umol/g)
y = -0.0648x + 4.3317
R2 = 0.0174
0
1
2
3
4
5
6
7
8
9
10
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

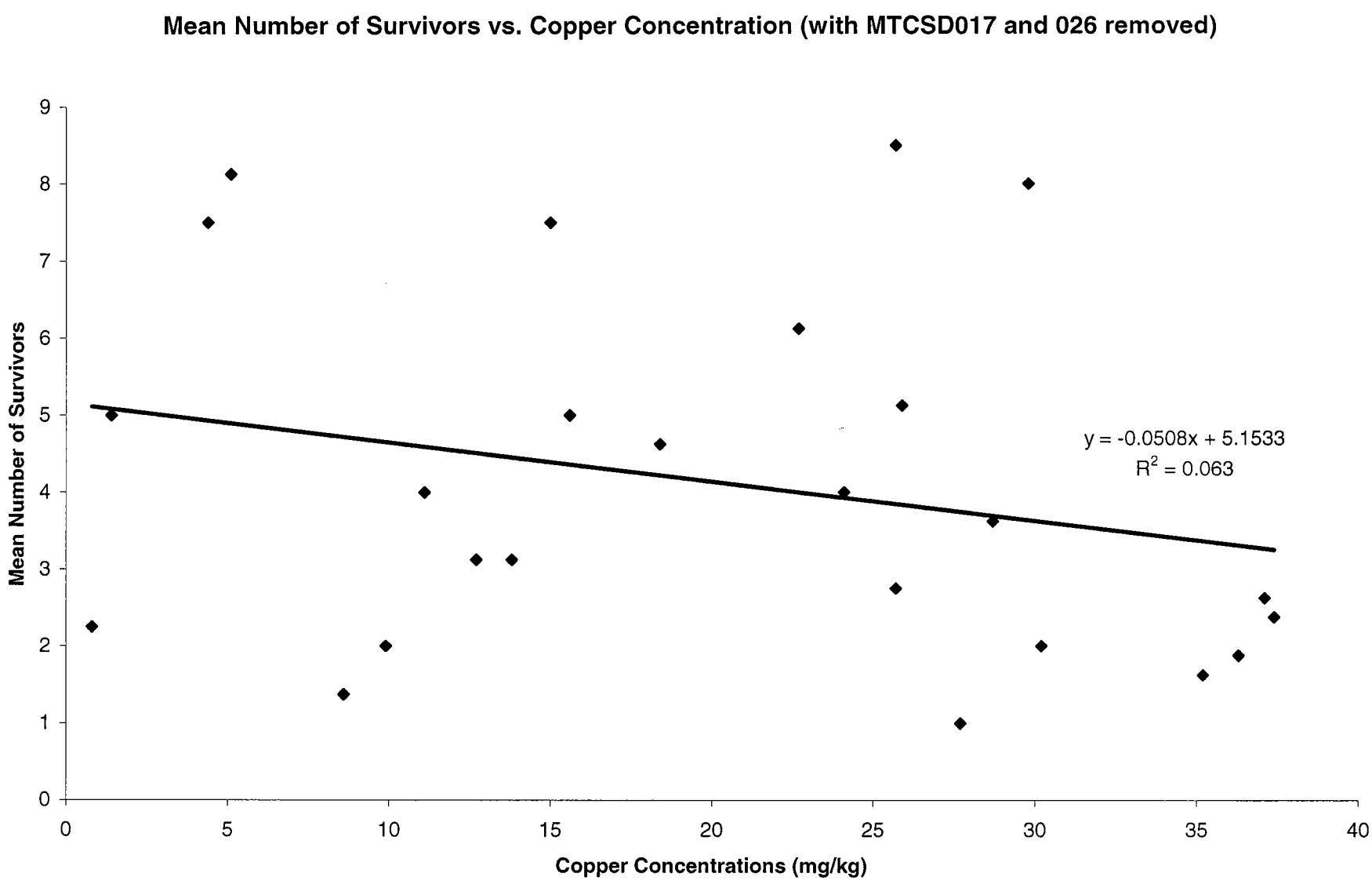

Mean Number of Survivors vs. Arsenic Concentration
Mean Number of Survivors
Arsenic Concentrations (mg/kg)
0
1
2
3
4
5
6
7
8
9
0.1
1
10
100
y = -0.0602x + 4.2527
R2 = 0.1242

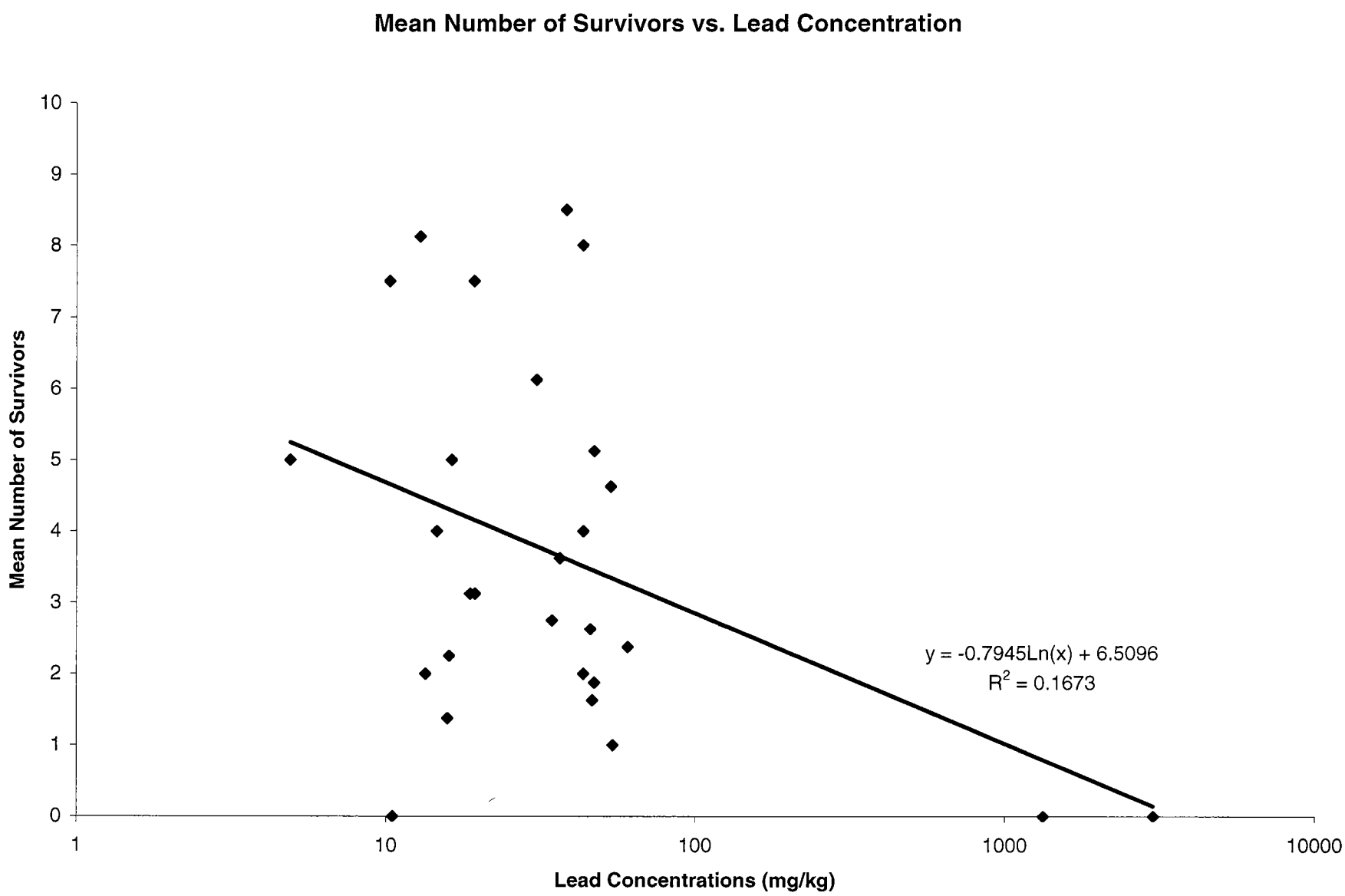

Mean Number of Survivors vs. Arsenic Concentration (with MTCSD017 and 026 removed)
y = 0.3756Ln(x) + 3.5891
R2 = 0.0188
Mean Number of Survivors
Arsenic Concentrations (mg/kg)
0
1
2
3
4
5
6
7
8
9
0
5
10
15
20
25

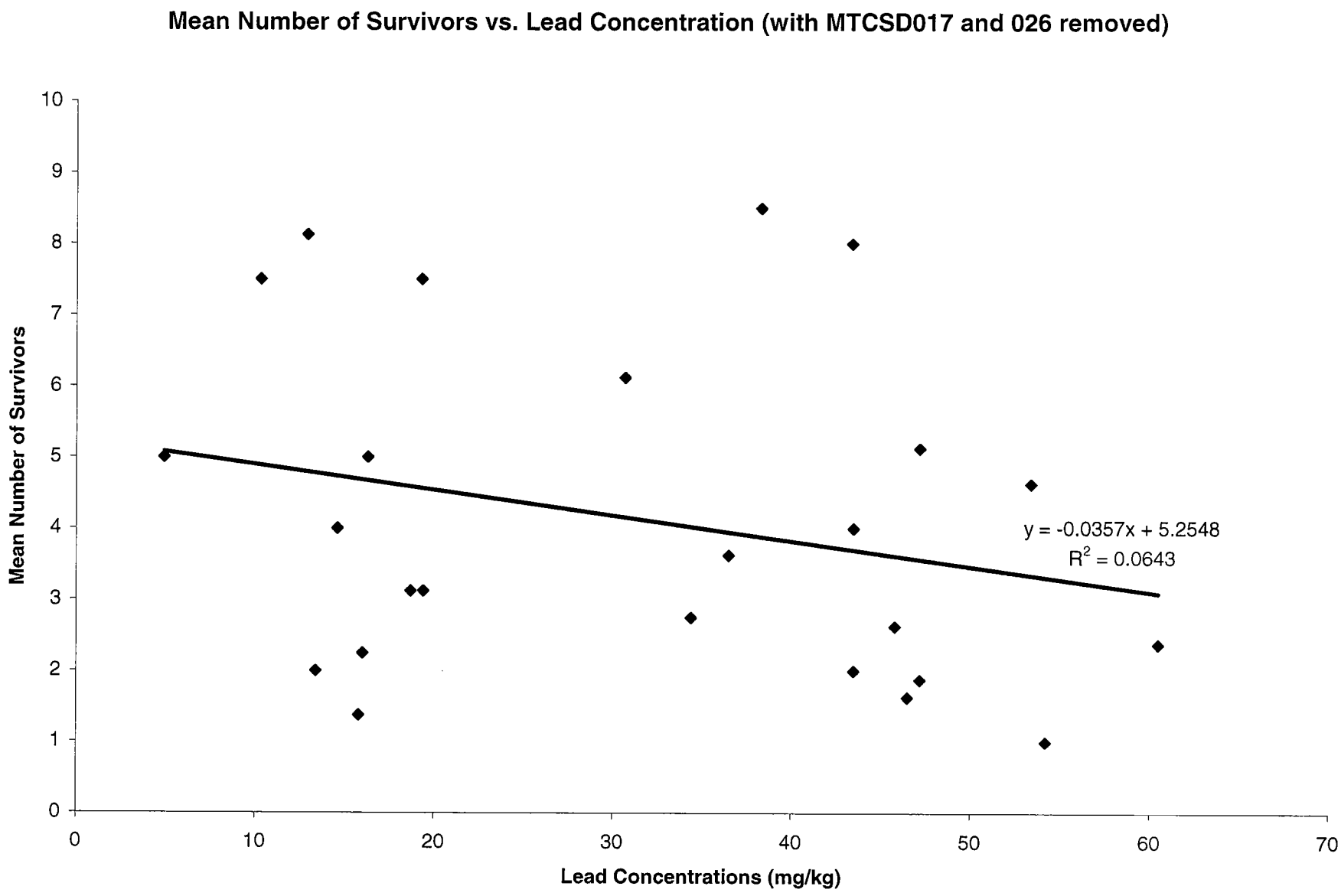

Mean Number of Survivors vs. Cadmium Concentration
Mean Number of Survivors
9
8
7
6
5
4
3
2
1
0
0.01
0.1
1
10
100
1000
Cadmium Concentrations (mg/kg)
y = -1.0013Ln(x) + 3.8087
R2 = 0.3793

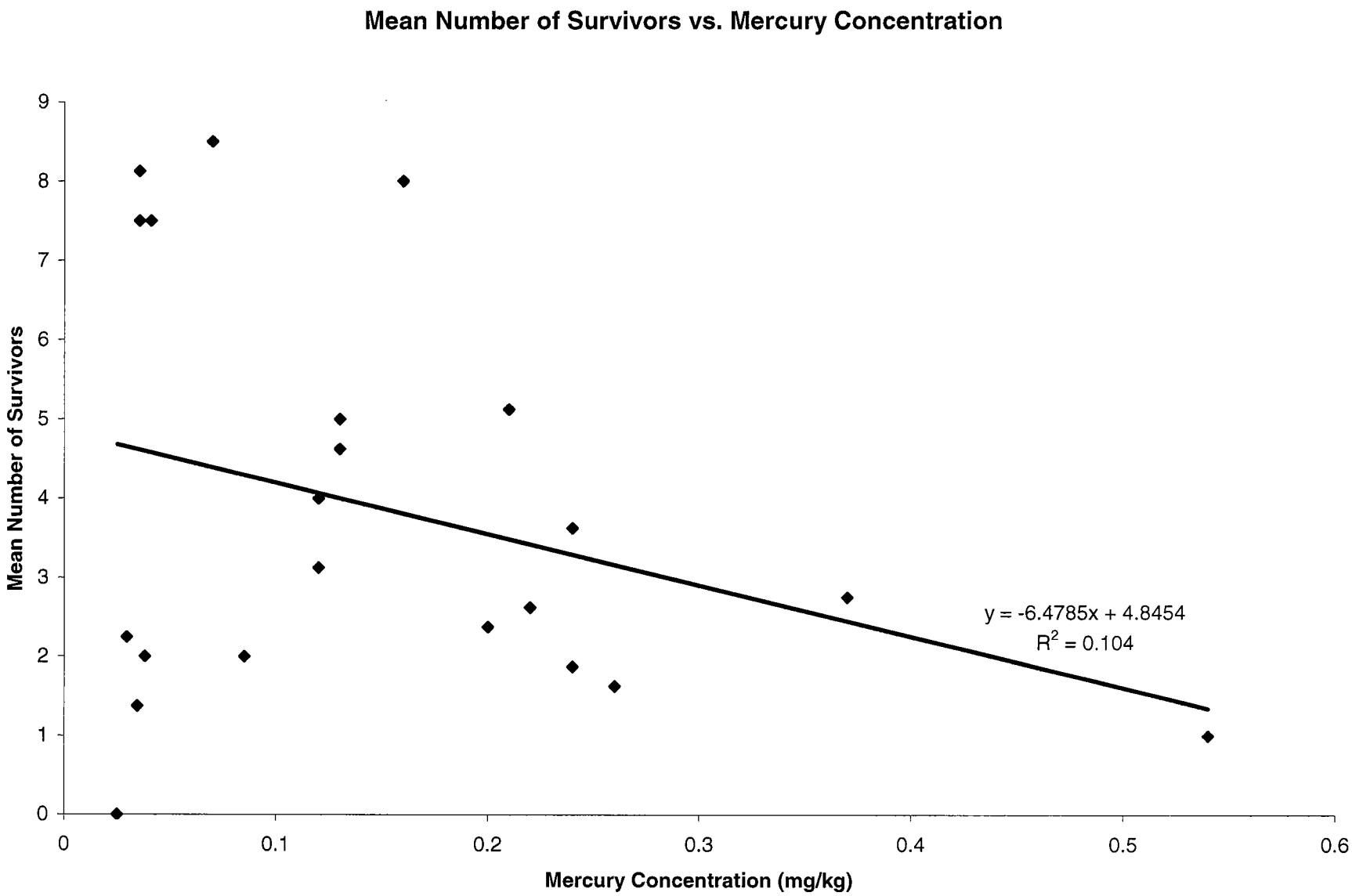

Mean Number of Survivors vs. Cadmium Concentration (with MTCSD017 and 026 removed)
Mean Number of Survivors
Cadmium Concentrations (mg/kg)
y = -1.2751Ln(x) + 3.9119
R2 = 0.3573
0
1
2
3
4
5
6
7
8
9
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5

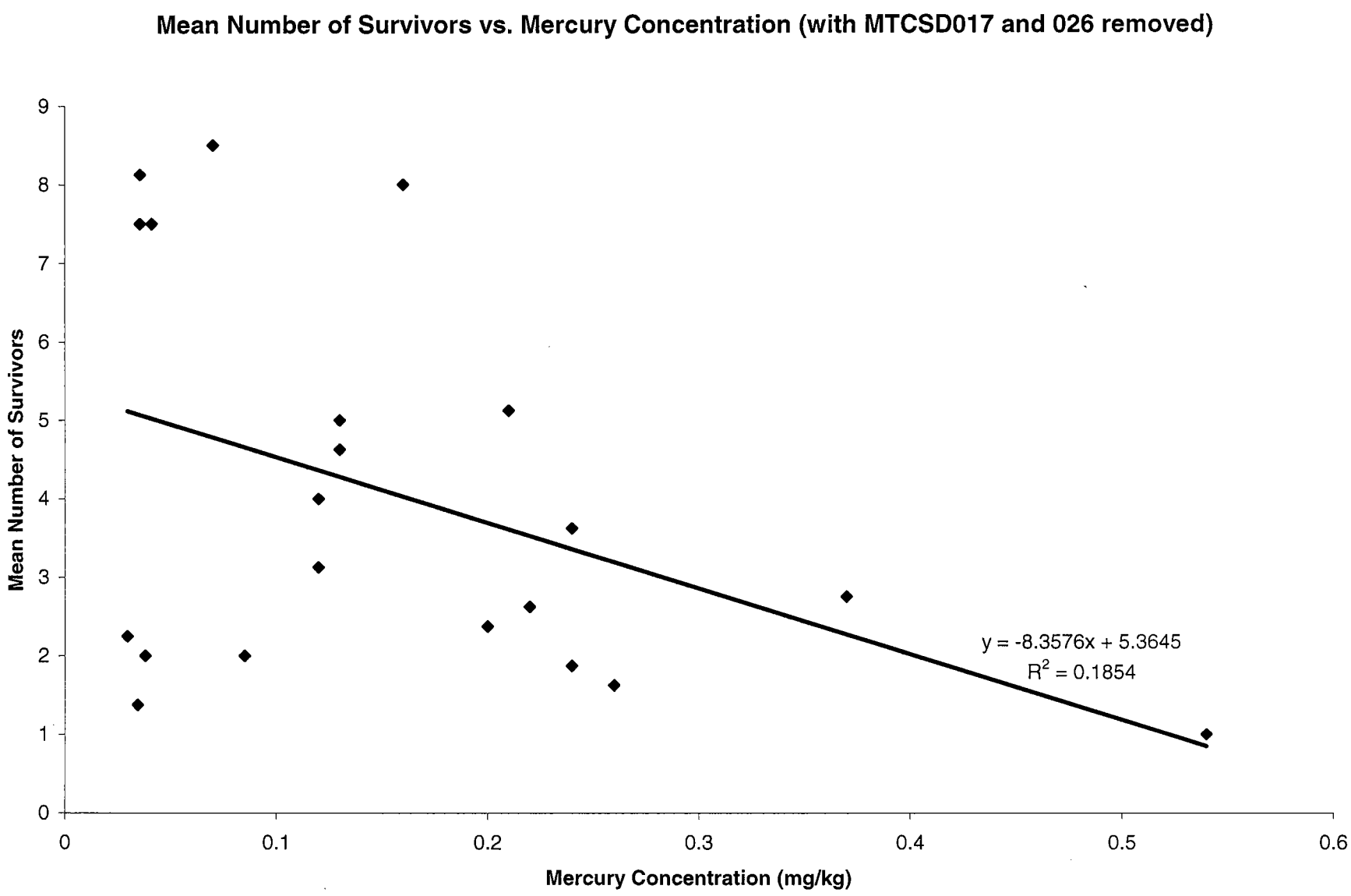

Mean Number of Survivors vs. Copper Concentration
Mean Number of Survivors
Copper Concentrations (mg/kg)
0
1
2
3
4
5
6
7
8
9
0.1
1
10
100
1000
y = -0.0231x + 4.3749
R2 = 0.1511

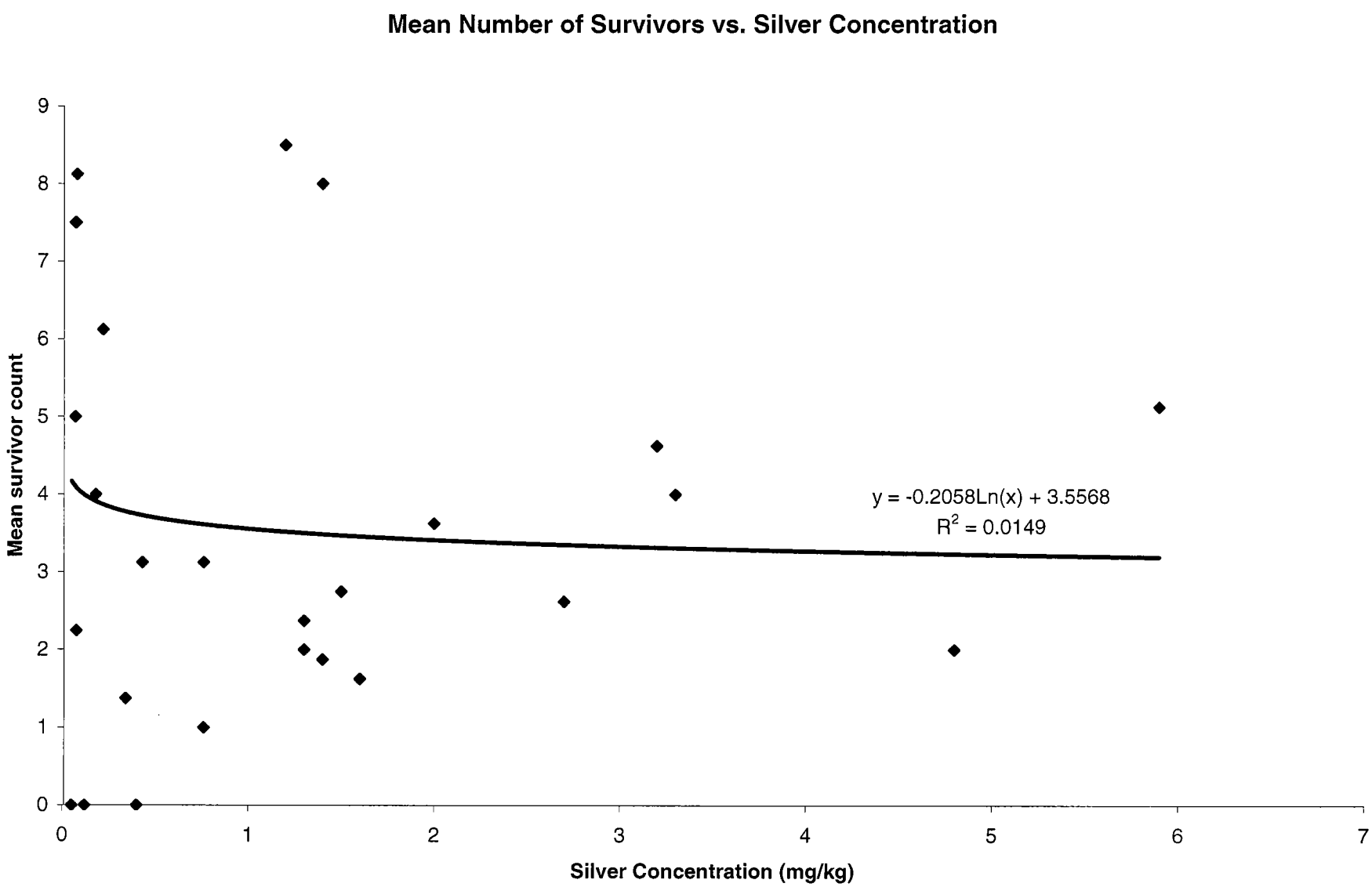

Mean Number of Survivors vs. Copper Concentration (with MTCSD017 and 026 removed)
Mean Number of Survivors
Copper Concentrations (mg/kg)
y = -0.0508x + 5.1533
R2 = 0.063
0
1
2
3
4
5
6
7
8
9
0
5
10
15
20
25
30
35
40

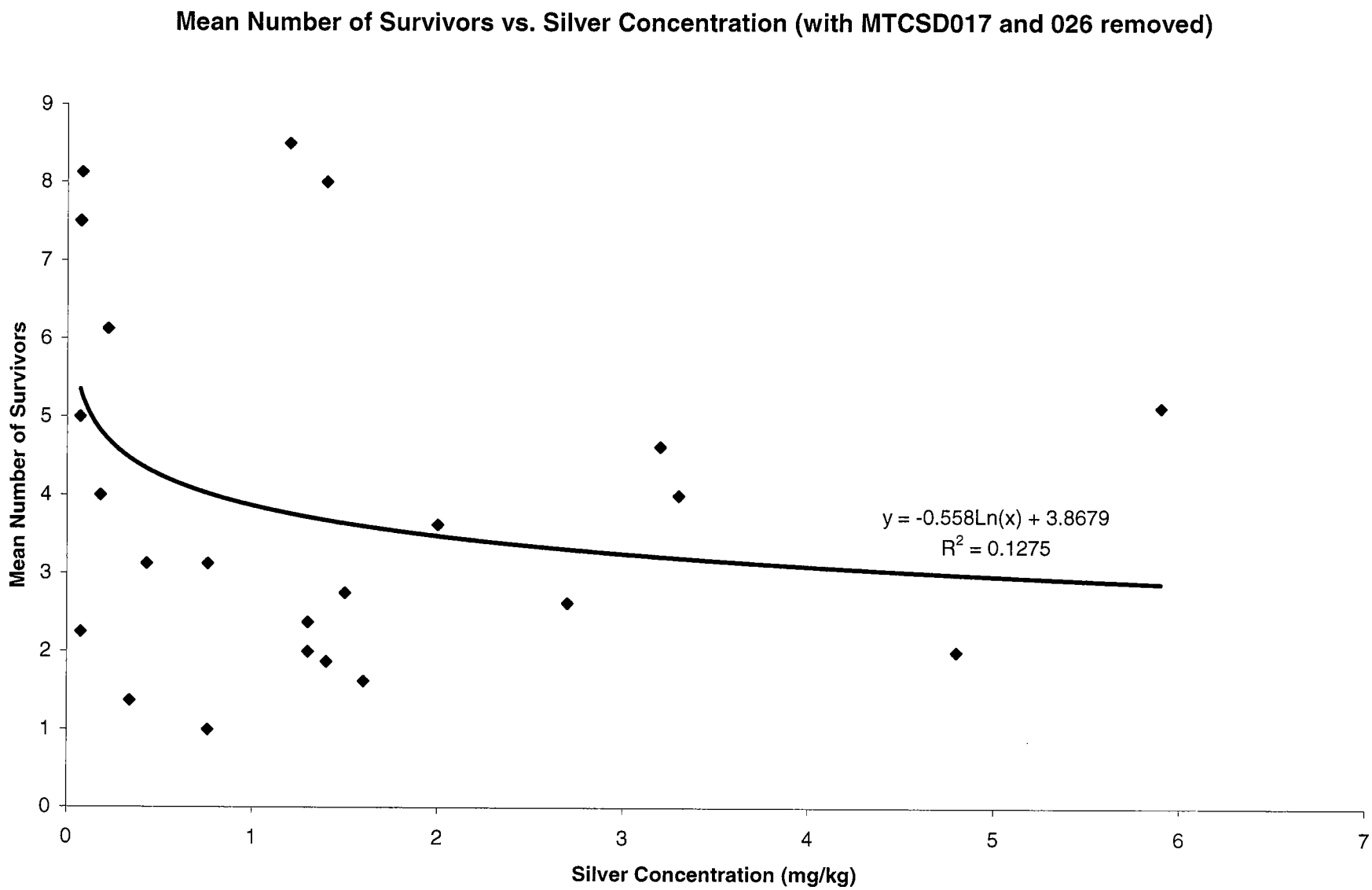

Mean Number of Survivors vs. Lead Concentration
Mean Number of Survivors
Lead Concentrations (mg/kg)
y = -0.7945Ln(x) + 6.5096
R2 = 0.1673
0
1
2
3
4
5
6
7
8
9
10
1
10
100
1000
10000

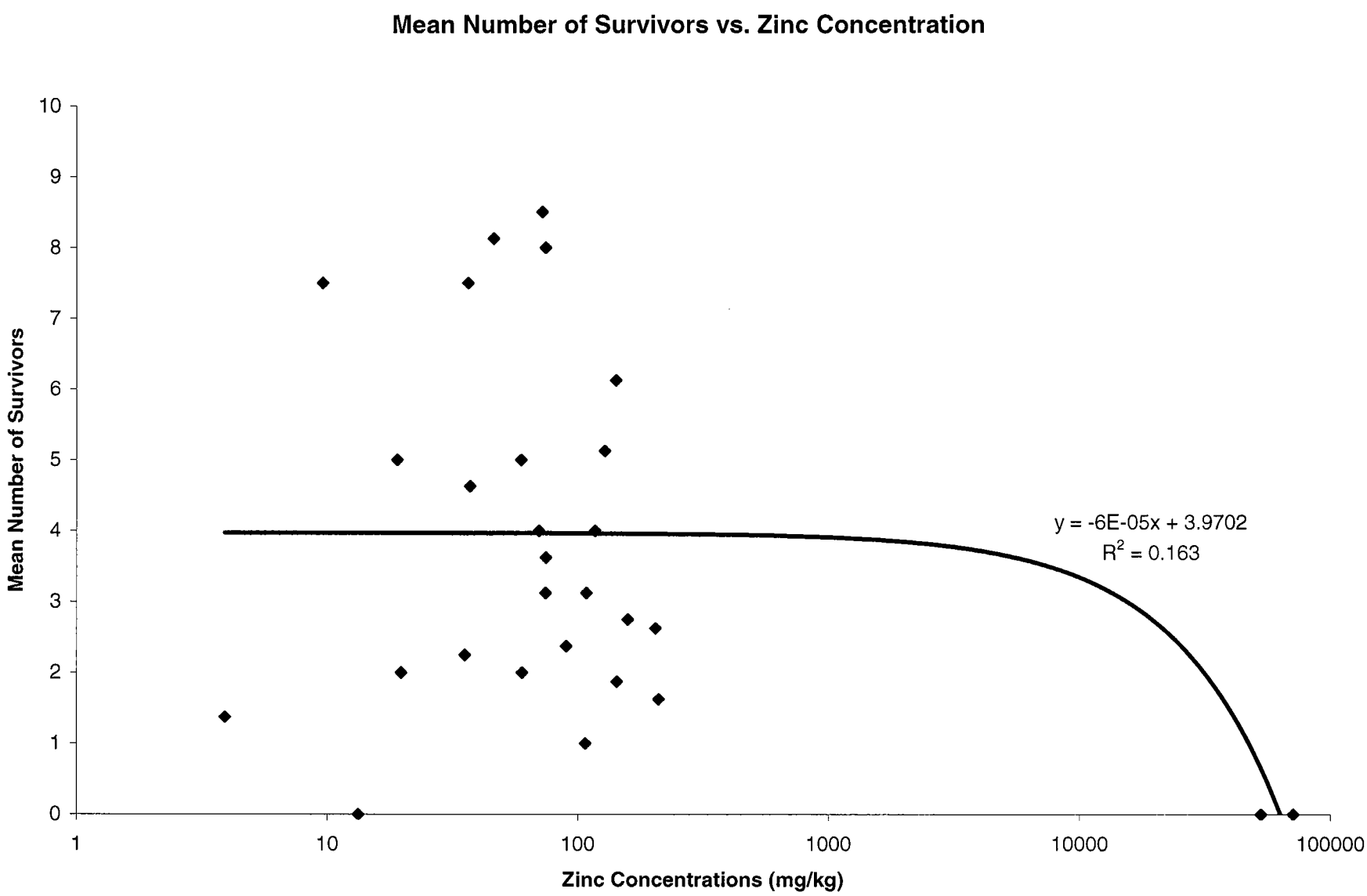

Mean Number of Survivors vs. Lead Concentration (with MTCSD017 and 026 removed)
Mean Number of Survivors
Lead Concentrations (mg/kg)
y = -0.0357x + 5.2548
R2 = 0.0643
0
1
2
3
4
5
6
7
8
9
10
0
10
20
30
40
50
60
70

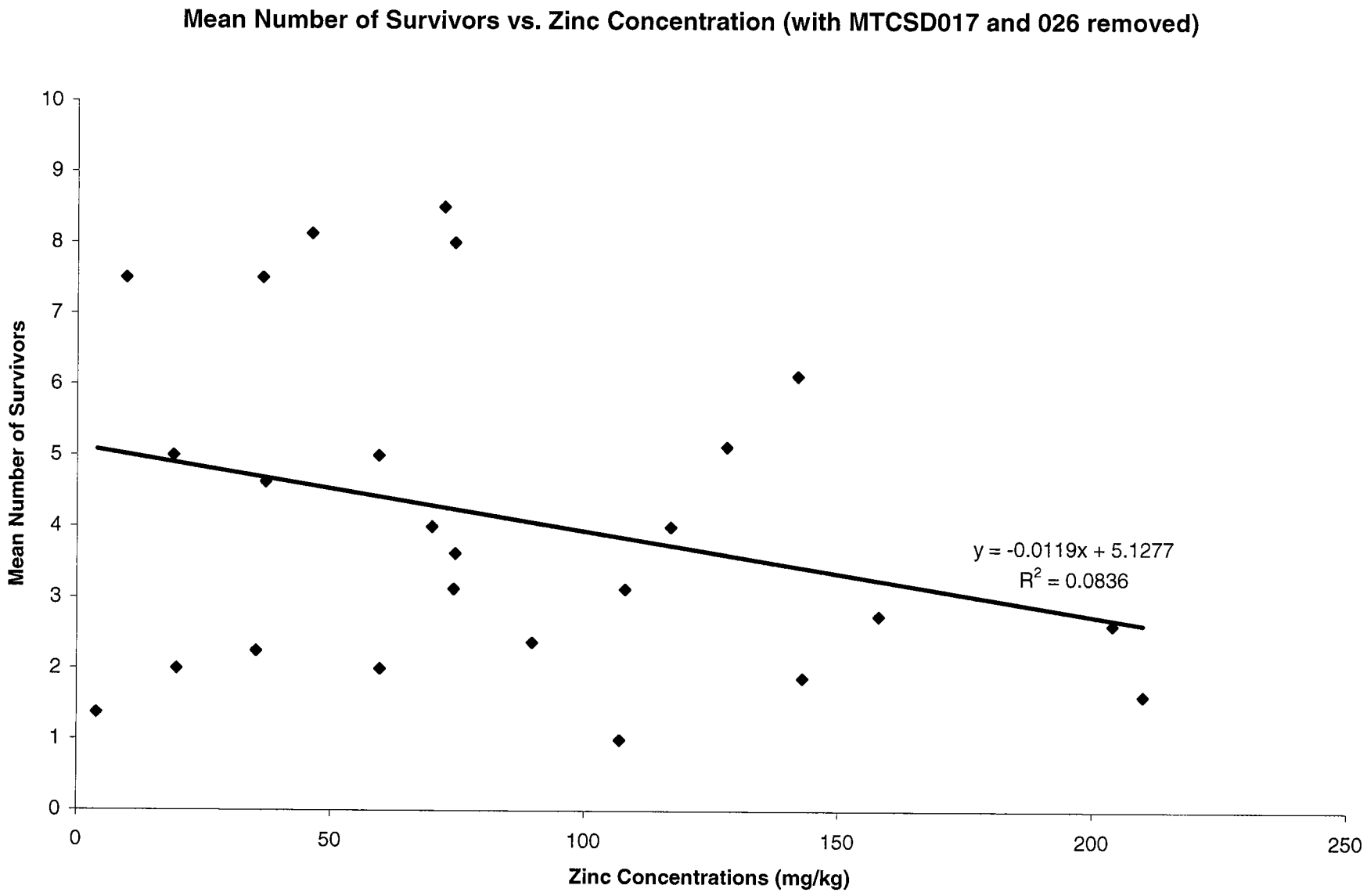

Mean Number of Survivors vs. Mercury Concentration
Mean Number of Survivors
Mercury Concentration (mg/kg)
y = -6.4785x + 4.8454
R2 = 0.104
0
1
2
3
4
5
6
7
8
9
0
0.1
0.2
0.3
0.4
0.5
0.6

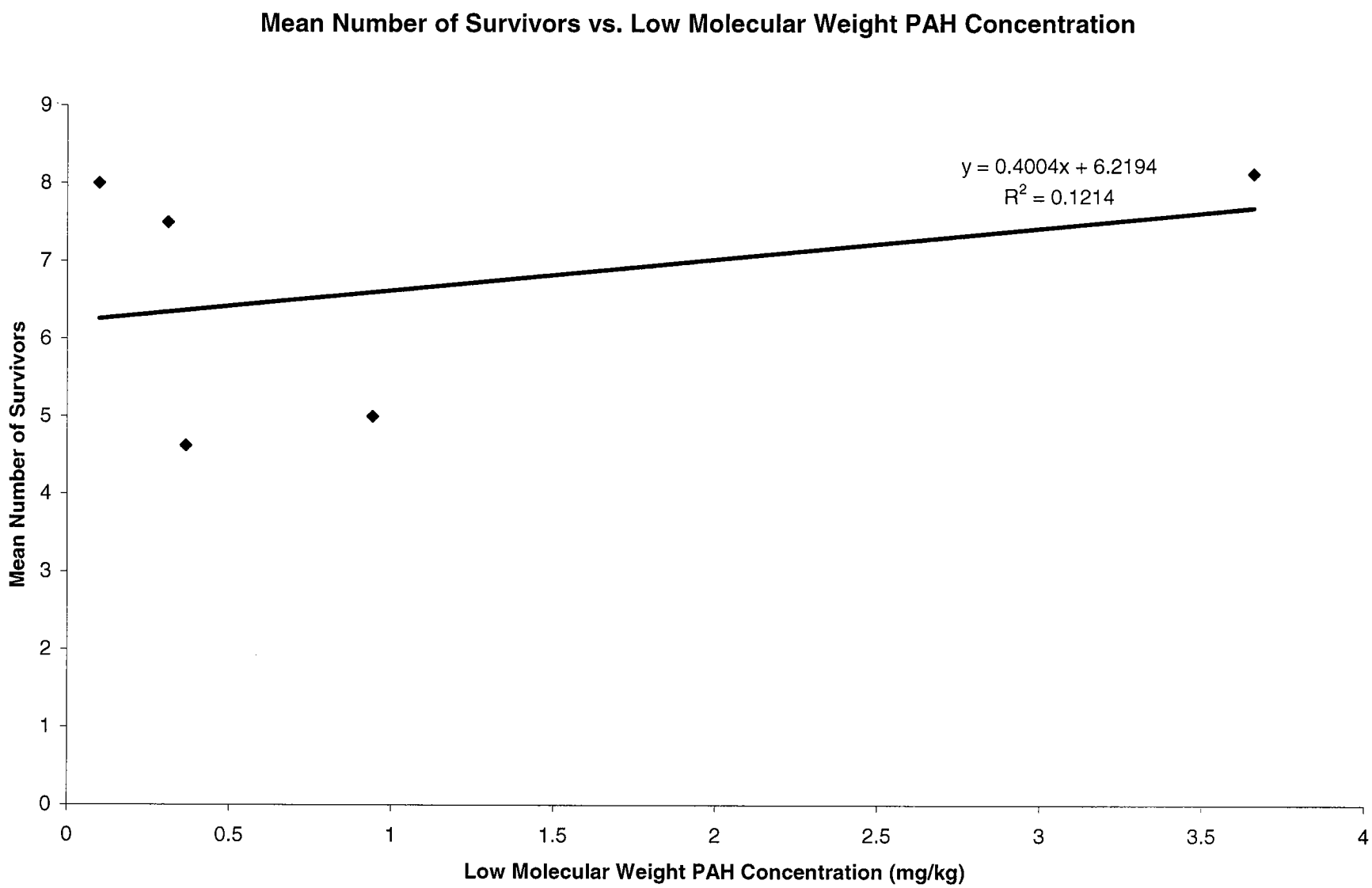

Mean Number of Survivors vs. Mercury Concentration (with MTCSD017 and 026 removed)
Mean Number of Survivors
Mercury Concentration (mg/kg)
y = -8.3576x + 5.3645
R2 = 0.1854
0
1
2
3
4
5
6
7
8
9
0
0.1
0.2
0.3
0.4
0.5
0.6

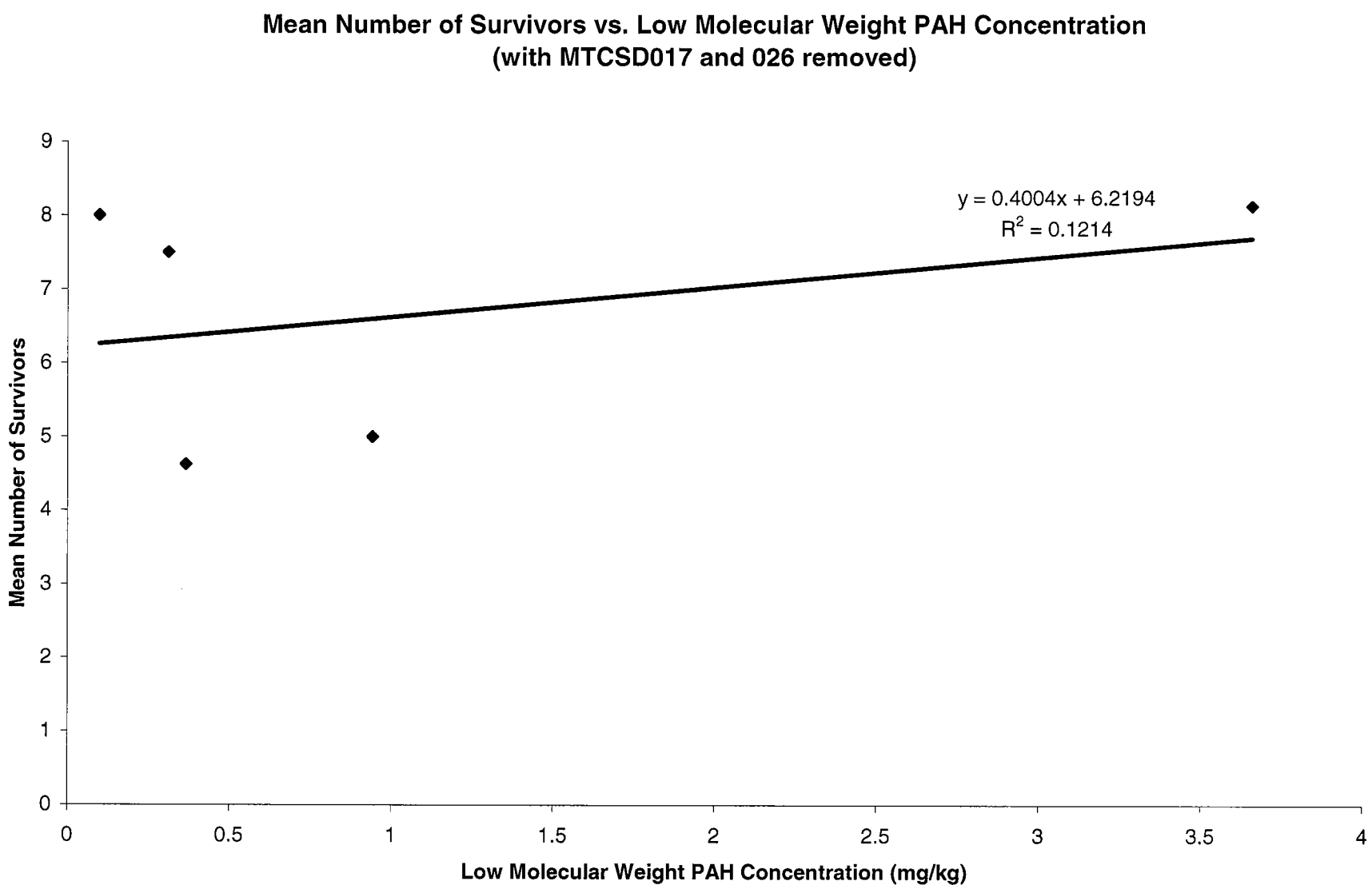

Mean Number of Survivors vs. Silver Concentration
Mean survivor count
Silver Concentration (mg/kg)
y = -0.2058Ln(x) + 3.5568
R2 = 0.0149
0
1
2
3
4
5
6
7
8
9

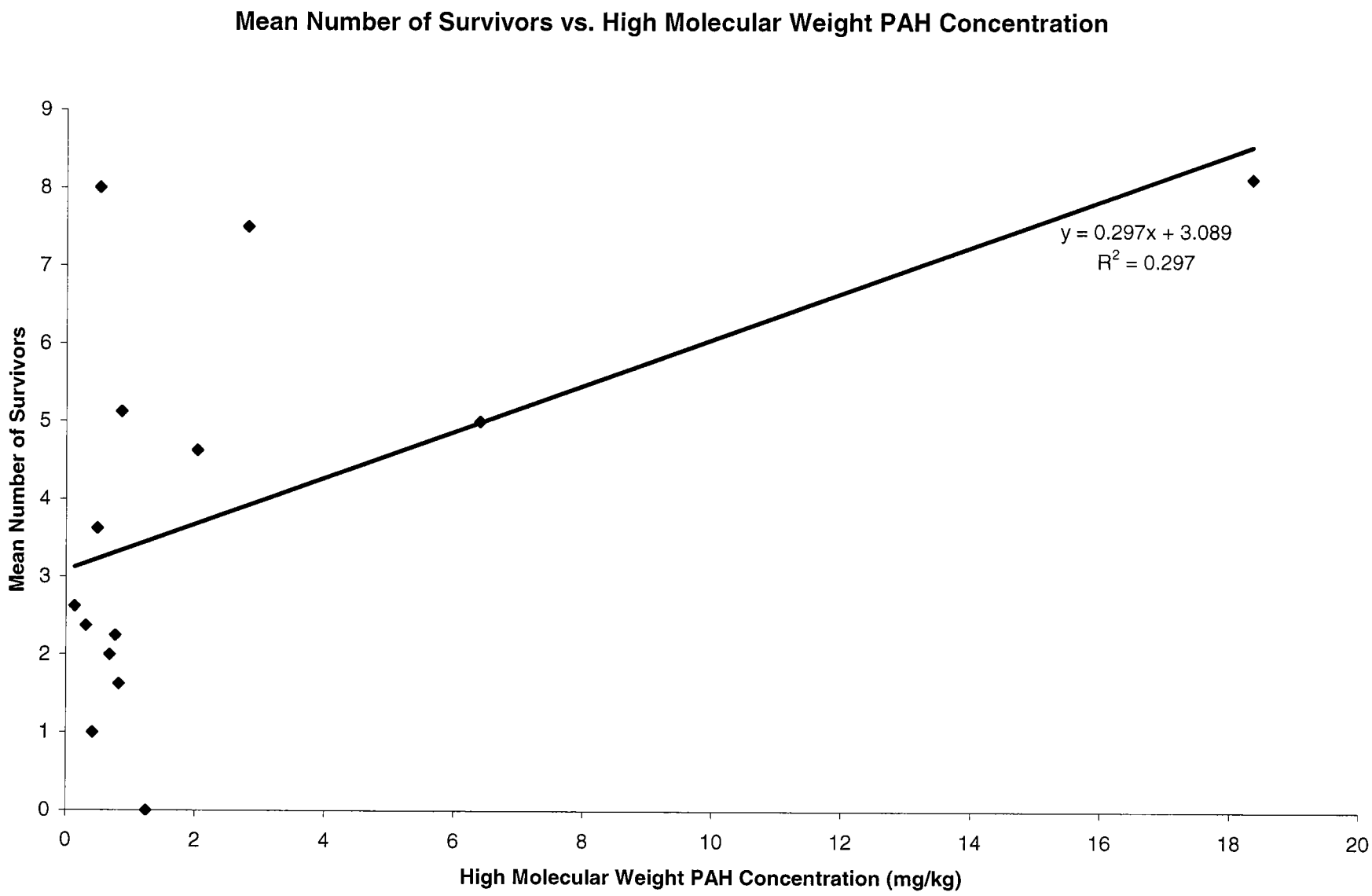

Mean Number of Survivors vs. Silver Concentration (with MTCSD017 and 026 removed)
Mean Number of Survivors
Silver Concentration (mg/kg)
y = -0.558Ln(x) + 3.8679
R2 = 0.1275
0
1
2
3
4
5
6
7
8
9

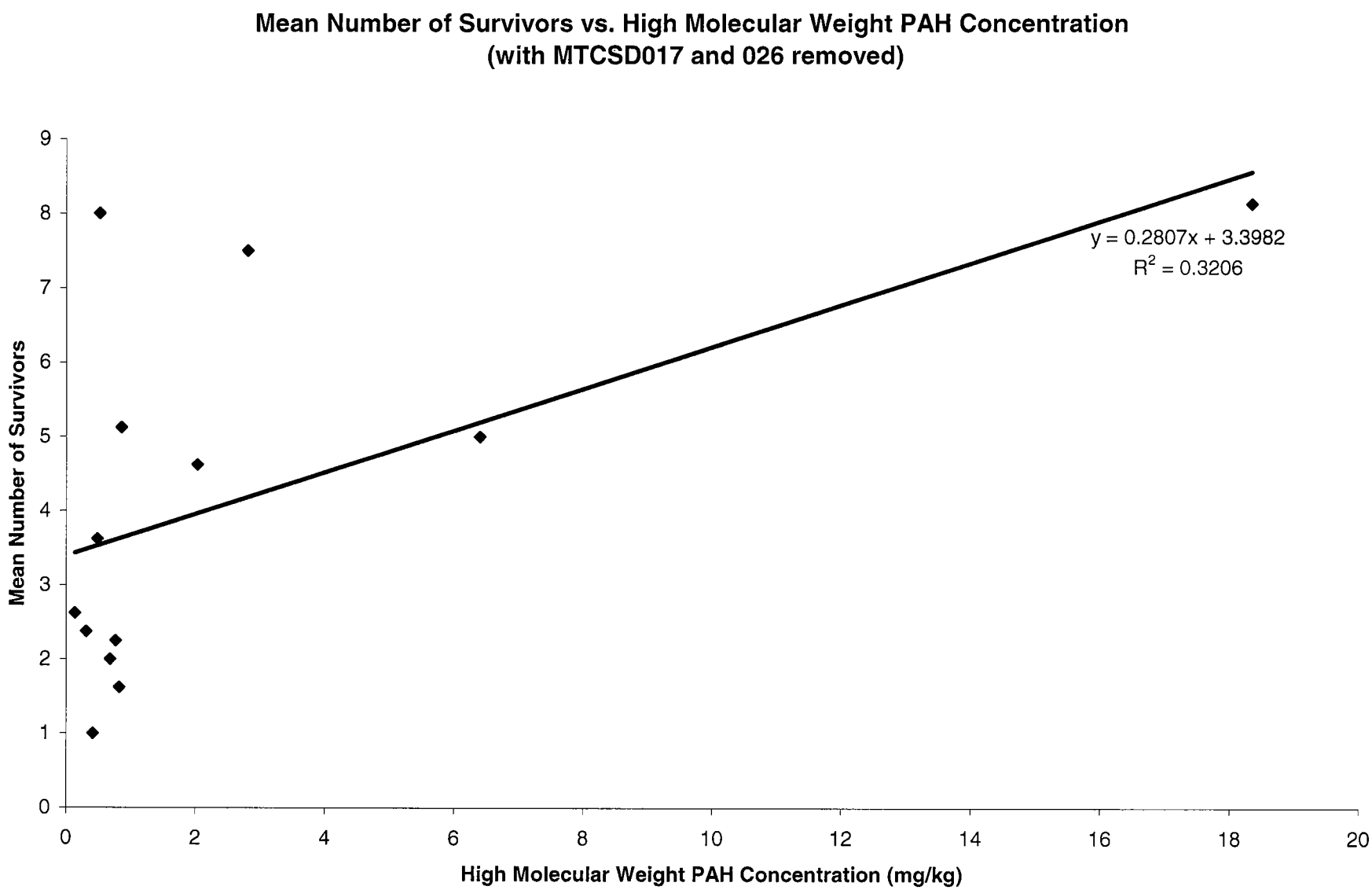

Mean Number of Survivors vs. Zinc Concentration
Mean Number of Survivors
Zinc Concentrations (mg/kg)
y = -6E-05x + 3.9702
R2 = 0.163
0
1
2
3
4
5
6
7
8
9
10
1
10
100
1000
10000
100000

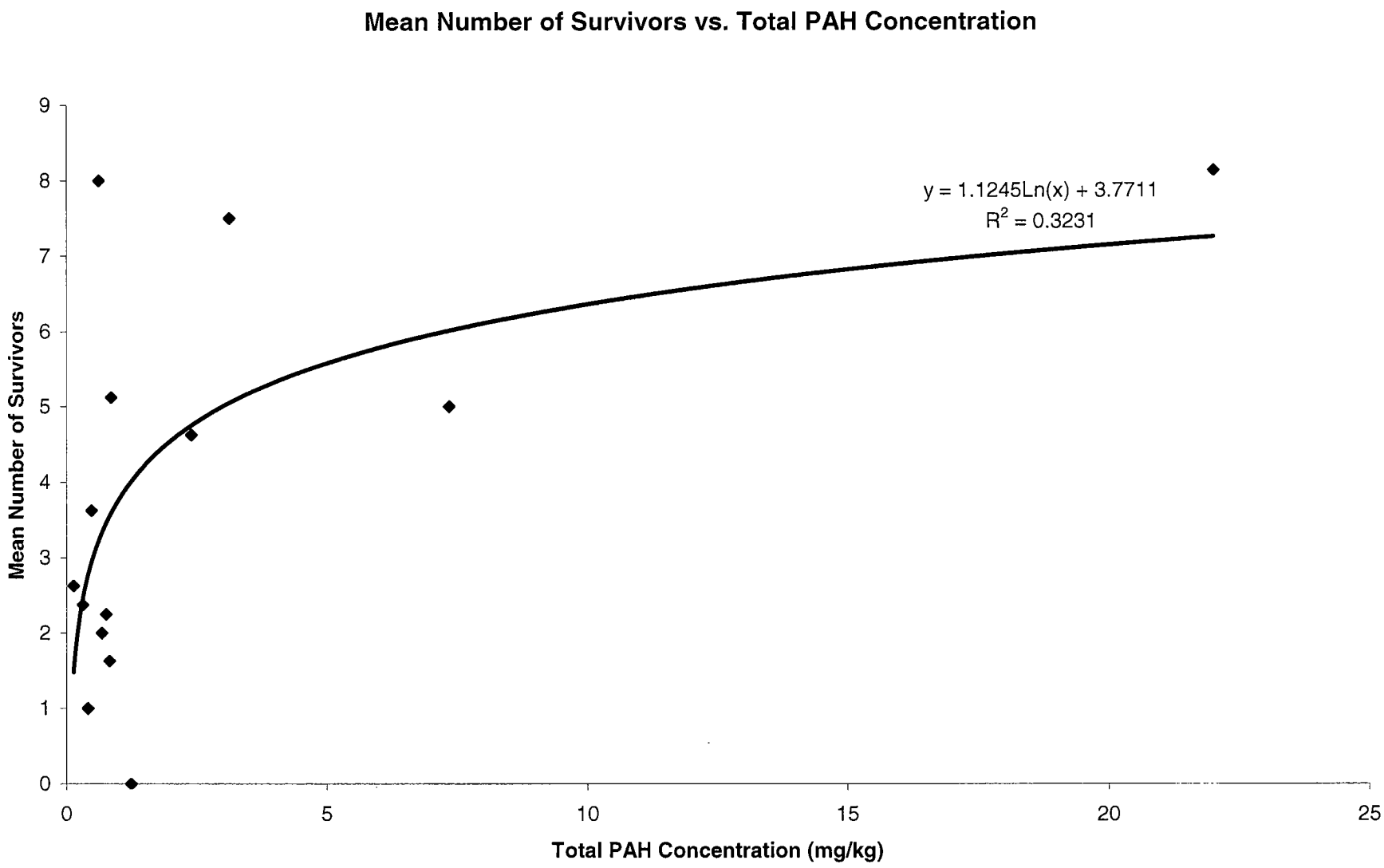

Mean Number of Survivors vs. Zinc Concentration (with MTCSD017 and 026 removed)
Mean Number of Survivors
Zinc Concentrations (mg/kg)
y = -0.0119x + 5.1277
R2 = 0.0836
0
1
2
3
4
5
6
7
8
9
10
0
50
100
150
200
250

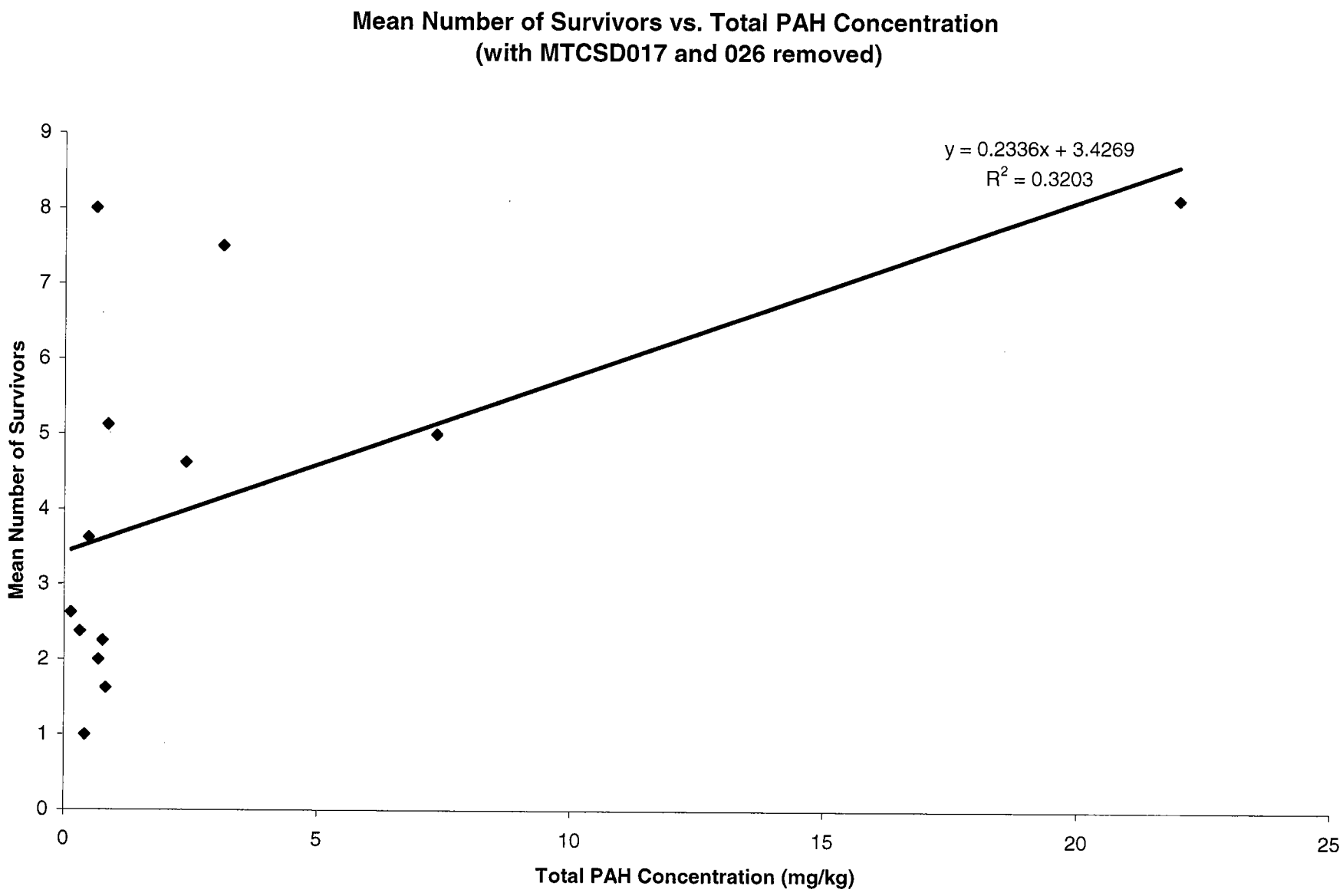

Mean Number of Survivors vs. Low Molecular Weight PAH Concentration
y = 0.4004x + 6.2194
R2 = 0.1214
Mean Number of Survivors
Low Molecular Weight PAH Concentration (mg/kg)
0
1
2
3
4
5
6
7
8
9
0
0.5
1
1.5
2
2.5
3
3.5
4

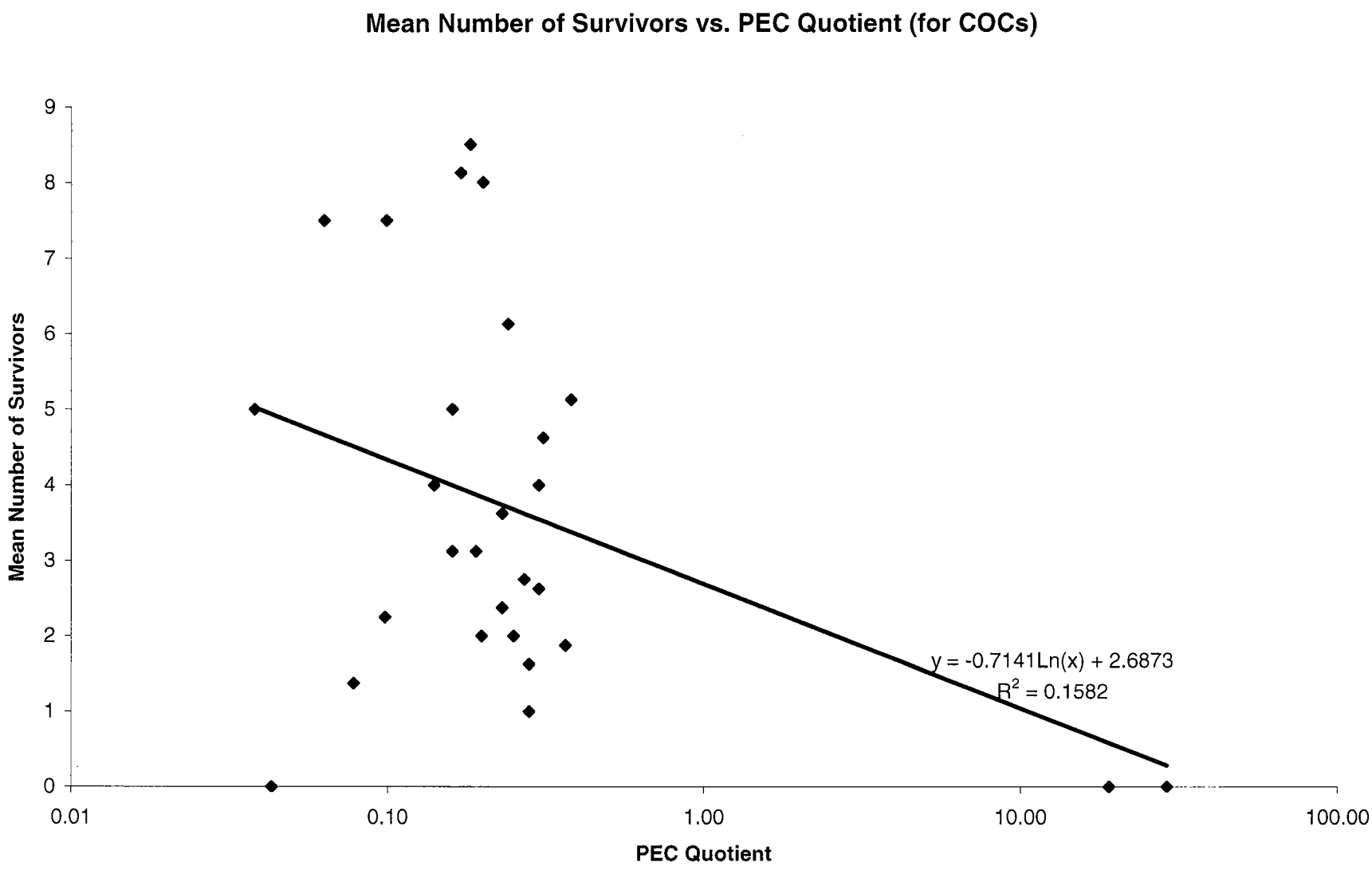

Mean Number of Survivors vs. Low Molecular Weight PAH Concentration
(with MTCSD017 and 026 removed)
y = 0.4004x + 6.2194
R2 = 0.1214
Mean Number of Survivors
Low Molecular Weight PAH Concentration (mg/kg)
0
1
2
3
4
5
6
7
8
9
0
0.5
1
1.5
2
2.5
3
3.5
4

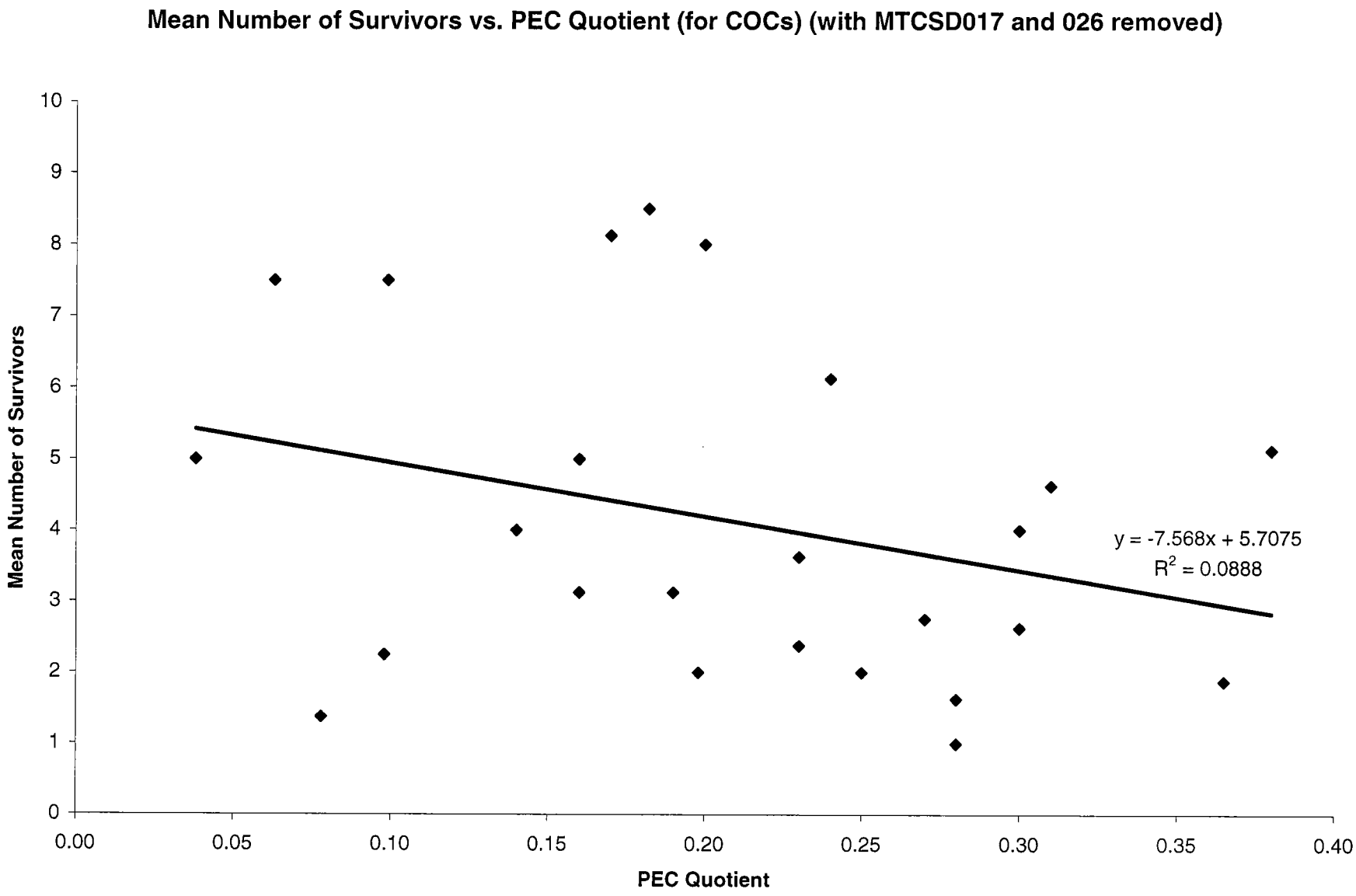

Mean Number of Survivors vs. High Molecular Weight PAH Concentration
y = 0.297x + 3.089
R2 = 0.297
Mean Number of Survivors
High Molecular Weight PAH Concentration (mg/kg)
0
1
2
3
4
5
6
7
8
9
0
2
4
6
8
10
12
14
16
18
20

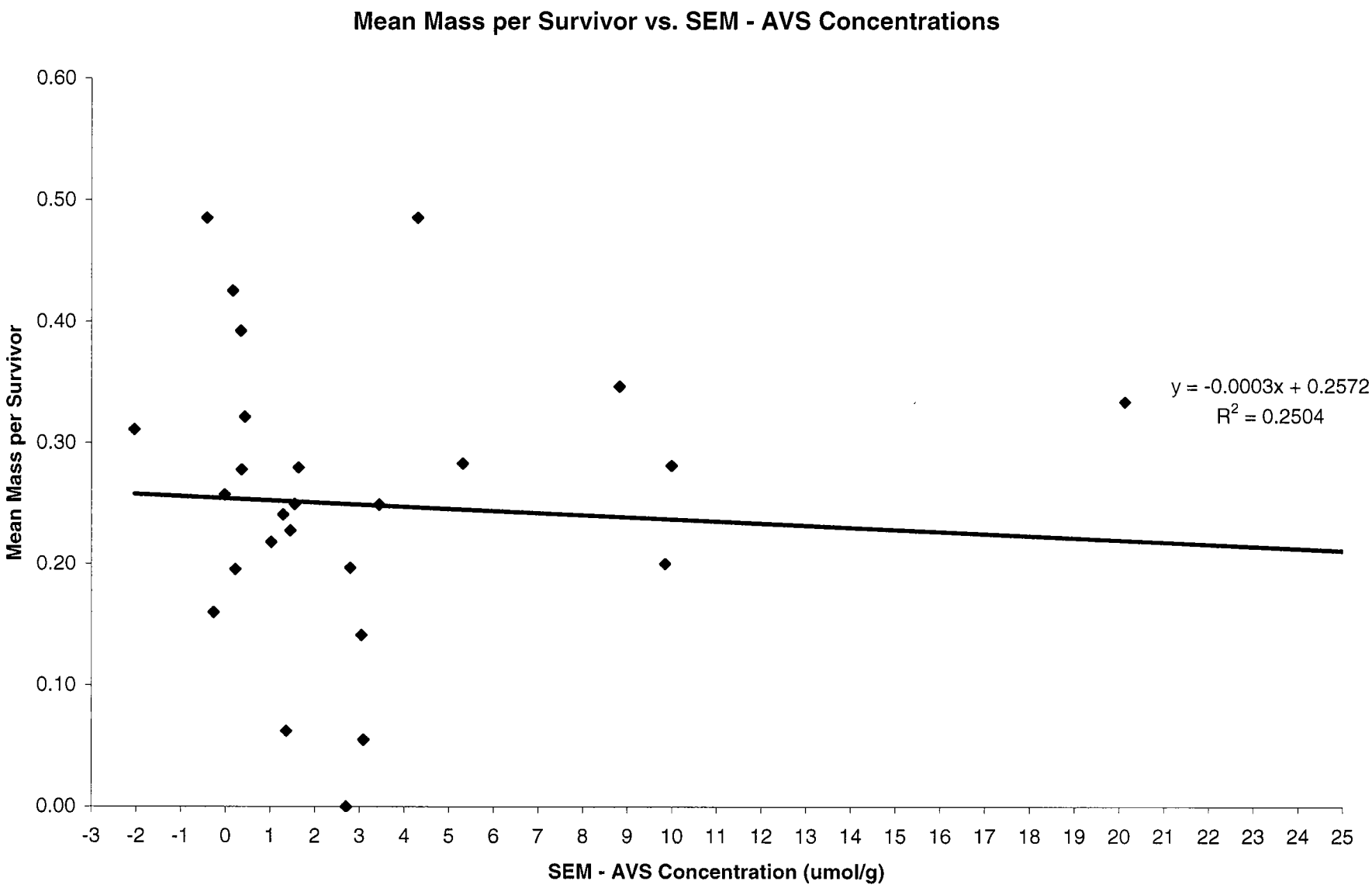

Mean Number of Survivors vs. High Molecular Weight PAH Concentration
(with MTCSD017 and 026 removed)
y = 0.2807x + 3.3982
R2 = 0.3206
Mean Number of Survivors
High Molecular Weight PAH Concentration (mg/kg)
0
1
2
3
4
5
6
7
8
9
0
2
4
6
8
10
12
14
16
18
20

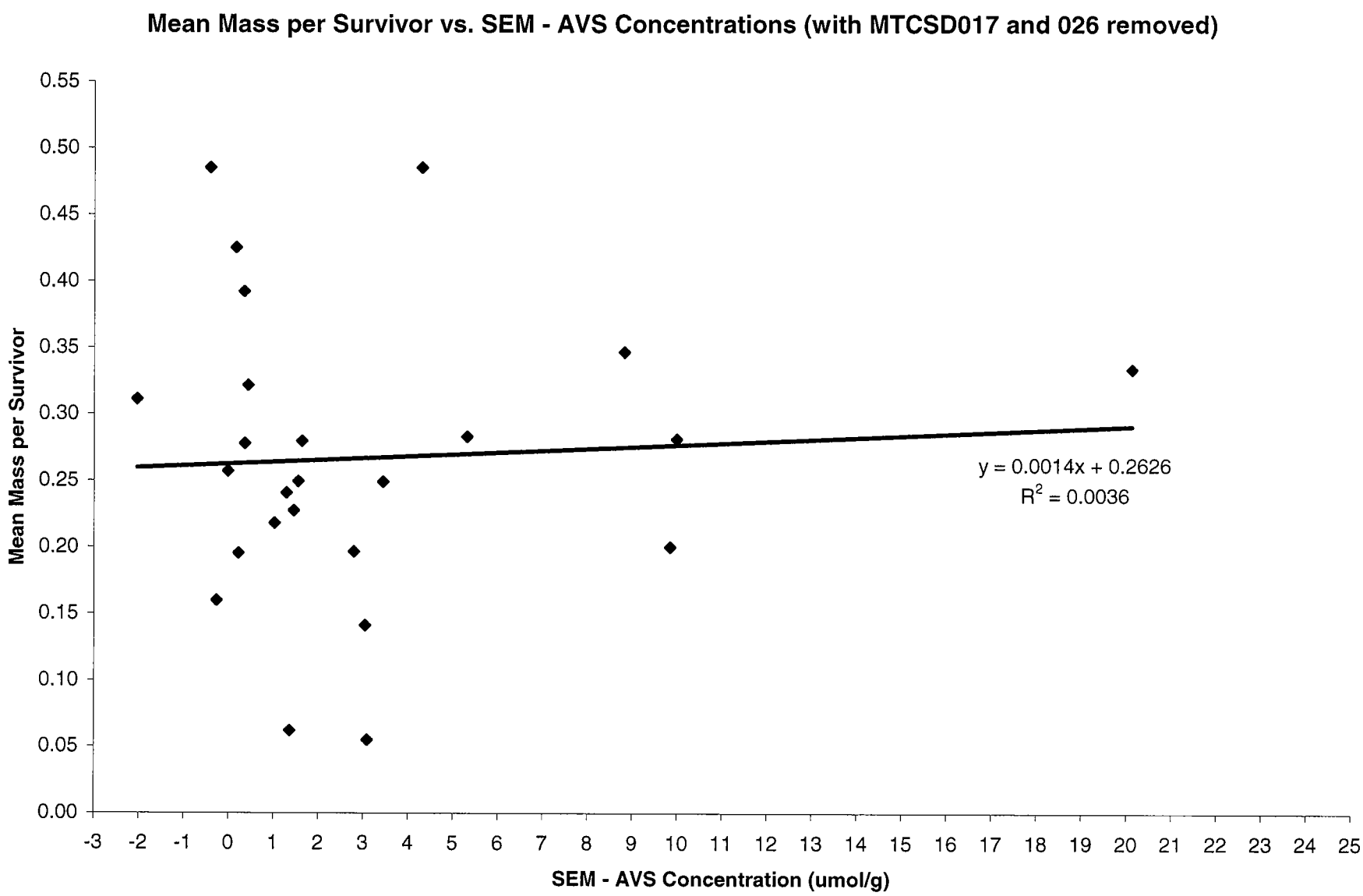

Mean Number of Survivors vs. Total PAH Concentration
y = 1.1245Ln(x) + 3.7711
R2 = 0.3231
Mean Number of Survivors
Total PAH Concentration (mg/kg)
0
1
2
3
4
5
6
7
8
9
0
5
10
15
20
25

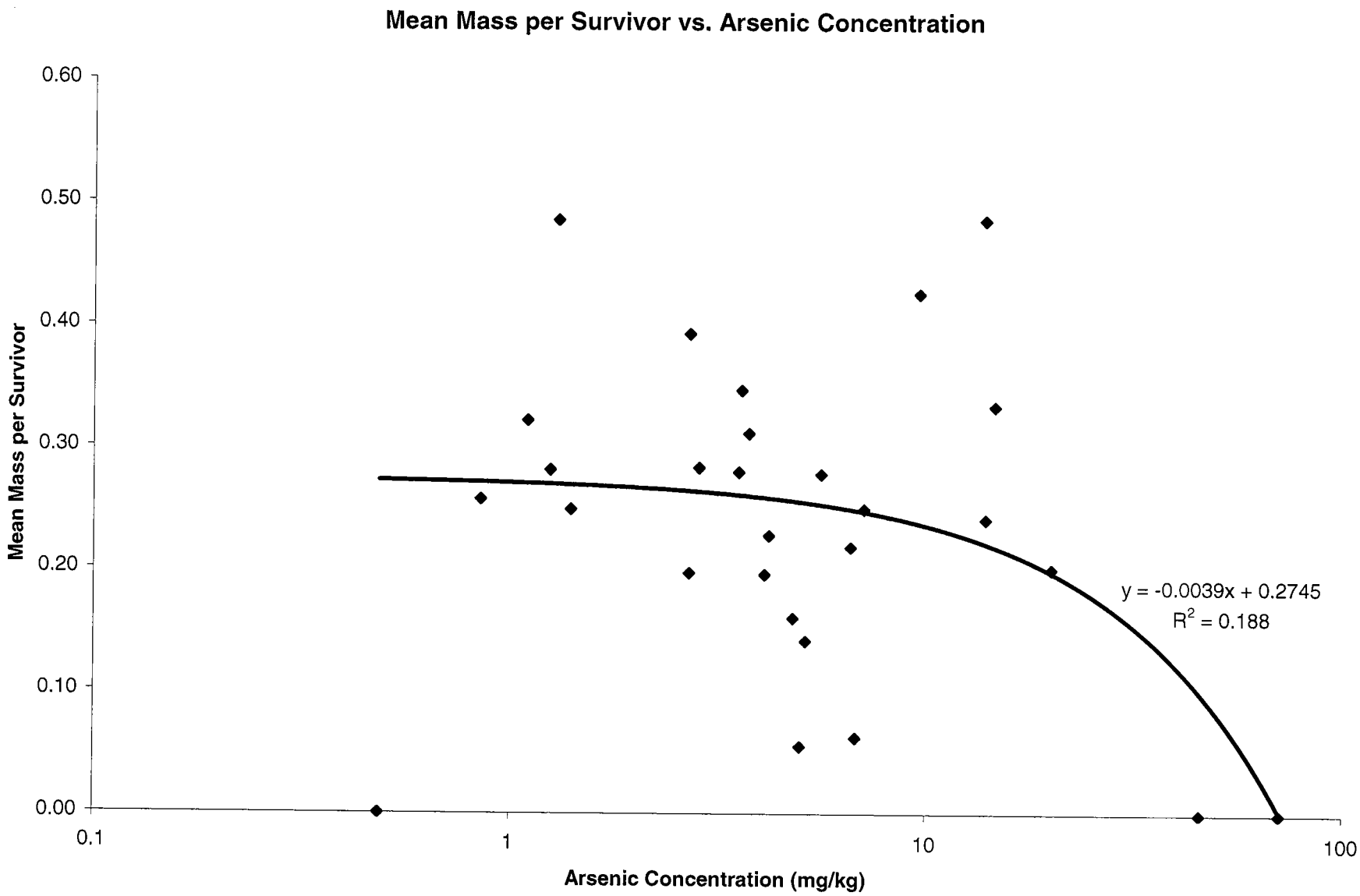

Mean Number of Survivors vs. Total PAH Concentration
(with MTCSD017 and 026 removed)
y = 0.2336x + 3.4269
R2 = 0.3203
Mean Number of Survivors
Total PAH Concentration (mg/kg)
0
1
2
3
4
5
6
7
8
9
0
5
10
15
20
25

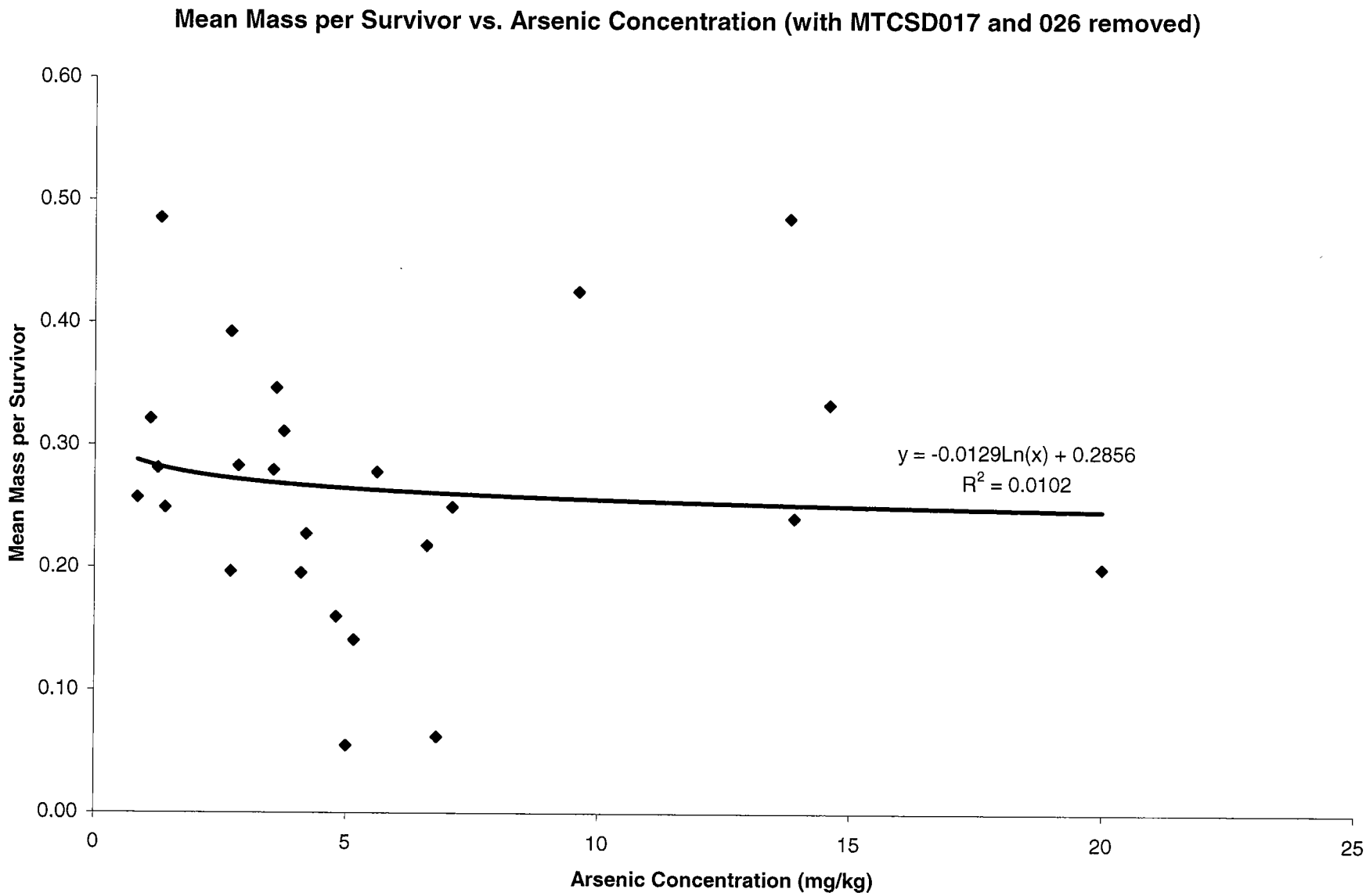

Mean Number of Survivors vs. PEC Quotient (for COCs)
Mean Number of Survivors
PEC Quotient
0
1
2
3
4
5
6
7
8
9
0.01
0.10
1.00
10.00
100.00
y = -0.7141Ln(x) + 2.6873
R2 = 0.1582

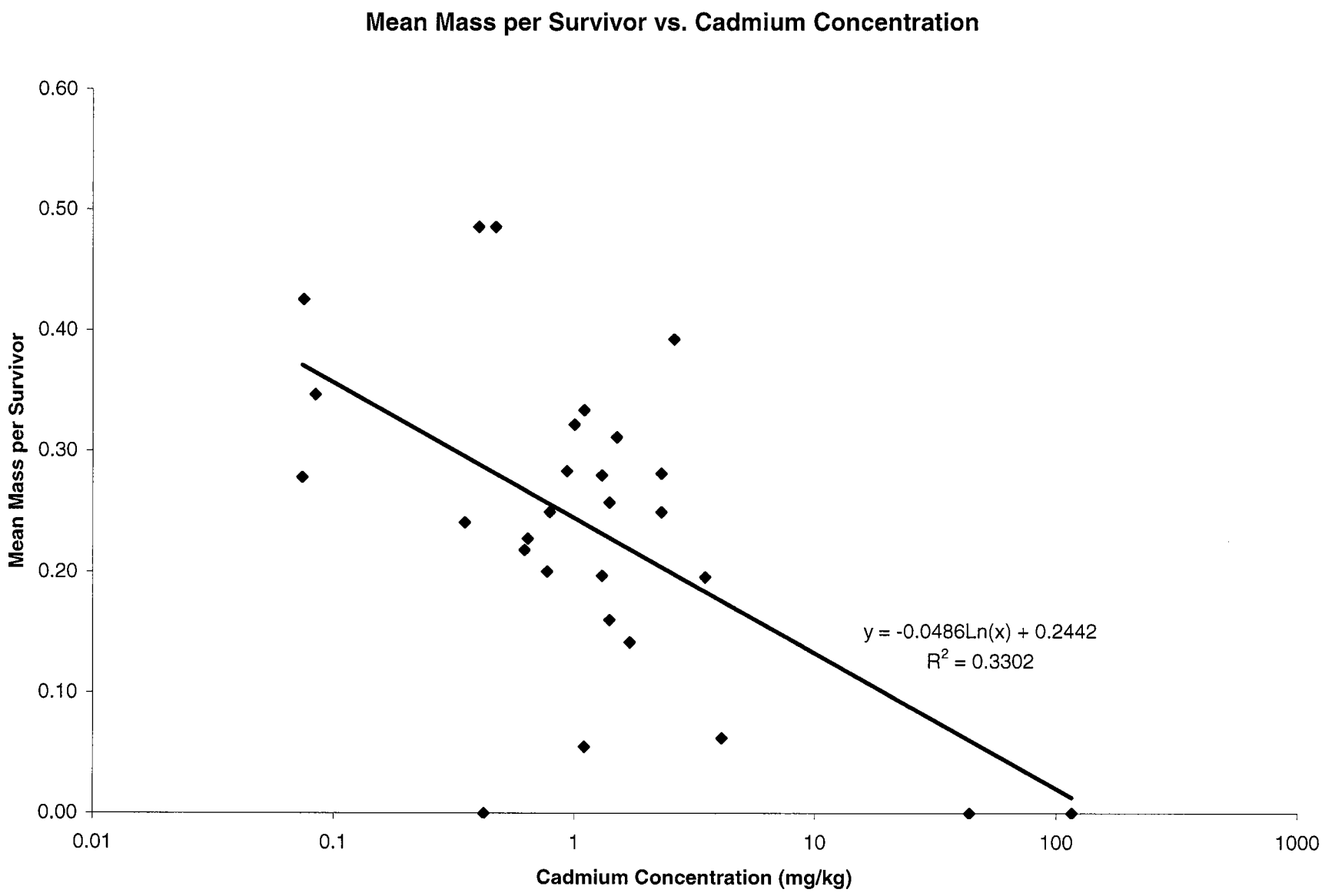

Mean Number of Survivors vs. PEC Quotient (for COCs) (with MTCSD017 and 026 removed)
Mean Number of Survivors
PEC Quotient
y = -7.568x + 5.7075
R2 = 0.0888
0
1
2
3
4
5
6
7
8
9
10
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40

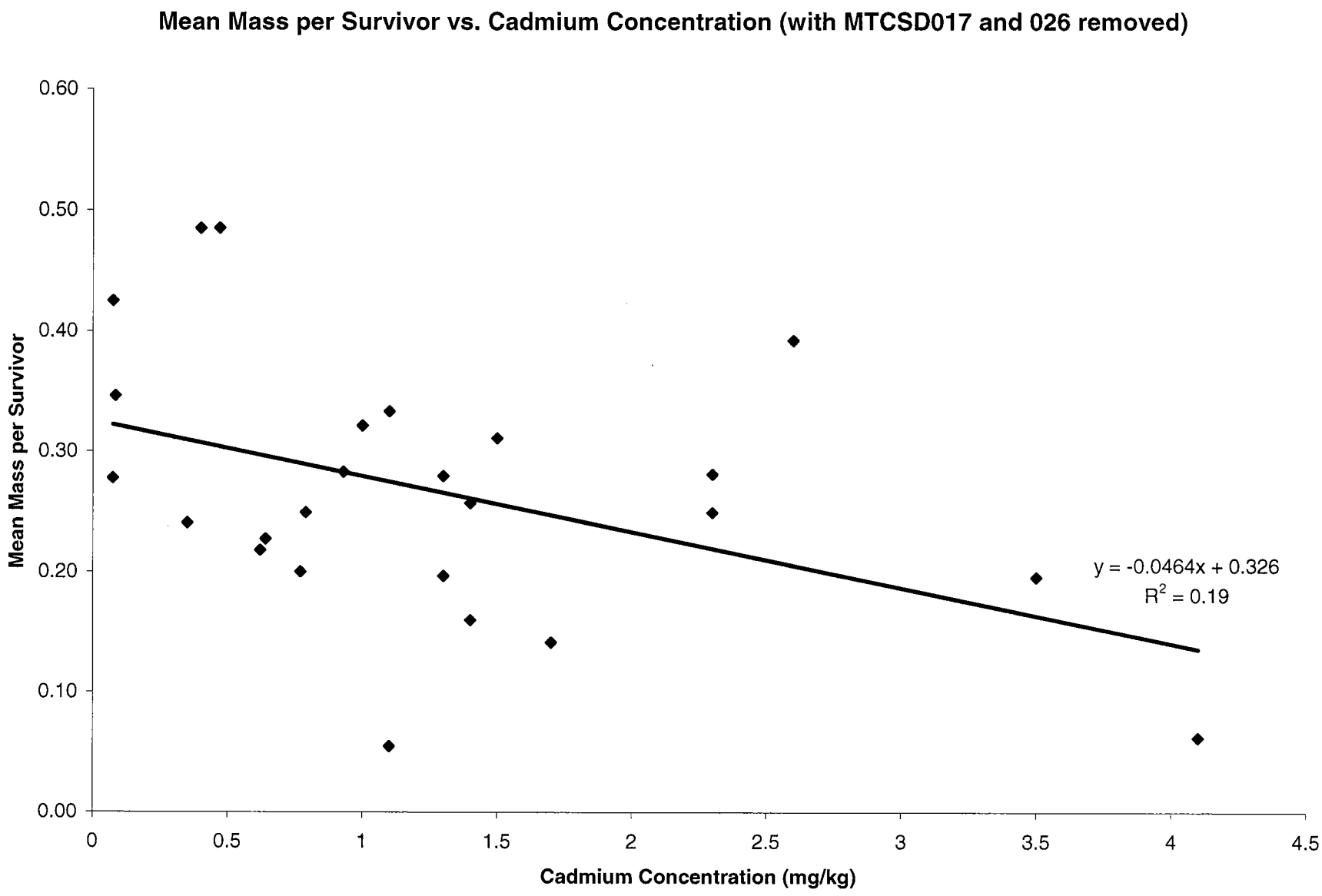

Mean Mass per Survivor vs. SEM - AVS Concentrations
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
SEM - AVS Concentration (umol/g)
y = -0.0003x + 0.2572
R2 = 0.2504

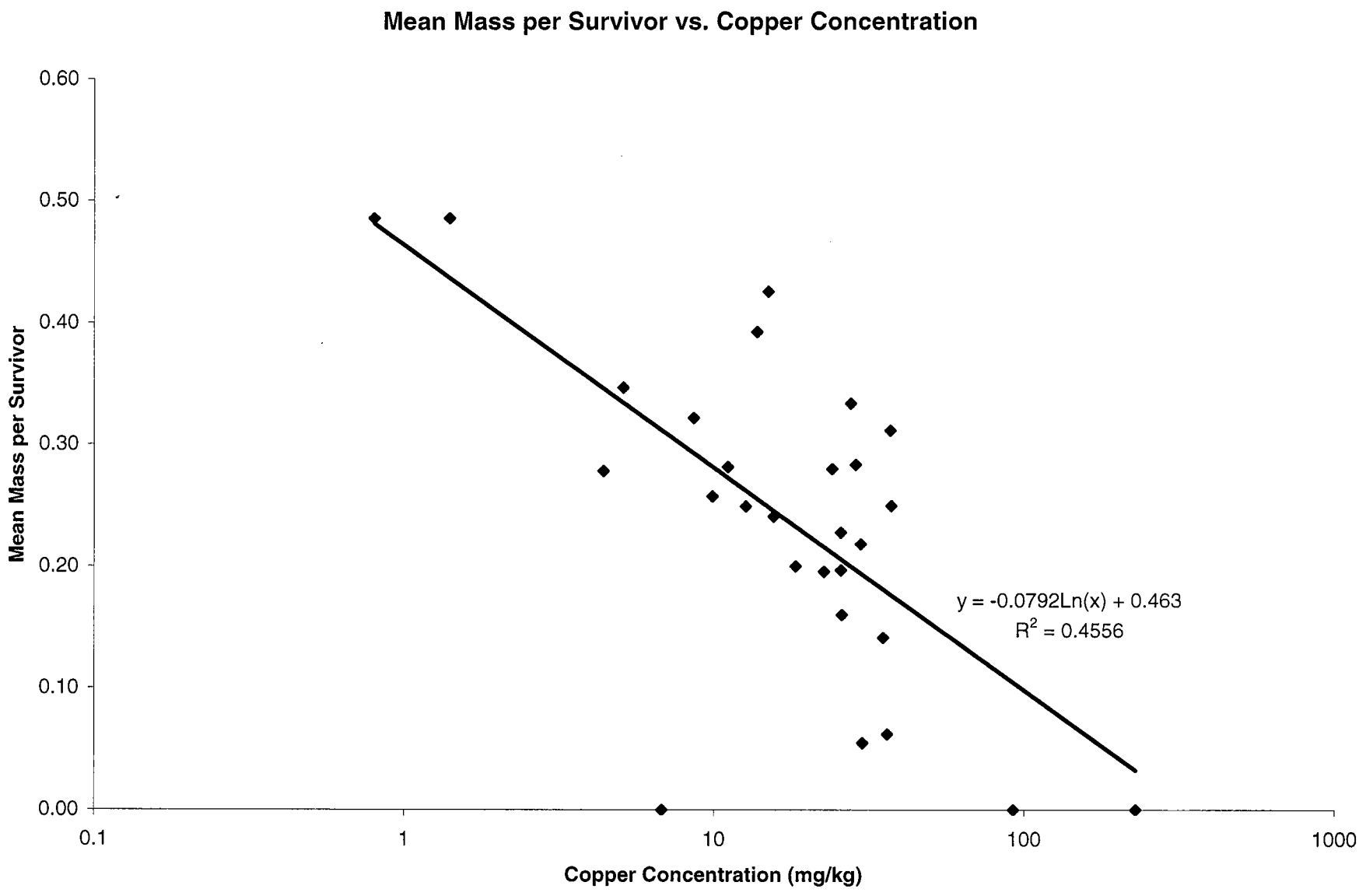

Mean Mass per Survivor vs. SEM - AVS Concentrations (with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-3 -2 -1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
SEM - AVS Concentration (umol/g)
y = 0.0014x + 0.2626
R2 = 0.0036

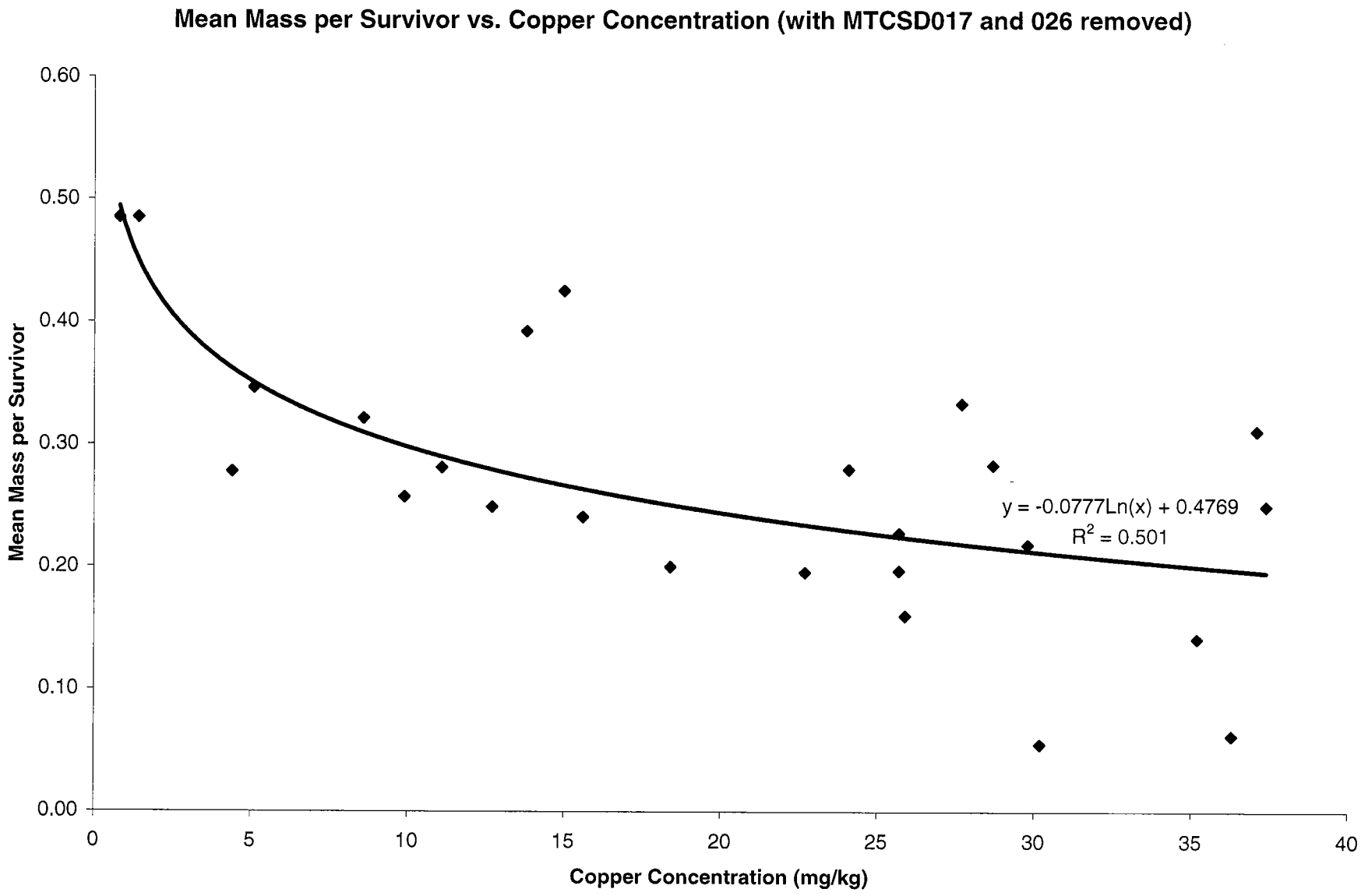

Mean Mass per Survivor vs. Arsenic Concentration
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.1
1
10
100
Arsenic Concentration (mg/kg)
y = -0.0039x + 0.2745
R2 = 0.188

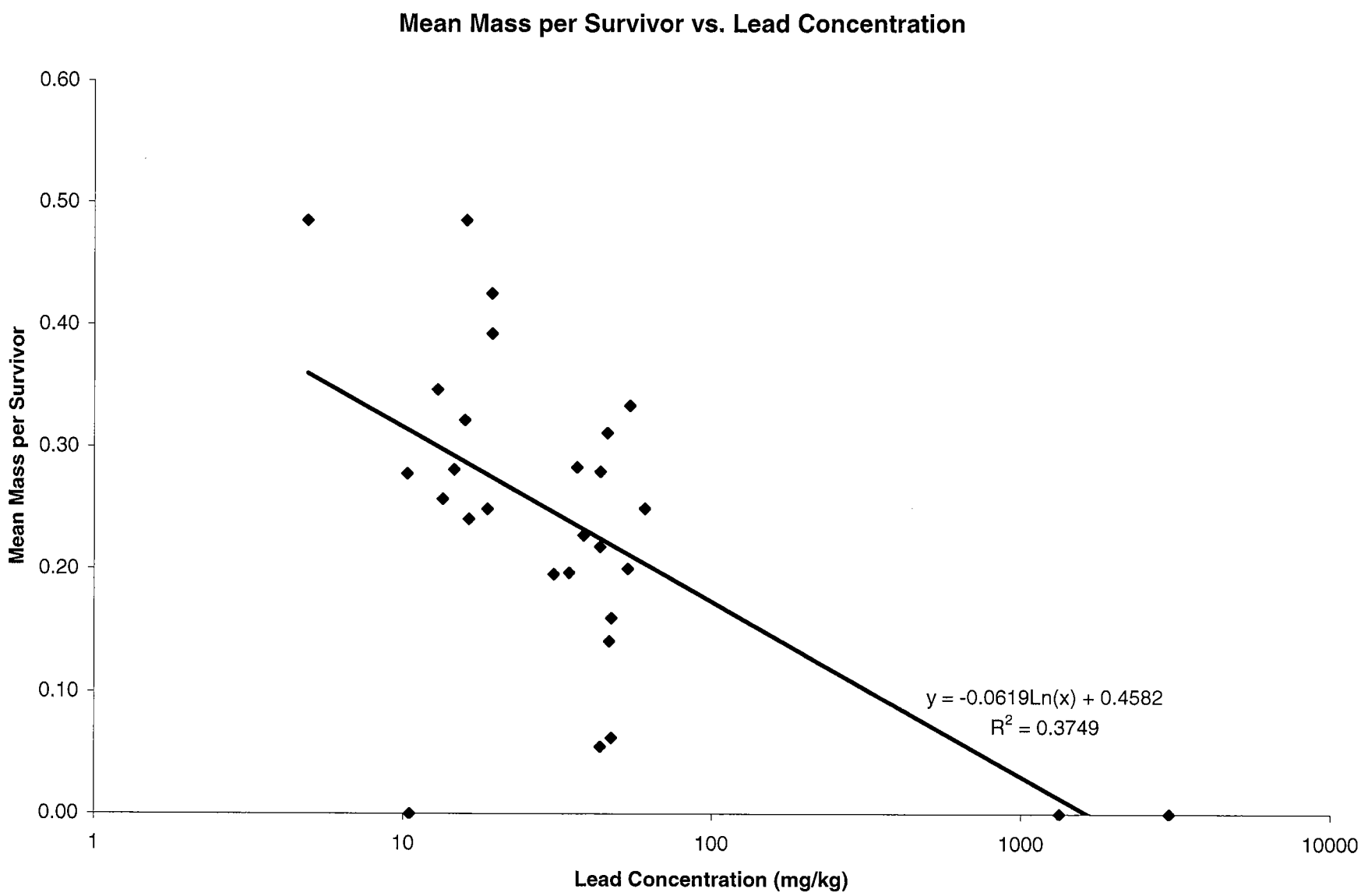

Mean Mass per Survivor vs. Arsenic Concentration (with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
5
10
15
20
25
Arsenic Concentration (mg/kg)
y = -0.0129Ln(x) + 0.2856
R2 = 0.0102

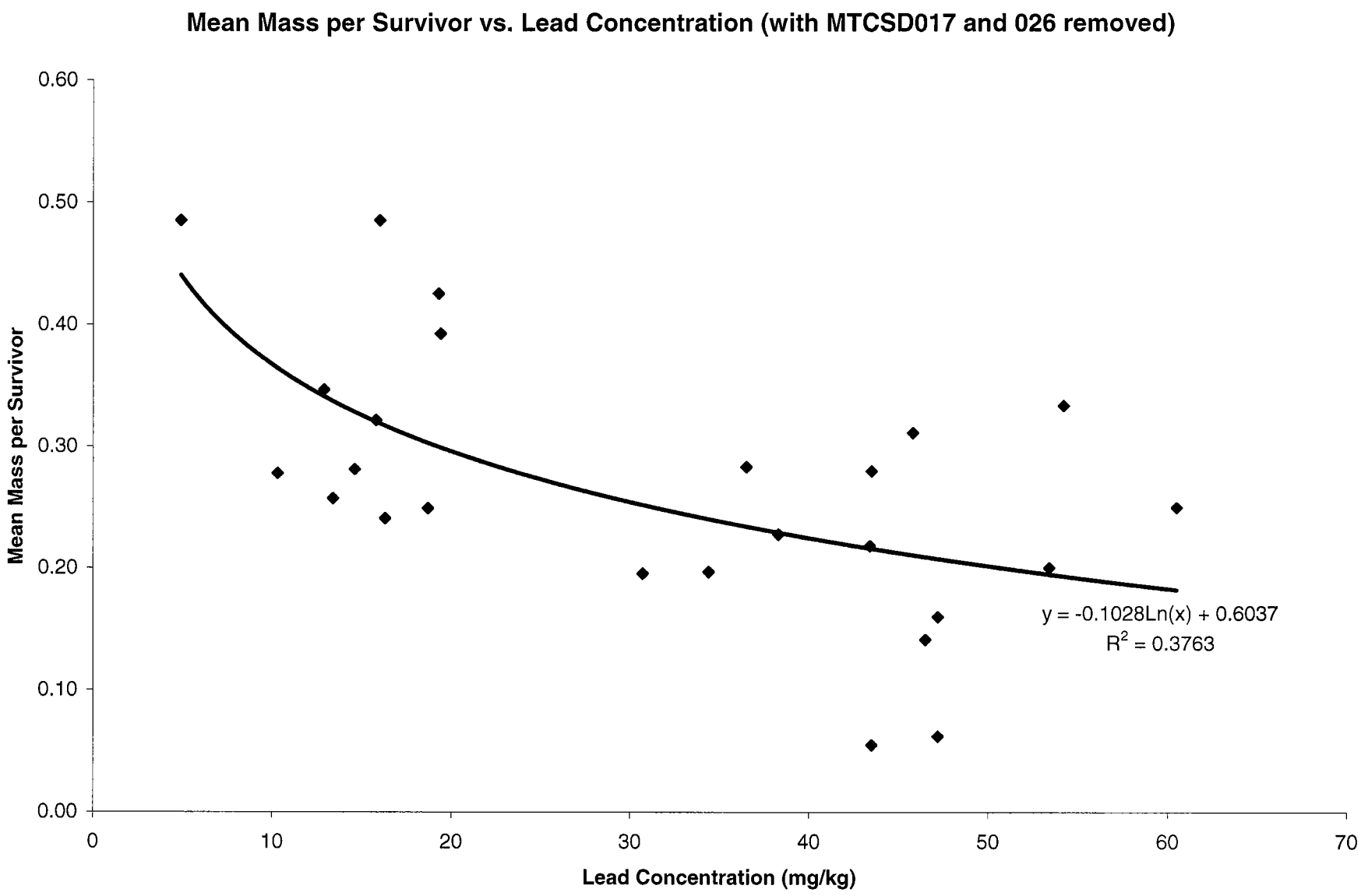

Mean Mass per Survivor vs. Cadmium Concentration
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.01
0.1
1
10
100
1000
Cadmium Concentration (mg/kg)
y = -0.0486Ln(x) + 0.2442
R2 = 0.3302

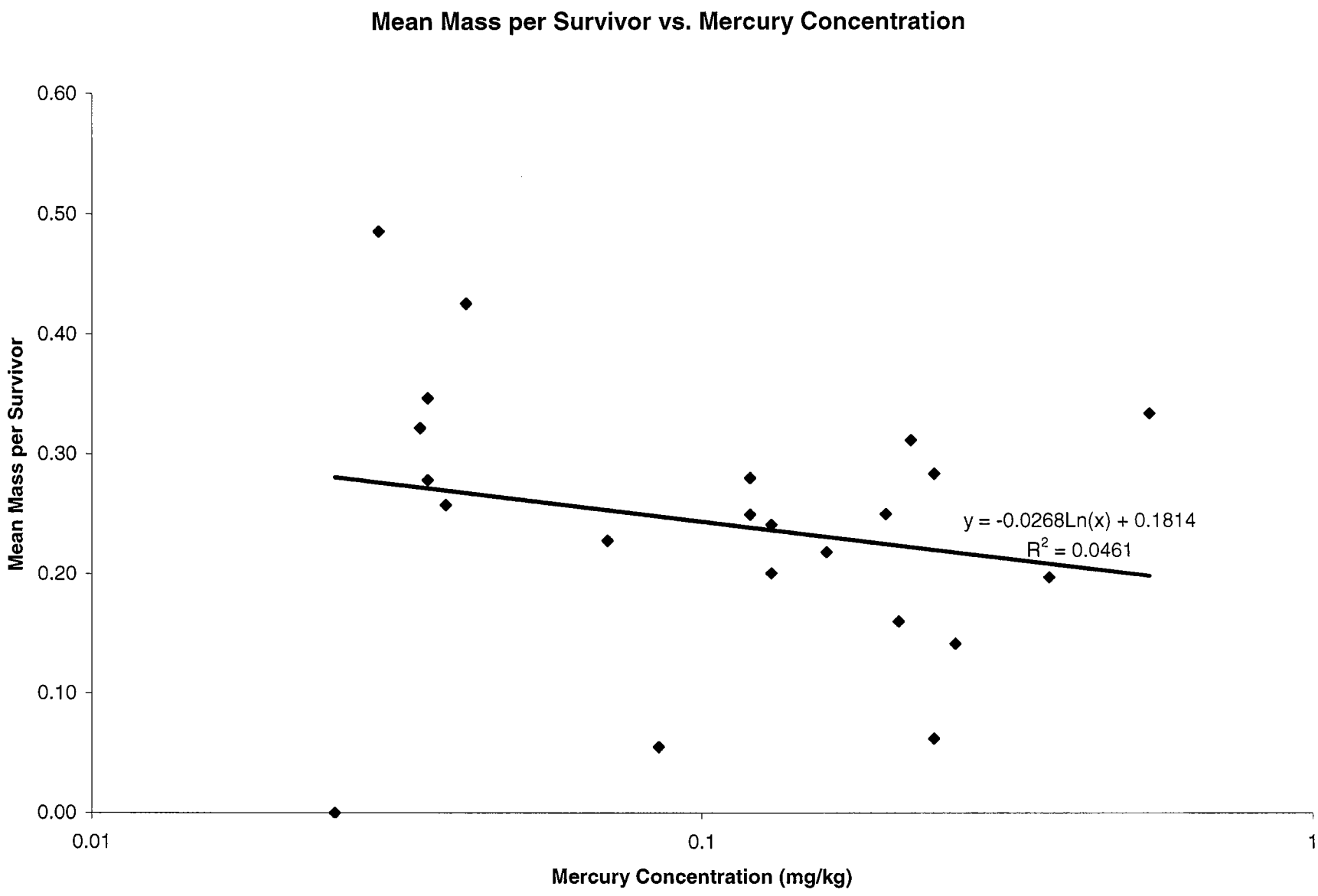

Mean Mass per Survivor vs. Cadmium Concentration (with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Cadmium Concentration (mg/kg)
y = -0.0464x + 0.326
R2 = 0.19

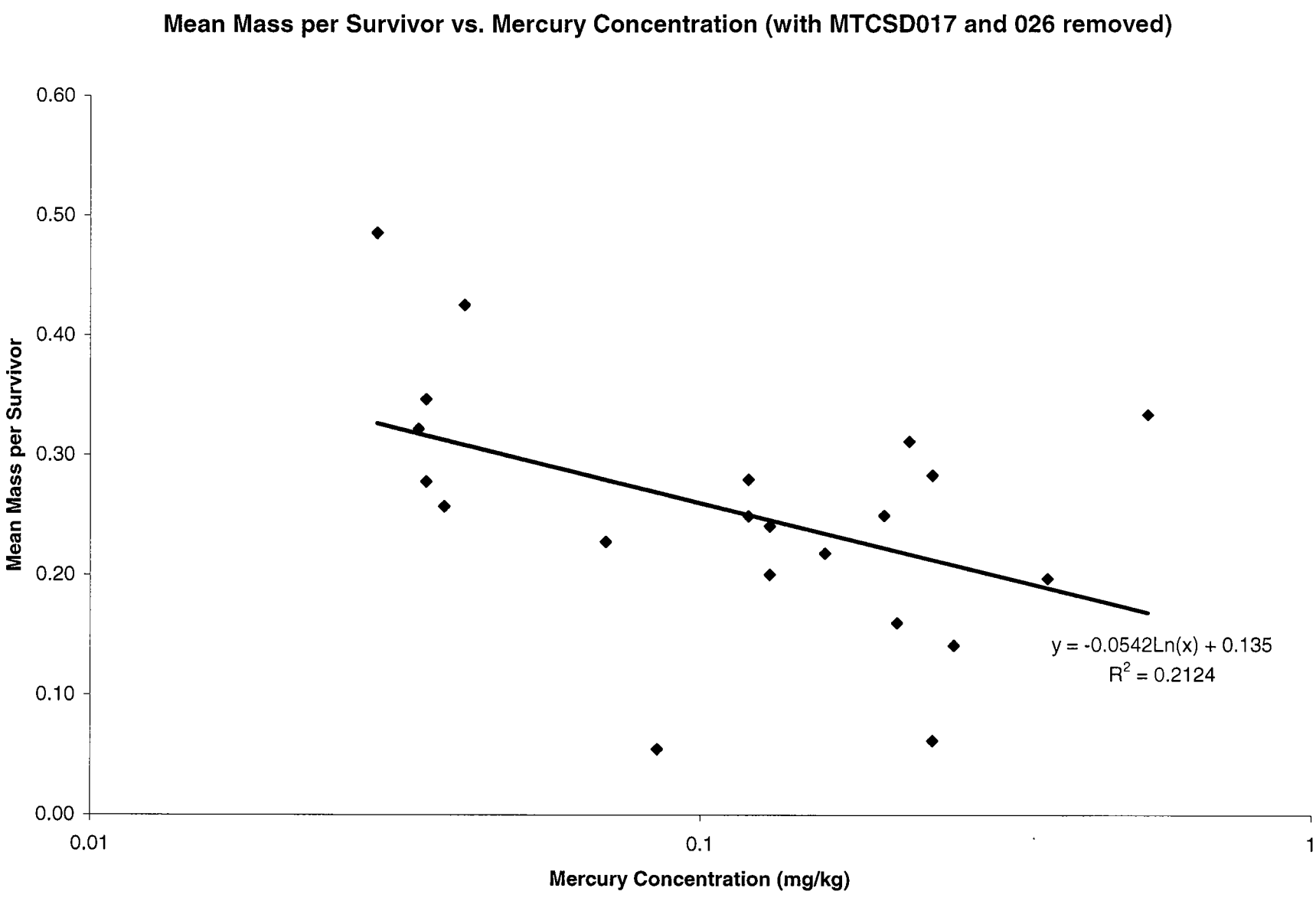

Mean Mass per Survivor vs. Copper Concentration
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Mean Mass per Survivor
0.1
1
10
100
1000
Copper Concentration (mg/kg)
y = -0.0792Ln(x) + 0.463
R2 = 0.4556

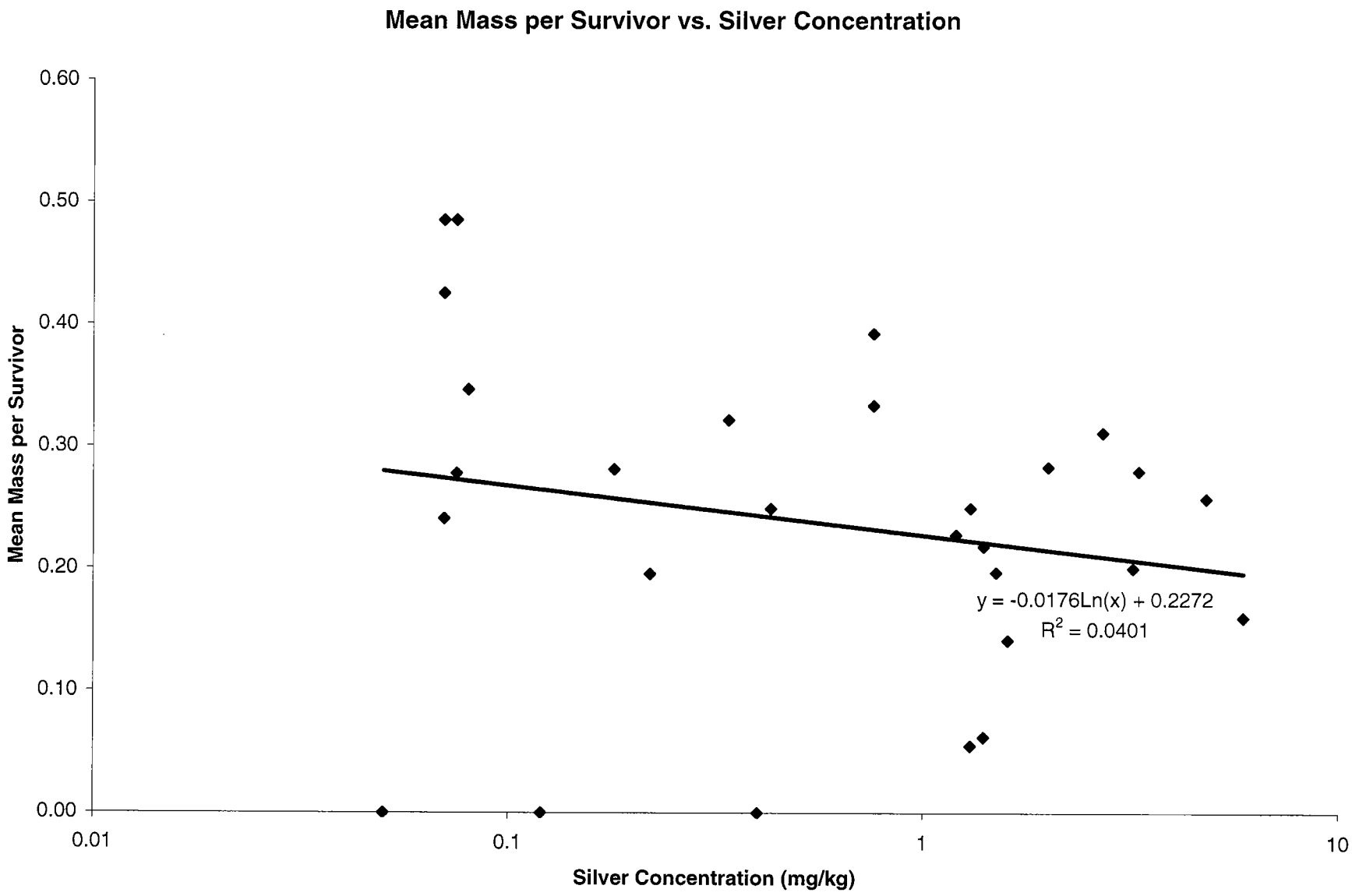

Mean Mass per Survivor vs. Copper Concentration (with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
5
10
15
20
25
30
35
40
Copper Concentration (mg/kg)
y = -0.0777Ln(x) + 0.4769
R2 = 0.501

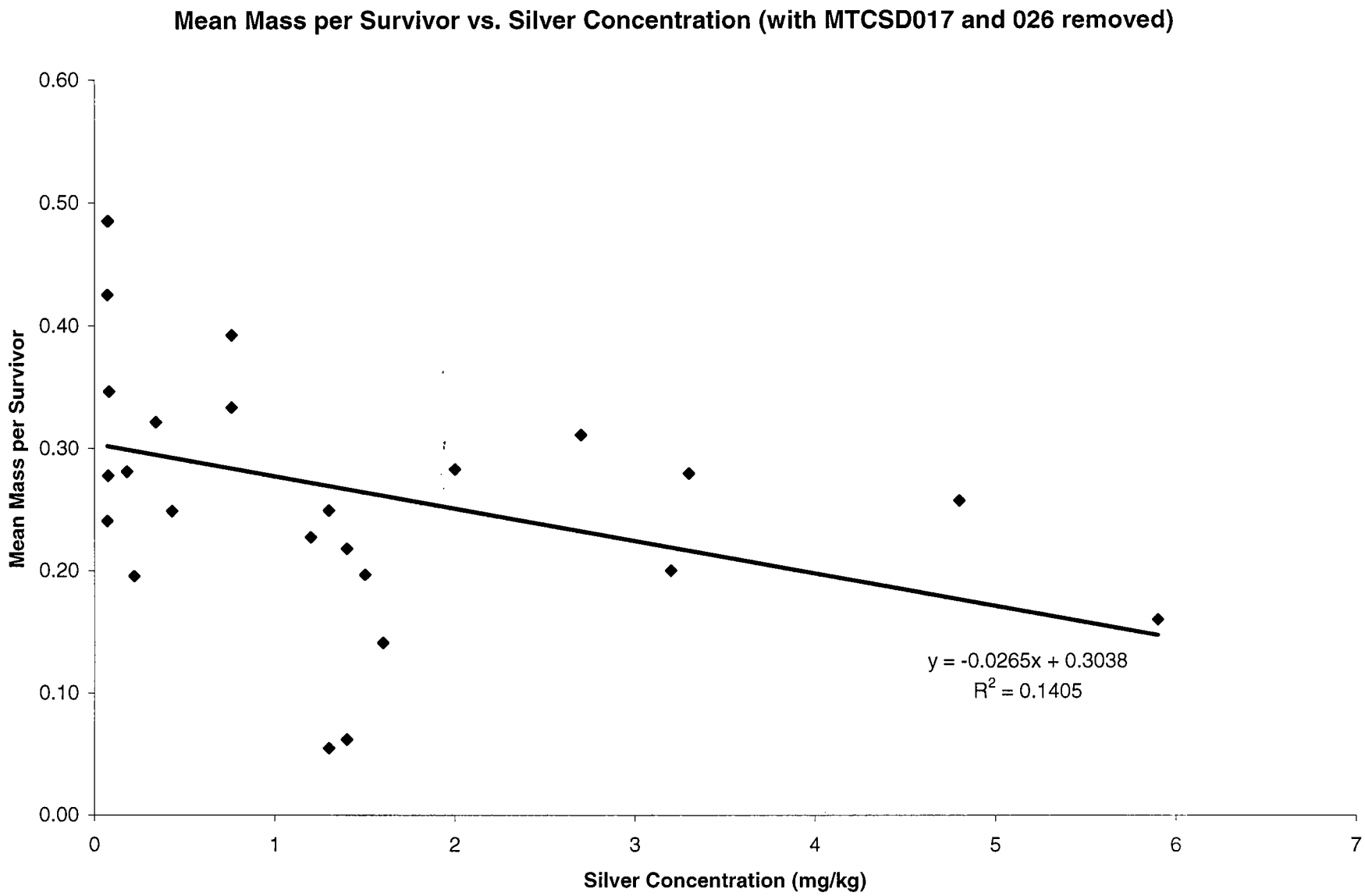

Mean Mass per Survivor vs. Lead Concentration
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1
10
100
1000
10000
Lead Concentration (mg/kg)
y = -0.0619Ln(x) + 0.4582
R2 = 0.3749

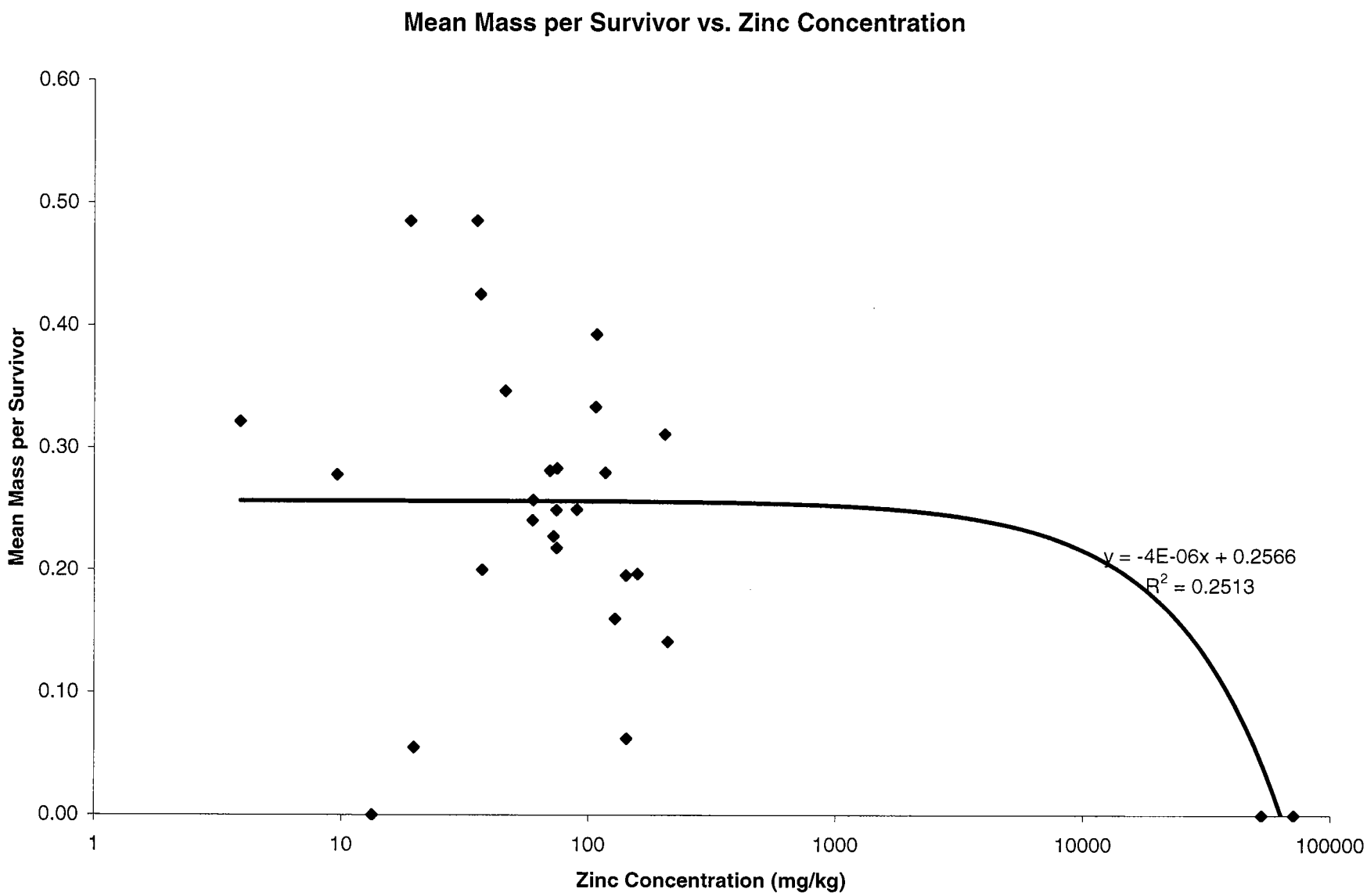

Mean Mass per Survivor vs. Lead Concentration (with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
10
20
30
40
50
60
70
Lead Concentration (mg/kg)
y = -0.1028Ln(x) + 0.6037
R2 = 0.3763

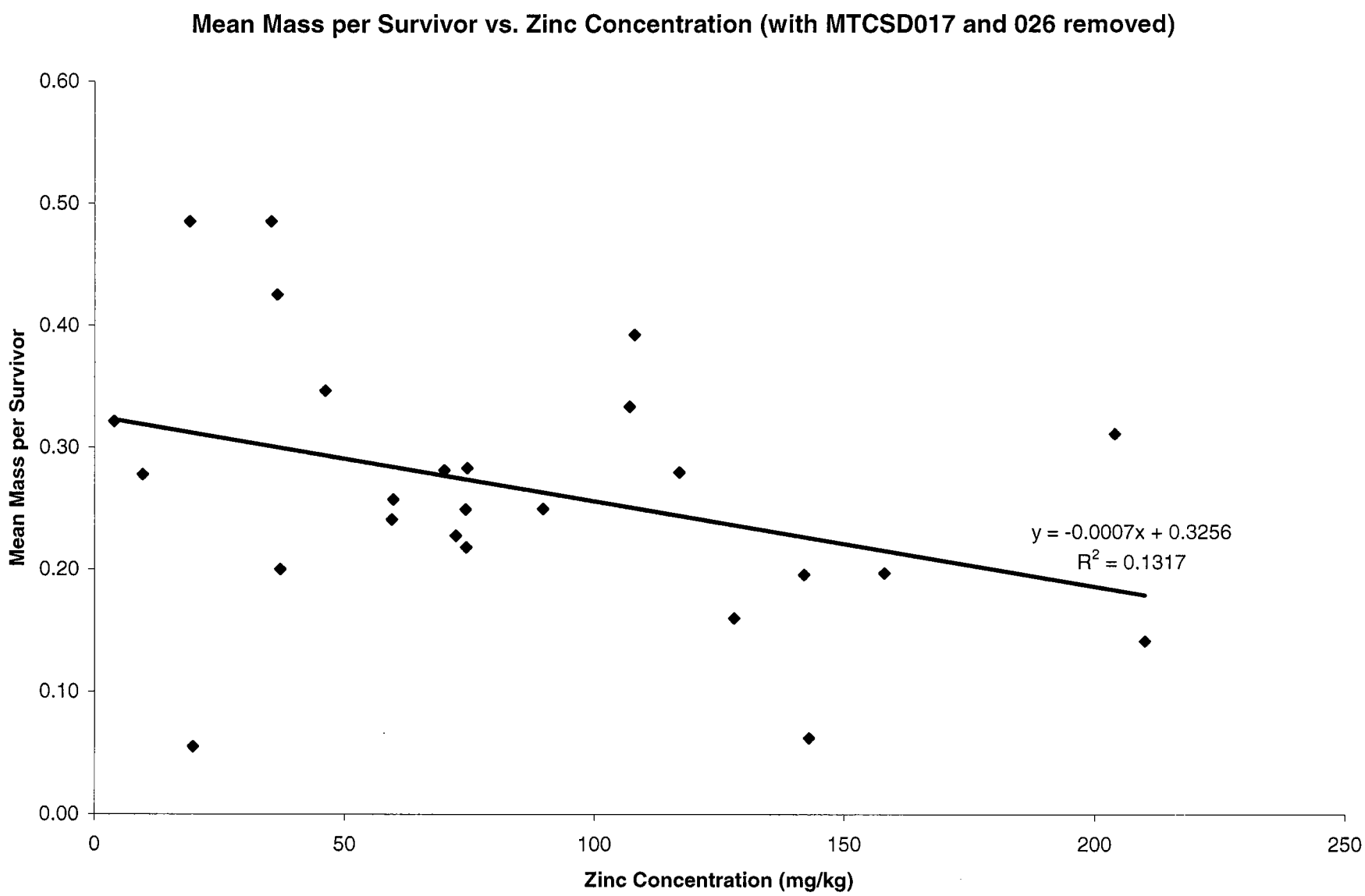

Mean Mass per Survivor vs. Mercury Concentration
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Mean Mass per Survivor
0.01
0.1
1
Mercury Concentration (mg/kg)
y = -0.0268Ln(x) + 0.1814
R2 = 0.0461

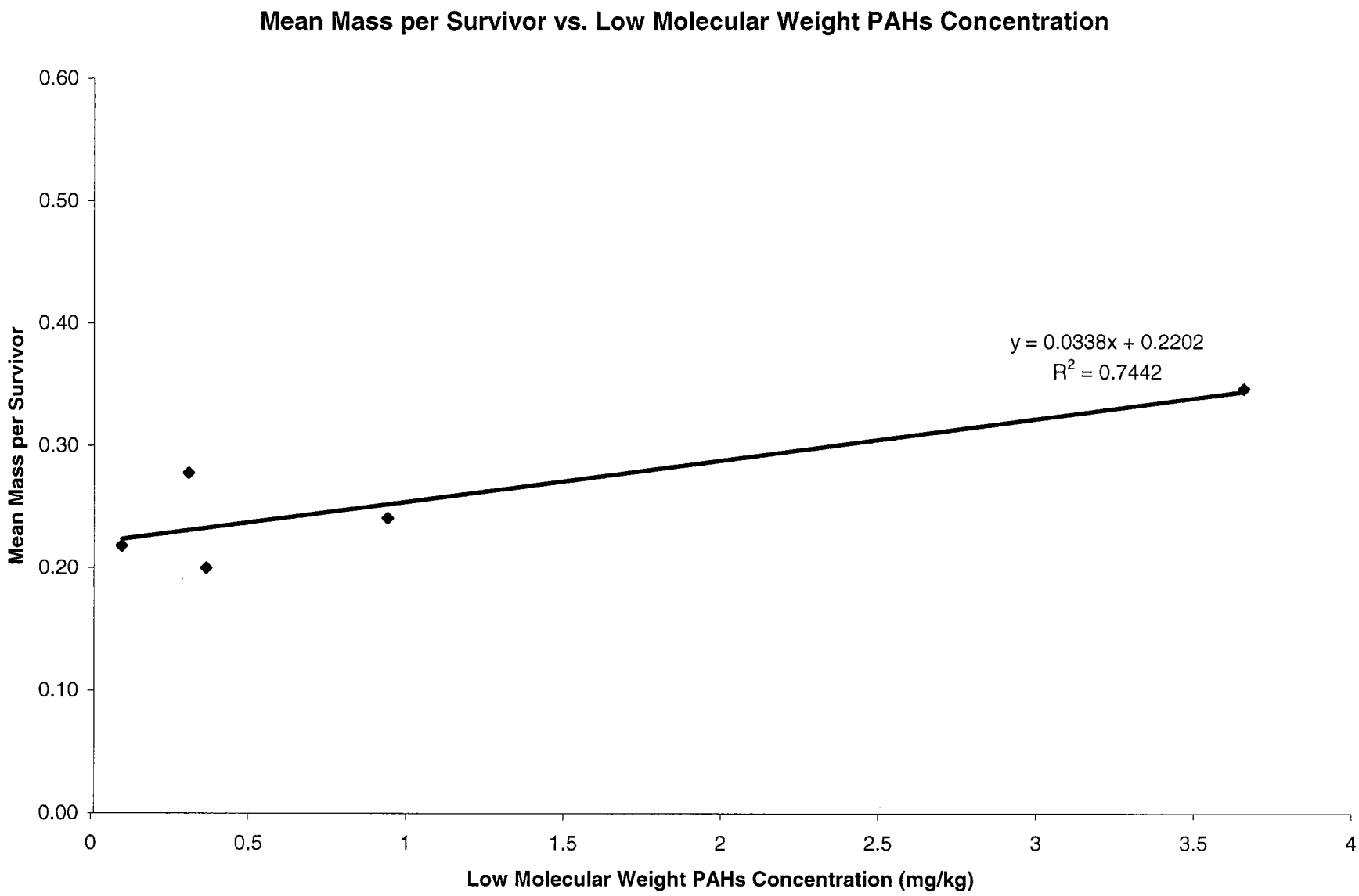

Mean Mass per Survivor vs. Mercury Concentration (with MTCSD017 and 026 removed)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Mean Mass per Survivor
0.01
0.1
1
Mercury Concentration (mg/kg)
y = -0.0542Ln(x) + 0.135
R2 = 0.2124

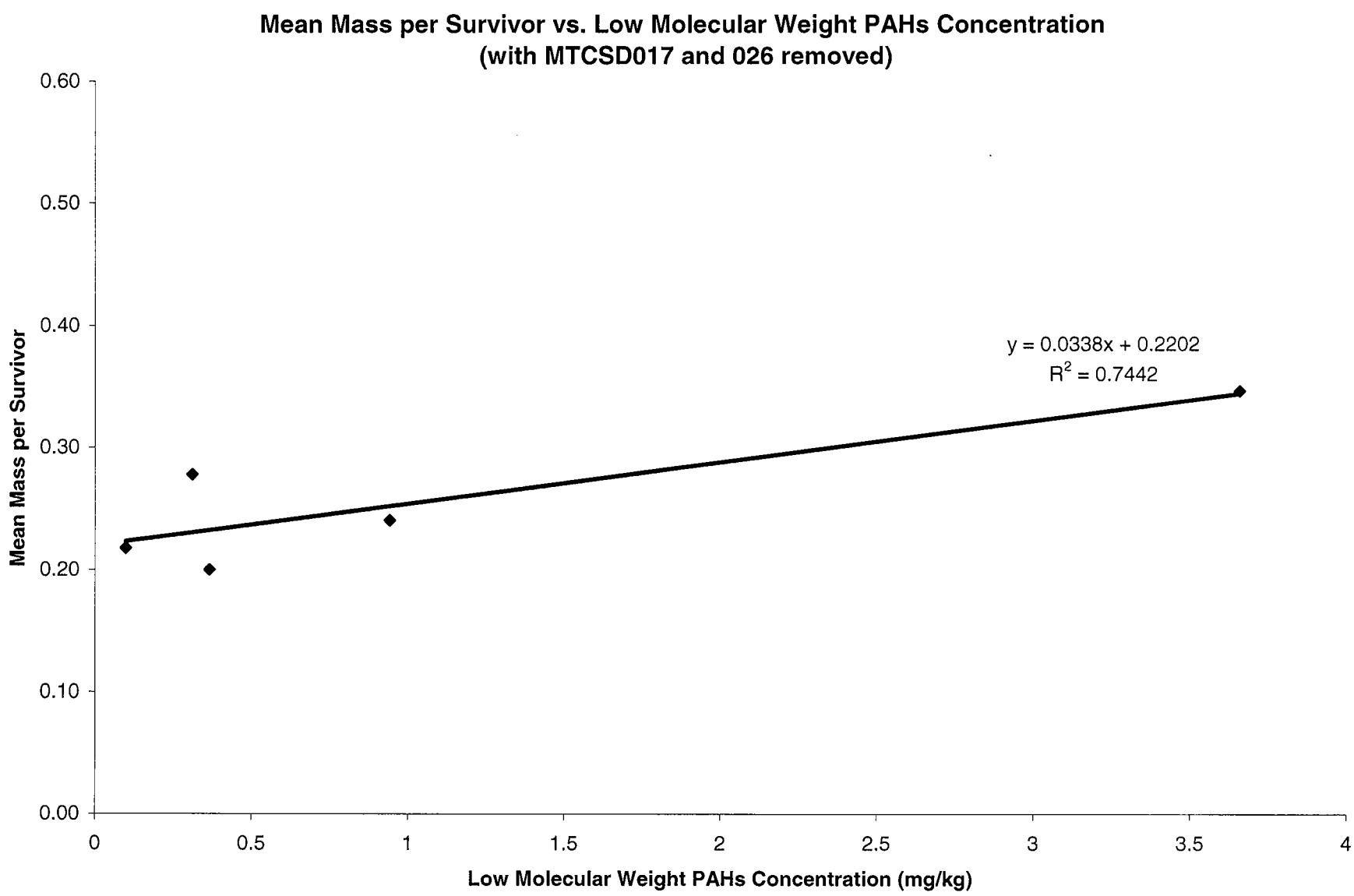

Mean Mass per Survivor vs. Silver Concentration
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.01
0.1
1
10
Silver Concentration (mg/kg)
y = -0.0176Ln(x) + 0.2272
R2 = 0.0401

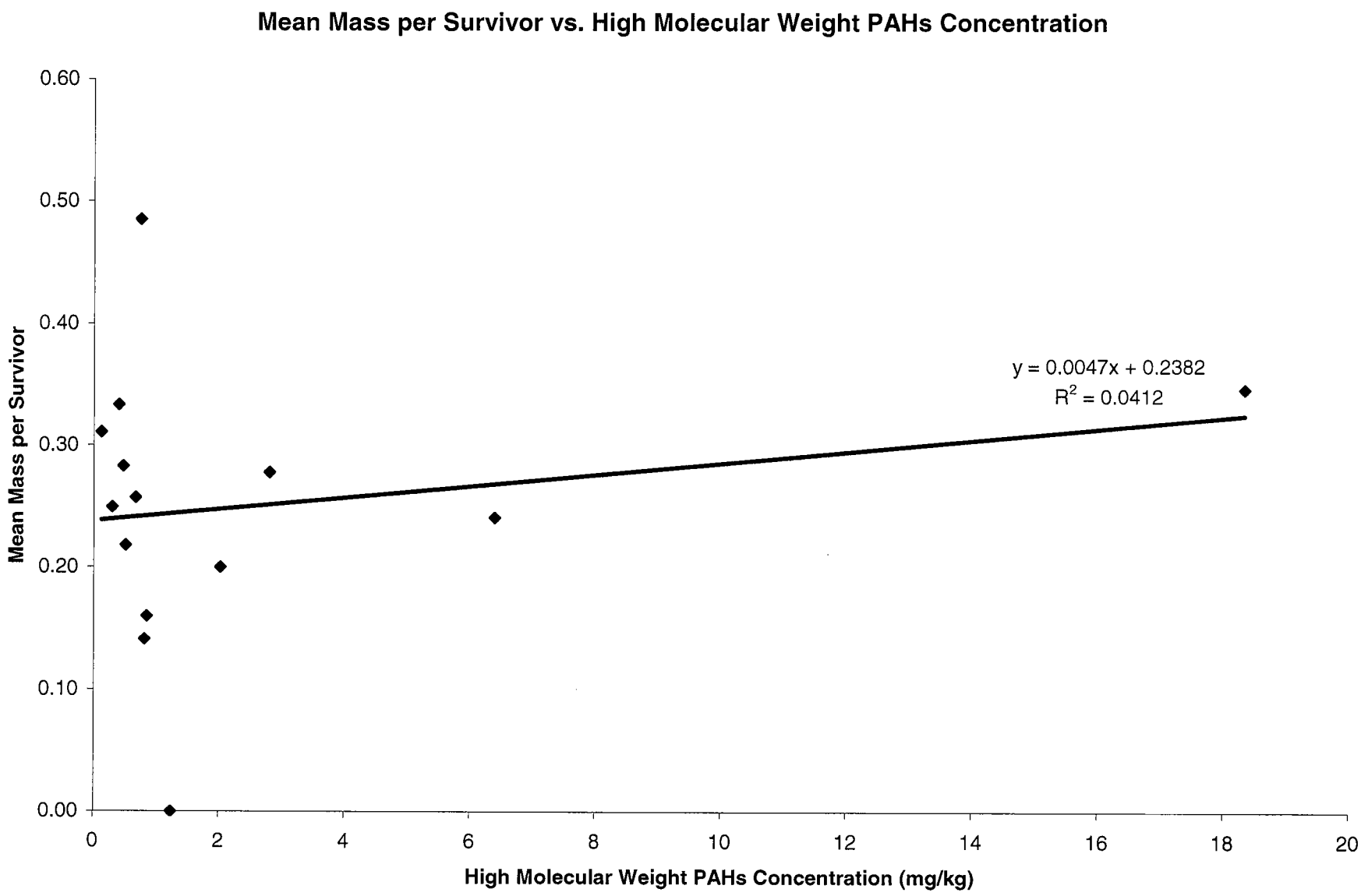

Mean Mass per Survivor vs. Silver Concentration (with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
1
2
3
4
5
6
7
Silver Concentration (mg/kg)
y = -0.0265x + 0.3038
R2 = 0.1405

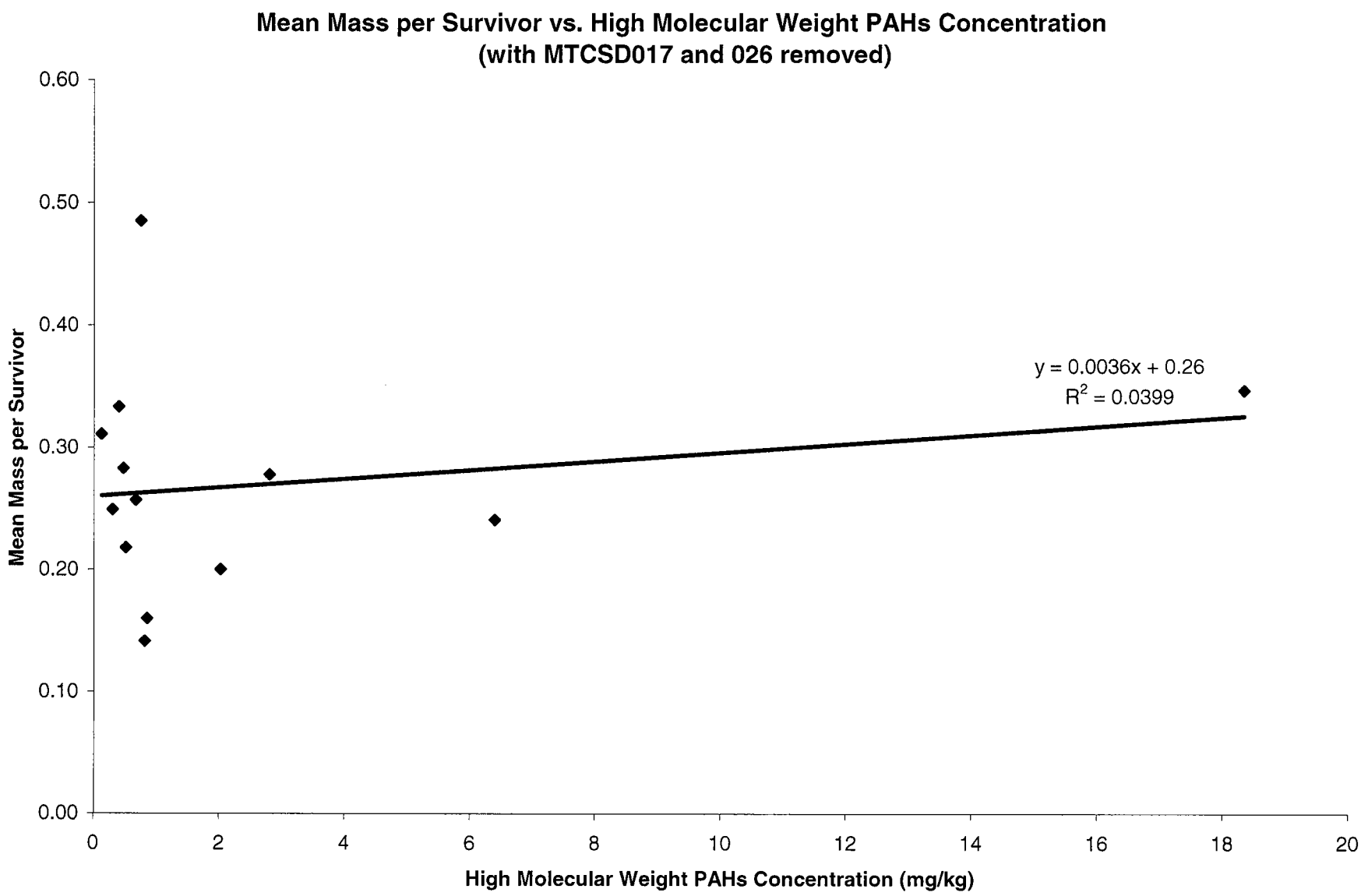

Mean Mass per Survivor vs. Zinc Concentration
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1
10
100
1000
10000
100000
Zinc Concentration (mg/kg)
y = -4E-06x + 0.2566
R2 = 0.2513

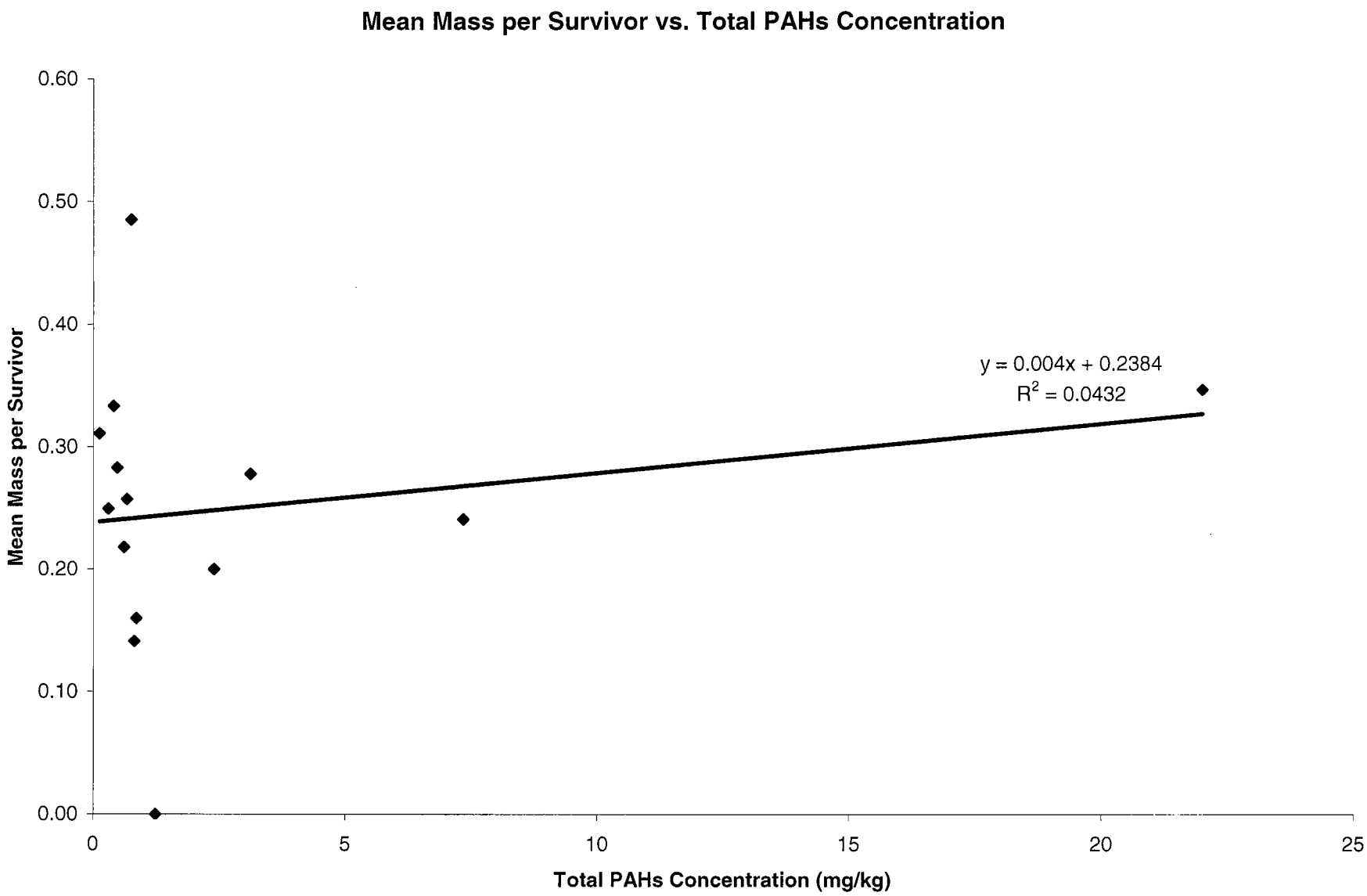

Mean Mass per Survivor vs. Zinc Concentration (with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
50
100
150
200
250
Zinc Concentration (mg/kg)
y = -0.0007x + 0.3256
R2 = 0.1317

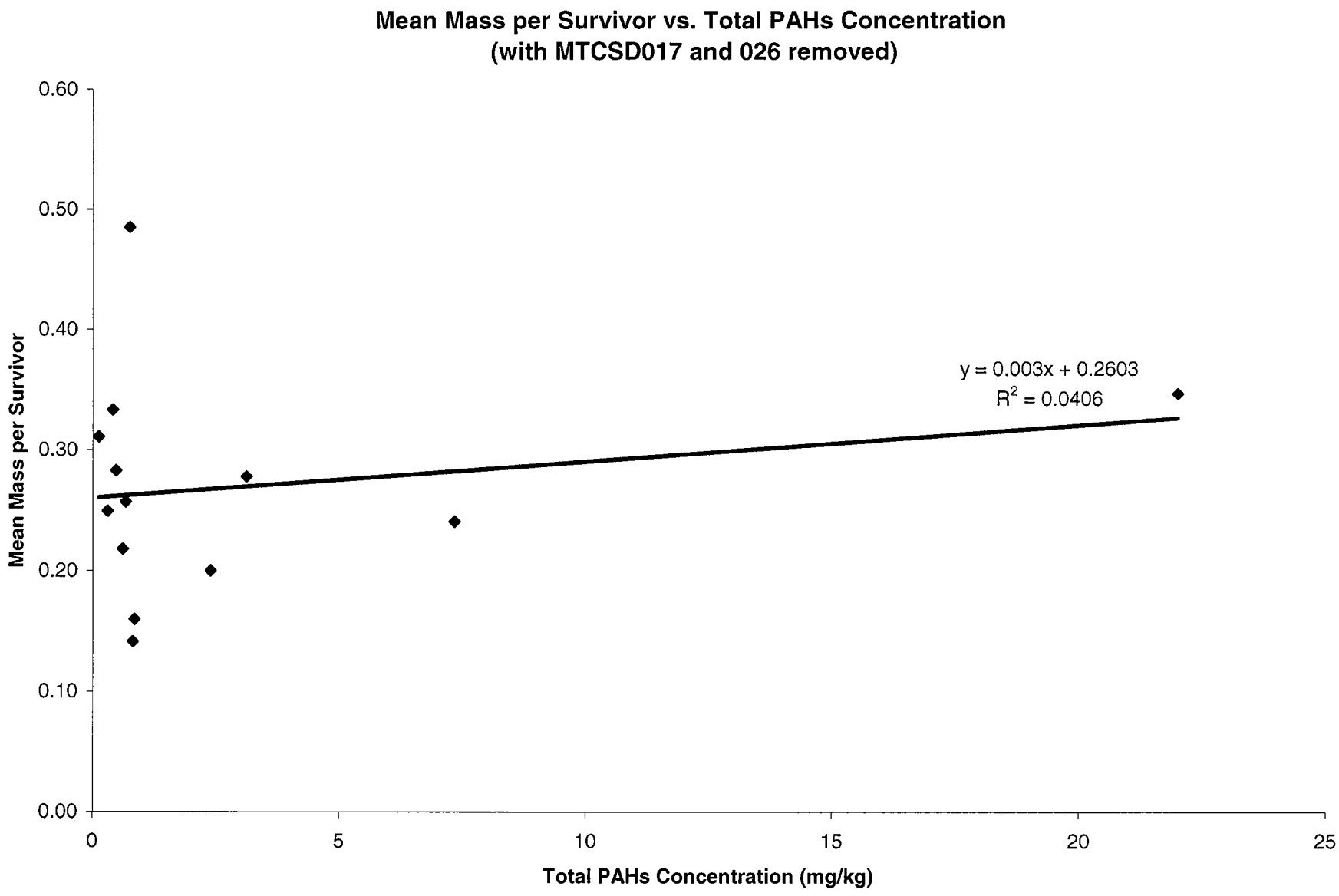

Mean Mass per Survivor vs. Low Molecular Weight PAHs Concentration
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
Low Molecular Weight PAHs Concentration (mg/kg)
y = 0.0338x + 0.2202
R2 = 0.7442

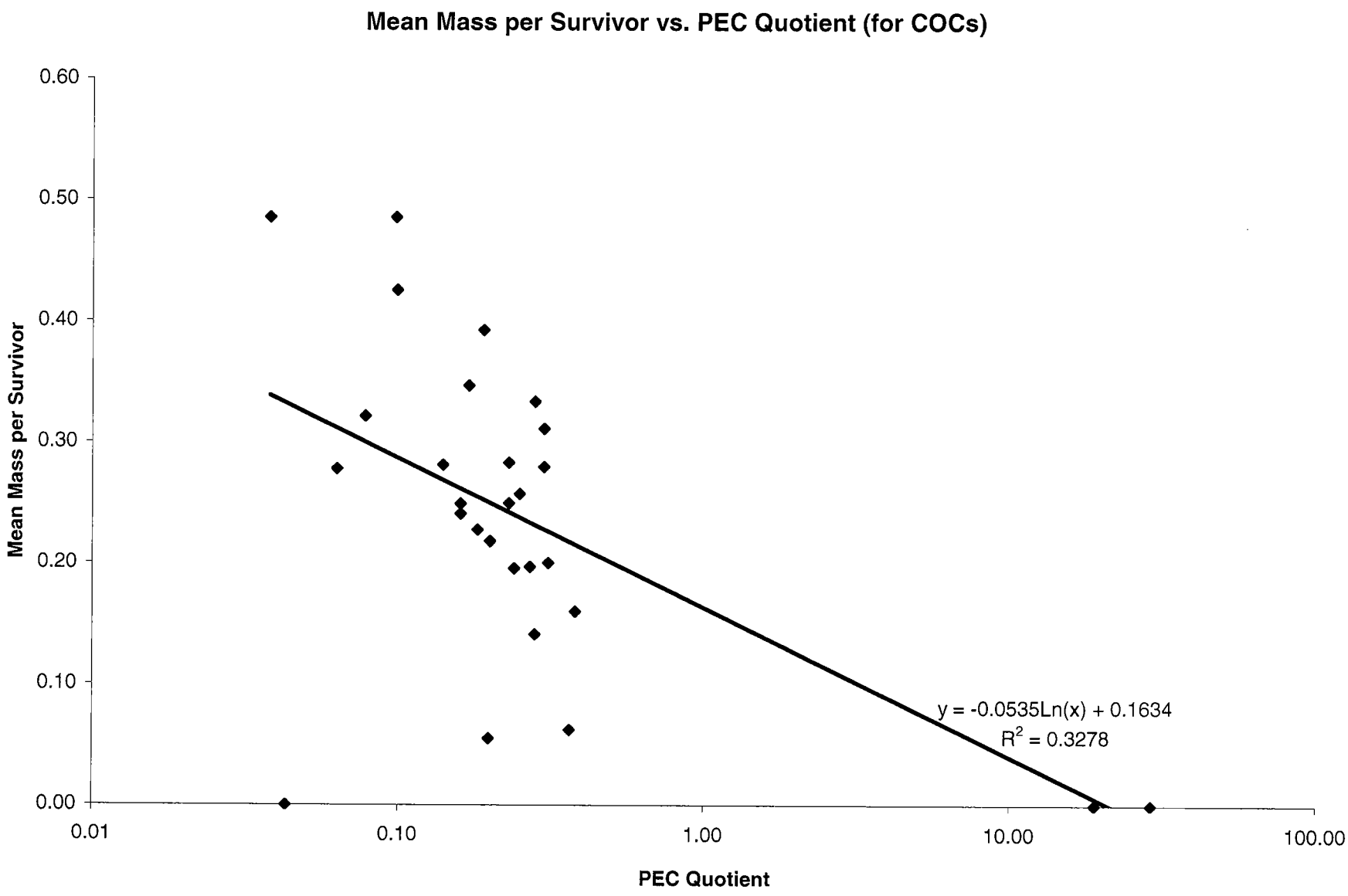

Mean Mass per Survivor vs. Low Molecular Weight PAHs Concentration
(with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
0.5
1
1.5
2
2.5
3
3.5
4
Low Molecular Weight PAHs Concentration (mg/kg)
y = 0.0338x + 0.2202
R2 = 0.7442

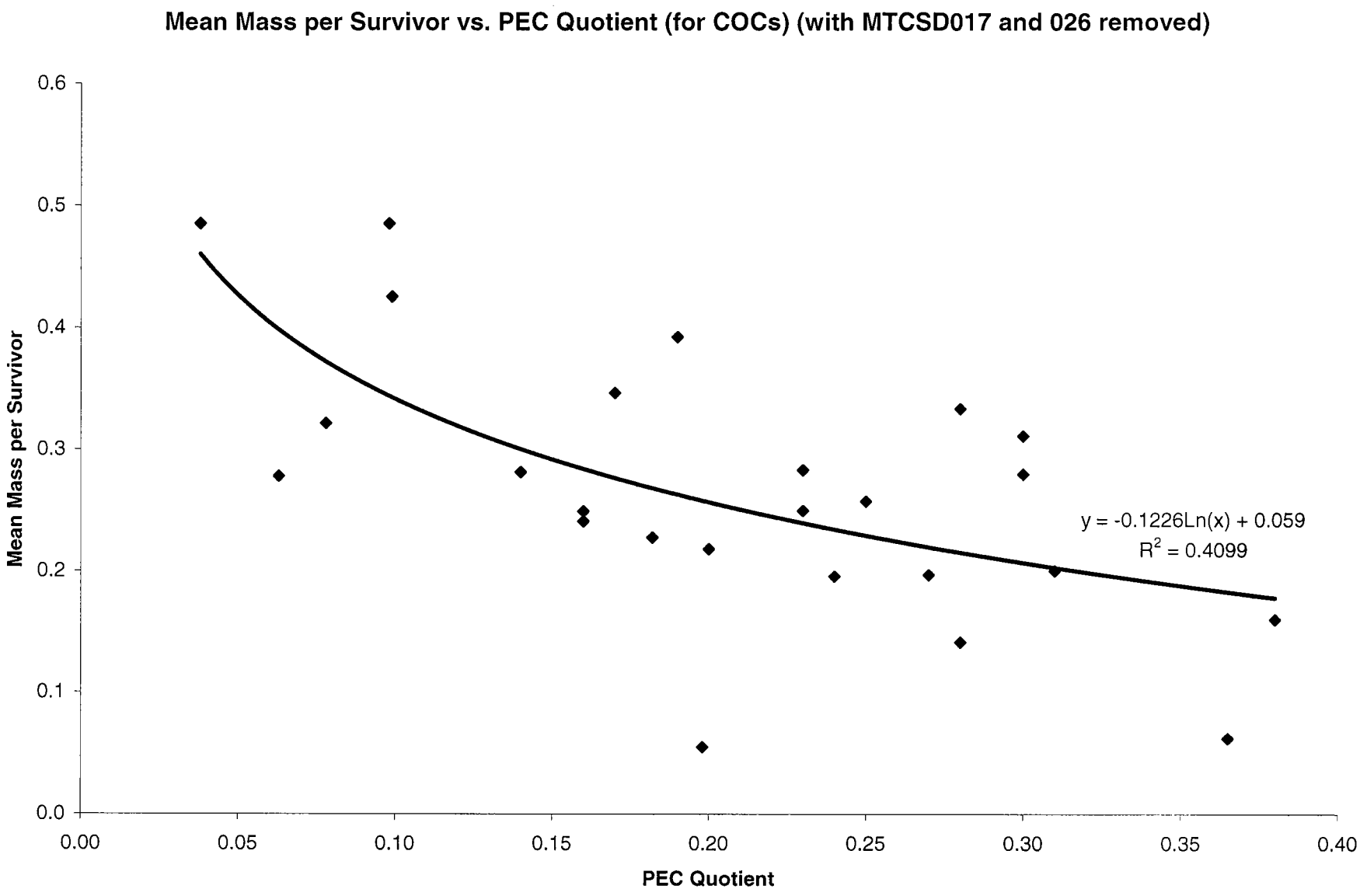

Mean Mass per Survivor vs. High Molecular Weight PAHs Concentration
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
y = 0.0047x + 0.2382
R2 = 0.0412
0
2
4
6
8
10
12
14
16
18
20
High Molecular Weight PAHs Concentration (mg/kg)


Mean Mass per Survivor vs. High Molecular Weight PAHs Concentration
(with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
2
4
6
8
10
12
14
16
18
20
High Molecular Weight PAHs Concentration (mg/kg)
y = 0.0036x + 0.26
R2 = 0.0399


Mean Mass per Survivor vs. Total PAHs Concentration
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
5
10
15
20
25
Total PAHs Concentration (mg/kg)
y = 0.004x + 0.2384
R2 = 0.0432


Mean Mass per Survivor vs. Total PAHs Concentration
(with MTCSD017 and 026 removed)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0
5
10
15
20
25
Total PAHs Concentration (mg/kg)
y = 0.003x + 0.2603
R2 = 0.0406


Mean Mass per Survivor vs. PEC Quotient (for COCs)
Mean Mass per Survivor
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.01
0.10
1.00
10.00
100.00
PEC Quotient
y = -0.0535Ln(x) + 0.1634
R2 = 0.3278


Mean Mass per Survivor vs. PEC Quotient (for COCs) (with MTCSD017 and 026 removed)
Mean Mass per Survivor
PEC Quotient
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
y = -0.1226Ln(x) + 0.059
R2 = 0.4099

APPENDIX C-8

BENTHIC MACROINVERTEBRATE RESULTS

BENTHIC MACROINVERTEBRATE RESULTS
MATTAWOMAN CREEK

SPECIES	T.V.**	F.F.G.***	MTCSD001	MTCSD002	MTCSD002D	MTCSD003	MTCSD004	MTCSD009	MTCSD010	MTCSD011	MTCSD012	MTCSD012D
PLATYHELMINTHES												
Turbellaria												
Tricladida												
Planariidae												
Cura foremanii	**4.97**					9						
MOLLUSCA												
Bivalvia												
Unionoida												
Veneroida												
Corbiculidae												
Corbicula fluminea	**6.12**	**FC**					2				2	5
Mactridae												
Rangia cuneata							1			1		
Sphaeriidae	***8**	**FC**										
Pisidium sp.	**6.48**	**FC**									1	1
Sphaerium sp.	**7.58**	**FC**							9	12		
Gastropoda												
Mesogastropoda												
Hydrobiidae	***8**	**SC**										
Amnicola sp.	**5.2**	**SC**	27	24	15	19		8	55	12	1	4
Pleuroceridae												
Elimia virginica		**SC**				4						
Valvatidae												
Valvata bicarinata	***2**	**SC**			2			1	16	1		
Basommatophora												
Physidae												
Physella sp.	**8.84**	**CG**	2	1		7		1	6	1		8
Planorbidae	***6**	**SC**										
Gyraulus parvus	**4.23**	**SC**				7		7	10	2		16
Menetus dilatatus	**8.23**	**SC**										
ANNELIDA												
Oligochaeta	***10**	**CG**										
Naididae	***8**	**CG**								1		
Dero sp.	**9**	**CG**										
Slavina appendiculata	**7.06**	**CG**										
Stylaria lacustris	**9.38**	**CG**				4						
Tubificidae	**7.11**	**CG**							1		127	
Tubificidae w.h.c.	**7.11**	**CG**			1							
Tubificidae w.o.h.c.	**7.11**	**CG**				60	8	2	9			126
Limnodrilus hoffmeisteri	**9.47**	**CG**	1			7			1		84	103
Polychaeta												
Ampharetidae												
Hobsonia florida												

BENTHIC MACROINVERTEBRATE RESULTS
MATTAWOMAN CREEK

SPECIES	T.V.**	F.F.G.***	MTCSD001	MTCSD002	MTCSD002D	MTCSD003	MTCSD004	MTCSD009	MTCSD010	MTCSD011	MTCSD012	MTCSD012D
Marenzelleria viridis												
Spionidae												
Streblospio benedicti												
Hirudinea	*8	P										
Erpobdellidae	8.33	P										
Glossiphoniidae	*8	P										
ARTHROPODA												
Arachnoidea												
Acariformes						2						
Crustacea												
Ostracoda												
Cladocera												
Sidaidae												
Sida crystillina												
Isopoda												
Anthuridae												
Cyathura polita												2
Amphipoda												
Gammaridae	*4											
Gammarus sp.	9.1	SH	4			1						13
Insecta												
Ephemeroptera												
Baetidae	*4	CG										
Baetis sp.	*4	CG							1			1
Caenidae	*7	CG										
Caenis sp.	7.41	CG				2						2
Odonata												
Coenagrionidae	*9	P										
Enallagma sp.	8.91	P			1	6			1	1		
Trichoptera												
Hydroptilidae	*4	PI										
Hydroptila sp.	*2	FC							1			
Coleoptera												
Dytiscidae	*5	P										
Hydrophilidae		P										
Berosus sp.	8.43	CG							1		1	4
Psephenidae	*4	SC										
Ectopria sp.	4.16	SC										

BENTHIC MACROINVERTEBRATE RESULTS
MATTAWOMAN CREEK

SPECIES	T.V.**	F.F.G.***	MTCSD001	MTCSD002	MTCSD002D	MTCSD003	MTCSD004	MTCSD009	MTCSD010	MTCSD011	MTCSD012	MTCSD012D
Diptera												
Ceratopogonidae	*5	P										
Bezzia/Palpomyia gp.	6.86	P							1			2
Chironomidae								1		1	1	
Ablabesmyia mallochi	7.19	P										
Ablabesmyia rhamphe gp.	7.37	P										
Chironomus sp.	9.63	CG				1	1				1	
Cladopelma sp.	3.49	CG									1	4
Cladotanytarsus sp.	4.09	FC									6	2
Clinotanypus sp.	8.74	P				1						3
Coelotanypus sp.	8	P	1					1				
Cricotopus sp.	*7	CG										
Cricotopus bicinctus	8.54	CG							1			
Cricotopus sylvestris sp. gp.	*7	SH							2			1
Cryptochironomus fulvus	6.38	P	1								3	
Dicrotendipes sp.	8.1	CG										2
Glyptotendipes sp.	9.47	FC										
Harnischia sp.	9.07	CG										
Labrundinia sp.	5.9	P						1				1
Nanocladius sp.	7.07	CG				1		2	1			
Parachironomus sp.	9.42	CG								1		
Parakiefferiella sp.	5.4	CG									1	
Paramerina sp.	4.29	P	2					1	1			
Phaenopsectra sp.	6.5	SC										
Polypedilum sp.	*6	SH										
Polypedilum halterale	7.31	SH					1				9	3
Procladius sp.	9.1	P				2			1			1
Rheotanytarsus sp.	5.89	FC										
Stictochironomus sp.	6.52											3
Tanytarsus sp.	6.76	FC									3	
Thienemannimyia gp.	8.42	P										
Tabanidae		PI										
Chrysops sp.	6.73	PI										
TOTAL NO. OF ORGANISMS			38	25	19	133	13	25	118	33	241	307
TOTAL NO. OF TAXA			7	2	4	16	5	10	18	10	14	22
BIOTIC INDEX			5.97	5.35	5.16	6.98	7.17	5.36	5.38	6.42	7.83	7.80
SHANNON DIVERSITY			1.554	0.242	1.058	2.844	1.7	2.378	2.732	2.377	1.772	2.517
PERCENT DOMINANT TAXA			71.1	96.0	78.9	45.1	61.5	32.0	46.6	36.4	52.7	41.0

BENTHIC MACROINVERTEBRATE RESULTS
MATTAWOMAN CREEK

SPECIES	T.V.**	F.F.G.***	MTCSD013	MTCSD014	MTCSD015	MTCSD016	MTCSD017	MTCSD018	MTCSD019	MTCSD020	MTCSD023	MTCSD023D
PLATYHELMINTHES												
Turbellaria												
Tricladida												
Planariidae												
Cura foremanii	**4.97**											
MOLLUSCA												
Bivalvia												
Unionoida												
Veneroida												
Corbiculidae												
Corbicula fluminea	**6.12**	**FC**					13			12	3	13
Mactridae												
Rangia cuneata												
Sphaeriidae	***8**	**FC**										
Pisidium sp.	**6.48**	**FC**					5		1			
Sphaerium sp.	**7.58**	**FC**									6	
Gastropoda												
Mesogastropoda												
Hydrobiidae	***8**	**SC**										
Amnicola sp.	**5.2**	**SC**	10	8	10	3	1	2			5	
Pleuroceridae												
Elimia virginica		**SC**	16									
Valvatidae												
Valvata bicarinata	***2**	**SC**										
Basommatophora												
Physidae												
Physella sp.	**8.84**	**CG**	3		3	4						
Planorbidae	***6**	**SC**										
Gyraulus parvus	**4.23**	**SC**	1	1	1	2	1	1		2	1	
Menetus dilatatus	**8.23**	**SC**	1			1					1	
ANNELIDA												
Oligochaeta	***10**	**CG**										
Naididae	***8**	**CG**										
Dero sp.	**9**	**CG**			1							
Slavina appendiculata	**7.06**	**CG**										
Stylaria lacustris	**9.38**	**CG**										
Tubificidae	**7.11**	**CG**										
Tubificidae w.h.c.	**7.11**	**CG**	6					1			3	
Tubificidae w.o.h.c.	**7.11**	**CG**	31		2		2	3	2	5	6	
Limnodrilus hoffmeisteri	**9.47**	**CG**			3				1	1	4	2
Polychaeta												
Ampharetidae												
Hobsonia florida												

SPECIES	T.V.**	F.F.G.***	MTCSD013	MTCSD014	MTCSD015	MTCSD016	MTCSD017	MTCSD018	MTCSD019	MTCSD020	MTCSD023	MTCSD023D
Marenzelleria viridis												
Spionidae												
Streblospio benedicti												
Hirudinea	*8	P										
Erpobdellidae	8.33	P										1
Glossiphoniidae	*8	P										
ARTHROPODA												
Arachnoidea												
Acariformes												
Crustacea												
Ostracoda												
Cladocera												
Sidaidae												
Sida crystillina						1						
Isopoda												
Anthuridae												
Cyathura polita			2				1				4	
Amphipoda												
Gammaridae	*4											
Gammarus sp.	9.1	SH	6			3					9	
Insecta												
Ephemeroptera												
Baetidae	*4	CG										
Baetis sp.	*4	CG										
Caenidae	*7	CG										
Caenis sp.	7.41	CG										
Odonata												
Coenagrionidae	*9	P										
Enallagma sp.	8.91	P	2			5					1	
Trichoptera												
Hydroptilidae	*4	PI										
Hydroptila sp.	*2	FC										
Coleoptera												
Dytiscidae	*5	P				1						
Hydrophilidae		P										
Berosus sp.	8.43	CG	1			1						
Psephenidae	*4	SC										
Ectopria sp.	4.16	SC					1					

BENTHIC MACROINVERTEBRATE RESULTS
MATTAWOMAN CREEK

SPECIES	T.V.**	F.F.G.***	MTCSD013	MTCSD014	MTCSD015	MTCSD016	MTCSD017	MTCSD018	MTCSD019	MTCSD020	MTCSD023	MTCSD023D
Diptera												
Ceratopogonidae	*5	P										
Bezzia/Palpomyia gp.	6.86	P	1				1			1		
Chironomidae			1				3					1
Ablabesmyia mallochi	7.19	P										
Ablabesmyia rhamphe gp.	7.37	P				1						
Chironomus sp.	9.63	CG								4	7	1
Cladopelma sp.	3.49	CG									3	
Cladotanytarsus sp.	4.09	FC					201			2	3	
Clinotanypus sp.	8.74	P	2									
Coelotanypus sp.	8	P	2	1		2		1	3		17	
Cricotopus sp.	*7	CG									1	
Cricotopus bicinctus	8.54	CG										
Cricotopus sylvestris sp. gp.	*7	SH									1	
Cryptochironomus fulvus	6.38	P									3	
Dicrotendipes sp.	8.1	CG										
Glyptotendipes sp.	9.47	FC					4					
Harnischia sp.	9.07	CG						1				
Labrundinia sp.	5.9	P	1									
Nanocladius sp.	7.07	CG	1			1					5	
Parachironomus sp.	9.42	CG										
Parakiefferiella sp.	5.4	CG										
Paramerina sp.	4.29	P		1								
Phaenopsectra sp.	6.5	SC										
Polypedilum sp.	*6	SH		1							1	
Polypedilum halterale	7.31	SH					4	1		4	1	
Procladius sp.	9.1	P	2	1							2	
Rheotanytarsus sp.	5.89	FC				1						
Stictochironomus sp.	6.52											
Tanytarsus sp.	6.76	FC									2	
Thienemannimyia gp.	8.42	P	1									
Tabanidae		PI										
Chrysops sp.	6.73	PI										
TOTAL NO. OF ORGANISMS			90	13	20	26	237	10	7	31	89	18
TOTAL NO. OF TAXA			19	6	6	13	12	7	4	8	23	5
BIOTIC INDEX			7.25	5.63	6.72	7.57	4.45	6.75	7.74	6.77	7.47	6.85
SHANNON DIVERSITY			3.197	1.854	2.085	3.427	1.052	2.646	1.842	2.547	4.052	1.386
PERCENT DOMINANT TAXA			34.4	61.5	50.0	19.2	84.8	30.0	42.9	38.7	19.1	72.2

BENTHIC MACROINVERTEBRATE RESULTS
MATTAWOMAN CREEK

SPECIES	T.V.**	F.F.G.***	MTCSD024	MTCSD025	MTCSD026	MTCSD026D	MTCSD027	MTCSD028	NJCSD001	NJCSD002
PLATYHELMINTHES										
Turbellaria										
Tricladida										
Planariidae										
Cura foremanii	**4.97**									
MOLLUSCA										
Bivalvia										
Unionoida										
Veneroida										
Corbiculidae										
Corbicula fluminea	**6.12**	**FC**		2			24			
Mactridae										
Rangia cuneata										12
Sphaeriidae	***8**	**FC**								
Pisidium sp.	**6.48**	**FC**								
Sphaerium sp.	**7.58**	**FC**								
Gastropoda										
Mesogastropoda										
Hydrobiidae	***8**	**SC**								
Amnicola sp.	**5.2**	**SC**								
Pleuroceridae										
Elimia virginica		**SC**								
Valvatidae										
Valvata bicarinata	***2**	**SC**								
Basommatophora										
Physidae										
Physella sp.	**8.84**	**CG**								
Planorbidae	***6**	**SC**								
Gyraulus parvus	**4.23**	**SC**								
Menetus dilatatus	**8.23**	**SC**								
ANNELIDA										
Oligochaeta	***10**	**CG**								
Naididae	***8**	**CG**								
Dero sp.	**9**	**CG**								
Slavina appendiculata	**7.06**	**CG**			1					
Stylaria lacustris	**9.38**	**CG**								
Tubificidae	**7.11**	**CG**								
Tubificidae w.h.c.	**7.11**	**CG**	1	2				4		
Tubificidae w.o.h.c.	**7.11**	**CG**	11	26			8	4	2	
Limnodrilus hoffmeisteri	**9.47**	**CG**	8	2			4		2	
Polychaeta										
Ampharetidae										
Hobsonia florida										1

SPECIES	T.V.**	F.F.G.***	MTCSD024	MTCSD025	MTCSD026	MTCSD026D	MTCSD027	MTCSD028	NJCSD001	NJCSD002
Marenzelleria viridis									1	
Spionidae										
Streblospio benedicti										1
Hirudinea	*8	P								
Erpobdellidae	8.33	P								
Glossiphoniidae	*8	P								
ARTHROPODA										
Arachnoidea										
Acariformes										
Crustacea										
Ostracoda				1						
Cladocera										
Sidaidae										
Sida crystillina				1						
Isopoda										
Anthuridae										
Cyathura polita			4	1			1	8		1
Amphipoda										
Gammaridae	*4									
Gammarus sp.	9.1	SH							1	
Insecta										
Ephemeroptera										
Baetidae	*4	CG								
Baetis sp.	*4	CG								
Caenidae	*7	CG								
Caenis sp.	7.41	CG							1	
Odonata										
Coenagrionidae	*9	P								
Enallagma sp.	8.91	P								
Trichoptera										
Hydroptilidae	*4	PI								
Hydroptila sp.	*2	FC								
Coleoptera										
Dytiscidae	*5	P								
Hydrophilidae		P								
Berosus sp.	8.43	CG								
Psephenidae	*4	SC								
Ectopria sp.	4.16	SC								

BENTHIC MACROINVERTEBRATE RESULTS
MATTAWOMAN CREEK

SPECIES	T.V.**	F.F.G.***	MTCSD024	MTCSD025	MTCSD026	MTCSD026D	MTCSD027	MTCSD028	NJCSD001	NJCSD002
Diptera										
Ceratopogonidae	*5	P								
Bezzia/Palpomyia gp.	6.86	P				1	1			
Chironomidae				1				1	3	
Ablabesmyia mallochi	7.19	P						1		
Ablabesmyia rhamphe gp.	7.37	P								
Chironomus sp.	9.63	CG	1					1		
Cladopelma sp.	3.49	CG								
Cladotanytarsus sp.	4.09	FC		24				1		
Clinotanypus sp.	8.74	P								
Coelotanypus sp.	8	P	4						1	
Cricotopus sp.	*7	CG							3	
Cricotopus bicinctus	8.54	CG							5	
Cricotopus sylvestris sp. gp.	*7	SH								
Cryptochironomus fulvus	6.38	P	4	1			1			
Dicrotendipes sp.	8.1	CG							57	
Glyptotendipes sp.	9.47	FC						2		
Harnischia sp.	9.07	CG								
Labrundinia sp.	5.9	P								
Nanocladius sp.	7.07	CG								
Parachironomus sp.	9.42	CG								
Parakiefferiella sp.	5.4	CG								
Paramerina sp.	4.29	P								
Phaenopsectra sp.	6.5	SC							1	
Polypedilum sp.	*6	SH								
Polypedilum halterale	7.31	SH		25			1			
Procladius sp.	9.1	P						2	5	
Rheotanytarsus sp.	5.89	FC							2	
Stictochironomus sp.	6.52			8						
Tanytarsus sp.	6.76	FC		1				1	2	
Thienemannimyia gp.	8.42	P								
Tabanidae		PI								
Chrysops sp.	6.73	PI								
TOTAL NO. OF ORGANISMS			33	95	1	1	40	25	86	15
TOTAL NO. OF TAXA			7	13	1	1	7	10	14	4
BIOTIC INDEX			7.87	6.33	7.06	6.86	6.72	7.61	8.05	N/A
SHANNON DIVERSITY			2.437	2.587	0	0	1.771	2.884	2.087	1.039
PERCENT DOMINANT TAXA			33.3	27.4	100.0	100.0	60.0	32.0	66.3	80.0

Cell: A121
Comment:

* North Carolina Tolerance values used when Hilsenhoff Tolerance values are not available.
**Hilsenhoff Tolerance values range form 0 for organisms very intolerant of organic wastes to 10 for organisms very tolerant of organic wastes.
***F.F.G.-Functional Feeding Groups:SH=Shredder, CG=Collector/Gatherer, FC=Filtering Collector, SC=Scraper, P=Predator and PI=Piercer

APPENDIX C-9

SCORING SYSTEM FOR BENTHIC MACROINVERTEBRATES

United States
Environmental Protection
Agency

Office of
Water
(WH-553)

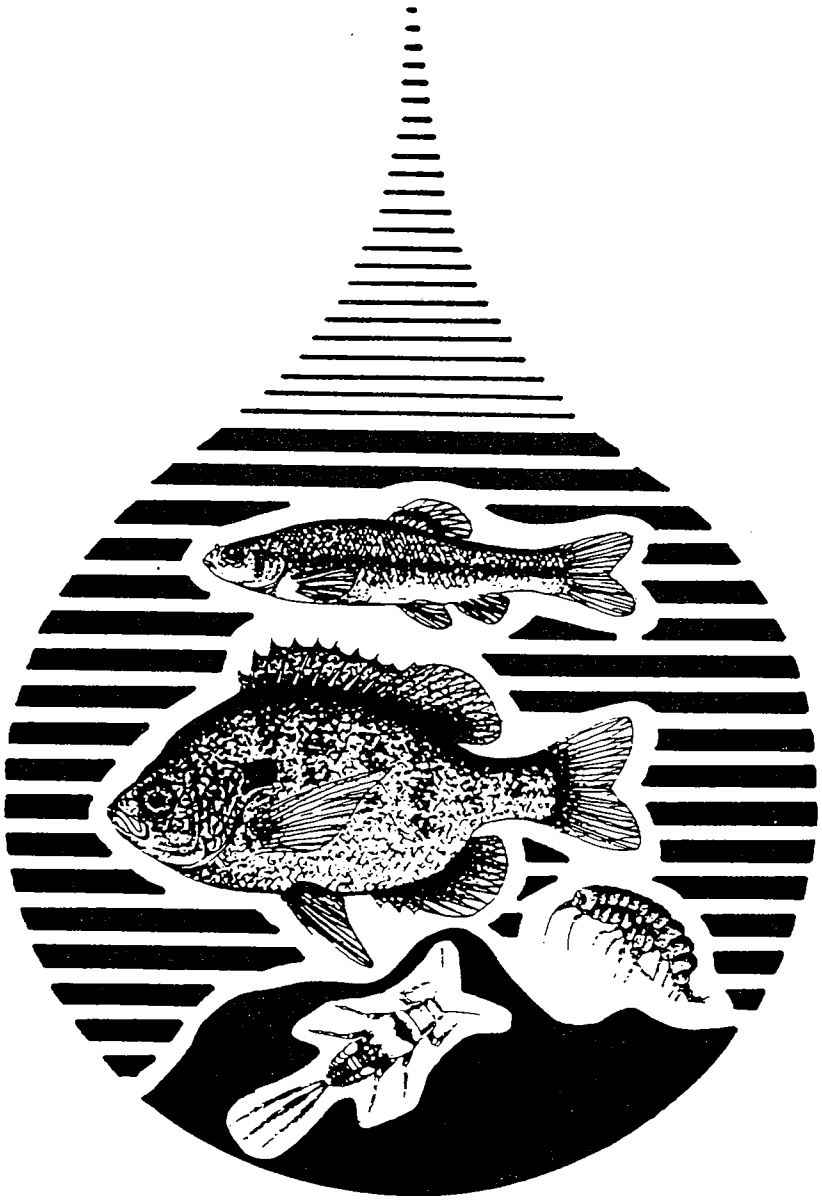
EPA/440/4-89/001
May 1989

EPA

Rapid Bioassessment Protocols for Use in Streams and Rivers

Benthic Macroinvertebrates and Fish

Previously Published as EPA/444/4-89-001



Site-Specific Study

Sampling & Analysis

Metric	Biological Condition Scoring Criteria			
	6	4	2	0
1. Taxa Richness[a]	>80%	60–80%	40–60%	<40%
2. Hilsenhoff Biotic Index (modified)[b]	>85%	70–85%	50–70%	<50%
3. Ratio of Scrapers/Filt. Collectors[a,c]	>50%	35–50%	20–35%	<20%
4. Ratio of EPT and Chironomid Abundances[a]	>75%	50–75%	25–50%	<25%
5. % Contribution of Dominant Taxon[d]	<20%	20–30%	30–40%	>40%
6. EPT Index[a]	>90%	80–90%	70–80%	<70%
7. Community Loss Index[e]	<0.5	0.5–1.5	1.5–4.0	>4.0
8. Ratio of Shredders/Total[a,c]	>50%	35–50%	20–35%	<20%

(a) Score is a ratio of study site to reference site × 100.
(b) Score is a ratio of reference site to study site × 100.
(c) Determination of Functional Feeding Group is independent of taxonomic grouping.
(d) Scoring criteria evaluate actual percent contribution, not percent comparability to the reference station.
(e) Range of values obtained. A comparison to the reference station is incorporated in these indices.

BIOASSESSMENT

% Comp. to Ref. Score[a]	Biological Condition Category	Attributes
>83%	Nonimpaired	Comparable to the best situation to be expected within an ecoregion. Balanced trophic structure. Optimum community structure (composition and dominance) for stream size and habitat quality.
54–79%	Slightly impaired	Community structure less than expected. Composition (species richness) lower than expected due to loss of some intolerant forms. Percent contribution of tolerant forms increases.
21–50%	Moderately impaired	Fewer species due to loss of most intolerant forms. Reduction in EPT index.
<17%	Severely impaired.	Few species present. If high densities of organisms, then dominated by one or two taxa.

(a) Percentage values obtained that are intermediate to the above ranges will require subjective judgement as to the correct placement. Use of the habitat assessment and physiochemical data may be necessary to aid in the decision process.

Recommendations

Figure 6.3-4. Flowchart of bioassessment approach advocated for Rapid Bioassessment Protocol III.

APPENDIX C-10

FISH TISSUE TOXICITY REFERENCE VALUES

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-1,3-DINITROBENZENE

whole-body data Species	LD50 (mg/kg)	NOED (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source	Notes
Guppy	22.9	4.6	1	14	Mortality	Absorption	Immature-Adult	Deneer, J.W., T.L. Sinnige, W. Seinen and J.L.M. Hermens, 1987	WES	Estimated 14 day LD50, No increase in mortality

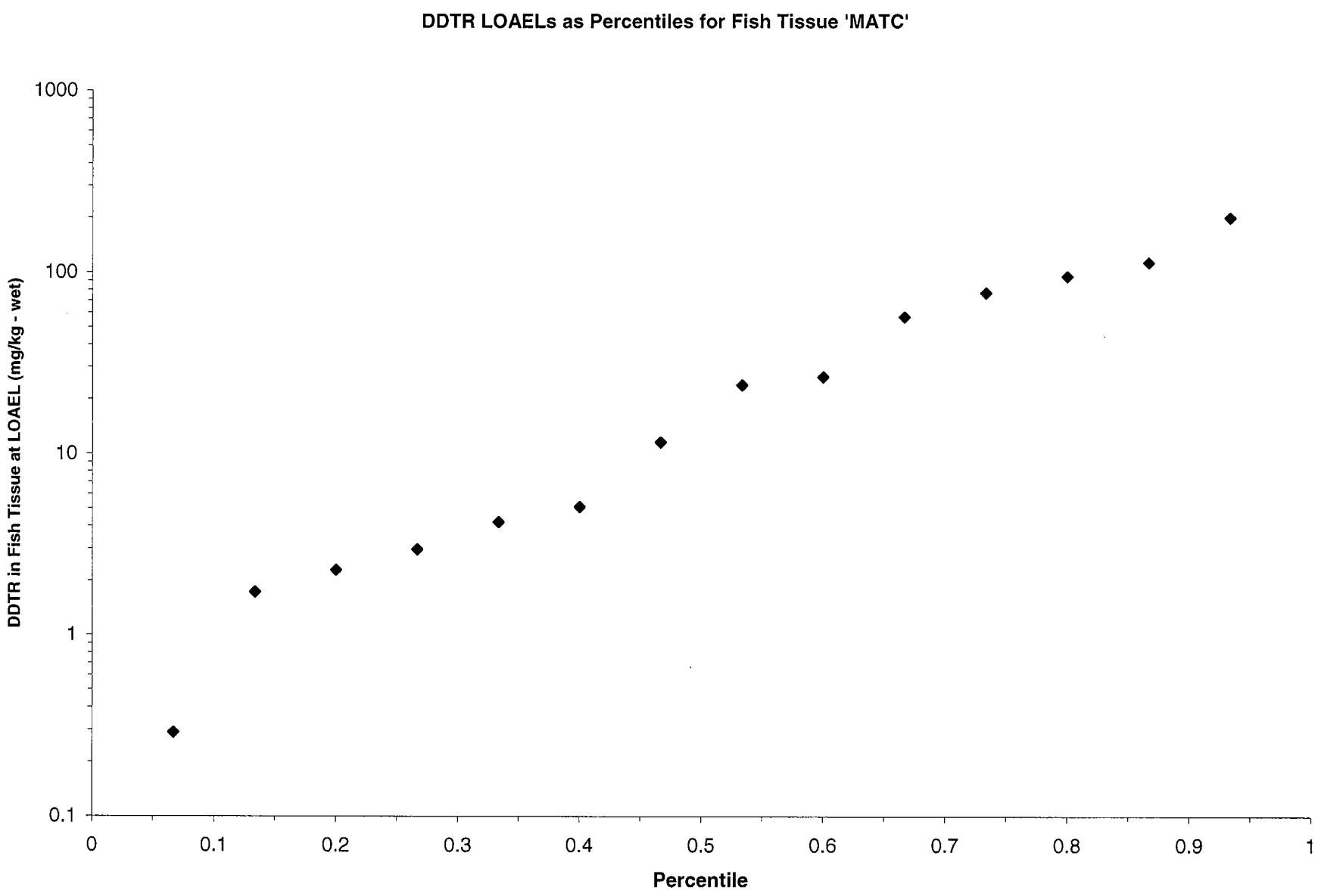
TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-CHLORDANE

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source	Notes
Pinfish	16.6		2		Mortality	Combined	Adult	Parrish et al., 1976	WES	Estimated Loed - No Statistical Summary In Text
Sheepshead minnow	3.6 - 5.6		2		Behavior	Water	Egg-embryo	Goodman, et al., 1977	WES	Exposed to 65% Heptachlor and 24% chlordane.
Sheepshead minnow	3.18	1.38	2		Reprod., Mortality	Combined	Adult	Parrish et al., 1976	WES	
Sheepshead minnow	1.2		1		Mortality	Combined	Mature	Schimmel et al., 1976	WES	ED35; Exposure Media 65% Heptachlor
Sheepshead minnow	0.01 - 0.019		1		Mortality	Combined	Mature	Schimmel et al., 1976	WES	ED5; Exposure Media 65% Heptachlor
Spot	0.16 - 0.55	0.01	1		Mortality	Combined	Mature	Schimmel et al., 1976	WES	ED25; Exposure Media 65% Heptachlor

Most of data set inadequate - estimated Loed, most exposure to heptachlor, ED5 use questionable, apparent lack of screening in WES data base

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-DDT

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Trout - lake	0.29			176	Mortality	Water, diet	Fry	28	J & A (1999)
Mummichog	1.73			2	Mortality	Water	Adult	96	J & A (1999)
Atlantic salmon	0.89-5.03			(105)	Mortality	Adults, 2.8-7.6 mg/kg	Embryo-fry	265	J & A (1999)
Trout -Lake	0.9 - 3.66		1		Mortality	Combined	Egg-embryo	Burdick, et al., 1964	WES
Bluegill	4.2		5		Behavior	Absorption	Immature	Gakstatter and Weiss, 1967	WES
Goldfish	5.1		5		Behavior	Absorption	Immature	Gakstatter and Weiss, 1967	WES
Chinook salmon	11.6	11.4		40	Mortality	Diet	Fingerling, 1.1 g	62	J & A (1999)
Sunfish-green, -p'seed	24			90	Mortality	Water	Juvenile	161	J & A (1999)
Mosquitofish	26.5			16	Mortality	Water	NA	363	J & A (1999)
Fathead minnow	57	40		266	Mortality	Water, diet	Juvenile-adult	218, 219	J & A (1999)
Sailfin molly	77.3	43		21	Growth, Mort	Water	3 d	27	J & A (1999)
Salmon-coho	95		1	31	Mortality	Ingestion	Immature	Buhler and Shanks, 1970	WES
Coho salmon	113	16.6		60	Mortality	Diet	Fingerling, 3.7 g	62	J & A (1999)
Goldfish	200	130		38-58	Mortality	Water, diet	Adult	370	J & A (1999)
Golden shiner		3.6		15	Mortality	Water	1.9 g	94	J & A (1999)
Trout - lake		2.68		176	Growth	Water, diet	Fry	28	J & A (1999)
Salmon - Atlantic		3	8		Morphology	Injection	Immature	Addison, et al., 1976	WES
Trout - Brook		25.6		120	Mortality	Diet	Juvenile	267	J & A (1999)
Trout - Rainbow		4.67		140	Growth, Mort	Diet	Juvenile, 15 g	269	J & A (1999)
Atlantic menhaden		24		48	Growth	Diet	Larvae-juvenile	480	J & A (1999)
Golden Ide		95	1	3	Mortality	Absorption	NA	Freitag, et al., 1985	WES
Mosquito fish		5.3	1	3	Mortality	Combined	NA	Metcalf, 1974	WES
Spiny Dogfish		0.1	4	1	Mortality	Injection	NA	Guarino and Arnold, 1979	WES
Trout - Brook		2.8-7.6		156	Growth, Mort	Diet	Yearling-adult	265	J & A (1999)


DDTR LOAELs as Percentiles for Fish Tissue 'MATC'
DDTR in Fish Tissue at LOAEL (mg/kg - wet)
1000
100
10
1
0.1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Percentile

DERIVATION OF DDT FISH TOXICITY REFERENCE VALUES (FTRVS)

%ile	LOAEL (mg/kg) input	LOAEL (mg/kg) avg. range	LOAEL log10
0.067	0.29	0.29	-0.537602
0.133	1.73	1.73	0.238046
0.200	0.9 - 3.66	2.28	0.357935
0.267	0.89-5.03	2.96	0.471292
0.333	4.2	4.2	0.623249
0.400	5.1	5.1	0.70757
0.467	11.6	11.6	1.064458
0.533	24	24	1.380211
0.600	26.5	26.5	1.423246
0.667	57	57	1.755875
0.733	77.3	77.3	1.888179
0.800	95	95	1.977724
0.867	113	113	2.053078
0.933	200	200	2.30103

TRV calculation	
	TRVs
All data	
n	14
mean	1.1217
sd	0.8368
mean-sd*1.771	-0.3602
0.05 probability untrns	**0.436**
mean untransformed	**13.235**

5 percent TRV =	**0.436**
50 percent TRV =	**13.235**

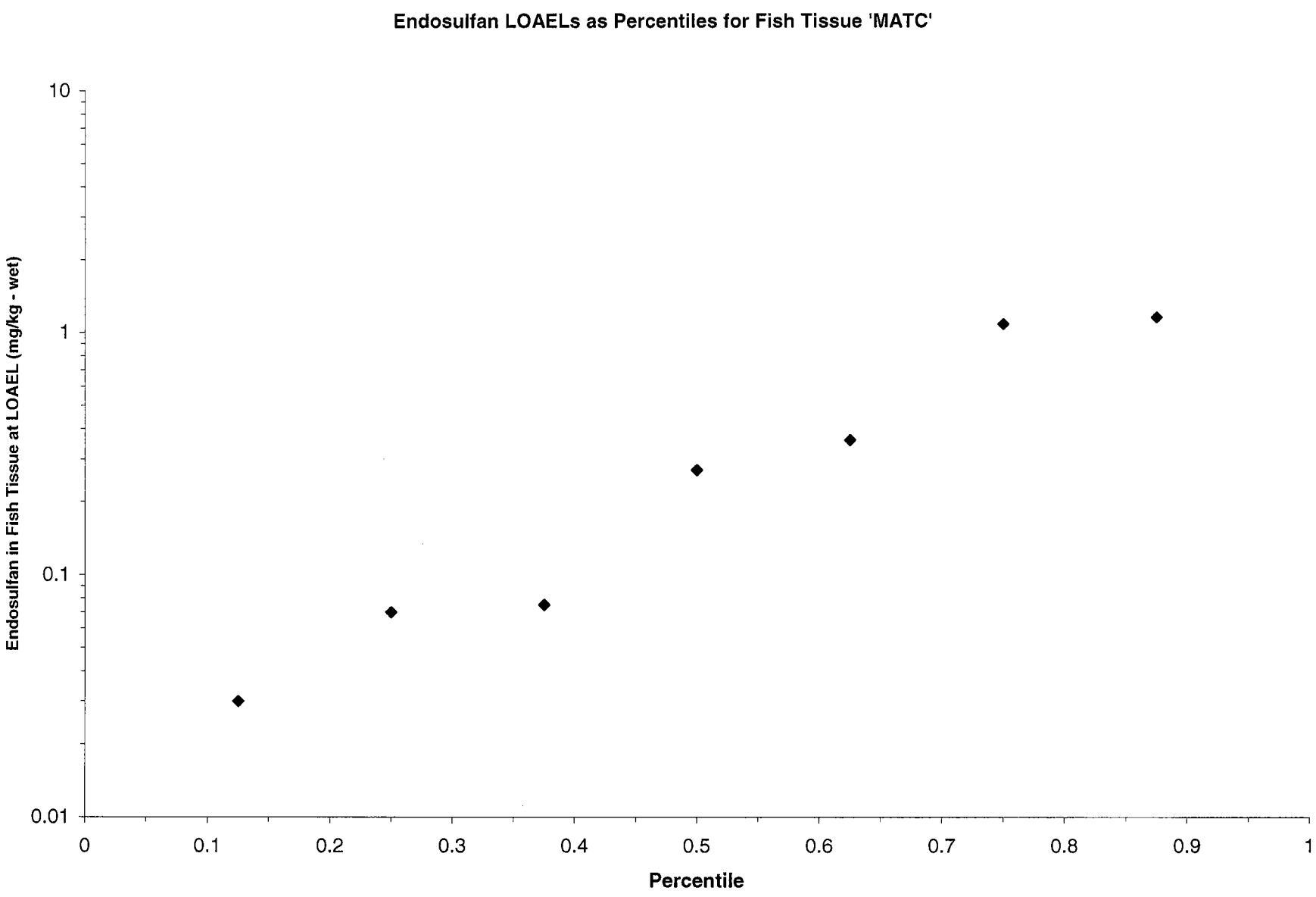
TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-DIELDRIN

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Bluegill	3.7		5		Behavior	Absorption	Immature	Gakstatter and Weiss, 1967	WES, 2000
Goldfish	3.8		5		Behavior	Absorption	Immature	Gakstatter and Weiss, 1967	WES, 2000
Trout, rainbow	5.65	0.548		4	Mortality	Water	Juvenile	406	J & A (1999)
Sheepshead minnow	34	12.8	2		Mortality	Combined	Immature	Parrish, et al.	WES, 2000
Trout, rainbow		0.36		112	Growth	Water	Juvenile	406	J & A (1999)
Spiny Dogfish		1	4		Mortality	Injection	NA	Guarino and Arnold, 1979	WES, 2000
Trout, rainbow		2.13		140	Mort., Growth	Diet	Juvenile, 15g	269	J & A (1999)
Mosquito fish		28	1		Mortality	Combined	NA	Metcalf, 1974	WES, 2000
Golden Ide		151	1		Mortality	Absorption	NA	Freitag, et al., 1985	WES, 2000

Lowest value (of pairs, for NOAELs)	3.7	0.548

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-ENDOSULFAN

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Spot	0.03			4	Mortality	Water	Juvenile	396	J & A (1999)
Clarias	0.07			3	Mortality	Water	Juvenile	276	J & A (1999)
Trout - Rainbow	0.075		16		Physiological	Injection	Immature	Jensen, et al., 1991	WES
Pinfish	0.27	0.2		4	Mortality	Water	Juvenile	396	J & A (1999)
Striped mullet	0.36			4	Mortality	Water	Juvenile	396	J & A (1999)
Haplochromis	1.08			3	Mortality	Water	Juvenile	276	J & A (1999)
Serranochromis	1.15			3	Mortality	Water	Juvenile	276	J & A (1999)


Endosulfan LOAELs as Percentiles for Fish Tissue 'MATC'
Endosulfan in Fish Tissue at LOAEL (mg/kg - wet)
10
1
0.1
0.01
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Percentile

DERIVATION OF ENDOSULFAN FISH TOXICITY REFERENCE VALUES (FTRVS)

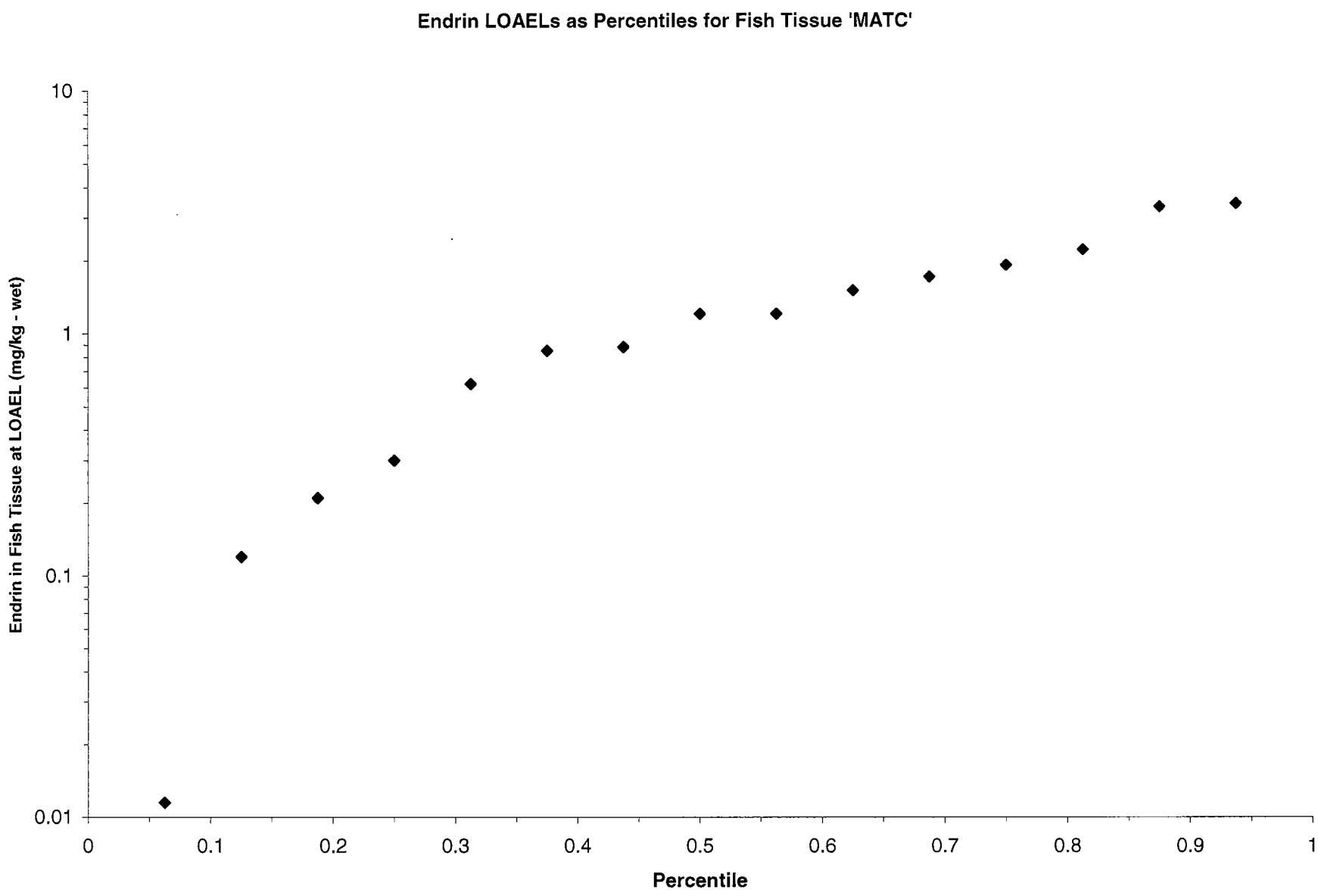
%ile	LOAEL (mg/kg) input	LOAEL (mg/kg) avg. range	LOAEL log10
0.125	0.03	0.03	-1.522879
0.250	0.07	0.07	-1.154902
0.375	0.075	0.075	-1.124939
0.500	0.27	0.27	-0.568636
0.625	0.36	0.36	-0.443697
0.750	1.08	1.08	0.033424
0.875	1.15	1.15	0.060698

TRV calculation	
	TRVs
All data	
n	7
mean	-0.6744
sd	0.6137
mean-sd*1.943	-1.8668
0.05 probability untrns	**0.014**
mean untransformed	**0.212**

5 percent TRV =	**0.014**
50 percent TRV =	**0.212**

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-ENDRIN

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Largemouth bass	0.0115			20	Mortality	Water	Fingerling	132	J & A (1999)
Trout - Rainbow	0.12	0.019	5		Behavior	Ingestion	Adult	Grant and Mehrle, 1973	WES
Trout - Rainbow	0.21	0.12	5		Growth	Ingestion	Adult	Grant and Mehrle, 1973	WES
Bluegill	0.3	0.08		1	Mortality	Water	NA	23	J & A (1999)
Sheepshead minnow	0.62	0.77	1		Growth	Absorption	Egg-embryo	Hansen and Parrish, 1977	WES
Channel catfish	0.7-1	0.41		54	Mortality	Water	Fingerling	15	J & A (1999)
Sheepshead minnow	0.88	0.29		140	Mortality	Water	Embryo-adult	176	J & A (1999)
Fathead minnow	1.2	1		300	Mortality	Water, diet	Juvenile-adult	221	J & A (1999)
Golden shiner	1.2	0.4		0.25	Mortality	Water	Adult	262	J & A (1999)
Sheepshead minnow	1.5	0.3	1		Mortality	Combined	Mature	Schimmel, et al., 1975	WES
Sailfin molly	1.7	0.26	1		Mortality	Combined	Mature	Schimmel, et al., 1975	WES
Black bullhead	1.6-2.2			5	Mortality	Water	Juvenile	12	J & A (1999)
Flagfish	2.2	1.7		140	Reproduction	Water	Larvae-juvenile	193	J & A (1999)
Flagfish	2.1-4.5	1.6-3.3		110	Growth, repro.	Water	Larvae-adult	190	J & A (1999)
Mosquito fish	3.4		1		Behavior, mort.	Combined	NA	Metcalf, et al., 1973	WES


Endrin LOAELs as Percentiles for Fish Tissue 'MATC'
Endrin in Fish Tissue at LOAEL (mg/kg - wet)
10
1
0.1
0.01
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Percentile

DERIVATION OF ENDRIN FISH TOXICITY REFERENCE VALUES (FTRVS)

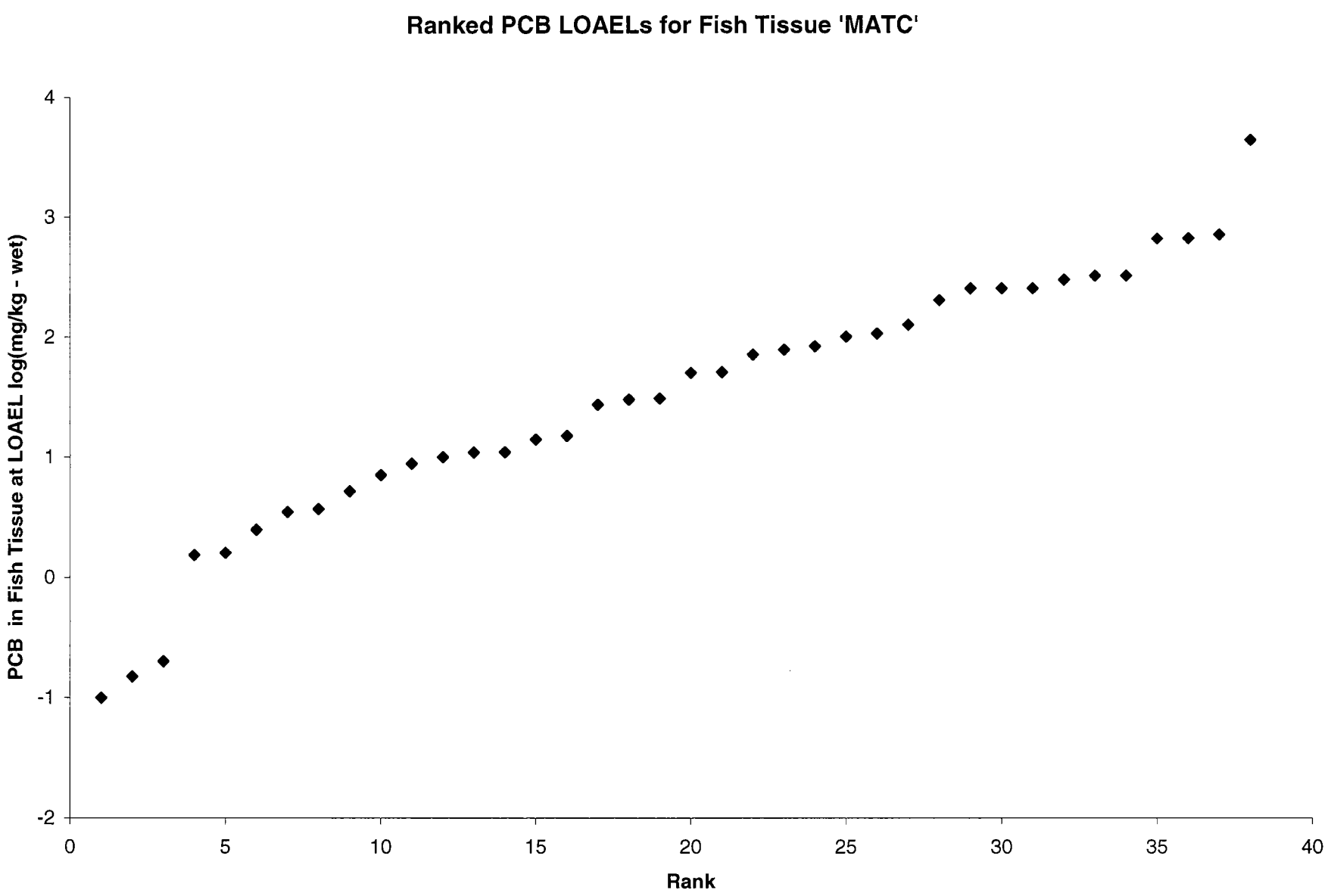
%ile	LOAEL (mg/kg) input	LOAEL (mg/kg) avg. range	LOAEL log10
0.063	0.0115	0.0115	-1.939302
0.125	0.12	0.12	-0.920819
0.188	0.21	0.21	-0.677781
0.250	0.3	0.3	-0.522879
0.313	0.62	0.62	-0.207608
0.375	0.7-1	0.85	-0.070581
0.438	0.88	0.88	-0.055517
0.500	1.2	1.2	0.079181
0.563	1.2	1.2	0.079181
0.625	1.5	1.5	0.176091
0.688	1.7	1.7	0.230449
0.750	1.6-2.2	1.9	0.278754
0.813	2.2	2.2	0.342423
0.875	2.1-4.5	3.3	0.518514
0.938	3.4	3.4	0.531479

TRV calculation	TRVs
All data	
n	15
mean	-0.1439
sd	0.6506
mean-sd*1.761	-1.2895
0.05 probability untrns	**0.051**
mean untransformed	**0.718**

5 percent TRV =	**0.051**
50 percent TRV =	**0.718**

PCB TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH
DATA SET, STATISTICAL TEST, AND FISH TOXICITY REFERENCE VALUE (FTRV) CALCULATION

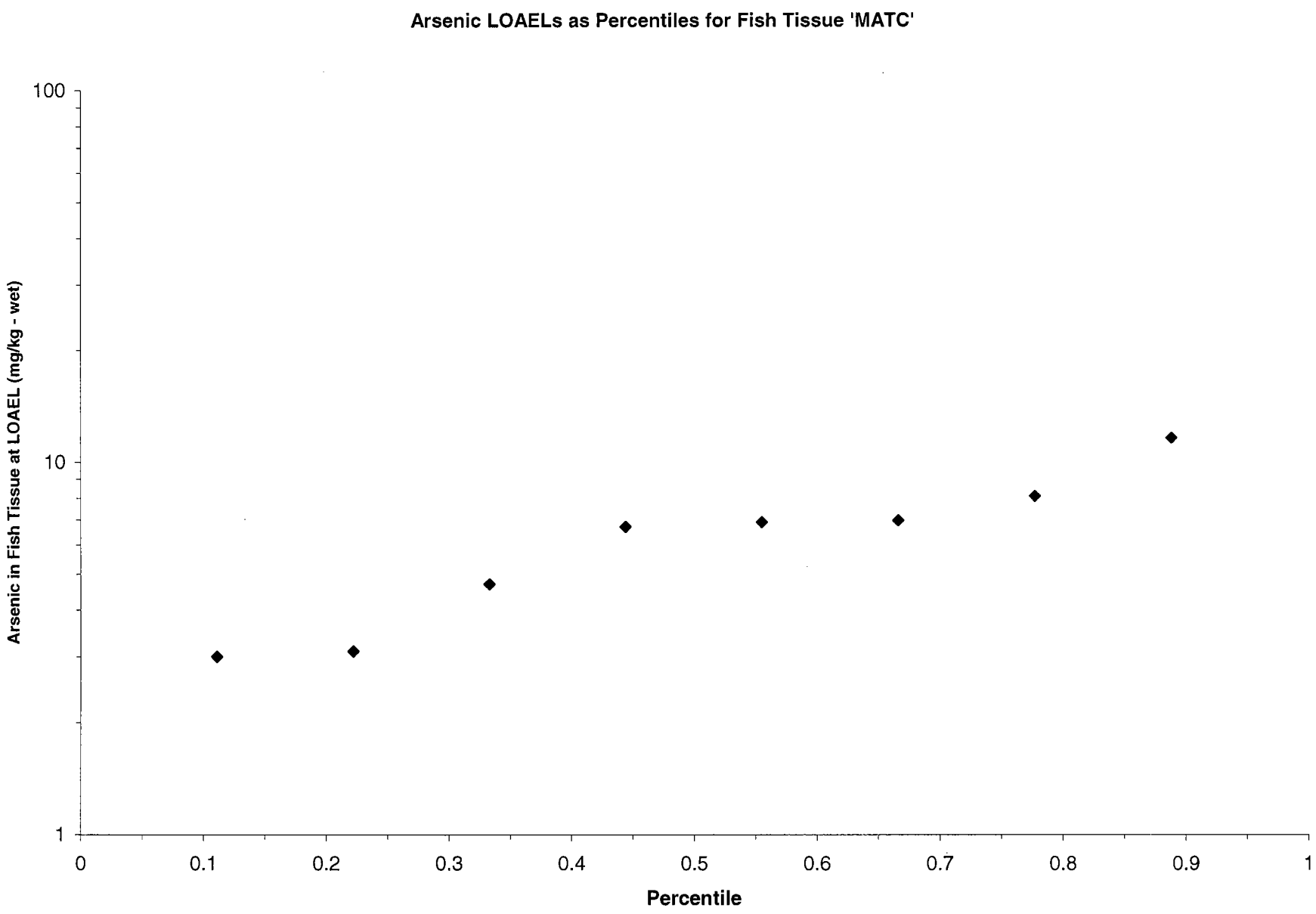
whole-body data Species	Salmonid	LOAEL (mg/kg)	LOAEL log(mg/kg)	Embryo/ larvae	Effect	Exposure route	Chemical	Median test Injection	Median test Balance	TRV calculation	TRV calculation TRVs
Carp	N	0.1	-1	N	Physiological	Injection	PCBs	0.008			
Salmon-coho	Y	0.15	-0.8239	N	Development	Injection	PCBs	0.063			
Trout-Rainbow	Y	0.2	-0.6990	N	Physiological	Injection	PCBs			**All data**	
Trout-Lake	Y	1.53	0.1847	N	Mortality	Combined	A-1254			mean	1.4721
Minnow	N	1.6	0.2041	N	Behavior	Diet	PCBs			sd	1.0698
Fatheadminnow	N	2.49	0.3962	N	Mortality	Water	A-1268			mean-sd*1.684	-0.3295
Salmon-Chinook	Y	3.5	0.5441	N	Cellular	Diet	PCBs			0.05 prob. untrns.	0.468
Salmon-Chinook	Y	3.7	0.5682	N	Mortality	Water	HexCB			mean untransfrmd	29.7
Fatheadminnow	N	5.18	0.7143	N	Mortality	Water	A-1260				
WinterFlounder	N	7.1	0.8513	Y	Growth	Combined	PCBs				
Trout-Lake	Y	8.8	0.9445	N	Mortality	Water	HexCB			**Data w/o Injection**	
Mummichog	N	10	1.0000	N	Physiological	Injection	PCBs	median		mean	1.6865
Fatheadminnow	N	10.9	1.0374	N	Mortality	Water	A-1242		0.005	sd	0.8995
Sheepsheadminnow	N	11	1.0414	Y	Mortality	Adultfish	A-1254			mean-sd*1.697	0.1601
Pinfish	N	14	1.1461	N	Mortality	Water	A-1254		0.035	0.05 prob. untrns.	1.446
Minnow	N	15	1.1761	N	Reproduction	Diet	PCBs			mean untransfrmd	48.6
Trout-Lake	Y	27.2	1.4346	Y	Mortality	Water	PentaCB				
Trout-Rainbow	Y	30	1.4771	N	Physiological	Injection	PCBs				
Fatheadminnow	N	30.5	1.4843	N	Growth	Water	A-1248				
Trout-Rainbow	Y	50	1.6990	N	Physiological	NA	PCBs				
Salmon-coho	Y	50.8	1.7059	N	Physiological	Injection	PCBs	0.063			
Trout-Brook	Y	71	1.8513	N	Growth	Water	A-1254		median		
Trout-Brook	Y	77.9	1.8915	Y	Mortality	Adultfish	A-1254				
Spot	N	83	1.9191	N	Mortality	Water	A-1254				
SandFlathead	N	100	2.0000	N	Physiological	Injection	PCBs	0.008			
Pinfish	N	106	2.0253	N	Mortality	Water	PCBs				
Trout-Brook	Y	125	2.0969	N	Mortality	Water	A-1254				
Sheepsheadminnow	N	200	2.3010	Y	Mortality	Water	A-1016		0.035		
Goldfish	N	250	2.3979	N	Mortality	Water	PCBs				
Goldfish	N	250	2.3979	N	Behavior	Water	PCBs		0.005		
Goldfish	N	250	2.3979	N	Morphology	Water	PCBs				
Guppy	N	295	2.4698	N	Mortality	Diet	OCB				
Guppy	N	318	2.5024	N	Mortality	Diet	HexCB				
Fatheadminnow	N	318	2.5024	N	Reproduction	Water	A-1254				
Salmon-coho	Y	645	2.8096	N	Mortality	Diet	PCBs				
Salmon-coho	Y	652	2.8142	N	Growth	Diet	A-1254				
Fatheadminnow	N	697	2.8432	N	Mortality	Water	A-1254				
Zebrafish	N	4300	3.6335	N	Mortality	Water	PCBs				


Ranked PCB LOAELs for Fish Tissue 'MATC'
PCB in Fish Tissue at LOAEL log(mg/kg - wet)
4
3
2
1
0
-1
-2
0
5
10
15
20
25
30
35
40
Rank

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-ARSENIC

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Trout - Rainbow	3	1		77	Growth	Water	Fingerling, 5.7 g	286	J & A (1999)
Trout - Rainbow	3.1	0.9		56	Growth	Diet	Juvenile	87	J & A (1999)
Trout - Rainbow	4.7	3	15		Mortality	Absorption	Immature	Dixon and Sprague, 1981	USACEWES
Sunfish - Green	6.7			5	Mortality	Water	NA	416	J & A (1999)
Trout - Rainbow	6.9	0.9		56	Growth	Diet	Juvenile	87	J & A (1999)
Trout - Rainbow	8.1			7	Mortality	Water	Fingerling, 1.5 g	287	J & A (1999)
Bluegill	11.6	5.5		112	Growth, Mort	Water	Adult	149	J & A (1999)
Bluegill	2.24-11.7	1.8		112	Growth, Mort	Water	Juvenile	149	J & A (1999)
Trout - Rainbow		2.6-4.7		21	Growth, Mort	Water	Juvenile	116	J & A (1999)

NA = not available


Arsenic LOAELs as Percentiles for Fish Tissue 'MATC'
Arsenic in Fish Tissue at LOAEL (mg/kg - wet)
100
10
1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Percentile

DERIVATION OF ARSENIC FISH TOXICITY REFERENCE VALUES (FTRVS)

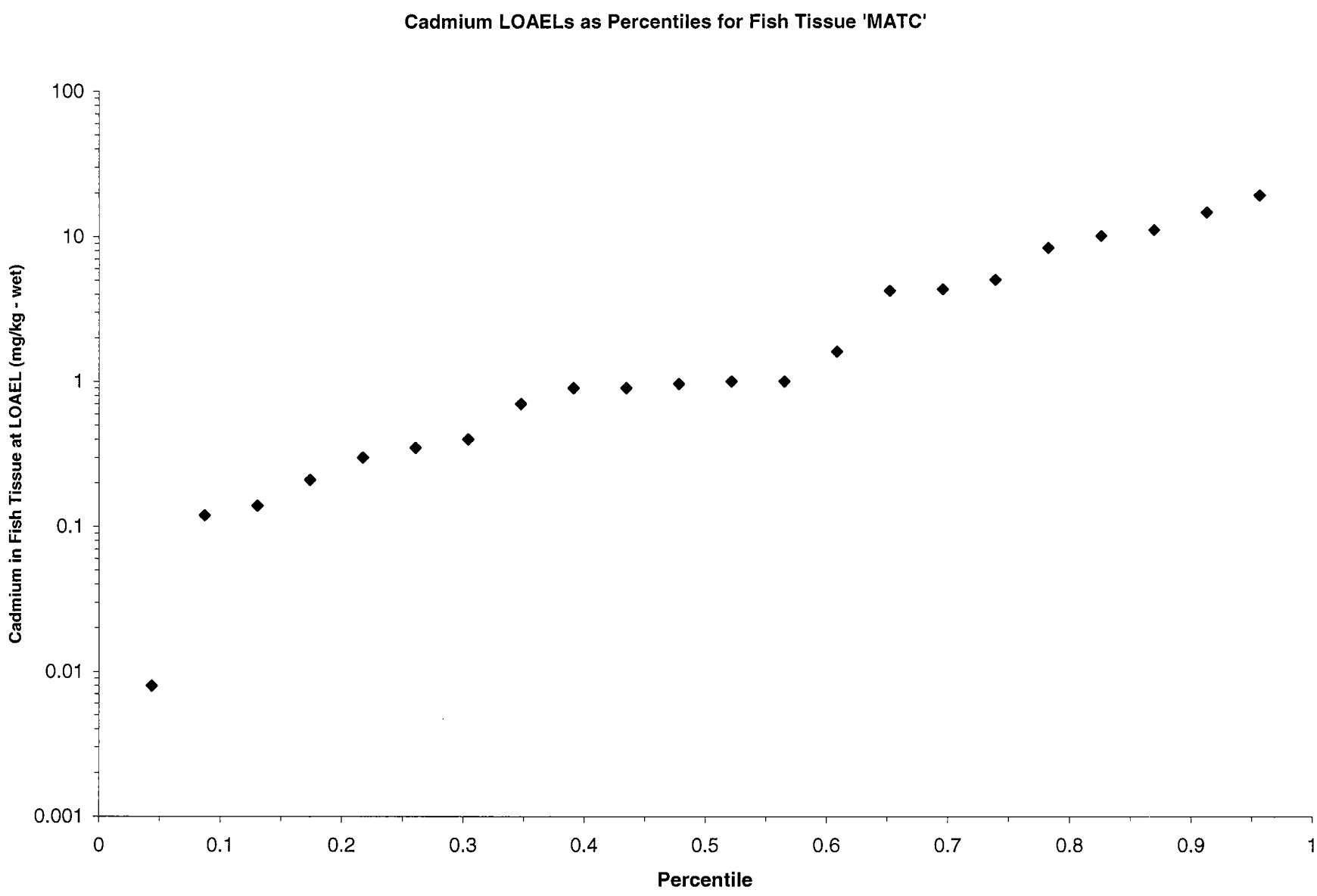
%ile	LOAEL (mg/kg) input	LOAEL (mg/kg) avg. range	LOAEL log10
0.111	3	3	0.477121
0.222	3.1	3.1	0.491362
0.333	4.7	4.7	0.672098
0.444	6.7	6.7	0.826075
0.555	6.9	6.9	0.838849
0.666	2.24-11.7	6.97	0.843233
0.777	8.1	8.1	0.908485
0.888	11.6	11.6	1.064458

TRV calculation	
	TRVs
All data	
n	8
mean	0.7652
sd	0.2042
mean-sd*1.895	0.3782
0.05 probability untrns	**2.389**
mean untransformed	**5.824**

5 percent TRV =	**2.389**
50 percent TRV =	**5.824**

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-CADMIUM

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Largemouth bass	0.008	0.004		120	Mortality	Water	Juvenile	81	J & A (1999)
Atlantic salmon	0.12	0.06		92	Growth	Water	Embryo-alevin	379	J & A (1999)
Trout - Brook	0.14			30	Mortality	Water	2-3 mo, 5 g	163, 164	J & A (1999)
Trout - Rainbow	0.21		3		Mort., Morphol.	Absorption	Egg-embryo	Beattie and Pascoe, 1978	WES
Stickleback	0.3			7	Mortality	Water	1.2 g	491	J & A (1999)
Bluegill	0.35	0.036		180	Mortality	Water	Juvenile	81	J & A (1999)
American flagfish	0.4	0.09 - 0.4	2		Mortality	Combined	Immature	Spehar, et al.,1978	WES
Trout - Rainbow	0.7			29	Mortality	Water	5-15 g	350	J & A (1999)
Sheepshead minnow	0.9		3		Development	Absorption	Egg-embryo	Meteyer, et al., 1988	WES
Stickleback	0.9			79	Mortality	Water	0.97 g	351	J & A (1999)
Trout - Rainbow	0.96	0.54		210	Growth	Water	3.1 g	248	J & A (1999)
Winter Flounder	1		4		Physiological	Injection	NA	Chan, et al., 1989	WES
Trout - Rainbow	1.6	0.47		84	Growth	Diet	3.1 g	248	J & A (1999)
Seabass	4.2	2.5		16	Mortality	Water	Larvae-juvenile	405	J & A (1999)
Spot	8.3	5.6		8	Mortality	Water	Larvae	300	J & A (1999)
Trout - Rainbow	10		1		Physiological	Injection	Adult	Bonham, et al., 1987	WES
Baltic Herring	19	11		15	Mortality	Water	Embryo	485	J & A (1999)
Guppy	0.8-1.2	0.8		30	Mortality	Diet	19 d	181	J & A (1999)
Garpike	10-19	7-11		25	Mortality	Water	Embryo	483	J & A (1999)
Trout - Rainbow	2.2 - 6.4		4		Mortality	Combined	Adult	Pascoe, et al., 1986	WES
Flagfish	2-8	1.2-5		100	Reproduction	Water	Embryo-adult	418	J & A (1999)
Flounder	4-18	2-6		17	Mortality	Water	Embryo-larvae	482	J & A (1999)
Largemouth bass		0.008		120	Growth	Water	Juvenile	81	J & A (1999)
Trout - Rainbow		0.0599	7		Mortality	Absorption	Adult	Handy, 1992	WES
Perch		0.075		40	Mortality	Water	Fingerling	126	J & A (1999)
Bluegill		0.35		180	Growth	Water	Juvenile	81	J & A (1999)
Eel		0.56		60	Mortality	Water	100 g	331	J & A (1999)
Dace		0.69		112	Growth, Mort	Water	1.1 g	248	J & A (1999)
Bluegill		1.33		28	Growth	Water	Juvenile	92	J & A (1999)
Stone loach		2.3		4	Mortality	Water	2.7 g	120	J & A (1999)
American flagfish		6	2		Repro., Growth	Combined	Immature	Spehar, et al.,1978	WES
Flounder		8-18		17	Growth	Water	Embryo-larvae	482	J & A (1999)


Cadmium LOAELs as Percentiles for Fish Tissue 'MATC'
Cadmium in Fish Tissue at LOAEL (mg/kg - wet)
100
10
1
0.1
0.01
0.001
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Percentile

DERIVATION OF CADMIUM FISH TOXICITY REFERENCE VALUES (FTRVS)

%ile	LOAEL (mg/kg) input	LOAEL (mg/kg) avg. range	LOAEL log10
0.043	0.008	0.008	-2.09691
0.087	0.12	0.12	-0.920819
0.130	0.14	0.14	-0.853872
0.174	0.21	0.21	-0.677781
0.217	0.3	0.3	-0.522879
0.261	0.35	0.35	-0.455932
0.304	0.4	0.4	-0.39794
0.348	0.7	0.7	-0.154902
0.391	0.9	0.9	-0.045757
0.435	0.9	0.9	-0.045757
0.478	0.96	0.96	-0.017729
0.522	0.8-1.2	1	0
0.565	1	1	0
0.609	1.6	1.6	0.20412
0.652	4.2	4.2	0.623249
0.696	2.2 - 6.4	4.3	0.633468
0.739	2-8	5	0.69897
0.783	8.3	8.3	0.919078
0.826	10	10	1
0.870	4-18	11	1.041393
0.913	10-19	14.5	1.161368
0.957	19	19	1.278754

TRV calculation	
	TRVs
All data	
n	22
mean	0.0623
sd	0.8237
mean-sd*1.721	-1.3554
0.05 probability untrns	**0.044**
mean untransformed	**1.154**

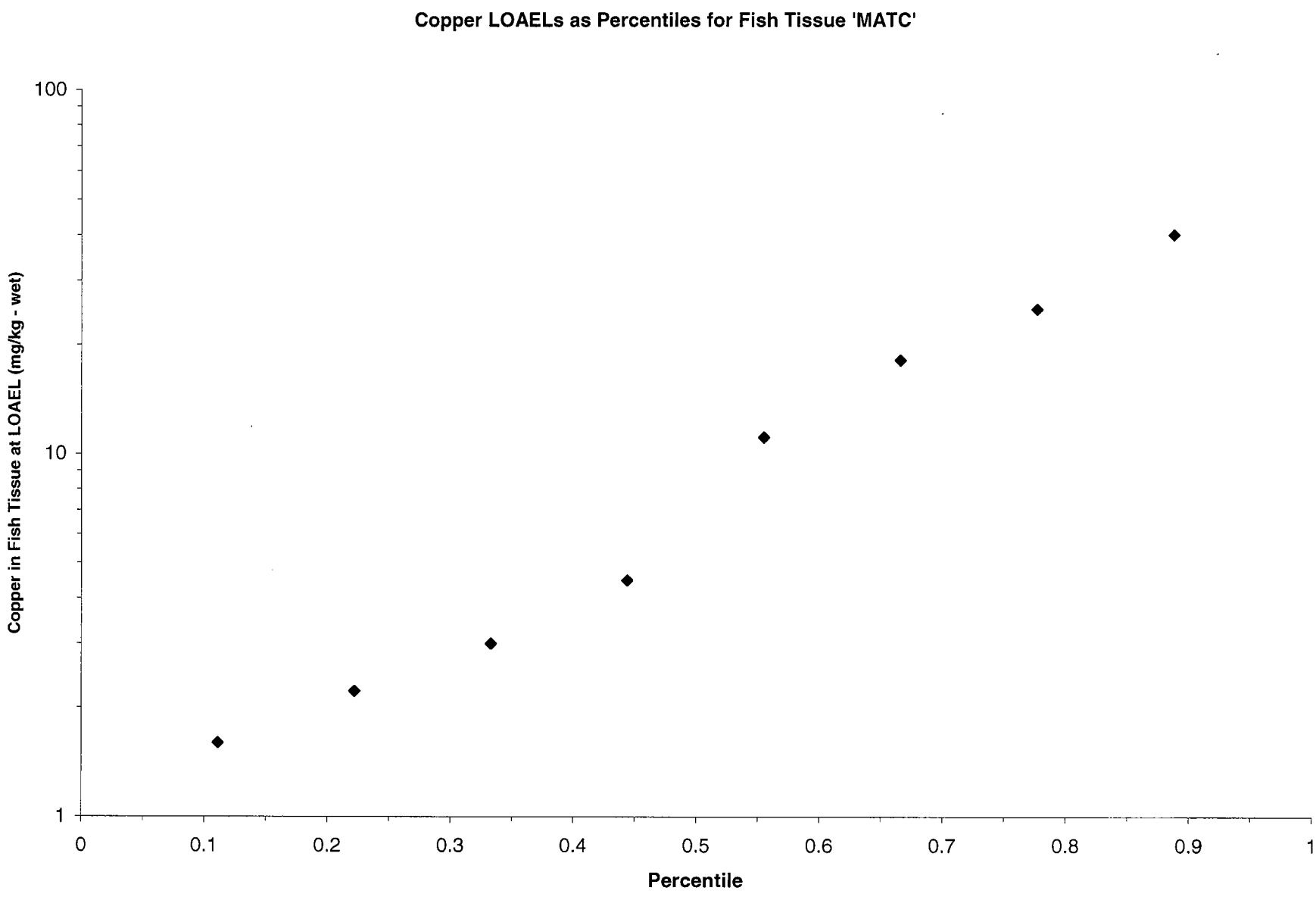
5 percent TRV =	**0.044**
50 percent TRV =	**1.154**

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-CHROMIUM

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Mudskipper	1		6		Cellular	Injection	NA	Krishnaja and Rege, 1982	WES
Trout - Rainbow	8.7	5.5	4		Mortality	Absorption	Immature	Van De Putte, et al., 1981	WES
Lowest value (of pairs, for NOAELs)	1	5.5							

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-COPPER

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Trout - Rainbow	1.6		10		Mortality	Absorption	Immature	Dixon and Sprague, 1981	WES
Trout - Rainbow	2.22		7		Mortality	Absorption	Adult	Handy, 1992	WES
Spot	3		4		Reproduction	Absorption	Egg-embryo	Engel and Sunda, 1979	WES
Trout - Rainbow	4.48	3.92	3		Survival	Combined	Immature	Mount, et al., 1994	WES
Carp	11.1	7.4		4	Mortality	Water	Larvae	432	J & A (1999)
Trout - Rainbow	18.1		12		Growth	Water	Fry	Marr, et al., 1996	WES
Silverside - Atlantic	25		5		Reproduction	Absorption	Egg-embryo	Engel and Sunda, 1979	WES
Trout - Rainbow	40		1		Physiological	Injection	Adult	Bonham, et al., 1987	WES


Copper LOAELs as Percentiles for Fish Tissue 'MATC'
Copper in Fish Tissue at LOAEL (mg/kg - wet)
100
10
1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Percentile

DERIVATION OF COPPER FISH TOXICITY REFERENCE VALUES (FTRVS)

%ile	LOAEL (mg/kg) input	LOAEL (mg/kg) avg. range	LOAEL log10
0.111	1.6	1.6	0.20412
0.222	2.22	2.22	0.346353
0.333	3	3	0.477121
0.444	4.48	4.48	0.651278
0.555	11.1	11.1	1.045323
0.666	18.1	18.1	1.257679
0.777	25	25	1.39794
0.888	40	40	1.60206

TRV calculation	
	TRVs
All data	
n	8
mean	0.8727
sd	0.5231
mean-sd*1.895	-0.1185
0.05 probability untrns	**0.761**
mean untransformed	**7.460**

5 percent TRV =	**0.761**
50 percent TRV =	**7.460**

TISSUE DATA ASSOCIATED WITH EFFECTS IN FISH-LEAD

whole-body data Species	LOAEL (mg/kg)	NOAEL (mg/kg)	n	Duration (days)	Effect	Exposure route	Lifestage	Reference	Source
Trout - Brook	4-8.8	2.5-5.1		84	Growth	Adults, water	Embryo-juvenile	207	J & A (1999)
Fathead minnow	26.2	44.2	2		Behavior	Absorption	Immature	Weber, et al., 1991	WES
Lowest value (of pairs, for NOAELs)	4	2.5							

APPENDIX C-11

POTOMAC RIVER SUBMERGED AQUATIC VEGETATION DISTRIBUTION AND STATUS OF HABITAT

Potomac River

SAV Distribution and Status of Habitat

The well-defined linkage between water quality and submerged aquatic vegetation (SAV) distribution and abundance make SAV communities good barometers of the health of estuarine ecosystems. SAV is important not only as an indicator of water quality, but it is also a critical nursery habitat for many estuarine species. Blue crab post-larvae are 30 times more abundant in SAV beds than adjacent unvegetated areas. Similarly, several species of waterfowl are dependant on SAV as food when they over-winter in the Chesapeake region.

The Chesapeake Bay Program has developed new criteria for determining SAV habitat suitability of an area based on water quality. The APercent Light at Leaf@ habitat requirement assesses the amount of available light reaching the leaf surface of SAV after being attenuated in the water column and by epiphytic growth on the leaves themselves. The document describing this new model is found on the Chesapeake Bay Program website (www.chesapeakebay.net/pubs/sav/index.html). The older AHabitat Requirements@ of five water quality parameters are still used for diagnostic purposes. Re-establishment of SAV is measured against the ATier 1 Goal@, an effort to restore SAV to any areas known to contain SAV from 1971 to 1990.

The tidal fresh Potomac River has had highly variable SAV coverage, according to the Virginia Institute of Marine Science annual aerial survey (www.vims.edu/bio/sav/), peaking in 1991 at 4,632 acres, or 72% of the 6,405 acre Tier I goal (**figure 1**). From this high, SAV abundance decreased to a low of 1,369 acres in 1997 and rebounded in 1998,1999 and 2000 to reach 3,879 or 61% of the Tier I goal. The SAV Beds fringe many of the shorelines. Ground-truthing by citizens, U. S. Geological Survey, U. S. Fish and Wildlife Service and Virginia Institute of Marine Science has found 11 species of SAV in this region, with wild celery, hydrilla and milfoil being the most reported ones. Data obtained from water quality monitoring stations located near Sheridan Point indicate that phosphorous levels and suspended solids pass, algae and percent light at leaf are borderline and light attenuation algae fail the SAV habitat requirements (**figure 2**). Nitrogen concentration is not applicable in tidal fresh regions.

Piscataway Creek has had increases in SAV coverage since 1995, though 1999 showed a large decrease from the 1998 levels (www.vims.edu/bio/sav/). The Tier I goal for this segment is 835 acres and the 1999 and 2000 SAV coverages were 15% and 38% of this number, respectively (**figure 1**), with the 2000 coverage being the most ever reported by the VIMS survey. Most of the SAV beds fringe the southern shore and the headwaters of this creek. Ground-truthing by citizens and staff from the U. S. Geological Survey has found 7 species in Piscataway Creek, listed in order of frequency recorded; hydrilla, naiads (2 species), coontail, wild celery, water stargrass, and milfoil. Water quality data from the station located near Calvert Manor indicate that algae levels pass, and percent light at leaf and total suspended solids are borderline in respect to the SAV habitat requirements (**figure 2**). Light attenuation and phosphorous

http://www.dnr.state.md.us/bay/sav/acreage/pot_sum01.pdf

levels fail these requirements. Nitrogen concentration is not applicable in tidal fresh regions.

Mattawoman Creek has had steady increases in SAV coverage since 1995 (**figure 1**), surpassing the Tier I goal (134 acres) in 1998 (163 acres), 1999 (210 acres) and 2000 (331 acres or 247% of the goal) (www.vims.edu/bio/sav/). Most of the beds fringe the shoreline, upstream of Swedes and Deep Points. Extensive ground-truthing by staff from the U. S. Geological Survey, U. S. Fish and Wildlife Service and citizens from Friends of Mattawoman Creek has found hydrilla, naiads, wild celery, coontail and milfoil (in order of frequency reported) in this creek. Water quality monitoring data from the station located near Swedes Point indicate that phosphorous meets and percent light at leaf is borderline to the SAV habitat requirements (**figure 2**). Light attenuation, total suspended solids and algae levels fail the requirements. Nitrogen concentration is not applicable in this tidal fresh creek.

In the oligohaline (low salinity) Potomac River, between Quantico and Mathias Points, has seen fairly consistent SAV coverage since 1984, ranging from a low of 2,529 acres in 1995 to a high of 4,306 acres in 1998 (**figure 1**), at which time the coverage exceed the Tier I goal of 4,264 acres (www.vims.edu/bio/sav/). The 2000 coverage was 3,909 acres or 92% of the Tier I goal. The largest SAV beds in the Maryland portion of the river are found in Chicamuxen Creek and then fringing the shoreline to Smith Point, then fringing the shoreline from Maryland Point to just upstream of Pope Creek, including the shorelines of Nanjemoy Creek and Port Tobacco River. On the Virginia side, there are fringing beds from Shipping to Clifton Points, near the mouth of Potomac Creek, near Somerset Beach, the mouth of Chotank Creek, and fringing the shoreline around Mathias Point. Ground-truthing by citizens and staff from U. S. Geological Survey, U. S. Fish and Wildlife Service and Virginia Institute of Marine Science has found 13 different species of SAV, with the three most often reported being milfoil, wild celery, hydrilla. Water quality data from the monitoring stations near Moss and Maryland Points indicate that only algae levels meet the SAV habitat requirements, percent light at leaf and concentration of suspended solids are borderline and light attenuation and phosphorus levels fail (**figure 2**). Nitrogen concentration is not applicable in this area.

In the mesohaline (moderate salinity) Potomac River, downstream of Mathias point to Point Lookout has had steady increases in SAV coverage since 1992 (when there was 238 acres), passing the Tier I goal of 989 acres and reaching the highest recorded level in 1999 of 2,351 acres (or 238% of the Tier I goal) (www.vims.edu/bio/sav/) However, the 2000 coverage was down 55% to 1,045 acres due to heavy springtime algal booms, but even this value exceeds the Tier I goal (**figure 1**). On the Maryland side, there are fringing beds from the Route 301 bridge to Cobb Island, scattered throughout the Wicomico River and St. Clements Bay. There are a few small beds downstream from here, but no large beds until St. George Island with fringing beds through much of the lower St. Mary=s River. On the Virginia side, there is a large fringing bed from Mathias Point to the Upper Machodoc Creek. Ground-truthing by citizens and staff from Patuxent River Park, Patuxent Naval Air Station, U. S. Geological Survey, U. S. Fish

and Wildlife Service and Virginia Institute of Marine Science has identified 11 species with milfoil, horned pondweed and wild celery the three most frequently reported ones. Data from the three water quality monitoring stations (located at the Route 301 bridge, near Ragged Point and Point Lookout) indicates that water quality is fairly good in this area with light attenuation and nitrogen levels being borderline, while percent light at leaf, concentrations of suspended solids, algae and phosphorous pass the SAV habitat requirements (**figure 2**).

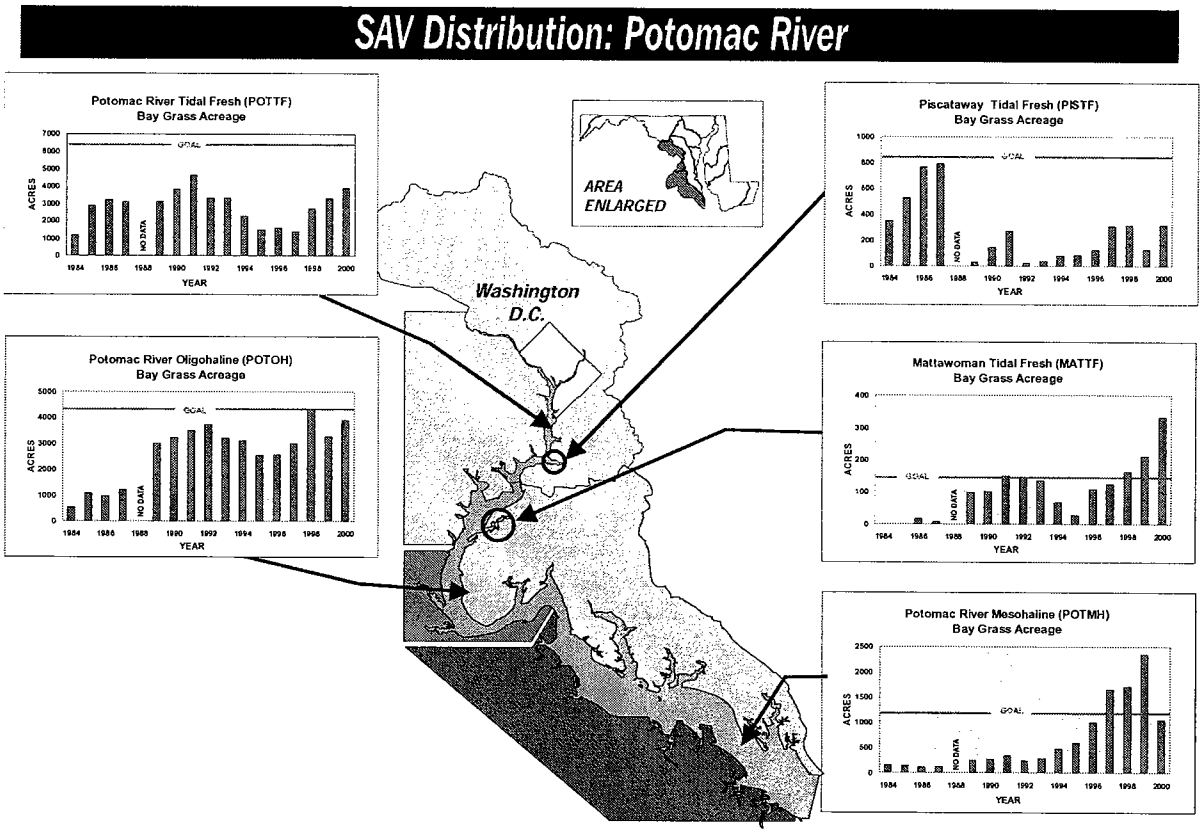


Figure 1: SAV coverage in Potomac River, 1984 to 2000

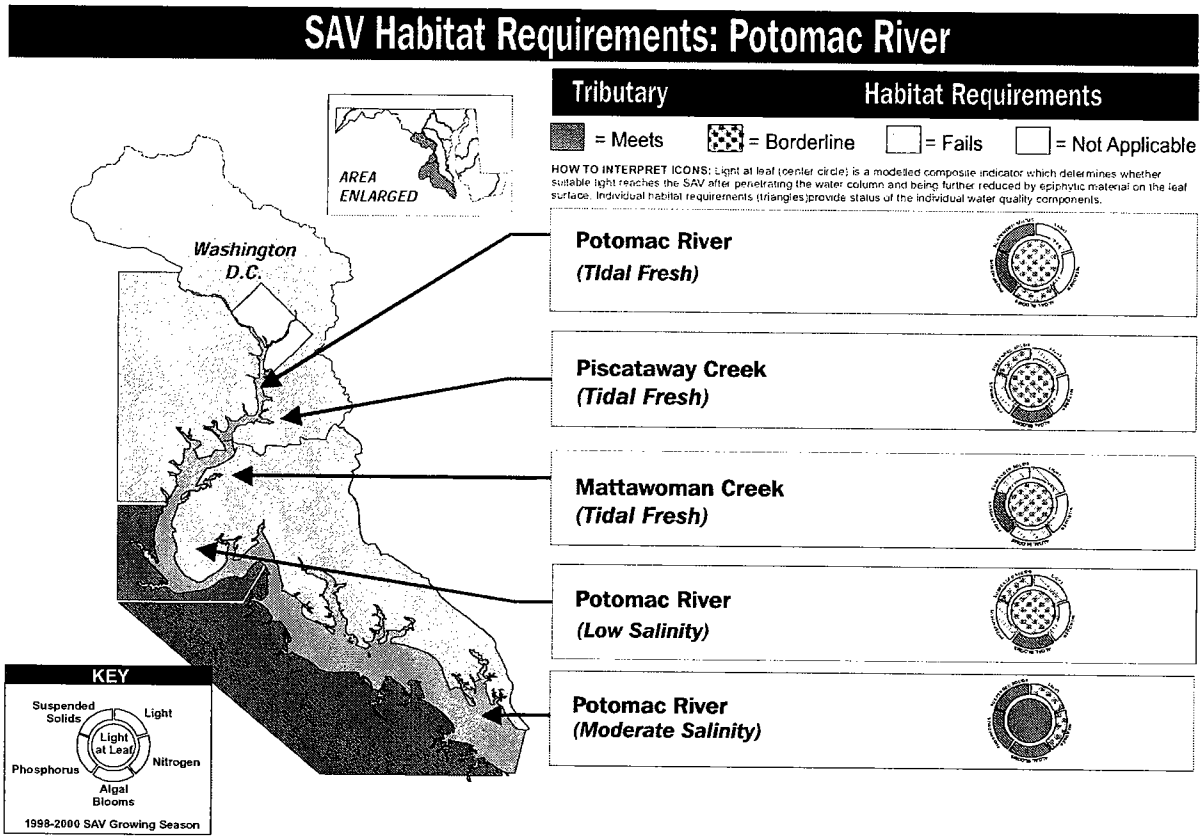


Figure 2: SAV habitat requirement attainment in Potomac River

APPENDIX D

SUPPORTING INFORMATION FOR HUMAN HEALTH RISK ASSESSMENT

D-1 TOXICOLOGICAL PROFILES FOR CHEMICALS OF CONCERN

D-2 SAMPLE CALCULATIONS

D-3 RAGS PART D TABLES

D-4 IEUBK LEAD MODELING RESULTS

APPENDIX D-1

TOXICOLOGICAL PROFILES

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1.0 ALUMINUM

Aluminum is a silver-white flexible metal with a vast number of uses. It is poorly absorbed and efficiently eliminated; however, when absorption does occur, aluminum is distributed mainly in bone, liver, testes, kidneys, and brain.

1.1 Noncancer Toxicity

Aluminum may be involved in Alzheimer's disease (dialysis dementia) and in Amyotrophic Lateral Sclerosis and Parkinsonism-Dementia Syndromes of Guam (Guam ALS-PD complex). Aluminum content of brain, muscle, and bone increases in Alzheimer's patients. Neurofibrillary tangles (NFTs) are found in patients suffering from aluminum encephalopathy and Alzheimer's disease. Symptoms of "dialysis dementia" include speech disorders, dementia, convulsions, and myoclonus. People of Guam and Rota have an unusually high incidence of neurodegenerative diseases. The volcanic soil in the region of Guam where the high incidence of ALS-PD occurs contains high levels of aluminum and manganese. Neurological effects have also been observed in rats orally exposed to aluminum compounds.

The respiratory system appears to be the primary target following inhalation exposure to aluminum. Alveolar proteinosis has been observed in guinea pigs, rats, and hamsters exposed to aluminum powders. No decrease in reproductive capacity, hormonal abnormalities, or testicular histopathology was observed in male rats exposed to aluminum in drinking water for 90 days. However, male rats exposed to aluminum (as aluminum chloride) via gavage for 6 months exhibited decreased spermatozoa counts and sperm motility, and testicular histological and histochemical changes.

Subchronic and chronic reference doses and reference concentrations have not been derived for aluminum. However, the EPA's National Center for Environmental Assessment (NCEA) has developed a provisional oral RfD of 1.0 mg/kg/day and an inhalation reference dose of 0.001 mg/kg/day.

1.2 Carcinogenicity

The U.S. EPA has not evaluated aluminum or aluminum compounds for carcinogenicity, and a weight-of-evidence classification is currently not assigned.

2.0 AMINODINITROTOLUENES

Little information regarding the toxicology of aminodinitrotoluenes (2-amino-2,6-dtrinitrotoluene and 4-amino-2,6-dtrinitrotoluene) is available in the literature. These compounds are degradation products of 2,4,6-TNT and other nitrogen-containing explosives and are expected to exhibit toxicological effects

similar to these compounds (TOXNET, online, 2001). The U.S. EPA has derived an oral RfD of 6.0E-5 mg/kg/day for the aminodinitrotoluenes and the target organ is considered to be the liver.

3.0 ANTIMONY

3.1 Pharmacokinetics

Ingested antimony is absorbed slowly and incompletely from the gastrointestinal (GI) tract. Within a few days of acute exposure, highest tissue concentrations are found in the liver, kidney, and thyroid. Organs of storage include skin, bones, and teeth. Highest concentrations in deceased smelter workers (inhalation exposure) occurred in the lungs and skeleton. Excretion is largely via the urine or feces, although some is incorporated into the hair.

3.2 Noncancer Toxicity

Acute intoxication from ingestion of large doses of antimony induces GI disturbances, dehydration, and cardiac effects in humans. Chronic effects from occupational exposure include irritation of the respiratory tract, pneumoconiosis, pustular eruptions of the skin called "antimony spots," allergic contact dermatitis, and cardiac effects, including abnormalities of the electrocardiograph (ECG) and myocardial changes. Cardiac effects were also observed in rats and rabbits exposed by inhalation for six weeks and in animals (dogs, and possibly other species) treated by intravenous injection.

Chronic oral exposure studies in laboratory animals include two briefly reported lifetime drinking water studies in rates and mice. The only dose tested, 5 ppm potassium antimony tartrate, resulted in reduced longevity in both species and in reduced mean heart weight in rats. The U.S. EPA verified an RfD of 0.0004 mg/kg/day for chronic oral exposure to antimony from the LOAEL of 5 ppm potassium antimony tartrate (0.35 mg/antimony/kg body weight-day) in the lifetime study in rats. An uncertainty factor of 1000 was applied; factors of 10 each for inter- and intraspecies variation were used to estimate an NOAEL from an LOAEL. The heart is considered a likely target organ for chronic oral exposure of humans.

3.3 Carcinogenicity

Data were not located regarding the carcinogenicity of antimony to humans. Antimony fed to rats did not produce an excess of tumors, but a high frequency of lung tumors was observed in rats exposed by inhalation to antimony trioxide for one year. Antimony is classified as U.S. EPA cancer weight-of-evidence Group D (not classifiable as a carcinogenicity to humans).

4.0 ARSENIC

4.1 Pharmacokinetics

Several studies confirm that soluble inorganic arsenic compounds and organic arsenic compounds are almost completely (>90 percent) absorbed from the GI tract in both animals and humans. The absorption efficiency of insoluble inorganic arsenic compounds depends on particle size an stomach pH. Initial distribution of absorbed arsenic is to the liver, kidneys, and lungs, flowed by redistribution to hair, nails, teeth, bone, and skin, which are considered tissues of accumulation. Arsenic has a long half-life in the blood of rats, compared with other animals and humans, because of firm binding to the hemoglobin in erythrocytes.

Metabolism of inorganic arsenic includes reversible oxidation-reduction so that both arsenite (valence of 3) and arsenate (valence of 5) are present in the urine of animals treated with arsenic of either valence. Arsenite is subsequently oxidized and methylated by a saturable mechanism to form mono- or dimethylarsenate; the latter is the predominant metabolite in the urine of animals or humans. Organic arsenic compounds (arsenilic acid, cacodylic acid) are not readily converted to inorganic arsenic. Excretion of organic or inorganic arsenic is largely via the urine, but considerable species variation exists. Continuously exposed humans appear to excrete 60 to 70 percent of their daily intake of arsenate or arsenite via the urine.

4.2 Noncancer Toxicity

A lethal dose of arsenic trioxide in humans is 70 to 180 milligrams (approximately 50 to 140 mg arsenic. Acute oral exposure of humans to high doses of arsenic produce liver swelling, skin lesions, disturbed heart function, and neurological effects. The only noncancer effects in humans clearly attributable to chronic oral exposure to arsenic are dermal hyperpigmentation and keratosis, as revealed by studies of several hundred Chinese exposed to naturally occurring arsenic in well water. Similar effects were observed in persons exposed to high levels of arsenic in water in Utah and the northern part of Mexico. Occupational (predominantly inhalation) exposure is also associated with neurological deficits, anemia, and cardiovascular effects, but concomitant exposure to other chemicals cannot be ruled out. The EPA derived an RfD of 0.0003 mg/kg/day for chronic oral exposure, based on an NOAEL of 0.0008 mg/kg/day for skin lesions from Chinese data. The principal target organ for arsenic appears to be the skin. The nervous system and cardiovascular systems appear to be less significant target organs. Inorganic arsenic may be an essential nutrient, exerting beneficial effects on growth, health, and feed conversion efficiency .

4.3 Carcinogenicity

Inorganic arsenic is clearly a carcinogen in humans. Inhalation exposure is associated with increased risk of lung cancer in persons employed as smelter workers, in arsenical pesticide applicators, and in a population residing near a pesticide manufacturing plant. Oral exposure to high levels in well water is associated with increased risk of skin cancer. Extensive animal testing with various forms of arsenic given by many routes of exposure to several species, however, has not demonstrated the carcinogenicity of arsenic. The EPA classifies inorganic arsenic in cancer weight-of-evidence Group A (human carcinogen), and recommends an oral unit risk of 0.00005 ug/L in drinking water, based on the incidence of skin cancer in the Chinese study. The EPA presents a chronic oral slope factor of 1.5 per mg/kg/day based on the same information. The EPA notes that the uncertainties associated with the oral unit risk are considerably less than those for most carcinogens, so that the unit risk might be reduced in order of magnitude. An inhalation unit risk of 0.0043 per mg/m^3 was derived for inorganic arsenic from the incidence of lung cancer in occupationally exposed men, equivalent to 15.1 per mg/kg/day, was derived from the same data assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg for humans.

5.0 BENZENE

5.1 Pharmacokinetics

Benzene is absorbed via ingestion, inhalation, and skin application. Experimental data indicate that animals can absorb up to 95% of oral doses and that humans can absorb up to 80% of inhaled benzene (after 5 minutes of exposure). Humans may absorb benzene vapors through the skin as well as the lungs; of the total dose absorbed by the two routes, an estimated 22-36% enters the body through the skin.

Autopsy of a youth who died while sniffing benzene revealed that the chemical was distributed to the urine, stomach, bile, liver, kidney, abdominal fat, and brain. The depots for benzene and its metabolites in animals are similar to those in humans, and in addition, include the fetus and placenta, bone marrow, Zymbal gland, and oral and nasal cavities. Numerous studies indicate that the metabolism of benzene is required for its toxicity. The liver is the main site for the metabolism of benzene; the bone marrow, a minor site.

5.2 Noncancer Toxicity

In humans, short-term inhalation exposure to benzene induced CNS effects such as drowsiness, dizziness, and headaches; long-term exposure induced anemia (ACGIH, 1991). Oral dosing in animals induced hematopoietic effects (Agency for Toxic Substances and Disease Registry [ATSDR], 1995). The EPA

presents an oral RfD of 0.003 mg/kg/day and an inhalation RfD of 0.00171 mg/kg/day. The CNS and the hematopoietic system are the target organs of benzene.

5.3 Carcinogenicity

The EPA (1999b) classifies benzene in cancer weight-of-evidence Group A (human carcinogen) based on several studies of increased risk of nonlymphocytic leukemia associated with occupational exposure, supported by an increased incidence of neoplasia in rats and mice exposed by inhalation and gavage. A verified oral slope factor of 0.029 per mg/kg/day and inhalation unit risk of 8.3e-06 □g/m^3 is based on the increased incidence of leukemia in several occupational (inhalation exposure) studies. The inhalation unit risk is equivalent to 0.029 per mg/kg/day, assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg for humans.

6.0 BENZO(A)ANTHRACENE

6.1 Noncancer Toxicity

The oral and inhalation RfD and RfC are not available at this time.

6.2 Carcinogenicity

Benzo(a)anthracene has a weight of evidence classification of B2, a probable human carcinogen. The classification was based on sufficient data from animal bioassays. Benzo(a)anthracene produced tumors in mice exposed by gavage; intraperitoneal, subcutaneous or intramuscular injection; and topical application. Benzo(a)anthracene produced mutations in bacteria and in mammalian cells, and transformed mammalian cells in culture.

Although there are no human data that specifically link exposure to benzo(a)anthracene to human cancers, benzo(a)anthracene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions and cigarette smoke.

Benzo(a)anthracene administration caused an increase in the incidence of tumors by gavage; dermal application; and both subcutaneous injection and intraperitoneal injection assays. A group of male mice was exposed to gavage solutions containing 3% benzo(a)anthracene for 5 weeks. There was an increased incidence of pulmonary adenomas and hepatomas.

Supporting data for carcinogenicity include genetic mutations in five different strains of Salmonella typhimurium. Benzo(a)anthracene produced positive results in an assay for mutations in Drosophila melongaster.

The currently used Oral Slope Factor (CSF) for benzo(a)anthracene is 0.73 per (mg/kg)/day which is extrapolated from the CSF for benzo(a)pyrene (BaP), i.e., 0.1 x 7.3 (BaP) = 0.73 per (mg/kg)/day).

7.0 BENZO(A)PYRENE (BAP)

7.1 Pharmacokinetics

Benzo(a)pyrene was readily absorbed across the GI and respiratory epithelia. Benzo(a)pyrene was distributed widely in the tissues of treated rats and mice, but primarily to tissues high in fat, such as adipose tissue and mammary gland.

Studies of the metabolism of benzo(a)pyrene provide information relevant to other PAHs because of the structural similarities of all members of the class. Metabolism involves microsomal mixed function oxidase hydroxylation of one or more of the phenyl rings with the formation of phenols and dihydrodiols, probably via formation of arene oxide intermediates. The dihydrodiols may be further oxidized to diol epoxides, which, for certain members of the class, are known to be the ultimate carcinogens. Conjugation with glutathione or glucuronic acid, and reduction to tetrahydrotetrols are important detoxification pathways.

Excretion of benzo(a)pyrene residue was reported to be rapid, although quantitative data were not located. Excretion occurred mainly via the feces, probably largely due to biliary secretion. The EPA concluded that accumulation in the body tissues of PAHs from chronic low level exposure would be unlikely.

7.2 Noncancer Toxicity

The oral RfD and inhalation RfC are not available at this time.

7.3 Carcinogenicity

The PAHs are ubiquitous, being released to the environment from anthropogenic as well as from natural sources. Benzo(a)pyrene is the most extensively studied member of the class, inducing tumors in multiple tissues of virtually all laboratory species tested by all routes of exposure. Although epidemiology studies suggested that complex mixtures that contain PAHs (coal tar, soots, coke oven emissions, cigarette smoke) are carcinogenic to humans, the carcinogenicity cannot be attributed to PAHs alone because of the presence of other potentially carcinogenic substances in these mixtures. In addition, recent investigations showed that the PAH fraction of roofing tar, cigarette smoke, and coke oven emissions accounted for only

0.1 to 8 percent of the total mutagenic activity of the unfractionated complex mixture in Salmonella. Aromatic amines, nitrogen heterocyclic compounds, highly oxygenated quinones, diones, and nitrooxygenated compounds, none of which would be expected to arise from in vivo metabolism of PAHs, probably accounted for the majority of the mutagenicity of coke oven emissions and cigarette smoke. Coal tar, which contains a mixture of many PAHs, has a long history of use in the clinical treatment of a variety of skin disorders in humans.

Because of the lack of human cancer data, assignment of individual PAHs to EPA cancer weight-of-evidence groups was based largely on the results of animal studies with large doses of purified compound. Frequently, unnatural routes of exposure, including implants of the test chemical in beeswax and trioctanoin in the lungs of female Osborne-Mendel rats, intratracheal instillation, and subcutaneous or intraperitoneal injection, were used. Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were classified in Group B2 (probable human carcinogens).

The EPA verified a slope factor for oral exposure to benzo(a)pyrene of 7.3 per mg/kg/day, based on several dietary studies in mice and rats. Neither verified nor provisional quantitative risk estimates were available for the other PAHs in Group B2. The EPA promulgated an ambient water quality criterion for "total carcinogenic PAHs," based on an oral slope factor derived from a study with benzo(a)pyrene, as being sufficiently protective for the class. Largely because of this precedent, the quantitative risk estimates for benzo(a)pyrene were adopted for the other carcinogenic PAHs when quantitative estimates were needed. The EPA has calculated an inhalation slope factor for benzo(a)pyrene of 3.1 per mg/kg/day.

Human data specifically linking benzo(a)pyrene to a carcinogenic effect are lacking. There are, however, multiple animal studies in many species demonstrating benzo(a)pyrene to be carcinogenic following administration by numerous routes. In addition, benzo(a)pyrene has produced positive results in numerous genotoxicity assays.

The data for animal carcinogenicity was sufficient. The animal data consist of dietary, gavage, inhalation, intratracheal instillation, dermal and subcutaneous studies in numerous strains of at least four species of rodents and several primates. Repeated benzo(a)pyrene administration has been associated with increased incidences of total tumors and of tumors at the site of exposure. The tumor types in mice from oral diet studies include forestomach, squamous cell papillomas and carcinomas.

Benzo(a)pyrene has been shown to cause genotoxic effects in a broad range of prokaryotic and mammalian cell assay systems.

8.0 BENZO(B)FLUORANTHENE

8.1 Noncancer Toxicity

Little information is available on benzo(b)fluoranthene. However, based on the similarities of chemical structures, most properties should be similar to benzo(a)pyrene.

8.2 Carcinogenicity

No long-term oral or inhalation bioassays were available to assess the carcinogenicity of benzo(b)fluoranthene. Benzo(b)fluoranthene was tested for carcinogenicity in dermal application, lung implantation, subcutaneous (s.c.) injection, and intraperitoneal (i.p.) injection studies. Dermal applications of 0.01-0.5% solutions of benzo(b)fluoranthene for life produced a high incidence of skin papillomas and carcinomas in mice (Wynder and Hoffmann, 1959). In initiation-promotion assays, the compound was active as an initiator of skin carcinogenesis in mice (LaVoie et al., 1982; Amin et al., 1985). Sarcomas and carcinomas of the lungs and thorax were seen in rats receiving single lung implants of 0.1-1 mg benzo(b)fluoranthene (Deutsch-Wenzel et al., 1983). Newborn mice receiving 0.5 umol benzo(b)fluoranthene via i.p. injection developed liver and lung tumors (LaVoie et al., 1987), and mice administered three s.c. injections of 0.6 mg benzo(b)fluoranthene developed injection site sarcomas (IARC, 1993).

Based on no human data and sufficient evidence for carcinogenicity in animals, EPA has assigned a weight-of-evidence classification of B2, probable human carcinogen, to benzo(b)fluoranthene. The currently used Oral Slope Factor (CSF) for benzo(b)fluoranthene is 0.73 per (mg/kg)/day which is extrapolated from the CSF for benzo(a)pyrene (BaP), i.e., 0.1 x 7.3 (BaP) = 0.73 per (mg/kg)/day).

9.0 BIS(2-ETHYLHEXYL)PHTHALATE (DI[2-ETHYLHEXYL]PHTHALATE)

9.1 Noncancer Toxicity

The acute oral toxicity of bis(2-ethylhexyl)phthalate is very low; oral $LD_{50/30}$ (lethal dose to 50 percent of population within 30 days without medical testament) values in rats and mice were 33,800 and 26,300 mg/kg, respectively. Repeated high-dose oral exposures were associated with decreased growth, altered organ weights, testicular degeneration, and developmental effects. The U.S. EPA presented a verified chronic oral RfD of 0.02 mg/kg/day based on an LOAEL for increased relative liver weight in guinea pings and an uncertainty factor of 1000. The principal target organs for the toxicity of bis(2-ethylhexyl)phthalate are the liver and testis.

9.2 Carcinogenicity

The U.S. EPA classifies bis(2-ethylhexyl)phthalate in cancer weight-of evidence Group B2 (probable human carcinogen), based on inadequate human cancer date (one limited occupational study) and sufficient cancer data in laboratory animals. An oral slope factor of 0.014 per mg/kg/day was based on the increased incidence of liver tumors in a dietary study in male mice. An inhalation slope factor of 0.014 per mg/kg/day was presented by U.S. EPA.

10.0 CADMIUM

10.1 Pharmacokinetics

Estimates of cadmium uptake by the respiratory tract range from 10 to 50 percent; uptake is greatest for fumes and small particles and least for large dust particles. GI absorption of ingested cadmium is ordinarily 5 to 8 percent, but may reach 20 percent in cases of serious dietary ion deficiency. Highest tissue levels are normally found in the kidneys followed by the liver, although levels in the liver may exceed those in the kidneys of persons suffering from cadmium-induced renal dysfunction. The half-life of cadmium in the kidneys and liver may be as long as 10-30 years. Fecal and urinary excretion of cadmium are approximately equivalent to normal humans exposed to small amounts. Urinary excretion increases markedly in humans with cadmium-induced renal disease.

10.2 Noncancer Toxicity

Acute inhalation exposure to fumes or particles of cadmium induces respiratory symptoms, general weakness, and, in severe cases, respiratory insufficiency, shock, and death. Acute oral exposure induces GI disturbances. Chronic inhalation exposure induces pulmonary emphysema, and chronic exposure by either route consistently produces renal tubular disease in humans and laboratory animals. Proteinuria is a reliable early indicator of cadmium-induced kidney disease. The combination of pulmonary emphysema and renal tubular disease, if severe, may result in early mortality. Painful osteomalacia and osteoporosis may arise from altered metabolism of bone minerals secondary to renal damage. The combination of renal and skeletal damage is called itai-itai disease in Japan. Cadmium exposure has been associated with liver damage, but the liver appears to be less sensitive than the kidney. The kidney is the primary target organ of cadmium toxicity. The U.S. EPA derived chronic oral RfD values of 0.0005 mg/kg/day for cadmium ingested in water and 0.001 mg/kg/day for cadmium ingested in food, based on a toxicokinetic model that predicted NOAELs from renal cortical concentration of cadmium. The different RfD values reflect assumed differences in GI absorption of cadmium from water (5 percent) and food (2.5 percent). The U.S. EPA currently employs an inhalation reference dose of 0.000057 mg/kg/day for cadmium.

10.3 Carcinogenicity

Carcinogenicity data in humans consist of several occupational studies that associate cadmium exposure with lung cancer, but concomitant exposure to other carcinogenic chemicals and smoking were not adequately controlled. Other occupational studies reported significantly increased risk of prostatic cancer, but this effect was not observed in the largest occupational study of workers exposed to high levels. The animal data consist of an inhalation study in rats that showed a significant increase in lung tumors, and several parenteral injection studies that produced injection site tumors. No evidence of carcinogenicity, however, was observed in seven oral studies in rats and mice. The U.S. EPA classifies cadmium a cancer weight-of-evidence Group B1 substance for inhalation exposure on the basis of limited evidence of carcinogenicity in humans and sufficient evidence in animals. The data were insufficient to classify cadmium as carcinogenic to humans exposed by the oral route. An inhalation unit risk of 0.0018 mg/m^3, equivalent to 6.3 per mg/kg/day, was derived from an occupational exposure study assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg for humans.

11.0 CHROMIUM

11.1 Noncancer Toxicity

In nature, chromium (III) predominates over chromium (VI). Little chromium (VI) exists in biological materials, except shortly after exposure, because reduction to chromium (III) occurs rapidly. Chromium (III) is considered a nutritionally essential trace element and is considerably less toxic than chromium (VI). No effects were observed in rats consuming 5% chromium (III)/kg/day in the diet for over two years. The No-Observed-Effect-Level (NOEL) of 5% Cr_2O_3 was the basis for a verified chronic oral RfD of 1.5 mg/kg/day. The same NOEL and an uncertainty factor of 1000 were the basis for a provisional subchronic oral RfD of 1 mg/kg/day.

Acute oral exposure of humans to high doses of chromium (VI) induced neurological effects, GI hemorrhage and fluid loss, and kidney and liver effects. Parenteral dosing of animals with chromium (VI) is selectively toxic to the kidney tubules. An NOAEL of 2.4 mg chromium (VI) /kg/day in a one-year drinking water study in rats and an uncertainty factor of 500 was the basis of a verified RfD of 0.003 mg/kg/day for chronic oral exposure.

Occupational (inhalation and dermal) exposure to chromium (III) compounds induced dermatitis. Similar exposure to chromium (VI) induced ulcerative and allergic contact dermatitis, irritation of the upper respiratory tract including ulceration of the mucosa and perforation of the nasal septum, and possibly kidney effects. An inhalation RfC values has not been determined for chromium (III), however, U.S. EPA has established an inhalation RfD of 0.00003 mg/kg/day for chromium (VI).

A target organ was not identified for chromium (III). The kidney appears to be the principal target organ for repeated oral dosing with chromium (VI). Additional target organs for dermal and inhalation exposure include the skin and respiratory tract.

11.2 Carcinogenicity

Data were not located regarding the carcinogenicity of chromium (III). The U.S. EPA classifies chromium (VI) in cancer weight-of-evidence Group A (human carcinogen), based on the consistent observation of increased risk of lung cancer in occupational studies of workers in chromate production or the chrome pigment industry. Parenteral dosing of animals with chromium (VI) compounds consistently induced injection-site tumors. There is no evidence that oral exposure to chromium (VI) induces cancer. An inhalation unit risk of 0.012 per mg/m^3, equivalent to 42 per mg/kg/day, assuming humans inhale 20 m^3/day and weigh 70 kg, was based on increased risk of lung cancer deaths in chromate production workers.

12.0 COPPER

Copper occurs naturally in elemental form and as a component of many minerals. Because of its high electrical and thermal conductivity, it is widely used in the manufacture of electrical equipment. Common copper salts, such as the sulfate, carbonate, cyanide, oxide, and sulfide are used as fungicides, as components of ceramics and pyrotechnics, for electroplating, and for numerous other industrial applications. Copper can be absorbed by the oral, inhalation, and dermal routes of exposure. It is an essential nutrient that is normally present in a wide variety of tissues.

12.1 Noncancer Toxicity

In humans, ingestion of gram quantities of copper salts may cause gastrointestinal, hepatic, and renal effects with symptoms such as severe abdominal pain, vomiting, diarrhea, hemolysis, hepatic necrosis, hematuria, proteinuria, hypotension, tachycardia, convulsions, coma, and death. Gastrointestinal disturbances and liver toxicity have also resulted from long-term exposure to drinking water containing 2.2-7.8 mg Cu/L. The chronic toxicity of copper has been characterized in patients with Wilson's disease, a genetic disorder causing copper accumulation in tissues. The clinical manifestations of Wilson's disease include cirrhosis of the liver, hemolytic anemia, neurologic abnormalities, and corneal opacities. In animal studies, oral exposure to copper caused hepatic and renal accumulation of copper, liver and kidney necrosis at doses of >=100 mg/kg/day; and hematological effects at doses of 40 mg/kg/day.

Acute inhalation exposure to copper dust or fumes at concentrations of 0.075-0.12 mg Cu/m^3 may cause metal fume fever with symptoms such as cough, chills and muscle ache. Among the reported effects in

workers exposed to copper dust are gastrointestinal disturbances, headache, vertigo, drowsiness. Vineyard workers chronically exposed to Bordeaux mixture (copper sulfate and lime) exhibit degenerative changes of the lungs and liver. Dermal exposure to copper may cause contact dermatitis in some individuals.

The oral reference dose (RfD) for elemental copper of 0.04 has been developed by USEPA National Center for Environmental Assessment (NCEA). The U.S. EPA established an action level of 1300 ug/L for drinking water. Data were insufficient to derive a Reference concentration (RfC) for copper.

12.2 Carcinogenicity

No suitable bioassays or epidemiological studies are available to assess the carcinogenicity of copper. Therefore, U.S. EPA has placed copper in weight-of-evidence group D, not classifiable as to human carcinogenicity.

13.0 CYANIDE

13.1 Noncancer Toxicity

Acute exposure to cyanide induced histotoxic hypoxia (inability of the tissues to use oxygen); death was due to central respiratory arrest (Smith 1991). Chronic dietary exposure to cyanide was associated with reduced body weight gain, decreased thyroid activity, myelin degeneration, and reduced fertility in rats (EPA 1997). The EPA (1997) presented a verified RfD of 0.02 mg/kg/day for oral exposure to cyanide, based on an NOAEL in a two-year study in rats that consumed food fumigated with hydrogen cyanide, and an uncertainty factor of 500. The same value was adopted as the provisional RfD for subchronic oral exposure (EPA 1997). The target organs for acute exposure are the CNS, respiratory system, and cardiovascular system (ACGIH 1991). Target organs for chronic oral exposure to cyanide appear to be the thyroid and nervous system.

13.2 Carcinogenicity

The EPA (1997) classifies cyanide as a cancer weight-of-evidence Group D substance (not classifiable as to carcinogenicity to humans). Quantitative risk estimates are not derived for Group D chemicals.

14.1 DDT, DDE, AND DDD

14.1 Noncancer Toxicity

Exposure to DDT, DDE, and DDD happens mostly from eating contaminated foods, such as root and leafy vegetables, meat, fish, and poultry. At high levels, it can damage the nervous system, causing excitability, tremors, and seizures in people. These chemicals have been found in at least 337 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

DDT (1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) was a manufactured chemical widely used to control insects on agricultural crops and insects that carry diseases like malaria and typhus. It does not occur naturally in the environment. DDT is a white, crystalline solid with no odor or taste. Because of damage to wildlife and the potential harm to human health, the use of DDT was banned in the United States, except for public health emergencies. DDT is still used in some other countries.

Two similar chemicals that sometimes contaminate are DDT degradation products: DDE (1,1-dichloro-2,2-bis(chlorophenyl) ethylene) and DDD (1,1-dichloro-2,2-bis(p-chlorophenyl) ethane). DDD was also used to kill pests, but its use has also been banned. One form of it has been used medically to treat cancer of the adrenal gland. DDE has no commercial use.

DDT entered the environment when it was used as an insecticide. DDT in air lasts for only a short time. Half the DDT in air is gone within 2 days. It does not dissolve easily in water. DDT sticks strongly to soil particles and does not move quickly to underground water. DDT lasts a very long time in soil; half the DDT in soil will break down in 2-15 years. Some DDT will evaporate from soil and surface water into the air and some is broken down by sunlight or by microorganisms in soil or surface water. DDT in soil usually breaks down to form DDE or DDD. Levels of DDT build up in plants and in the fatty tissues of fish, birds,and animals.

DDT affects the nervous system. People who accidentally swallowed large amounts of DDT became excitable and had tremors and seizures. These effects went away after the exposure stopped. No effects were seen in people who took small daily doses of DDT by capsule for 18 months. People who worked with DDT for a long time had some reversible changes in the levels of liver enzymes.

In animals, short-term exposure to large amounts of DDT in food affected the nervous system. In animals, long-term exposure to DDT affected the liver. Animal studies suggest that short-term exposure to DDT in food may have a harmful effect on reproduction.

14.2 Carcinogenicity

The department of health and human services (DHHS) has determined that DDT may reasonably be anticipated to be a human carcinogen. DHHS has not classified DDE and DDD, but the environmental protection agency (EPA) has determined that they are probable human carcinogens. Liver cancer has been seen in animals that were fed DDT. studies in DDT-exposed workers did not show increases in cancer.

15.0 DIBENZO(A,H)ANTHRACENE

15.1 Noncancer Toxicity

The oral RfD and inhalation RfC are not available.

15.2 Carcinogenicity

The EPA has classified dibenzo(a,h)anthracene in cancer weight-of-evidence group B2 (Probable Human Carcinogen, sufficient evidence of carcinogenicity in animals) based on carcinomas in mice following oral or dermal exposure and injection site tumors in several species following subcutaneous or intramuscular administration. Dibenzo[a,h]anthracene has induced DNA damage and gene mutations in bacteria as well as gene mutations and transformation in several types of mammalian cell cultures.

Although there are no human data that specifically link exposure to dibenzo(a,h)anthracene with human cancers, dibenzo(a,h)anthracene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions and cigarette smoke.

Dibenzo(a,h)anthracene has been shown to be carcinogenic when administered to mice by the oral route in a water-olive oil emulsion. Mice developed pulmonary adenomas, pulmonary carcinomas, and mammary carcinomas.

Dibenzo(a,h)anthracene has produced positive results in bacterial DNA damage and mutagenicity assays and in mammalian cell DNA damage, mutagenicity and cell transformation assays.

The currently used Oral Slope Factor (CSF) for dibenzo(a,h)anthracene is 7.3 per (mg/kg)/day which is extrapolated from the CSF for benzo[a]pyrene i.e., 1.0 x 7.3 (BaP) = 7.3 per (mg/kg)/day).

16.0 DIELDRIN

16.1 Noncancer Toxicity

Dieldrin does not appear to be mutagenic when tested in a number of systems. Dieldrin is toxic to the reproductive system and teratogenic. Reproductive effects include decreased fertility, increased fetal death, and effects on gestation; while teratogenic effects include cleft palate, webbed foot, and skeletal anomalies. Chronic effects attributed to dieldrin include liver toxicity and central nervous system abnormalities. Dieldrin is acutely toxic; the oral LD_{50} is around 50 mg/kg, and the dermal LD_{50} is about 100 mg/kg (Clement, 1985). An oral RfD of 5E-5 mg/kg/day was derived from a two year diet study with rats and an uncertainty factor of 100. The NOAEL is 0.005 mg/kg/day based on a high incidence of liver lesions. The inhalation RfC was not located.

16.2 Carcinogenicity

Dieldrin is a carcinogen, causing increases in a variety of tumors in rats at low but not at high doses and producing a higher incidence of liver tumors in mice. The reason for this reversed dose-response relationship is unclear. A diet study with mice resulted in liver carcinomas. Based on this study, EPA (1998) presented an oral slope factor of 16 per mg/kg/day. Based on route-to-route extrapolation, the inhalation slope factor is 16 per mg/kg/day (EPA, 1998).

17.0 1,3-DINITROBENZENE

17.1 Pharmacokinetics:

The biotransformation of m-dinitrobenzene was studied in rabbits. The animals received a single oral dose of radiocarbon-labeled m-DNB in the range of 50 to 100 mg/kg. Urine was collected for two days after dosing for analysis of metabolites. Over the two day period, more than 80% of the radiolabel was excreted in the urine; feces contained between 0.3 and 5.2% of the radioactive dose. m-DNB underwent extensive biotransformation. The major urinary metabolites were 2,4-diaminophenol (31% of the dose), m-nitroaniline and m-phenylenediamine.

In, animals, 1,3-DNB is rapidly absorbed by the oral route; data from one study indicate that at least 70% of a single oral dose was absorbed. In animals, depending on the vehicle, 1,3-DNB can also be readily absorbed through the skin.

17.2 Noncancer Toxicity

When exposed to 1,3-dinitrobenzene via inhalation and cutaneous routes, symptoms of methemoglobinemia, cyanosis and hemolytic anemia were observed. A specific case of acute intoxication

of workers due to exposure to m-dinitrobenzene dust occurred in 1969. The exposed individuals developed cyanosis which was followed by a slight to moderate anemia (1.9-15.5% loss in specific gravity of the whole blood).

The probable lethal oral dose in humans is estimated to be between 5 & 50 mg/kg or 7 drops to 1 teaspoonful for a 70 kg adult.

When 1,3-dinitrobenzene was given to rats orally as a 1% suspension in corn oil, the LD50 was 83 mg/kg with fiducial limits 56-124 mg/kg. The compound was equally toxic in both sexes. Signs of toxicity included reduction in ambulatory motion, ataxia, weakness, dyspnea, rapid heartbeat, cyanosis, coma & respiratory failure. When 1,3-dinitrobenzene was added to the daily drinking water in concentrations of 50, 100 & 200 mg/l for 8 wk, 3 of 6 male rats receiving the highest concentration died during wk 4 & another died during wk 5. In females, one died during wk 6 & another during wk 7. All other animals survived. Growth rate was reduced in both sexes & at 200 mg/l 1,3-dinitrobenzene in the water supply the animals lost weight. There were mild, consistent reductions in hematocrit & hemoglobin values. Enlarged spleens were present in both sexes at all concentrations ; fibrosis with deposition of hemosiderin was present in all rats at 200 mg/l **1,3-dinitrobenzene.** Testicular atrophy was evident but there was no effect on the ovaries. A brown-yellow pigment was deposited in the Kupffer cells of the liver.

17.3 Carcinogenicity

1,3-dinitrobenzene is not classifiable as a human carcinogen.

18.0 ETHYLBENZENE

18.1 Pharmacokenitics

Human exposure to ethylbenzene occurs mainly by inhalation; 40-60% of inhaled ethylbenzene is retained in the lung. Ethylbenzene is extensively metabolized, mainly to mandelic and phenylglyoxylic acids. These urinary metabolites can be used to monitor human exposures.

18.2 Noncancer Toxicity

Subchronic to chronic oral or inhalation exposure of laboratory animals to ethyl benzene induced mild liver and kidney lesions (EPA 1997). Acute inhalation exposure induced irritation of the mucous membranes in animals and humans, and prolonged inhalation exposure induced testicular degeneration in rabbits and monkeys (ACGIH 1991). The EPA (1999b) presented a verified chronic oral RfD for ethyl benzene of 0.1 mg/kg/day based on an NOEL for liver and kidney toxicity in female rats in a subchronic gavage study and an uncertainty factor of 1000. The EPA (1999b) presented a provisional subchronic

oral RfD of 1 mg/kg/day based on the same NOEL and an uncertainty factor of 100. The EPA (1999b) also presented a verified chronic inhalation RfC of 1 mg/m3 derived from studies on developmental effects in rats and rabbits and an uncertainty factor of 300. The same value was adopted as the provisional subchronic inhalation exposure (EPA 1999b). The inhalation RfC is equivalent to 0.286 mg/kg/day, assuming humans inhale 20 m3 of air/day and weigh 70 kg. Target organs for exposure to ethyl benzene include the liver, kidneys, and testes, and, for inhalation exposure, the mucous membranes.

There are no data for terrestrial plants, birds, or wild mammals. In humans, it is toxic to the central nervous system and is an irritant of mucous membranes and the eyes. Ethylbenzene is an inducer of liver microsomal enzymes. It is not mutagenic or teratogenic No information is available on reproductive toxicity or carcinogenicity of ethylbenzene.

18.3 Carcinogenicity

Ethyl benzene is classified as a cancer weight-of-evidence Group D compound (not classifiable as to carcinogenicity to humans) (EPA 1999b) based on an absence of human or animal cancer studies. Quantitative estimates are not derived for Group D chemicals.

19.0 INDENO(1,2,3-CD)PYRENE

19.1 Noncancer Toxicity

The chronic oral RfD and chronic inhalation RfC are not available.

19.2 Carcinogenicity

EPA classifies indeno(1,2,3-cd)pyrene as cancer weight-of-evidence B2, probable human carcinogen, based on sufficient data from animal bioassays. Indeno(1,2,3-cd)pyrene produced tumors in mice following lung implants, subcutaneous injection and dermal exposure. Indeno(1,2,3-cd)pyrene tested positive in bacterial gene mutation assays.

Although there are no human data that specifically link exposure to indeno(1,2,3-cd)pyrene to human cancers, indeno(1,2,3-cd)pyrene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions and cigarette smoke.

In animal carcinogen bioassays indeno(1,2,3-cd)pyrene exposure resulted in increased incidences of epidermoid carcinomas in a lung implantation study, injection site sarcomas in a subcutaneous injection assay and skin tumors in dermal application studies.

Supporting data for carcinogenicity includes genotoxicity studies. Indeno(1,2,3-cd)pyrene produced positive results in mutation assays in Salmonella typhimurium strains.

The currently used Oral Slope Factor (CSF) for indeno(1,2,3-cd)pyrene is 0.73 per (mg/kg)/day which is extrapolated from the CSF for benzo(a)pyrene, i.e., 0.1 x 7.3 (BaP) = 0.73 per (mg/kg)/day).

20.0 IRON

20.1 Noncancer Toxicity

Iron is potentially toxic in all forms and by all routes of exposure. Inorganic iron is a poison by the intraperitoneal route. The inhalation of large amounts of iron dust may result in iron pneumoconiosis or arc welders lung. Chronic exposure to excess levels of iron (>50-100 mg Iron/day) can result in pathological deposition of iron in tissues. The target organs are the pancreas and liver.

Iron compounds are of varying toxicity. Iron oxides are a potential risk in all industrial settings. In general, ferrous compounds are more toxic than ferric compounds. Acute exposure to excessive levels of ferrous compounds can cause liver and kidney damage, altered respiratory rates and convulsions. An oral RfD of 0.3 mg/kg/day has been published for iron by the U.S. EPA based on based on allowable intakes rather than adverse effect levels. No inhalation RfD has been established for iron.

20.2 Carcinogenicity

Some iron compounds are suspected human carcinogens. Iron dust is an experimental neoplastigen and an increased incidence of lung cancer has been associated with exposure to iron dust. Iron oxide is an experimental tumorigen and a suspected human carcinogen. U.S. EPA has not published oral or inhalation slope factors for iron.

21.0 LEAD

21.1 Pharmacokinetics

Studies in humans indicate that an average of 10 percent of ingested lead is absorbed, but estimates as high as 40 percent were obtained in some individuals. Nutritional factors have a profound effect on GI

absorption efficiency. Children absorb ingested lead more efficiently than adults; absorption efficiencies up to 53 percent were recorded for children three months to eight years of age. Similar results were obtained for laboratory animals; absorption efficiencies of 5 to 10 percent were obtained for adults and 50 percent were obtained for young animals. The deposition rate of inhaled lead averages approximately 30 to 50 percent, depending on particle size, with as much as 60 percent deposition of very small particles near highways. All lead deposited in the lungs is eventually absorbed.

Approximately 95 percent of the lead in the blood is located in the erythrocytes. Lead in the plasma exchanges with several body compartments, including the internal organs, bone, and several excretory pathways. In humans, lead concentrations in bone increase with age. About 90 percent of the body burden of lead is located in the skeleton. Neonatal blood concentrations are about 85 percent of maternal concentrations. Excretion of absorbed lead is principally through the urine, although GI secretion, biliary excretion, and loss through hair, nails, and sweat are also significant.

21.2 Noncancer Toxicity

The noncancer toxicity of lead to humans has been well characterized through decades of medical observation and scientific research. The principal effects of acute oral exposure are colic with diffuse paroxysmal abdominal pain (probably due to vagal irritation), anemia, and, in severe cases, acute encephalopathy, particularly in children. The primary effects of long-term exposure are neurological and hematological. Limited occupational data indicate that long-term exposure to lead may induce kidney damage. The principal target organs of lead toxicity are the erythrocyte and the nervous system. Some of the effects on the blood, particularly changes in levels of certain blood enzymes, and subtle neurobehavioral changes in children, appear to occur at levels so low as to be considered nonthreshold effects.

The U.S. EPA has not determined an inhalation RfC for lead.

The U.S. EPA determined that it is inappropriate to derive an RfD for oral exposure to lead for several reasons. First, the use of an RfD assumes that a threshold for toxicity exists, below which adverse effects are not expected to occur; however, the most sensitive effects of lead exposure, impaired neurobehavioral development in children and altered blood enzyme levels associated with anemia, may occur at blood lead concentrations so low as to be considered practically nonthreshold in nature. Second, RfD values are specific for the route of exposure for which they are derived. Lead, however, is ubiquitous, so that exposure occurs from virtually all media and by all pathways simultaneously, making it practically impossible to quantify the contribution to blood lead from any one route of exposure. Finally, the dose-response relationships common to many toxicants, and upon which derivation of an RfD is based, do not hold true for lead. This is because the fate of lead within the body depends, in part, on the amount and rate of previous exposures, the age of the recipient, and the rate of exposure. There is, however, a reasonably good

correlation between blood lead concentration and effect. Therefore, blood lead concentration is the appropriate parameter on which to base the regulation of lead.

Because of the absence of published dose-response parameters for lead, the exposure and potential risks associated with lead are addressed through the use of the USEPA IEUBK Model for the child (0-7 years). Adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood lead concentration in the developing fetuses of adult women presented in the Technical Review Workgroup Lead Model for Adult Exposure. These models are designed to estimate blood lead levels based on either default or site-specific input values.

The U.S. EPA IEUBK lead model is an iterated set of equations that estimate blood lead concentration in children aged 0 to 7 years. The biokinetic part of the model describes the movement of lead between the plasma and several body compartments and estimates the resultant blood lead concentration. The rate of the movement of lead between the plasma and each compartment is a function of the transition or residence time (i.e., the mean time for lead to leave the plasma and enter a given compartment, or the mean residence time for lead in that compartment). Compartments modeled include the erythrocytes, liver, kidneys, all the other soft tissue of the body, cortical bone, and trabecular bone. Excretory pathways and their rates are also modeled. These include the mean time for excretion from the plasma to the urine, from the liver to the bile, and from the other soft tissues to the hair, skin, sweat, etc. The model permits the user to adjust the transition and residence times.

U.S. EPA guidance established a soil cleanup level for lead of 400 parts per million (ppm) to be applied at Superfund sites. This range is considered by U.S. EPA to be protective for direct contact with lead-contaminated soils in residential settings. The guidance adopts recommendations of the Centers for Disease Control and is to be followed when current or predicted land use is residential.

21.3 Carcinogenicity

U.S. EPA has classified lead in cancer weight-of-evidence Group B2 (probable human carcinogen), based on inadequate evidence of cancer in humans and sufficient animal evidence. The human data consist of several epidemiologic occupational studies that yielded confusing results. All of the studies lacked quantitative exposure data and failed to control for smoking and concomitant exposure to other possibly carcinogenic metals. Rat and mouse bioassays showed statistically significant increases in renal tumors following dietary and subcutaneous exposure to several soluble lead salts. Various lead compounds were observed to induce chromosomal alterations in vivo and in vitro, sister chromatid exchange in exposed workers, and cell transformation in Syrian hamster embryo cells; to enhance simian adenovirus induction; and to alter molecular processes that regulate gene expression. U.S. EPA declined to estimate risk for oral exposure to lead because many factors (e.g., age, general health, nutritional status, existing body burden

and duration of exposure) influence the bioavailability of ingested lead, introducing a great deal of uncertainty into any estimate of risk.

22.0 MANGANESE

22.1 Noncancer Toxicity

Manganese is nutritionally required in humans for normal growth and health. Humans exposed to approximately 0.8 mg manganese/kg/day in drinking water exhibited lethargy, mental disturbances (1/16 committed suicide), and other neurologic effects. The elderly appeared to be more sensitive than children. Oral treatment of laboratory rodents induced biochemical changes in the brain, but rodents did not exhibit the neurological signs exhibited by humans. Occupational exposure to high concentrations in air induced a generally typical spectrum of neurological effects and an increased incidence of pneumonia.

U.S. EPA has established an oral RfD of 0.02 mg/kg/day for manganese based on drinking water and an oral RfD of 0.14 mg/kg/day based on food. The U.S. EPA presented a verified chronic inhalation RfC based on a LOAEL for impairment of neurobehaviorial function in occupationally exposed humans. The inhalation RfC is equivalent to 0.000014 mg/kg/day, assuming humans inhale 20 m^3 of air/day and weigh 70 kg. The CNS and respiratory tract are target organs of inhalation exposure to manganese.

22.2 Carcinogenicity

The U.S. EPA classifies manganese in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans). Quantitative cancer risk estimates are not derived from Group D chemicals.

23.0 MERCURY

Mercury is a naturally occurring element existing in multiple forms and in various oxidation states. It is used in a wide variety of products and processes. In the environment, mercury may undergo transformations among its various forms and among its oxidation states. Exposure to mercury may occur in both occupational and environmental settings, the latter primarily involving dietary exposure.

23.1 Noncancer Toxicity

Absorption, distribution, metabolism, and excretion of mercury is dependent upon its form and oxidation state. Organic forms of mercury are more readily absorbed than are inorganic forms. Ingestion of mercury metal is usually without effect. Ingestion of inorganic salts may cause severe gastrointestinal irritation, renal failure, and death with acute lethal doses in humans ranging from 1 to 4 g. Mercuric (divalent) salts are usually more toxic than are mercurous (monovalent) salts. Mercury is also known to induce

hypersensitivity reactions such as contact dermatitis and acrodynia (pink disease). Inhalation of mercury vapor may cause irritation of the respiratory tract, renal disorders, central nervous system effects characterized by neurobehavioral changes, peripheral nervous system toxicity, renal toxicity (immunologic glomerular disease), and death. Toxicity resulting from subchronic and chronic exposure to mercury and mercury compounds usually involves the kidneys and/or nervous system, the specific target and effect being dependent on the form of mercury. Organic mercury, especially methyl mercury, rapidly enters the central nervous system resulting in behavioral and neuromotor disorders. The developing central nervous system is especially sensitive to this effect, as documented by the epidemiologic studies in Japan and Iraq where ingestion of methyl mercury-contaminated food resulted in severe toxicity and death in adults and severe central nervous system effects in infants. Blood mercury levels of <10 µg/dL and 300 µg/dL corresponded to mild effects and death, respectively. Teratogenic effects due to organic or inorganic mercury exposure do not appear to be well documented for humans or animals, although some evidence exists for mercury-induced menstrual cycle disturbances and spontaneous abortions. A subchronic and chronic oral RfD of 0.0001 mg/kg/day for methyl mercury is based on a benchmark dose of 1.1 µg/kg/day relative to neurologic developmental abnormalities in human infants. A subchronic and chronic oral RfD of 0.0003 mg/kg/day for mercuric chloride is based on immunologic glomerulonephritis. A subchronic and chronic inhalation RfC of 0.0003 mg Hg/m^3 for inorganic mercury is based on neurological disorders (increased frequency of intention tremors) following long-term occupational exposure to mercury vapor. An inhalation RfC for methyl mercury has not been determined.

23.2 Carcinogenicity

No data were available regarding the carcinogenicity of mercury in humans or animals. U.S. EPA has placed inorganic mercury in weight-of-evidence classification D, not classifiable as to human carcinogenicity. Weight-of-evidence classifications of C (possible human carcinogen) have been assigned to mercuric chloride and methyl mercury by U.S. EPA based upon limited evidence of carcinogenicity in rodents. No slope factors have been calculated.

24.0 4-METHYLPHENOL

24.1 Pharmicokinetics

The assessment of exposure to cresols can be accomplished through measurement of o, m, or p-cresol. However, cresol in urine is often measured to determine exposure to toluene or other aromatic compounds, of which cresol is a metabolite. O-cresol is a frequently used test used as an indicator of toluene exposure. Although o- and m- cresols are not normally detected in urine, p-cresol is excreted daily in the urine as a result of the breakdown of tyrosine. Measurement of cresols in urine for assessing only cresol exposure is useful for identification of exposure only. Measurement of o- or m-cresol are the

better choices of tests, since they are not normally present in unexposed people. However since other compounds produce cresols as metabolites, it may be necessary to rule out these exposure prior to evaluation of results.

24.2 Noncancer Toxicity

The oral toxicity of 4-methylphenol is low; the $LD_{50/30}$ in rats is 1800 mg/kg (ACGIH 1991). Ingestion by animals or humans of mixed isomers of methylphenol was associated with corrosion of the GI tissues, kidney tubular, pancreatic and liver damage, and nodular pneumonia. Occupational exposure of humans or inhalation exposure of animals to mixed isomers of methylphenol was associated with neurological effects, impaired kidney function and irritation of the respiratory tract. The EPA (1997) presented a provisional chronic oral RfD of 0.005 mg/kg/day based on an NOAEL for decreased body weight and neurotoxicity in a gavage study in rats and an uncertainty factor of 1000. Principal target organs are the nervous system, respiratory mucosa, liver and kidney.

24.3 Carcinogenicity

Methylphenol isomers are tumor promoters in the two-stage mouse skin tumor initiation-promotion test (ACGIH 1991). The EPA (1999b) classifies 2-methylphenol as a cancer weight-of-evidence Group C compound (possible human carcinogen), but derives no quantitative risk estimates for either oral or inhalation exposure.

25.0 PERCHLORATE

Perchlorate (ClO4-) is an anion that originates as a contaminant in ground water and surface waters from the dissolution of ammonium, potassium, magnesium, or sodium salts. Because perchlorate is nonlabile kinetically (i.e., the reduction of the central chlorine atom occurs extremely slowly) and sorption or natural chemical reduction in the environment is not significant, perchlorate is exceedingly mobile in aqueous systems and can persist for many decades under typical ground and surface water conditions. Sources for the contamination include chemical fertilizer and various other chemical and industrial uses. One major source of contamination is the manufacture of ammonium perchlorate for use as the oxidizer component and primary ingredient in solid propellant for rockets, missiles, and fireworks. Perchlorate salts are also used on a large scale as a component of air bag inflators.

The concerns surrounding perchlorate contamination involves its ability to effect the thyroid gland, which can affect metabolism, growth, and development. The limited database on the toxicology of perchlorate confirms its potential to disrupt thyroid hormone production in mammalian test species, but no robust data exist to evaluate the dose-response for this thyroid effect or to evaluate other potential target tissues or

effects. There are no existing data to evaluate the effects of perchlorate in developing fetuses or other populations that may be potentially more susceptible or to evaluate its effects on ecological systems.

The provisional RfD values (1992 and 1995) were based on an acute study in which single doses of potassium perchlorate caused the release of iodide from the thyroids of patients with Graves' Disease. The no-observed-adverse-effect-level (NOAEL) was determined to be 0.14 mg/Kg-day based on release of iodine in the thyroid followed by incomplete inhibition of iodine uptake. Uncertainty factors that ranged from 300 to 1000 were applied to account for data missing on additional endpoints and extrapolations required to calculate a lifetime human exposure level. Standard assumptions for ingestion rate and body weight were then applied to the RfD to calculate the reported range in the ground water cleanup guidance levels of 4 -18 parts per billion (ppb). The California department of Health Services (CA DHS)adopted 18 ppb as its provisional action level.

26.0 POLYCHLORINATED BIPHENYLS

26.1 Noncancer Toxicity

Epidemiologic studies of women in the United States associated oral PCB exposure with low birth weight or retarded musculoskeletal or neurobehavioral development of their infants (ATSDR 1991). Oral studies in animals established the liver as the target organ in all species, and the thyroid as an additional target organ in the rat. Effects observed in monkeys included gastritis, anemia, chloracne-like dermatitis, and immunosuppression. Oral treatment of animals induced developmental effects, including retarded neurobehavioral and learning development in monkeys. Oral RfD values of 0.02 ug/kg/day for Aroclor-1254 and 0.07 ug/kg/day for Aroclor-1016 were located.

Occupational exposure to PCBs was associated with upper respiratory tract and ocular irritation, loss of appetite, liver enlargement, increased serum concentrations of liver enzymes, skin irritation, rashes and chloracne, and, in heavily exposed female workers, decreased birth weight of their infants (ATSDR 1991). Concurrent exposure to other chemicals confounded the interpretation of the occupational exposure studies. Laboratory animals exposed by inhalation to Aroclor-1254 vapors exhibited moderate liver degeneration, decreased body weight gain and slight renal tubular degeneration. Neither subchronic nor chronic inhalation RfC values were available.

Target organs for PCBs include the skin, liver, fetus, and neonate.

26.2 Carcinogenicity

The EPA (1997) classifies the PCBs as EPA cancer weight-of-evidence Group B2 substances (probable human carcinogens), based on inadequate data in humans and sufficient data in animals. The human data consist of several epidemiologic occupational and accidental oral exposure studies with serious limitations, including poorly quantified concentrations of PCBs and durations of exposure, and probable exposures to other potential carcinogens.

The animal data consist of several oral studies in rats and mice with various aroclors, kanechlors, or clophens (commercial PCB mixtures manufactured in the United States, Japan and Germany, respectively) that reported increased incidence of liver tumors in both species (EPA 1994).

The EPA (1998) presents a verified oral slope factor and an inhalation slope factor of 2.0 per mg/kg/day for PCBs based on liver tumors in rats treated with Aroclor-1260.

27.0 SILVER

27.1 Pharmacokinetics

The GI absorption of ingested silver in animals was estimated at □10 percent; however, absorption of 18 percent was estimated for one human subject given silver acetate (Fowler and Nordberg 1986). Highest tissue levels are located in the liver; lower levels are located in the lungs, brain, spleen, bone marrow, muscle, and skin (Fowler and Nordberg 1986; Goyer 1991). Excretion is virtually entirely through the bile. The excretion kinetics appear to be species- and organ-dependent. In humans, the apparent half-life for silver in the liver is approximately 50 days. Silver in skin also appeared to have a long half-life (not quantified).

27.2 Noncancer Toxicity

Silver compounds have been used in dentistry, medicinally in the treatment of burns, as a local disinfectant, and as a drinking water disinfectant (Fowler and Nordberg 1986). The classical syndrome of toxicity, called argyria, is a blue-gray to nearly black discoloration of areas of the skin or the viscera resulting from deposition of microscopic granules of silver compounds in the affected tissues. Argyria results from occupational (inhalation), parenteral, or oral exposure. The EPA (1993a) derived an RfD of 0.005 mg/kg/day for chronic oral exposure based on a 2 to 9 year human i.v. study, where a total i.v. dose of 1g metallic silver (in the form of 4g silver arsphenamine) resulted in minimal observed effects (argyria) in patients. This total i.v. dose for metallic silver was converted into an oral dose (LOAEL) of 0.014 mg/kg/day. The chronic oral RfD was derived by dividing the LOAEL by an uncertainty factor of 3,

which was applied to account for minimal effects in a subpopulation that has exhibited an increased propensity for the development of argyria.

27.3 Carcinogenicity

The EPA (1997) classifies silver in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans). The human data consist of no evidence in the literature of cancer despite frequent medical use of silver compounds. The animal data are limited to studies of implanted silver foil or injected metallic silver that provided unconvincing indications of a carcinogenic response relevant to humans.

28.0 THALLIUM

28.1 Noncancer Toxicity

Thallium is highly toxic; acute ingestion by humans or laboratory animals induced gastroenteritis, neurological dysfunction, and renal and liver damage. Chronic ingestion of more moderate doses characteristically caused alopecia. Thallium was used medicinally to induce alopecia in cases of ringworm of the scalp, sometimes with disastrous results. In industrial (inhalation, oral, dermal) exposure, neurologic signs preceded alopecia, suggesting that the nervous system is more sensitive than the hair follicle. The U.S. EPA presented verified chronic oral RfD values for several thallium compounds (thallium acetate, thallium acetate, thallium carbonate, thallium chloride, thallium nitrate, thallium sulfate, and thallic oxide) based on increased incidence of alopecia and increased serum levels of liver enzymes indicative of hepatocellular damage in rats treated with thallium sulfate for 90 days. Risks from exposure to thallium are evaluated using the chronic oral RfD for thallium, 0.00007 mg/kg/day, listed in the U.S. EPA Region 3 RBC tables.

28.2 Carcinogenicity

No information was located regarding the carcinogenicity of thallium.

29.0 TRICHLOROETHENE

Trichloroethene (TCE) is an industrial solvent used primarily in metal degreasing and cleaning operations. TCE can be absorbed through the lungs, mucous membranes, gastrointestinal tract, and the skin.

29.1 Pharmacokinetics

TCE is extensively metabolized in humans to trichloroacetic acid and trichloroethanol, as well as to several minor metabolites, with most of the absorbed dose excreted in urine.

29.2 Noncancer Toxicity

Human and animal data indicate that exposure to TCE can result in toxic effects on a number of organs and systems, including the liver, kidney, blood, skin, immune system, reproductive system, nervous system, and cardiovascular system. In humans, acute inhalation exposure to TCE causes central nervous system symptoms such as headache, dizziness, nausea, and unconsciousness. Among the reported effects from occupational exposure studies are fatigue, light-headedness, sleepiness, vision distortion, abnormal reflexes, tremors, ataxia, nystagmus, increased respiration, as well as neurobehavioral or psychological changes. Cardiovascular effects include tachycardia, extrasystoles, EKG abnormalities, and precordial pain. The use of TCE as an anesthetic has been associated with cardiac arrhythmias. Cases of severe liver and kidney damage, including necrosis, have been reported in humans following acute exposure to TCE, but these effects generally are not associated with long-term occupational exposures. In animals, TCE has produced liver enlargement with hepatic biochemical and/or histological changes and kidney enlargement, renal tubular alterations and/or toxic nephropathy. Also observed in animals were hematological effects and immunosuppression. Inhalation studies with rats indicate that TCE is a developmental toxicant causing skeletal ossification anomalies and other effects consistent with delayed maturation. TCE may cause dermatitis and dermographism.

Reference Doses (RfDs) and Reference Concentrations (RfCs) for subchronic and chronic oral and inhalation exposure to TCE are presently under review by EPA. However, EPA-NCEA has published an oral RfD of 0.006 mg/kg-day for TCE.

29.3 Carcinogenicity

Epidemiologic studies have been inadequate to determine if a correlation exists between exposure to TCE and increased cancer risk. Chronic oral exposure to TCE increased the incidences of hepatocellular carcinomas in mice and renal adenocarcinomas and leukemia in rats. Chronic inhalation exposure induced lung and liver tumors in mice and testicular Leydig cell tumors in rats. Although U.S. EPA's Science Advisory Board recommended a weight-of-evidence classification of C-B2 continuum (C = possible human carcinogen; B2 = probable human carcinogen), the agency has not adopted a current position on the weight-of-evidence classification. In an earlier evaluation, TCE was assigned to weight-of-evidence Group B2, probable human carcinogen, based on tumorigenic responses in rats and mice for both oral and inhalation exposure and on inadequate data in humans. Carcinogen slope factors

are 0.011 $(mg/kg/day)^{-1}$ and 0.006 $(mg/kg/day)^{-1}$ for oral and inhalation exposure, respectively. The corresponding unit risks are 3.2×10^{-7} $(\mu g/L)^{-1}$ and 1.7×10^{-6} $(\mu g/m^3)^{-1}$, respectively.

30.0 ZINC

30.1 Pharmacokinetics

Zinc is a nutritionally required trace element. Estimates of the efficiency of GI absorption of zinc in animals range from <10 to 90 percent. Estimates in normal humans range from approximately 20 to 77 percent. The net absorption of zinc appears to be homeostatically controlled, but it is unclear whether GI absorption, intestinal secretion, or both are regulated. Distribution of absorbed zinc is primarily to the liver, with subsequent redistribution to bone, muscle, and kidney. Highest tissue concentrations are found in the prostate. Excretion appears to be principally through the feces, in part from biliary secretion, but the relative importance of fecal and urinary excretion is species-dependent. The half-life of zinc absorbed from the GI tracts of humans in normal zinc homeostasis is approximately 162 to 500 days.

30.2 Noncancer Toxicity

Humans exposed to high concentrations of aerosols of zinc compounds may experience severe pulmonary damage and death. The usual occupational exposure is to freshly formed fumes of zinc, which can induce a reversible syndrome known as metal fume fever. Orally, zinc exhibits a low order of acute toxicity. Animals dosed with 100 times dietary requirement showed no evidence of toxicity. In humans, acute poisoning from foods or beverages prepared in galvanized containers is characterized by GI upset. Chronic oral toxicity in animals is associated with poor growth, GI inflammation, arthritis, lameness, and a microcytic, hypochromic anemia, possibly secondary to copper deficiency. The U.S. EPA calculated an RfD of 0.3 mg/kg/day for chronic oral exposure to zinc, based on anemia in humans.

30.3 Carcinogenicity

The U.S. EPA classifies zinc in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans) based on inadequate evidence for carcinogenicity in humans and animals. The human data consist largely of occupational exposure studies not designed to detect a carcinogenic response, and of reports that prostatic zinc concentrations were lower in cancerous than in noncancerous tissue. The animal data consist of several dietary, drinking water, and zinc injection studies, none of which provided convincing data for a carcinogenic response.

SOURCES

The information contained in the Toxicological Profiles has been extracted from the following sources:

Agency for Toxic Substances and Disease Registry, ToxFAQs (Online), http://www.atsdr.cdc.gov.toxfaq.html, July 2002.

Hazardous Substance Data Base (HSDB), Online, http://toxnet.nlm.nih/gov/cgi/sis, November 2001.

U.S. EPA (U.S. Environmental Protection Agency). July 2002. Integrated Risk Information System (IRIS) - On-Line Database, http://www.epa.gov/ngispgm3/iris/subst/index.html.

U.S. Department of Energy, November 2001. Toxicity Profiles (Summary), Risk Assessment Information System (RAIS), Office of Environmental Management, Oak Ridge Operations (ORO), http://risk.lsd.ornl.gov/rap_hp.shtml.

U.S. Environmental Protection Agency (USEPA), Region 9, November 2000. "Region 9 Preliminary Remediation Goals (PRGs) 2000", EPA Region 9, 75 Hawthorne Street, San Francisco, California, 94105.

U.S. Environmental Protection Agency (USEPA), Region 3, April 2002. Risk-Based Concentration Table. EPA Region III, 841 Chestnut Street, Philadelphia, Pennsylvania 19107.

USEPA, July 1997, Health Effects Assessment Summary Tables (HEAST)

APPENDIX D-2

SAMPLE CALCULATIONS

CALCULATION WORKSHEET

CLIENT: INDIV-NSWC, INDIAN HEAD, MARYLAND		**JOB NUMBER:** 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT CURRENT/FUTURE CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1989		
BY: D. SCHLOER	**CHECKED BY:**	**DATE:** 06/28/02

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of sediment at Mattawoman Creek.

EQUATION:

$$IEX = \frac{CS \times IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil/sediment (mg/kg)
IR	=	incidental soil ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFo $(mg/kg/day)^{-1}$
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	13.6	mg/kg	Chemical: Arsenic
IR	=	240	mg/day	
EF	=	60	days/year	
ED	=	1	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	365	days	
CSFo	=	1.5E+00	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CLIENT: INDIV-NSWC, INDIAN HEAD, MARYLAND		**JOB NUMBER:** 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT CURRENT/FUTURE CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1989		
BY: D. SCHLOER	**CHECKED BY:**	**DATE:** 06/28/02

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{13.6 \text{ mg/kg} \times 240 \text{ mg/day} \times 60 \text{ days/year} \times 1 \text{ years} \times 1.0E\text{-}06 \text{ kg/mg}}{70 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 1.09E-07 mg/kg/day

ICLR = 1.09E-07 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 1.64E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{13.6 \text{ mg/kg} \times 240 \text{ mg/day} \times 60 \text{ days/year} \times 1 \text{ years} \times 1.0E\text{-}06 \text{ kg/mg}}{70 \text{ kg} \times 365 \text{ days}}$$

IEXnc = 7.66E-06 mg/kg/day

HQ = 7.66E-06 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 2.55E-02

CALCULATION WORKSHEET

CLIENT: INDIV-NSWC, INDIAN HEAD, MARYLAND		**JOB NUMBER:** 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT CURRENT/FUTURE ADULT RECREATIONAL USER		
BASED ON: USEPA, DEC. 2001		
BY: D. SCHLOER	**CHECKED BY:**	**DATE:** 06/28/02

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with sediment at Mattawoman Creek.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil/sediment (mg/kg)
CF	=	conversion factor (1.0E-6 kg/mg)
SA	=	skin surface available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFd (mg/kg/day)$^{-1}$
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDd (mg/kg/day)

ASSUMPTIONS:

Cs	=	13.6	mg/kg	Chemical: Arsenic
CF	=	1.0E-06	kg/mg	
SA	=	6000	cm^2/day	
AF	=	0.07	mg/cm^2	
ABS	=	0.03	(unitless)	
EF	=	16	days/year	
ED	=	30	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	10950	days	
CSFd	=	1.5E+00	(mg/kg/day)$^{-1}$	
RfDd	=	3.0E-04	(mg/kg/day)	

CLIENT: INDIV-NSWC, INDIAN HEAD, MARYLAND		JOB NUMBER: 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT CURRENT/FUTURE ADULT RECREATIONAL USER		
BASED ON: USEPA, DEC. 2001		
BY: D. SCHLOER	CHECKED BY:	DATE: 06/28/02

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{13.6\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 6000\ cm2/day \times 0.07\ mg/cm2 \times 0.03 \times 16\ days/year \times 30\ years}{70\ kg \times 25550\ days}$$

DEXc = 4.60E-08 mg/kg/day

ICLR = 4.60E-08 mg/kg/day x 1.50E+00 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 6.90E-08

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{13.6\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 6000\ cm2/day \times 0.07\ mg/cm2 \times 0.03 \times 16\ days/year \times 30\ years}{70\ kg \times 10950\ days}$$

DEXnc = 1.07E-07 mg/kg/day

HQ = 1.07E-07 mg/kg/day / 3.00E-04 (mg/kg/day) = Hazard Quotient

HQ = 3.58E-04

CALCULATION WORKSHEET

CLIENT: INDIV-NSWC INDIAN HEAD, MARYLAND		**JOB NUMBER:** 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER CURRENT/FUTURE ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989		
BY: D. SCHLOER	**CHECKED BY:**	**DATE:** 06/28/02

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface water by an adolescent recreational user.

EQUATION:

$$IEX = \frac{Csw \times CF \times CRsw \times ET \times EF \times ED}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Csw	=	exposure point concentration in surface water (ug/L)
CF	=	conversion factor (1.0E-3 mg/ug)
CRsw	=	contact rate (L/hour)
ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFo $(mg/kg/day)^{-1}$
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Csw	=	1.27	ug/L	Chemical: Trichloroethene
CRsw	=	0.05	L/hour	
CF	=	1.0E-03	ug/mg	
ET	=	2	hours	
EF	=	16	days/year	
ED	=	10	years	
BW	=	43	kg	
ATc	=	25550	days	
ATnc	=	3650	days	
CSFo	=	4.0E-01	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CALCULATION WORKSHEET

CLIENT: INDIV-NSWC INDIAN HEAD, MARYLAND		**JOB NUMBER:** 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER CURRENT/FUTURE ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989		
BY: D. SCHLOER	**CHECKED BY:**	**DATE:** 06/28/02

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{1.27\ ug/L \times 1.0E\text{-}03\ ug/mg \times 0.05\ L/hour \times 2\ hours \times 16\ days/year \times 10\ years}{43\ kg \times 25550\ days}$$

IEXc = 1.85E-08 mg/kg/day

ICLR = 1.85E-08 mg/kg/day x 4.00E-01 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 7.40E-09

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{1.27\ ug/L \times 1.0E\text{-}03\ ug/mg \times 0.05\ L/hour \times 2\ hours \times 16\ days/year \times 10\ years}{43\ kg \times 3650\ days}$$

IEXnc = 1.29E-07 mg/kg/day

$$HQ = \frac{1.29E\text{-}07\ mg/kg/day}{3.00E\text{-}04\ (mg/kg/day)} = \text{Hazard Quotient}$$

HQ = 4.32E-04

CLIENT: IHDIV INDIAN HEAD, MARYLAND		**JOB NUMBER:** 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CURRENT/FUTURE ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989, 2001		
BY: D. SCHLOER	**CHECKED BY:**	**DATE:** 06/28/02

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with surface water by an adolescent recreational user.

EQUATION:

$$DAD = \frac{DAevent \times EV \times ED \times EF \times A}{BW \times AT}$$

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed does per event (mg/cm^2/event)
EV	=	event frequency (events/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
A	=	skin surface available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = DAD (mg/kg/day) x CSFd (mg/kg/day)$^{-1}$
HQ (Noncarcinogens) = DAD (mg/kg/day) / RFDd (mg/kg/day)

EQUATIONS for DAevent:

For Inorganics:

$$DA_{event} = (K_p)(C_{gw})(t_{event})$$

For Organics:

$$\text{If } t_{event} < t^*, \text{ then : } DA_{event} = (2K_p)(C_{gw})(CF)\left(\sqrt{\frac{6\tau t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then : } DA_{event} = (K_p)(C_{gw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B}{(1+B)}\right)\right)$$

CLIENT: IHDIV INDIAN HEAD, MARYLAND		**JOB NUMBER:** 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CURRENT/FUTURE ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989, 2001		
BY: D. SCHLOER	**CHECKED BY:**	**DATE:** 06/28/02

Where:

Kp	=	permeability coefficient from water (cm/hr)
Cgw	=	concentration of chemical in groundwater (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
t*	=	time it takes to reach steady-state (hr/event)
τ	=	lag time (hr/event)
B	=	Bunge Model Constant (dimensionless)

EXAMPLE CALCULATION OF DAevent

ASSUMPTIONS:

Cgw	=	0.00155	mg/L	Chemical: Benzene
Kp	=	1.49E-02	cm/hr	
tevent	=	2	hr/event	
CF	=	1.00E-03	L/cm^3	
t*	=	0.70	hr/event	
τ	=	0.29	hr/event	
B	=	0.050	unitless	

tevent > t*, therefore,

$$DAevent = (0.0149\ cm/hr)\ (0.00155\ mg/L)\ (0.001\ L/cm3)\ x \left[\frac{2\ hr/event}{1 + 0.05} + 2 \times 0.29\ hr/event \times \frac{(1 + 3 \times 0.05)}{(1 + 0.05)} \right]$$

DAevent = 5.87E-08 mg/cm^2-event

RISK CALCULATIONS

ASSUMPTIONS:

A	=	12,400	cm^2/day
EV	=	1	event/day
ED	=	10	years
EF	=	16	days/year
BW	=	43	kg
ATc	=	25550	days
ATnc	=	3650	days
CSFd	=	1.5E-02	(mg/kg/day)$^{-1}$
RfDd	=	3.0E-03	(mg/kg/day)

CLIENT: IHDIV INDIAN HEAD, MARYLAND		JOB NUMBER: 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CURRENT/FUTURE ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989, 2001		
BY: D. SCHLOER	CHECKED BY:	DATE: 06/28/02

EXAMPLE CARCINOGENIC CALCULATION

$$DADc = \frac{5.87E\text{-}08 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 10 \text{ years} \times 16 \text{ days/year} \times 12400 \text{ cm2/day}}{43 \text{ kg} \times 25550 \text{ days}}$$

DADc = 1.06E-07 mg/kg/day

DADc = 1.06E-07 mg/kg/day x 1.50E-02 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 1.59E-09

EXAMPLE NONCARCINOGENIC CALCULATION

$$DADnc = \frac{5.87E\text{-}08 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 10 \text{ years} \times 16 \text{ days/year} \times 12400 \text{ cm2/day}}{43 \text{ kg} \times 3650 \text{ days}}$$

DADnc = 7.42E-07 mg/kg/day

HQ = 7.42E-07 mg/kg/day / 3.00E-03 (mg/kg/day) = Hazard Quotient

HQ = 2.47E-04

CALCULATION WORKSHEET

CLIENT: INDIV-NSWC, INDIAN HEAD, MARYLAND		**JOB NUMBER:** 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF FISH/SHELLFISH CURRENT/FUTURE ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989		
BY: D. SCHLOER	**CHECKED BY:**	**DATE:** 06/28/02

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of fish/shellfish at Mattawoman Creek.

EQUATION:

$$IEX = \frac{CFfish \times IR \times EF \times ED \times FI}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
CFfish	=	exposure point concentration in fish tissue(mg/kg)
IR	=	incidental soil ingestion rate (kg/meal)
EF	=	exposure frequency (meals/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFo $(mg/kg/day)^{-1}$
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

CFfish	=	0.0024	mg/kg	Chemical: Dieldrin
IR	=	0.129	kg/meal	
EF	=	104	meals/year	
ED	=	10	years	
FI	=	1	unitless	
BW	=	43	kg	
ATc	=	25550	days	
ATnc	=	3650	days	
CSFo	=	1.6E+01	$(mg/kg/day)^{-1}$	
RfDo	=	5.0E-05	(mg/kg/day)	

CLIENT: INDIV-NSWC, INDIAN HEAD, MARYLAND		JOB NUMBER: 4019
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF FISH/SHELLFISH CURRENT/FUTURE ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989		
BY: D. SCHLOER	CHECKED BY:	DATE: 06/28/02

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{0.0024 \text{ mg/kg} \times 0.129 \text{ kg/meal} \times 104 \text{ meals/year} \times 10 \text{ years} \times 1}{43 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 2.93E-07 mg/kg/day

ICLR = 2.93E-07 mg/kg/day x 1.60E+01 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 4.69E-06

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{0.0024 \text{ mg/kg} \times 0.129 \text{ kg/meal} \times 104 \text{ meals/year} \times 10 \text{ years} \times 1 \text{ unitless}}{43 \text{ kg} \times 3650 \text{ days}}$$

IEXnc = 2.05E-06 mg/kg/day

HQ = 2.05E-06 mg/kg/day / 5.00E-05 (mg/kg/day) = Hazard Quotient

HQ = 4.10E-02

APPENDIX D-3

RAGS PART D TABLES

RAGS Part D Table 1

Selection of Exposure Pathways

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Sediment	Sediment	Mattawoman Creek	Construction Workers	Adult	Ingestion	On-Site	Quant	Construction workers may contact sediment during construction activities.
						Dermal	On-Site	Quant	
				Recreational Users	Adolescents	Ingestion	On-Site	Quant	Recreational users may be exposed to sediment in Mattawoman Creek.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Recreational users may be exposed to sediment in Mattawoman Creek.
						Dermal	On-Site	Quant	
				Off-Site Residents	Child	Ingestion	On-Site	None	Off-Site residents are considered to be part of the recreational user group; therefore, off-site residents are not evaluated as a separate receptor group.
						Dermal	On-Site	None	
					Adult	Ingestion	On-Site	None	
						Dermal	On-Site	None	
	Surface Water	Surface Water	Mattawoman Creek	Construction Workers	Adult	Ingestion	On-Site	None	Construction workers are not anticipated to ingested surface water.
						Dermal	On-Site	Quant	Construction workers may contact surface water during construction activities.
				Recreational Users	Adolescents	Ingestion	On-Site	Quant	Recreational users may be exposed to surface water in Mattawoman Creek.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Recreational users may be exposed to surface water in Mattawoman Creek.
						Dermal	On-Site	Quant	
				Off-Site Residents	Child	Ingestion	On-Site	None	Off-Site residents are considered to be part of the recreational user group; therefore, off-site residents are not evaluated as a separate receptor group.
						Dermal	On-Site	None	
					Adult	Ingestion	On-Site	None	
						Dermal	On-Site	None	
		Fish	Mattawoman Creek	Recreational Users	Adolescents	Ingestion	On-site	Quant	Recreational users may fish at the site.
					Adult	Ingestion	On-site	Quant	Recreational users may fish at the site.

RAGS Part D Table 2

Occurrence, Distribution And Selection Of Chemicals Of Potential Concern

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE WATER - MATTAWOMAN CREEK
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency (1)	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	U.S. EPA Region 3 RBC-Tap Water (5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Volatile Organic Compounds																
67-64-1	ACETONE	5	J	5	J	ug/L	MTCSW00801	1/5	10	5	NA	61 N	NA	NA	No	BSL
71-43-2	BENZENE	0.7	J	8		ug/L	MTCSW01001	5/38	1 - 10	8	NA	0.32 C	NA	NA	Yes	ASL
75-25-2	BROMOFORM	0.5	J	0.5	J	ug/L	MTCSW00301	1/38	1 - 10	0.5	NA	8.5 C	NA	NA	No	BSL
156-59-2	CIS-1,2-DICHLOROETHENE	4		4		ug/L	MTCSW02101	1/38	1 - 10	4	NA	6.1 N	NA	NA	No	BSL
60-29-7	DIETHYL ETHER	6	J	6	J	ug/L	MTCSW02101	1/28	1 - 10	6	NA	120 N	NA	NA	No	BSL
100-41-4	ETHYLBENZENE	0.6	J	7		ug/L	MTCSW01001	5/38	1 - 10	7	NA	3.3 C	NA	NA	Yes	ASL
1634-04-4	METHYL TERT-BUTYL ETHER	1	J	1	J	ug/L	IS11SW01	1/4	10	1	NA	2.6 C	NA	NA	No	BSL
108-88-3	TOLUENE	0.6	J	30		ug/L	MTCSW01501	8/38	1 - 10	30	NA	75 N	NA	NA	No	BSL
1330-20-7	TOTAL XYLENES	1		48		ug/L	MTCSW01001	7/38	1 - 10	48	NA	1200 N	NA	NA	No	BSL
79-01-6	TRICHLOROETHENE	1		6		ug/L	MTCSW02101	2/38	1 - 10	6	NA	0.026 C	NA	NA	Yes	ASL
Semivolatile Organic Compounds																
91-57-6	2-METHYLNAPHTHALENE	2	J	2	J	ug/L	MTCSW01001	1/38	5 - 10	2	NA	12 N	NA	NA	No	BSL
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	1	J	1	J	ug/L	IS11SW01, MTCSW00501, MTCSW02301-D, MTCSW02601, S39SW0020001, S39SW0040001, MTCSW02401	7/38	5 - 10	1	NA	4.8 C	NA	NA	No	BSL
91-20-3	NAPHTHALENE	2	J	2	J	ug/L	MTCSW01001	1/38	5 - 10	2	NA	0.65 N	NA	NA	No	FREQ
Energetics																
99-65-0	1,3-DINITROBENZENE	0.075	J	0.075	J	ug/L	IS11SW01	1/38	0.1 - 0.2	0.075	NA	0.37 N	NA	NA	No	BSL
99-99-0	4-NITROTOLUENE	0.11	J	0.11	J	ug/L	IS17SW02	1/38	0.2 - 0.56	0.11	NA	6.1 N	NA	NA	No	BSL
2691-41-0	HMX	0.15	J	0.15	J	ug/L	MTCSW01001	1/38	0.1 - 0.5	0.15	NA	180 N	NA	NA	No	BSL
Inorganics																
7429-90-5	ALUMINUM	124		918		ug/L	S39SW0020001-D	23/44	4.6 - 190	918	NA	3700 N	NA	NA	No	BSL
7440-38-2	ARSENIC	4.2	K	8.3	K	ug/L	MTCSW02101	7/44	3.3 - 4.2	8.3	NA	0.045 C	NA	NA	Yes	ASL
7440-39-3	BARIUM	19	J	76.8		ug/L	S39SW0050001	44/44	NA	76.8	NA	260 N	NA	NA	No	BSL
7440-41-7	BERYLLIUM	0.12		0.12		ug/L	MTCSW00601	1/44	0.1 - 0.42	0.12	NA	7.3 N	NA	NA	No	BSL
7440-43-9	CADMIUM	0.11	K	0.21	K	ug/L	MTCSW02301-D	3/44	0.1 - 0.4	0.21	NA	1.8 N	NA	NA	No	BSL
7440-70-2	CALCIUM	9490		34400		ug/L	S39SW0030001	44/44	NA	34400	NA	NA	NA	NA	No	NUT
7440-47-3	CHROMIUM	0.57	K	3.4	K	ug/L	MTCSW00401	2/44	0.4 - 2.4	3.4	NA	11 (7) N	NA	NA	No	BSL
7440-48-4	COBALT	6.3		6.3		ug/L	S39SW0020001-D	1/44	0.4 - 2.3	6.3	NA	73 N	NA	NA	No	BSL
7440-50-8	COPPER	2.4	J	28.1	K	ug/L	MTCSW02101	8/44	1.1 - 9.1	28.1	NA	150 N	NA	NA	No	BSL
57-12-5	CYANIDE	1.1	L	10		ug/L	MTCSW00501, IS17SW02	5/44	0.98 - 10.3	10	NA	73 N	NA	NA	No	BSL
7439-89-6	IRON	84.8		1620	K	ug/L	S39SW0020001-D	44/44	NA	1620	NA	1100 N	NA	NA	Yes	ASL
7439-92-1	LEAD	1.3	J	38.4		ug/L	IS11SW01	9/44	1.2 - 4.1	38.4	NA	15 (8)	NA	NA	Yes	ASL
7439-95-4	MAGNESIUM	5140		34300		ug/L	S39SW0030001	44/44	0	34300	NA	NA	NA	NA	No	NUT
7439-96-5	MANGANESE	9.3	K	202		ug/L	S39SW0020001-D	44/44	1.6	202	NA	73 N	NA	NA	Yes	ASL
7440-02-0	NICKEL	1.9		4		ug/L	S39SW0020001-D	11/44	1.9 - 8.2	4	NA	73 N	NA	NA	No	BSL
7440-09-7	POTASSIUM	2630	J	12400		ug/L	S39SW0010001, S39SW0030001, S39SW0040001	44/44	NA	12400	NA	NA	NA	NA	No	NUT
7782-49-2	SELENIUM	5.8		5.8		ug/L	IS17SW05	1/44	2.8 - 860	5.8	NA	18 N	NA	NA	No	BSL
7440-22-4	SILVER	1.1		6		ug/L	S39SW0020001-D	1/44	0.6 - 3.1	6	NA	18 N	NA	NA	No	BSL
7440-23-5	SODIUM	11900		211000	J	ug/L	S39SW0030001	44/44	NA	211000	NA	NA	NA	NA	No	NUT
7440-62-2	VANADIUM	0.73	K	7.4		ug/L	MTCSW02101	36/44	0.99 - 2.1	7.4	NA	26 N	NA	NA	No	BSL
7440-66-6	ZINC	16		90.4		ug/L	S39SW0050001	6/44	0.7 - 53.5	90.4	NA	1100 N	NA	NA	No	BSL
Dissolved Metals																
7440-38-2	ARSENIC	3.75	K	5.4	K	ug/L	MTCSW01201-F	4/38	3.6 - 4.2	5.4	NA	0.045 C	NA	NA	Yes	ASL
7440-39-3	BARIUM	17	J	62.3		ug/L	MTCSW01901-F	36/38	22.4 - 80.3	62.3	NA	260 N	NA	NA	No	BSL
7440-43-9	CADMIUM	0.11	K	6.5	K	ug/L	MTCSW02501-F	16/38	0.1 - 0.5	6.5	NA	1.8 N	NA	NA	Yes	ASL
7440-70-2	CALCIUM	9120		16300		ug/L	MTCSW02101-F	38/38	NA	16300	NA	NA	NA	NA	No	NUT
7440-47-3	CHROMIUM	9.7	K	9.7	K	ug/L	MTCSW00201-F-D	1/38	0.46 - 4.4	9.7	NA	11 (7) N	NA	NA	No	BSL
7440-50-8	COPPER	2.2	J	69.1		ug/L	MTCSW02101-F	5/38	1 - 29.7	69.1	NA	150 N	NA	NA	No	BSL
7439-89-6	IRON	28.2	J	456		ug/L	IS17SW01	10/38	12.8 - 74.9	456	NA	2200 N	NA	NA	No	BSL
7439-92-1	LEAD	1.3		66.9		ug/L	MTCSW02401-F	4/38	1.2 - 1.6	66.9	NA	15 (8)	NA	NA	Yes	ASL

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SURFACE WATER - MATTAWOMAN CREEK
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek

7439-95-4	MAGNESIUM	4840	J	8780		ug/L	MTCSW00401-F	36/38	5960 - 6050	8780	NA	NA	NA	NA	No	NUT
7439-96-5	MANGANESE	1.7	J	86.7		ug/L	IS17SW01	14/38	0.81 - 11.6	86.7	NA	73 N	NA	NA	Yes	ASL
7440-02-0	NICKEL	3.1	J	17.9	J	ug/L	IS17SW01	5/38	1.8 - 6.8	17.9	NA	73 N	NA	NA	No	BSL
7440-09-7	POTASSIUM	2400	J	3980		ug/L	MTCSW00401-F, MTCSW02101-F	38/38	NA	3980	NA	NA	NA	NA	No	NUT
7782-49-2	SELENIUM	4.9	J	4.9	J	ug/L	IS17SW04	1/38	4.3	4.9	NA	18 N	NA	NA	No	BSL
7440-23-5	SODIUM	11300		26500		ug/L	MTCSW01001-F	38/38	NA	26500	NA	NA	NA	NA	No	NUT
7440-62-2	VANADIUM	0.48		3.4		ug/L	MTCSW02101-F	26/38	0.4 - 1.4	3.4	NA	26 N	NA	NA	No	BSL
7440-66-6	ZINC	29.9		29.9		ug/L	IS17SW04	1/38	5.3 - 119	29.9	NA	1100 N	NA	NA	No	BSL
Miscellaneous Parameters																
14797-55-8	NITRATE	0.047	J	0.19	J	mg/L	MTCSW02101	5/23	0.05	0.19	NA	5.8 N	NA	NA	No	BSL
14797-73-0	PERCHLORATE	1.36	J	3.05	J	ug/L	IS11SW04	3/38	3.39 - 5	3.05	NA	0.11 (9)N	NA	NA	Yes	ASL

Notes:
(1) - Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
(2) - Values presented are sample-specific quantitation limits.
(3) - The maximum detected concentration is used for screening purposes.
(4) - No Background data available.
(5) - U.S. EPA Region 3 Risk-Based Concentration Table, April 2, 2002. (RBCs for noncarcinogenic compounds are divided by 10 to correspond to a HI of 0.1).
(6) - Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
No Toxicity Information (NTX)
Detection frequency less than 5% (FREQ)
(7) - Value is for hexavalent chromium.
(8) - OSWER action level. USEPA, 2000: Drinking Water Standards and Health Advisories.
(9) - Calculated value using U.S. EPA Region 3 RBC guidance.
Shading indicates that the maximum detected concentration exceeded the screening criteria therefore the chemical was retained as a COPC.

Definitions:
NA = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

Associated Samples:

IS11SW01	IS17SW03	MTCSW00301	MTCSW01001	MTCSW01601	MTCSW02301	MTCSW03001	S39SW0060001
IS11SW02	IS17SW04	MTCSW00401	MTCSW01101	MTCSW01701	MTCSW02301-D	S39SW0010001	
IS11SW03	IS17SW05	MTCSW00501	MTCSW01201	MTCSW01801	MTCSW02401	S39SW0020001	
IS11SW04	IS17SW06	MTCSW00601	MTCSW01201-D	MTCSW01901	MTCSW02501	S39SW0020001-D	
IS17SW01	MTCSW00101	MTCSW00701	MTCSW01301	MTCSW02001	MTCSW02601	S39SW0030001	
IS17SW01P	MTCSW00201	MTCSW00801	MTCSW01401	MTCSW02101	MTCSW02601-D	S39SW0040001	
IS17SW02	MTCSW00201-D	MTCSW00901	MTCSW01501	MTCSW02201	MTCSW02901	S39SW0050001	

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - MATTAWOMAN CREEK
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	U.S. EPA Region 3 RBC-Residential (5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
Volatile Organic Compounds																
78-93-3	2-BUTANONE	14	J	390		ug/kg	S39SD0070001	3/40	10 - 50	390	NA	4700000 N	NA	NA	No	BSL
67-64-1	ACETONE	7	J	2400	J	ug/kg	S39SD0070001	26/40	8.7 - 160	2400	NA	780000 N	NA	NA	No	BSL
75-15-0	CARBON DISULFIDE	2	J	45	J	ug/kg	MTCSD00901	26/40	10 - 16	45	NA	780000 N	NA	NA	No	BSL
67-66-3	CHLOROFORM	10	J	12	J	ug/kg	MTCSD02301-D	2/40	10 - 50	12	NA	78000 N	NA	NA	No	BSL
74-87-3	CHLOROMETHANE	14	J	14	J	ug/kg	IS11SD010001	1/40	10 - 50	14	NA	49000 C	NA	NA	No	BSL
156-59-2	CIS-1,2-DICHLOROETHENE	2	J	2	J	ug/kg	MTCSD02101	1/32	10 - 50	2	NA	78000 N	NA	NA	No	BSL
60-29-7	DIETHYL ETHER	6	J	57	J	ug/kg	MTCSD02101	2/28	10 - 50	57	NA	1600000 N	NA	NA	No	BSL
1634-04-4	METHYL TERT-BUTYL ETHER	3	J	3	J	ug/kg	MTCSD02201	1/32	10 - 50	3	NA	160000 C	NA	NA	No	BSL
108-88-3	TOLUENE	0.8	J	4	J	ug/kg	MTCSD01901	4/40	10 - 50	4	NA	1600000 N	NA	NA	No	BSL
79-01-6	TRICHLOROETHENE	5	J	5	J	ug/kg	MTCSD02101	1/40	10 - 50	5	NA	1600 C	NA	NA	No	BSL
Semivolatile Organic Compounds																
99-35-4	1,3,5-TRINITROBENZENE	0.094	J	0.094	J	ug/kg	IS17SD020001	1/38	0.25 - 40.2	0.094	NA	230000 N	NA	NA	No	BSL
606-20-2	2,6-DINITROTOLUENE	0.1	J	0.1	J	ug/kg	IS17SD030001	1/46	0.0476 - 1000	0.1	NA	7800 N	NA	NA	No	BSL
91-57-6	2-METHYLNAPHTHALENE	48	J	85	J	ug/kg	MTCSD02101	2/40	390 - 1600	85	NA	160000 N	NA	NA	No	BSL
106-44-5	4-METHYLPHENOL	80	J	80	J	ug/kg	MTCSD01201-D	1/40	390 - 1600	80	NA	39000 N	NA	NA	No	BSL
83-32-9	ACENAPHTHENE	50	J	120	J	ug/kg	MTCSD02101	2/40	390 - 1600	120	NA	470000 N	NA	NA	No	BSL
208-96-8	ACENAPHTHYLENE	52	J	340	J	ug/kg	MTCSD01201-D	2/40	390 - 1600	340	NA	470000 (7)N	NA	NA	No	BSL
120-12-7	ANTHRACENE	69	J	540	J	ug/kg	MTCSD01201-D	4/40	390 - 1600	540	NA	2300000 N	NA	NA	No	BSL
56-55-3	BENZO(A)ANTHRACENE	70	J	1700	J	ug/kg	MTCSD01201-D	11/40	390 - 1600	1700	NA	870 C	NA	NA	Yes	ASL
50-32-8	BENZO(A)PYRENE	77	J	1800	J	ug/kg	MTCSD01201-D	11/40	390 - 1600	1800	NA	87 C	NA	NA	Yes	ASL
205-99-2	BENZO(B)FLUORANTHENE	51	J	2000	J	ug/kg	MTCSD01201-D	21/40	390 - 1600	2000	NA	870 C	NA	NA	Yes	ASL
191-24-2	BENZO(G,H,I)PERYLENE	51	J	1100	J	ug/kg	MTCSD01201-D	6/40	390 - 1600	1100	NA	230000 (8)N	NA	NA	No	BSL
207-08-9	BENZO(K)FLUORANTHENE	50	J	1500	J	ug/kg	MTCSD02101	7/40	390 - 1600	1500	NA	8700 C	NA	NA	No	BSL
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	48	J	410	J	ug/kg	S39SD0040001	6/40	50 - 1600	410	NA	46000 C	NA	NA	No	BSL
86-74-8	CARBAZOLE	96	J	140	J	ug/kg	MTCSD02101	3/40	390 - 1600	140	NA	32000 C	NA	NA	No	BSL
218-01-9	CHRYSENE	46	J	1700	J	ug/kg	MTCSD01201-D	17/40	390 - 1600	1700	NA	87000 C	NA	NA	No	BSL
84-74-2	DI-N-BUTYL PHTHALATE	470	J	640	J	ug/kg	S39SD0080001	4/40	390 - 1600	640	NA	780000 N	NA	NA	No	BSL
53-70-3	DIBENZO(A,H)ANTHRACENE	55	J	220	J	ug/kg	MTCSD01201-D	4/40	390 - 1600	220	NA	87 C	NA	NA	Yes	ASL
132-64-9	DIBENZOFURAN	80	J	94	J	ug/kg	MTCSD02101	2/40	390 - 1600	94	NA	31000 N	NA	NA	No	BSL
84-66-2	DIETHYL PHTHALATE	65	J	840		ug/kg	MTCSD01501	3/40	390 - 1600	840	NA	6300000 N	NA	NA	No	BSL
206-44-0	FLUORANTHENE	56	J	4000	J	ug/kg	MTCSD01201-D	21/40	390 - 1600	4000	NA	310000 N	NA	NA	No	BSL
86-73-7	FLUORENE	64	J	200	J	ug/kg	MTCSD02101	3/40	390 - 1600	200	NA	310000 N	NA	NA	No	BSL
193-39-5	INDENO(1,2,3-CD)PYRENE	55	J	1100	J	ug/kg	MTCSD01201-D	7/40	390 - 1600	1100	NA	870 C	NA	NA	Yes	ASL
86-30-6	N-NITROSODIPHENYLAMINE	42	J	4800	J	ug/kg	MTCSD02101	10/40	390 - 1600	4800	NA	130000 C	NA	NA	No	BSL
91-20-3	NAPHTHALENE	50	J	71	J	ug/kg	MTCSD02101	2/40	390 - 1600	71	NA	160000 N	NA	NA	No	BSL
85-01-8	PHENANTHRENE	77	J	2600	J	ug/kg	MTCSD01201-D	10/40	390 - 1600	2600	NA	230000 (8)N	NA	NA	No	BSL
129-00-0	PYRENE	48	J	4000	J	ug/kg	MTCSD01201-D	22/40	390 - 1600	4000	NA	230000 N	NA	NA	No	BSL
Pesticides/PCBs																
72-54-8	4,4'-DDD	6	J	7.7	J	ug/kg	S39SD0070001	2/36	3.7 - 16	7.7	NA	2700 C	NA	NA	No	BSL
72-55-9	4,4'-DDE	4.1	J	6	J	ug/kg	S39SD0070001	2/36	3.7 - 16	6	NA	1900 C	NA	NA	No	BSL
319-84-6	ALPHA-BHC	0.7	J	0.7	J	ug/kg	S39SD0030001	1/36	1.9 - 8.1	0.7	NA	100 C	NA	NA	No	BSL
12672-29-6	AROCLOR-1248	170		170		ug/kg	MTCSD00401	1/36	37 - 160	170	NA	320 C	NA	NA	No	BSL
Energetics																
99-65-0	1,3-DINITROBENZENE	0.069	J	0.069	J	mg/kg	IS17SD020001	1/46	0.0372 - 0.25	0.069	NA	0.78 N	NA	NA	No	BSL
118-96-7	2,4,6-TRINITROTOLUENE	0.066	J	0.1	J	mg/kg	IS17SD020001	2/46	0.0356 - 0.25	0.1	NA	21 C	NA	NA	No	BSL
35572-78-2	2-AMINO-4,6-DINITROTOLUENE	0.22	J	0.22	J	mg/kg	IS17SD050001	1/46	0.0467 - 0.25	0.22	NA	0.47 N	NA	NA	No	BSL
99-08-1	3-NITROTOLUENE	0.18	J	0.22	J	mg/kg	IS17SD020001	2/46	0.0818 - 0.25	0.22	NA	160 N	NA	NA	No	BSL
99-99-0	4-NITROTOLUENE	0.14	J	0.14	J	mg/kg	IS11SD040001	1/46	0.0872 - 0.25	0.14	NA	78 N	NA	NA	No	BSL
2691-41-0	HMX	0.1	J	0.1	J	mg/kg	MTCSD02401	1/46	0.0705 - 0.5	0.1	NA	390 N	NA	NA	No	BSL
9004-70-0	NITROCELLULOSE	2	J	4780		mg/kg	MTCSD02101	30/36	0.52 - 16.4	4780	NA	NA	NA	NA	No	NTX
Inorganics																
7429-90-5	ALUMINUM	245		19600		mg/kg	S39SD0070001	46/46	NA	19600	NA	7800 N	NA	NA	Yes	ASL
7440-36-0	ANTIMONY	0.69	L	63.9	L	mg/kg	IS11SD020001	8/46	0.4 - 5.2	63.9	NA	3.1 N	NA	NA	Yes	ASL
7440-38-2	ARSENIC	1.1	K	70.7	J	mg/kg	MTCSD02601	36/46	0.69 - 10.3	70.7	NA	0.43 C	NA	NA	Yes	ASL
7440-39-3	BARIUM	5.5		169		mg/kg	IS11SD010001	46/46	NA	169	NA	550 N	NA	NA	No	BSL
7440-41-7	BERYLLIUM	0.061	J	1.6	J	mg/kg	MTCSD01901	40/46	0.055 - 0.22	1.6	NA	16 N	NA	NA	No	BSL
7440-43-9	CADMIUM	0.074	K	116	J	mg/kg	MTCSD02601	38/46	0.07 - 0.8	116	NA	3.9 N	NA	NA	Yes	ASL
7440-70-2	CALCIUM	85		22100	J	mg/kg	IS11SD020001	44/46	151 - 198	22100	NA	NA	NA	NA	No	NUT
7440-47-3	CHROMIUM	1.8	K	69.7	L	mg/kg	IS11SD040001	46/46	NA	69.7	NA	23 (9)N	NA	NA	Yes	ASL
7440-48-4	COBALT	1.5		34.7		mg/kg	S39SD0020001	44/46	1.4 - 5.1	34.7	NA	160 N	NA	NA	No	BSL

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - DIRECT CONTACT WITH SEDIMENT - MATTAWOMAN CREEK
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND
PAGE 2 OF 2

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	U.S. EPA Region 3 RBC-Residential (5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
7440-50-8	COPPER	3	J	757	L	mg/kg	IS11SD010001	43/46	0.3 - 4.7	757	NA	310 N	NA	NA	Yes	ASL
57-12-5	CYANIDE	0.12	J	4.7	J	mg/kg	MTCSD00201	4/46	0.14 - 2.7	4.7	NA	160 N	NA	NA	No	BSL
7439-89-6	IRON	1710		134000	J	mg/kg	IS11SD030001	46/46	NA	134000	NA	2300 N	NA	NA	Yes	ASL
7439-92-1	LEAD	1.7		76400	J	mg/kg	IS11SD010001	46/46	NA	76400	NA	400 (10)	NA	NA	Yes	ASL
7439-95-4	MAGNESIUM	108	J	3190	J	mg/kg	IS11SD020001	43/46	56.2 - 106	3190	NA	NA	NA	NA	No	NUT
7439-96-5	MANGANESE	28.2		1470	J	mg/kg	MTCSD01901	46/46	0	1470	NA	160 N	NA	NA	Yes	ASL
7439-97-6	MERCURY	0.02		8.7		mg/kg	S39SD0070001	32/45	0.05 - 0.17	8.7	NA	2.3 N	NA	NA	Yes	ASL
7440-02-0	NICKEL	1.3	K	46.4	L	mg/kg	IS11SD040001	44/46	1.2 - 2	46.4	NA	160 N	NA	NA	No	BSL
2023695	POTASSIUM	74.7		1530	J	mg/kg	MTCSD00901	45/46	8.9 - 44.8	1530	NA	NA	NA	NA	No	NUT
7782-49-2	SELENIUM	1.7	L	1.7	L	mg/kg	IS11SD030001	1/45	0.65 - 3.9	1.7	NA	39 N	NA	NA	No	BSL
7440-22-4	SILVER	0.12	L	308		mg/kg	S39SD0040001	33/46	0.099 - 0.82	308	NA	39 N	NA	NA	Yes	ASL
7440-23-5	SODIUM	372	J	23000	J	mg/kg	MTCSD02601	4/46	34.9 - 607	23000	NA	NA	NA	NA	No	NUT
7440-28-0	THALLIUM	1.1	K	4.2		mg/kg	IS11SD010001	9/46	0.64 - 3.6	4.2	NA	0.55 N	NA	NA	Yes	ASL
7440-62-2	VANADIUM	3.5	K	53.4		mg/kg	MTCSD02101	46/46	NA	53.4	NA	55 N	NA	NA	No	BSL
7440-66-6	ZINC	8.8	J	71000	J	mg/kg	MTCSD02601	40/46	3.5 - 149	71000	NA	2300 N	NA	NA	Yes	ASL

Notes:
(1) - Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
(2) - Values presented are sample-specific quantitation limits.
(3) - The maximum detected concentration is used for screening purposes.
(4) - No Background data available for this site.
(5) - U.S. EPA Region 3 Risk-Based Concentration Table, April 2, 2002. (RBCs for noncarcinogenic compounds are divided by 10 to correspond to a HI of 0.1).
(6) - Rationale Codes — Selection Reason: Above Screening Levels (ASL); Deletion Reason: Essential Nutrient (NUT), Below Screening Level (BSL), No Toxicity Information (NTX)
(7) - Value is for acenaphthene.
(8) - Value is for pyrene.
(9) - Value is for hexavalent chromium.
(10) - OSWER screening level. U.S. EPA, 1994; Guidance on Residential Lead-Based Paint, Lead Contaminated Dust, and Lead Contaminated Soil.
Shaded cells indicate that the specified criterion has been exceeded or that the chemical has been selected as a COPC.

Definitions:
NA = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

IS11SD010001	MTCSD00101	MTCSD01001	MTCSD01901	MTCSD02601-A-D	S39SD0070001
IS11SD020001	MTCSD00201	MTCSD01101	MTCSD02001	MTCSD02601-D	S39SD0080001
IS11SD030001	MTCSD00201-D	MTCSD01201	MTCSD02101	MTCSD02901	
IS11SD040001	MTCSD00301	MTCSD01201-D	MTCSD02201	MTCSD03001	
IS17SD010001	MTCSD00401	MTCSD01301	MTCSD02301	S39SD0010001	
IS17SD020001	MTCSD00501	MTCSD01401	MTCSD02301-D	S39SD0020001	
IS17SD030001	MTCSD00601	MTCSD01501	MTCSD02401	S39SD0030001	
IS17SD040001	MTCSD00701	MTCSD01601	MTCSD02501	S39SD0040001	
IS17SD050001	MTCSD00801	MTCSD01701	MTCSD02601	S39SD0050001	
IS17SD060001	MTCSD00901	MTCSD01801	MTCSD02601-A	S39SD0060001	

TABLE 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - FISH TISSUE
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Fish Tissue
Exposure Point: Mattawoman Creek

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	U.S. EPA Region 3 RBC (5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)
	Semivolatile Organic Compounds															
106-44-5	4-Methylphenol	80	J	64000		ug/kg	MTCCT00302	11/16	330	64000		680 N	NA	NA	Yes	ASL
100-52-7	Benzaldehyde	43	J	91	J	ug/kg	MTCLB005	5/16	330 - 9800	91		14000 N	NA	NA	No	BSL
117-81-7	Bis(2-Ethylhexyl)Phthalate	75	J	2200		ug/kg	MTCCT00403	14/16	330	2200		230 C	NA	NA	Yes	ASL
108-95-2	Phenol	54	J	150	J	ug/kg	MTCCT005	3/16	330 - 9800	150		81000 N	NA	NA	No	BSL
	Pesticides/PCBs															
72-55-9	4,4'-DDE	4.2		110		ug/kg	MTCCT00301	12/16	3.3	110		9.3 C	NA	NA	Yes	ASL
11096-82-5	Aroclor-1260	39		380	J	ug/kg	MTCCT00301	12/16	33	380		1.6 C	NA	NA	Yes	ASL
60-57-1	Dieldrin	7.3	J	7.3	J	ug/kg	MTCCT00301	1/15	3.3	7.3		0.2 C	NA	NA	Yes	ASL
959-98-8	Endosulfan I	2.1	J	2.1	J	ug/kg	MTCCT00102	1/16	1.7	2.1		810 (7) N	NA	NA	No	BSL
72-20-8	Endrin	5		5		ug/kg	MTCCT00402	1/16	3.3	5		41 N	NA	NA	No	BSL
5103-74-2	Gamma-Chlordane	3.2	J	8.5	J	ug/kg	MTCCT00301	3/14	1.7	8.5		9 (8) C	NA	NA	No	BSL
	Energetics															
99-65-0	1,3-Dinitrobenzene	0.057	J	0.057	J	mg/kg	MTCCT005	1/16	0.25	0.057		0.014 N	NA	NA	Yes	ASL
35572-78-2	2-Amino-4,6-Dinitrotoluene	0.096	J	0.096	J	mg/kg	MTCCT00402	1/16	0.25	0.096		0.0081 N	NA	NA	Yes	ASL
2691-41-0	HMX	0.083	J	0.083	J	mg/kg	MTCCT005	1/16	0.25	0.083		6.8 N	NA	NA	No	BSL
9004-70-0	Nitrocellulose	5.7		5.7		mg/kg	MTCCT00402	1/16	1.2 - 3.5	5.7		NA	NA	NA	No	NTX
556-88-7	Nitroguanidine	0.12	J	0.19	J	mg/kg	MTCLB00401	2/16	0.25	0.19		NA	NA	NA	No	NTX
	Inorganics															
7429-90-5	Aluminum	2.8		22.4		mg/kg	MTCCT00102	8/16	1.4 - 4.1	22.4		140 N	NA	NA	No	BSL
7440-38-2	Arsenic	0.65		1.6	K	mg/kg	MTCLB00202	8/16	0.57 - 0.84	1.6		0.0021 C	NA	NA	Yes	ASL
7440-39-3	Barium	0.3		0.74		mg/kg	MTCLB005	4/16	0.06 - 0.42	0.74		9.5 N	NA	NA	No	BSL
7440-43-9	Cadmium	0.017		0.034		mg/kg	MTCCT00101	9/16	0.014 - 0.02	0.034		0.14 N	NA	NA	No	BSL
7440-70-2	Calcium	101		16900		mg/kg	MTCLB005	16/16	NA	16900		NA	NA	NA	No	NUT
7440-47-3	Chromium	0.92	K	6.2		mg/kg	MTCLB00202	3/16	0.17 - 0.32	6.2		0.41 (9) N	NA	NA	Yes	ASL
7440-50-8	Copper	3.6		3.6		mg/kg	MTCCT005	1/16	0.3 - 1.1	3.6		5.4 N	NA	NA	No	BSL
57-12-5	Cyanide	0.49		5.5		mg/kg	MTCLB00201	2/16	0.3 - 0.43	5.5		2.7 N	NA	NA	Yes	ASL
7439-89-6	Iron	7.3	J	48		mg/kg	MTCLB00202	8/16	3 - 7.5	48		41 N	NA	NA	No	BSL
7439-92-1	Lead	0.2		1.1		mg/kg	MTCLB00202	4/16	0.16 - 0.54	1.1		NA	NA	NA	No	NTX
7439-95-4	Magnesium	113		611		mg/kg	MTCLB005	16/16	NA	611		NA	NA	NA	No	NUT
7439-96-5	Manganese	0.39	K	4	J	mg/kg	MTCCT00302	15/16	0.34	4		2.7 N	NA	NA	Yes	ASL
7439-97-6	Mercury	0.052		0.098		mg/kg	MTCLB005	2/16	0.042 - 0.05	0.098		0.014 (10) N	NA	NA	Yes	ASL
7440-09-7	Potassium	1400	J	3680		mg/kg	MTCLB005	16/16	NA	3680		NA	NA	NA	No	NUT
7440-23-5	Sodium	200		880		mg/kg	MTCCT005	16/16	NA	880		NA	NA	NA	No	NUT
7440-66-6	Zinc	6.1	J	11.9		mg/kg	MTCLB00201	9/16	5.1 - 7.2	11.9		41 N	NA	NA	No	BSL
	Miscellaneous Parameters															
14797-73-0	Perchlorate	10200		10200		ug/kg	MTCLB00201	1/16	2500 - 5000	10200		4.1 (11) N	NA	NA	Yes	ASL

TABLE 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN - FISH TISSUE
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Fish Tissue
Exposure Point: Mattawoman Creek

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Nondetects(2)	Concentration Used for Screening(3)	Background Value(4)	U.S. EPA Region 3 RBC (5)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection(6)

Notes:
(1) - Sample and duplicate are counted as two separate samples when determining the minimum and maximum detected concentrations.
(2) - Values presented are sample-specific quantitation limits.
(3) - The maximum detected concentration is used for screening purposes.
(4) - No background values.
(5) - U.S. EPA Region 3 Risk-Based Concentration Table, April 2, 2002. (RBCs for noncarcinogenic compounds are divided by 10 to correspond to a HI of 0.1).
(6) - Rationale Codes
Selection Reason: Above Screening Levels (ASL)
No Toxicity Information (NTX)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)
Below Background Value (BKG)
(7) - Value is for Endosulfan.
(8) - Value is for chlordane.
(9) - Value is for hexavalent chromium.
(10) - Value is for methyl mercury.
(11) - Calculated value using U.S. EPA Region 3 RBC guidance.
Shaded cells indicate that the specified criterion has been exceeded or that the chemical has been selected as a COPC.

Definitions:
NA = Not Applicable.
SQL = Sample Quantitation Limit.
COPC = Chemical of Potential Concern.
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered.
J = Estimated Value.
C = Carcinogenic.
N = Noncarcinogenic.

ASSOCIATED SAMPLES

MTCCT00101	MTCCT00403	MTCLB003
MTCCT00102	MTCCT005	MTCLB00401
MTCCT00301	MTCLB001	MTCLB00402
MTCCT00302	MTCLB00201	MTCLB005
MTCCT00401	MTCLB00202	
MTCCT00402	MTCLB00203	

RAGS Part D Table 3

Medium-Specific Exposure Point Concentration Summary

TABLE 3.1
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
BENZENE	ug/L	1.32	1.84	8.00		ug/L	1.55	95%UCL-T	W - Test (1)	1.55	95%UCL-T	W - Test (1)
ETHYLBENZENE	ug/L	1.32	1.84	8.00		ug/L	1.55	95%UCL-T	W - Test (1)	1.55	95%UCL-T	W - Test (1)
TRICHLOROETHENE	ug/L	1.13	1.57	6.00		ug/L	1.27	95%UCL-T	W - Test (1)	1.27	95%UCL-T	W - Test (1)
ARSENIC	ug/L	2.51	2.88	8.30	K	ug/L	2.75	95%UCL-T	W - Test (1)	2.75	95%UCL-T	W - Test (1)
IRON	ug/L	389	457	1340	K	ug/L	474	95%UCL-T	W - Test (2)	474	95%UCL-T	W - Test (2)
LEAD	ug/L	2.03	3.50	38.4		ug/L	2.03	Mean-N	(3)	2.03	Mean-N	(3)
MANGANESE(surface water)	ug/L	66.6	76.1	178		ug/L	81.2	95%UCL-T	W - Test (2)	81.2	95%UCL-T	W - Test (2)
PERCHLORATE	ug/L	2.34	2.44	3.05	J	ug/L	3.05	95%UCL-T	W - Test (1)	3.05	95%UCL-T	W - Test (1)

Notes:
For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.
W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.
Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).
(1) - Shapiro-Wilk W Test is inconclusive and the data distribution is undefined. Therefore, the 95% UCL of the log-transformed data is used for the exposure point concentration.
(2) - Shapiro-Wilk W Test indicates the data are lognormally distributed. Therefore, the 95% UCL of the log-transformed data is used for the exposure point concentration.

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
BENZO(A)ANTHRACENE	mg/kg	0.397	0.472	1.40	J	mg/kg	0.515	95%UCL-T	W - Test (3)	0.515	95%UCL-T	W - Test (3)
BENZO(A)PYRENE	mg/kg	0.384	0.452	1.06	J	mg/kg	0.501	95%UCL-T	W - Test (3)	0.501	95%UCL-T	W - Test (3)
BENZO(B)FLUORANTHENE	mg/kg	0.346	0.433	1.50	J	mg/kg	0.445	95%UCL-T	W - Test (3)	0.445	95%UCL-T	W - Test (3)
DIBENZO(A,H)ANTHRACENE	mg/kg	0.358	0.409	0.220	J	mg/kg	0.220	Max	(4)	0.220	Max	(4)
INDENO(1,2,3-CD)PYRENE	mg/kg	0.371	0.423	0.640	J	mg/kg	0.423	95%UCL-T	W - Test (2)	0.423	95%UCL-T	W - Test (2)
ALUMINUM	mg/kg	6277	7476	19600		mg/kg	10259	95%UCL-T	W - Test (1)	10259	95%UCL-T	W - Test (1)
ANTIMONY	mg/kg	4.10	7.01	63.9	L	mg/kg	3.70	95%UCL-T	W - Test (1)	3.70	95%UCL-T	W - Test (1)
ARSENIC	mg/kg	8.73	11.3	58.1	J	mg/kg	13.6	95%UCL-T	W - Test (3)	13.6	95%UCL-T	W - Test (3)
CADMIUM	mg/kg	3.45	6.39	79.9	J	mg/kg	5.74	95%UCL-T	W - Test (3)	5.74	95%UCL-T	W - Test (3)
CHROMIUM	mg/kg	20.1	23.5	69.7	L	mg/kg	26.7	95%UCL-T	W - Test (3)	26.7	95%UCL-T	W - Test (3)
COPPER	mg/kg	81.4	123	757	L	mg/kg	196	95%UCL-T	W - Test (3)	196	95%UCL-T	W - Test (3)
IRON	mg/kg	25970	33137	134000	J	mg/kg	34457	95%UCL-T	W - Test (3)	34457	95%UCL-T	W - Test (3)
LEAD	mg/kg	1832	4619	76400	J	mg/kg	1832	Mean-N	(5)	1832	Mean-N	(5)
MANGANESE(sediment)	mg/kg	428	515	1470	J	mg/kg	702	95%UCL-T	W - Test (1)	702	95%UCL-T	W - Test (1)
MERCURY	mg/kg	0.392	0.719	8.70		mg/kg	0.439	95%UCL-T	W - Test (1)	0.439	95%UCL-T	W - Test (1)
SILVER	mg/kg	10.6	22.0	308		mg/kg	17.7	95%UCL-T	W - Test (3)	17.7	95%UCL-T	W - Test (3)
THALLIUM	mg/kg	1.08	1.28	4.20		mg/kg	1.30	95%UCL-T	W - Test (3)	1.30	95%UCL-T	W - Test (3)
ZINC	mg/kg	1562	3817	61900	J	mg/kg	1106	95%UCL-T	W - Test (3)	1106	95%UCL-T	W - Test (3)

Notes:
For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.
W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.
Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).
(1) - Shapiro-Wilk W Test is inconclusive and the data distribution is undefined. Therefore, the 95% UCL of the log-transformed data is used for the exposure point concentration.
(2) - Shapiro-Wilk W Test indicates data are normally distributed. Therefore, the 95% UCL of the normal data is used for the exposure point concentration.
(3) - Shapiro-Wilk W Test indicates the data are lognormally distributed. Therefore, the 95% UCL of the log-transformed data is used for the exposure point concentration.
(4) - UCL is greater than maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.
(5) - Mean concentration is used as the exposure point concentration for evaluating exposure to lead. U.S. EPA 1994: Guidance for the Integrated Exposure Uptake Biokinetic Model for Lead in Children.

TABLE 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Fish Tissue
Exposure Point: Mattawoman Creek

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
4-METHYLPHENOL	mg/kg	8.74	15.9	64.0	J	mg/kg	64.0	Max	(4)	64.0	Max	(4)
BIS(2-ETHYLHEXYL)PHTHALATE	mg/kg	0.903	1.19	2.20	J	mg/kg	1.19	95%UCL-N	W - Test (2)	1.19	95%UCL-N	W - Test (2)
4,4'-DDE	mg/kg	0.021	0.034	0.110		mg/kg	0.083	95%UCL-T	W - Test (3)	0.083	95%UCL-T	W - Test (3)
AROCLOR-1260	mg/kg	0.114	0.164	0.380		mg/kg	0.284	95%UCL-T	W - Test (3)	0.284	95%UCL-T	W - Test (3)
DIELDRIN	mg/kg	0.002	0.003	0.007	J	mg/kg	0.002	95%UCL-T	W - Test (1)	0.002	95%UCL-T	W - Test (1)
1,3-DINITROBENZENE	mg/kg	0.121	0.128	0.057	J	mg/kg	0.057	Max	(4)	0.057	Max	(4)
2-AMINO-4,6-DINITROTOLUENE	mg/kg	0.123	0.126	0.096	J	mg/kg	0.096	Max	(4)	0.096	Max	(4)
ARSENIC	mg/kg	0.720	0.929	1.60		mg/kg	1.04	95%UCL-T	W - Test (1)	1.04	95%UCL-T	W - Test (1)
CHROMIUM	mg/kg	0.630	1.30	6.20	K	mg/kg	1.09	95%UCL-T	W - Test (1)	1.09	95%UCL-T	W - Test (1)
CYANIDE	mg/kg	0.532	1.11	5.50		mg/kg	0.621	95%UCL-T	W - Test (1)	0.621	95%UCL-T	W - Test (1)
MANGANESE(fish)	mg/kg	1.37	1.85	4.00	K	mg/kg	2.44	95%UCL-T	W - Test (3)	2.44	95%UCL-T	W - Test (3)
MERCURY(fish)	mg/kg	0.029	0.038	0.098		mg/kg	0.035	95%UCL-T	W - Test (1)	0.035	95%UCL-T	W - Test (1)
PERCHLORATE	mg/kg	2.59	3.52	10.2		mg/kg	3.34	95%UCL-T	W - Test (1)	3.34	95%UCL-T	W - Test (1)

Notes:
For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.
W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.
Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).
(1) - Shapiro-Wilk W Test is inconclusive and the data distribution is undefined. Therefore, the 95% UCL of the log-transformed data is used for the exposure point concentration.
(2) - Shapiro-Wilk W Test indicates data are normally distributed. Therefore, the 95% UCL of the normal data is used for the exposure point concentration.
(3) - Shapiro-Wilk W Test indicates the data are lognormally distributed. Therefore, the 95% UCL of the log-transformed data is used for the exposure point concentration.
(4) - UCL is greater than maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.

RAGS Part D Table 4

Values Used For Daily Intake Calculations

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	240	(1)	120	(1)	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	1.0E-06	- -	
	FI	Fraction Ingested	unitless	1	EPA, 1993	1	EPA, 1993	
	EF	Exposure Frequency	days/year	60	(1)	30	(1)	
	ED	Exposure Duration	years	1	(1)	1	(1)	
	BW	Body Weight	kg	70	EPA, 1993	70	EPA, 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	1.0E-06	- -	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	4,300	(2)	4,300	(2)	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	0.02	EPA, 1997	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA, 2001	Chemical Specific	EPA, 2001	
	EF	Exposure Frequency	days/year	60	(1)	30	(1)	
	ED	Exposure Duration	years	1	(1)	1	(1)	
	BW	Body Weight	kg	70	EPA, 1993	70	EPA, 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

Notes:

(1) - Professional judgement.

(2) - Mean value for head, arms, and hands.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1992a: Supplemental Guidance to RAGS: Calculating the Concentration Term. OSWER Publication 9285.7-081

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

EPA, 2001: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R99/005.

TABLE 4.2

VALUES USED FOR DAILY INTAKE CALCULATIONS

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 2001	Calculated	EPA, 2001	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	4,300	(1)	4,300	(1)	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(2)	1	(2)	
	ET	Exposure Time	hours/event	8	EPA, 1989	4	(2)	
	EF	Exposure Frequency	days/year	60	(2)	30	(2)	
	ED	Exposure Duration	years	1	(2)	1	(2)	
	BW	Body Weight	kg	70	EPA, 1993	70	EPA, 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	365	EPA, 1989	

Notes:

(1) - Mean value for head, arms, and hands, EPA, 2001.

(2) - Professional judgement.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

EPA, 2001: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R99/005.

TABLE 4.3

VALUES USED FOR DAILY INTAKE CALCULATIONS

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA, 1993	50	EPA, 1993	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	1.0E-06	--	
	FI	Fraction Ingested	unitless	1	EPA, 1993	1	EPA, 1993	
	EF	Exposure Frequency	days/year	16	(1)	8	(1)	
	ED	Exposure Duration	years	10	(2)	10	(2)	
	BW	Body Weight	kg	43	EPA, 1989	43	EPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,650	EPA, 1989	3,650	EPA, 1989	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	1.0E-06	--	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3,720	(3)	3,720	(3)	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	0.02	EPA, 1997	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA, 2001	Chemical Specific	EPA, 2001	
	EF	Exposure Frequency	days/year	16	(1)	8	(1)	
	ED	Exposure Duration	years	10	(2)	10	(2)	
	BW	Body Weight	kg	43	EPA, 1989	43	EPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,650	EPA, 1989	3,650	EPA, 1989	

Notes:

1 - Assumes one day a week during the summer months. CTE is 50 percent of RME.

2 - Professional judgement, ages 7 to 16.

3 - Assumed 30 percent of total body surface area (12,400 cm^2) is available for exposure.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

EPA, 1992: Supplemental Guidance to RAGS: Calculating the Concentration Term. OSWER Publication 9285.7-081

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2001: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R99/005.

TABLE 4.4

VALUES USED FOR DAILY INTAKE CALCULATIONS

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Intake (mg/kg/day) =
	CR	Contact Rate	L/hr	0.05	EPA, 1988	0.05	EPA, 1988	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	mg/ug	0.001	- -	0.001	- -	
	ET	Exposure Time	hours/event	2	(1)	1	(1)	
	EF	Exposure Frequency	events/year	16	(2)	8	(2)	
	ED	Exposure Duration	years	10	(3)	10	(3)	
	BW	Body Weight	kg	43	EPA, 1997	43	EPA, 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,650	EPA, 1989	3,650	EPA, 1989	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 2001	Calculated	EPA, 2001	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	12,400	EPA, 2001	12,400	EPA, 2001	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	1	(1)	
	ET	Exposure Time	hours/event	2	(1)	1	(1)	
	EF	Exposure Frequency	days/year	16	(2)	8	(2)	
	ED	Exposure Duration	years	10	(3)	10	(3)	
	BW	Body Weight	kg	43	EPA, 1997	43	EPA, 1997	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,650	EPA, 1989	3,650	EPA, 1989	

Notes:

1 - Professional judgement.

2 - Assumes one day a week during the summer months. CTE is 50 percent of RME.

3 - Professional judgement, ages 7 to 16.

Sources:

EPA, 1988: Superfund Exposure Factors Handbook. EPA/540/1-88/001.

EPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

EPA, 1992: Supplemental Guidance to RAGS: Calculating the Concentration Term. OSWER Publication 9285.7-081

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2001: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R99/005.

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CFish	Chemical Concentration in Fish	mg/kg	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Intake (mg/kg/day) =
	IR	Ingestion Rate of fish/shellfish	kg/meal	0.129	EPA, 1997	0.129	EPA, 1997	CFish x IR x FI x EF x ED / BW x AT
	FI	Fraction ingested from source	unitless	1	EPA, 1993	1	EPA, 1993	
	EF	Exposure Frequency	meals/year	104	(1)	62	EPA, 1997	
	ED	Exposure Duration	years	10	(2)	10	(2)	
	BW	Body Weight	kg	43	EPA, 1989	43	EPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	3,650	EPA, 1989	3,650	EPA, 1989	

Notes:

1 - Professional judgement, assumes two meals a week.

2 - Professional judgement, ages 7 to 16.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund, Vol. 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

EPA, 1992: Supplemental Guidance to RAGS: Calculating the Concentration Term. OSWER Publication 9285.7-081

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook EPA/600/P-95/002Fa.

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA, 1993	50	EPA, 1993	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	1.0E-06	--	
	FI	Fraction Ingested	unitless	1	EPA, 1993	1	EPA, 1993	
	EF	Exposure Frequency	days/year	16	(1)	8	(1)	
	ED	Exposure Duration	years	30	EPA, 1993	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1989	70	EPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	10,950	EPA, 1989	3,285	EPA, 1989	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	1.0E-06	--	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	6,000	(2)	6,000	(2)	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.07	EPA, 1997	0.01	EPA, 1997	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA, 2000	Chemical Specific	EPA, 2000	
	EF	Exposure Frequency	days/year	16	(1)	8	(1)	
	ED	Exposure Duration	years	30	EPA, 1993	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1989	70	EPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	10,950	EPA, 1989	3,285	EPA, 1989	

Notes:

1 - Assumes one day a week during the summer months. CTE is 50 percent of RME.

2 - Assume 30 percent of total body surface area (20,000 cm^2) is available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

EPA, 1992: Supplemental Guidance to RAGS: Calculating the Concentration Term. OSWER Publication 9285.7-081

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2001: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R99/005.

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Intake (mg/kg/day) =
	CR	Contact Rate	L/hr	0.05	EPA, 1988	0.05	EPA, 1988	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	mg/ug	0.001	- -	0.001	- -	
	ET	Exposure Time	hours/event	2	(1)	1	(1)	
	EF	Exposure Frequency	events/year	16	(2)	8	(2)	
	ED	Exposure Duration	years	30	EPA, 1993	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1989	70	EPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	10,950	EPA, 1989	3,285	EPA, 1989	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 2001	Calculated	EPA, 2001	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	20,000	EPA, 2001	20,000	EPA, 2001	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	1	(1)	
	ET	Exposure Time	hours/event	2	(1)	1	(1)	
	EF	Exposure Frequency	days/year	16	(2)	8	(2)	
	ED	Exposure Duration	years	30	EPA, 1993	9	EPA, 1993	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1989	70	EPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	10,950	EPA, 1989	3,285	EPA, 1989	

Notes:

1 - Professional Judgement.

2 - Assumes one day a week during the summer months. CTE is 50 percent of RME.

Sources:

EPA, 1988: Superfund Exposure Factors Handbook. EPA/540/1-88/001.

EPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

EPA, 1992: Supplemental Guidance to RAGS: Calculating the Concentration Term. OSWER Publication 9285.7-081

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2001: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R99/005.

TABLE 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CFish	Chemical Concentration in Fish	mg/kg	Max or 95% UCL	EPA, 1992	Max or 95% UCL	EPA, 1992	Intake (mg/kg/day) =
	IR	Ingestion Rate of fish/shellfish	kg/meal	0.129	EPA, 1997	0.129	EPA, 1997	CFish x IR x FI x EF x ED
	FI	Fraction ingested from source	unitless	1	EPA, 1993	1	EPA, 1993	BW x AT
	EF	Exposure Frequency	meals/year	104	(1)	64	EPA, 1997	
	ED	Exposure Duration	years	30	EPA, 1993	9	EPA, 1993	
	BW	Body Weight	kg	70	EPA, 1993	70	EPA, 1993	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	25,550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	10,950	EPA, 1989	3,285	EPA, 1989	

Notes:

1 - Professional judgement, assumes two meals a week.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. EPA/540/1-86/060.

EPA, 1992: Supplemental Guidance to RAGS: Calculating the Concentration Term. OSWER Publication 9285.7-081

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook EPA/600/P-95/002Fa.

RAGS Part D Table 5

Non-Cancer Toxicity Data

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
Volatile Organic Compounds										
Benzene	Chronic	3.0E-03	mg/kg/day	1	3.0E-03	mg/kg/day	Carcinogen	NA	IRIS	07/03/02
Ethylbenzene	Chronic	1.0E-01	mg/kg/day	1	1.0E-01	mg/kg/day	Liver,Kidney	1000/1	IRIS	07/03/02
Trichloroethene	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Liver	NA	IRIS	07/03/02
Semivolatile Organic Compounds										
4-Methylphenol	Chronic	5.0E-03	mg/kg/day	1	5.0E-03	mg/kg/day	CNS,Respiratory	NA	IRIS	07/03/02
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Liver	1000/1	IRIS	07/03/02
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Body Weight	3000/1	IRIS	07/03/02
Pesticides/PCBs										
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	Chronic	5.0E-05	mg/kg/day	1	5.0E-05	mg/kg/day	Liver	300/1	IRIS	07/03/02
Explosives										
1,3-Dinitrobenzene	Chronic	1.0E-04	mg/kg/day	1	1.0E-04	mg/kg/day	Spleen	3000/1	IRIS	07/03/02
2-Amino-4,6-Dinitrotoluene	Chronic	6.0E-05	mg/kg/day	1	6.0E-05	mg/kg/day	Liver	NA	IRIS	07/03/02
Inorganics										
Aluminum	Chronic	1.0E+00	mg/kg/day	1	1.0E+00	mg/kg/day	Immune, Nails	NA	IRIS	07/03/02
Antimony	Chronic	4.0E-04	mg/kg/day	0.15	6.0E-05	mg/kg/day	Blood	1000/1	IRIS	07/03/02
Arsenic	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	Skin, CVS	3/1	IRIS	07/03/02
Cadmium	Chronic	5.0E-04	mg/kg/day	0.05	2.5E-05	mg/kg/day	Kidney	10/1	IRIS	07/03/02
Chromium	Chronic	3.0E-03	mg/kg/day	0.025	7.5E-05	mg/kg/day	None Reported	300/3	IRIS	07/03/02
Copper	Chronic	4.0E-02	mg/kg/day	1	4.0E-02	mg/kg/day	GS	NA	HEAST	7/97
Cyanide	Chronic	2.0E-02	mg/kg/day	1	2.0E-02	mg/kg/day	Body Weight	100/5	IRIS	07/03/02
Iron	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Liver, Blood, GS	NA	IRIS	07/03/02
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese(sediment)	Chronic	7.2E-02	mg/kg/day	0.04	2.9E-03	mg/kg/day	CNS	1/1	IRIS	07/03/02
Manganese(surface water)	Chronic	2.4E-02	mg/kg/day	0.04	9.6E-04	mg/kg/day	CNS	1/1	IRIS	07/03/02
Manganese(fish)	Chronic	1.4E-01	mg/kg/day	0.04	5.6E-03	mg/kg/day	CNS	1/1	IRIS	07/03/02
Mercury(methyl)	Chronic	1.0E-04	mg/kg/day	1	1.0E-04	mg/kg/day	CNS	10/1	IRIS	07/03/02
Mercuric chloride	Chronic	3.0E-04	mg/kg/day	1	3.0E-04	mg/kg/day	CNS	30/1	IRIS	07/03/02
Silver	Chronic	5.0E-03	mg/kg/day	0.04	2.0E-04	mg/kg/day	Blood	3/1	IRIS	07/03/02
Thallium	Chronic	7.0E-05	mg/kg/day	1	7.0E-05	mg/kg/day	Liver	NA	IRIS	07/03/02
Zinc	Chronic	3.0E-01	mg/kg/day	1	3.0E-01	mg/kg/day	Blood	3/1	IRIS	07/03/02
Miscellaneous Parameters										
Perchlorate(4)	Chronic	3.0E-05	mg/kg/day	1	3.0E-05	mg/kg/day	CNS	10	NCEA	01/16/02

Notes:
(1) - EPA, 2001: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
(2) - RfDdermal = RfDoral x Oral to Dermal Adjustment Factor
(3) - Dates of IRIS, HEAST, or NCEA.
(4) - Toxicity data obtained from "Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization", January 16, 2002.

Definitions:
CNS = Central Nervous System
CVS = Cardiovascular System
GS = Gastrointestinal
NA = Not Available
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
NCEA = U.S. EPA National Center for Environmental Assessment (U.S. EPA Region 3 RBC Table, April 2, 2002)

RAGS Part D Table 6

Cancer Toxicity Data

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (3) (MM/DD/YY)
Volatile Organic Compounds							
Benzene	1.5E-02	1	1.5E-02	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/03/02
Ethylbenzene	NA	NA	NA	NA	D	IRIS	07/03/02
Trichloroethene	4.0E-01	1	4.0E-01	$(mg/kg/day)^{-1}$	NA	IRIS	07/03/02
Semivolatile Organic Compounds							
4-Methylphenol	NA	NA	NA	NA	C	IRIS	07/03/02
Benzo(a)anthracene	7.3E-01	1	7.3E-01	$(mg/kg\text{-}day)^{-1}$	NA	EPA	7/93
Benzo(a)pyrene	7.3E+00	1	7.3E+00	$(mg/kg/day)^{-1}$	B2	IRIS	07/03/02
Benzo(b)fluoranthene	7.3E-01	1	7.3E-01	$(mg/kg/day)^{-1}$	B2	EPA	07/93
Bis(2-ethylhexyl)phthalate	1.4E-02	1	1.4E-02	$(mg/kg/day)^{-1}$	B2	IRIS	07/03/02
Dibenzo(a,h)anthracene	7.3E+00	1	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	EPA	7/93
Indeno(1,2,3-cd)pyrene	7.3E-01	1	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	EPA	7/93
Naphthalene	NA	NA	NA	NA	C	IRIS	07/03/02
Pesticides/PCBs							
4,4'-DDE	3.4E-01	1	3.4E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	07/03/02
Aroclor-1260	2.0E+00	1	2.0E+00	$(mg/kg\text{-}day)^{-1}$	NA	IRIS	07/03/02
Dieldrin	1.6E+01	1	1.6E+01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	6/26/02
Explosives							
1,3-Dinitrobenzene	NA	NA	NA	NA	D	IRIS	07/03/02
2-Amino-4,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
Inorganics							
Arsenic	1.5E+00	1	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/03/02
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.5E+00	1	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	07/03/02
Cadmium	NA	NA	NA	NA	B1	IRIS	07/03/02
Chromium	NA	NA	NA	NA	A	IRIS	07/03/02
Copper	NA	NA	NA	NA	D	IRIS	07/03/02
Cyanide	2.0E-02	1	2.0E-02	$(mg/kg\text{-}day)^{-1}$	D	IRIS	07/03/02
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	B2	IRIS	07/03/02
Manganese	NA	NA	NA	NA	D	IRIS	07/03/02
Mercury	NA	NA	NA	NA	D	IRIS	07/03/02
Silver	NA	NA	NA	NA	D	IRIS	07/03/02
Thallium	NA	1	NA	NA	D	IRIS	07/03/02
Zinc	NA	1	NA	NA	D	IRIS	07/03/02

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
MATTAWOMAN CREEK
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (3) (MM/DD/YY)
Miscellaneous Parameters							
Perchlorate	NA	NA	NA	NA	NA	NA	NA

Notes:
(1) - EPA, 2001: Risk Assessment Guidance for Superfund (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA/540/R/99/005.
(2) - CSFdermal = CSForal/Oral to Dermal Adjustment Factor.
(3) - Dates of IRIS, HEAST or NCEA.

EPA Group:
A - Human carcinogen
B1 - Probable human carcinogen - indicates that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

Definitions:
IRIS = Integrated Risk Information System
HEAST= Health Effects Assessment Summary Tables
EPA 3 = U.S. EPA Region 3 RBC Table, April 2, 2002
EPA = U.S. EPA, Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons, July, 1993, EPA/600/R-93/089.
NA = Not Available

RAGS Part D Table 7

Calculation Of Non-Cancer Hazards

TABLE 7.1
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	1.9E-06	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	6.4E-04
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	5.9E-06	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	5.9E-05
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	1.3E-06	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	4.4E-03
	ARSENIC	2.75	ug/L	2.75	ug/L	M	2.2E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	7.4E-04
	IRON	474	ug/L	474	ug/L	M	3.8E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	1.3E-04
	LEAD	2.03	ug/L	2.03	ug/L	M	1.6E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	6.6E-06	mg/kg/day	9.6E-04	mg/kg/day	NA	NA	6.8E-03
	(Total)												1.3E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-02

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.2
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	5.1E-07	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	1.7E-04
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	1.7E-06	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	1.7E-05
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	3.8E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.3E-03
	ARSENIC	2.75	ug/L	2.75	ug/L	M	5.6E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.9E-04
	IRON	474	ug/L	474	ug/L	M	9.6E-06	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	3.2E-05
	LEAD	2.03	ug/L	2.03	ug/L	M	4.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	1.6E-06	mg/kg/day	9.6E-04	mg/kg/day	NA	NA	1.7E-03
	(Total)												3.4E-03
												Total Hazard Index Across All Exposure Routes/Pathways	3.4E-03

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.3
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	2.9E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	2.8E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	2.5E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	1.2E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	2.4E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	5.8E-03	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	5.8E-03
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	2.1E-06	mg/kg/day	4.0E-04	mg/kg/day	NA	NA	5.2E-03
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	7.7E-06	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.6E-02
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	3.2E-06	mg/kg/day	5.0E-04	mg/kg/day	NA	NA	6.5E-03
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	1.5E-05	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	1.0E-05
	COPPER	196	mg/kg	196	mg/kg	M	1.1E-04	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	2.8E-03
	IRON	34457	mg/kg	34457	mg/kg	M	1.9E-02	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	6.5E-02
	LEAD	1832	mg/kg	1832	mg/kg	M	1.0E-03	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	4.0E-04	mg/kg/day	7.2E-02	mg/kg/day	NA	NA	5.5E-03
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	2.5E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	8.2E-04
	SILVER	17.7	mg/kg	17.7	mg/kg	M	1.0E-05	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	2.0E-03
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	7.3E-07	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	1.0E-02
	ZINC	1106	mg/kg	1106	mg/kg	M	6.2E-04	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	2.1E-03
	(Total)												1.3E-01
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.4E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.3E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	1.2E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	5.8E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	1.1E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	8.2E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.7E-03
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.2E-08	mg/kg/day	2.5E-05	mg/kg/day	NA	NA	4.6E-04
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	2.9E-03	mg/kg/day	NA	NA	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	2.1E-05	mg/kg/day	NA	NA	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-04	mg/kg/day	NA	NA	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	(Total)												3.2E-03
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-01

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.4
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	7.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	7.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	6.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	3.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	6.0E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	1.4E-03	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	1.4E-03
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	5.2E-07	mg/kg/day	4.0E-04	mg/kg/day	NA	NA	1.3E-03
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	1.9E-06	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	6.4E-03
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	8.1E-07	mg/kg/day	5.0E-04	mg/kg/day	NA	NA	1.6E-03
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	3.8E-06	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	2.5E-06
	COPPER	196	mg/kg	196	mg/kg	M	2.8E-05	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	6.9E-04
	IRON	34457	mg/kg	34457	mg/kg	M	4.9E-03	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	1.6E-02
	LEAD	1832	mg/kg	1832	mg/kg	M	2.6E-04	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	9.9E-05	mg/kg/day	7.2E-02	mg/kg/day	NA	NA	1.4E-03
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	6.2E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.1E-04
	SILVER	17.7	mg/kg	17.7	mg/kg	M	2.5E-06	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	5.0E-04
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	1.8E-07	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	2.6E-03
	ZINC	1106	mg/kg	1106	mg/kg	M	1.6E-04	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	5.2E-04
	(Total)												3.3E-02
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	6.8E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	6.6E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	5.8E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	2.9E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	5.6E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	4.1E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.4E-04
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	5.8E-10	mg/kg/day	2.5E-05	mg/kg/day	NA	NA	2.3E-05
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	2.9E-03	mg/kg/day	NA	NA	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	2.1E-05	mg/kg/day	NA	NA	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-04	mg/kg/day	NA	NA	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	(Total)												1.6E-04
												Total Hazard Index Across All Exposure Routes/Pathways	3.3E-02

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.5
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZENE	1.55	ug/L	1.55	ug/L	M	1.6E-07	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	5.3E-05
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	1.6E-07	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	1.6E-06
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	1.3E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	4.3E-04
	ARSENIC	2.75	ug/L	2.75	ug/L	M	2.8E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	9.3E-04
	IRON	474	ug/L	474	ug/L	M	4.8E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	1.6E-04
	LEAD	2.03	ug/L	2.03	ug/L	M	2.1E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	8.3E-06	mg/kg/day	2.4E-02	mg/kg/day	NA	NA	3.4E-04
	(Total)												1.9E-03
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	7.3E-07	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	2.4E-04
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	2.6E-06	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	2.6E-05
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	5.8E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.9E-03
	ARSENIC	2.75	ug/L	2.75	ug/L	M	7.0E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.3E-04
	IRON	474	ug/L	474	ug/L	M	1.2E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	4.0E-05
	LEAD	2.03	ug/L	2.03	ug/L	M	5.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	2.1E-06	mg/kg/day	9.6E-04	mg/kg/day	NA	NA	2.1E-03
	(Total)												4.6E-03
												Total Hazard Index Across All Exposure Routes/Pathways	6.6E-03

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.6
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZENE	1.55	ug/L	1.55	ug/L	M	4.0E-08	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	1.3E-05
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	4.0E-08	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	4.0E-07
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	3.2E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.1E-04
	ARSENIC	2.75	ug/L	2.75	ug/L	M	7.0E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.3E-04
	IRON	474	ug/L	474	ug/L	M	1.2E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	4.0E-05
	LEAD	2.03	ug/L	2.03	ug/L	M	5.2E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	2.1E-06	mg/kg/day	2.4E-02	mg/kg/day	NA	NA	8.6E-05
	(Total)												4.8E-04
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	2.3E-07	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	7.6E-05
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	8.6E-07	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	8.6E-06
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	2.0E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	6.6E-04
	ARSENIC	2.75	ug/L	2.75	ug/L	M	1.7E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	5.8E-05
	IRON	474	ug/L	474	ug/L	M	3.0E-06	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	1.0E-05
	LEAD	2.03	ug/L	2.03	ug/L	M	1.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	5.1E-07	mg/kg/day	9.6E-04	mg/kg/day	NA	NA	5.3E-04
	(Total)												1.3E-03
												Total Hazard Index Across All Exposure Routes/Pathways	1.8E-03

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.7
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	5.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	5.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	4.5E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	2.2E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	4.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	1.0E-03	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	1.0E-03
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	3.8E-07	mg/kg/day	4.0E-04	mg/kg/day	NA	NA	9.4E-04
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	1.4E-06	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	4.6E-03
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	5.9E-07	mg/kg/day	5.0E-04	mg/kg/day	NA	NA	1.2E-03
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	2.7E-06	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	1.8E-06
	COPPER	196	mg/kg	196	mg/kg	M	2.0E-05	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	5.0E-04
	IRON	34457	mg/kg	34457	mg/kg	M	3.5E-03	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	1.2E-02
	LEAD	1832	mg/kg	1832	mg/kg	M	1.9E-04	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	7.2E-05	mg/kg/day	7.2E-02	mg/kg/day	NA	NA	9.9E-04
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	4.5E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.5E-04
	SILVER	17.7	mg/kg	17.7	mg/kg	M	1.8E-06	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	3.6E-04
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	1.3E-07	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	1.9E-03
	ZINC	1106	mg/kg	1106	mg/kg	M	1.1E-04	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	3.8E-04
	(Total)												2.4E-02
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	5.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	4.9E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	4.4E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	2.2E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	4.2E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	3.1E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.0E-03
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	4.4E-09	mg/kg/day	2.5E-05	mg/kg/day	NA	NA	1.7E-04
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	2.9E-03	mg/kg/day	NA	NA	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	2.1E-05	mg/kg/day	NA	NA	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-04	mg/kg/day	NA	NA	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	(Total)												1.2E-03
												Total Hazard Index Across All Exposure Routes/Pathways	2.5E-02

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.8
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	1.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	5.6E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	1.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	2.6E-04	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	2.6E-04
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	9.4E-08	mg/kg/day	4.0E-04	mg/kg/day	NA	NA	2.4E-04
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	3.5E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.2E-03
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.5E-07	mg/kg/day	5.0E-04	mg/kg/day	NA	NA	2.9E-04
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	6.8E-07	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	4.5E-07
	COPPER	196	mg/kg	196	mg/kg	M	5.0E-06	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	1.2E-04
	IRON	34457	mg/kg	34457	mg/kg	M	8.8E-04	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	2.9E-03
	LEAD	1832	mg/kg	1832	mg/kg	M	4.7E-05	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	1.8E-05	mg/kg/day	7.2E-02	mg/kg/day	NA	NA	2.5E-04
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	1.1E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	3.7E-05
	SILVER	17.7	mg/kg	17.7	mg/kg	M	4.5E-07	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	9.0E-05
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	3.3E-08	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	4.7E-04
	ZINC	1106	mg/kg	1106	mg/kg	M	2.8E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	9.4E-05
	(Total)												5.9E-03
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	2.5E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	2.5E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	2.2E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	1.1E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	2.1E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	1.5E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	5.2E-05
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	2.2E-10	mg/kg/day	2.5E-05	mg/kg/day	NA	NA	8.7E-06
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	2.9E-03	mg/kg/day	NA	NA	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	2.1E-05	mg/kg/day	NA	NA	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-04	mg/kg/day	NA	NA	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	(Total)												6.0E-05
												Total Hazard Index Across All Exposure Routes/Pathways	6.0E-03

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.9
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	4-METHYLPHENOL	64.0	mg/kg	64.0	mg/kg	M	5.5E-02	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	1.1E+01
	BIS(2-ETHYLHEXYL)PHTHALATE	1.19	mg/kg	1.19	mg/kg	M	1.0E-03	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	5.1E-02
	4,4'-DDE	0.083	mg/kg	0.083	mg/kg	M	7.1E-05	mg/kg/day	NA	mg/kg/day	NA	NA	--
	AROCLOR-1260	0.284	mg/kg	0.284	mg/kg	M	2.4E-04	mg/kg/day	NA	mg/kg/day	NA	NA	--
	DIELDRIN	0.002	mg/kg	0.002	mg/kg	M	2.0E-06	mg/kg/day	5.0E-05	mg/kg/day	NA	NA	4.1E-02
	1,3-DINITROBENZENE	0.057	mg/kg	0.057	mg/kg	M	4.9E-05	mg/kg/day	1.0E-04	mg/kg/day	NA	NA	4.9E-01
	2-AMINO-4,6-DINITROTOLUENE	0.096	mg/kg	0.096	mg/kg	M	8.2E-05	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	1.4E+00
	ARSENIC	1.04	mg/kg	1.04	mg/kg	M	8.9E-04	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	3.0E+00
	CHROMIUM	1.09	mg/kg	1.09	mg/kg	M	9.3E-04	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	6.2E-04
	CYANIDE	0.621	mg/kg	0.621	mg/kg	M	5.3E-04	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	2.7E-02
	MANGANESE(fish)	2.44	mg/kg	2.44	mg/kg	M	2.1E-03	mg/kg/day	1.4E-01	mg/kg/day	NA	NA	1.5E-02
	MERCURY(fish)	0.035	mg/kg	0.035	mg/kg	M	3.0E-05	mg/kg/day	1.0E-04	mg/kg/day	NA	NA	3.0E-01
	(Total)												1.6E+01
												Total Hazard Index Across All Exposure Routes/Pathways	1.6E+01

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.10
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	4-METHYLPHENOL	64.0	mg/kg	64.0	mg/kg	M	3.3E-02	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	6.5E+00
	BIS(2-ETHYLHEXYL)PHTHALATE	1.19	mg/kg	1.19	mg/kg	M	6.1E-04	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	3.0E-02
	4,4'-DDE	0.083	mg/kg	0.083	mg/kg	M	4.2E-05	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	AROCLOR-1260	0.284	mg/kg	0.284	mg/kg	M	1.4E-04	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIELDRIN	0.002	mg/kg	0.002	mg/kg	M	1.2E-06	mg/kg/day	5.0E-05	mg/kg/day	NA	NA	2.4E-02
	1,3-DINITROBENZENE	0.057	mg/kg	0.057	mg/kg	M	2.9E-05	mg/kg/day	1.0E-04	mg/kg/day	NA	NA	2.9E-01
	2-AMINO-4,6-DINITROTOLUENE	0.096	mg/kg	0.096	mg/kg	M	4.9E-05	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	8.2E-01
	ARSENIC	1.04	mg/kg	1.04	mg/kg	M	5.3E-04	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.8E+00
	CHROMIUM	1.09	mg/kg	1.09	mg/kg	M	5.5E-04	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	3.7E-04
	CYANIDE	0.621	mg/kg	0.621	mg/kg	M	3.2E-04	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	1.6E-02
	MANGANESE(fish)	2.44	mg/kg	2.44	mg/kg	M	1.2E-03	mg/kg/day	1.4E-01	mg/kg/day	NA	NA	8.9E-03
	MERCURY(fish)	0.035	mg/kg	0.035	mg/kg	M	1.8E-05	mg/kg/day	1.0E-04	mg/kg/day	NA	NA	1.8E-01
	(Total)												9.7E+00
												Total Hazard Index Across All Exposure Routes/Pathways	9.7E+00

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.11
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZENE	1.55	ug/L	1.55	ug/L	M	9.7E-08	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	3.2E-05
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	9.7E-08	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	9.7E-07
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	8.0E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.7E-04
	ARSENIC	2.75	ug/L	2.75	ug/L	M	1.7E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	5.7E-04
	IRON	474	ug/L	474	ug/L	M	3.0E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	9.9E-05
	LEAD	2.03	ug/L	2.03	ug/L	M	1.3E-07	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	5.1E-06	mg/kg/day	2.4E-02	mg/kg/day	NA	NA	2.1E-04
	(Total)												1.2E-03
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	7.3E-07	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	2.4E-04
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	2.6E-06	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	2.6E-05
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	5.8E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.9E-03
	ARSENIC	2.75	ug/L	2.75	ug/L	M	6.9E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.3E-04
	IRON	474	ug/L	474	ug/L	M	1.2E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	4.0E-05
	LEAD	2.03	ug/L	2.03	ug/L	M	5.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	2.0E-06	mg/kg/day	9.6E-04	mg/kg/day	NA	NA	2.1E-03
	(Total)												4.6E-03
												Total Hazard Index Across All Exposure Routes/Pathways	5.8E-03

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.12
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZENE	1.55	ug/L	1.55	ug/L	M	2.4E-08	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	8.1E-06
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	2.4E-08	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	2.4E-07
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	2.0E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	6.6E-05
	ARSENIC	2.75	ug/L	2.75	ug/L	M	4.3E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.4E-04
	IRON	474	ug/L	474	ug/L	M	7.4E-06	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	2.5E-05
	LEAD	2.03	ug/L	2.03	ug/L	M	3.2E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	1.3E-06	mg/kg/day	2.4E-02	mg/kg/day	NA	NA	5.3E-05
	(Total)												3.0E-04
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	2.3E-07	mg/kg/day	3.0E-03	mg/kg/day	NA	NA	7.5E-05
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	8.6E-07	mg/kg/day	1.0E-01	mg/kg/day	NA	NA	8.6E-06
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	2.0E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	6.5E-04
	ARSENIC	2.75	ug/L	2.75	ug/L	M	1.7E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	5.7E-05
	IRON	474	ug/L	474	ug/L	M	3.0E-06	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	9.9E-06
	LEAD	2.03	ug/L	2.03	ug/L	M	1.3E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	5.1E-07	mg/kg/day	9.6E-04	mg/kg/day	NA	NA	5.3E-04
	(Total)												1.3E-03
												Total Hazard Index Across All Exposure Routes/Pathways	1.6E-03

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.13
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	3.2E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	3.1E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	2.8E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	1.4E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	2.7E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	6.4E-04	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	6.4E-04
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	2.3E-07	mg/kg/day	4.0E-04	mg/kg/day	NA	NA	5.8E-04
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	8.5E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.8E-03
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	3.6E-07	mg/kg/day	5.0E-04	mg/kg/day	NA	NA	7.2E-04
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	1.7E-06	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	1.1E-06
	COPPER	196	mg/kg	196	mg/kg	M	1.2E-05	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	3.1E-04
	IRON	34457	mg/kg	34457	mg/kg	M	2.2E-03	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	7.2E-03
	LEAD	1832	mg/kg	1832	mg/kg	M	1.1E-04	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	4.4E-05	mg/kg/day	7.2E-02	mg/kg/day	NA	NA	6.1E-04
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	2.7E-08	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	9.2E-05
	SILVER	17.7	mg/kg	17.7	mg/kg	M	1.1E-06	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	2.2E-04
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	8.1E-08	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	1.2E-03
	ZINC	1106	mg/kg	1106	mg/kg	M	6.9E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	2.3E-04
	(Total)												1.5E-02
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.8E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.7E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	1.5E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	7.5E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	1.4E-08	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	1.1E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	3.6E-04
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.5E-09	mg/kg/day	2.5E-05	mg/kg/day	NA	NA	6.0E-05
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	2.9E-03	mg/kg/day	NA	NA	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	2.1E-05	mg/kg/day	NA	NA	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-04	mg/kg/day	NA	NA	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	(Total)												4.2E-04
												Total Hazard Index Across All Exposure Routes/Pathways	1.5E-02

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.14
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	8.1E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	7.8E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	7.0E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	3.4E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	6.6E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	1.6E-04	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	1.6E-04
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	5.8E-08	mg/kg/day	4.0E-04	mg/kg/day	NA	NA	1.4E-04
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	2.1E-07	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	7.1E-04
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	9.0E-08	mg/kg/day	5.0E-04	mg/kg/day	NA	NA	1.8E-04
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	4.2E-07	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	2.8E-07
	COPPER	196	mg/kg	196	mg/kg	M	3.1E-06	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	7.7E-05
	IRON	34457	mg/kg	34457	mg/kg	M	5.4E-04	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	1.8E-03
	LEAD	1832	mg/kg	1832	mg/kg	M	2.9E-05	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	1.1E-05	mg/kg/day	7.2E-02	mg/kg/day	NA	NA	1.5E-04
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	6.9E-09	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.3E-05
	SILVER	17.7	mg/kg	17.7	mg/kg	M	2.8E-07	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	5.5E-05
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	2.0E-08	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	2.9E-04
	ZINC	1106	mg/kg	1106	mg/kg	M	1.7E-05	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	5.8E-05
	(Total)												3.6E-03
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.3E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.2E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	1.1E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	5.4E-10	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	1.0E-09	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	1.0E+00	mg/kg/day	NA	NA	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	7.7E-09	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	2.6E-05
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.1E-10	mg/kg/day	2.5E-05	mg/kg/day	NA	NA	4.3E-06
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	4.0E-02	mg/kg/day	NA	NA	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	2.9E-03	mg/kg/day	NA	NA	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	2.1E-05	mg/kg/day	NA	NA	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	2.0E-04	mg/kg/day	NA	NA	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	7.0E-05	mg/kg/day	NA	NA	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	3.0E-01	mg/kg/day	NA	NA	- -
	(Total)												3.0E-05
												Total Hazard Index Across All Exposure Routes/Pathways	3.7E-03

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.15
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	4-METHYLPHENOL	64.0	mg/kg	64.0	mg/kg	M	3.4E-02	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	6.7E+00
	BIS(2-ETHYLHEXYL)PHTHALATE	1.19	mg/kg	1.19	mg/kg	M	6.3E-04	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	3.1E-02
	4,4'-DDE	0.083	mg/kg	0.083	mg/kg	M	4.4E-05	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	AROCLOR-1260	0.284	mg/kg	0.284	mg/kg	M	1.5E-04	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIELDRIN	0.002	mg/kg	0.002	mg/kg	M	1.3E-06	mg/kg/day	5.0E-05	mg/kg/day	NA	NA	2.5E-02
	1,3-DINITROBENZENE	0.057	mg/kg	0.057	mg/kg	M	3.0E-05	mg/kg/day	1.0E-04	mg/kg/day	NA	NA	3.0E-01
	2-AMINO-4,6-DINITROTOLUENE	0.096	mg/kg	0.096	mg/kg	M	5.0E-05	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	8.4E-01
	ARSENIC	1.04	mg/kg	1.04	mg/kg	M	5.5E-04	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.8E+00
	CHROMIUM	1.09	mg/kg	1.09	mg/kg	M	5.7E-04	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	3.8E-04
	CYANIDE	0.621	mg/kg	0.621	mg/kg	M	3.3E-04	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	1.6E-02
	MANGANESE(fish)	2.44	mg/kg	2.44	mg/kg	M	1.3E-03	mg/kg/day	1.4E-01	mg/kg/day	NA	NA	9.1E-03
	MERCURY(fish)	0.035	mg/kg	0.035	mg/kg	M	1.8E-05	mg/kg/day	1.0E-04	mg/kg/day	NA	NA	1.8E-01
	(Total)												1.0E+01
												Total Hazard Index Across All Exposure Routes/Pathways	1.0E+01

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

TABLE 7.16
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	4-METHYLPHENOL	64.0	mg/kg	64.0	mg/kg	M	2.1E-02	mg/kg/day	5.0E-03	mg/kg/day	NA	NA	4.1E+00
	BIS(2-ETHYLHEXYL)PHTHALATE	1.19	mg/kg	1.19	mg/kg	M	3.8E-04	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	1.9E-02
	4,4'-DDE	0.083	mg/kg	0.083	mg/kg	M	2.7E-05	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	AROCLOR-1260	0.284	mg/kg	0.284	mg/kg	M	9.2E-05	mg/kg/day	NA	mg/kg/day	NA	NA	- -
	DIELDRIN	0.002	mg/kg	0.002	mg/kg	M	7.7E-07	mg/kg/day	5.0E-05	mg/kg/day	NA	NA	1.5E-02
	1,3-DINITROBENZENE	0.057	mg/kg	0.057	mg/kg	M	1.8E-05	mg/kg/day	1.0E-04	mg/kg/day	NA	NA	1.8E-01
	2-AMINO-4,6-DINITROTOLUENE	0.096	mg/kg	0.096	mg/kg	M	3.1E-05	mg/kg/day	6.0E-05	mg/kg/day	NA	NA	5.2E-01
	ARSENIC	1.04	mg/kg	1.04	mg/kg	M	3.4E-04	mg/kg/day	3.0E-04	mg/kg/day	NA	NA	1.1E+00
	CHROMIUM	1.09	mg/kg	1.09	mg/kg	M	3.5E-04	mg/kg/day	1.5E+00	mg/kg/day	NA	NA	2.3E-04
	CYANIDE	0.621	mg/kg	0.621	mg/kg	M	2.0E-04	mg/kg/day	2.0E-02	mg/kg/day	NA	NA	1.0E-02
	MANGANESE(fish)	2.44	mg/kg	2.44	mg/kg	M	7.9E-04	mg/kg/day	1.4E-01	mg/kg/day	NA	NA	5.6E-03
	MERCURY(fish)	0.035	mg/kg	0.035	mg/kg	M	1.1E-05	mg/kg/day	1.0E-04	mg/kg/day	NA	NA	1.1E-01
	(Total)												6.1E+00
												Total Hazard Index Across All Exposure Routes/Pathways	6.1E+00

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

RAGS Part D Table 8

Calculation Of Cancer Risks

TABLE 8.1
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	2.7E-08	mg/kg/day	1.5E-02	$(mg/kg/day)^{-1}$	4.1E-10
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	8.5E-08	mg/kg/day	NA	$(mg/kg/day)^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	1.9E-08	mg/kg/day	4.0E-01	$(mg/kg/day)^{-1}$	7.5E-09
	ARSENIC	2.75	ug/L	2.75	ug/L	M	3.2E-09	mg/kg/day	1.5E+00	$(mg/kg/day)^{-1}$	4.8E-09
	IRON	474	ug/L	474	ug/L	M	5.5E-07	mg/kg/day	NA	$(mg/kg/day)^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	2.3E-09	mg/kg/day	NA	$(mg/kg/day)^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	9.4E-08	mg/kg/day	NA	$(mg/kg/day)^{-1}$	- -
	(Total)										1.3E-08
										Total Risk Across All Exposure Routes/Pathways	1.3E-08

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.2
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	7.3E-09	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	1.1E-10
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	2.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	5.4E-09	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	2.1E-09
	ARSENIC	2.75	ug/L	2.75	ug/L	M	7.9E-10	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.2E-09
	IRON	474	ug/L	474	ug/L	M	1.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	5.9E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	2.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										3.4E-09
										Total Risk Across All Exposure Routes/Pathways	3.4E-09

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.3
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	4.1E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	3.0E-09
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	4.0E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	2.9E-08
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	3.6E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	2.6E-09
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	1.8E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.3E-09
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	3.4E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	2.5E-09
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	8.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	3.0E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	1.1E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.6E-07
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	4.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	2.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	1.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	2.8E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	1.5E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	5.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	3.5E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	1.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	1.0E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	8.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										2.0E-07
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.9E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.4E-09
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.9E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.4E-08
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	1.7E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.2E-09
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	8.3E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	6.0E-10
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	1.6E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.2E-09
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	1.2E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.8E-08
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.7E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										3.6E-08
										Total Risk Across All Exposure Routes/Pathways	2.4E-07

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.4
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Construction Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.0E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	7.6E-10
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.0E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	7.4E-09
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	9.0E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	6.5E-10
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	4.4E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	3.2E-10
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	8.5E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	6.2E-10
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	2.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	7.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	2.7E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	4.1E-08
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	5.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	3.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	6.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	3.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	1.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	8.8E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	3.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	2.6E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	2.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										5.1E-08
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	9.7E-11	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	7.1E-11
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	9.4E-11	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	6.9E-10
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	8.3E-11	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	6.1E-11
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	4.1E-11	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	3.0E-11
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	7.9E-11	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	5.8E-11
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	5.9E-10	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	8.8E-10
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	8.3E-12	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.8E-09
										Total Risk Across All Exposure Routes/Pathways	5.3E-08

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.5
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZENE	1.55	ug/L	1.55	ug/L	M	2.3E-08	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	3.4E-10
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	2.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	1.8E-08	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	7.4E-09
	ARSENIC	2.75	ug/L	2.75	ug/L	M	4.0E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	6.0E-08
	IRON	474	ug/L	474	ug/L	M	6.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	3.0E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	1.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										6.8E-08
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	1.0E-07	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	1.6E-09
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	3.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	8.3E-08	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	3.3E-08
	ARSENIC	2.75	ug/L	2.75	ug/L	M	9.9E-09	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.5E-08
	IRON	474	ug/L	474	ug/L	M	1.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	7.3E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	2.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										5.0E-08
										Total Risk Across All Exposure Routes/Pathways	1.2E-07

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.6
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZENE	1.55	ug/L	1.55	ug/L	M	5.6E-09	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	8.5E-11
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	5.6E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	4.6E-09	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	1.8E-09
	ARSENIC	2.75	ug/L	2.75	ug/L	M	1.0E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.5E-08
	IRON	474	ug/L	474	ug/L	M	1.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	7.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	3.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.7E-08
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	3.3E-08	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	4.9E-10
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	1.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	2.8E-08	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	1.1E-08
	ARSENIC	2.75	ug/L	2.75	ug/L	M	2.5E-09	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.7E-09
	IRON	474	ug/L	474	ug/L	M	4.3E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	1.8E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	7.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.5E-08
										Total Risk Across All Exposure Routes/Pathways	3.2E-08

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.7
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	7.5E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	5.5E-09
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	7.3E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	5.3E-08
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	6.5E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	4.7E-09
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	3.2E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	2.3E-09
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	6.2E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	4.5E-09
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	1.5E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	5.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	2.0E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.0E-07
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	8.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	3.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	2.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	5.0E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	2.7E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	1.0E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	6.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	2.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	1.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	1.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										3.7E-07
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	7.3E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	5.3E-09
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	7.1E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	5.2E-08
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	6.3E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	4.6E-09
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	3.1E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	2.3E-09
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	6.0E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	4.4E-09
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	4.4E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	6.6E-08
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	6.2E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.3E-07
										Total Risk Across All Exposure Routes/Pathways	5.0E-07

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.8
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.9E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.4E-09
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.8E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.3E-08
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	1.6E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.2E-09
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	8.0E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	5.8E-10
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	1.5E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.1E-09
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	3.7E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	1.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	4.9E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	7.4E-08
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	2.1E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	9.7E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	7.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	1.3E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	6.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	2.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	1.6E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	6.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	4.7E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	4.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										9.2E-08
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	3.6E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	2.6E-10
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	3.5E-10	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	2.6E-09
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	3.1E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	2.3E-10
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	1.5E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.1E-10
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	3.0E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	2.2E-10
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	2.2E-09	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.3E-09
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	3.1E-11	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										6.7E-09
										Total Risk Across All Exposure Routes/Pathways	9.9E-08

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.9
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	4-METHYLPHENOL	64.0	mg/kg	64.0	mg/kg	M	7.8E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	BIS(2-ETHYLHEXYL)PHTHALATE	1.19	mg/kg	1.19	mg/kg	M	1.5E-04	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	2.0E-06
	4,4'-DDE	0.083	mg/kg	0.083	mg/kg	M	1.0E-05	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	3.4E-06
	AROCLOR-1260	0.284	mg/kg	0.284	mg/kg	M	3.5E-05	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	6.9E-05
	DIELDRIN	0.002	mg/kg	0.002	mg/kg	M	2.9E-07	mg/kg/day	1.6E+01	(mg/kg/day) $^{-1}$	4.7E-06
	1,3-DINITROBENZENE	0.057	mg/kg	0.057	mg/kg	M	7.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	2-AMINO-4,6-DINITROTOLUENE	0.096	mg/kg	0.096	mg/kg	M	1.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	1.04	mg/kg	1.04	mg/kg	M	1.3E-04	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.9E-04
	CHROMIUM	1.09	mg/kg	1.09	mg/kg	M	1.3E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CYANIDE	0.621	mg/kg	0.621	mg/kg	M	7.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(fish)	2.44	mg/kg	2.44	mg/kg	M	3.0E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY(fish)	0.035	mg/kg	0.035	mg/kg	M	4.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										2.7E-04
										Total Risk Across All Exposure Routes/Pathways	2.7E-04

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.10
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	4-METHYLPHENOL	64.0	mg/kg	64.0	mg/kg	M	4.7E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	BIS(2-ETHYLHEXYL)PHTHALATE	1.19	mg/kg	1.19	mg/kg	M	8.7E-05	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	1.2E-06
	4,4'-DDE	0.083	mg/kg	0.083	mg/kg	M	6.0E-06	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	2.1E-06
	AROCLOR-1260	0.284	mg/kg	0.284	mg/kg	M	2.1E-05	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	4.1E-05
	DIELDRIN	0.002	mg/kg	0.002	mg/kg	M	1.7E-07	mg/kg/day	1.6E+01	(mg/kg/day) $^{-1}$	2.8E-06
	1,3-DINITROBENZENE	0.057	mg/kg	0.057	mg/kg	M	4.1E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	2-AMINO-4,6-DINITROTOLUENE	0.096	mg/kg	0.096	mg/kg	M	7.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	1.04	mg/kg	1.04	mg/kg	M	7.6E-05	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.1E-04
	CHROMIUM	1.09	mg/kg	1.09	mg/kg	M	7.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CYANIDE	0.621	mg/kg	0.621	mg/kg	M	4.5E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(fish)	2.44	mg/kg	2.44	mg/kg	M	1.8E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY(fish)	0.035	mg/kg	0.035	mg/kg	M	2.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.6E-04
										Total Risk Across All Exposure Routes/Pathways	1.6E-04

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.11
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZENE	1.55	ug/L	1.55	ug/L	M	4.2E-08	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	6.2E-10
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	4.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	3.4E-08	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	1.4E-08
	ARSENIC	2.75	ug/L	2.75	ug/L	M	7.4E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.1E-07
	IRON	474	ug/L	474	ug/L	M	1.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	5.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	2.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.2E-07
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	3.1E-07	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	4.7E-09
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	1.1E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	2.5E-07	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	9.9E-08
	ARSENIC	2.75	ug/L	2.75	ug/L	M	3.0E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	4.4E-08
	IRON	474	ug/L	474	ug/L	M	5.1E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	2.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	8.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.5E-07
										Total Risk Across All Exposure Routes/Pathways	2.7E-07

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.12
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZENE	1.55	ug/L	1.55	ug/L	M	3.1E-09	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	4.7E-11
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	3.1E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	2.6E-09	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	1.0E-09
	ARSENIC	2.75	ug/L	2.75	ug/L	M	5.5E-09	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	8.3E-09
	IRON	474	ug/L	474	ug/L	M	9.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	4.1E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	1.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										9.4E-09
Dermal	BENZENE	1.55	ug/L	1.55	ug/L	M	2.9E-08	mg/kg/day	1.5E-02	(mg/kg/day) $^{-1}$	4.4E-10
	ETHYLBENZENE	1.55	ug/L	1.55	ug/L	M	1.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	TRICHLOROETHENE	1.27	ug/L	1.27	ug/L	M	2.5E-08	mg/kg/day	4.0E-01	(mg/kg/day) $^{-1}$	1.0E-08
	ARSENIC	2.75	ug/L	2.75	ug/L	M	2.2E-09	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.3E-09
	IRON	474	ug/L	474	ug/L	M	3.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	2.03	ug/L	2.03	ug/L	M	1.6E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(surface water)	81.2	ug/L	81.2	ug/L	M	6.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.4E-08
										Total Risk Across All Exposure Routes/Pathways	2.3E-08

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.13
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.4E-08	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.0E-08
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.3E-08	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	9.8E-08
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	1.2E-08	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	8.7E-09
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	5.9E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	4.3E-09
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	1.1E-08	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	8.3E-09
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	2.8E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	9.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	3.6E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	5.5E-07
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	7.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	5.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	9.2E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	4.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	1.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	1.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	4.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	3.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	3.0E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										6.8E-07
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	7.5E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	5.5E-09
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	7.3E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	5.4E-08
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	6.5E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	4.8E-09
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	3.2E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	2.4E-09
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	6.2E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	4.5E-09
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	4.6E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	6.9E-08
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	6.5E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.4E-07
										Total Risk Across All Exposure Routes/Pathways	8.2E-07

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.14
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.0E-09	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	7.6E-10
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.0E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	7.4E-09
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	9.0E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	6.5E-10
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	4.4E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	3.2E-10
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	8.5E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	6.2E-10
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	2.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	7.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	2.7E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	4.1E-08
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	5.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	3.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	6.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	3.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	1.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	8.8E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	3.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	2.6E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	2.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										5.1E-08
Dermal	BENZO(A)ANTHRACENE	0.515	mg/kg	0.515	mg/kg	M	1.6E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.2E-10
	BENZO(A)PYRENE	0.501	mg/kg	0.501	mg/kg	M	1.6E-10	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.1E-09
	BENZO(B)FLUORANTHENE	0.445	mg/kg	0.445	mg/kg	M	1.4E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	1.0E-10
	DIBENZO(A,H)ANTHRACENE	0.220	mg/kg	0.220	mg/kg	M	6.9E-11	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	5.0E-11
	INDENO(1,2,3-CD)PYRENE	0.423	mg/kg	0.423	mg/kg	M	1.3E-10	mg/kg/day	7.3E-01	(mg/kg/day) $^{-1}$	9.7E-11
	ALUMINUM	10259	mg/kg	10259	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ANTIMONY	3.70	mg/kg	3.70	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	13.6	mg/kg	13.6	mg/kg	M	9.8E-10	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.5E-09
	CADMIUM	5.74	mg/kg	5.74	mg/kg	M	1.4E-11	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CHROMIUM	26.7	mg/kg	26.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	COPPER	196	mg/kg	196	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	IRON	34457	mg/kg	34457	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	LEAD	1832	mg/kg	1832	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(sediment)	702	mg/kg	702	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY	0.439	mg/kg	0.439	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	SILVER	17.7	mg/kg	17.7	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	THALLIUM	1.30	mg/kg	1.30	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ZINC	1106	mg/kg	1106	mg/kg	M	0.0E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										3.0E-09
										Total Risk Across All Exposure Routes/Pathways	5.4E-08

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.15
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	4-METHYLPHENOL	64.0	mg/kg	64.0	mg/kg	M	1.4E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	BIS(2-ETHYLHEXYL)PHTHALATE	1.19	mg/kg	1.19	mg/kg	M	2.7E-04	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	3.8E-06
	4,4'-DDE	0.083	mg/kg	0.083	mg/kg	M	1.9E-05	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	6.4E-06
	AROCLOR-1260	0.284	mg/kg	0.284	mg/kg	M	6.4E-05	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	1.3E-04
	DIELDRIN	0.002	mg/kg	0.002	mg/kg	M	5.4E-07	mg/kg/day	1.6E+01	(mg/kg/day) $^{-1}$	8.6E-06
	1,3-DINITROBENZENE	0.057	mg/kg	0.057	mg/kg	M	1.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	2-AMINO-4,6-DINITROTOLUENE	0.096	mg/kg	0.096	mg/kg	M	2.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	1.04	mg/kg	1.04	mg/kg	M	2.3E-04	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.5E-04
	CHROMIUM	1.09	mg/kg	1.09	mg/kg	M	2.4E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CYANIDE	0.621	mg/kg	0.621	mg/kg	M	1.4E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(fish)	2.44	mg/kg	2.44	mg/kg	M	5.5E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY(fish)	0.035	mg/kg	0.035	mg/kg	M	7.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										5.0E-04
										Total Risk Across All Exposure Routes/Pathways	5.0E-04

(1) Medium-Specific (M) EPC selected for risk calculation.

TABLE 8.16
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Mattawoman Creek
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	4-METHYLPHENOL	64.0	mg/kg	64.0	mg/kg	M	2.7E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	BIS(2-ETHYLHEXYL)PHTHALATE	1.19	mg/kg	1.19	mg/kg	M	4.9E-05	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	6.9E-07
	4,4'-DDE	0.083	mg/kg	0.083	mg/kg	M	3.5E-06	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	1.2E-06
	AROCLOR-1260	0.284	mg/kg	0.284	mg/kg	M	1.2E-05	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	2.4E-05
	DIELDRIN	0.002	mg/kg	0.002	mg/kg	M	1.0E-07	mg/kg/day	1.6E+01	(mg/kg/day) $^{-1}$	1.6E-06
	1,3-DINITROBENZENE	0.057	mg/kg	0.057	mg/kg	M	2.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	2-AMINO-4,6-DINITROTOLUENE	0.096	mg/kg	0.096	mg/kg	M	4.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	ARSENIC	1.04	mg/kg	1.04	mg/kg	M	4.3E-05	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	6.5E-05
	CHROMIUM	1.09	mg/kg	1.09	mg/kg	M	4.5E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	CYANIDE	0.621	mg/kg	0.621	mg/kg	M	2.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MANGANESE(fish)	2.44	mg/kg	2.44	mg/kg	M	1.0E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	MERCURY(fish)	0.035	mg/kg	0.035	mg/kg	M	1.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										9.2E-05
										Total Risk Across All Exposure Routes/Pathways	9.2E-05

(1) Medium-Specific (M) EPC selected for risk calculation.

RAGS Part D Table 9

Summary Of Receptor Risks And Hazards For COPCs

TABLE 9.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	BENZENE	--	--	4.1E-10	4.1E-10	BENZENE	None Reported	--	--	0.0006	0.0006
			ETHYLBENZENE	--	--	--	--	ETHYLBENZENE	Liver/Kidney	--	--	0.00006	0.00006
			TRICHLOROETHENE	--	--	7.5E-09	7.5E-09	TRICHLOROETHENE	Liver	--	--	0.004	0.004
			ARSENIC	--	--	4.8E-09	4.8E-09	ARSENIC	Skin, CVS	--	--	0.0007	0.0007
			IRON	--	--	--	--	IRON	Liver, Blood, GS	--	--	0.0001	0.0001
			LEAD	--	--	--	--	LEAD	NA	--	--	--	--
			MANGANESE(surface water)	--	--	--	--	MANGANESE(surface water)	CNS	--	--	--	--
			(Total)	--	--	1.3E-08	1.3E-08	(Total)		--	--	0.01	0.01
Sediment	Sediment	Mattawoman Creek	BENZO(A)ANTHRACENE	3.0E-09	--	1.4E-09	4.4E-09	BENZO(A)ANTHRACENE	NA	--	--	--	--
			BENZO(A)PYRENE	2.9E-08	--	1.4E-08	4.3E-08	BENZO(A)PYRENE	NA	--	--	--	--
			BENZO(B)FLUORANTHENE	2.6E-09	--	1.2E-09	3.8E-09	BENZO(B)FLUORANTHENE	NA	--	--	--	--
			DIBENZO(A,H)ANTHRACENE	1.3E-09	--	6.0E-10	1.9E-09	DIBENZO(A,H)ANTHRACENE	NA	--	--	--	--
			INDENO(1,2,3-CD)PYRENE	2.5E-09	--	1.2E-09	3.6E-09	INDENO(1,2,3-CD)PYRENE	NA	--	--	--	--
			ALUMINUM	--	--	--	--	ALUMINUM	Immune, Nails	0.006	--	--	0.006
			ANTIMONY	--	--	--	--	ANTIMONY	Blood	0.005	--	--	0.005
			ARSENIC	1.6E-07	--	1.8E-08	1.8E-07	ARSENIC	Skin, CVS	0.03	--	0.003	0.03
			CADMIUM	--	--	--	--	CADMIUM	Kidney	0.006	--	0.0005	0.007
			CHROMIUM	--	--	--	--	CHROMIUM	None Reported	0.00001	--	--	0.00001
			COPPER	--	--	--	--	COPPER	GS	0.003	--	--	0.003
			IRON	--	--	--	--	IRON	Liver, Blood, GS	0.06	--	--	0.06
			LEAD	--	--	--	--	LEAD	NA	--	--	--	--
			MANGANESE(sediment)	--	--	--	--	MANGANESE(sediment)	CNS	0.005	--	--	0.005
			MERCURY	--	--	--	--	MERCURY	CNS	0.0008	--	--	0.0008
			SILVER	--	--	--	--	SILVER	Skin	0.002	--	--	0.002
			THALLIUM	--	--	--	--	THALLIUM	Liver	0.01	--	--	0.01
			ZINC	--	--	--	--	ZINC	Blood	0.002	--	--	0.002
			(Total)	2.0E-07	--	3.6E-08	2.4E-07	(Total)		0.1	--	0.003	0.1

Total Risk Across Surface Water	1.3E-08
Total Risk Across Sediment	2.4E-07
Total Risk Across All Media and All Exposure Routes	2.5E-07

Total Hazard Index Across All Media and All Exposure Routes	0.1
Total Blood HI	0.007
Total CNS HI	0.006
Total CVS HI	0.03
Total GS HI	0.003
Total Kidney HI	0.007
Total Liver HI	0.08
Total Skin HI	0.03
Total None Reported HI	0.0006

TABLE 9.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	BENZENE	--	--	1.1E-10	1.1E-10	BENZENE	None Reported	--	--	0.0002	0.0002
			ETHYLBENZENE	--	--	--	--	ETHYLBENZENE	Liver/Kidney	--	--	0.00002	0.00002
			TRICHLOROETHENE	--	--	2.1E-09	2.1E-09	TRICHLOROETHENE	Liver	--	--	0.001	0.001
			ARSENIC	--	--	1.2E-09	1.2E-09	ARSENIC	Skin, CVS	--	--	0.0002	0.0002
			IRON	--	--	--	--	IRON	Liver, Blood, GS	--	--	0.00003	0.00003
			LEAD	--	--	--	--	LEAD	NA	--	--	--	--
			MANGANESE(surface water)	--	--	--	--	MANGANESE(surface water)	CNS	--	--	--	--
			(Total)	--	--	3.4E-09	3.4E-09	(Total)		--	--	0.003	0.003
Sediment	Sediment	Mattawoman Creek	BENZO(A)ANTHRACENE	7.6E-10	--	7.1E-11	8.3E-10	BENZO(A)ANTHRACENE	NA	--	--	--	--
			BENZO(A)PYRENE	7.4E-09	--	6.9E-10	8.0E-09	BENZO(A)PYRENE	NA	--	--	--	--
			BENZO(B)FLUORANTHENE	6.5E-10	--	6.1E-11	7.1E-10	BENZO(B)FLUORANTHENE	NA	--	--	--	--
			DIBENZO(A,H)ANTHRACENE	3.2E-10	--	3.0E-11	3.5E-10	DIBENZO(A,H)ANTHRACENE	NA	--	--	--	--
			INDENO(1,2,3-CD)PYRENE	6.2E-10	--	5.8E-11	6.8E-10	INDENO(1,2,3-CD)PYRENE	NA	--	--	--	--
			ALUMINUM	--	--	--	--	ALUMINUM	Immune, Nails	0.001	--	--	0.001
			ANTIMONY	--	--	--	--	ANTIMONY	Blood	0.001	--	--	0.001
			ARSENIC	4.1E-08	--	8.8E-10	4.2E-08	ARSENIC	Skin, CVS	0.006	--	0.0001	0.007
			CADMIUM	--	--	--	--	CADMIUM	Kidney	0.002	--	0.00002	0.002
			CHROMIUM	--	--	--	--	CHROMIUM	None Reported	0.000003	--	--	0.000003
			COPPER	--	--	--	--	COPPER	GS	0.0007	--	--	0.0007
			IRON	--	--	--	--	IRON	Liver, Blood, GS	0.02	--	--	0.02
			LEAD	--	--	--	--	LEAD	NA	--	--	--	--
			MANGANESE(sediment)	--	--	--	--	MANGANESE(sediment)	CNS	0.001	--	--	0.001
			MERCURY	--	--	--	--	MERCURY	CNS	0.0002	--	--	0.0002
			SILVER	--	--	--	--	SILVER	Skin	0.0005	--	--	0.0005
			THALLIUM	--	--	--	--	THALLIUM	Liver	0.003	--	--	0.003
			ZINC	--	--	--	--	ZINC	Blood	0.0005	--	--	0.0005
			(Total)	5.1E-08	--	1.8E-09	5.3E-08	(Total)		0.03	--	0.0002	0.03

Total Risk Across Surface Water	3.4E-09
Total Risk Across Sediment	5.3E-08
Total Risk Across All Media and All Exposure Routes	5.6E-08

Total Hazard Index Across All Media and All Exposure Routes	0.04

Total Blood HI	0.002
Total Body Weight HI	0.0000
Total CNS HI	0.003
Total CVS HI	0.007
Total GS HI	0.0007
Total Kidney HI	0.002
Total Liver HI	0.02
Total Skin HI	0.007
Total None Reported HI	0.0002

TABLE 9.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	BENZENE	3.4E-10	- -	1.6E-09	1.9E-09	BENZENE	None Reported	0.00005	- -	0.0002	0.0003
			ETHYLBENZENE	- -	- -	- -	- -	ETHYLBENZENE	Liver/Kidney	0.000002	- -	0.00003	0.00003
			TRICHLOROETHENE	7.4E-09	- -	3.3E-08	4.1E-08	TRICHLOROETHENE	Liver	0.0004	- -	0.002	0.002
			ARSENIC	6.0E-08	- -	1.5E-08	7.5E-08	ARSENIC	Skin, CVS	0.0009	- -	0.0002	0.001
			IRON	- -	- -	- -	- -	IRON	Liver, Blood, GS	0.0002	- -	0.00004	0.0002
			LEAD	- -	- -	- -	- -	LEAD	NA	- -	- -	- -	--
			MANGANESE(surface water)	- -	- -	- -	- -	MANGANESE(surface water)	CNS	0.0003	- -	0.002	0.002
			(Total)	6.8E-08	- -	5.0E-08	1.2E-07	(Total)		0.002	--	0.005	0.01
Sediment	Sediment	Mattawoman Creek	BENZO(A)ANTHRACENE	5.5E-09	- -	5.3E-09	1.1E-08	BENZO(A)ANTHRACENE	NA	- -	- -	- -	--
			BENZO(A)PYRENE	5.3E-08	- -	5.2E-08	1.0E-07	BENZO(A)PYRENE	NA	- -	- -	- -	--
			BENZO(B)FLUORANTHENE	4.7E-09	- -	4.6E-09	9.3E-09	BENZO(B)FLUORANTHENE	NA	- -	- -	- -	--
			DIBENZO(A,H)ANTHRACENE	2.3E-09	- -	2.3E-09	4.6E-09	DIBENZO(A,H)ANTHRACENE	NA	- -	- -	- -	--
			INDENO(1,2,3-CD)PYRENE	4.5E-09	- -	4.4E-09	8.9E-09	INDENO(1,2,3-CD)PYRENE	NA	- -	- -	- -	--
			ALUMINUM	- -	- -	- -	- -	ALUMINUM	Immune, Nails	0.001	- -	--	0.001
			ANTIMONY	- -	- -	- -	- -	ANTIMONY	Blood	0.0009	- -	--	0.0009
			ARSENIC	3.0E-07	- -	6.6E-08	3.6E-07	ARSENIC	Skin, CVS	0.005	- -	0.001	0.006
			CADMIUM	- -	- -	- -	- -	CADMIUM	Kidney	0.001	- -	0.0002	0.001
			CHROMIUM	- -	- -	- -	- -	CHROMIUM	None Reported	0.000002	- -	--	0.000002
			COPPER	- -	- -	- -	- -	COPPER	GS	0.0005	- -	--	0.0005
			IRON	- -	- -	- -	- -	IRON	Liver, Blood, GS	0.01	- -	--	0.01
			LEAD	- -	- -	- -	- -	LEAD	NA	- -	- -	- -	--
			MANGANESE(sediment)	- -	- -	- -	- -	MANGANESE(sediment)	CNS	0.0010	- -	--	0.0010
			MERCURY	- -	- -	- -	- -	MERCURY	CNS	0.0001	- -	--	0.0001
			SILVER	- -	- -	- -	- -	SILVER	Skin	0.0004	- -	--	0.0004
			THALLIUM	- -	- -	- -	- -	THALLIUM	Liver	0.002	- -	--	0.002
			ZINC	- -	- -	- -	- -	ZINC	Blood	0.0004	- -	--	0.0004
			(Total)	3.7E-07	- -	1.3E-07	5.0E-07	(Total)		0.02	--	0.001	0.02
Surface Water	Finfish/Shellfish	Mattawoman Creek	4-METHYLPHENOL	- -	- -	- -	- -	4-METHYLPHENOL	CNS,Respiratory	11	- -	- -	11
			BIS(2-ETHYLHEXYL)PHTHALATE	2.0E-06	- -	- -	2.0E-06	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	0.05	- -	- -	0.05
			4,4'-DDE	3.4E-06	- -	- -	3.4E-06	4,4'-DDE	NA	- -	- -	- -	--
			AROCLOR-1260	6.9E-05	- -	- -	6.9E-05	AROCLOR-1260	NA	- -	- -	- -	--
			DIELDRIN	4.7E-06	- -	- -	4.7E-06	DIELDRIN	Liver	0.04	- -	- -	0.04
			1,3-DINITROBENZENE	- -	- -	- -	- -	1,3-DINITROBENZENE	Spleen	0.5	- -	- -	0.5
			2-AMINO-4,6-DINITROTOLUENE	- -	- -	- -	- -	2-AMINO-4,6-DINITROTOLUENE	Liver	1.4	- -	- -	1.4
			ARSENIC	1.9E-04	- -	- -	1.9E-04	ARSENIC	Skin, CVS	3.0	- -	- -	3.0
			CHROMIUM	- -	- -	- -	- -	CHROMIUM	None Reported	0.0006	- -	- -	0.0006
			CYANIDE	- -	- -	- -	- -	CYANIDE	Body Weight	0.03	- -	- -	0.03
			MANGANESE(fish)	- -	- -	- -	- -	MANGANESE(fish)	CNS	0.01	- -	- -	0.01
			MERCURY(fish)	- -	- -	- -	- -	MERCURY(fish)	CNS	0.3	- -	- -	0.3
			(Total)	2.7E-04	- -	- -	2.7E-04	(Total)		16	--	--	16

Total Risk Across Surface Water	5.0E-07
Total Risk Across Sediment	5.0E-07
Total Risk Across Fish Tissue	2.7E-04
Total Risk Across All Media and All Exposure Routes	2.7E-04

Total Hazard Index Across All Media and All Exposure Routes	16

Total Blood HI	0.001
Total Body Weight HI	0.03
Total CNS HI	0.3
Total CVS HI	0.007
Total GS HI	0.0005
Total Kidney HI	0.001
Total Liver HI	1.5
Total Skin HI	3.0
Total None Reported HI	0.0009
Total Spleen HI	0.5

TABLE 9.4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	BENZENE	8.5E-11	- -	4.9E-10	5.7E-10	BENZENE	None Reported	0.00001	- -	0.00008	0.00009
			ETHYLBENZENE	- -	- -	- -	- -	ETHYLBENZENE	Liver/Kidney	0.0000004	- -	0.000009	0.000009
			TRICHLOROETHENE	1.8E-09	- -	1.1E-08	1.3E-08	TRICHLOROETHENE	Liver	0.0001	- -	0.0007	0.0008
			ARSENIC	1.5E-08	- -	3.7E-09	1.9E-08	ARSENIC	Skin, CVS	0.0002	- -	0.00006	0.0003
			IRON	- -	- -	- -	- -	IRON	Liver, Blood, GS	0.00004	- -	0.000010	0.00005
			LEAD	- -	- -	- -	- -	LEAD	NA	- -	- -	- -	--
			MANGANESE(surface water)	- -	- -	- -	- -	MANGANESE(surface water)	CNS	0.00009	- -	0.0005	0.0006
			(Total)	1.7E-08	- -	1.5E-08	3.2E-08	(Total)		0.0005	--	0.001	0.002
Sediment	Sediment	Mattawoman Creek	BENZO(A)ANTHRACENE	1.4E-09	- -	2.6E-10	1.6E-09	BENZO(A)ANTHRACENE	NA	- -	- -	- -	--
			BENZO(A)PYRENE	1.3E-08	- -	2.6E-09	1.6E-08	BENZO(A)PYRENE	NA	- -	- -	- -	--
			BENZO(B)FLUORANTHENE	1.2E-09	- -	2.3E-10	1.4E-09	BENZO(B)FLUORANTHENE	NA	- -	- -	- -	--
			DIBENZO(A,H)ANTHRACENE	5.8E-10	- -	1.1E-10	7.0E-10	DIBENZO(A,H)ANTHRACENE	NA	- -	- -	- -	--
			INDENO(1,2,3-CD)PYRENE	1.1E-09	- -	2.2E-10	1.3E-09	INDENO(1,2,3-CD)PYRENE	NA	- -	- -	- -	--
			ALUMINUM	- -	- -	- -	- -	ALUMINUM	Immune, Nails	0.0003	- -	--	0.0003
			ANTIMONY	- -	- -	- -	- -	ANTIMONY	Blood	0.0002	- -	--	0.0002
			ARSENIC	7.4E-08	- -	3.3E-09	7.8E-08	ARSENIC	Skin, CVS	0.001	- -	0.00005	0.001
			CADMIUM	- -	- -	- -	- -	CADMIUM	Kidney	0.0003	- -	0.000009	0.0003
			CHROMIUM	- -	- -	- -	- -	CHROMIUM	None Reported	0.0000005	- -	--	0.0000005
			COPPER	- -	- -	- -	- -	COPPER	GS	0.0001	- -	--	0.0001
			IRON	- -	- -	- -	- -	IRON	Liver, Blood, GS	0.003	- -	--	0.003
			LEAD	- -	- -	- -	- -	LEAD	NA	- -	- -	- -	--
			MANGANESE(sediment)	- -	- -	- -	- -	MANGANESE(sediment)	CNS	0.0002	- -	--	0.0002
			MERCURY	- -	- -	- -	- -	MERCURY	CNS	0.00004	- -	--	0.00004
			SILVER	- -	- -	- -	- -	SILVER	Skin	0.00009	- -	--	0.00009
			THALLIUM	- -	- -	- -	- -	THALLIUM	Liver	0.0005	- -	--	0.0005
			ZINC	- -	- -	- -	- -	ZINC	Blood	0.00009	- -	--	0.00009
			(Total)	9.2E-08	- -	6.7E-09	9.9E-08	(Total)		0.006	--	0.00006	0.006
Surface Water	Finfish/Shellfish	Mattawoman Creek	4-METHYLPHENOL	- -	- -	- -	- -	4-METHYLPHENOL	CNS,Respiratory	6.5	- -	- -	6.5
			BIS(2-ETHYLHEXYL)PHTHALATE	1.2E-06	- -	- -	1.2E-06	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	0.03	- -	- -	0.03
			4,4'-DDE	2.1E-06	- -	- -	2.1E-06	4,4'-DDE	NA	- -	- -	- -	--
			AROCLOR-1260	4.1E-05	- -	- -	4.1E-05	AROCLOR-1260	NA	- -	- -	- -	--
			DIELDRIN	2.8E-06	- -	- -	2.8E-06	DIELDRIN	Liver	0.02	- -	- -	0.02
			1,3-DINITROBENZENE	- -	- -	- -	- -	1,3-DINITROBENZENE	Spleen	0.3	- -	- -	0.3
			2-AMINO-4,6-DINITROTOLUENE	- -	- -	- -	- -	2-AMINO-4,6-DINITROTOLUENE	Liver	0.8	- -	- -	0.8
			ARSENIC	1.1E-04	- -	- -	1.1E-04	ARSENIC	Skin, CVS	1.8	- -	- -	1.8
			CHROMIUM	- -	- -	- -	- -	CHROMIUM	None Reported	0.0004	- -	- -	0.0004
			CYANIDE	- -	- -	- -	- -	CYANIDE	Body Weight	0.02	- -	- -	0.02
			MANGANESE(fish)	- -	- -	- -	- -	MANGANESE(fish)	CNS	0.009	- -	- -	0.009
			MERCURY(fish)	- -	- -	- -	- -	MERCURY(fish)	CNS	0.2	- -	- -	0.2
			(Total)	1.6E-04	--	--	1.6E-04	(Total)		10	--	--	10

Total Risk Across Surface Water	3.2E-08
Total Risk Across Sediment	9.9E-08
Total Risk Across Fish Tissue	1.6E-04
Total Risk Across All Media and All Exposure Routes	1.6E-04

Total Hazard Index Across All Media and All Exposure Routes	10

Total Blood HI	0.0003
Total Body Weight HI	0.02
Total CNS HI	6.7
Total CVS HI	0.001
Total GS HI	0.0001
Total Kidney HI	0.0003
Total Liver HI	0.9
Total Skin HI	1.8
Total None Reported HI	0.0005
Total Spleen HI	0.3

TABLE 9.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	BENZENE	6.2E-10	--	4.7E-09	5.3E-09	BENZENE	None Reported	0.00003	--	0.0002	0.0003
			ETHYLBENZENE	--	--	--	--	ETHYLBENZENE	Liver/Kidney	0.0000010	--	0.00003	0.00003
			TRICHLOROETHENE	1.4E-08	--	9.9E-08	1.1E-07	TRICHLOROETHENE	Liver	0.0003	--	0.002	0.002
			ARSENIC	1.1E-07	--	4.4E-08	1.5E-07	ARSENIC	Skin, CVS	0.0006	--	0.0002	0.0008
			IRON	--	--	--	--	IRON	Liver, Blood, GS	0.00010	--	0.00004	0.0001
			LEAD	--	--	--	--	LEAD	NA	--	--	--	--
			MANGANESE(surface water)	--	--	--	--	MANGANESE(surface water)	CNS	0.0002	--	0.002	0.002
			(Total)	1.2E-07	--	1.5E-07	2.7E-07	(Total)		0.001	--	0.005	0.006
Sediment	Sediment	Mattawoman Creek	BENZO(A)ANTHRACENE	1.0E-08	--	5.5E-09	1.6E-08	BENZO(A)ANTHRACENE	NA	--	--	--	--
			BENZO(A)PYRENE	9.8E-08	--	5.4E-08	1.5E-07	BENZO(A)PYRENE	NA	--	--	--	--
			BENZO(B)FLUORANTHENE	8.7E-09	--	4.8E-09	1.3E-08	BENZO(B)FLUORANTHENE	NA	--	--	--	--
			DIBENZO(A,H)ANTHRACENE	4.3E-09	--	2.4E-09	6.7E-09	DIBENZO(A,H)ANTHRACENE	NA	--	--	--	--
			INDENO(1,2,3-CD)PYRENE	8.3E-09	--	4.5E-09	1.3E-08	INDENO(1,2,3-CD)PYRENE	NA	--	--	--	--
			ALUMINUM	--	--	--	--	ALUMINUM	Immune, Nails	0.0006	--	--	0.0006
			ANTIMONY	--	--	--	--	ANTIMONY	Blood	0.0006	--	--	0.0006
			ARSENIC	5.5E-07	--	6.9E-08	6.2E-07	ARSENIC	Skin, CVS	0.003	--	0.0004	0.003
			CADMIUM	--	--	--	--	CADMIUM	Kidney	0.0007	--	0.00006	0.0008
			CHROMIUM	--	--	--	--	CHROMIUM	None Reported	0.000001	--	--	0.000001
			COPPER	--	--	--	--	COPPER	GS	0.0003	--	--	0.0003
			IRON	--	--	--	--	IRON	Liver, Blood, GS	0.007	--	--	0.007
			LEAD	--	--	--	--	LEAD	NA	--	--	--	--
			MANGANESE(sediment)	--	--	--	--	MANGANESE(sediment)	CNS	0.0006	--	--	0.0006
			MERCURY	--	--	--	--	MERCURY	CNS	0.00009	--	--	0.00009
			SILVER	--	--	--	--	SILVER	Skin	0.0002	--	--	0.0002
			THALLIUM	--	--	--	--	THALLIUM	Liver	0.001	--	--	0.001
			ZINC	--	--	--	--	ZINC	Blood	0.0002	--	--	0.0002
			(Total)	6.8E-07	--	1.4E-07	8.2E-07	(Total)		0.015	--	0.0004	0.02
Surface Water	Finfish/Shellfish	Mattawoman Creek	4-METHYLPHENOL	--	--	--	--	4-METHYLPHENOL	CNS,Respiratory	6.7	--	--	6.7
			BIS(2-ETHYLHEXYL)PHTHALATE	3.8E-06	--	--	3.8E-06	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	0.03	--	--	0.03
			4,4'-DDE	6.4E-06	--	--	6.4E-06	4,4'-DDE	NA	--	--	--	--
			AROCLOR-1260	1.3E-04	--	--	1.3E-04	AROCLOR-1260	NA	--	--	--	--
			DIELDRIN	8.6E-06	--	--	8.6E-06	DIELDRIN	Liver	0.03	--	--	0.03
			1,3-DINITROBENZENE	--	--	--	--	1,3-DINITROBENZENE	Spleen	0.3	--	--	0.3
			2-AMINO-4,6-DINITROTOLUENE	--	--	--	--	2-AMINO-4,6-DINITROTOLUENE	Liver	0.8	--	--	0.8
			ARSENIC	3.5E-04	--	--	3.5E-04	ARSENIC	Skin, CVS	1.8	--	--	1.8
			CHROMIUM	--	--	--	--	CHROMIUM	None Reported	0.0004	--	--	0.0004
			CYANIDE	--	--	--	--	CYANIDE	Body Weight	0.02	--	--	0.02
			MANGANESE(fish)	--	--	--	--	MANGANESE(fish)	CNS	0.009	--	--	0.009
			MERCURY(fish)	--	--	--	--	MERCURY(fish)	CNS	0.2	--	--	0.2
			(Total)	5.0E-04	--	--	5.0E-04	(Total)		10	--	--	10

Total Risk Across Surface Water	2.7E-07
Total Risk Across Sediment	8.2E-07
Total Risk Across Fish Tissue	5.0E-04
Total Risk Across All Media and All Exposure Routes	5.0E-04

Total Hazard Index Across All Media and All Exposure Routes	10

Total Blood HI	0.0008
Total Body Weight HI	0.02
Total CNS HI	6.9
Total CVS HI	0.004
Total GS HI	0.0003
Total Kidney HI	0.0008
Total Liver HI	0.9
Total Skin HI	1.8
Total None Reported HI	0.0007
Total Spleen HI	0.3

TABLE 9.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	BENZENE	4.7E-11	- -	4.4E-10	4.8E-10	BENZENE	None Reported	0.000008	- -	0.00008	0.00008
			ETHYLBENZENE	- -	- -	- -	- -	ETHYLBENZENE	Liver/Kidney	0.0000002	- -	0.000009	0.000009
			TRICHLOROETHENE	1.0E-09	- -	1.0E-08	1.1E-08	TRICHLOROETHENE	Liver	0.00007	- -	0.0007	0.0007
			ARSENIC	8.3E-09	- -	3.3E-09	1.2E-08	ARSENIC	Skin, CVS	0.0001	- -	0.00006	0.0002
			IRON	- -	- -	- -	- -	IRON	Liver, Blood, GS	0.00002	- -	0.000010	0.00003
			LEAD	- -	- -	- -	- -	LEAD	NA	- -	- -	- -	--
			MANGANESE(surface water)	- -	- -	- -	- -	MANGANESE(surface water)	CNS	0.00005	- -	0.0005	0.0006
			(Total)	9.4E-09	- -	1.4E-08	2.3E-08	(Total)		0.0003	--	0.001	0.002
Sediment	Sediment	Mattawoman Creek	BENZO(A)ANTHRACENE	7.6E-10	- -	1.2E-10	8.8E-10	BENZO(A)ANTHRACENE	NA	- -	- -	- -	--
			BENZO(A)PYRENE	7.4E-09	- -	1.1E-09	8.5E-09	BENZO(A)PYRENE	NA	- -	- -	- -	--
			BENZO(B)FLUORANTHENE	6.5E-10	- -	1.0E-10	7.6E-10	BENZO(B)FLUORANTHENE	NA	- -	- -	- -	--
			DIBENZO(A,H)ANTHRACENE	3.2E-10	- -	5.0E-11	3.7E-10	DIBENZO(A,H)ANTHRACENE	NA	- -	- -	- -	--
			INDENO(1,2,3-CD)PYRENE	6.2E-10	- -	9.7E-11	7.2E-10	INDENO(1,2,3-CD)PYRENE	NA	- -	- -	- -	--
			ALUMINUM	- -	- -	- -	- -	ALUMINUM	Immune, Nails	0.0002	- -	--	0.0002
			ANTIMONY	- -	- -	- -	- -	ANTIMONY	Blood	0.0001	- -	--	0.0001
			ARSENIC	4.1E-08	- -	1.5E-09	4.3E-08	ARSENIC	Skin, CVS	0.0007	- -	0.00003	0.0007
			CADMIUM	- -	- -	- -	- -	CADMIUM	Kidney	0.0002	- -	0.000004	0.0002
			CHROMIUM	- -	- -	- -	- -	CHROMIUM	None Reported	0.0000003	- -	--	0.0000003
			COPPER	- -	- -	- -	- -	COPPER	GS	0.00008	- -	--	0.00008
			IRON	- -	- -	- -	- -	IRON	Liver, Blood, GS	0.002	- -	--	0.002
			LEAD	- -	- -	- -	- -	LEAD	NA	- -	- -	- -	--
			MANGANESE(sediment)	- -	- -	- -	- -	MANGANESE(sediment)	CNS	0.0002	- -	--	0.0002
			MERCURY	- -	- -	- -	- -	MERCURY	CNS	0.00002	- -	--	0.00002
			SILVER	- -	- -	- -	- -	SILVER	Skin	0.00006	- -	--	0.00006
			THALLIUM	- -	- -	- -	- -	THALLIUM	Liver	0.0003	- -	--	0.0003
			ZINC	- -	- -	- -	- -	ZINC	Blood	0.00006	- -	--	0.00006
			(Total)	5.1E-08	- -	3.0E-09	5.4E-08	(Total)		0.004	--	0.00003	0.004
Surface Water	Finfish/Shellfish	Mattawoman Creek	4-METHYLPHENOL	- -	- -	- -	- -	4-METHYLPHENOL	CNS,Respiratory	4.1	- -	- -	4.1
			BIS(2-ETHYLHEXYL)PHTHALATE	6.9E-07	- -	- -	6.9E-07	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	0.02	- -	- -	0.02
			4,4'-DDE	1.2E-06	- -	- -	1.2E-06	4,4'-DDE	NA	- -	- -	- -	--
			AROCLOR-1260	2.4E-05	- -	- -	2.4E-05	AROCLOR-1260	NA	- -	- -	- -	--
			DIELDRIN	1.6E-06	- -	- -	1.6E-06	DIELDRIN	Liver	0.02	- -	- -	0.02
			1,3-DINITROBENZENE	- -	- -	- -	- -	1,3-DINITROBENZENE	Spleen	0.2	- -	- -	0.2
			2-AMINO-4,6-DINITROTOLUENE	- -	- -	- -	- -	2-AMINO-4,6-DINITROTOLUENE	Liver	0.5	- -	- -	0.5
			ARSENIC	6.5E-05	- -	- -	6.5E-05	ARSENIC	Skin, CVS	1.1	- -	- -	1.1
			CHROMIUM	- -	- -	- -	- -	CHROMIUM	None Reported	0.0002	- -	- -	0.0002
			CYANIDE	- -	- -	- -	- -	CYANIDE	Body Weight	0.01	- -	- -	0.01
			MANGANESE(fish)	- -	- -	- -	- -	MANGANESE(fish)	CNS	0.006	- -	- -	0.006
			MERCURY(fish)	- -	- -	- -	- -	MERCURY(fish)	CNS	0.1	- -	- -	0.1
			(Total)	9.2E-05	- -	- -	9.2E-05	(Total)		6.1	--	--	6.1

Total Risk Across Surface Water	2.3E-08
Total Risk Across Sediment	5.4E-08
Total Risk Across Fish Tissue	9.2E-05
Total Risk Across All Media and All Exposure Routes	9.2E-05

Total Hazard Index Across All Media and All Exposure Routes	6.1

Total Blood HI	0.0002
Total Body Weight HI	0.01
Total CNS HI	4.3
Total CVS HI	0.0009
Total GS HI	0.00008
Total Kidney HI	0.0002
Total Liver HI	0.6
Total Skin HI	1.1
Total None Reported HI	0.0003
Total Spleen HI	0.2

RAGS Part D Table 10

Risks Assessment Summaries

TABLE 10.1
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Sediment	Sediment	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				

TABLE 10.2
RISK ASSESSMENT SUMMARY
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Sediment	Sediment	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				

TABLE 10.3
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Sediment	Sediment	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Surface Water	Finfish/Shellfish	Mattawoman Creek	4-METHYLPHENOL	- -	- -	- -	- -	4-METHYLPHENOL	CNS,Respiratory	11	- -	- -	11
			BIS(2-ETHYLHEXYL)PHTHALATE	2.0E-06	- -	- -	2.0E-06	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	0.05	- -	- -	0.05
			4,4'-DDE	3.4E-06	- -	- -	3.4E-06	4,4'-DDE	NA	- -	- -	- -	--
			AROCLOR-1260	6.9E-05	- -	- -	6.9E-05	AROCLOR-1260	NA	- -	- -	- -	--
			DIELDRIN	4.7E-06	- -	- -	4.7E-06	DIELDRIN	Liver	0.04	- -	- -	0.04
			2-AMINO-4,6-DINITROTOLUENE	- -	- -	- -	- -	2-AMINO-4,6-DINITROTOLUENE	Liver	1.4	- -	- -	1.4
			ARSENIC	1.9E-04	- -	- -	1.9E-04	ARSENIC	Skin, CVS	3.0	- -	- -	3.0
			(Total)	2.7E-04	- -	- -	2.7E-04	(Total)		15	--	--	15
						Total Risk Across Fish Tissue	2.7E-04					Total Hazard Index Across All Media and All Exposure Routes	15
						Total Risk Across All Media and All Exposure Routes	2.7E-04						

Total CNS HI	11
Total CVS HI	3.0
Total Liver HI	1.5
Total Skin HI	3.0
Total Respiratory HI	11

TABLE 10.4
RISK ASSESSMENT SUMMARY
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Sediment	Sediment	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Surface Water	Finfish/Shellfish	Mattawoman Creek	4-METHYLPHENOL	- -	- -	- -	- -	4-METHYLPHENOL	CNS,Respiratory	6.5	- -	- -	6.5
			BIS(2-ETHYLHEXYL)PHTHALATE	1.2E-06	- -	- -	1.2E-06	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	0.03	- -	- -	0.03
			4,4'-DDE	2.1E-06	- -	- -	2.1E-06	4,4'-DDE	NA	- -	- -	- -	--
			AROCLOR-1260	4.1E-05	- -	- -	4.1E-05	AROCLOR-1260	NA	- -	- -	- -	--
			DIELDRIN	2.8E-06	- -	- -	2.8E-06	DIELDRIN	Liver	0.02	- -	- -	0.02
			ARSENIC	1.1E-04	- -	- -	1.1E-04	ARSENIC	Skin, CVS	1.8	- -	- -	1.8
			(Total)	1.6E-04	- -	- -	1.6E-04	(Total)		8.4	--	--	8.4
						Total Risk Across Fish Tissue	1.6E-04					Total Hazard Index Across All Media and All Exposure Routes	8.4
						Total Risk Across All Media and All Exposure Routes	1.6E-04						

Total CNS HI	6.5
Total CVS HI	1.8
Total Liver HI	0.02
Total Skin HI	1.8
Total Respiratory HI	6.5

TABLE 10.5
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Sediment	Sediment	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Surface Water	Finfish/Shellfish	Mattawoman Creek	4-METHYLPHENOL	- -	- -	- -	- -	4-METHYLPHENOL	CNS,Respiratory	6.7	- -	- -	6.7
			BIS(2-ETHYLHEXYL)PHTHALATE	3.8E-06	- -	- -	3.8E-06	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	0.03	- -	- -	0.03
			4,4'-DDE	6.4E-06	- -	- -	6.4E-06	4,4'-DDE	NA	- -	- -	- -	- -
			AROCLOR-1260	1.3E-04	- -	- -	1.3E-04	AROCLOR-1260	NA	- -	- -	- -	- -
			DIELDRIN	8.6E-06	- -	- -	8.6E-06	DIELDRIN	Liver	0.03	- -	- -	0.03
			ARSENIC	3.5E-04	- -	- -	3.5E-04	ARSENIC	Skin, CVS	1.8	- -	- -	1.8
			(Total)	5.0E-04	- -	- -	5.0E-04	(Total)		8.6	- -	- -	8.6
			Total Risk Across Fish Tissue				5.0E-04	Total Hazard Index Across All Media and All Exposure Routes					8.6
			Total Risk Across All Media and All Exposure Routes				5.0E-04						

Total CNS HI	6.7
Total CVS HI	1.8
Total Liver HI	0.03
Total Skin HI	1.8
Total Respiratory HI	6.7

TABLE 10.6
RISK ASSESSMENT SUMMARY
CENTRAL TENDENCY EXPOSURES
INDIV-NSWC, INDIAN HEAD, MARYLAND

Scenario Timeframe: Current/Future
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Sediment	Sediment	Mattawoman Creek	All Cancer Risks Less than 1E-06						All Hazard Quotients less than 1				
Surface Water	Finfish/Shellfish	Mattawoman Creek	4-METHYLPHENOL	--	--	--	--	4-METHYLPHENOL	CNS,Respiratory	4.1	--	--	4.1
			4,4'-DDE	1.2E-06	--	--	1.2E-06	4,4'-DDE	NA	--	--	--	--
			AROCLOR-1260	2.4E-05	--	--	2.4E-05	AROCLOR-1260	NA	--	--	--	--
			DIELDRIN	1.6E-06	--	--	1.6E-06	DIELDRIN	Liver	0.02	--	--	0.02
			ARSENIC	6.5E-05	--	--	6.5E-05	ARSENIC	Skin, CVS	1.1	--	--	1.1
			(Total)	9.1E-05	--	--	9.1E-05	(Total)		5.3	--	--	5.3
			Total Risk Across Fish Tissue				9.1E-05	Total Hazard Index Across All Media and All Exposure Routes					5.3
			Total Risk Across All Media and All Exposure Routes				9.1E-05						

Total CNS HI	4.1
Total CVS HI	1.1
Total Liver HI	0.02
Total Skin HI	1.1
Total Respiratory HI	4.1

APPENDIX D-4

LEAD MODELING RESULTS

Calculations of 95th Percentile Fetal Blood Lead Concentrations for Adult Exposure to Soil

SITE NAME: **INDIV-NSWC, INDIAN HEAD, MARYLAND**
LOCATION: **MATTAWOMAN CREEK**
RECEPTOR: **CONSTRUCTION WORKERS**
DATE: **JUNE 20, 2002**

OBJECTIVE: Adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood lead concentration in the developing fetuses of adult women. This spreadsheet calculates a range of 95th percentile fetal blood lead concentrations from central estimates of blood lead concentrations in pregnant adult women using the exposure parameters identified below (U.S. EPA, Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil, December 1996).

RELEVANT EQUATIONS:

$$PbB_{fetal,\ GM} = R_{fetal/maternal} \times [PbB_{adult,\ 0} + (PbS \times BKSF \times IR_s \times AF_s \times EF_s)/AT]$$

and

$$PbB_{fetal,\ 0.95} = PbB_{fetal,\ GM} \times GSD_{i,\ adult}^{1.645}$$

Exposure Parameter	Description (units)	Construction Worker		
		Area 1	Area 1 Excluding IS11SD01	Area 5
$PbB_{adult,\ 0}$	Typical blood lead concentration in adult women of child-bearing age in absence of site exposures (ug/dL)	2.0	2.0	2.0
PbS	Site-specific soil lead concentration (mg/kg)	10122	653	341
BKSF	Biokinetic slope factor (ug/dL per ug/day))	0.4	0.4	0.4
IR_s	Intake rate of soil, includes outdoor soil and indoor soil-derived dust (g/day)	0.100	0.100	0.100
AF_s	Absolute gastrointestinal absorption fraction (unitless)	0.12	0.12	0.12
EF_s	Exposure frequency (days/year)	60	60	60
AT	Averaging time (days/year)	365	365	365
$GSD_{i,\ adult}$	Estimate of individual geometric standard deviation among adults (unitless)	2.0	2.0	2.0
$R_{fetal/maternal}$	Constant of proportionality between fetal blood lead concentraiton at birth and maternal blood lead concentration (unitless)	0.9	0.9	0.9
$PbB_{adult,\ central}$	Calculated central estimate of blood lead concentrations in adult women of child-bearing age from site exposures (ug/dL)	9.99	2.52	2.27
$PbB_{fetal,\ GM}$	Central estimate of blood lead concentration (ug/dL) for fetuses carried by women who have site exposures to soil lead at concentration, PbS.	8.99	2.26	2.04
	Probabillty that PbB_{fetal} exceeds 10 ug/dL.	43.88%	1.60%	1.10%
$PbB_{fetal,\ 0.95}$	Calculated 95th percentile blood lead concentratlons among fetuses born to women having site exposures (ug/dL)	28.11	7.08	6.39
RBRG	Lead soil concentration corresponding to a 95th percentile 10 ug/dL lead blood level in a fetus (mg/kg).	1968	1968	1968