N65928.AR.000572
NTC ORLANDO
5090.3a

FINAL REMEDIAL INVESTIGATION REPORT FOR OPERABLE UNIT 1 (OU 1) NORTH GRINDER LANDFILL VOLUME 2 OF 2 APPENDICES G THROUGH K NTC ORLANDO FL
12/19/1996
ABB ENVIRONMENTAL

7457-10.0-55
03.07.01.0002
1b-00189

REMEDIAL INVESTIGATION REPORT
NORTH GRINDER LANDFILL
OPERABLE UNIT 1

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

VOLUME II: APPENDICES G THROUGH K

UNIT IDENTIFICATION CODE: N65928
CONTRACT NO.: N62467-89-D-0317/107

DECEMBER 1996

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

PRINTED ON RECYCLED PAPER

APPENDIX G

MONITORING WELL SAMPLING LOGS

OGD-U1-01A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Point of Interest: ~~OU 1 U1-01-01~~
Project Number: 08519.70
Date: 8/09/95
Sample Location ID: U1G00101
Time: Start: 0920 End: 1115
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 13.01 Ft. ✓ Measured ___ Historical
✓ Top of Well ___ Top of Protective Casing ___
Well Riser Stick-up (from ground) FM Ft.
Protective Casing/Well Difference FM Ft.
Protective Casing FM Ft.

Depth to Water 3.29 Ft.
Well Material: ✓ PVC ___ SS ___
Well Locked?: ✓ Yes ___ No
Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch ___
Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___

Height of Water Column 9.72 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 1.56 Gal/Vol; 7.5 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: ✓ / ___
Concrete Collar Intact: ✓ / ___
Other: ___ / ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	✓	In-line Filter	
___	___	Press/Vac Filter	
___	___		

Decontamination Fluids Used: (✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm
Field Data Collected ___ In-line ✓ In Container
Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ✓ Colored ___ Odor

Purge Data	@ 0 Gal.	@ 4.52 Gal.	@ 6.30 Gal.	@ 6.97 Gal.	@ 7.5 Gal.
Temperature, Deg. C	28.5	29.5	29.5	29.5	29.5
pH, units	5.88	6.28	6.27	6.28	6.27
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	259	275	270	269	269
~~Oxidation-Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	21.5	11.77	14.60	14.90	15.40

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	120 mL	✓	___ / ___ / ___ / ___
SVOA	___	4°C	2.5 L	✓	___ / ___ / ___ / ___
Pest/PCB	___	4°C	2.5 L	✓	___ / ___ / ___ / ___
Inorganics	✓	HNO_3	1L / 1L	✓✓	___ / ___ / ___ / ___
~~Explosives~~ Alpha/Beta	___	4°C	1 gal	✓	___ / ___ / ___ / ___
TPH	___	H_2SO_4	32 oz	✓	___ / ___ / ___ / ___
TOC	___	H_2SO_4		___	___ / ___ / ___ / ___
~~Nitrate~~ Herbicides	___	~~H_2SO_4~~	2.5L	✓	___ / ___ / ___ / ___

~~Notes:~~
Secondary Parameters
pH, TSS TDS, NO_3 ALK SO_4, Hardness ½ gal
TOC, $NO_2/3$, TPO H_2SO_4
Sulfide $NaOH + ZnAc$

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 08519.70
Sample Location ID: OLD-UL-OLA
Time: Start: 1037 End: 1140

Point of Interest: OU1
Date: 2-27-96
Signature of Sampler: [illegible]

Water Level/Well Data

Well Depth 12.99 Ft. — X Measured / ___ Historical

Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) N/A Ft.

Protective Casing/Well Difference N/A Ft.

Protective Casing N/A Ft.

Depth to Water 5.22 Ft.

Well Material: X PVC / ___ SS

Well Locked?: X Yes / ___ No

Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 7.77 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 7.77 Gal/Ft. (12 in.) = 1.2 ~~31.7~~ 10.5 Gal/Vol

55 Total Gal Purged 1.2 9.3

Well Integrity:

	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

Purging	Sampling		Equipment ID
		Peristaltic Pump	
		Submersible Pump	
	X	Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	
X		Cent. Pump	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- X Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line / X In Container

Sample Observations: X Turbid / ___ Clear / ___ Cloudy / X Colored / ___ Odor

Purge Data	@ 5 Gal.	@ 20 Gal.	@ 45 Gal.	@ 50 Gal.	@ 55 Gal.
Temperature, Deg. C	25	24.5	24.5	25.0	25.0
pH, units	4.84	5.02	5.21	5.36	5.44
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	135	135	135	135	135
Oxidation - Reduction, +/- mv	206.2	215.3	206.9	196.6	192.3
Dissolved Oxygen, ppm mg/L	6.2	5.4	4.7	4.7	5.1

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING FOR METHANE & TVS

OCD-U1-02B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G00201
Time: Start: 1500 End: 1829

Point of Interest: ~~OU-1 U1-01-02~~
Date: 8/08/95
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 27.94 Ft. — ✓ Measured ___ Historical — ✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft. — Protective Casing/Well Difference FM Ft. — Protective Casing FM Ft.

Depth to Water 7.27 Ft. — Well Material: ✓ PVC ___ SS — Well Locked?: ✓ Yes ___ No — Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch — Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 20.67 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__in.) = 3.31 Gal/Vol; 6.0 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ✓ No ___; Concrete Collar Intact — Yes ✓ No ___; Other ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ✓ Colored ___ Odor

Purge Data	@ 0.53 Gal.	@ 3.3 Gal.	@ 5.0 Gal.	@ 5.5 Gal.	@ 6.0 Gal.
Temperature, Deg. C	30.0	31.5	29.0	28.0	28.5
pH, units	4.93	4.82	4.88	4.85	4.90
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	80	79	71	71	70
~~Oxidation-Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	>200	123.1	103.6	103.3	100.7

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5 L	✓	/ / /

Notes:
Secondary Parameters
pH, TSS, TDS, NO_3, ALK, SO_4, Hardness — 1/2 gal
TOC, NO2/3, TPO — H_2SO_4
Sulfide — NaOH + ZnAc

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OU 1
Project Number: 08519.70
Date: 2-27/96
Sample Location ID: OLD-01-02B
Time: Start: 1150 End: 1218
Signature of Sampler: [illegible]

Water Level/Well Data

Well Depth 28.21 Ft. X Measured ___ Historical

X Top of Well ___ Top of Protective Casing ___ ___

Well Riser Stick-up (from ground) NA Ft.

Protective Casing/Well Difference NA Ft.

Protective Casing NA Ft.

Depth to Water 10.12 Ft.

Well Material: X PVC ___ SS ___

Well Locked?: X Yes ___ No

Well Dia. X 2 inch ___ 4 inch ___ 6 inch ___ ___

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___ ___

Height of Water Column 16.09 Ft. X ___ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (___ in.) = 16.2 Gal/Vol

40 Total Gal Purged

Well Integrity:

	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
		Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	
X		Cent. Pump	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- X Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line X In Container

Sample Observations: X Turbid ___ Clear ___ Cloudy X Colored ___ Odor

Purge Data	@ 5 Gal.	@ 20 Gal.	@ 30 Gal.	@ 35 Gal.	@ 40 Gal.
Temperature, Deg. C	26.0	26.0	26.0	26.0	26.5
pH, units	4.75	5.07	5.05	5.01	4.99
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	60 ~~59.2~~	60 ~~59.0~~	58 ~~96.8~~	60 ~~162.2~~	60 ~~161.3~~
Oxidation - Reduction, +/- mv	98.2	89.0	90.8	162.2	161.3
Dissolved Oxygen, ppm	2.20	4.6	4.4	4.2	4.3

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING FOR METHANE & TPH

OUS-U1-03C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1 G00302
Time: Start: 1130 End: 1607

Point of Interest: ~~OU-1 U1-01-03~~
Date: 8/09/95
Signature of Sampler: John Mad

Water Level/Well Data

Well Depth 58.13 Ft. — ✓ Measured ___ Historical — ✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft. — Protective Casing/Well Difference FM Ft. — Protective Casing FM Ft.

Depth to Water 17.02 Ft. — Well Material: ✓ PVC ___ SS — Well Locked?: ✓ Yes ___ No — Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch — Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 41.11 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__in.) = 6.58 Gal/Vol; 14.41 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ✓ No ___; Concrete Collar Intact — Yes ✓ No ___; Other ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	890026
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line ✓ In Container

Sample Observations: ✓ Turbid ___ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0.42 Gal.	@ 4.0 Gal.	@ 13.6 Gal.	@ 14.0 Gal.	@ 14.41 Gal.
Temperature, Deg. C	30.5	28.0	28.0	28.5	29.0
pH, units	6.70	6.48	6.51	6.49	6.45
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	260	238	225	231	226
~~Oxidation - Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	>200	>200	>200	>200	>200

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4°C	2.5 L	✓	
Pest/PCB		4°C	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4			
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	

Notes:

GROUNDWATER SAMPLE FIELD DATA

Project: OU1-WBZ RESAMPLING
Point of Interest:
Project Number: 8519.70
Date: 10/18/95
Sample Location ID: OU-U1-03C
Time: Start: 09:00 End: 1155
Signature of Sampler: J. NASH

Water Level/Well Data

Well Depth 57.5 Ft. — ___ Measured / X Historical — ___ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) ___ Ft.

Protective Casing/Well Difference ___ Ft.

Protective Casing ___ Ft.

FLUSH

Depth to Water 12.7 Ft. — Well Material: X PVC / ___ SS — Well Locked?: X Yes / ___ No — Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch — Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 45 Ft. X X .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.) = 7.4 Gal/Vol; 26.5 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes X, No ___; Concrete Collar Intact — Yes X, No ___; Other ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line / X In Container

Sample Observations: X Turbid / ___ Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 1 Gal.	@ 5 Gal.	@ 10 Gal.	@ 15 Gal.	@ 20 Gal.	26.5
Temperature, Deg. C	25	25	25	26	26	27
pH, units	6.05	6.05	6.02	5.94	5.98	5.98
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	125	125	110	100	95	85
Oxidation - Reduction, +/- mv	—	—	—	—	—	—
Dissolved Oxygen, ppm	—	—	—	—	—	—
TURBIDITY	7200	7200	7200	195	195	193

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING FOR RADS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 08519.70
Sample Location ID: OU1-UI-03C
Time: Start: 1225 End: 1322

Point of Interest: OU1
Date: 2-27-96
Signature of Sampler: [illegible]

Water Level/Well Data

Well Depth 58.14 Ft. — X Measured ___ Historical — X Top of Well ___ Top of Protective Casing

Well Riser Stick-up NA Ft. (from ground)

Protective NA Ft. Casing/Well Difference

Protective NA Ft. Casing

Depth to Water 15.42 Ft.

Well Material: X PVC ___ SS

Well Locked?: X Yes ___ No

Well Dia. X 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 42.67 Ft. X ___ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (12 in.) = 6.82 / 8.4 / 1.2

15.2 Gal/Vol

50 Total Gal Purged

Well Integrity:

	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
		Peristaltic Pump	
		Submersible Pump	
	X	Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	
X		cent. Pump	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- X Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line X In Container

Sample Observations: X Turbid ___ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 5 Gal.	@ 25 Gal.	@ 40 Gal.	@ 45 Gal.	@ 50 Gal.
Temperature, Deg. C	26.5	29.0	30.0	30.0	30.0
pH, units	5.15	5.54	5.57	5.55	5.53
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	62	65	62	65	61
Oxidation - Reduction, +/- mv	111.9	107.2	95.0	97.8	122.9
Dissolved Oxygen, ppm	3.6	4.8	5.1	5.4	5.2

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: OUG003CH 1x 250ml w/ septa cap clear glass - Methane
1x 500ml clear glass TVS

OLD-U1-04/A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1 G00401
Time: Start: 1130 End: 1530

Point of Interest: ~~OU-1 U1-02-01~~
Date: 8/14/95
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 20.38 Ft. — ✓ Measured / ___ Historical

✓ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 11.37 Ft.

Well Material: ✓ PVC / ___ SS

Well Locked?: ✓ Yes / ___ No

Well Dia. ✓ 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 9.01 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (__ in.) = 1.44 Gal/Vol; 14.0 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	890026
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / ✓ In Container

Sample Observations: ___ Turbid / ✓ Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ .40 Gal.	@ 6.0 Gal.	@ 12.8 Gal.	@ 13.3 Gal.	@ 14.0 Gal.
Temperature, Deg. C	31.0	31.0	31.0	31.0	31.0
pH, units	5.23	5.12	5.24	5.22	5.32
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	65	67	62	64	70
~~Oxidation - Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	8.44	8.62	11.67	11.30	11.35

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	/ / /

Notes:

OCD-01-05B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G00501
Time: Start: 0857 End: 1330

Point of Interest: ~~OU-1 U1-02-02~~
Date: 8/14/95
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 37.29 Ft. — ✓ Measured / ___ Historical — ✓ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 14.67 Ft.

Well Material: ✓ PVC / ___ SS

Well Locked?: ✓ Yes / ___ No

Well Dia. ✓ 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 22.62 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.) = 3.62 Gal/Vol; 9 Total Gal Purged

Well Integrity:

	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line / ✓ In Container

Sample Observations: ___ Turbid / ✓ Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 0 Gal.	@ 4.0 Gal.	@ 8.0 Gal.	@ 8.5 Gal.	@ 9.0 Gal.
Temperature, Deg. C	28.0	28.5	30.0	30.0	30.0
pH, units	5.21	5.03	4.86	4.85	4.91
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	109	101	101	102	101
~~Oxidation-Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	51.3	18.01	9.60	9.69	9.62

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4°C	2.5 L	✓	
Pest/PCB		4°C	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4			
~~Nitrate~~ Herbicides		H_2SO_4	2.5L	✓	

Notes:

OCD-V1-06C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U2G00601
Time: Start: 0905 End: 1355

Point of Interest: ~~OU-1 U1-02-03~~
Date: 8/15/95
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 58.66 Ft. ✓ Measured ___ Historical ✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 14.51 Ft.

Well Material: ✓ PVC ___ SS

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 44.15 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__in.) = 7.1 Gal/Vol; 10 Total Gal Purged

Well Integrity: Prot. Casing Secure ✓ Yes; Concrete Collar Intact ✓ Yes; Other ___ No

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	289639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth 4/4 ppm Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Colored ___ Clear ___ Odor ✓ Cloudy

Purge Data	@ 0.6 Gal.	@ 4.1 Gal.	@ 8.8 Gal.	@ 9.6 Gal.	@ 10.0 Gal.
Temperature, Deg. C	27.5	29.0	29.0	29.0	29.5
pH, units	5.54	5.19	5.17	5.15	5.16
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	360	242	210	210	211
~~Oxidation Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	>200	85.6	53.5	57.5	58.6

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓/✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	/ / /

Notes:

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OU 1
Project Number: 08519.70
Date: 2-27/96
Sample Location ID: OLD-U1-06C
Time: Start: 1700 End: 1725
Signature of Sampler: [illegible]

Water Level/Well Data

Well Depth 58.61 Ft. X Measured ___ Historical

X Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) NA Ft.

Protective Casing/Well Difference NA Ft.

Protective Casing NA Ft.

Depth to Water 13.22 Ft.

Well Material: X PVC ___ SS

Well Locked?: X Yes ___ No

Well Dia. X 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 45.4 Ft. × 45.4 .16 Gal/Ft. (2 in.) / .65 Gal/Ft. (4 in.) / 1.5 Gal/Ft. (6 in.) / 1.2 Gal/Ft. (6 in.) = 7.3 + 8.4

15.7 Gal/Vol

55 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
		Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	
X		Cent. Pump	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- X Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm

Field Data Collected ___ In-line X In Container

Sample Observations: X Turbid ___ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 5 Gal.	@ 25 Gal.	@ 35 Gal.	@ 45 Gal.	@ 55 Gal.
Temperature, Deg. C	26.0	26.5	26.5	26.0	26.5
pH, units	5.15	4.91	5.00	5.01	4.99
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	175	142	135	145	155
Oxidation - Reduction, +/- mv	116.2	111.6	111.5	113.4	121.1
Dissolved Oxygen, ppm	2.2	2.2	2.3	2.4	2.2

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING FOR METHANE & TVS

OU-U1-07A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G00701
Time: Start: 1424 End: 1600

Point of Interest: ~~OU-1 U1-03-01~~
Date: 8/15/95
Signature of Sampler: John Marsh

Water Level/Well Data

Well Depth 22.19 Ft. — ✓ Measured / ___ Historical

✓ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 14.72 Ft.

Well Material: ✓ PVC / ___ SS

Well Locked?: ✓ Yes / ___ No

Well Dia. ✓ 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 7.47 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.) = 1.2 Gal/Vol; 7 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / ✓ In Container

Sample Observations: ___ Turbid / ✓ Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 0 Gal.	@ 2.7 Gal.	@ 5.4 Gal.	@ 6.2 Gal.	@ 7 Gal.
Temperature, Deg. C	28.5	27.5	27.5	27.0	27.5
pH, units	4.73	4.79	4.72	4.69	4.69
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	170	181	200	198	200
~~Oxidation Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	3.10	2.88	2.32	1.81	1.79

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	___/___/___/___
SVOA		4OC	2.5 L	✓	___/___/___/___
Pest/PCB		4OC	2.5 L	✓	___/___/___/___
Inorganics	✓	HNO_3	1L / 1L	✓✓	___/___/___/___
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	___/___/___/___
TPH		H_2SO_4	32 oz	✓	___/___/___/___
TOC		H_2SO_4		✓	___/___/___/___
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5 L	✓	___/___/___/___

Notes:

OCD-U1-08B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G00801
Time: Start: 1503 End: 1850

Point of Interest: ~~OU-1 U1-03-02~~
Date: 8/15/95
Signature of Sampler: John Marsh

Water Level/Well Data

Well Depth 41.29 Ft. ✓ Measured ___ Historical

✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 14.76 Ft.

Well Material: ✓ PVC ___ SS

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 26.53 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__in.) = 4.24 Gal/Vol; 8 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	890026
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0 Gal.	@ 4.0 Gal.	@ 6.8 Gal.	@ 7.4 Gal.	@ 8 Gal.
Temperature, Deg. C	28.0	29.0	29.0	29.0	29.0
pH, units	5.08	4.85	4.86	4.89	4.90
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	185	190	188	189	187
~~Oxidation Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	19.36	11.81	11.54	11.84	10.36

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5 L	✓	/ / /

Notes:

OUD-U1-09C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G00901
Time: Start: 0824 End: 1345

Point of Interest: ~~OU-1 U1-03-03~~
Date: 8/21/95
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 57.09 Ft. ✓ Measured ___ Historical ✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 14.85 Ft.

Well Material: ✓ PVC ___ SS

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 42.24 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 6.8 Gal/Vol; 4 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	589639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0 Gal.	@ 1.7 Gal.	@ 3.0 Gal.	@ 3.6 Gal.	@ 4 Gal.
Temperature, Deg. C	25.5	26.0	27.0	27.0	27.0
pH, units	6.17	6.09	6.11	6.09	6.10
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	205	205	205	208	209
~~Oxidation - Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	4.78	3.48	2.99	2.98	2.77

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5 L	✓	/ / /

Notes:

Secondary Parameters

pH, TSS, TDS, NO_3, ALK, SO_4, Hardness		1/2 gal
TOC, $NO_2/3$, TPO	H_2SO_4	1 quart
Sulfide	NaOH + ZnAC	1 pint

OID-111-10A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Point of Interest: ~~OU 1 U1-04-01~~
Project Number: 08519.70
Date: 8/16/95
Sample Location ID: U1G01001
Time: Start: 0917 End: 1340
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 22.94 Ft. ✓ Measured ___ Historical

✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 14.76 Ft.

Well Material: ✓ PVC ___ SS

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 8.18 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__in.) = 1.3 Gal/Vol; 9 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	890026
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0.5 Gal.	@ 3.0 Gal.	@ 7.6 Gal.	@ 8.25 Gal.	@ 9 Gal.
Temperature, Deg. C	26.0	26.0	27.0	27.0	27.0
pH, units	4.75	4.78	4.75	4.79	4.80
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	121	138	145	151	148
~~Oxidation-Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	4.20	2.62	0.58	0.50	0.58

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	/ / /

~~Notes:~~

Secondary Parameters

pH, TSS, TDS, NO_3, ALK, SO_4, Hardness		1/2 gal	✓
TOC, $NO_2/3$, TPO	H_2SO_4	1 quart	✓
Sulfide	NaOH + ZnAc	1 pint	✓

OCD-U1-11B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Point of Interest: ~~OU-1 U1-04-02~~
Project Number: 08519.70
Date: 8/16/95
Sample Location ID: U1G01101
Time: Start: 1054 End: 1507
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 39.55 Ft. ✓ Measured ___ Historical
✓ Top of Well ___ Top of Protective Casing
Well Riser Stick-up (from ground) FM Ft.
Protective Casing/Well Difference FM Ft.
Protective Casing FM Ft.

Depth to Water 14.63 Ft.
Well Material: ✓ PVC ___ SS
Well Locked?: ✓ Yes ___ No
Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch
Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 24.92 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 4.0 Gal/Vol; 21 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm
Field Data Collected ___ In-line ✓ In Container
Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0.8 Gal.	@ 10.5 Gal.	@ 19.3 Gal.	@ 20.3 Gal.	@ 21 Gal.
Temperature, Deg. C	26.0	26.0	27.0	27.0	27.5
pH, units	5.19	5.23	5.20	5.21	5.19
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	108	111	115	112	117
~~Oxidation-Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	32.9	22.8	14.94	14.66	14.92

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4°C	2.5 L	✓	
Pest/PCB		4°C	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4			
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5 L	✓	

~~Notes:~~

Secondary Parameters

pH, TSS, TDS, NO_3, ALK, SO_4, Hardness		½ gal	✓
TOC, $NO_2/3$, TPO	H_2SO_4	1 quart	✓
Sulfide	NaOH + ZnAc	1 pint	✓

OLD-01-12C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G01201
Time: Start: 0810 End: 1125

Point of Interest: ~~OU-1 US-04-03~~
Date: 8/17/95
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 64.35 Ft. ✓ Measured ___ Historical ✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft. Protective Casing/Well Difference FM Ft. Protective Casing FM Ft.

Depth to Water 14.63 Ft. Well Material: ✓ PVC ___ SS Well Locked?: ✓ Yes ___ No Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 49.72 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 8.0 Gal/Vol; 16 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	890026
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth 5 ppm Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ___ Clear ✓ Cloudy ___ Colored ___ Odor

Purge Data	@ 0 Gal.	@ 7.5 Gal.	@ 14.5 Gal.	@ 15.2 Gal.	@ 16 Gal.
Temperature, Deg. C	25.0	26.0	26.5	26.5	26.5
pH, units	4.81	4.74	4.75	4.79	4.74
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	139	134	140	139	135
~~Oxidation - Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	>200	31.8	20.6	22.7	22.2

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4OC	2.5 L	✓	
Pest/PCB		4OC	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓/✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4		✓	
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	

Notes:

Secondary Parameters

pH, TSS, TDS, NO_3, ALK SO_4, Hardness		1/2 gal	✓
TOC, $NO_2/3$, TPO	H_2SO_4	1 quart	✓
Sulfide	NaOH + ZnAc	1 pint	✓

OLD-U1-13A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G01302
Time: Start: 1250 End: 1335

Point of Interest: ~~OU-1 U1-05-01~~
Date: 8/24/95
Signature of Sampler: –

Water Level/Well Data

Well Depth _____ Ft. ✓ Measured ___ Historical

✓ Top of Well ___ Top of Protective Casing ___ _____

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water _____ Ft.

Well Material: ✓ PVC ___ SS _____

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch ___ _____

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___ _____

Height of Water Column _____ Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ ___ Gal/Ft. (___ in.) = _____ Gal/Vol _____ Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: ✓ / ___
Concrete Collar Intact: ✓ / ___
Other _____ ___ / ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	✓	In-line Filter	
___	___	Press/Vac Filter	
___	___		

Decontamination Fluids Used: (✓ All That Apply at Location)

___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth ___ ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ___ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ .5 Gal.	@ 10 Gal.	@ 20 Gal.	@ 30 Gal.	@ 40 Gal.	50
Temperature, Deg. C	26.0	26.0	26.0	25.5	25.5	25.5
pH, units	5.18	5.19	4.98	4.99	5.02	4.91
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	330	350	315	210	210	200
~~Oxidation-Reduction, +/- mv~~						
~~Dissolved Oxygen, ppm~~						
Turbidity (NTU)	6.26	3.74	1.01	1.38	2.02	1.56

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	120 mL	✓	___ / ___ / ___ / ___
SVOA	___	4OC	2.5 L	✓	___ / ___ / ___ / ___
Pest/PCB	___	4OC	2.5 L	✓	___ / ___ / ___ / ___
Inorganics	✓	HNO_3	1L / 1L	✓/✓	___ / ___ / ___ / ___
~~Explosives~~ Alpha/Beta	___	4°C	1 gal	✓	___ / ___ / ___ / ___
TPH	___	H_2SO_4	32 oz	✓	___ / ___ / ___ / ___
TOC	___	H_2SO_4		___	___ / ___ / ___ / ___
~~Nitrate~~ Herbicides	___	~~H_2SO_4~~	2.5 L	✓	___ / ___ / ___ / ___

Notes: _____

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OUL
Project Number: 0E519.70
Date: 2-27/95
Sample Location ID: OLD-01-13A
Time: Start: 1400 End: 1418
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 23.21 Ft. X Measured ___ Historical

X Top of Well ___ Top of Protective Casing ___

Well Riser Stick-up (from ground) NA Ft.

Protective Casing/Well Difference NA Ft.

Protective Casing NA Ft.

Depth to Water 12.88 Ft.

Well Material: X PVC ___ SS ___

Well Locked?: X Yes ___ No

Well Dia. X 2 inch ___ 4 inch ___ 6 inch ___

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___

Height of Water Column 10.33 Ft. X 10.33 .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (___ in.) = 1.6 / 1.2 / 12.4

14.0 Gal/Vol

8.0 Total Gal Purged

Well Integrity:

	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
		Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	
X		Cent. Pump	

Decontamination Fluids Used:

(✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- X Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line X In Container

Sample Observations: ___ Turbid X Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 5 Gal.	@ 25 Gal.	@ 40 Gal.	@ 65 Gal.	@ 80 Gal.
Temperature, Deg. C	29.0	30.0	25.0	25.0	25.0
pH, units	5.24	5.43	5.3	5.25	5.20
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	100	100	102	100	102
Oxidation - Reduction, +/- mv	266.9	192.3	296.1	307.6	310.9
Dissolved Oxygen, ppm	3.5	3.4	3.2	3.2	3.0

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING FOR METHANE & TVS

OCD-W1-14B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: V1G01401
Time: Start: 1115 End: 1340

Point of Interest: OU-1 V1-05-02
Date: 8/22/95
Signature of Sampler: John Mach

Water Level/Well Data

Well Depth 39.30 Ft. — ✓ Measured / ___ Historical — ✓ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 13.69 Ft.

Well Material: ✓ PVC / ___ SS

Well Locked?: ✓ Yes / ___ No

Well Dia. ✓ 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 25.61 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (__ in.) = 4.1 Gal/Vol; 18 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth 400/8 ppm

Field Data Collected: ___ In-line / ✓ In Container

Sample Observations: ___ Turbid / ✓ Clear / ___ Cloudy / ✓ Colored / ___ Odor

Purge Data	@ 1.5 Gal.	@ 11.3 Gal.	@ 15.8 Gal.	@ 17 Gal.	@ 18 Gal.
Temperature, Deg. C	26.0	26.0	26.5	26.5	26.5
pH, units	5.05	5.12	5.09	5.09	5.09
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	165	177	175	180	179
~~Oxidation-Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	23.5	17.05	11.19	11.16	11.30

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4OC	2.5 L	✓	
Pest/PCB		4OC	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓✓	
~~Explosives~~ Alpha/Beta		4°C	1gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4		✓	
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	

Notes:

GROUNDWATER SAMPLE FIELD DATA

Project: OU-1 NIBCO RESAMPLING
Point of Interest: —
Project Number: OU-01-14B
Date: 10/18/95
Sample Location ID: 8579, 70
Time: Start: 0935 End: 1049
Signature of Sampler: J. NASH

Water Level/Well Data

Well Depth 34.5 Ft. ___ Measured X Historical
___ Top of Well ___ Top of Protective Casing
Well Riser Stick-up ___ Ft. (from ground)
Protective ___ Ft. Casing/Well Difference FLUSH
Protective ___ Ft. Casing

Depth to Water 10.4 Ft.
Well Material: X PVC ___ SS
Well Locked?: X Yes ___ No
Well Dia. X 2 inch ___ 4 inch ___ 6 inch
Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 24 Ft. X X .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (___ in.) = 5 Gal/Vol; 17.5 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes X; Concrete Collar Intact — Yes X; Other — No

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
___ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm
Field Data Collected ___ In-line X In Container
Sample Observations: ___ Turbid X Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 1.5 Gal.	@ 5 Gal.	@ 10 Gal.	@ 15 Gal.	@ 17.5 Gal.
Temperature, Deg. C	25	25	25	25	25
pH, units	5.3	5.3	5.3	5.4	5.4
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	165	160	162	160	160
Oxidation - Reduction, +/- mv	—	—	—	—	—
Dissolved Oxygen, ppm	—	—	—	—	—
TURBIDITY	35.7	35.4	20.3	17.5	17.2

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING PER ADS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 08519.70
Sample Location ID: OLD-01-14B
Time: Start: 1429 End: 1448

Point of Interest: OU 1
Date: 2-27-95
Signature of Sampler: William D. Olson

Water Level/Well Data

Well Depth 39.48 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) NA Ft.

Protective Casing/Well Difference NA Ft.

Protective Casing NA Ft.

Depth to Water 12.73 Ft.

Well Material: X PVC / ___ SS

Well Locked?: X Yes / ___ No

Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 26.75 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / X ___ Gal/Ft. (12 in.) 12 = 4.28 [12.7 Gal/Vol / 55 Total Gal Purged] 8.4

Well Integrity:	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
		Peristaltic Pump	
		Submersible Pump	
	X	Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	
X		Cent Pump	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- X Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line / X In Container

Sample Observations: ___ Turbid / ___ Clear / ___ Cloudy / X Colored / X Odor

Purge Data	@ 5 Gal.	@ 20 Gal.	@ 30 Gal.	@ 40 Gal.	@ 55 Gal.
Temperature, Deg. C	26.0	26.5	26.5	26.5	26.0
pH, units	5.15	5.14	5.14	5.14	5.10
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	151	158	155	152	15[illegible]
Oxidation - Reduction, +/- mv	77.6	70.1	65.2	65.5	66.2
Dissolved Oxygen, ppm	2.8	4.6	3.6	3.4	3.3

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 1126014 04 1x250ml clear glass w/septa CAP - Methane
1x500ml clear glass TVS

OLD-U1-15C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G01501
Time: Start: 0815 End: 1205

Point of Interest: ~~OU 1 U1-05-03~~
Date: 8/22/95
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 53.87 Ft. — ✓ Measured / ___ Historical

✓ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 13.73 Ft.

Well Material: ✓ PVC / ___ SS

Well Locked?: ✓ Yes / ___ No

Well Dia. ✓ 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 40.14 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.) = 6.4 Gal/Vol; 21 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	890026
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth 10/Ø ppm

Field Data Collected: ___ In-line / ✓ In Container

Sample Observations: ___ Turbid / ✓ Colored / ___ Cloudy / ✓ Clear / ✓ Odor

Purge Data	@ 1.0 Gal.	@ 10.5 Gal.	@ 19.7 Gal.	@ 20.4 Gal.	@ 21 Gal.
Temperature, Deg. C	25.5	26.0	26.5	26.5	26.0
pH, units	5.00	4.91	4.91	4.93	4.94
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	190	180	178	178	177
~~Oxidation-Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	103.0	29.0	14.30	14.06	13.72

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓ ✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	/ / /

Notes:

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OUL
Project Number: 08.519.70
Date: 2-27-96
Sample Location ID: OUL-01-15 C
Time: Start: 1510 End: 1528
Signature of Sampler: [illegible]

Water Level/Well Data

Well Depth 54.04 Ft. X Measured ___ Historical

X Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) NA Ft.

Protective Casing/Well Difference NA Ft.

Protective Casing NA Ft.

Depth to Water 12.75 Ft.

Well Material: X PVC ___ SS

Well Locked?: X Yes ___ No

Well Dia. X 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 41.29 Ft.

41.29 X .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) X 1.2 Gal/Ft. (6 in.) = 6.6

6.6 × 3 = 15.0 Gal/Vol

70 Total Gal Purged

8.4

Well Integrity:

	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
—	—	Peristaltic Pump	
—	—	Submersible Pump	
—	—	Bailer	
—	—	PVC/Silicon Tubing	
—	—	Teflon/Silicon Tubing	
—	—	Airlift	
—	—	Hand Pump	
—	—	In-line Filter	
—	—	Press/Vac Filter	
X	—	Cent. Pump	

Decontamination Fluids Used:

(✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- X Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm

Field Data Collected ___ In-line ___ In Container

Sample Observations: X Turbid ___ Clear ___ Cloudy ___ Colored X Odor

Purge Data	@ 5 Gal.	@ 20 Gal.	@ 35 Gal.	@ 55 Gal.	@ 70 Gal.
Temperature, Deg. C	26.5	26.0	26.0	26.0	26.0
pH, units	5.03	5.07	5.07	5.03	5.02
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	175	142	160	160	160
Oxidation - Reduction, +/- mv	28.5	9.5	-2.5	-3.5	-3.2
Dissolved Oxygen, ppm	1.8	2.0	2.1	1.9	2.0

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING FOR METHANE & TVS

OLD-U1-16A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1GO1601
Time: Start: 0834 End: 1158

Point of Interest: ~~OU-1~~ U1-06-01
Date: 8/18/95
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 19.65 Ft. — ✓ Measured ___ Historical — ✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft. — Protective Casing/Well Difference FM Ft. — Protective Casing FM Ft.

Depth to Water 11.95 Ft. — Well Material: ✓ PVC ___ SS — Well Locked?: ✓ Yes ___ No — Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch — Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 7.7 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__in.) = 1.23 Gal/Vol; 15 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0.5 Gal.	@ 9 Gal.	@ 13 Gal.	@ 14 Gal.	@ 15 Gal.
Temperature, Deg. C	26.0	25.5	26.5	26.5	26.5
pH, units	5.24	5.04	5.11	5.17	5.13
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	75	100	103	102	108
~~Oxidation-Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	8.60	4.30	2.33	2.41	2.38

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5 L	✓	/ / /

Notes:

Secondary Parameters

pH, TSS, TDS, NO_3, ALK, SO_4, Hardness		½ gal	✓
TOC, $NO_{2/3}$, TPO	H_2SO_4	1 quart	✓
Sulfide	NaOH + ZnAC	1 pint	✓

OLD-U1-17B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G01701
Time: Start: 1419 End: 1835

Point of Interest: ~~OU 1 U1-06-02~~
Date: 8/17/95
Signature of Sampler: John M[illegible]

Water Level/Well Data

Well Depth 34.33 Ft. — ✓ Measured / ___ Historical — ✓ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft. — Protective Casing/Well Difference FM Ft. — Protective Casing FM Ft.

Depth to Water 11.95 Ft. — Well Material: ✓ PVC / ___ SS — Well Locked?: ✓ Yes / ___ No — Well Dia. ✓ 2 inch / ___ 4 inch / ___ 6 inch — Water Level Equip. Used: ✓ Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 22.38 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (__in.) = 3.6 Gal/Vol; 9 Total Gal Purged

Well Integrity: Prot. Casing Secure ✓ Yes / ___ No; Concrete Collar Intact ✓ Yes / ___ No; Other ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0 Gal.	@ 4 Gal.	@ 7.6 Gal.	@ 8.1 Gal.	@ 9 Gal.
Temperature, Deg. C	29.0	27.0	27.0	27.5	27.5
pH, units	4.72	4.97	4.99	4.94	4.98
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	170	187	189	190	195
~~Oxidation-Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	16.83	13.90	9.40	9.22	9.78

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4°C	2.5 L	✓	
Pest/PCB		4°C	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓/✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4		✓	
~~Nitrate~~ Herbicides ~~Nitrite~~		~~H_2SO_4~~	2.5L	✓	

Secondary Parameters

pH, TSS, TDS, NO_3, ALK, SO_4, Hardness		1/2 gal	✓
TOC, $NO_{2/3}$, TPO	H_2SO_4	1 quart	✓
Sulfide	NaOH + Zn Ac	1 pint	✓

OCD-U1-18C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Point of Interest: ~~OU-1 U1-06-03~~
Project Number: 08519.70
Date: 8/25/95
Sample Location ID: U1G01801
Time: Start: 1045 End: 1505
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 47.56 Ft. ✓ Measured ___ Historical
✓ Top of Well ___ Top of Protective Casing
Well Riser Stick-up (from ground) FM Ft.
Protective Casing/Well Difference FM Ft.
Protective Casing FM Ft.

Depth to Water 9.91 Ft.
Well Material: ✓ PVC ___ SS
Well Locked?: ✓ Yes ___ No
Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch
Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 37.65 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 6.0 Gal/Vol; 5 Total Gal Purged

Well Integrity: Prot. Casing Secure ✓ Yes; Concrete Collar Intact ✓ Yes; Other ___ Yes ___ No

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth 5 ppm Field Data Collected ___ In-line ✓ In Container
Sample Observations: ___ Turbid ___ Clear ✓ Cloudy ___ Colored ___ Odor

Purge Data	@ 0.5 Gal.	@ 2.7 Gal.	@ 4.2 Gal.	@ 4.6 Gal.	@ 5 Gal.
Temperature, Deg. C	26.0	26.0	28.0	27.5	27.5
pH, units	5.41	5.29	5.23	5.25	5.26
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	78	83	88	85	85
~~Oxidation-Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	83.8	35.4	25.0	25.2	24.8

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4OC	2.5 L	✓	
Pest/PCB		4OC	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓/✓	
~~Explosives~~ Alpha/Beta		4°C	1 Gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4			
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5 L	✓	

~~Notes:~~

Secondary Parameters

pH, TSS, TDS, NO_3, ALK, SO_4, Hardness		1/2 gal	✓
TOC, $NO_2/_3$, TPO	H_2SO_4	1 quart	✓
Sulfide	NaOH + ZnAc	1 pint	✓

OCD-U1-19A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G01901
Time: Start: 0921 End: 1200

Point of Interest: ~~OU-1 U1-07-01~~
Date: 8/23/95
Signature of Sampler: John Marsh

Water Level/Well Data

Well Depth 22.39 Ft. — ✓ Measured ___ Historical — ✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 12.89 Ft.

Well Material: ✓ PVC ___ SS

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 9.5 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__in.) = 1.5 Gal/Vol; 16 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: ✓ / ___
Concrete Collar Intact: ✓ / ___
Other: ___ / ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	✓	In-line Filter	
___	___	Press/Vac Filter	
___	___		

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None
___ ___
___ ___

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth ___ ppm Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 1.4 Gal.	@ 7 Gal.	@ 13.9 Gal.	@ 15 Gal.	@ 16 Gal.
Temperature, Deg. C	26.0	25.5	25.5	25.5	26.0
pH, units	5.67	5.80	5.81	5.78	5.83
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	101	150	156	158	160
~~Oxidation - Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	277	1.80	1.34	1.27	1.32

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	120 mL	✓	___/___/___/___
SVOA	___	4°C	2.5 L	✓	___/___/___/___
Pest/PCB	___	4°C	2.5 L	✓	___/___/___/___
Inorganics	✓	HNO_3	1L / 1L	✓/✓	___/___/___/___
~~Explosives~~ Alpha/Beta	___	4°C	1 gal	✓	___/___/___/___
TPH	___	H_2SO_4	32 oz	✓	___/___/___/___
TOC	___	H_2SO_4		___	___/___/___/___
~~Nitrate~~ Herbicides	___	~~H_2SO_4~~	2.5 L	✓	___/___/___/___

Notes: ___

OCD-V1-20B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: V1G02001
Time: Start: 0810 End: 1138

Point of Interest: ~~OU 1~~ V1-07-02
Date: 8/23/95
Signature of Sampler: John Mash

Water Level/Well Data

Well Depth 34.33 Ft. ✓ Measured ___ Historical ✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft. Protective Casing/Well Difference FM Ft. Protective Casing FM Ft.

Depth to Water 12.81 Ft.

Well Material: ✓ PVC ___ SS

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 21.52 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 3.4 Gal/Vol; 8 Total Gal Purged

Well Integrity:

	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	890026
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth ___ ppm Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 1.0 Gal.	@ 3.3 Gal.	@ 6.7 Gal.	@ 7.4 Gal.	@ 8 Gal.
Temperature, Deg. C	25.0	25.0	25.0	25.0	25.0
pH, units	5.72	5.81	5.73	5.74	5.75
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	202	200	205	200	200
~~Oxidation - Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	13.18	6.17	3.68	4.17	3.65

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4°C	2.5 L	✓	
Pest/PCB		4°C	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4			
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5 L	✓	

Notes:

OCD-U1-21C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G02101
Time: Start: 0800 End: 1018

Point of Interest: ~~OU-1 U1-07-03~~
Date: 8/25/95
Signature of Sampler: John Nash

Water Level/Well Data

Well Depth 50.41 Ft. ✓ Measured ___ Historical

✓ Top of Well ___ Top of Protective Casing ___ ___

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 12.55 Ft.

Well Material: ✓ PVC ___ SS ___

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch ___ ___

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___ ___

Height of Water Column 37.86 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ ___ Gal/Ft. (___ in.) = 6 Gal/Vol; 10 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None
___ ___

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth 10/1 ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ✓ Colored ✓ Odor

Purge Data	@ 0.5 Gal.	@ 4.5 Gal.	@ 8.6 Gal.	@ 9.3 Gal.	@ 10 Gal.
Temperature, Deg. C	25.0	25.0	25.0	25.0	25.0
pH, units	5.27	5.11	5.06	5.04	5.08
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	99	95	95	95	95
~~Oxidation-Reduction, +/-mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	40.1	11.24	8.68	9.07	8.98

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓/✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	/ / /

Notes:

OCD-01-22A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1 G022 01
Time: Start: 0845 End: 1400

Point of Interest: ~~OU 1 U1-08-01~~
Date: 8/03/95
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 19.88 Ft. ✓ Measured ___ Historical

✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 14.26 Ft.

Well Material: ✓ PVC ___ SS

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 5.62 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (___ in.) = 0.9 Gal/Vol; 3.5 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0 Gal.	@ 1.8 Gal.	@ 2.8 Gal.	@ 3.1 Gal.	@ 3.5 Gal.
Temperature, Deg. C	26.0	27.0	27.0	27.1	27.0
pH, units	5.92	6.30	6.18	6.15	6.08
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	208	210	180	175	180
~~Oxidation-Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	7.72	7.92	4.23	4.04	3.64

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	/ / /
SVOA		4°C	2.5 L	✓	/ / /
Pest/PCB		4°C	2.5 L	✓	/ / /
Inorganics	✓	HNO_3	1L / 1L	✓ / ✓	/ / /
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	/ / /
TPH		H_2SO_4	32 oz	✓	/ / /
TOC		H_2SO_4			/ / /
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	/ / /

Notes:

OGD-U1-23B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G02301
Time: Start: 1408 End: 1650

Point of Interest: ~~OU 1 U1-08-02~~
Date: 8/03/95
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 39.68 Ft. ✓ Measured ___ Historical

✓ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 14.30 Ft.

Well Material: ✓ PVC ___ SS

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column 25.38 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 4.1 Gal/Vol; 9 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth 5 ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 0.3 Gal.	@ 3.7 Gal.	@ 7.7 Gal.	@ 8.3 Gal.	@ 9 Gal.
Temperature, Deg. C	27.5	26.5	26.5	26.7	26.5
pH, units	4.72	4.79	4.81	4.80	4.81
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	215	199	199	190	191
~~Oxidation - Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	45.5	22.9	9.68	9.89	8.29

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4°C	2.5 L	✓	
Pest/PCB		4°C	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4		✓	
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	

Notes:

OLD-U1-24/C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1 G02401
Time: Start: 0835 End: 1100

Point of Interest: ~~OU 1 U1-08-03~~
Date: 8/04/95
Signature of Sampler: Robert J. Brandt

Water Level/Well Data

Well Depth 69.59 Ft. — ✓ Measured / ___ Historical — ✓ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft. — Protective Casing/Well Difference FM Ft. — Protective Casing FM Ft.

Depth to Water 14.16 Ft. — Well Material: ✓ PVC / ___ SS — Well Locked?: ✓ Yes / ___ No — Well Dia. ✓ 2 inch / ___ 4 inch / ___ 6 inch — Water Level Equip. Used: ✓ Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 55.43 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.) = 8.9 Gal/Vol; 10 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line / ✓ In Container

Sample Observations: ___ Turbid ___ Clear ✓ Cloudy ___ Colored ___ Odor

Purge Data	@ 0 Gal.	@ 4.2 Gal.	@ 8.7 Gal.	@ 9.2 Gal.	@ 10 Gal.
Temperature, Deg. C	26.0	26.0	26.0	26.0	26.0
pH, units	5.09	5.14	5.02	5.05	5.02
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	75	52	51	50	51
~~Oxidation-Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	>200	42.5	28.8	26.2	28.5

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	___/___/___/___
SVOA		4°C	2.5 L	✓	___/___/___/___
Pest/PCB		4°C	2.5 L	✓	___/___/___/___
Inorganics	✓	HNO_3	1L / 1L	✓✓	___/___/___/___
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	___/___/___/___
TPH		H_2SO_4	32 oz	✓	___/___/___/___
TOC		H_2SO_4			___/___/___/___
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	___/___/___/___

Notes:

OU-U1-25 A

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G0250.1
Time: Start: 0901 End: 1417

Point of Interest: ~~OU 1~~ U1 09-01
Date: 8/08/95
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 19.21 Ft. ✓ Measured ___ Historical

✓ Top of Well ___ Top of Protective Casing ___ ___

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 9.36 Ft.

Well Material: ✓ PVC ___ SS ___

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch ___ ___

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___ ___

Height of Water Column 9.85 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ ___ Gal/Ft. (___ in.) = 1.6 Gal/Vol; 10 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: ✓ / ___
Concrete Collar Intact: ✓ / ___
Other ___ / ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
___	___	Submersible Pump	
___	___	Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	✓	In-line Filter	
___	___	Press/Vac Filter	
___	___		

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
✓ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None
___ ___

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ___ Turbid ✓ Colored ___ Clear ___ Odor ✓ Cloudy

Purge Data	@ 0 Gal.	@ 4.5 Gal.	@ 8.8 Gal.	@ 9.4 Gal.	@ 10 Gal.
Temperature, Deg. C	27.0	26.1	26.5	27.0	27.0
pH, units	4.30	4.32	4.16	4.19	4.12
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	85	100	99	99	98
~~Oxidation Reduction, +/- mv~~ ~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	31.2	34.6	35.6	36.0	35.7

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	120 mL	✓	___ / ___ / ___ / ___
SVOA	___	4OC	2.5 L	✓	___ / ___ / ___ / ___
Pest/PCB	___	4OC	2.5 L	✓	___ / ___ / ___ / ___
Inorganics	✓	HNO_3	1L / 1L	✓/✓	___ / ___ / ___ / ___
~~Explosives~~ Alpha/Beta	___	4°C	1 gal	✓	___ / ___ / ___ / ___
TPH	___	H_2SO_4	32 oz	✓	___ / ___ / ___ / ___
TOC	___	H_2SO_4		✓	___ / ___ / ___ / ___
~~Nitrate~~ Herbicides	___	~~H_2SO_4~~	2.5 L	✓	___ / ___ / ___ / ___
~~Nitrite~~					
Secondary Parameters					
pH, TSS, TDS, NO_3, ALK, SO_4, Hardness			½ gal	✓	
TOC, $NO_{2/3}$, TPO		H_2SO_4	1 quart	✓	
Sulfide		NaOH + ZnAC	1 pint	✓	

OLD-U1-76B

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G02601
Time: Start: 1306 End: 1600

Point of Interest: ~~OU-1 U1-09-02~~
Date: 8/04/95
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 49.76 Ft. ✓ Measured ___ Historical

✓ Top of Well ___ Top of Protective Casing ___

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 16.01 Ft.

Well Material: ✓ PVC ___ SS ___

Well Locked?: ✓ Yes ___ No

Well Dia. ✓ 2 inch ___ 4 inch ___ 6 inch ___

Water Level Equip. Used: ✓ Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___

Height of Water Column 33.25 Ft. X ✓ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 5.4 Gal/Vol; 8.5 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ✓; Concrete Collar Intact — Yes ✓; Other ___ — Yes ___ No ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	889639
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/~~Silicon~~ Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line ✓ In Container

Sample Observations: ✓ Turbid ___ Colored ___ Clear ___ Odor ___ Cloudy

Purge Data	@ 0.8 Gal.	@ 4.1 Gal.	@ 7.4 Gal.	@ 8 Gal.	@ 8.5 Gal.
Temperature, Deg. C	28.0	26.5	27.0	27.0	27.0
pH, units	6.23	6.07	5.90	5.91	5.85
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	249	165	112	111	109
~~Oxidation - Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	>200	166.8	144.2	137.5	144.9

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4°C	2.5 L	✓	
Pest/PCB		4°C	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4			
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	

~~Notes:~~

Secondary Parameters

pH, TSS, TDS, NO_3, ALK, SO_4, Hardness		½ gal	✓
TOC, $NO_2/3$, TPO	H_2SO_4	1 quart	✓
Sulfide	NaOH + ZnAc	1 pint	✓

GROUNDWATER SAMPLE FIELD DATA

Project: OU1-WELL RESAMPLING
Point of Interest: –
Project Number: 8579.70
Date: 10/16/95
Sample Location ID: OLD-01-26B
Time: Start: 1207 End: 1508
Signature of Sampler: J. NASH

Water Level/Well Data

Well Depth 49.5 Ft. — ___ Measured; X Historical
___ Top of Well; ___ Top of Protective Casing; ___ ___
Well Riser Stick-up (from ground) ___ Ft.
Protective Casing/Well Difference ___ Ft.
Protective Casing ___ Ft.

FLUSH

Depth to Water 11.95 Ft.
Well Material: X PVC; ___ SS; ___
Well Locked?: X Yes; ___ No
Well Dia. X 2 inch; ___ 4 inch; ___ 6 inch; ___ ___
Water Level Equip. Used: X Elect. Cond. Probe; ___ Float Activated; ___ Press. Transducer; ___ ___

Height of Water Column ≈38 Ft. X
X .16 Gal/Ft. (2 in.); ___ .65 Gal/Ft. (4 in.); ___ 1.5 Gal/Ft. (6 in.); ___ ___ Gal/Ft. (___ in.) =
7.5 Gal/Vol
19.5 Total Gal Purged

Well Integrity:

	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other ___		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
___ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None
___ ___
___ ___

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm Field Data Collected ___ In-line; X In Container

Sample Observations: X Turbid; ___ Clear; ___ Cloudy; ___ Colored; ___ Odor

Purge Data	@ 1 Gal.	@ 5 Gal.	@ 10 Gal.	@ 13 Gal.	@ 19 Gal.
Temperature, Deg. C	26	25	25	25	24
pH, units	11.05	7.7	7.05	6.90	6.8
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	520	180	140	135	133
Oxidation - Reduction, +/- mv	–	–	–	–	
Dissolved Oxygen, ppm	–	–	–	–	
TURBIDITY	58.4	61.0	130	142	171

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		40C			/ / /
Pest/PCB		40C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING FOR QADS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 08519.70
Sample Location ID: OLD-UL-26B
Time: Start: 1630 End: 1647

Point of Interest: OUL
Date: 2-27-95
Signature of Sampler: [illegible]

Water Level/Well Data

Well Depth ~~[illegible]~~ 49.74 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) NA Ft.

Protective Casing/Well Difference NA Ft.

Protective Casing NA Ft.

Depth to Water 14.25 Ft.

Well Material: X PVC / ___ SS

Well Locked?: X Yes / ___ No

Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 35.49 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 7 Gal/Ft. (10 in.) = 5.7 [14.1] Gal/Vol; 55 Total Gal Purged

1.2 [1.06] 8.4

Well Integrity:

	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
___	___	Peristaltic Pump	
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
___	___	Teflon/Silicon Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	___	In-line Filter	
___	___	Press/Vac Filter	
X	___	Cent. Pump	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- X Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: X Turbid / ___ Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 5 Gal.	@ 15 Gal.	@ 25 Gal.	@ 40 Gal.	@ 55 Gal.
Temperature, Deg. C	25.0	25.0	25.0	25.0	25.0
pH, units	11.66	6.33	6.04	6.04	5.95
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	1500	161	121	119	110
Oxidation - Reduction, +/- mv	-153.4	-55.4	-45.9	-41.3	-39.4
Dissolved Oxygen, ppm	1.5	1.6	1.4	1.8	1.5

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	___	___	___/___/___/___
SVOA	___	4°C	___	___	___/___/___/___
Pest/PCB	___	4°C	___	___	___/___/___/___
Inorganics	___	HNO_3	___	___	___/___/___/___
Explosives	___	4°C	___	___	___/___/___/___
TPH	___	H_2SO_4	___	___	___/___/___/___
TOC	___	H_2SO_4	___	___	___/___/___/___
Nitrate	___	H_2SO_4	___	___	___/___/___/___

Notes: SAMPLING FOR METHANE & TVS

OU-U1-27C

GROUNDWATER SAMPLE FIELD DATA

Project: BRAC NTC Orlando
Project Number: 08519.70
Sample Location ID: U1G02701
Time: Start: 0825 End: 1700

Point of Interest: ~~OU 1 U1 09 03~~
Date: 8/07/95
Signature of Sampler: [signature]

Water Level/Well Data

Well Depth 62.51 Ft. — ✓ Measured / ___ Historical — ✓ Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference FM Ft.

Protective Casing FM Ft.

Depth to Water 16.05 Ft.

Well Material: ✓ PVC / ___ SS

Well Locked?: ✓ Yes / ___ No

Well Dia. ✓ 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: ✓ Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 46.46 Ft. X ✓ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.) = 7.4 Gal/Vol; 5.5 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
✓	✓	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
✓	✓	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
	✓	In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ✓ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth 4 ppm Field Data Collected ___ In-line / ✓ In Container

Sample Observations: ✓ Turbid / ___ Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 0.4 Gal.	@ 2.6 Gal.	@ 4.9 Gal.	@ 5.3 Gal.	@ 5.5 Gal.
Temperature, Deg. C	23.5	28.5	30.0	30.0	30.0
pH, units	8.71	6.90	8.94	8.96	8.98
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	420	330	360	360	359
~~Oxidation - Reduction, +/- mv~~					
~~Dissolved Oxygen, ppm~~ Turbidity (NTU)	>200	>200	>200	>200	>200

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL	120 mL	✓	
SVOA		4°C	2.5 L	✓	
Pest/PCB		4°C	2.5 L	✓	
Inorganics	✓	HNO_3	1L / 1L	✓	
~~Explosives~~ Alpha/Beta		4°C	1 gal	✓	
TPH		H_2SO_4	32 oz	✓	
TOC		H_2SO_4			
~~Nitrate~~ Herbicides		~~H_2SO_4~~	2.5L	✓	

~~Notes:~~

Secondary Parameters

pH, TSS, TDS, NO_3, Alk, SO_4, Hardness		½ gal	✓
TOC, $NO_2/3$, TPO	H_2SO_4	1 quart	✓
Sulfide	NaOH+ZnAc	1 pint	✓

GROUNDWATER SAMPLE FIELD DATA

Project: OU1-WELL RESAMPLING
Point of Interest: -
Project Number: 8579.70
Date: 10/17/95
Sample Location ID: OU1-01-27C
Time: Start: 0839 End: 1254
Signature of Sampler: J. NASH

Water Level/Well Data

Well Depth 62.5 Ft. ___ Measured X Historical

___ Top of Well ___ Top of Protective Casing ___ ___

Well Riser Stick-up ___ Ft. (from ground)

Protective ___ Ft. Casing/Well Difference FLUSH

Protective ___ Ft. Casing

Depth to Water 12.3 Ft.

Well Material: X PVC ___ SS ___

Well Locked?: X Yes ___ No

Well Dia. X 2 inch ___ 4 inch ___ 6 inch ___ ___

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___ ___

Height of Water Column 50 Ft. X X .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ ___ Gal/Ft. (___ in.) = 10 Gal/Vol; 27 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
___ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected ___ In-line X In Container

Sample Observations: X Turbid ___ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ 12 Gal.	@ 7 Gal.	@ 14 Gal.	@ 21 Gal.	@ 27 Gal.
Temperature, Deg. C	29	24	23	23	24
pH, units	8.5	7.7	7.6	7.4	7.1
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	320	260	210	190	160
Oxidation - Reduction, +/- mv	—	—	—	—	—
Dissolved Oxygen, ppm	—	—	—	—	—
TURBIDITY	7200	7200	192	159	194

Sample Collection Requirements
(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLING FOR RADS.

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO Point of Interest: OUL
Project Number: CLD-UL-27 08.5170 Date: 2-27/95
Sample Location ID: OLD-UL-27C
Time: Start: 1533 End: 1625 Signature of Sampler: William D. Olsen

Water Level/Well Data

Well Depth 62.48 Ft. X Measured ___ Historical X Top of Well ___ Top of Protective Casing ___ ___ Well Riser Stick-up NA Ft. (from ground) Protective NA Ft. Casing/Well Difference Protective NA Ft. Casing

Depth to Water 14.20 Ft. Well Material: X PVC ___ SS ___ Well Locked?: X Yes ___ No Well Dia. X 2 inch ___ 4 inch ___ 6 inch ___ ___ Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___ ___

Height of Water Column X ___ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ ___ Gal/Ft. (___ in.) = 16.1 Gal/Vol; 50 Total Gal Purged
48.28 Ft. 7.7 7.2 8.4

Well Integrity: Prot. Casing Secure Yes X No ___; Concrete Collar Intact Yes X No ___; Other ___ Yes ___ No ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
___	___	Peristaltic Pump	___
___	___	Submersible Pump	___
___	X	Bailer	___
___	___	PVC/Silicon Tubing	___
___	___	Teflon/Silicon Tubing	___
___	___	Airlift	___
___	___	Hand Pump	___
___	___	In-line Filter	___
___	___	Press/Vac Filter	___
X	___	Cent. Pump	___

Decontamination Fluids Used: (✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
X Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None
___ ___
___ ___

Field Analysis Data

Ambient Air VOC 10 ppm Well Mouth 0 ppm Field Data Collected ___ In-line X In Container

Sample Observations: X Turbid ___ Clear ___ Cloudy ___ Colored X Odor

Purge Data	@ 5 Gal.	@ 25 Gal.	@ 40 Gal.	@ 45 Gal.	@ 50 Gal.
Temperature, Deg. C	27.0	26.5	27.0	27.0	26.5
pH, units	11.34	6.63	6.29	6.28	6.25
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	148.0	148	130	125	120
Oxidation - Reduction, +/- mv	-62.3	-56.2	-34.4	-27.8	-30.2
Dissolved Oxygen, ppm	4.1	1.6	1.4	1.6	1.2

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	___	___	___/___/___/___
SVOA	___	4°C	___	___	___/___/___/___
Pest/PCB	___	4°C	___	___	___/___/___/___
Inorganics	___	HNO_3	___	___	___/___/___/___
Explosives	___	4°C	___	___	___/___/___/___
TPH	___	H_2SO_4	___	___	___/___/___/___
TOC	___	H_2SO_4	___	___	___/___/___/___
Nitrate	___	H_2SO_4	___	___	___/___/___/___

Notes: OLD 027 04 1 X 250 ml clear glass w/ septa cap - Methane
1 X 500 ml clear glass - TVS

GROUNDWATER SAMPLE FIELD DATA

Project: OU1 SUPPLEMENT WELL INSTALL Point of Interest: —
Project Number: 8579.70 Date: 8/28/96
Sample Location ID: OU-01-28B
Time: Start: 1406 End: 1605 Signature of Sampler: WDC

Water Level/Well Data

Well Depth 32.5 Ft. ___ Measured ___ Historical ___ Top of Well ___ Top of Protective Casing

Well Riser Stick-up (from ground) ___ Ft.

Protective Casing/Well Difference FLUSH Ft.

Protective Casing ___ Ft.

Depth to Water 1.97 Ft.

Well Material: X PVC ___ SS

Well Locked?: X Yes ___ No

Well Dia. X 2 inch ___ 4 inch ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer

Height of Water Column ≈ 20 Ft. X X .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (___ in.) = 4 Gal/Vol; 4.5 Total Gal Purged

Well Integrity:

	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- ___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line X In Container

Sample Observations: X Turbid ___ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ .5 Gal.	@ 1.5 Gal.	@ 2.5 Gal.	@ 3 Gal.	@ 4.5 Gal.
Temperature, Deg. C	32	32	32	30	30
pH, units	5.7	5.7	5.5	5.4	5.7
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	252	245	200	180	185
Oxidation - Reduction, +/- mv	—	—	—	—	—
Dissolved Oxygen, ppm	—	—	—	—	—
TURBIDITY	>200	>200	>200	>200	>200

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLE PER POU SUITE CLP TCL & TAL

GROUNDWATER SAMPLE FIELD DATA

Project: OU1- SUPPLEMENT WELL INSTALL Point of Interest: -
Project Number: 3579.70 Date: 8/28/96
Sample Location ID: OU5-W1-29 C
Time: Start: 1046 End: 1224 Signature of Sampler: WDC

Water Level/Well Data

Well Depth 65.5 Ft. ___ Measured X Historical ___ Top of Well ___ Top of Protective Casing ___ ___ Well Riser Stick-up ___ Ft. (from ground) Protective ___ Ft. Casing/Well Difference FLUSH Protective ___ Ft. Casing

Depth to Water 17.5 Ft. Well Material: X PVC ___ SS ___ Well Locked?: X Yes ___ No Well Dia. X 2 inch ___ 4 inch ___ 6 inch ___ ___ Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___ ___

Height of Water Column 48 Ft. X X 16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ ___ Gal/Ft. (___ in.) = 10 Gal/Vol; 3.5 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other ___		

Equipment Documentation

Purging/Sampling Equipment Used :

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
		Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used :

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
___ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
___ None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line X In Container

Sample Observations: X Turbid ___ Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ .5 Gal.	@ 1 Gal.	@ 2 Gal.	@ 2.5 Gal.	@ 3.5 Gal.
Temperature, Deg. C	29	27	29	30	30
pH, units	7.4	5.7	5.4	5.5	5.5
Specific Conductivity (umhos/cm. @ 25 Deg. C.)	120	110	180	165	100
Oxidation - Reduction, +/- mv	-	-	-	-	-
Dissolved Oxygen, ppm	-	-	-	-	-
TURBIDITY	7200	7200	7200	7200	7200

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: SAMPLE FOR FULL SUITE CLP TCL & TAL

APPENDIX H

PERMEABILITY TEST RESULTS

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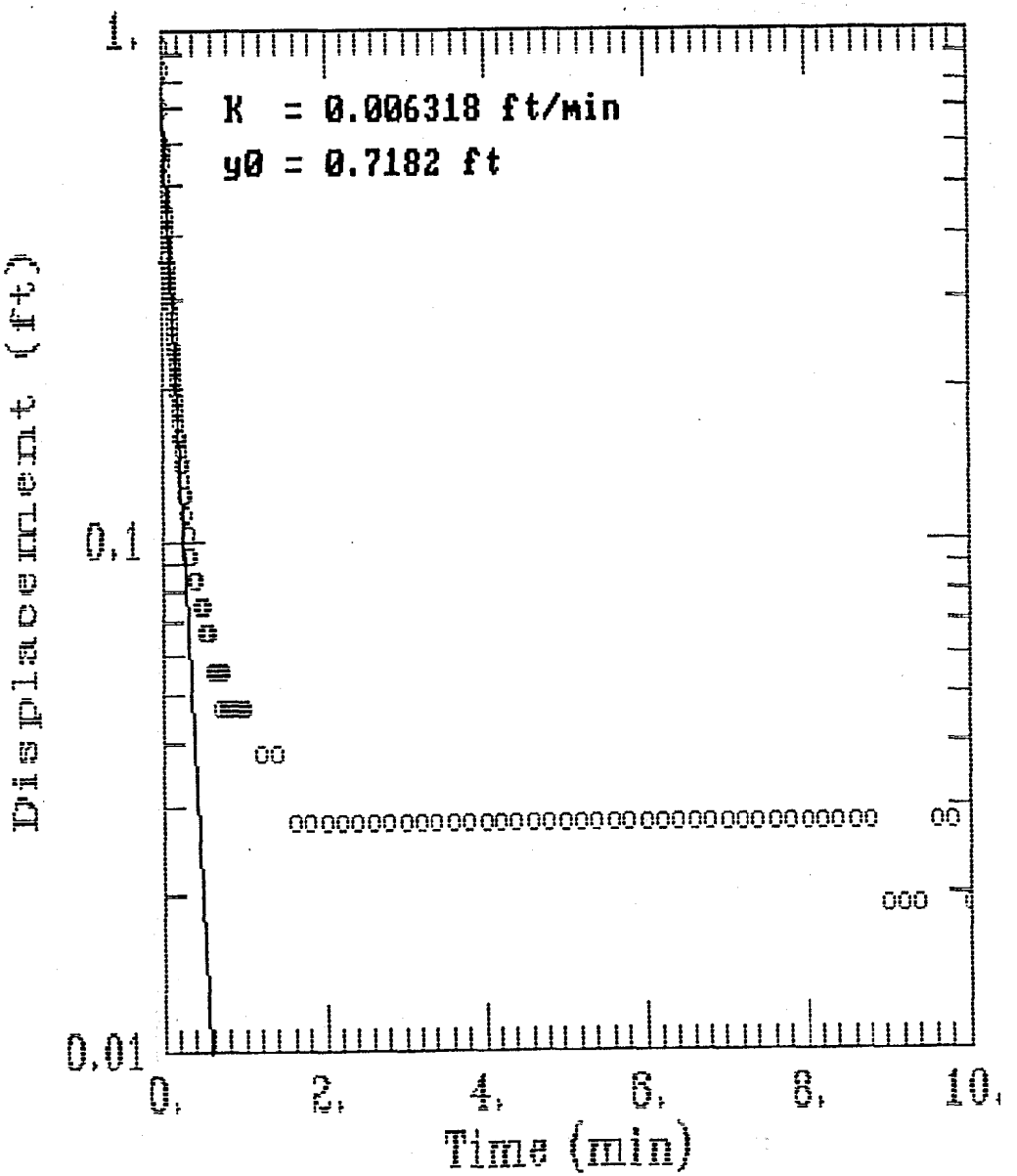

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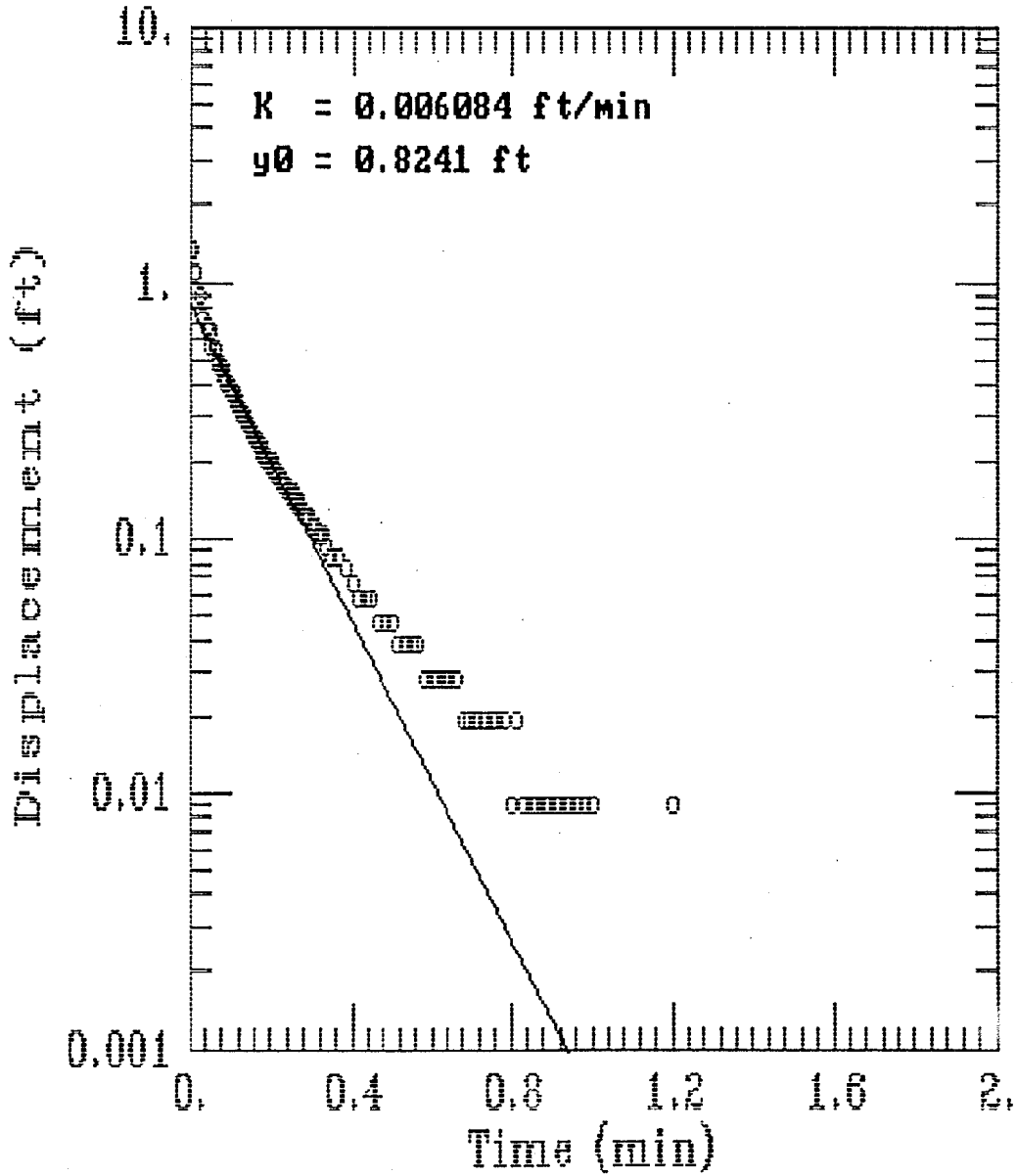

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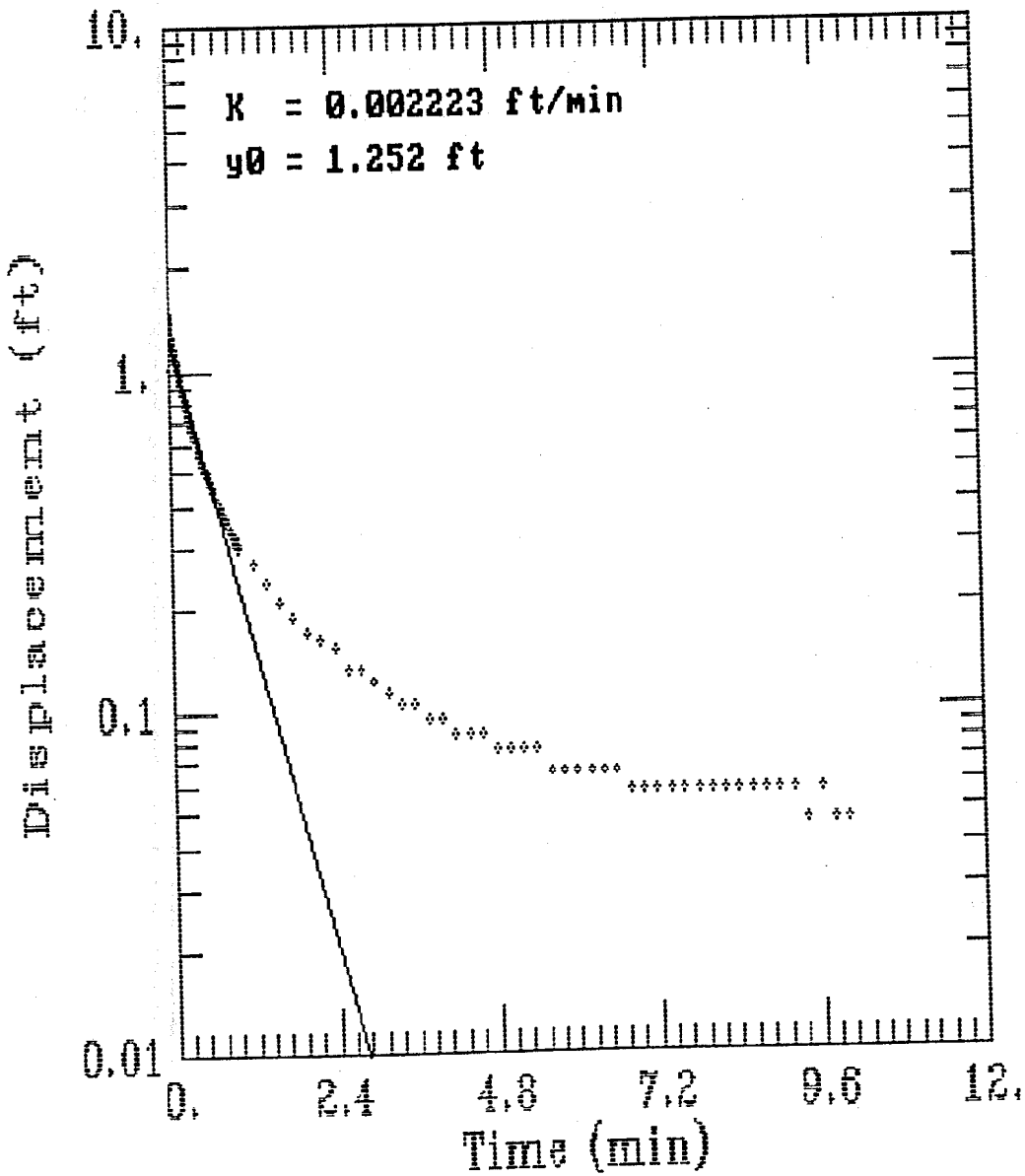

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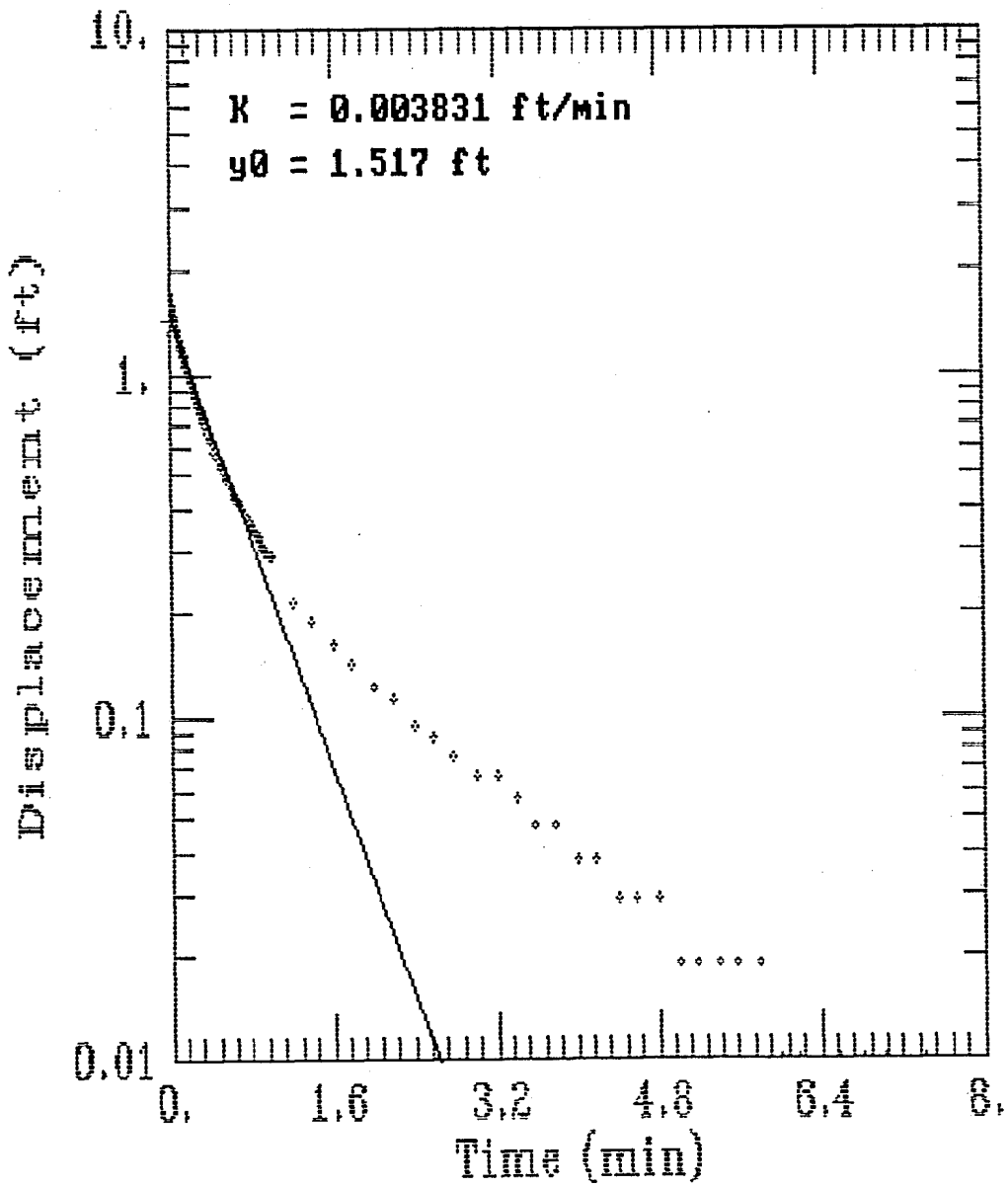

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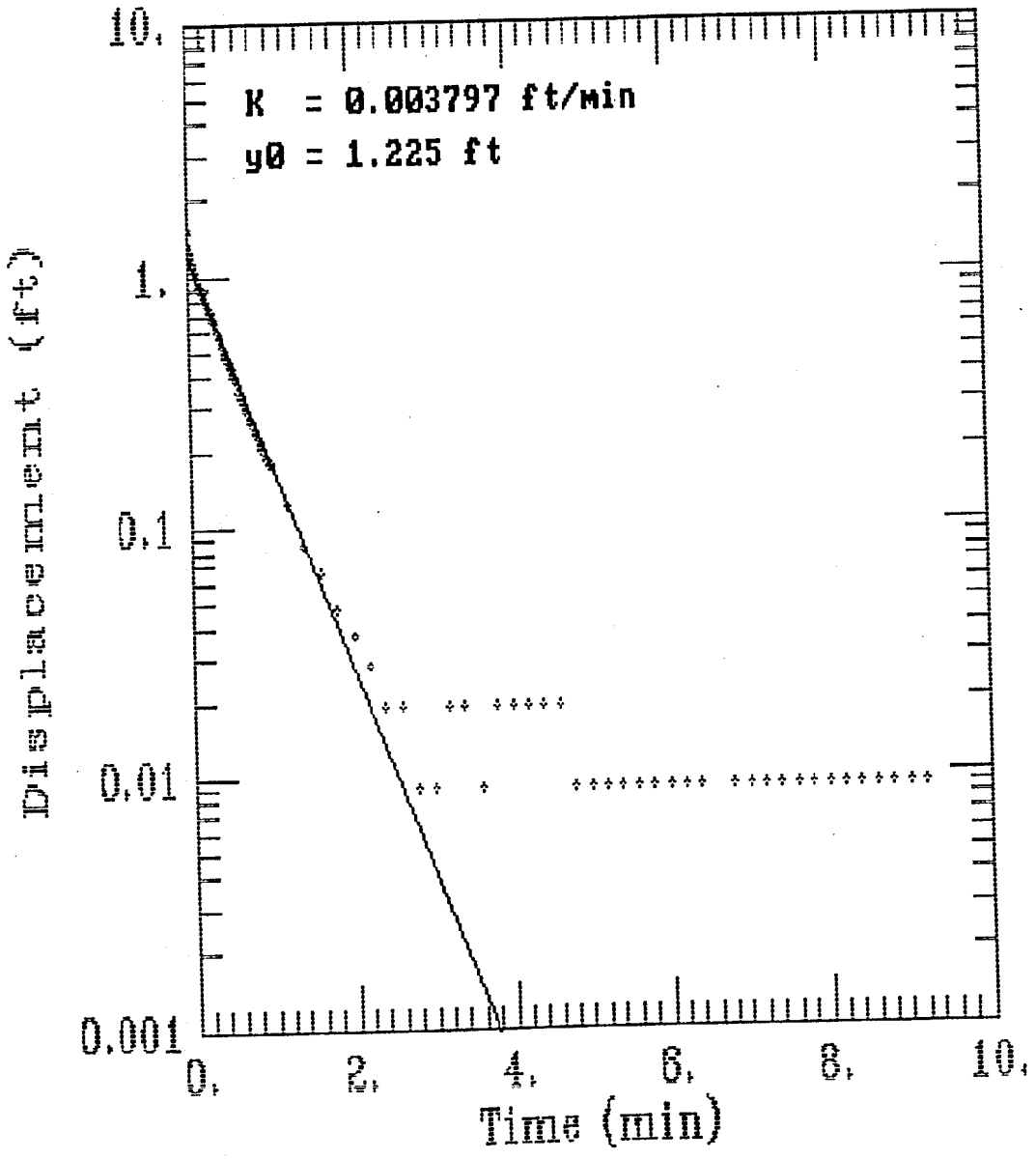

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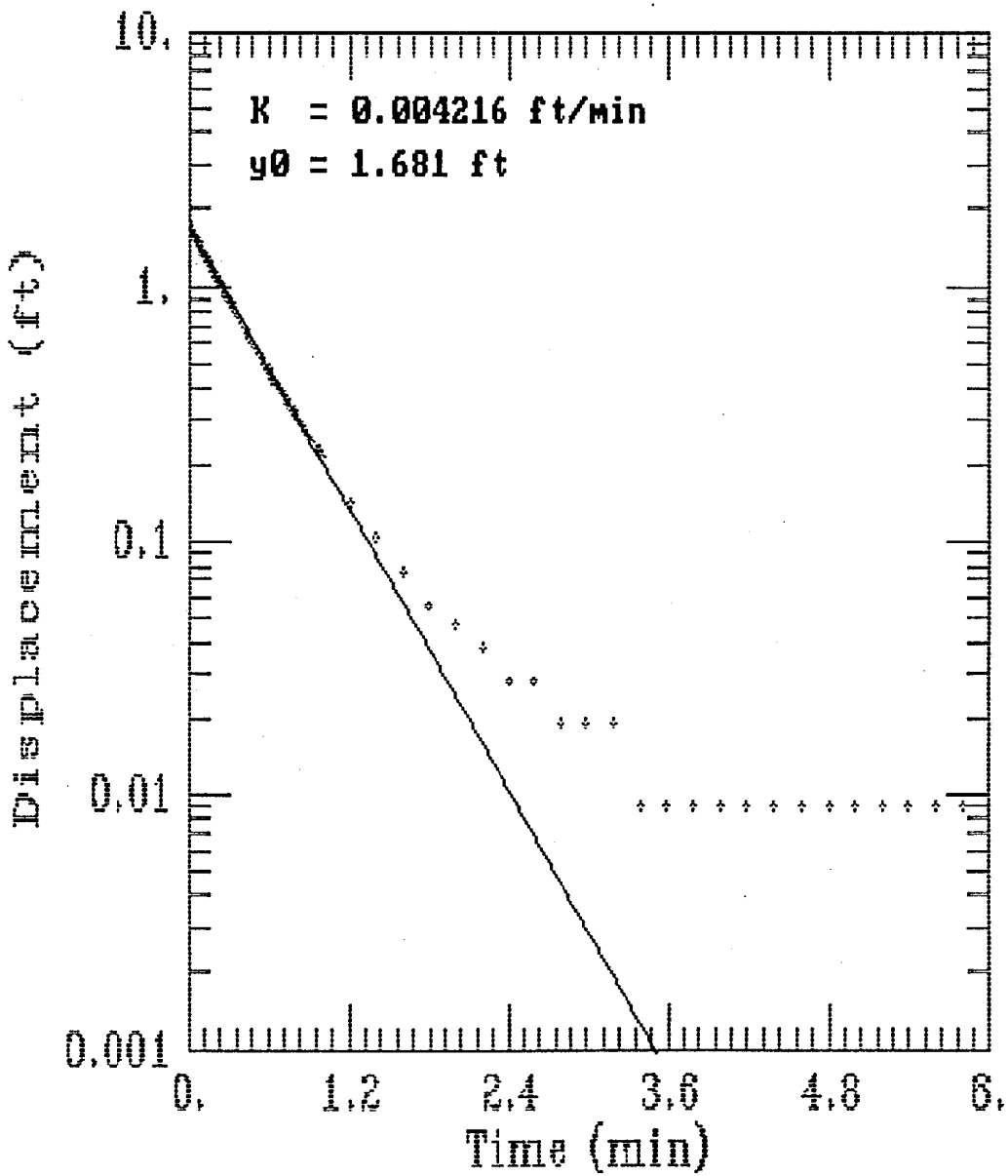

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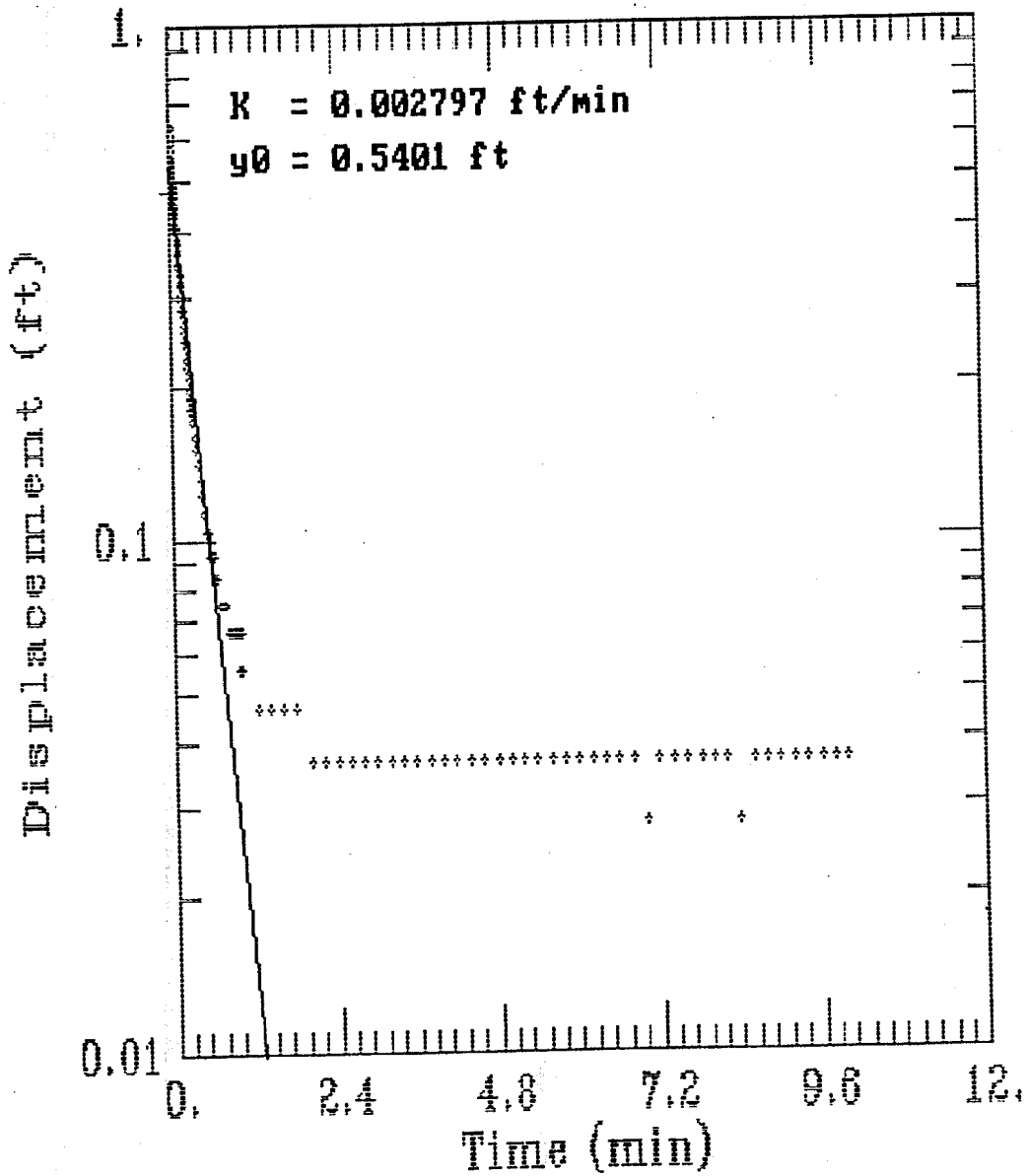

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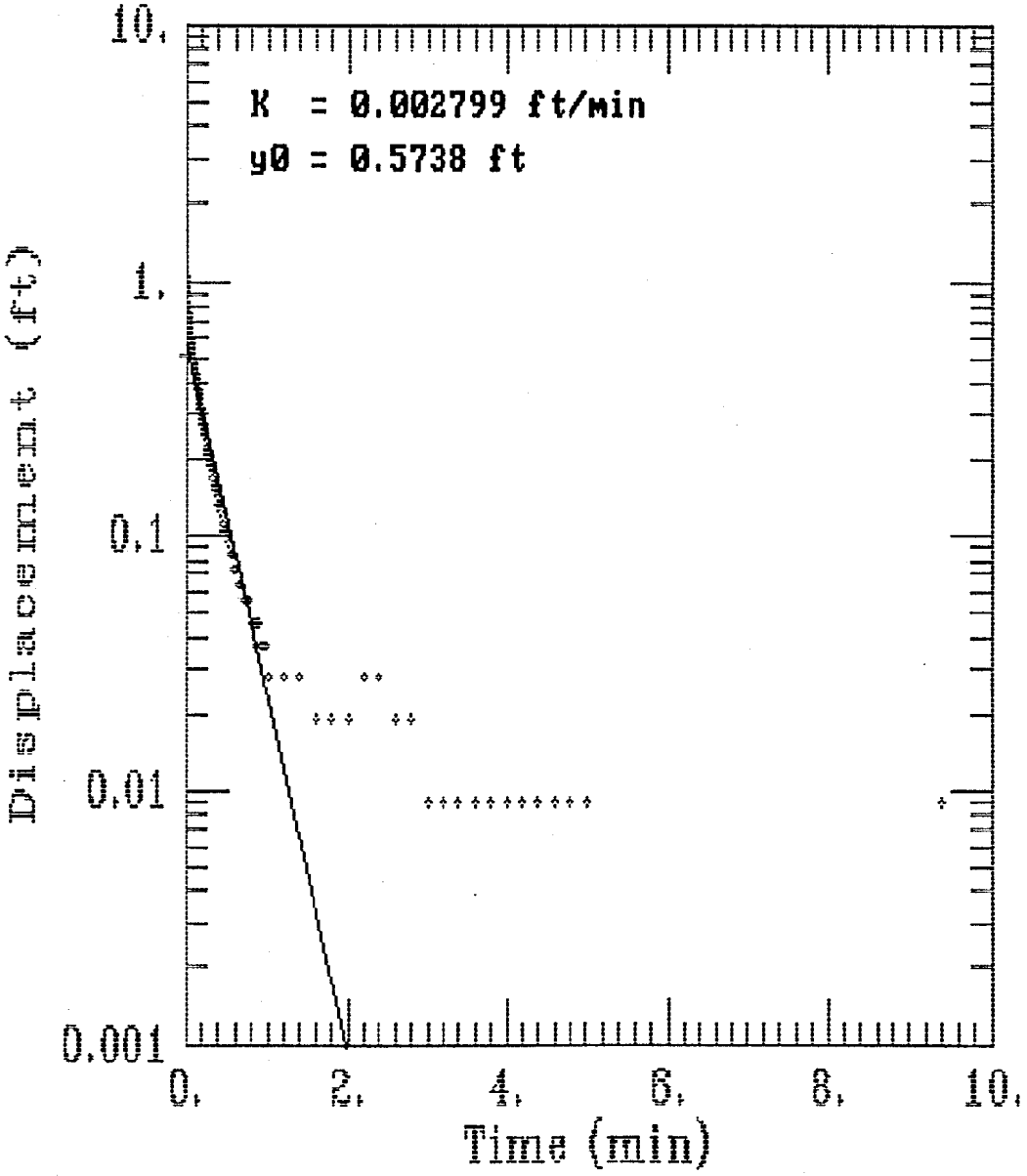

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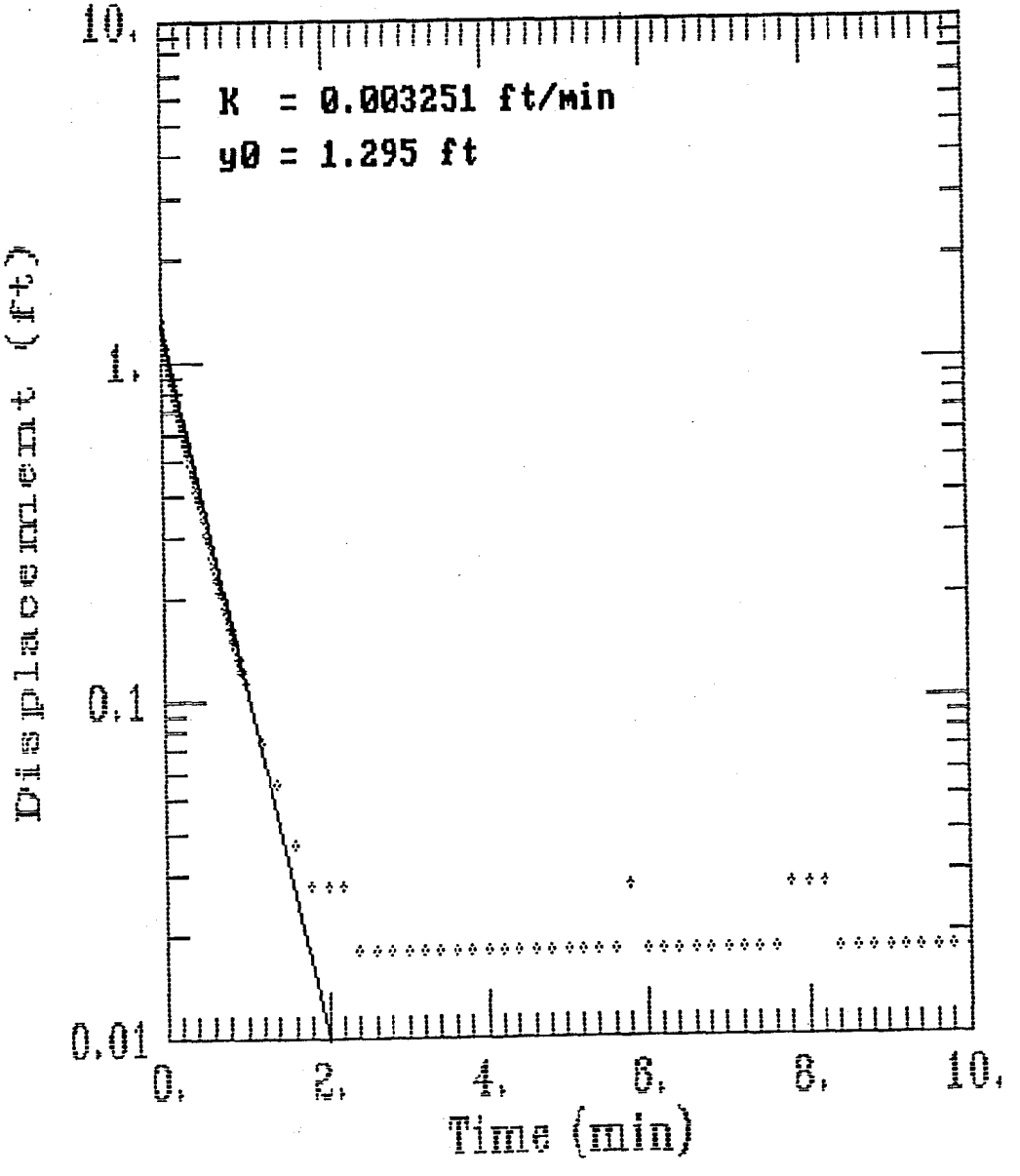

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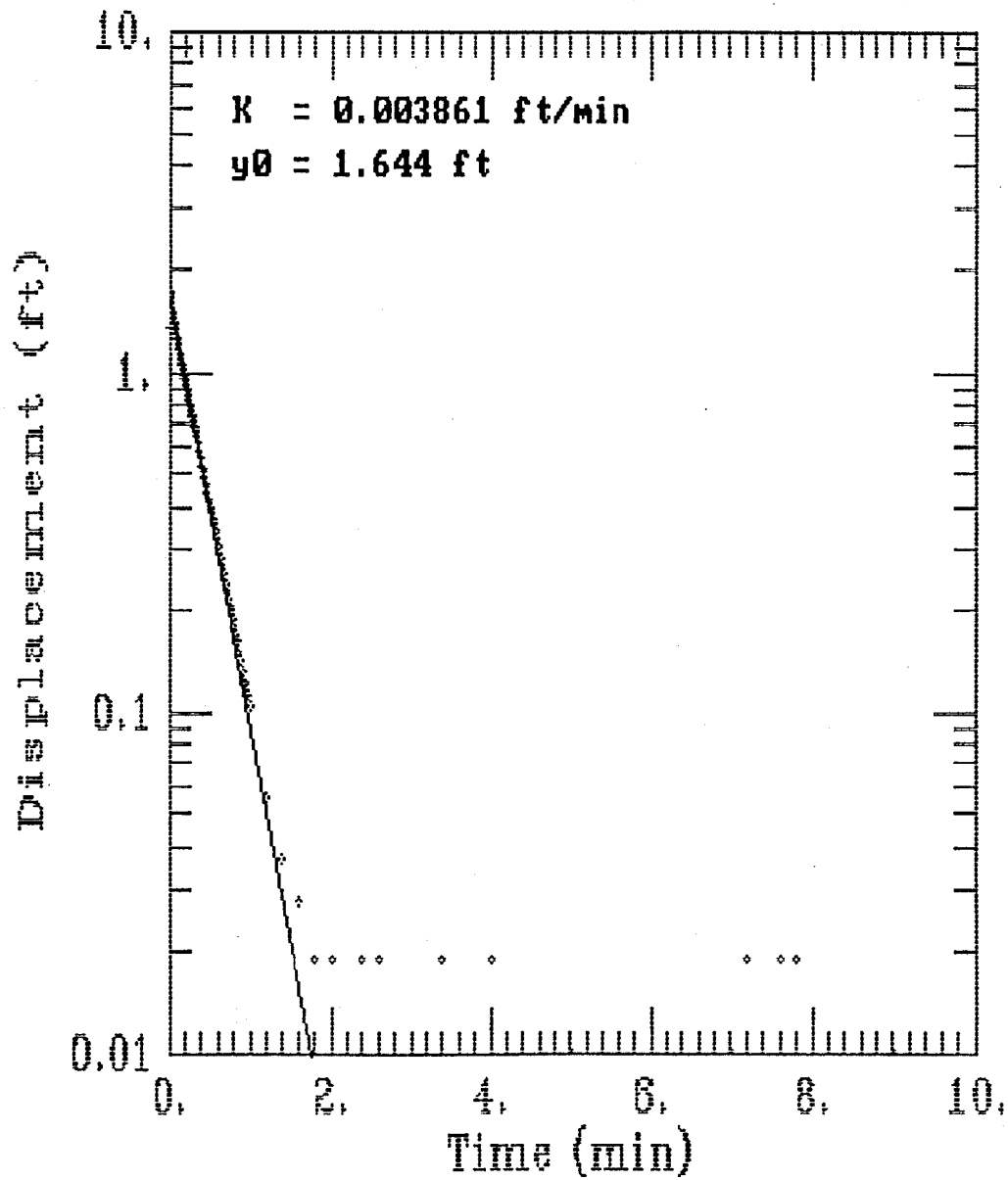

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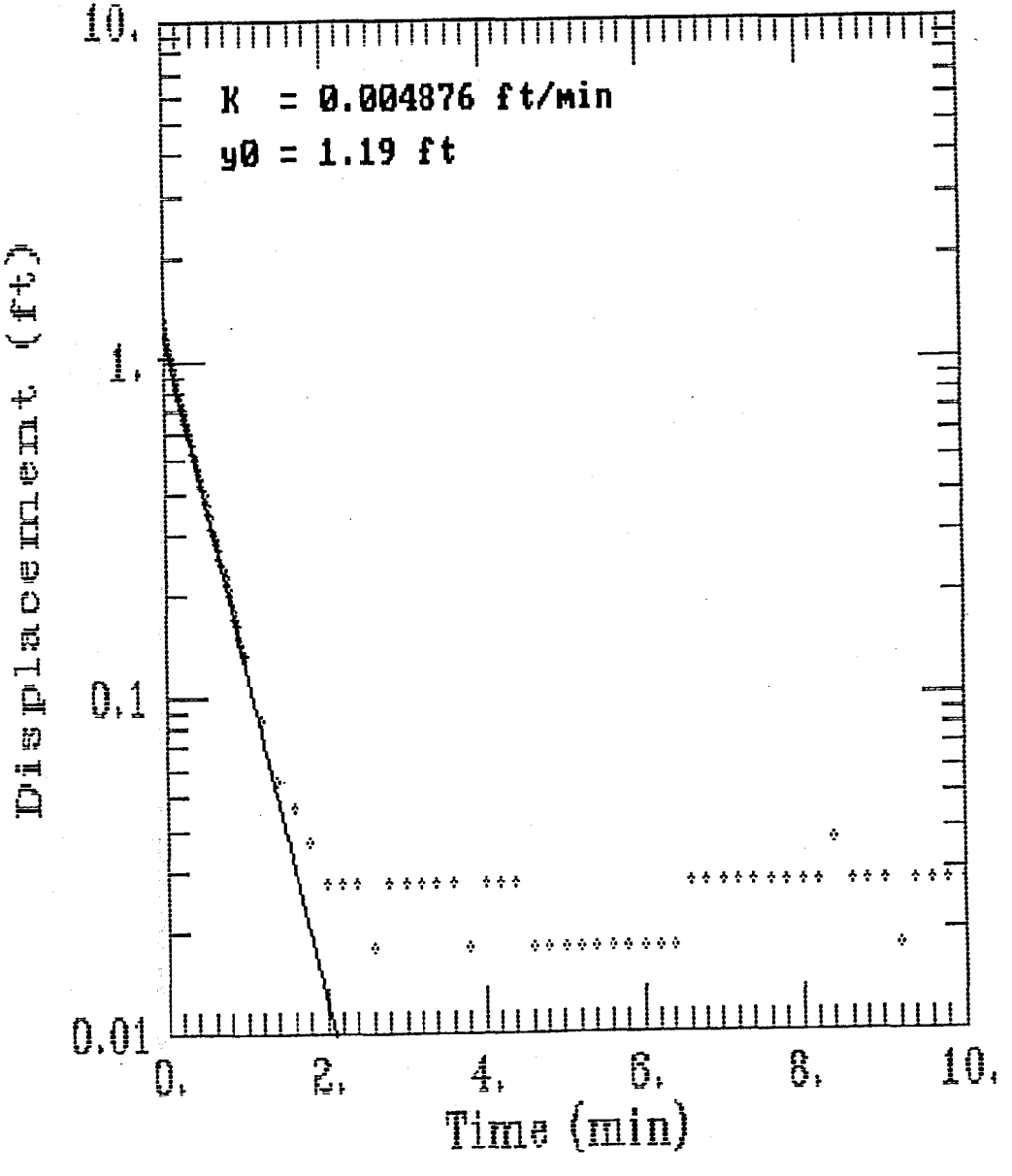

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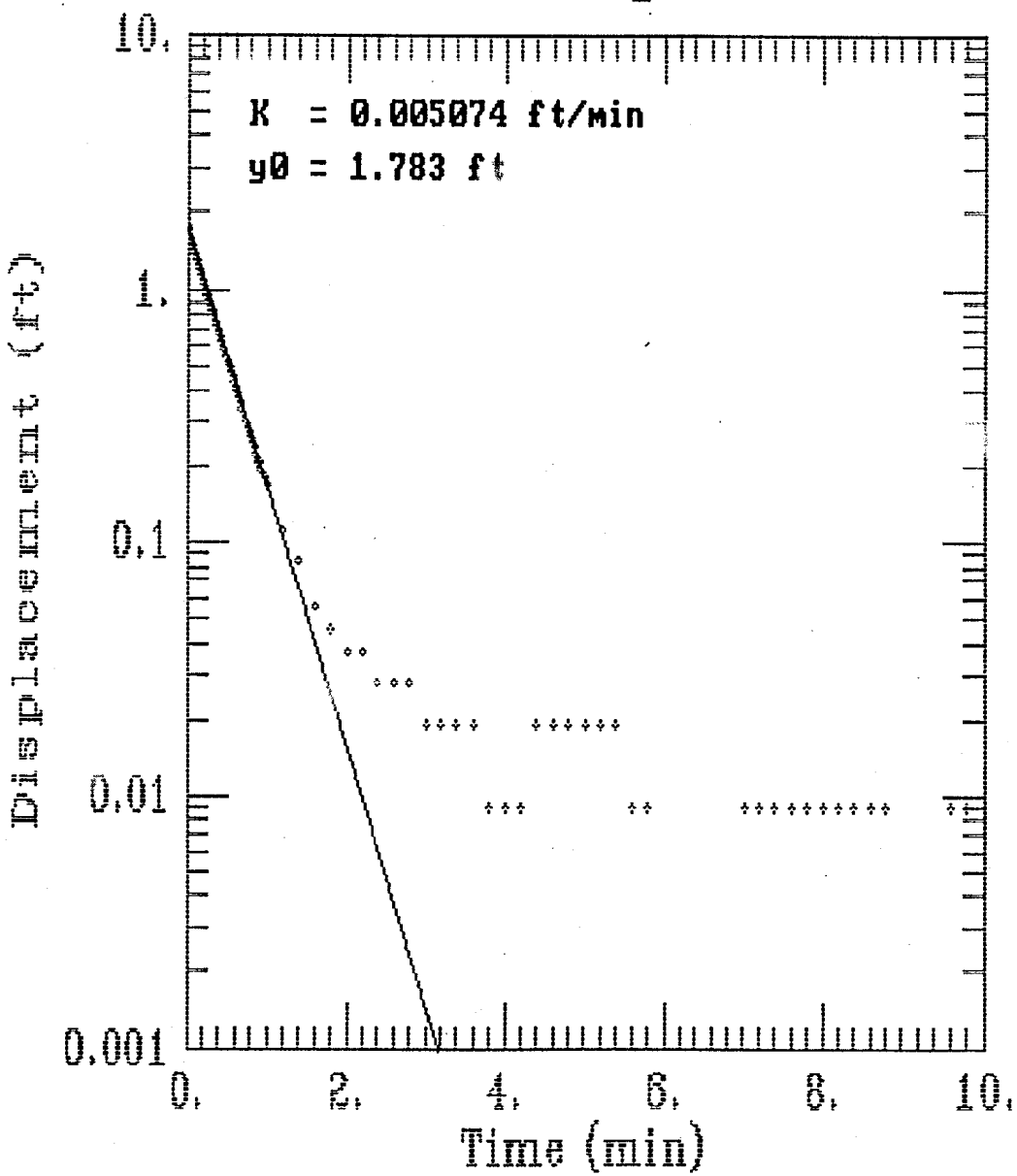

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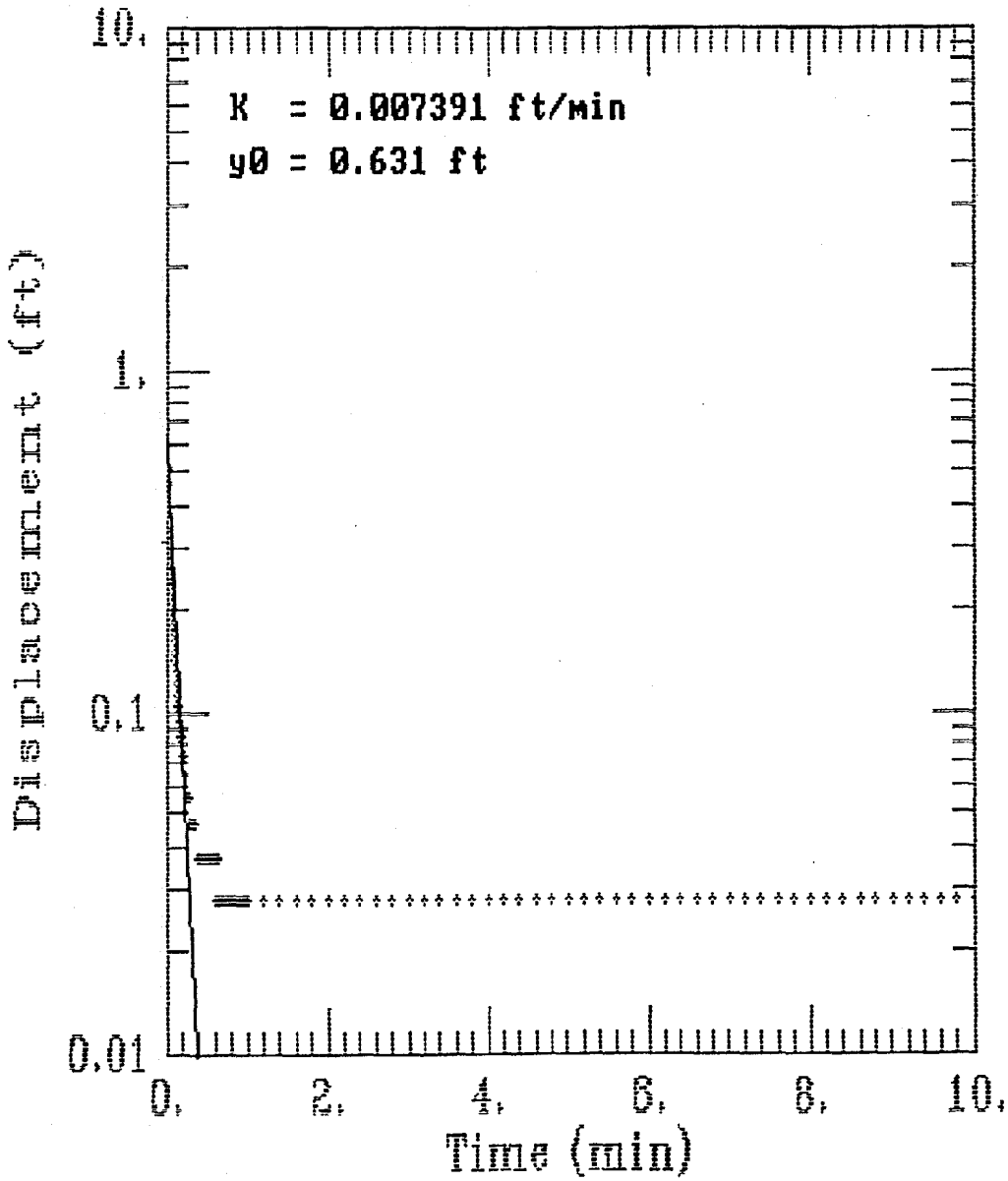

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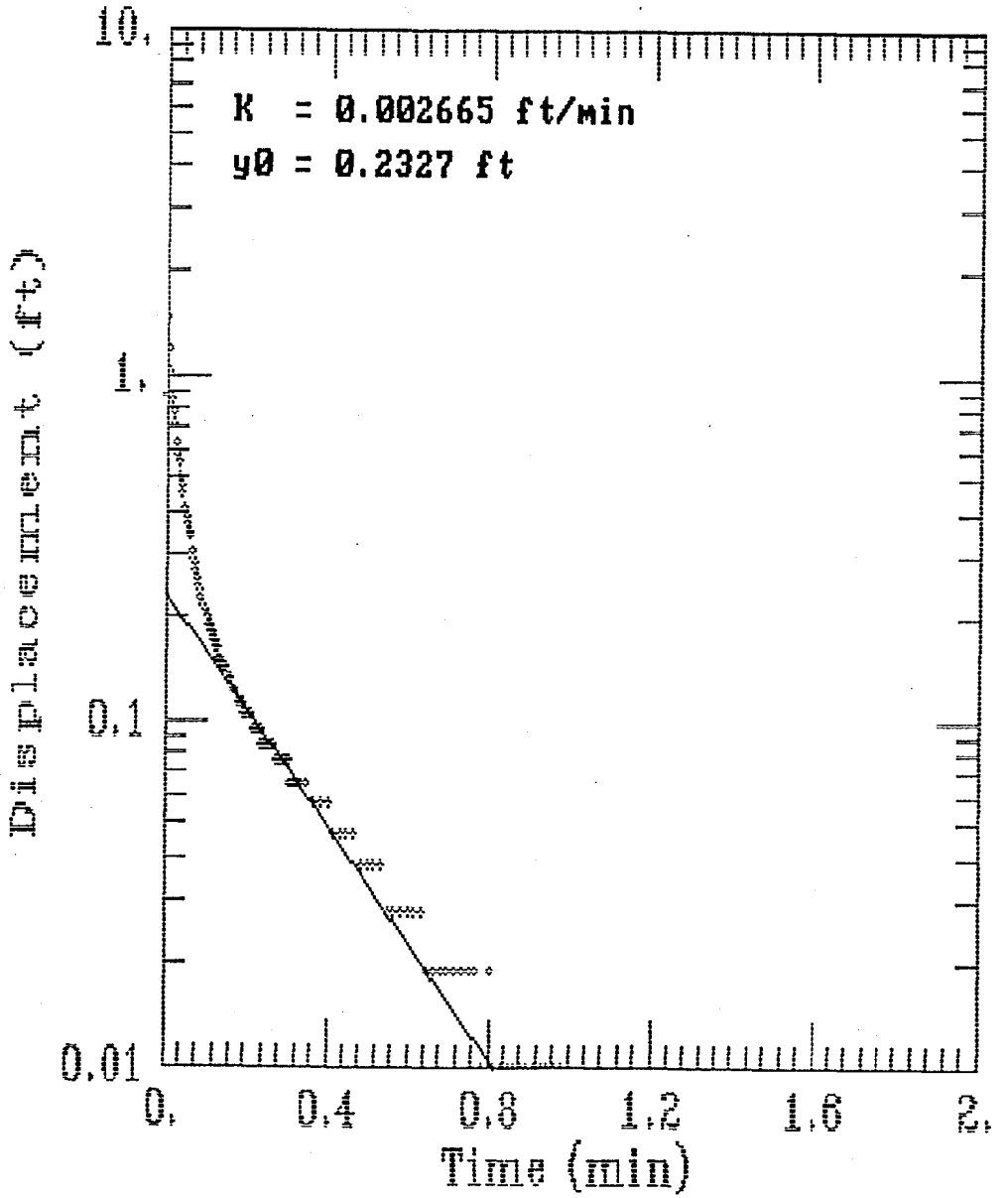

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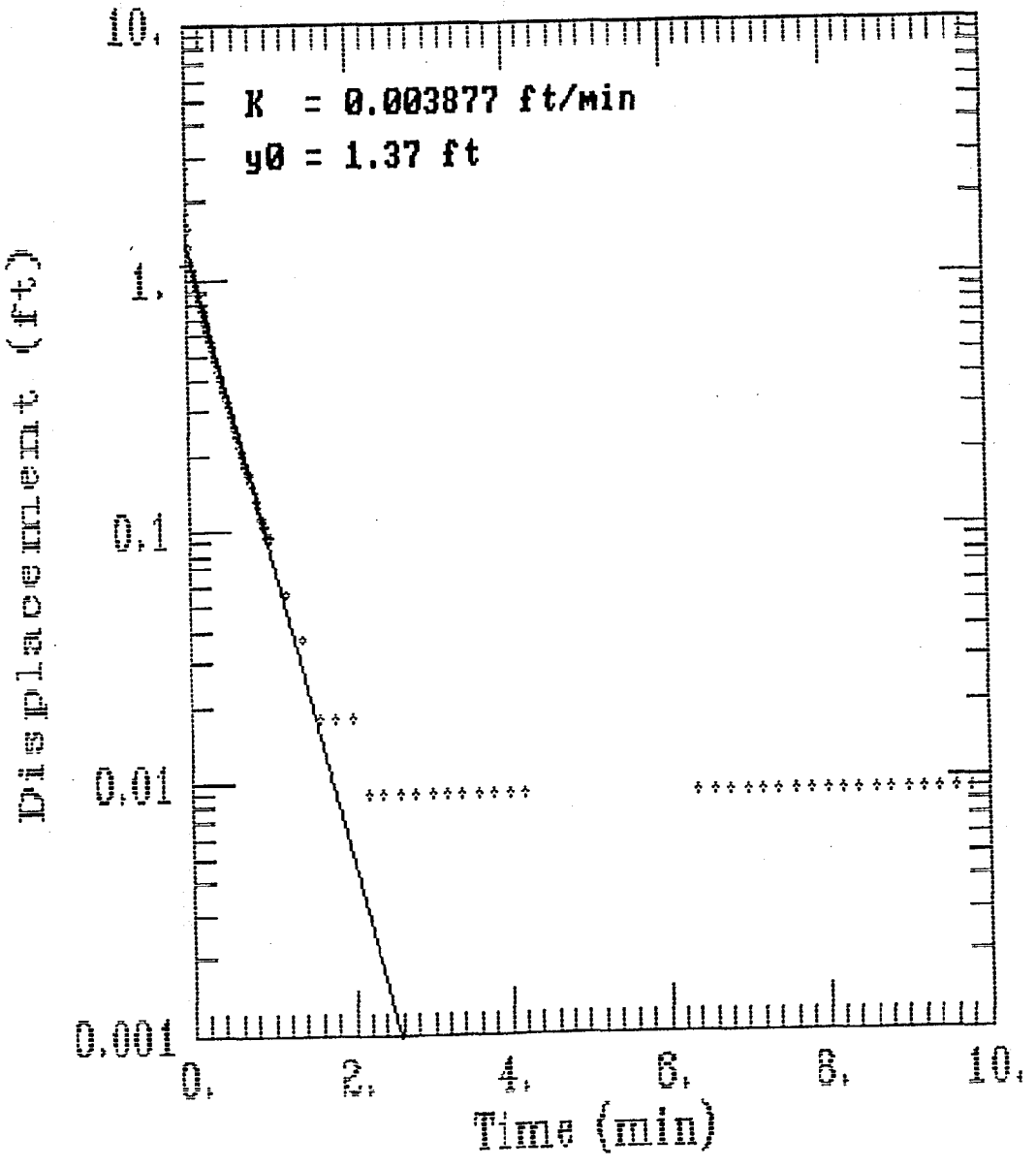

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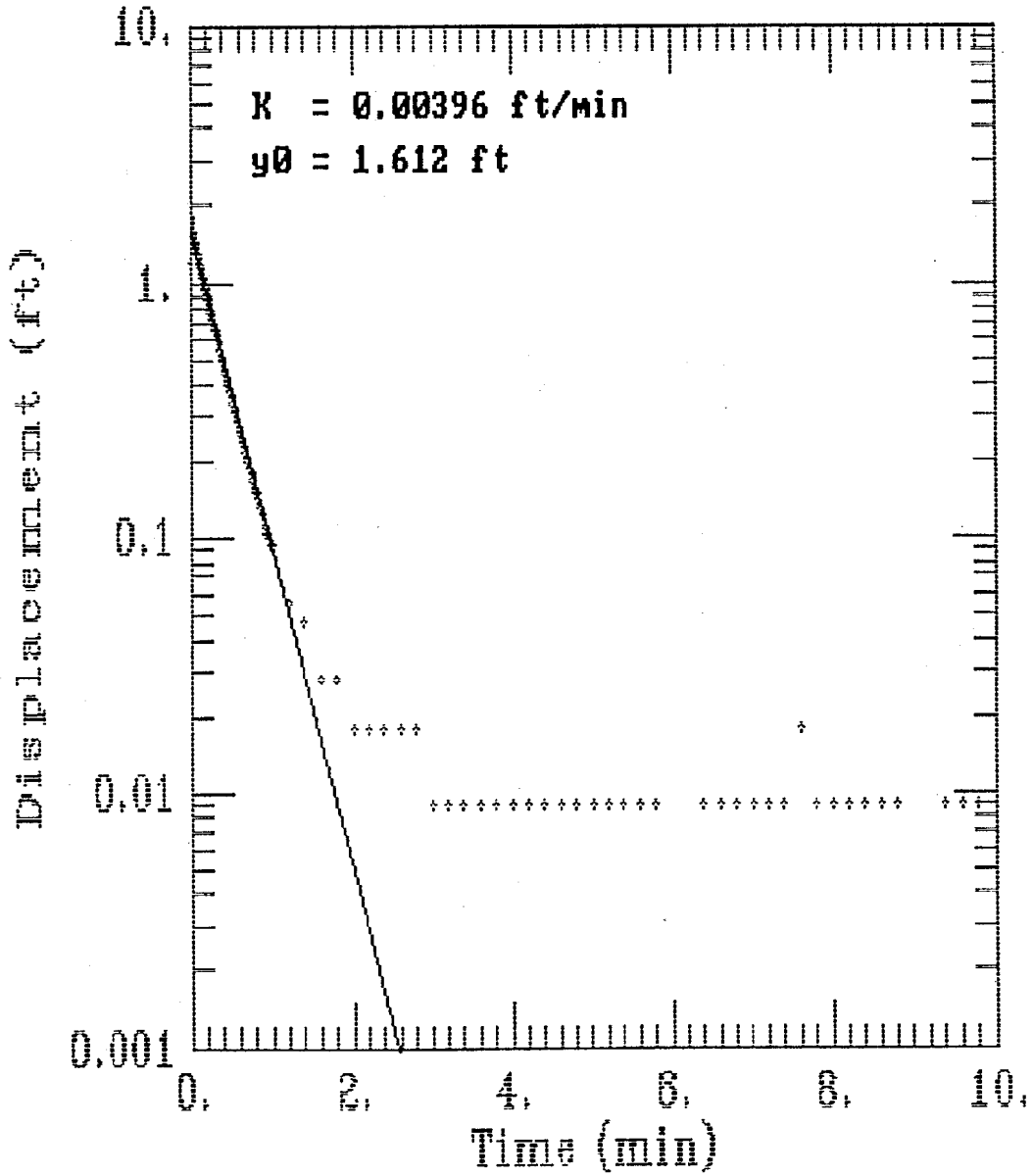

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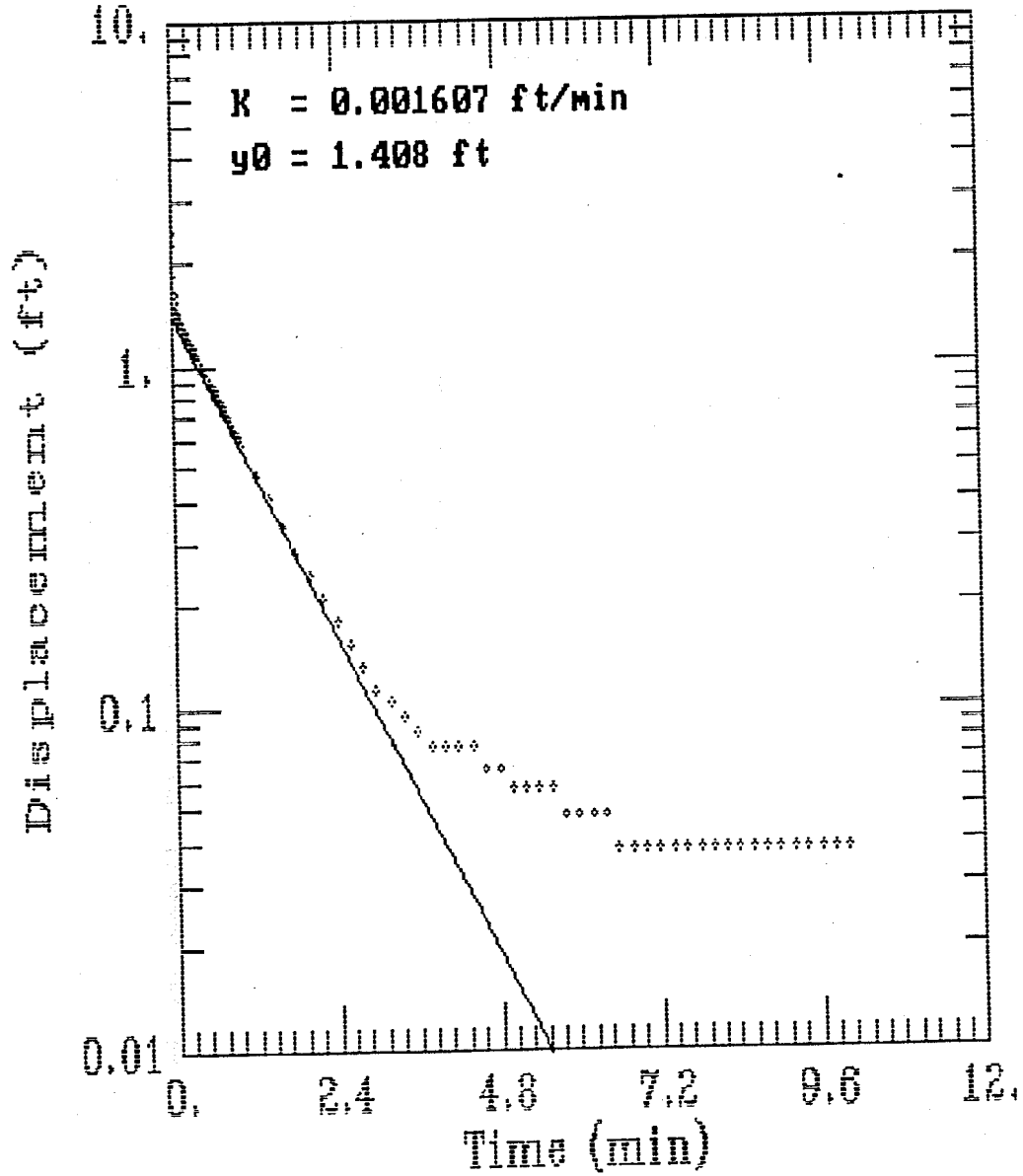

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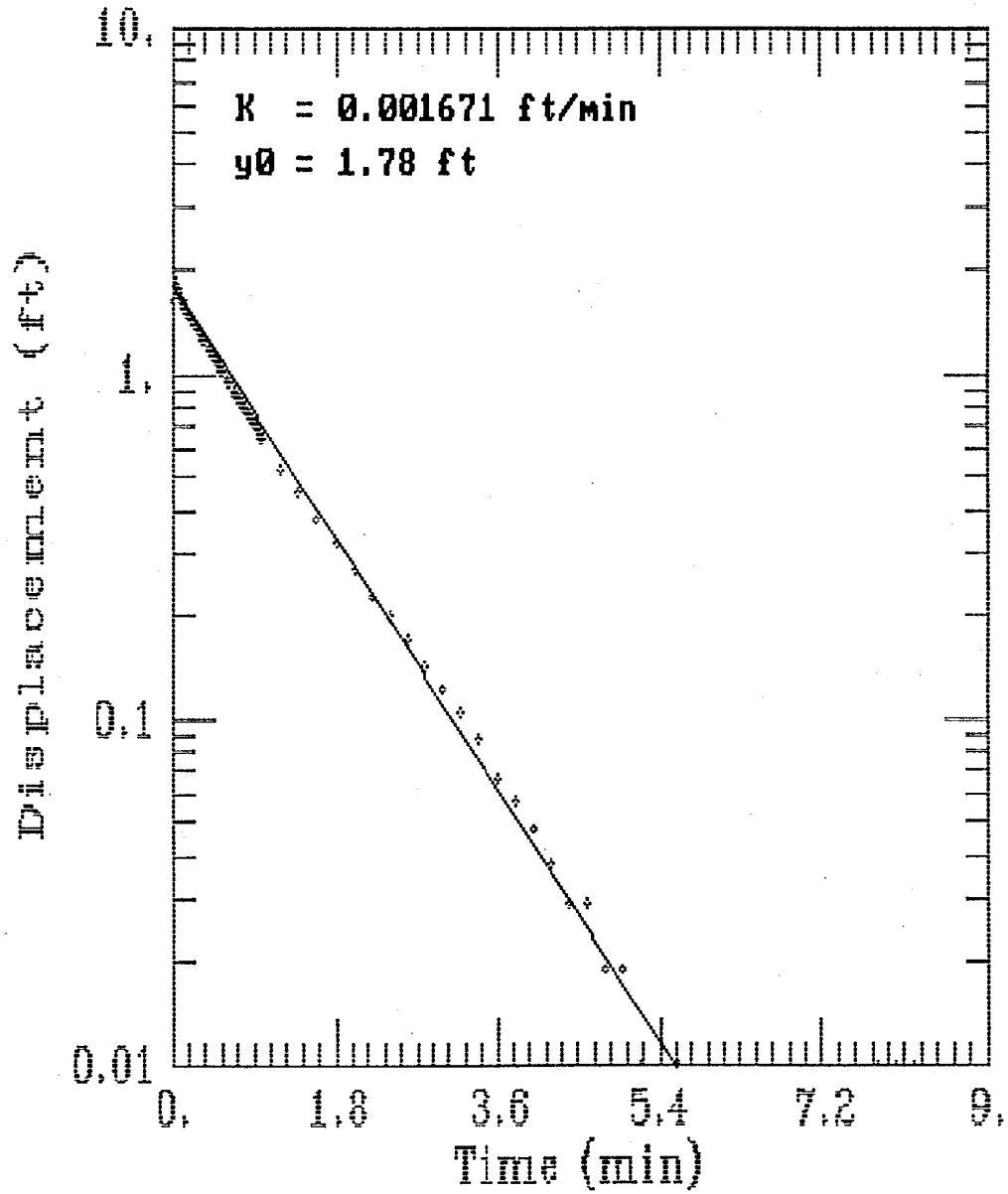

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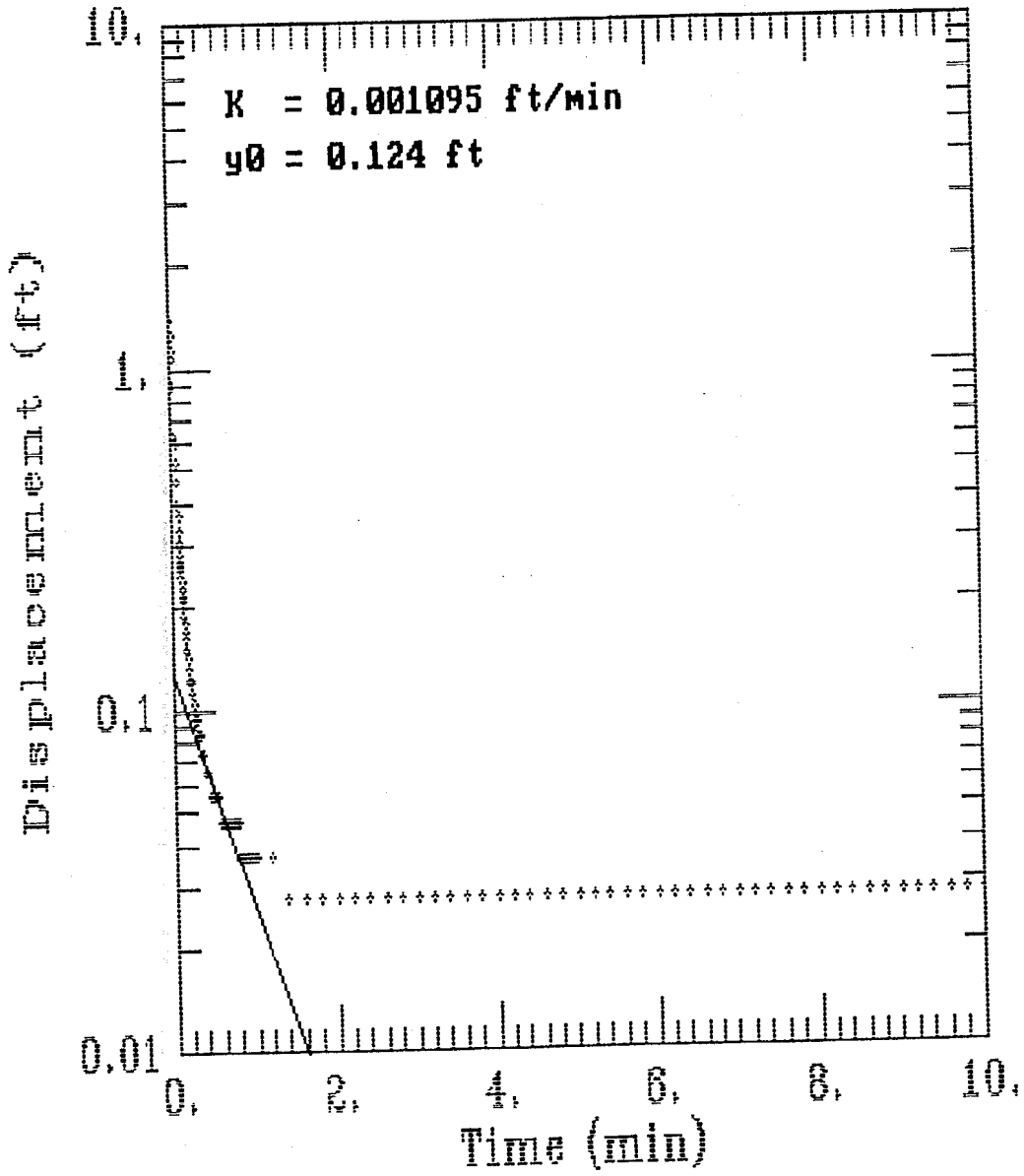

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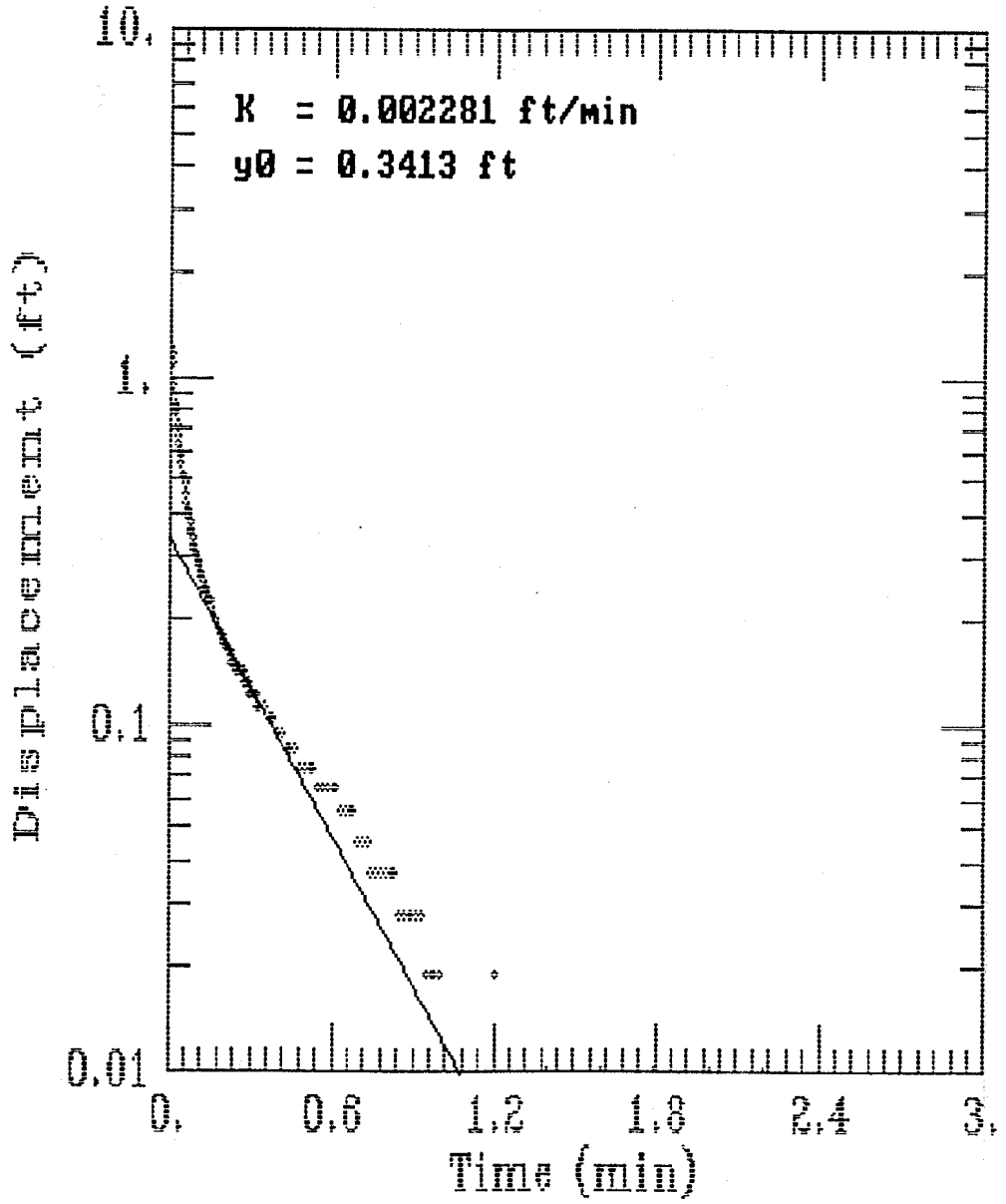

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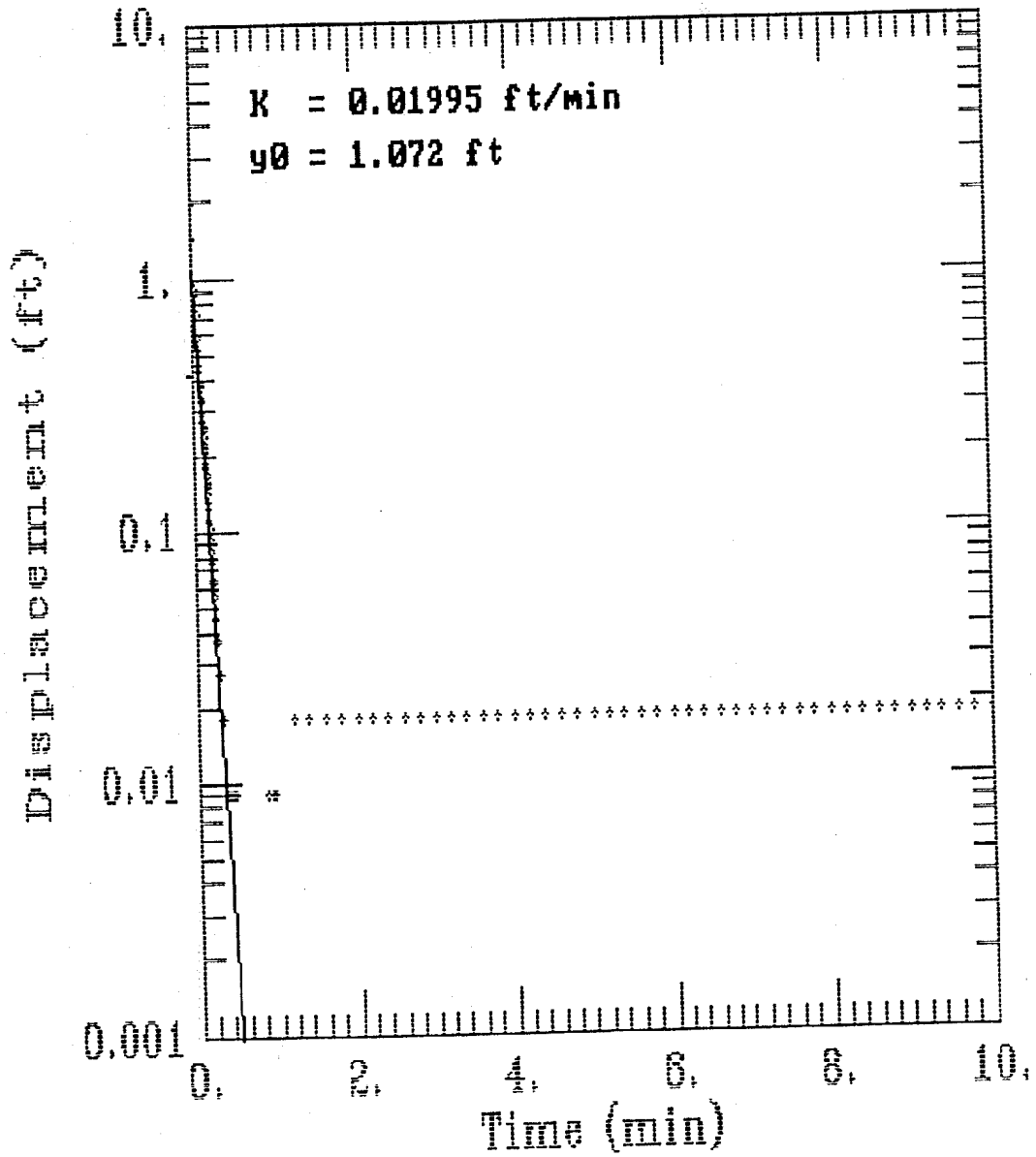

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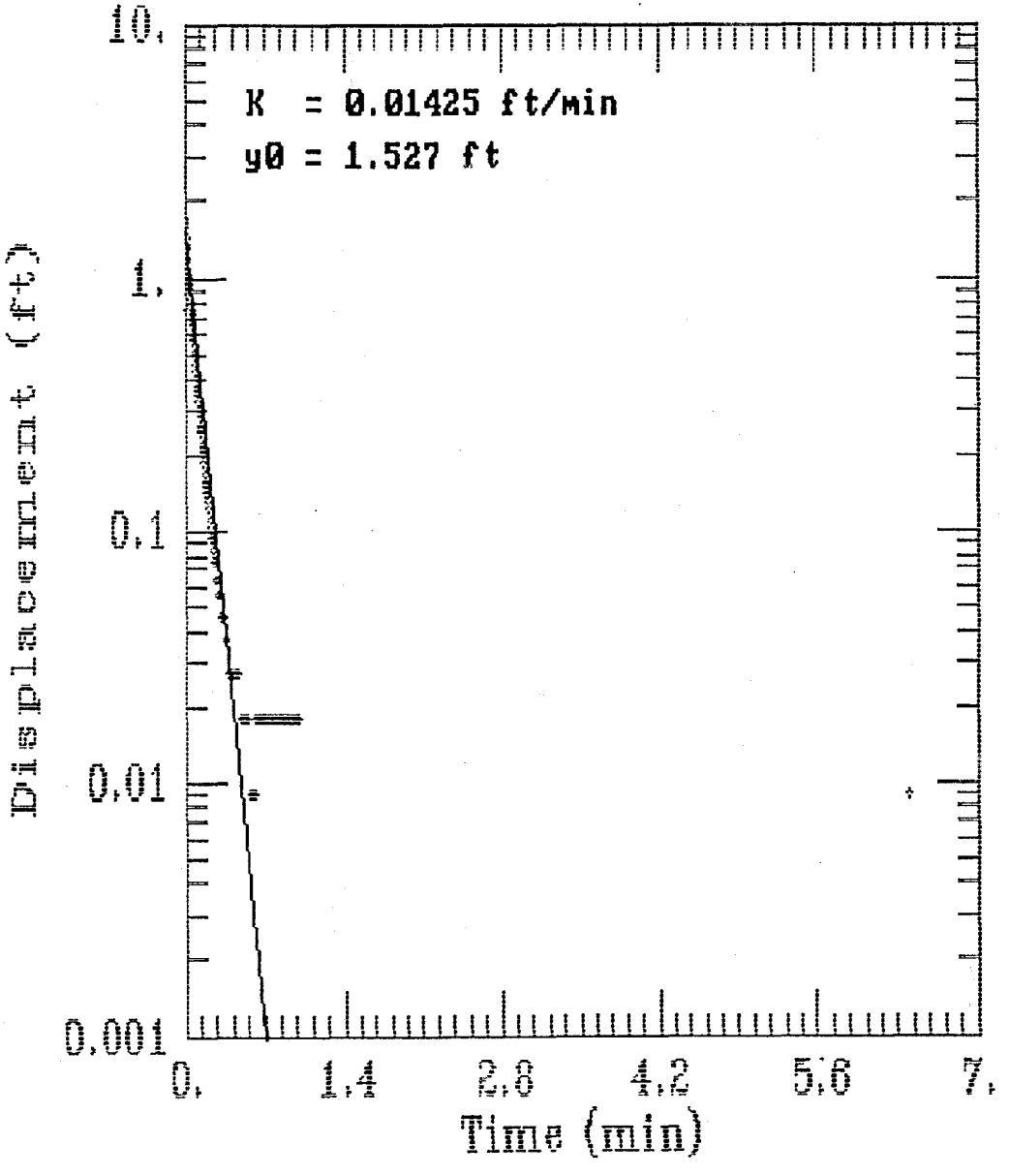

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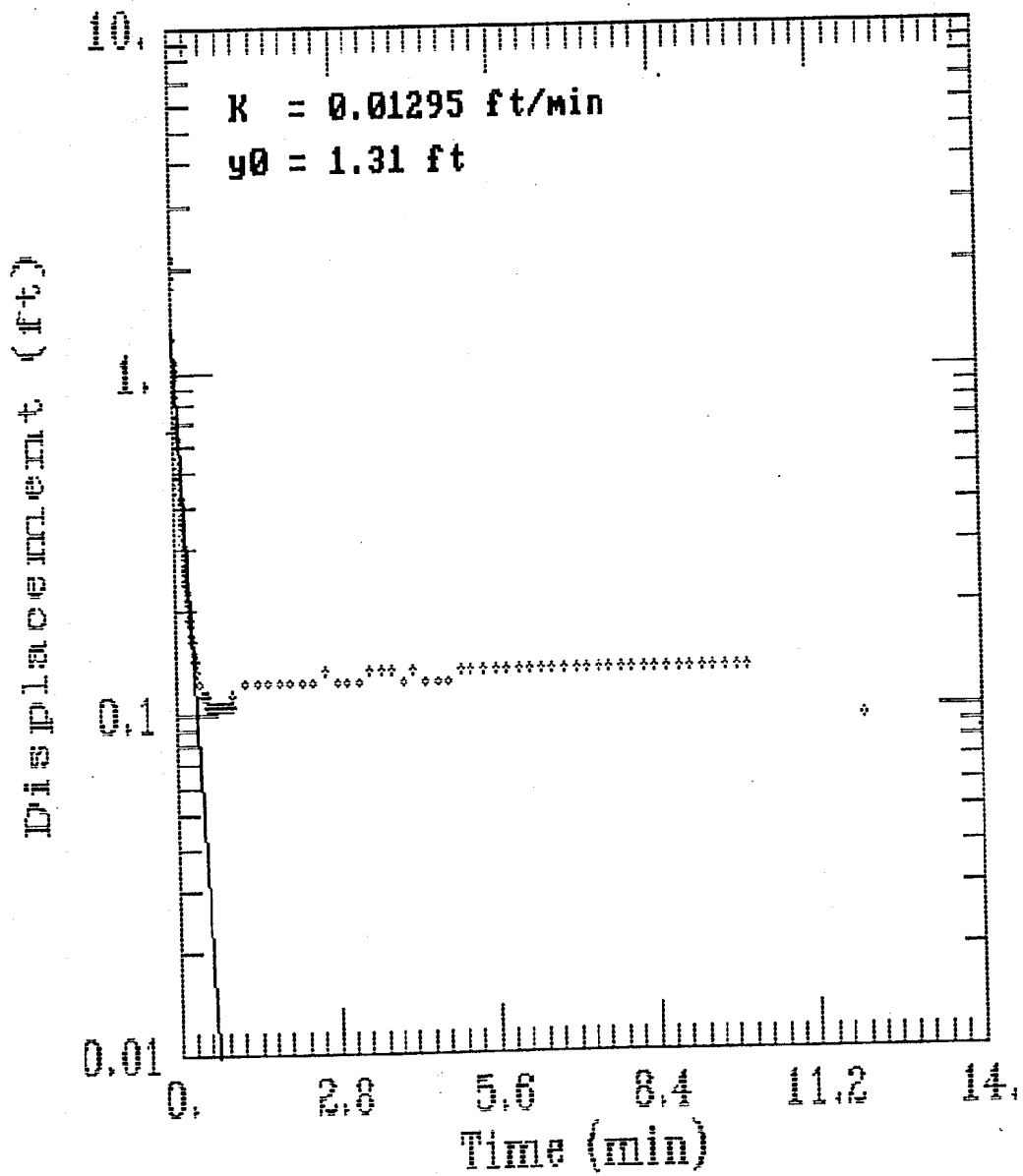

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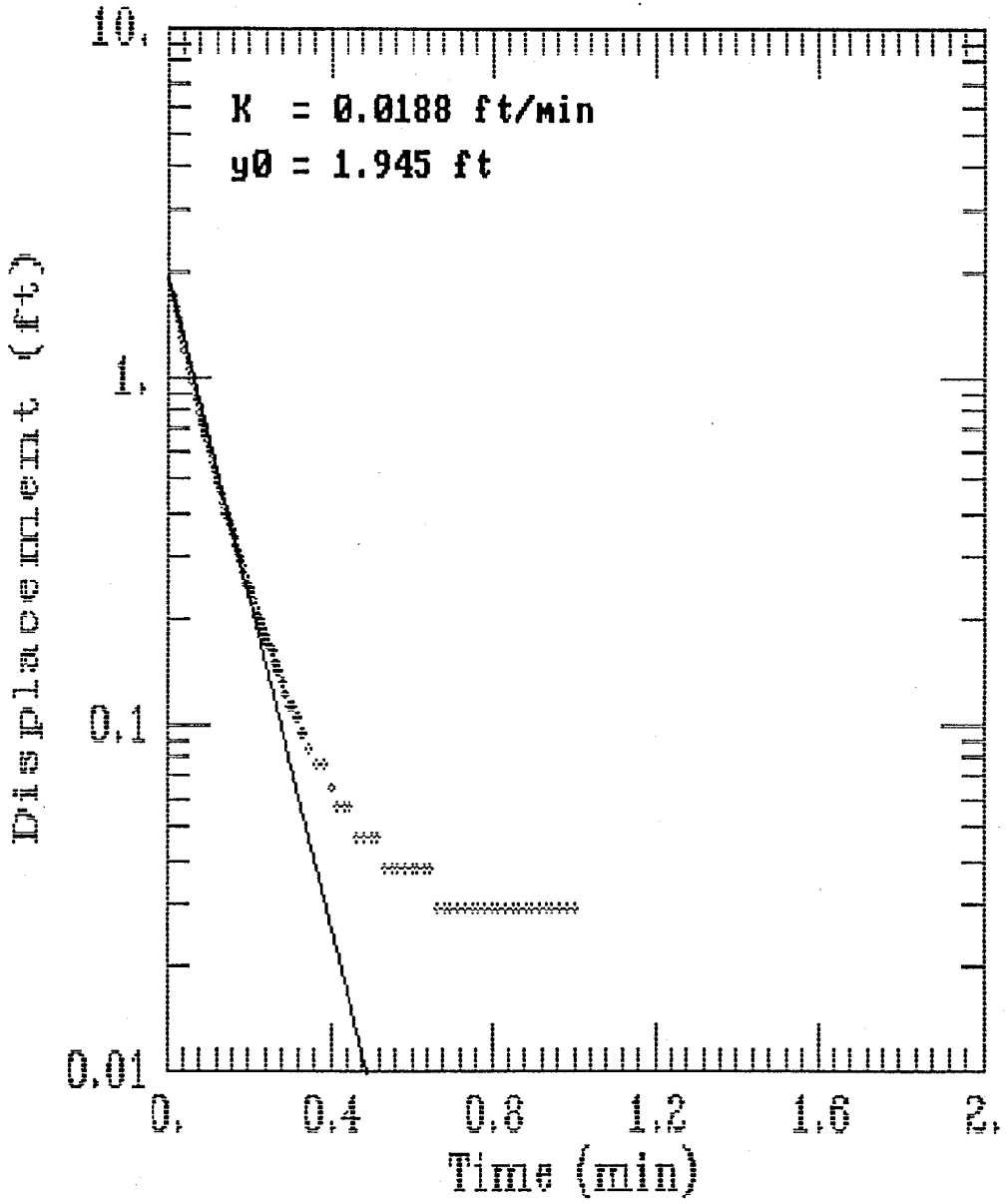

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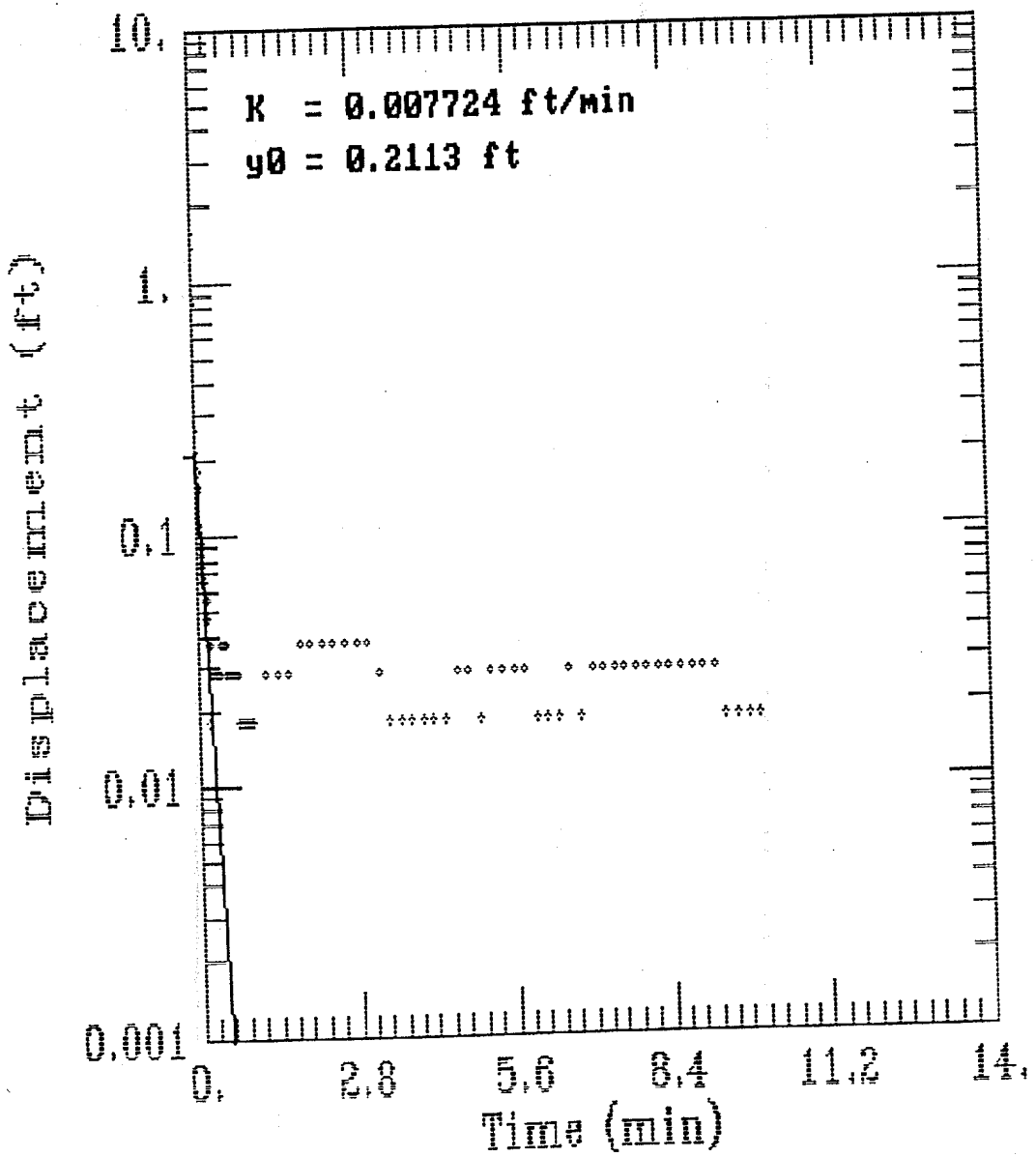

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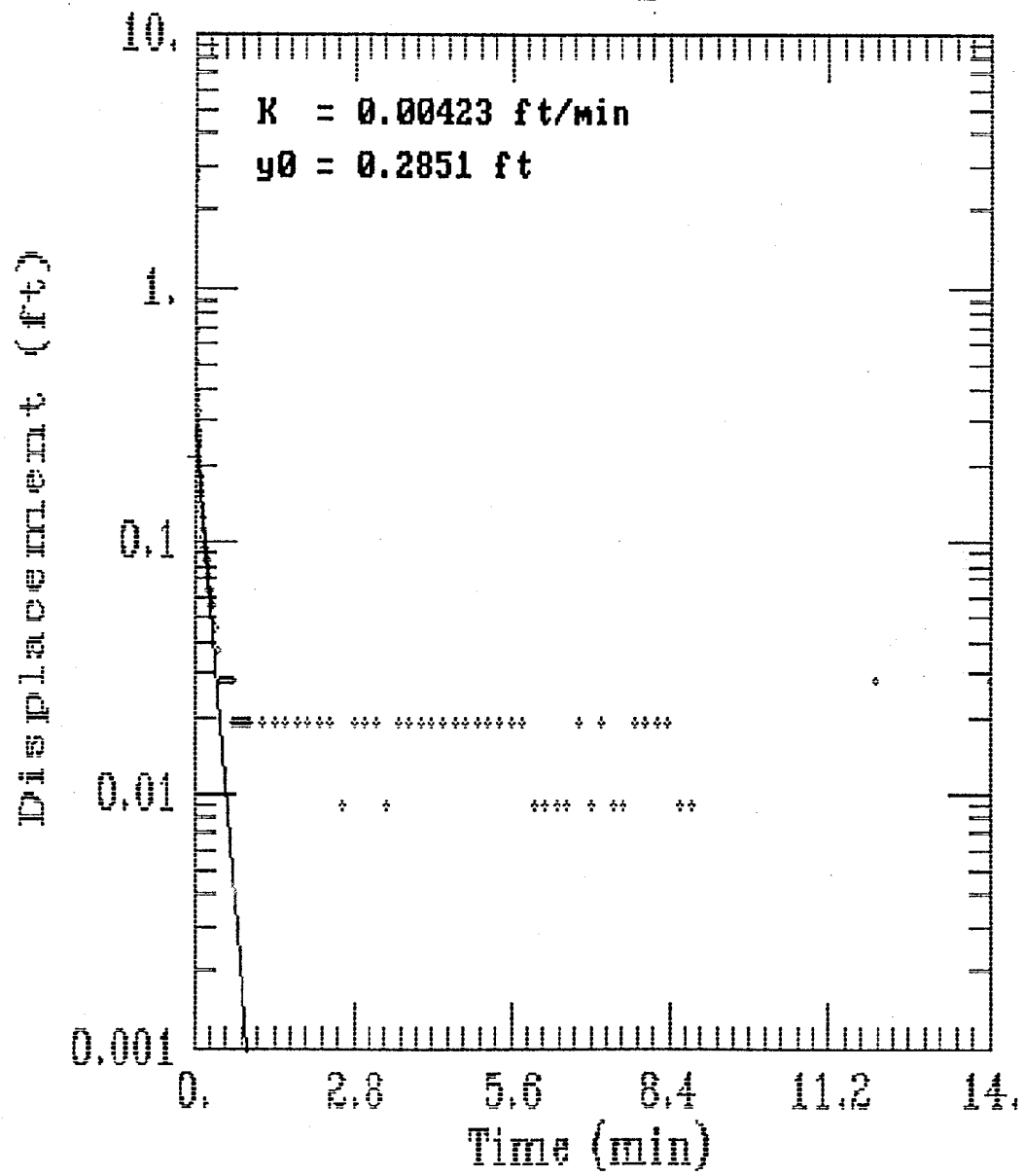

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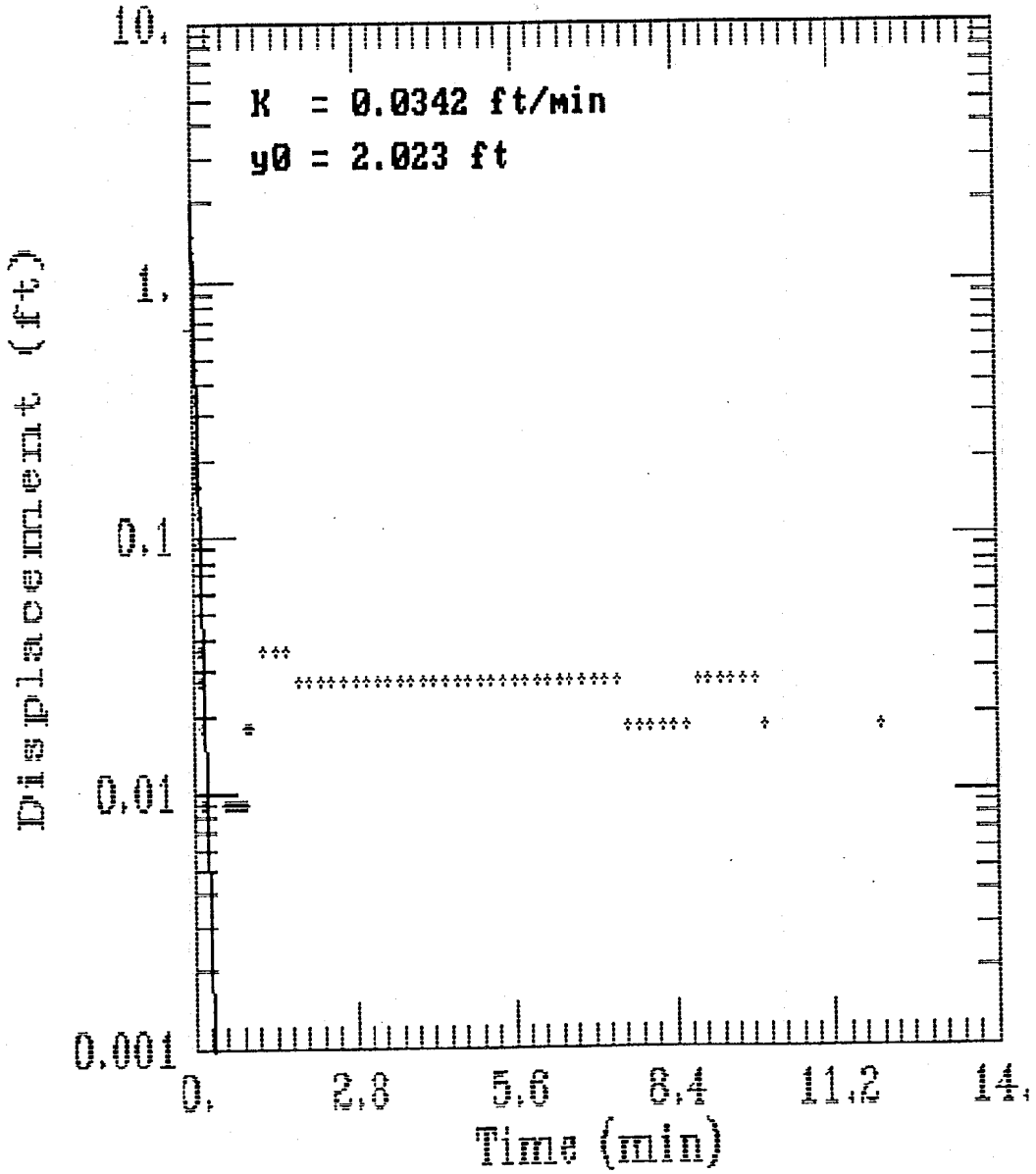

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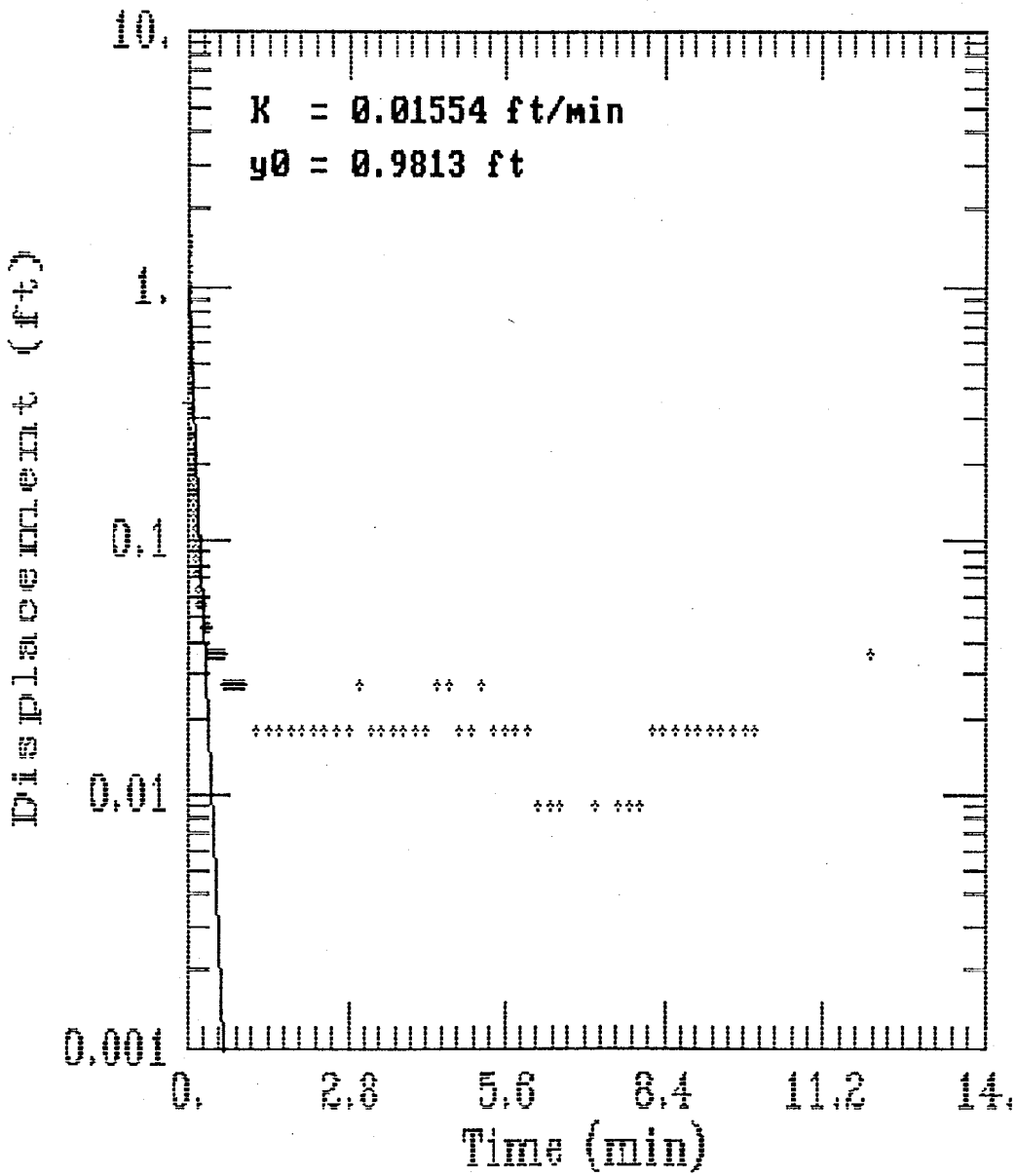

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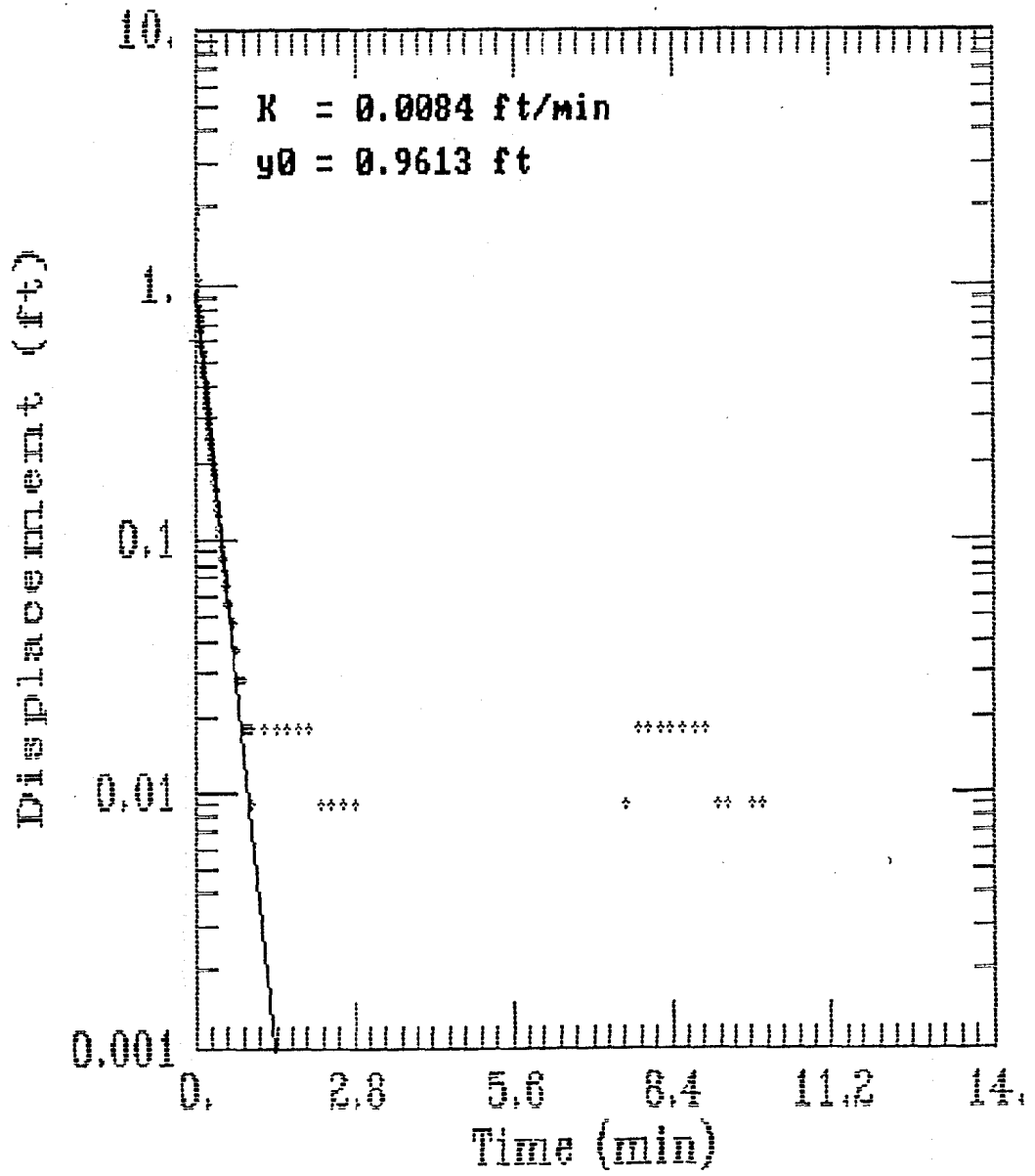

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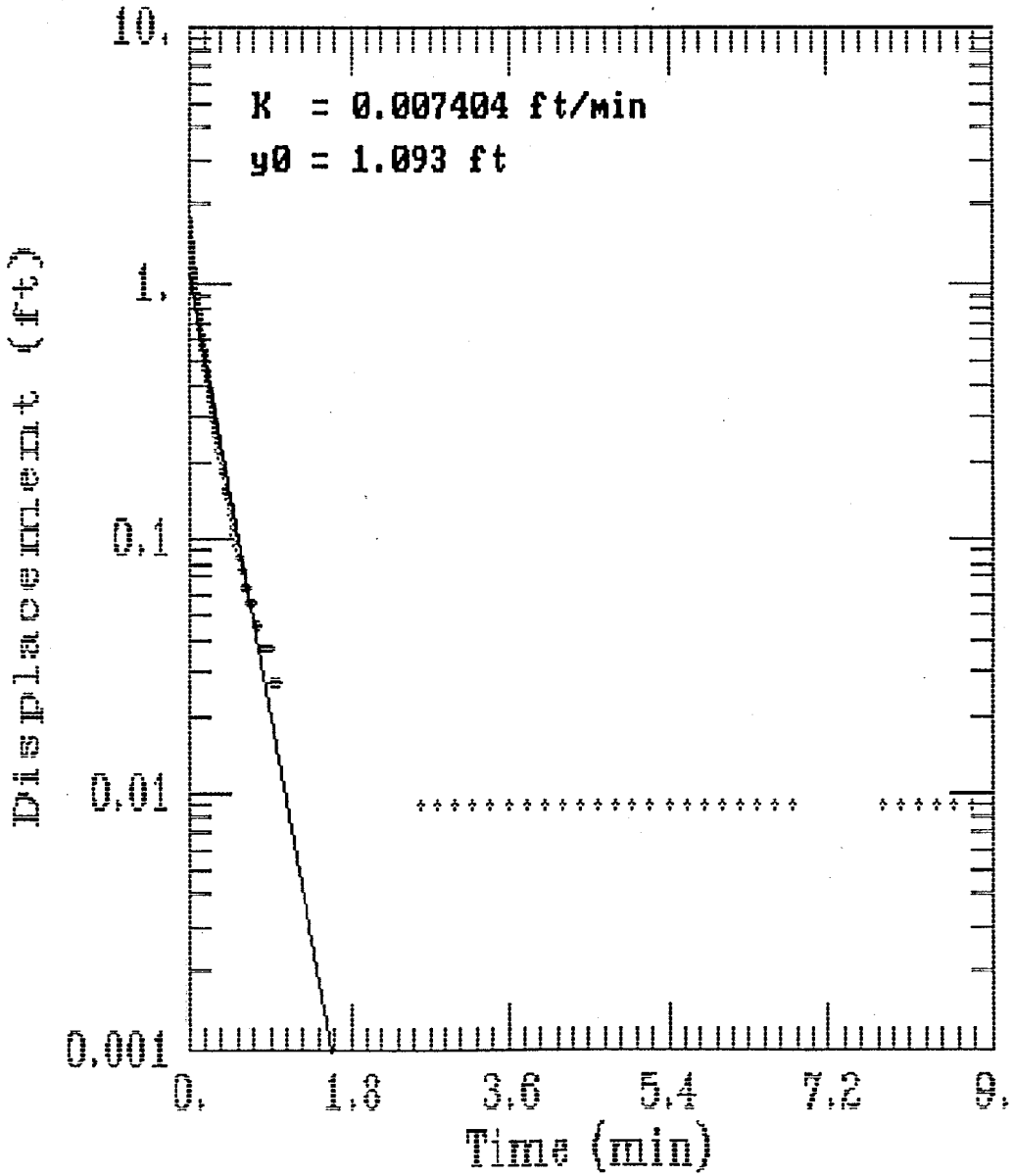

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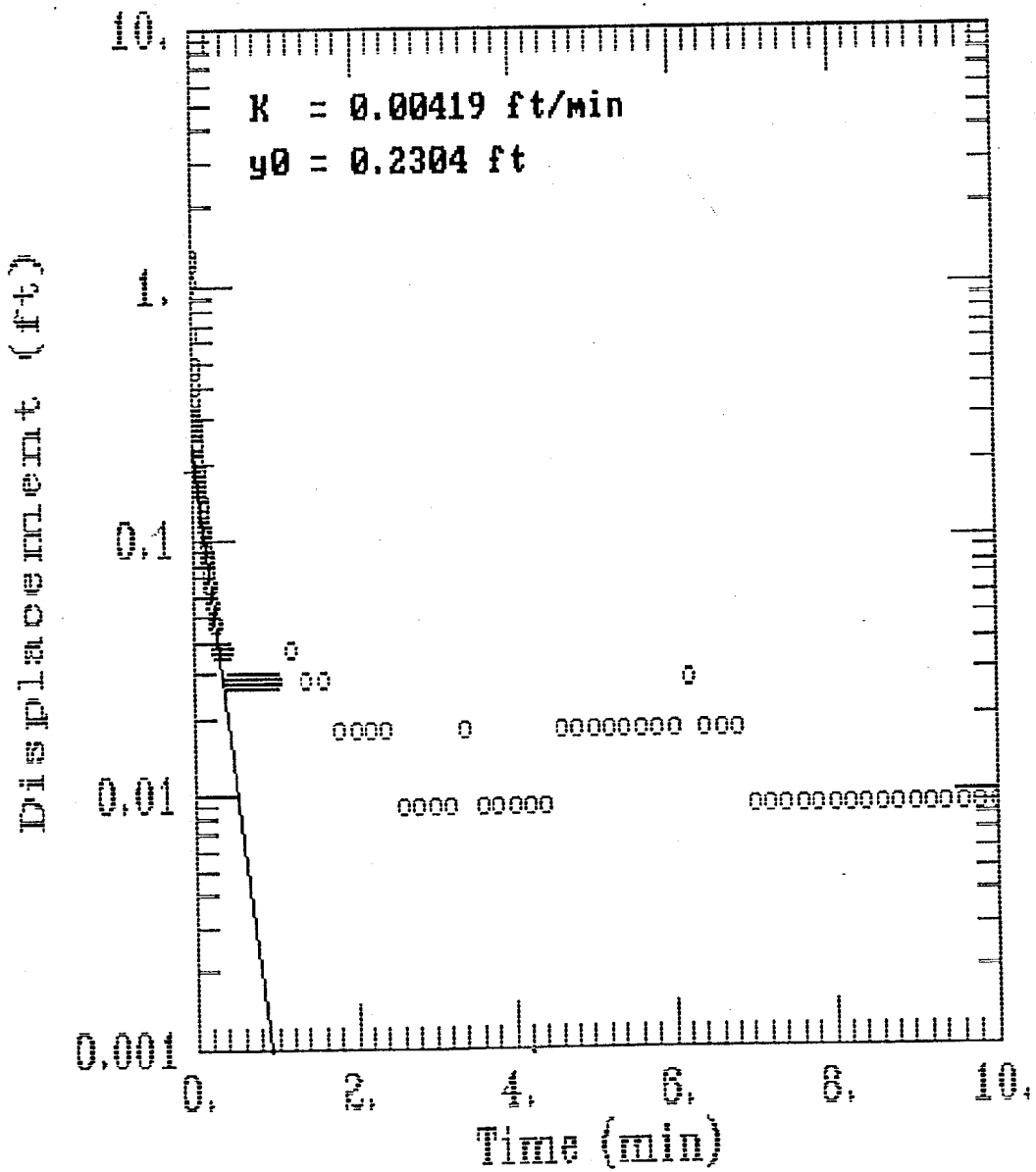

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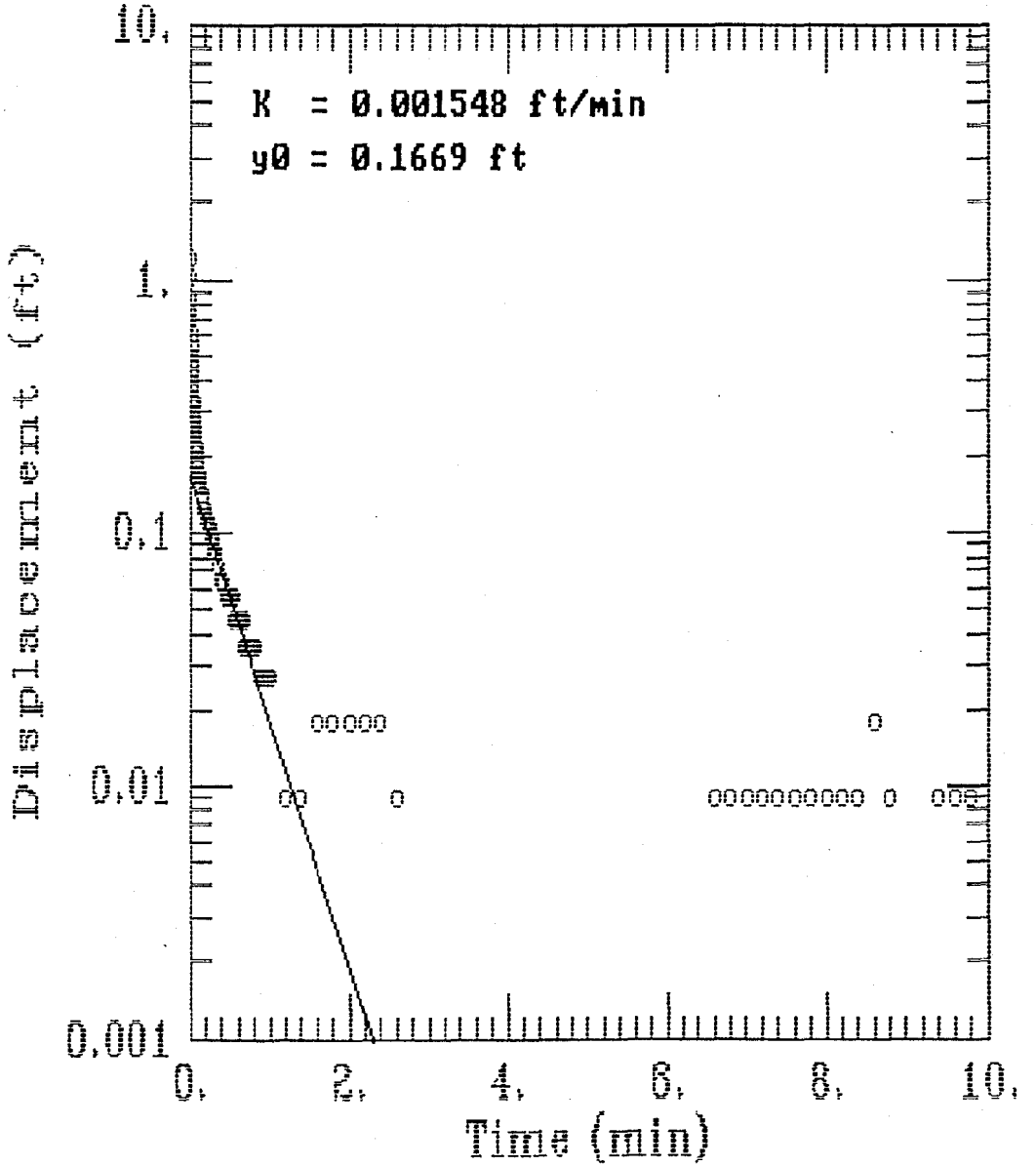

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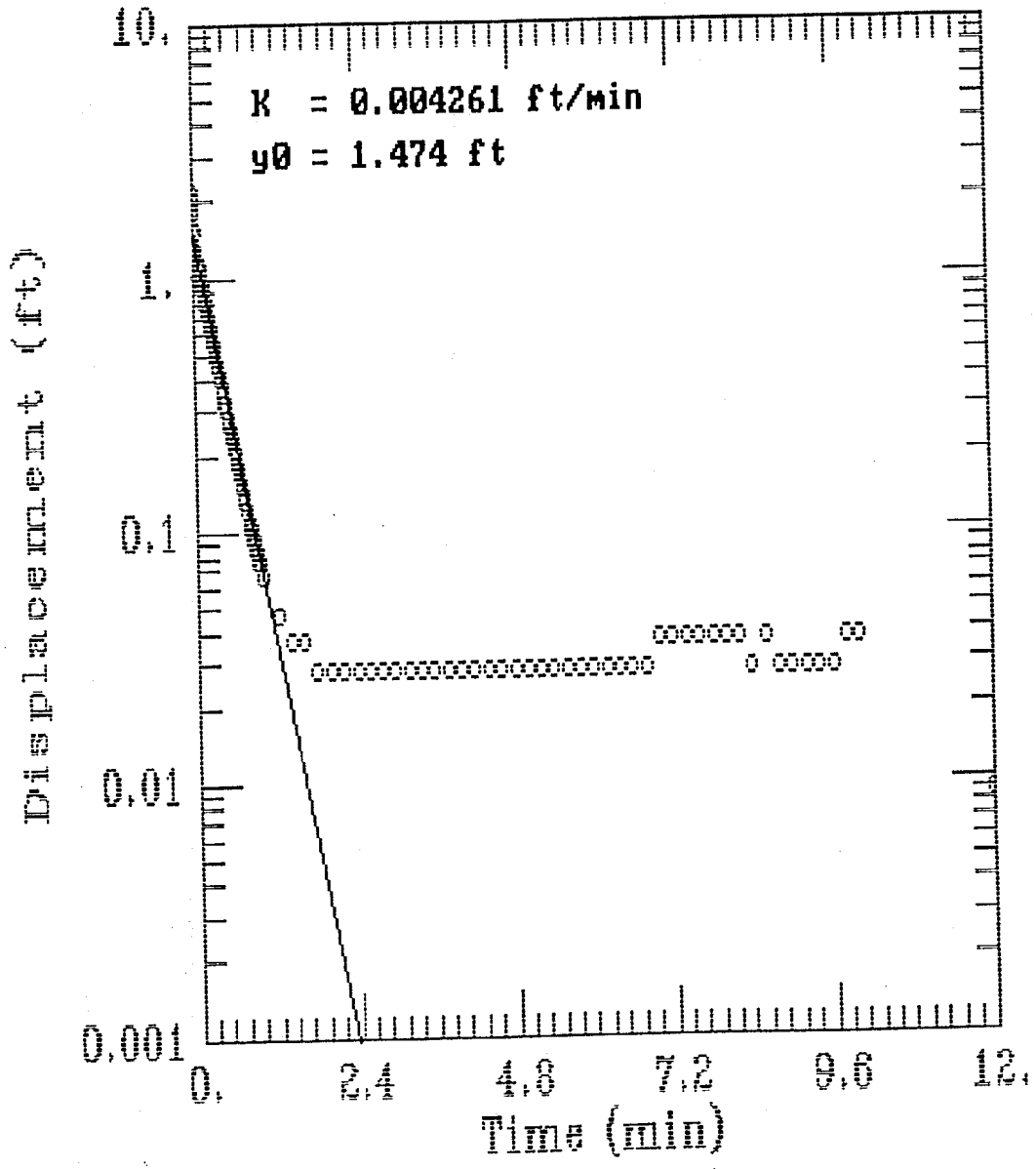

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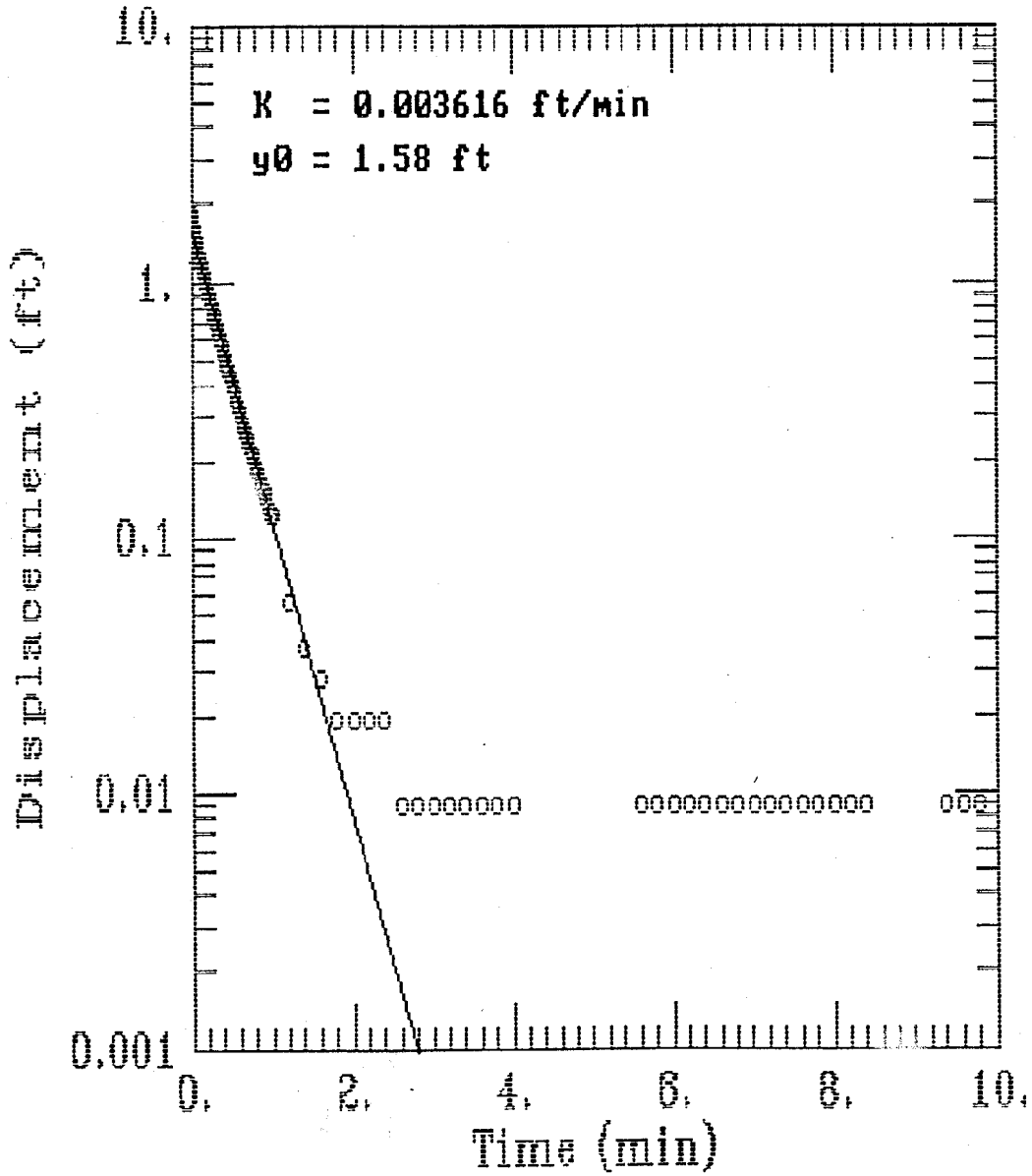

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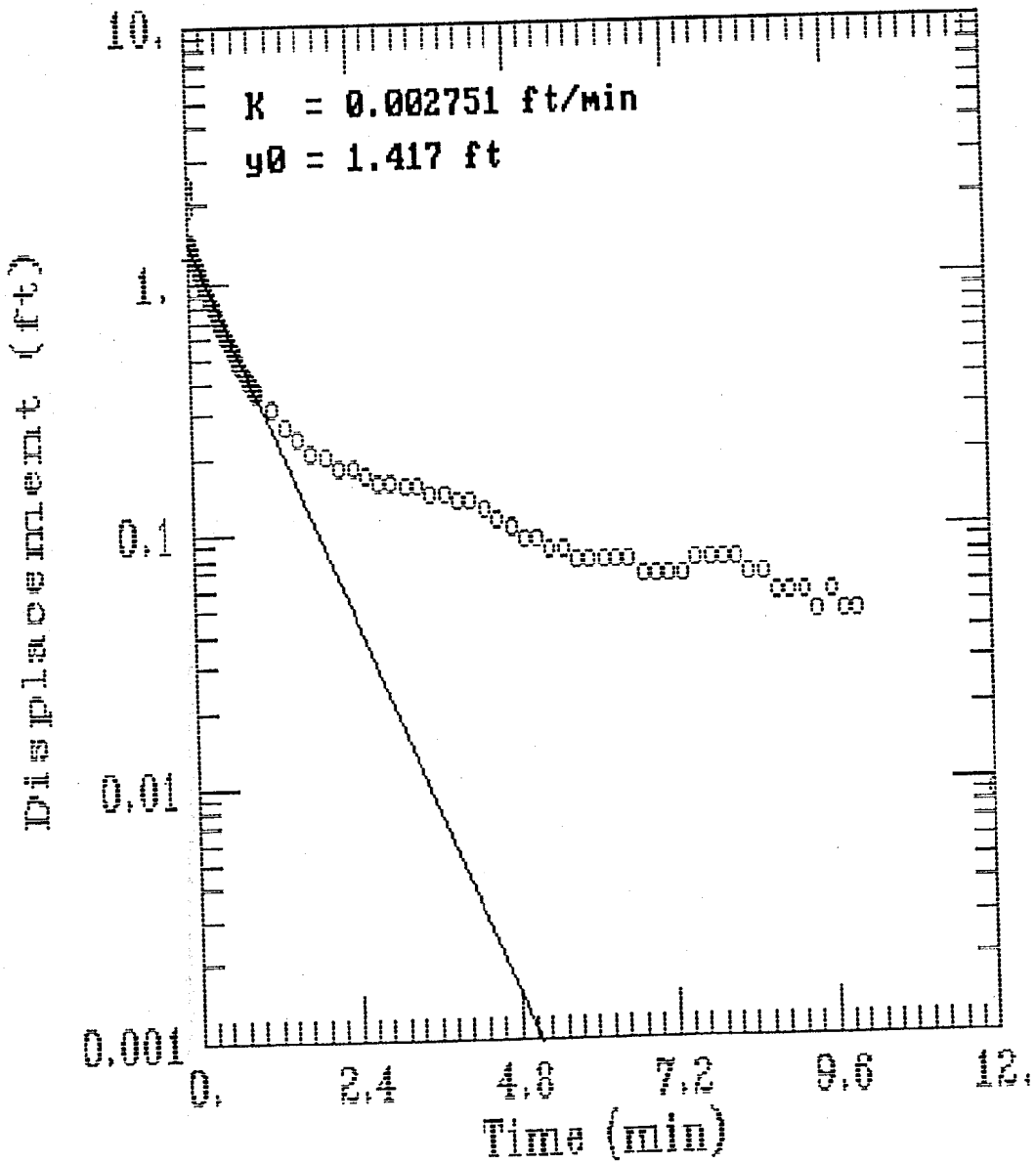

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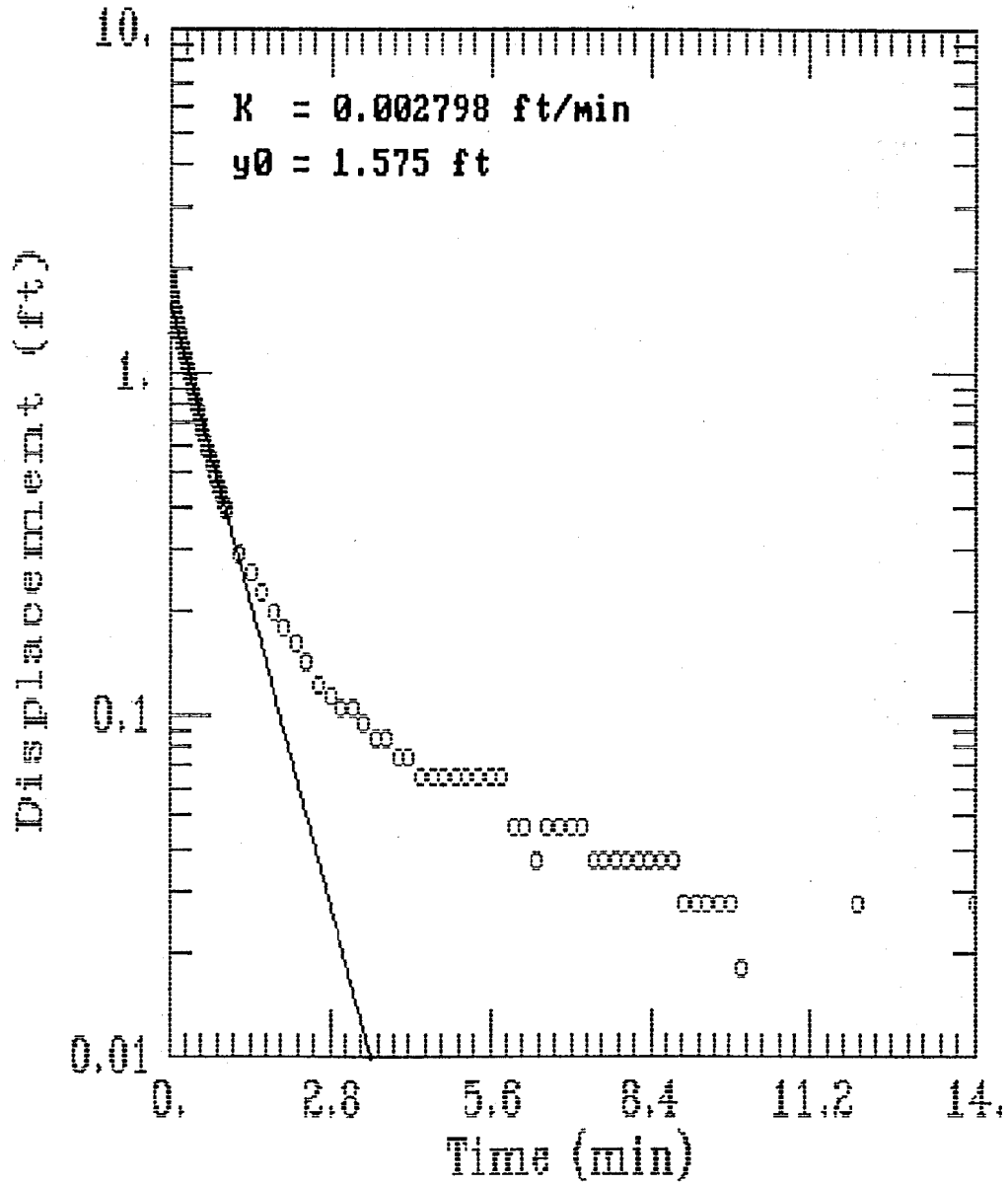

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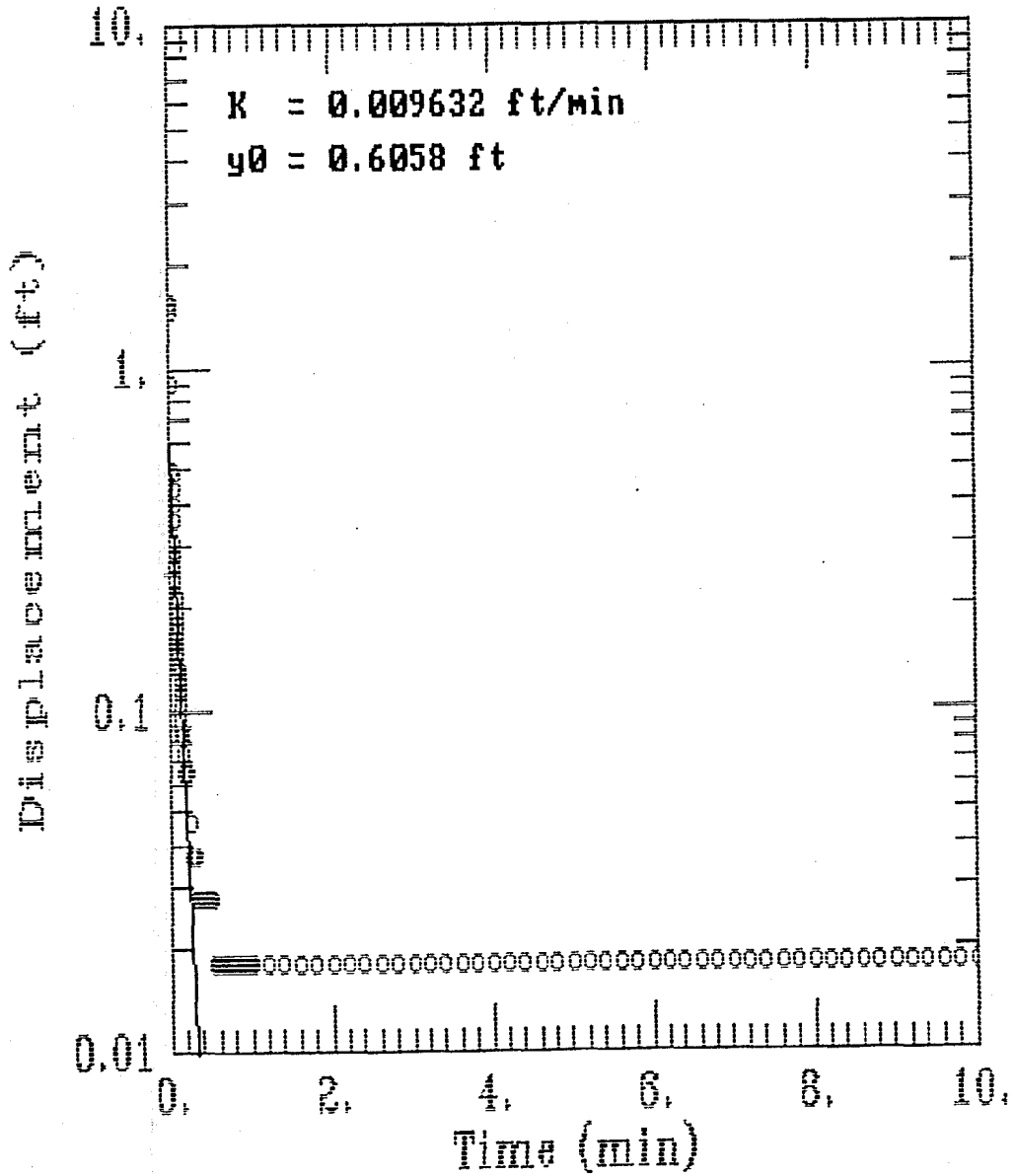

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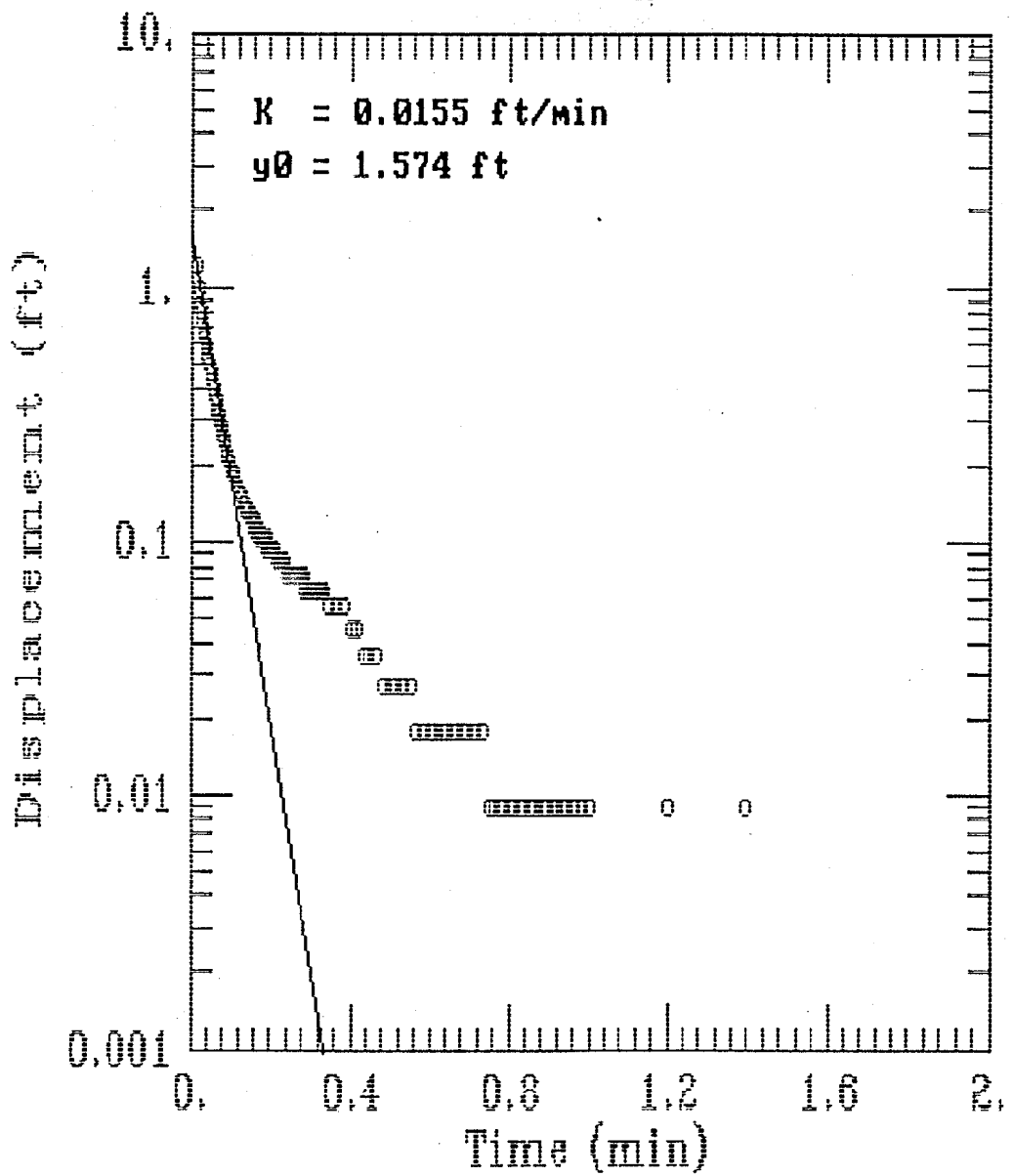

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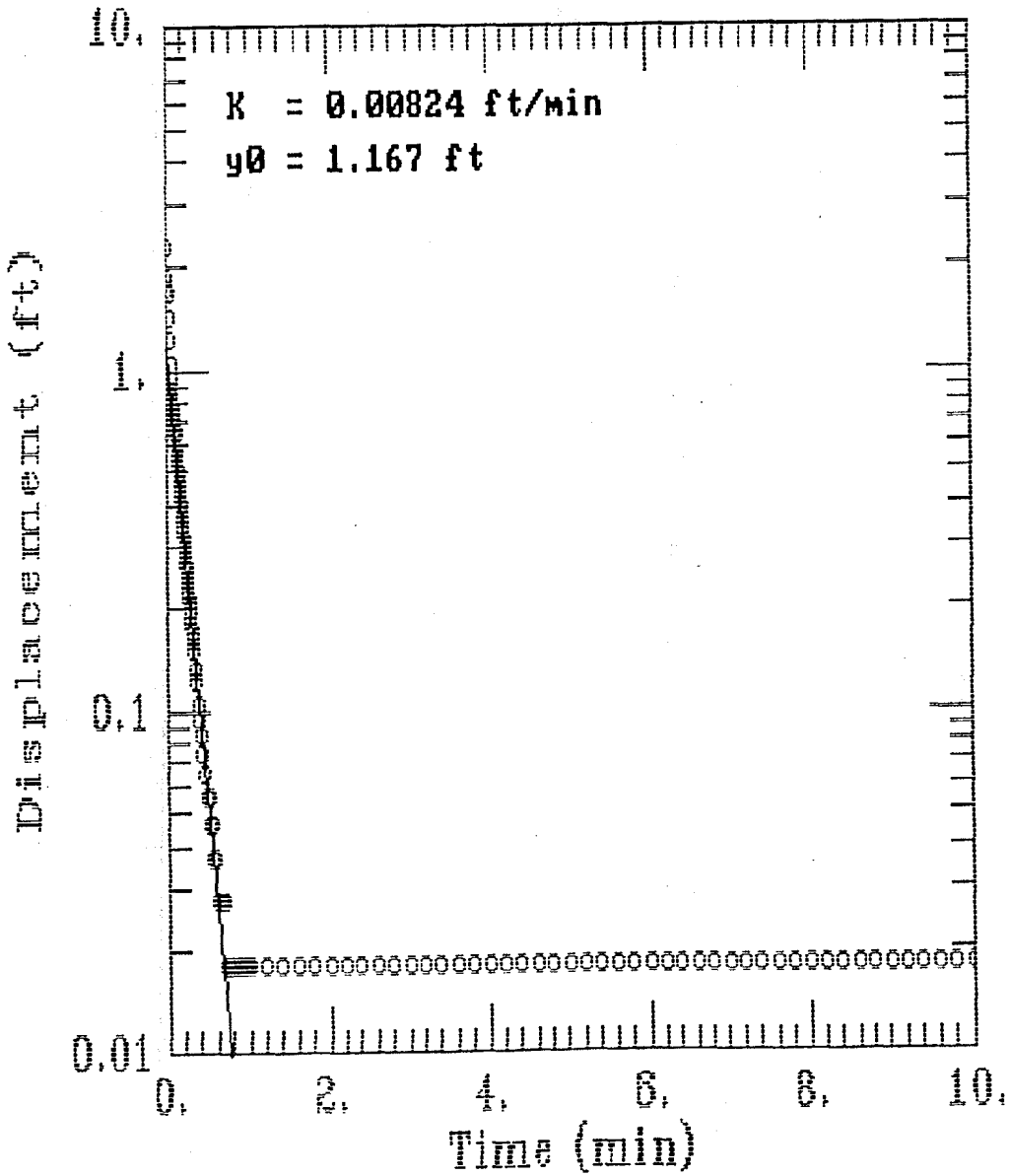

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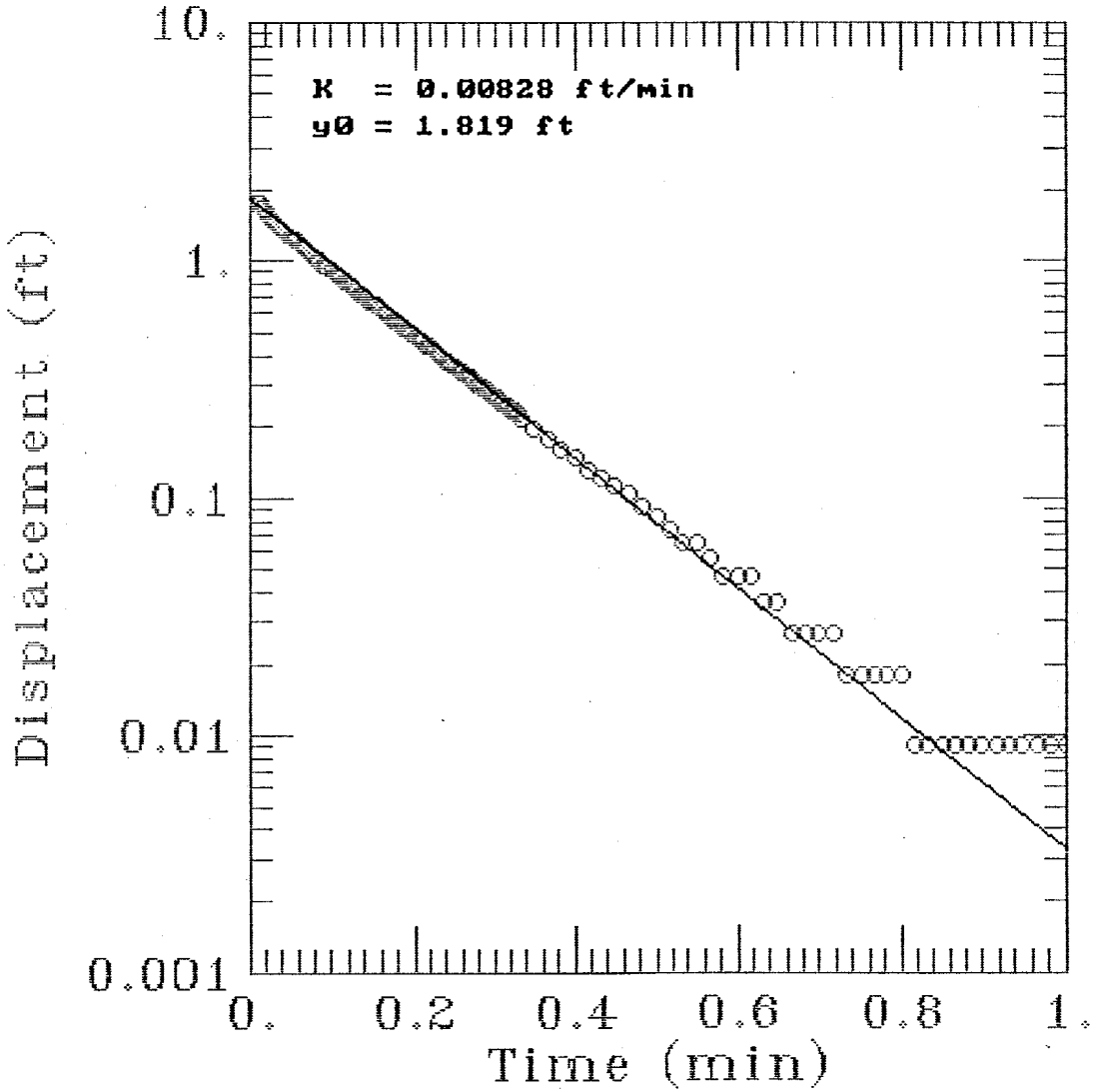

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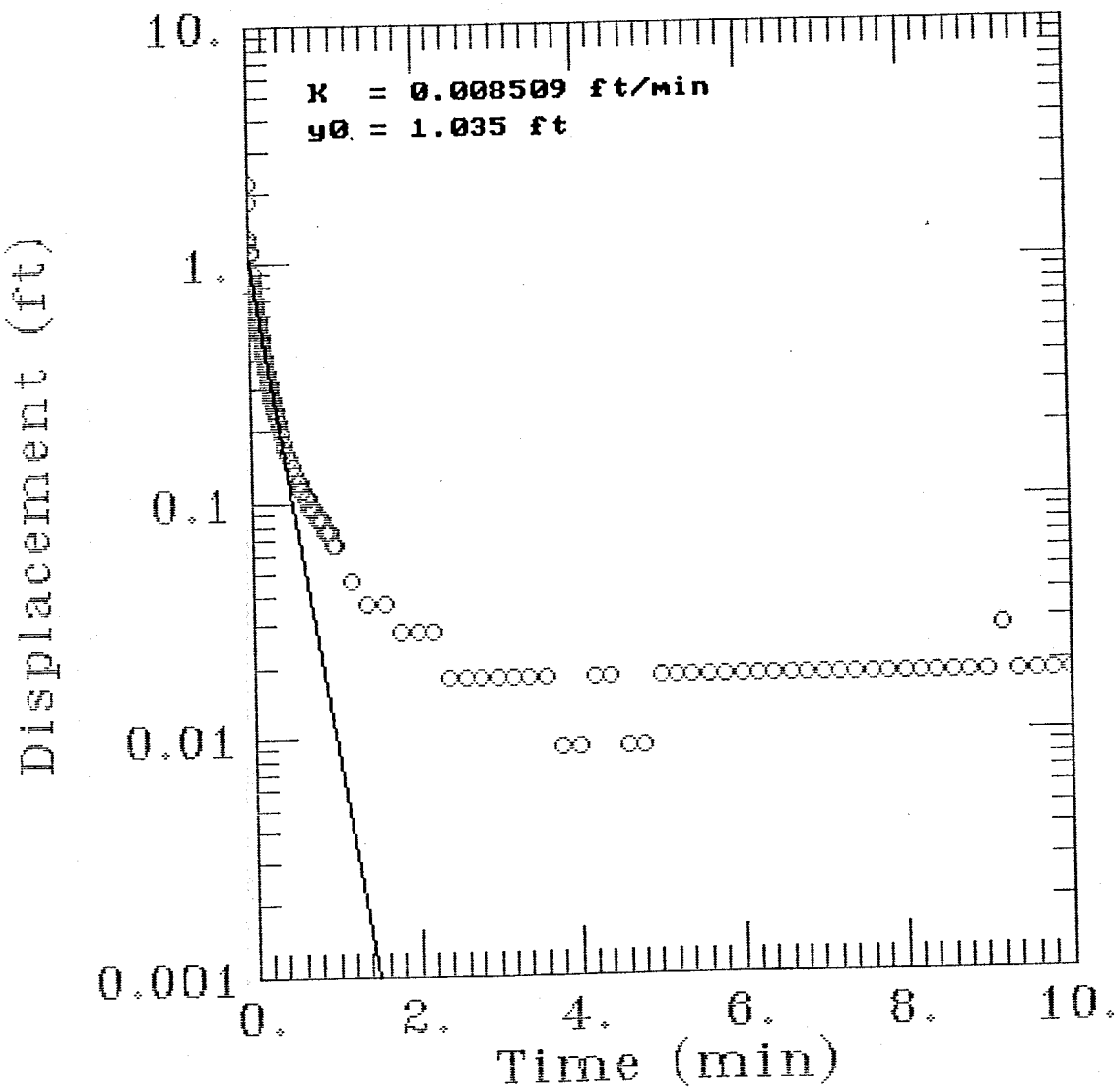

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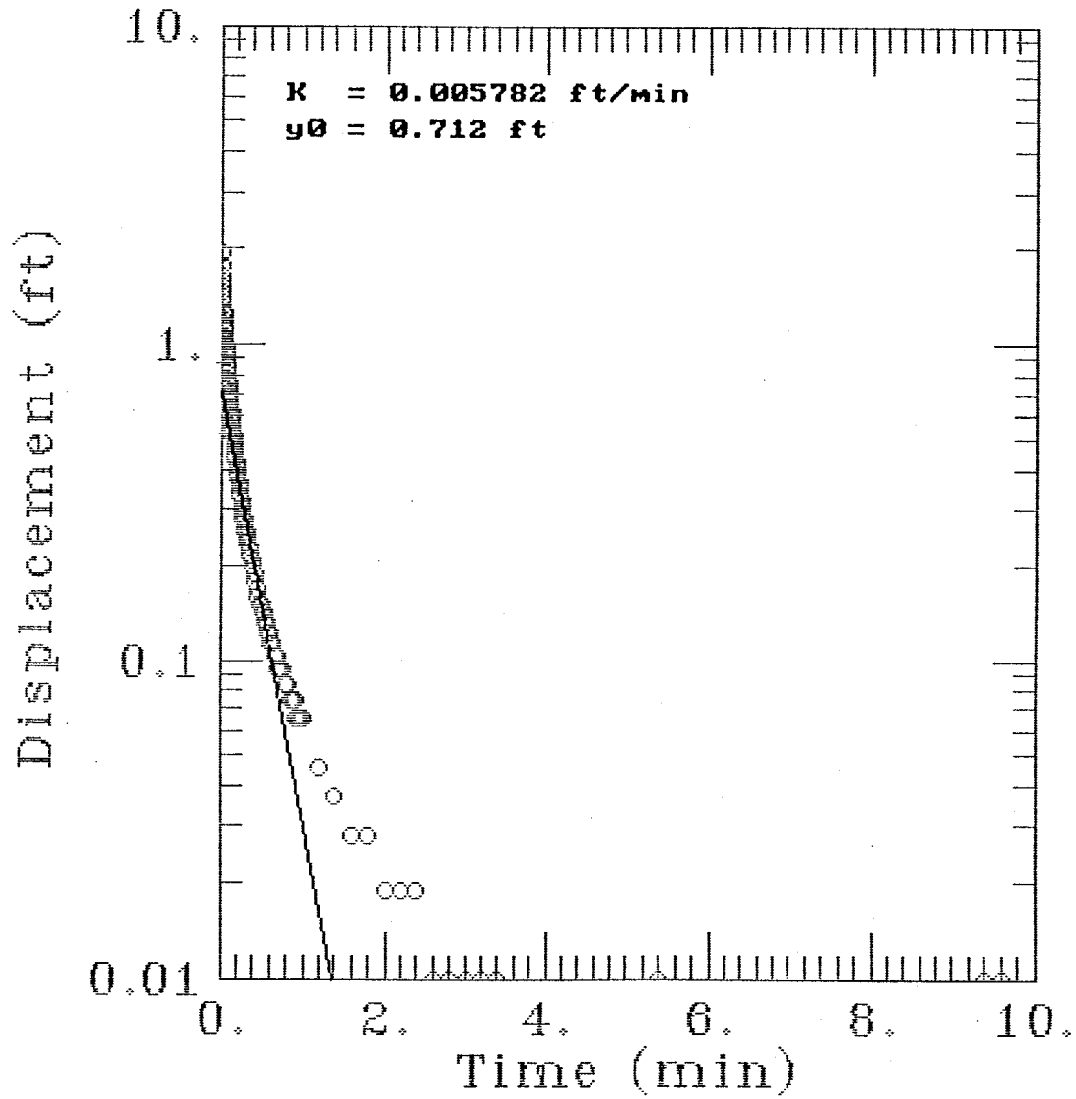

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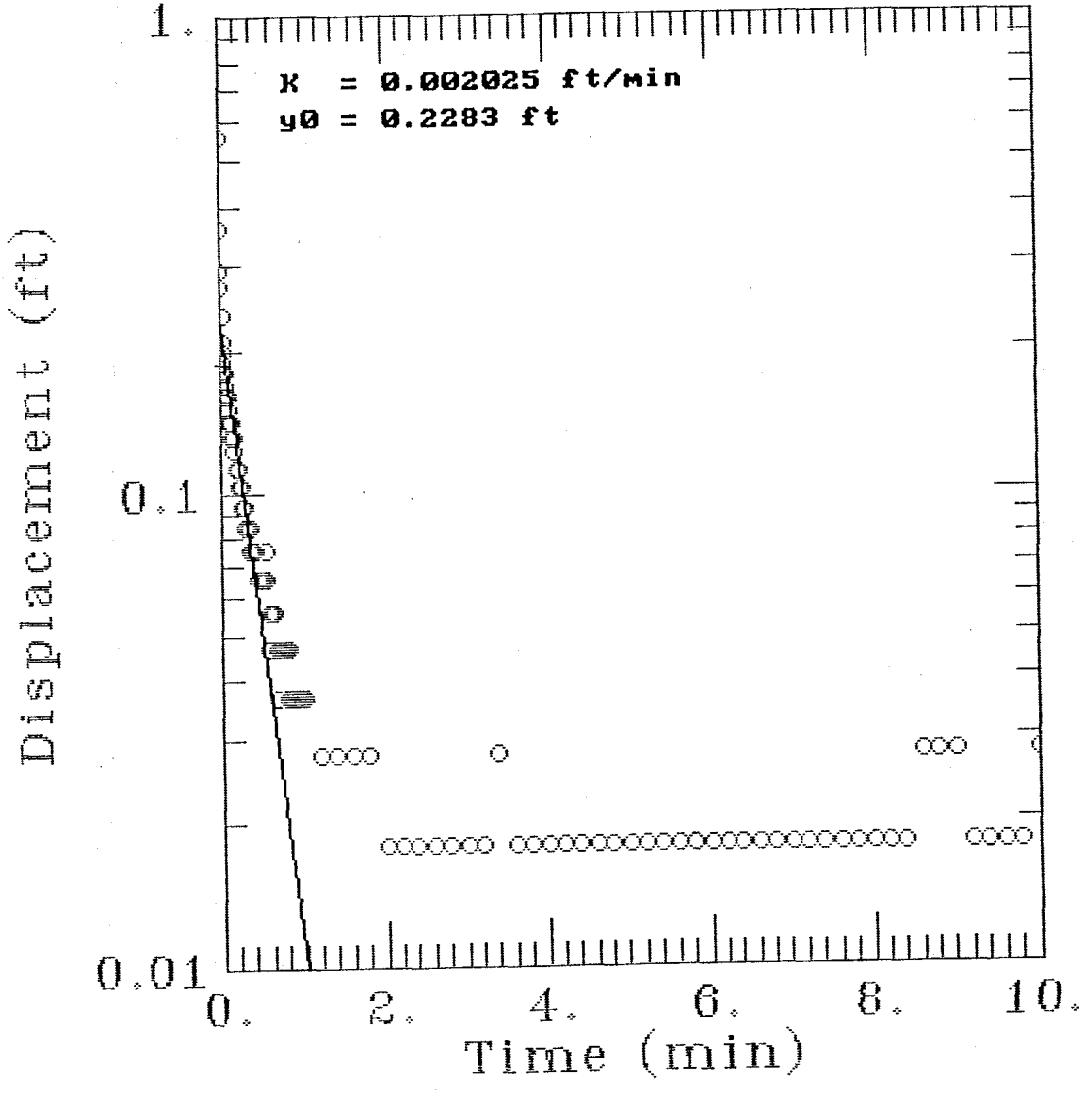

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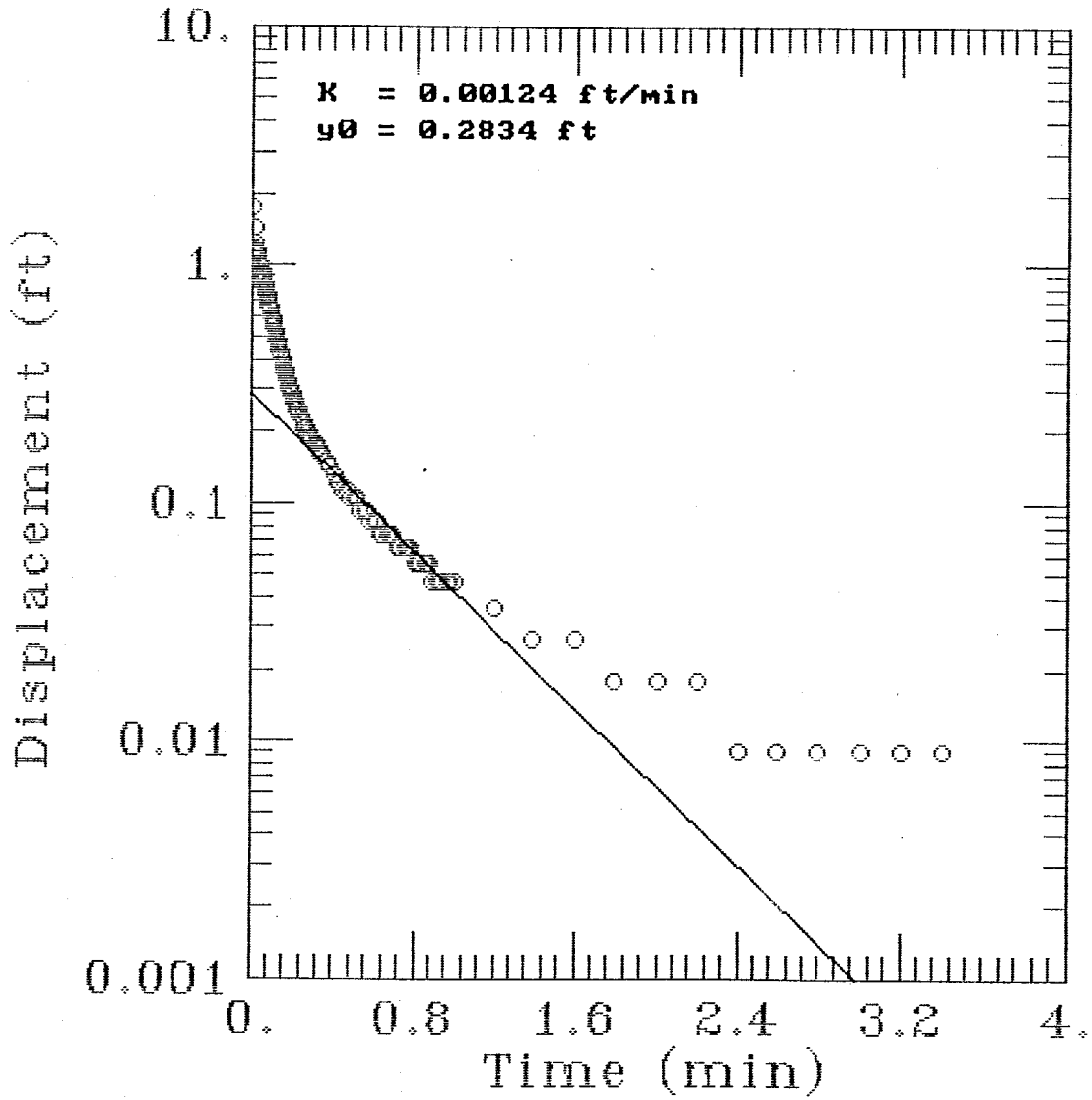

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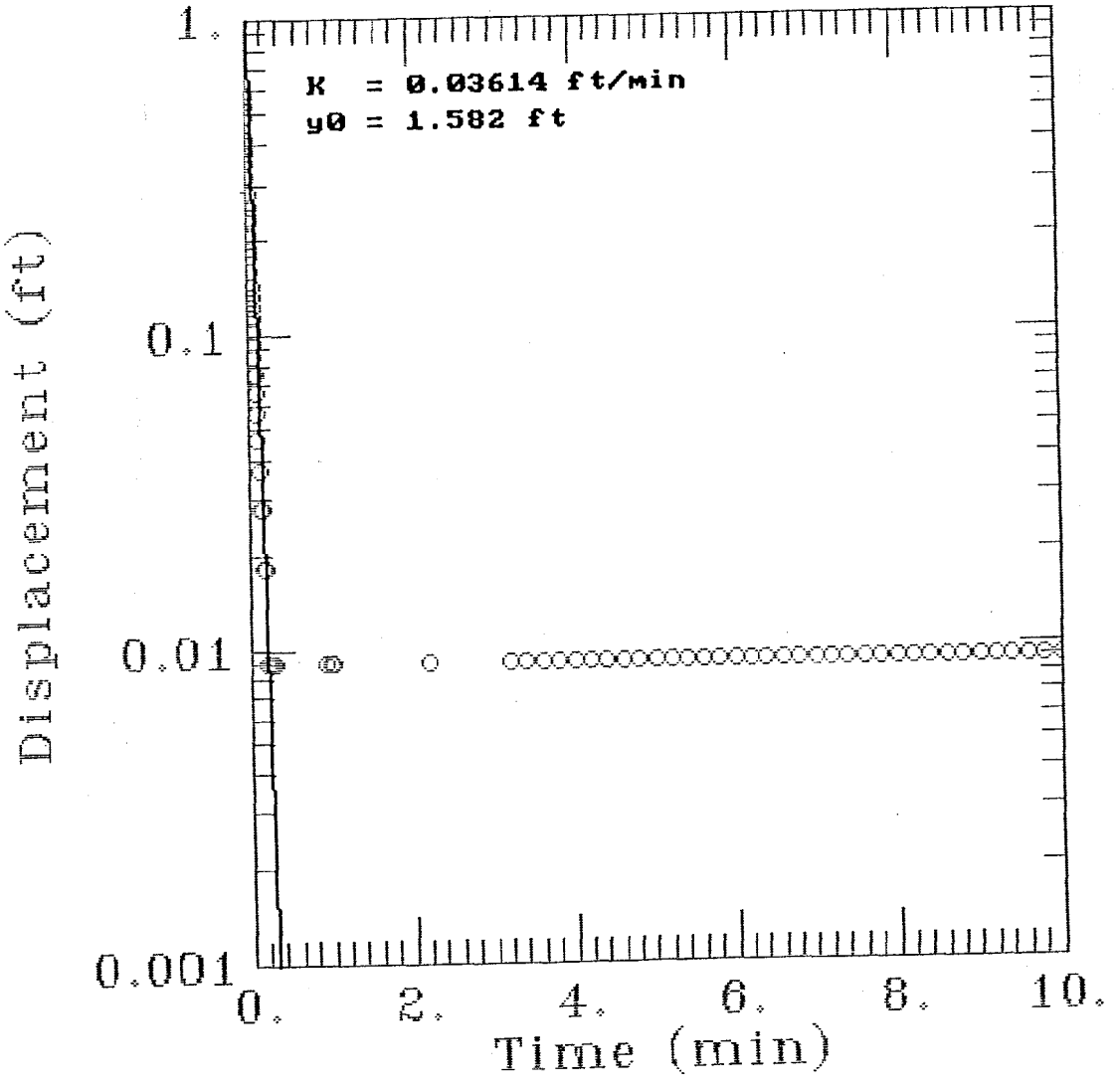

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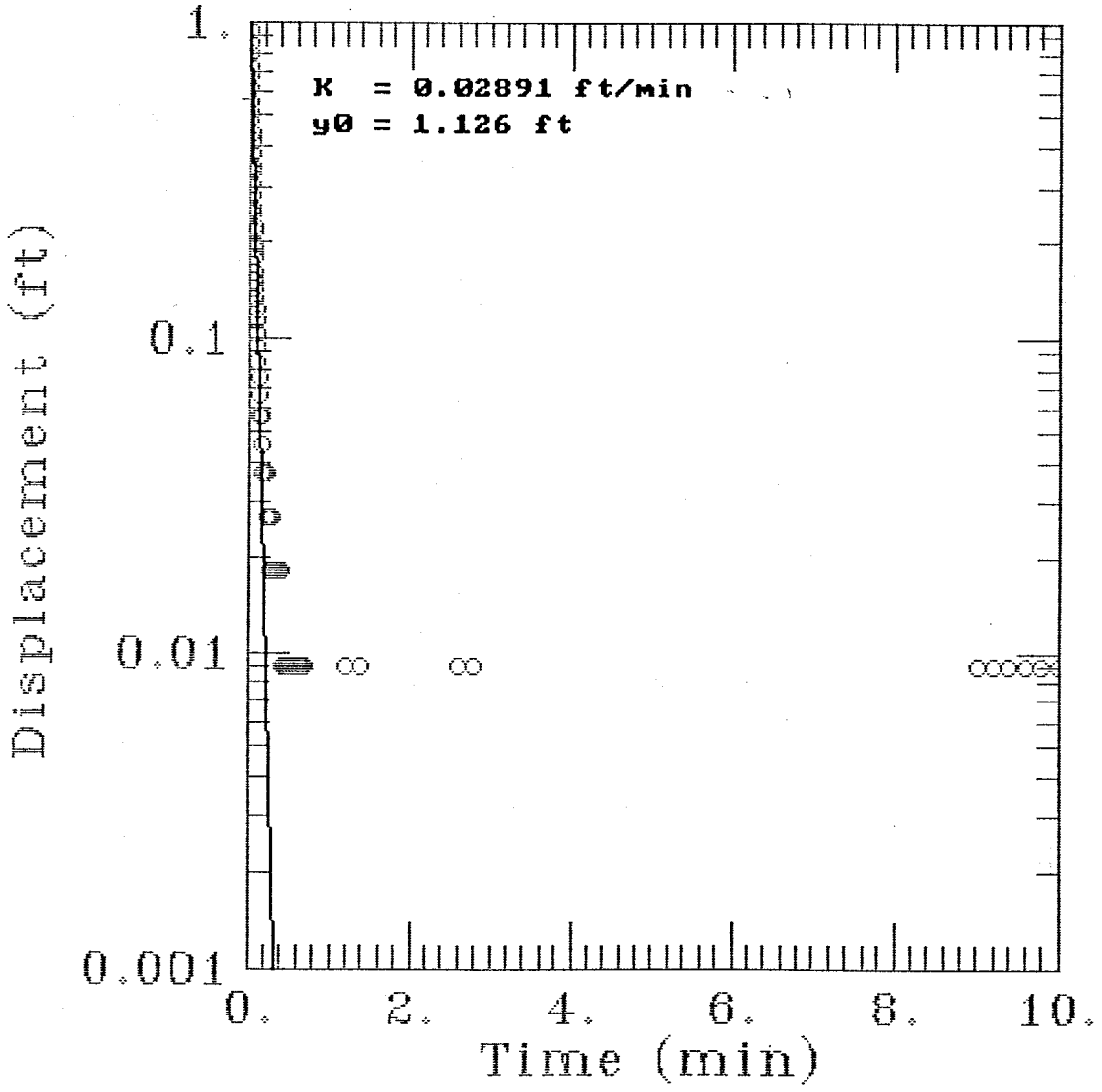

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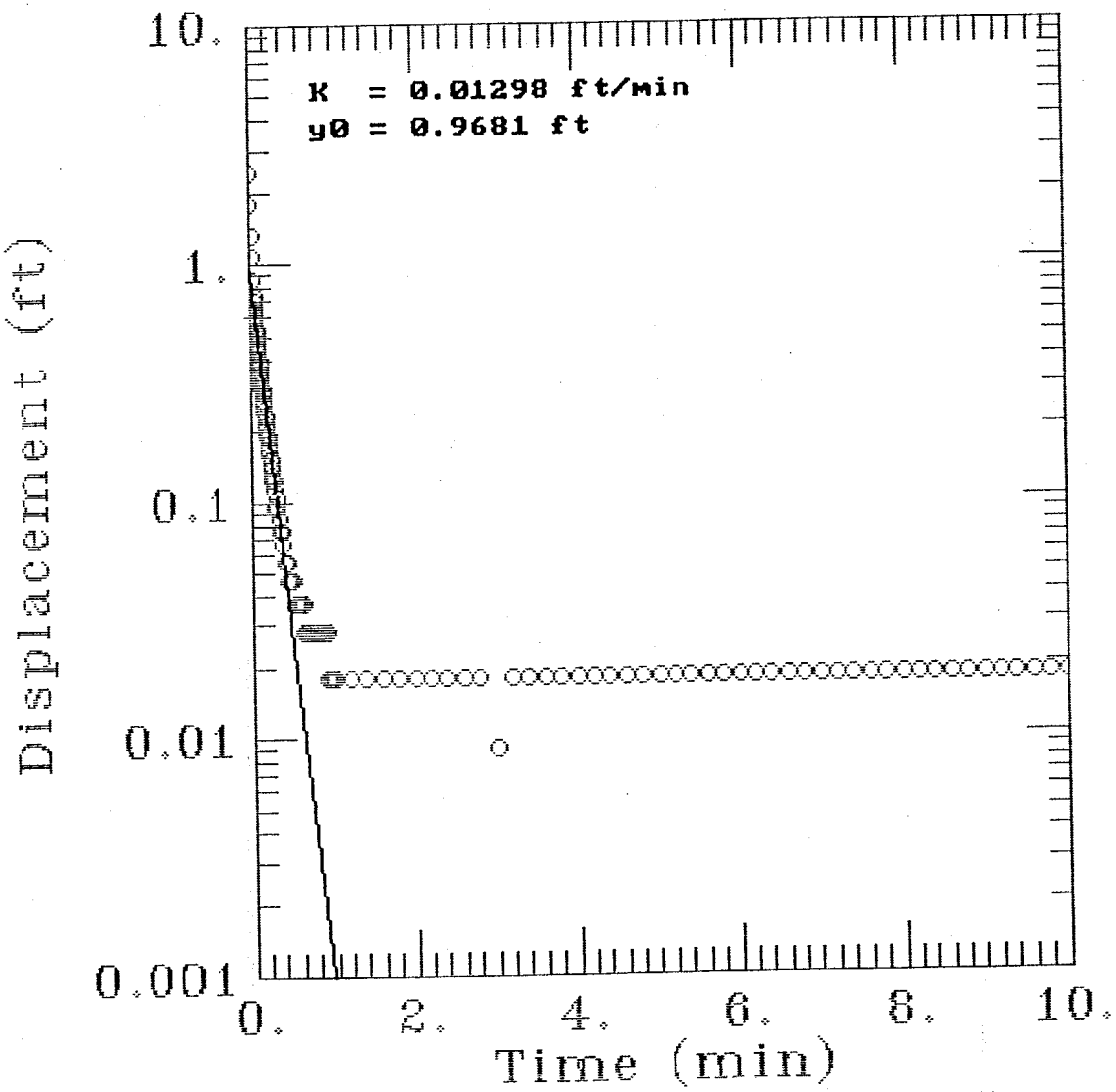

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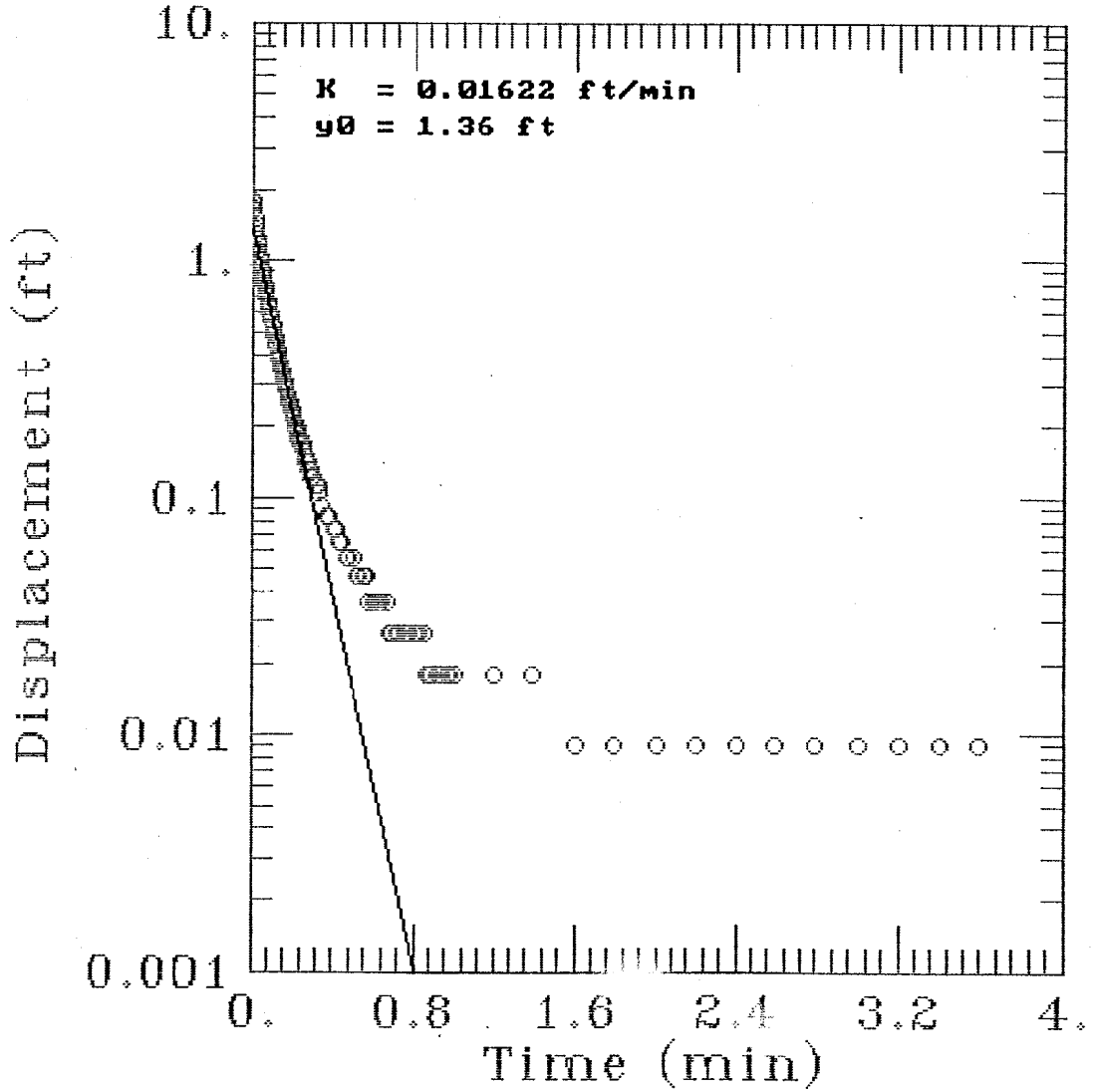

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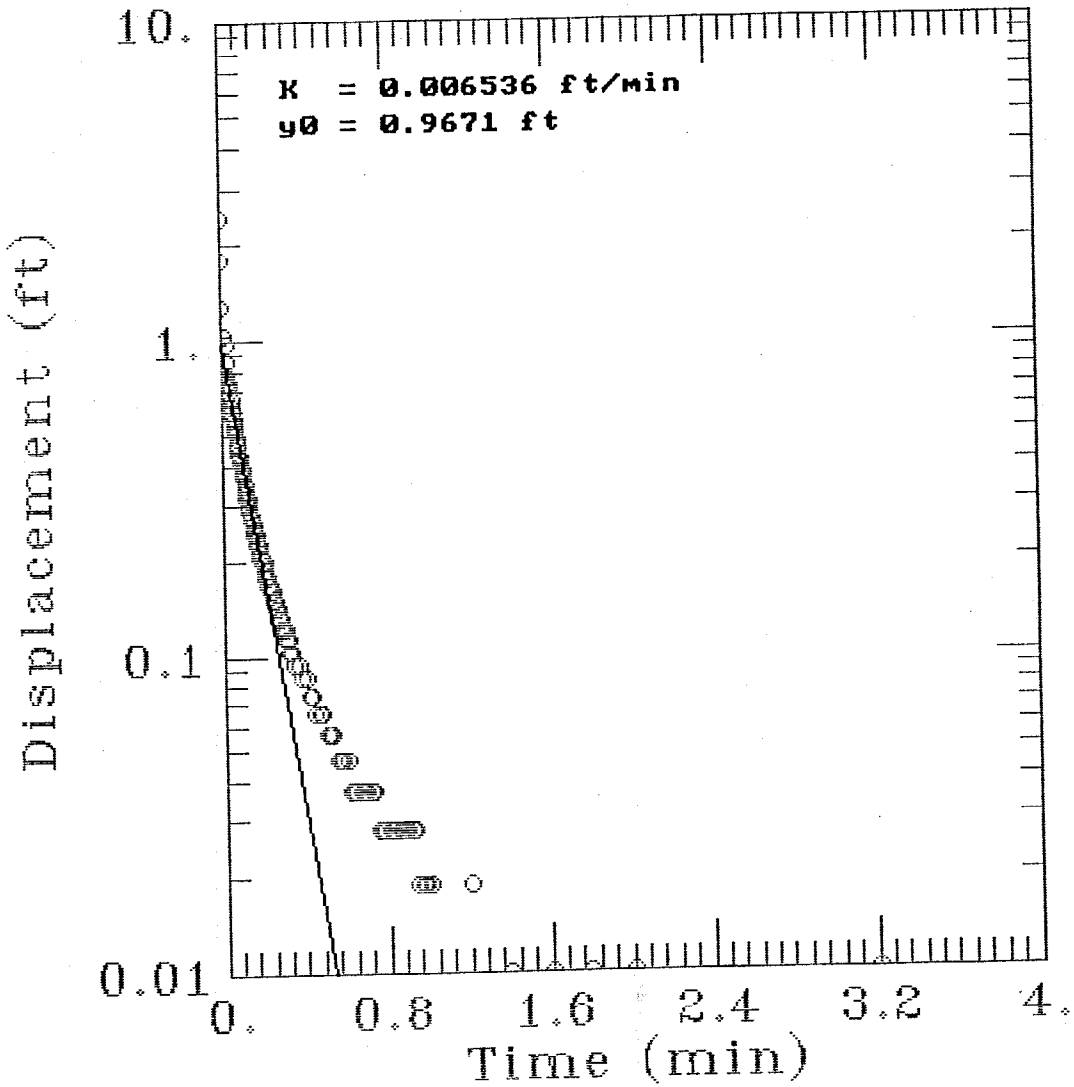

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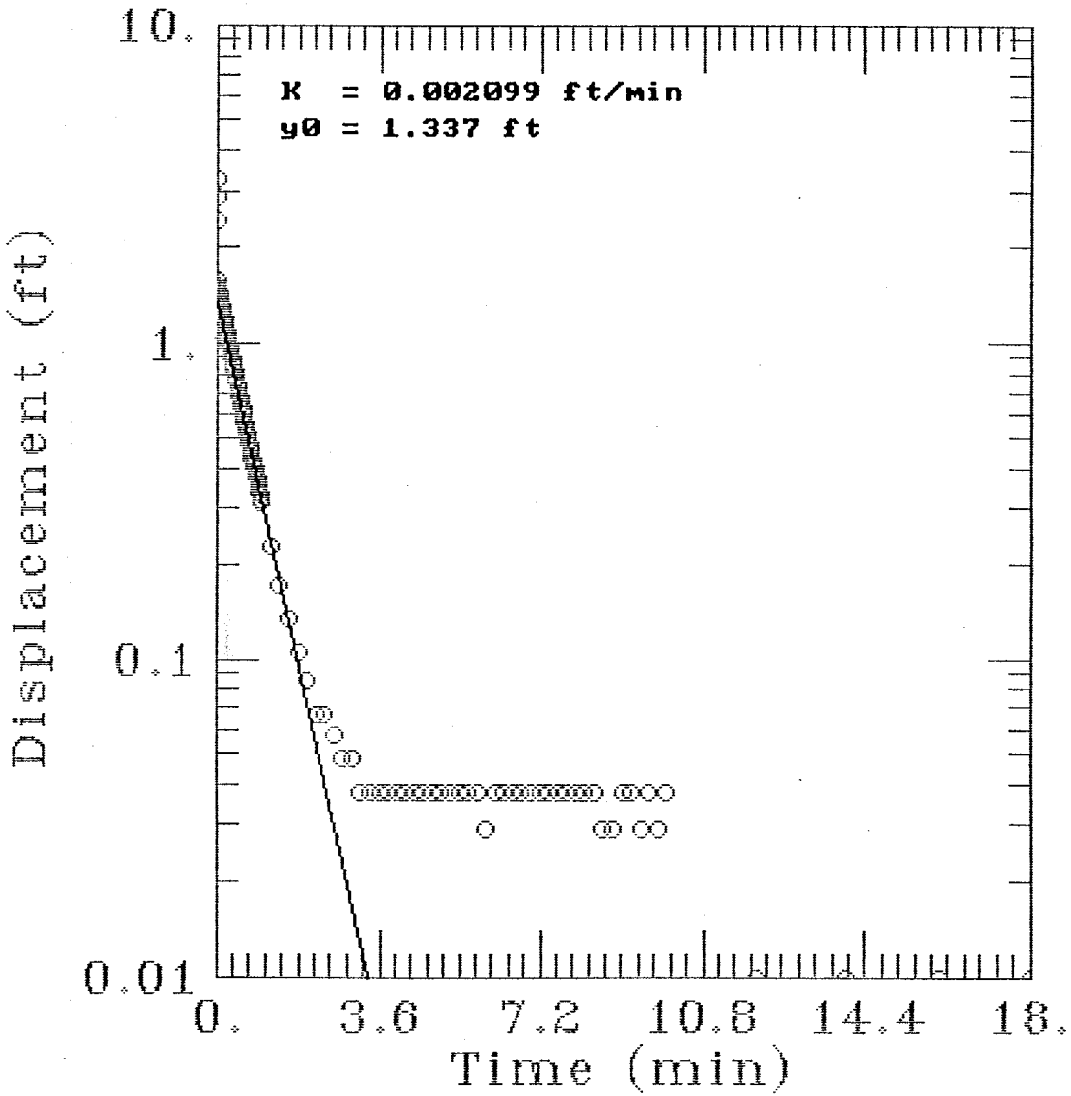

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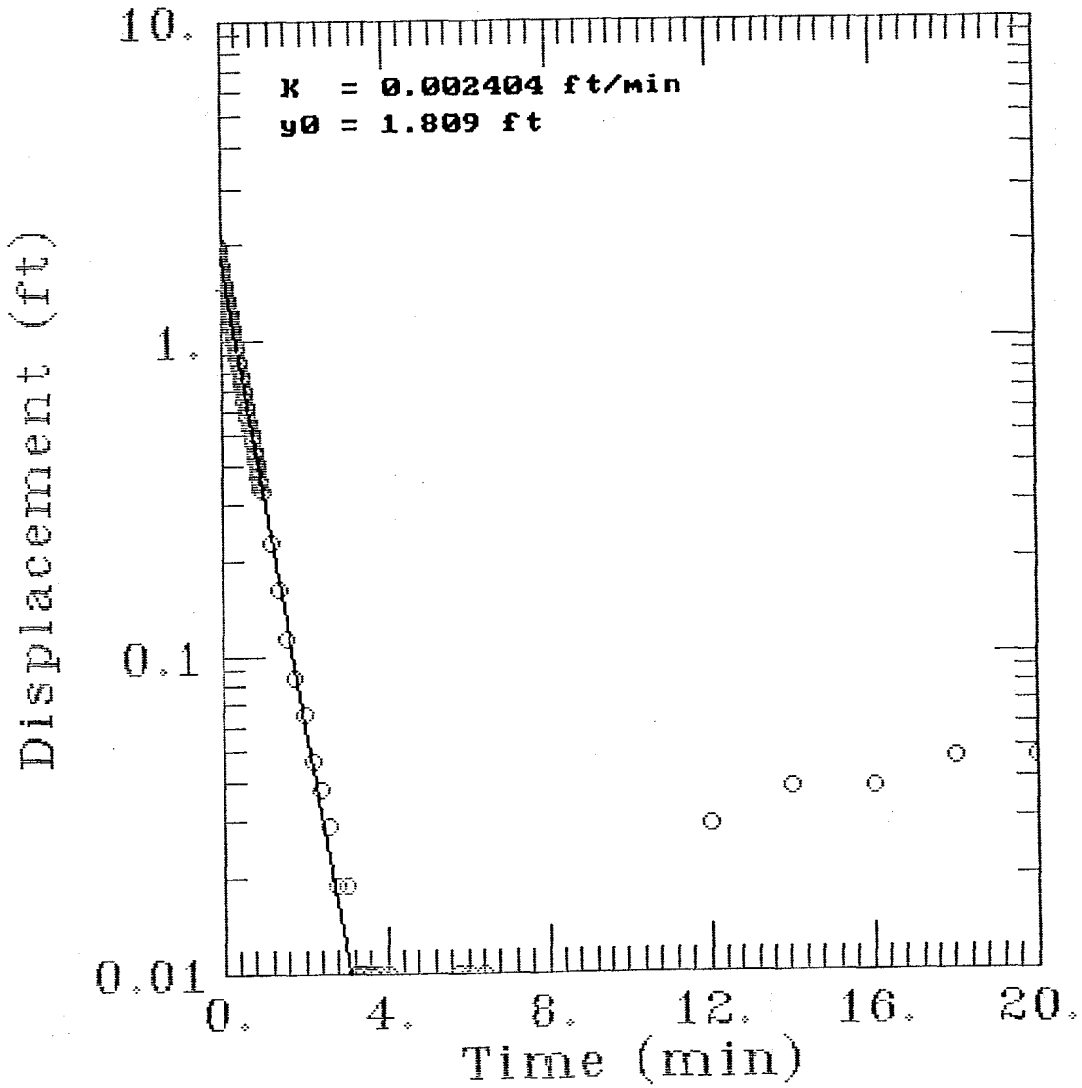

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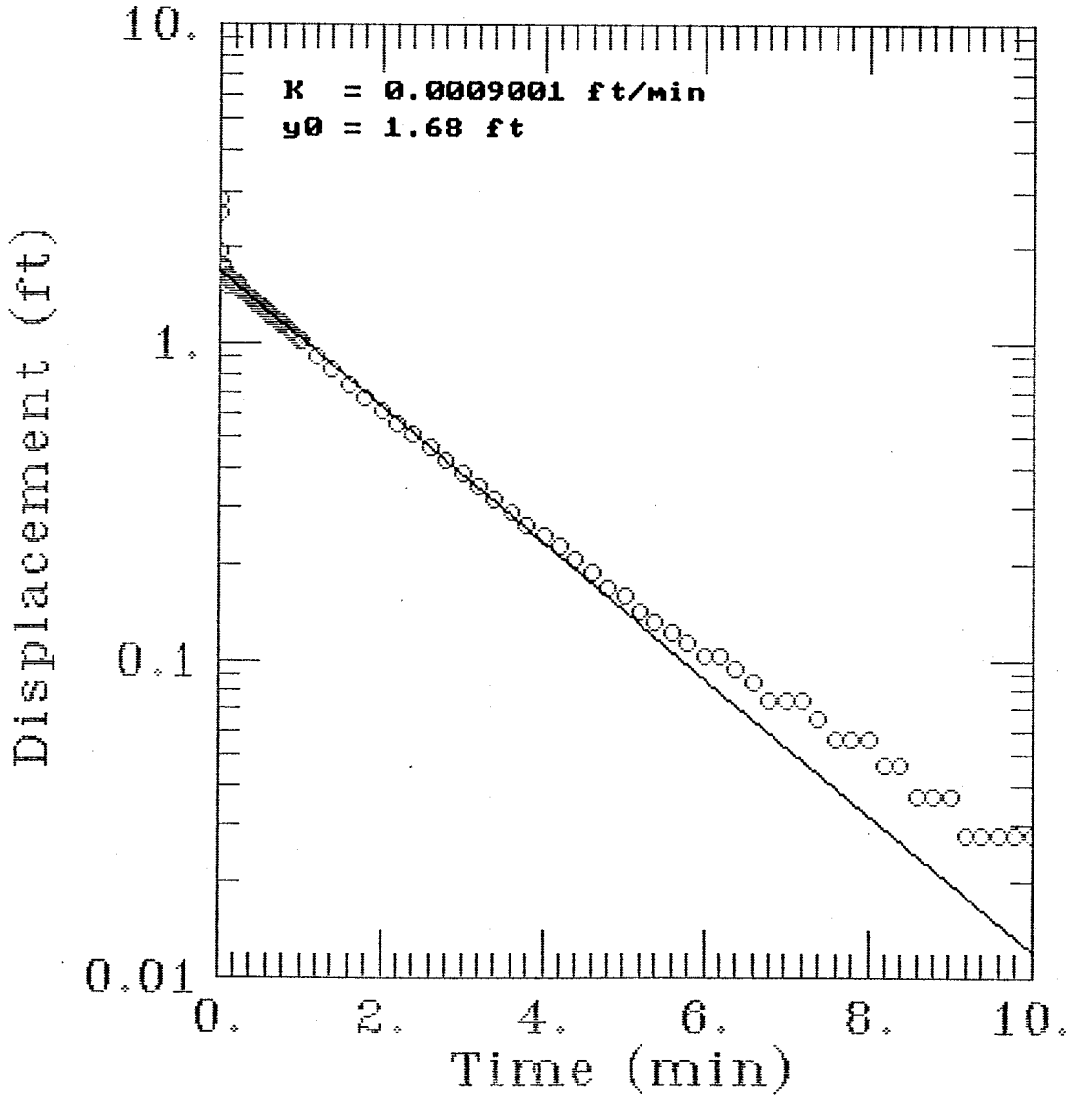

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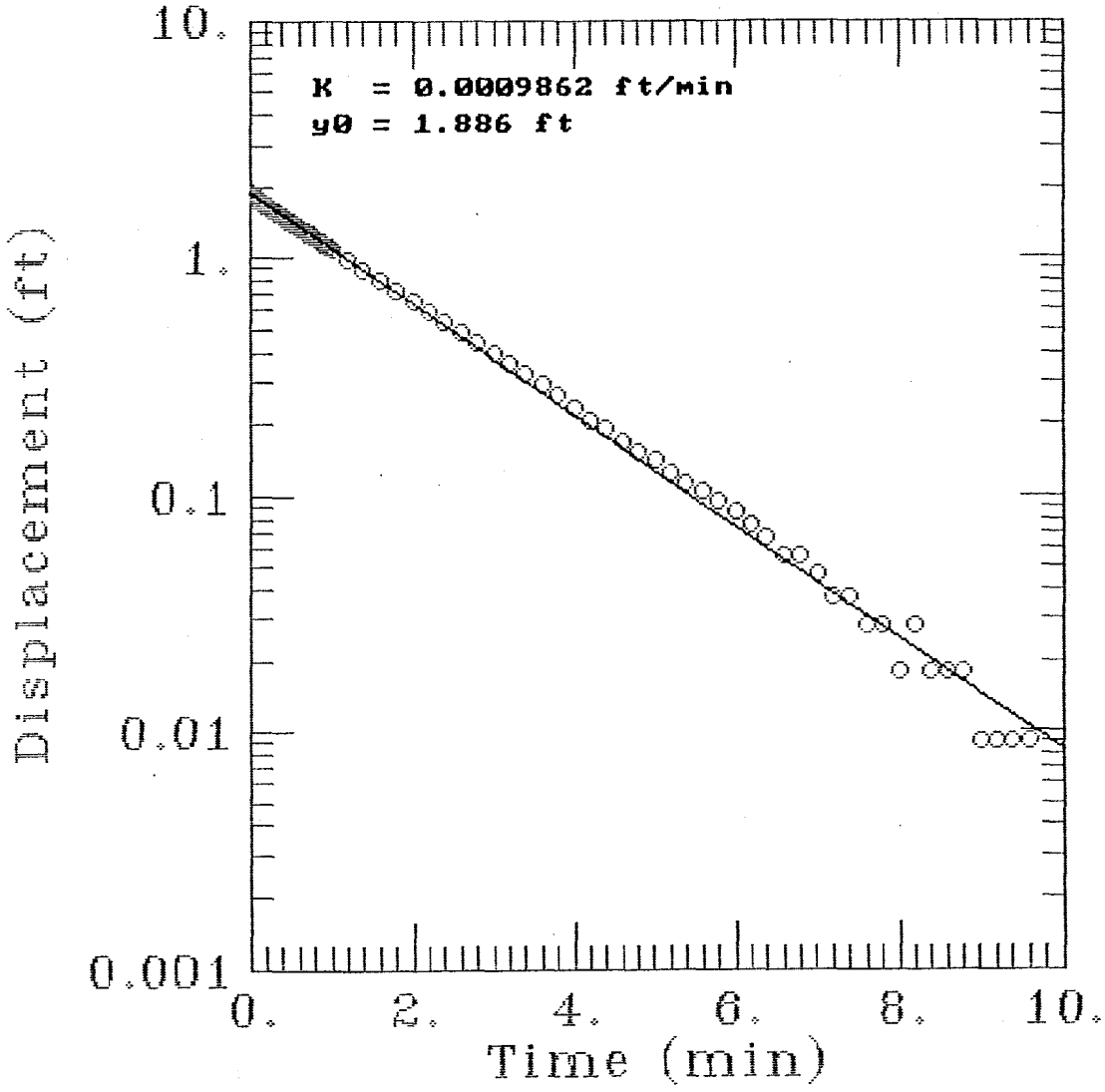

APPENDIX I

LABORATORY ANALYTICAL DATA

Appendix I-1	Laboratory Sample Tracking Logs
Appendix I-2	Positive Detection Tables
Appendix I-3	Laboratory Analytical Tables
Appendix I-4	Analytical Data PARCC Reports
Appendix I-5	Analytical Data Statistical Evaluation
Appendix I-6	Radionuclide Activity and Inorganic Evaluation

APPENDIX I-1

LABORATORY SAMPLE TRACKING LOGS

APPENDIX I-1. OFF-SITE SAMPLE TRACKING LOG

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

							ANALYSIS PERFORMED									TRACKING DATES				
ABB SDG	Lab Batch	GROUP	COC_ID	C_SAMP_ID	DEPTH	MATRIX	TAL_MET	VOC	SVOC	PPCB	HERB	RAD*	TOC	TPH	WCHEM*	S_DATE	DRFL	TAT	DSTV	DRFV
U1-1	G7466	OU1	U1P01003		3.3	W		X								5/2/95	5/9/95	7	6/30/95	8/9/95
U1-1	G7466	OU1	U1P01903		8-10	W		X								5/2/95	5/9/95	7	6/30/95	8/9/95
U1-1	G7466	OU1	U1P03203		15-17	W		X								5/2/95	5/9/95	7	6/30/95	8/9/95
U1-1	G7395	OU1	U1R00001		NA	W	X	X	X	X	X					4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00100		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00100D		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00100MS		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00100MSD		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00200		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00300		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00400		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00500		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00600		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00700		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00800		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S00900		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S01000		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S01100		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S01100D		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S01200		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S01300		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1S01400		.5-1.5	S	X	X	X	X	X			X		4/21/95	5/23/95	32	6/30/95	8/9/95
U1-1	G7395	OU1	U1T00001		NA	W		X								4/21/95	5/23/95	32	6/30/95	8/9/95
U1-2	G7551	OU1	U1P03603		27-28	W		X								5/12/95	6/26/95	45	6/30/95	8/9/95
U1-2	G7564	OU1	U1P03604		52-53	W		X								5/19/95	6/26/95	38	6/30/95	8/9/95
U1-2	G7551	OU1	U1P03903		38-39	W		X								5/12/95	6/26/95	45	6/30/95	8/9/95
U1-2	G7551	OU1	U1P03904		56.5-57.5	W		X								5/12/95	6/26/95	45	6/30/95	8/9/95
U1-2	G7551	OU1	U1P05205D		NA	W		X								5/11/95	6/26/95	46	6/30/95	8/9/95
U1-2	G7610	OU1	U1P05901		23-24	W		X								5/19/95	6/26/95	38	6/30/95	8/9/95
U1-2	G7610	OU1	U1P05902		57-58	W		X								5/19/95	6/26/95	38	6/30/95	8/9/95
U1-3	G8192	OU1	U1G00101		2.5-12.5	W	X	X	X	X	X	X		X		8/9/95	9/5/95	27	9/5/95	10/13/95
U1-3	G8186	OU1	U1G00201		22.5-27.5	W	X	X	X	X	X	X		X		8/8/95	9/5/95	28	9/5/95	10/13/95

SEE NOTES AT END OF TABLE

APPENDIX I-1. OFF-SITE SAMPLE TRACKING LOG

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

							ANALYSIS PERFORMED									TRACKING DATES				
ABB SDG	Lab Batch	GROUP	COC_ID	C_SAMP_ID	DEPTH	MATRIX	TAL_MET	VOC	SVOC	PPCB	HERB	RAD*	TOC	TPH	WCHEM*	S_DATE	DRFL	TAT	DSTV	DRFV
U1-3	G8192	OU1	U1G00301		52.8-57.8	W	X	X	X	X	X	X		X		8/9/95	9/5/95	27	9/5/95	10/13/95
U1-3	G8149	OU1	U1G02201		9.4-19.4	W	X	X	X	X	X	X		X		8/3/95	9/5/95	33	9/5/95	10/13/95
U1-3	G8149	OU1	U1G02301		34.2-39.2	W	X	X	X	X	X	X		X		8/3/95	9/5/95	33	9/5/95	10/13/95
U1-3	G8160	OU1	U1G02401		64.1-69.1	W	X	X	X	X	X	X		X		8/4/95	9/5/95	32	9/5/95	10/13/95
U1-3	G8186	OU1	U1G02501		8.7-18.7	W	X	X	X	X	X	X	X	X	X	8/8/95	9/5/95	28	9/5/95	10/13/95
U1-3	G8186	OU1	U1G02501MS		8.7-18.7	W	X	X	X	X	X	X				8/8/95	9/5/95	28	9/5/95	10/13/95
U1-3	G8186	OU1	U1G02501MSD		8.7-18.7	W	X	X	X	X	X	X				8/8/95	9/5/95	28	9/5/95	10/13/95
U1-3	G8160	OU1	U1G02601		44.2-49.2	W	X	X	X	X	X	X		X	X	8/4/95	9/5/95	32	9/5/95	10/13/95
U1-3	G8178	OU1	U1G02701		57-62	W	X	X	X	X	X	X	X	X	X	8/7/95	9/5/95	29	9/5/95	10/13/95
U1-3	G8178	OU1	U1G02701D		57-62	W	X	X	X	X	X	X	X	X	X	8/7/95	9/5/95	29	9/5/95	10/13/95
U1-3	G8192	OU1	U1H00101		2.5-12.5	W	X									8/9/95	9/5/95	27	9/5/95	10/13/95
U1-3	G8186	OU1	U1H00201		22.5-27.5	W	X									8/8/95	9/5/95	28	9/5/95	10/13/95
U1-3	G8192	OU1	U1H00301		52.8-57.8	W	X									8/9/95	9/5/95	27	9/5/95	10/13/95
U1-3	G8149	OU1	U1H02201		9.4-19.4	W	X									8/3/95	9/5/95	33	9/5/95	10/13/95
U1-3	G8149	OU1	U1H02301		34.2-39.2	W	X									8/3/95	9/5/95	33	9/5/95	10/13/95
U1-3	G8160	OU1	U1H02401		64.1-69.1	W	X									8/4/95	9/5/95	32	9/5/95	10/13/95
U1-3	G8186	OU1	U1H02501		8.7-18.7	W	X									8/8/95	9/5/95	28	9/5/95	10/13/95
U1-3	G8186	OU1	U1H02501MS		8.7-18.7	W	X									8/8/95	9/5/95	28	9/5/95	10/13/95
U1-3	G8186	OU1	U1H02501MSD		8.7-18.7	W	X									8/8/95	9/5/95	28	9/5/95	10/13/95
U1-3	G8160	OU1	U1H02601		44.2-49.2	W	X									8/4/95	9/5/95	32	9/5/95	10/13/95
U1-3	G8178	OU1	U1H02701		57-62	W	X									8/7/95	9/5/95	29	9/5/95	10/13/95
U1-3	G8178	OU1	U1H02701D		57-62	W	X									8/7/95	9/5/95	29	9/5/95	10/13/95
U1-3	G8137	OU1	U1R00002		NA	W	X	X	X	X	X	X				8/1/95	9/5/95	35	9/5/95	10/13/95
U1-3	G8137	OU1	U1T00002		NA	W		X								8/1/95	9/5/95	35	9/5/95	10/13/95
U1-3	G8149	OU1	U1T00003		NA	W		X								8/3/95	9/5/95	33	9/5/95	10/13/95
U1-3	G8160	OU1	U1T00004		NA	W		X								8/4/95	9/5/95	32	9/5/95	10/13/95
U1-3	G8178	OU1	U1T00005		NA	W		X								8/7/95	9/5/95	29	9/5/95	10/13/95
U1-3	G8186	OU1	U1T00006		NA	W		X								8/8/95	9/5/95	28	9/5/95	10/13/95
U1-3	G8192	OU1	U1T00007		NA	W		X								8/9/95	9/5/95	27	9/5/95	10/13/95
U1-3	G8160	OU1	U1Y00001		NA	W	X	X	X	X		X				8/4/95	9/5/95	32	9/5/95	10/13/95
U1-4	G8220	OU1	U1G00401		9.9-19.9	W	X	X	X	X	X	X		X		8/14/95	9/22/95	39	9/22/95	10/26/95
U1-4	G8220	OU1	U1G00501		31.8-36.8	W	X	X	X	X	X	X		X		8/14/95	9/22/95	39	9/22/95	10/26/95

SEE NOTES AT END OF TABLE

APPENDIX I-1. OFF-SITE SAMPLE TRACKING LOG

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

							ANALYSIS PERFORMED									TRACKING DATES				
ABB SDG	Lab Batch	GROUP	COC_ID	C_SAMP_ID	DEPTH	MATRIX	TAL_MET	VOC	SVOC	PPCB	HERB	RAD*	TOC	TPH	WCHEM*	S_DATE	DRFL	TAT	DSTV	DRFV
U1-4	G8234	OU1	U1G00601		53.1-58.1	W	X	X	X	X	X	X		X		8/15/95	9/22/95	38	9/22/95	10/26/95
U1-4	G8234	OU1	U1G00701		11.7-21.7	W	X	X	X	X	X	X		X		8/15/95	9/22/95	38	9/22/95	10/26/95
U1-4	G8234	OU1	U1G00801		34.8-39.8	W	X	X	X	X	X	X		X		8/15/95	9/22/95	38	9/22/95	10/26/95
U1-4	G8272	OU1	U1G00901		51.6-56.6	W	X	X	X	X	X	X		X		8/21/95	9/22/95	32	9/22/95	10/26/95
U1-4	G8238	OU1	U1G01001		12.5-22.5	W	X	X	X	X	X	X	X	X	X	8/16/95	9/22/95	37	9/22/95	10/26/95
U1-4	G8238	OU1	U1G01001D		12.5-22.5	W	X	X	X	X	X	X	X	X	X	8/16/95	9/22/95	37	9/22/95	10/26/95
U1-4	G8238	OU1	U1G01101		34-39	W	X	X	X	X	X	X	X	X	X	8/16/95	9/22/95	37	9/22/95	10/26/95
U1-4	G8255	OU1	U1G01201		58.9-63.9	W	X	X	X	X	X	X	X	X	X	8/17/95	9/22/95	36	9/22/95	10/26/95
U1-4	G8299	OU1	U1G01301		12.5-22.5	W	X	X	X	X	X	X		X		8/24/95	9/22/95	29	9/22/95	10/26/95
U1-4	G8276	OU1	U1G01401		33.8-38.8	W	X	X	X	X	X	X		X		8/22/95	9/22/95	31	9/22/95	10/26/95
U1-4	G8276	OU1	U1G01501		48.3-53.3	W	X	X	X	X	X	X		X		8/22/95	9/22/95	31	9/22/95	10/26/95
U1-4	G8261	OU1	U1G01601		9.1-19.1	W	X	X	X	X	X	X	X	X	X	8/18/95	9/22/95	35	9/22/95	10/26/95
U1-4	G8255	OU1	U1G01701		28.8-33.8	W	X	X	X	X	X	X	X	X	X	8/17/95	9/22/95	36	9/22/95	10/26/95
U1-4	G8255	OU1	U1G01701D		28.8-33.8	W	X	X	X	X	X	X	X	X	X	8/17/95	9/22/95	36	9/22/95	10/26/95
U1-4	G8306	OU1	U1G01801		42.5-47.5	W	X	X	X	X	X	X	X	X	X	8/25/95	9/22/95	28	9/22/95	10/26/95
U1-4	G8285	OU1	U1G01901		11.9-21.9	W	X	X	X	X	X	X		X		8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8285	OU1	U1G02001		28.8-33.8	W	X	X	X	X	X	X		X		8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8285	OU1	U1G02001MS		28.8-33.8	W	X	X	X	X	X	X				8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8285	OU1	U1G02001MSD		28.8-33.8	W	X	X	X	X	X	X				8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8306	OU1	U1G02101		45.5-50.5	W	X	X	X	X	X	X		X		8/25/95	9/22/95	28	9/22/95	10/26/95
U1-4	G8220	OU1	U1H00401		9.9-19.9	W	X									8/14/95	9/22/95	39	9/22/95	10/26/95
U1-4	G8220	OU1	U1H00501		31.8-36.8	W	X									8/14/95	9/22/95	39	9/22/95	10/26/95
U1-4	G8234	OU1	U1H00601		53.1-58.1	W	X									8/15/95	9/22/95	38	9/22/95	10/26/95
U1-4	G8234	OU1	U1H00701		11.7-21.7	W	X									8/15/95	9/22/95	38	9/22/95	10/26/95
U1-4	G8234	OU1	U1H00801		34.8-39.8	W	X									8/15/95	9/22/95	38	9/22/95	10/26/95
U1-4	G8272	OU1	U1H00901		51.6-56.6	W	X									8/21/95	9/22/95	32	9/22/95	10/26/95
U1-4	G8238	OU1	U1H01001		12.5-22.5	W	X									8/16/95	9/22/95	37	9/22/95	10/26/95
U1-4	G8238	OU1	U1H01001D		12.5-22.5	W	X									8/16/95	9/22/95	37	9/22/95	10/26/95
U1-4	G8255	OU1	U1H01201		58.9-63.9	W	X									8/17/95	9/22/95	36	9/22/95	10/26/95
U1-4	G8299	OU1	U1H01301		12.5-22.5	W	X									8/25/95	9/22/95	28	9/22/95	10/26/95
U1-4	G8276	OU1	U1H01401		33.8-38.8	W	X									8/22/95	9/22/95	31	9/22/95	10/26/95
U1-4	G8276	OU1	U1H01501		48.3-53.3	W	X									8/22/95	9/22/95	31	9/22/95	10/26/95

SEE NOTES AT END OF TABLE

APPENDIX I-1. OFF-SITE SAMPLE TRACKING LOG

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

							ANALYSIS PERFORMED									TRACKING DATES				
ABB SDG	Lab Batch	GROUP	COC_ID	C_SAMP_ID	DEPTH	MATRIX	TAL_MET	VOC	SVOC	PPCB	HERB	RAD*	TOC	TPH	WCHEM*	S_DATE	DRFL	TAT	DSTV	DRFV
U1-4	G8261	OU1	U1H01601		9.1-19.1	W	X									8/18/95	9/22/95	35	9/22/95	10/26/95
U1-4	G8255	OU1	U1H01701		28.8-33.8	W	X									8/17/95	9/22/95	36	9/22/95	10/26/95
U1-4	G8255	OU1	U1H01701D		28.8-33.8	W	X									8/17/95	9/22/95	36	9/22/95	10/26/95
U1-4	G8306	OU1	U1H01801		42.5-47.5	W	X									8/25/95	9/22/95	28	9/22/95	10/26/95
U1-4	G8285	OU1	U1H01901		11.9-21.9	W	X									8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8285	OU1	U1H02001		28.8-33.8	W	X									8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8285	OU1	U1H02001MS		28.8-33.8	W	X									8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8285	OU1	U1H02001MSD		28.8-33.8	W	X									8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8306	OU1	U1H02101		45.5-50.5	W	X									8/25/95	9/22/95	28	9/22/95	10/26/95
U1-4	G8272	OU1	U1R00003		NA	W		X	X	X	X	X				8/21/95	9/22/95	32	9/22/95	10/26/95
U1-4	G8220	OU1	U1T00008		NA	W		X								8/14/95	9/22/95	39	9/22/95	10/26/95
U1-4	G8234	OU1	U1T00009		NA	W		X								8/15/95	9/22/95	38	9/22/95	10/26/95
U1-4	G8238	OU1	U1T00010		NA	W		X								8/16/95	9/22/95	37	9/22/95	10/26/95
U1-4	G8255	OU1	U1T00011		NA	W		X								8/17/95	9/22/95	36	9/22/95	10/26/95
U1-4	G8261	OU1	U1T00012		NA	W		X								8/18/95	9/22/95	35	9/22/95	10/26/95
U1-4	G8272	OU1	U1T00013		NA	W		X								8/21/95	9/22/95	32	9/22/95	10/26/95
U1-4	G8276	OU1	U1T00014		NA	W		X								8/22/95	9/22/95	31	9/22/95	10/26/95
U1-4	G8285	OU1	U1T00015		NA	W		X								8/23/95	9/22/95	30	9/22/95	10/26/95
U1-4	G8299	OU1	U1T00016		NA	W		X								8/24/95	9/22/95	29	9/22/95	10/26/95
U1-4	G8306	OU1	U1T00017		NA	W		X								8/25/95	9/22/95	28	9/22/95	10/26/95
U1-5	G8531	OU1	ORG00102		3-13	W						X				10/5/95	Analysis halted			
U1-5	G8616	OU1	ORG00103		3-13	W						X			X	10/16/95	10/25/95	9	10/25/95	1/22/96
U1-5	G8616	OU1	ORH00103		3-13	W						X				10/16/95	10/25/95	9	10/25/95	1/22/96
U1-5	G8531	OU1	U1G00302		52.8-57.8	W						X				10/6/95	Analysis halted			
U1-5	G8531	OU1	U1G00302D		52.8-57.8	W						X				10/6/95	Analysis halted			
U1-5	G8616	OU1	U1G00303		52.8-57.8	W						X			X	10/19/95	10/25/95	6	10/25/95	1/22/96
U1-5	G8531	OU1	U1G01402		33.8-38.8	W						X				10/6/95	Analysis halted			
U1-5	G8616	OU1	U1G01403		33.8-38.8	W						X			X	10/18/95	10/25/95	7	10/25/95	1/22/96
U1-5	G8531	OU1	U1G02602		44.2-49.2	W						X				10/5/95	Analysis halted			
U1-5	G8616	OU1	U1G02603		44.2-49.2	W						X			X	10/16/95	10/25/95	9	10/25/95	1/22/96
U1-5	G8531	OU1	U1G02702		57-62	W						X				10/5/95	Analysis halted			
U1-5	G8616	OU1	U1G02703		57-62	W						X			X	10/17/95	10/25/95	8	10/25/95	1/22/96

SEE NOTES AT END OF TABLE

APPENDIX I-1. OFF-SITE SAMPLE TRACKING LOG

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

							ANALYSIS PERFORMED									TRACKING DATES				
ABB SDG	Lab Batch	GROUP	COC_ID	C_SAMP_ID	DEPTH	MATRIX	TAL_MET	VOC	SVOC	PPCB	HERB	RAD*	TOC	TPH	WCHEM*	S_DATE	DRFL	TAT	DSTV	DRFV
U1-5	G8616	OU1	U1H00303		52.8-57.8	W						X				10/19/95	10/25/95	6	10/25/95	1/22/96
U1-5	G8616	OU1	U1H01403		33.8-38.8	W						X				10/18/95	10/25/95	7	10/25/95	1/22/96
U1-5	G8616	OU1	U1H02603		44.5-49.5	W						X				10/16/95	10/25/95	9	10/25/95	1/22/96
U1-5	G8616	OU1	U1H02703		57.5-62.5	W						X				10/17/95	10/25/95	8	10/25/95	1/22/96
U1-6	Wake	OU1	U1G00304		52.8-57.8	W									X	2/27/96	2/28/96	1	Not validated	
U1-6	Wake	OU1	U1G01404		33.8-8.8	W									X	2/27/96	2/28/96	1	Not validated	
U1-6	Wake	OU1	U1G02704		57.5-62.5	W									X	2/27/96	2/28/96	1	Not validated	
OR042	ABBOW	OU1	U1G02801		20-23	W	X					X				8/28/96	10/25/96	58	Not validated	
OR042	ABBOW	OU1	U1G02901		60-65	W	X					X				8/28/96	10/25/96	58	Not validated	
OR042	ABBOW	OU1	U1H02801		20-23	W	X					X				8/28/96	10/25/96	58	Not validated	
OR042	ABBOW	OU1	U1H02901		60-65	W	X					X				8/28/96	10/25/96	58	Not validated	

SEE NOTES AT END OF TABLE

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE TRACKING LOG

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

NOTES:

ABB SDG	ABB-ES Sample Delivery Group
Lab Batch	Laboratory Analytical Batch
GROUP	NTC Orlando Sampling Program Group
COC_ID	Chain-of-Custody Sample Identifier
C_SAMP_ID	Corrected Sample Identifier
DEPTH	Sampling Depth
MATRIX	Media Sampled
S_DATE	Date of Sample Collection
TAL_MET	Target Analyte List Metals
VOC	Target Compound List Volatile Organics
SVOC	Target Compound List Semivolatile Organics
PPCB	Target Compound List Pesticides and Polychlorinated Biphenyls
HERB	Herbicides
RAD*	Radiological Parameters
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
WCHEM*	General Wet Chemistry Tests
DRFL	Date Package Received from Laboratory
TAT	Turnaround Time (days)
DSTV	Date Package Sent to Validators
DRFV	Date Package Received from Validators

* Radionuclides and Wet Chemistry tests may include one or more specific analysis.
See relevant complementary tables for details on these analyses.

APPENDIX I-1 (Cont). OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

WET CHEMISTRY ANALYTICAL SUITE, OU 1 SAMPLES																	
Identifier	U1G00103	U1G00303	U1G01001	U1G01001	U1G01101	U1G01201	U1G01403	U1G01601	U1G01701	U1G01701	U1G01801	U1G02501	U1G02601	U1G02603	U1G02701	U1G02701	U1G02703
Alkalinity			X	X	X	X		X	X	X	X	X			X	X	
Hardness			X	X	X	X		X	X	X	X	X	X		X	X	
Nitrate			X	X	X	X		X	X	X	X	X	X		X	X	
Nitrate/Nitrite			X	X	X	X		X	X	X	X	X			X	X	
pH			X	X	X	X		X	X	X	X	X	X		X	X	
Sulfate			X	X	X	X		X	X	X	X	X	X		X	X	
Sulfide			X	X	X	X		X	X	X	X	X	X		X	X	
Total Phosphorus			X	X	X	X		X	X	X	X	X	X		X	X	
TDS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TSS			X	X	X	X		X	X	X	X	X	X		X	X	
Note:																	
TDS = Total Dissolved Solids; TSS = Total Suspended Solids																	
The following analysis was done on groundwater samples submitted to ABB-ES Wakefield Lab (U1-6) on February 27, 1996 (Sample IDs U1G00304, U1G01404 and U1G02704)																	
Methane, Ethene and Ethane using Modified EPA Method 8015, Total Suspended Solids, Volatile Suspended Solids and Percent Volatile Solids																	

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

RADIONUCLIDE ANALYTICAL SUITE, OU 1 SAMPLES														
Identifier	Gross Alpha	Gross Beta	Cesium-137	Lead-210	Polonium-210	Potassium-40	Radium-226	Radium-228	Thorium-227	Thorium-228	Thorium-230	Thorium-232	Uranium-234	Uranium-238
ORG00103	X	X	X			X	X	X	X	X	X	X	X	X
ORH00103	X	X	X			X	X	X	X	X	X	X	X	X
U1G00101	X	X												
U1G00201	X	X												
U1G00301	X	X												
U1G00303	X	X	X			X	X	X	X	X	X	X	X	X
U1G00401	X	X												
U1G00501	X	X												
U1G00601	X	X												
U1G00701	X	X												
U1G00801	X	X												
U1G00901	X	X												
U1G01001	X	X												
U1G01001D	X	X												
U1G01101	X	X												
U1G01201	X	X												
U1G01301	X	X												
U1G01401	X	X												
U1G01403	X	X	X			X	X	X	X	X	X	X	X	X
U1G01501	X	X												
U1G01601	X	X												
U1G01701	X	X												
U1G01701D	X	X												
U1G01801	X	X												
U1G01901	X	X												
U1G02001	X	X												
U1G02101	X	X												
U1G02201	X	X												
U1G02301	X	X												
U1G02401	X	X												
U1G02501	X	X												
U1G02601	X	X												
U1G02603	X	X	X			X	X	X	X	X	X	X	X	X

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

RADIONUCLIDE ANALYTICAL SUITE, OU 1 SAMPLES														
Identifier	Gross Alpha	Gross Beta	Cesium-137	Lead-210	Polonium-210	Potassium-40	Radium-226	Radium-228	Thorium-227	Thorium-228	Thorium-230	Thorium-232	Uranium-234	Uranium-238
U1G02701	X	X												
U1G02701D	X	X												
U1G02703	X	X	X			X	X	X	X	X	X	X	X	X
U1H00303	X	X	X			X	X	X	X	X	X	X	X	X
U1H01403	X	X	X			X	X	X	X	X	X	X	X	X
U1H02603	X	X	X			X	X	X	X	X	X	X	X	X
U1H02703	X	X	X			X	X	X	X	X	X	X	X	X
U1G02801	X	X												
U1G02901	X	X		X	X	X	X	X			X		X	X
U1H02801	X	X												
U1H02901	X	X												

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

METHODS USED		
PARAMETER	**MATRIX**	**METHOD**
Inorganics		
Aluminum	SOIL/WATER	EPA200.7/SW6010
Antimony	SOIL/WATER	EPA200.7/SW6010
Arsenic	SOIL/WATER	EPA206.2/SW7060
Barium	SOIL/WATER	EPA200.7/SW6010
Beryllium	SOIL/WATER	EPA200.7/SW6010
Cadmium	SOIL/WATER	EPA200.7/SW6010
Calcium	SOIL/WATER	EPA200.7/SW6010
Chromium	SOIL/WATER	EPA200.7/SW6010
Cobalt	SOIL/WATER	EPA200.7/SW6010
Copper	SOIL/WATER	EPA200.7/SW6010
Iron	SOIL/WATER	EPA200.7/SW6010
Lead	SOIL/WATER	EPA239.2/SW7421
Magnesium	SOIL/WATER	EPA200.7/SW6010
Manganese	SOIL/WATER	EPA200.7/SW6010
Mercury	SOIL/WATER	SW7471
Nickel	SOIL/WATER	EPA200.7/SW6010
Potassium	SOIL/WATER	EPA200.7/SW6010
Selenium	SOIL/WATER	EPA270.2/SW7740
Silver	SOIL/WATER	EPA200.7/SW6010
Sodium	SOIL/WATER	EPA200.7/SW6010
Thallium	SOIL/WATER	EPA279.2/SW7841
Vanadium	SOIL/WATER	EPA200.7/SW6010
Zinc	SOIL/WATER	EPA200.7/SW6010
Volatile Organics		
1,1,1-Trichloroethane	SOIL/WATER	1990 CLP SOW
1,1,2,2-Tetrachloroethane	SOIL/WATER	1990 CLP SOW
1,1,2-Trichloroethane	SOIL/WATER	1990 CLP SOW
1,1-Dichloroethane	SOIL/WATER	1990 CLP SOW
1,1-Dichloroethene	SOIL/WATER	1990 CLP SOW
1,2-Dichloroethane	SOIL/WATER	1990 CLP SOW
1,2-Dichloroethene (total)	SOIL/WATER	1990 CLP SOW
1,2-Dichloropropane	SOIL/WATER	1990 CLP SOW
2-Butanone	SOIL/WATER	1990 CLP SOW
2-Hexanone	SOIL/WATER	1990 CLP SOW

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

PARAMETER	MATRIX	METHOD
4-Methyl-2-pentanone	SOIL/WATER	1990 CLP SOW
Acetone	SOIL/WATER	1990 CLP SOW
Benzene	SOIL/WATER	1990 CLP SOW
Bromodichloromethane	SOIL/WATER	1990 CLP SOW
Bromoform	SOIL/WATER	1990 CLP SOW
Bromomethane	SOIL/WATER	1990 CLP SOW
Carbon disulfide	SOIL/WATER	1990 CLP SOW
Carbon tetrachloride	SOIL/WATER	1990 CLP SOW
Chlorobenzene	SOIL/WATER	1990 CLP SOW
Chloroethane	SOIL/WATER	1990 CLP SOW
Chloroform	SOIL/WATER	1990 CLP SOW
Chloromethane	SOIL/WATER	1990 CLP SOW
Dibromochloromethane	SOIL/WATER	1990 CLP SOW
Ethylbenzene	SOIL/WATER	1990 CLP SOW
Methylene chloride	SOIL/WATER	1990 CLP SOW
Styrene	SOIL/WATER	1990 CLP SOW
Tetrachloroethene	SOIL/WATER	1990 CLP SOW
Toluene	SOIL/WATER	1990 CLP SOW
Trichloroethene	SOIL/WATER	1990 CLP SOW
Vinyl chloride	SOIL/WATER	1990 CLP SOW
Xylene (total)	SOIL/WATER	1990 CLP SOW
cis-1,3-Dichloropropene	SOIL/WATER	1990 CLP SOW
trans-1,3-Dichloropropene	SOIL/WATER	1990 CLP SOW
1-Pentene	WATER	1990 CLP SOW
Propene	WATER	1990 CLP SOW
Herbicides		
Semivolatile Organics		
1,2,4-Trichlorobenzene	SOIL/WATER	1990 CLP SOW
1,2-Dichlorobenzene	SOIL/WATER	1990 CLP SOW
1,3-Dichlorobenzene	SOIL/WATER	1990 CLP SOW
1,4-Dichlorobenzene	SOIL/WATER	1990 CLP SOW
2,2'-oxybis(1-Chloropropane)	SOIL/WATER	1990 CLP SOW
2,4,5-Trichlorophenol	SOIL/WATER	1990 CLP SOW
2,4,6-Trichlorophenol	SOIL/WATER	1990 CLP SOW
2,4-Dichlorophenol	SOIL/WATER	1990 CLP SOW
2,4-Dimethylphenol	SOIL/WATER	1990 CLP SOW
2,4-Dinitrophenol	SOIL/WATER	1990 CLP SOW

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

PARAMETER	MATRIX	METHOD
2,4-Dinitrotoluene	SOIL/WATER	1990 CLP SOW
2,6-Dinitrotoluene	SOIL/WATER	1990 CLP SOW
2-Chloronaphthalene	SOIL/WATER	1990 CLP SOW
2-Chlorophenol	SOIL/WATER	1990 CLP SOW
2-Methylnaphthalene	SOIL/WATER	1990 CLP SOW
2-Methylphenol	SOIL/WATER	1990 CLP SOW
2-Nitroaniline	SOIL/WATER	1990 CLP SOW
2-Nitrophenol	SOIL/WATER	1990 CLP SOW
3,3'-Dichlorobenzidine	SOIL/WATER	1990 CLP SOW
3-Nitroaniline	SOIL/WATER	1990 CLP SOW
4,6-Dinitro-2-methylphenol	SOIL/WATER	1990 CLP SOW
4-Bromophenyl-phenylether	SOIL/WATER	1990 CLP SOW
4-Chloro-3-methylphenol	SOIL/WATER	1990 CLP SOW
4-Chloroaniline	SOIL/WATER	1990 CLP SOW
4-Chlorophenyl-phenylether	SOIL/WATER	1990 CLP SOW
4-Methylphenol	SOIL/WATER	1990 CLP SOW
4-Nitroaniline	SOIL/WATER	1990 CLP SOW
4-Nitrophenol	SOIL/WATER	1990 CLP SOW
Acenaphthene	SOIL/WATER	1990 CLP SOW
Acenaphthylene	SOIL/WATER	1990 CLP SOW
Anthracene	SOIL/WATER	1990 CLP SOW
Benzo(a)anthracene	SOIL/WATER	1990 CLP SOW
Benzo(a)pyrene	SOIL/WATER	1990 CLP SOW
Benzo(b)fluoranthene	SOIL/WATER	1990 CLP SOW
Benzo(g,h,i)perylene	SOIL/WATER	1990 CLP SOW
Benzo(k)fluoranthene	SOIL/WATER	1990 CLP SOW
Butylbenzylphthalate	SOIL/WATER	1990 CLP SOW
Carbazole	SOIL/WATER	1990 CLP SOW
Chrysene	SOIL/WATER	1990 CLP SOW
Di-n-butylphthalate	SOIL/WATER	1990 CLP SOW
Di-n-octylphthalate	SOIL/WATER	1990 CLP SOW
Dibenz(a,h)anthracene	SOIL/WATER	1990 CLP SOW
Dibenzofuran	SOIL/WATER	1990 CLP SOW
Diethylphthalate	SOIL/WATER	1990 CLP SOW
Dimethylphthalate	SOIL/WATER	1990 CLP SOW
Fluoranthene	SOIL/WATER	1990 CLP SOW
Fluorene	SOIL/WATER	1990 CLP SOW

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

PARAMETER	MATRIX	METHOD
Hexachlorobenzene	SOIL/WATER	1990 CLP SOW
Hexachlorobutadiene	SOIL/WATER	1990 CLP SOW
Hexachlorocyclopentadiene	SOIL/WATER	1990 CLP SOW
Hexachloroethane	SOIL/WATER	1990 CLP SOW
Indeno(1,2,3-cd)pyrene	SOIL/WATER	1990 CLP SOW
Isophorone	SOIL/WATER	1990 CLP SOW
N-Nitroso-di-n-propylamine	SOIL/WATER	1990 CLP SOW
N-Nitrosodiphenylamine (1)	SOIL/WATER	1990 CLP SOW
Naphthalene	SOIL/WATER	1990 CLP SOW
Nitrobenzene	SOIL/WATER	1990 CLP SOW
Pentachlorophenol	SOIL/WATER	1990 CLP SOW
Phenanthrene	SOIL/WATER	1990 CLP SOW
Phenol	SOIL/WATER	1990 CLP SOW
Pyrene	SOIL/WATER	1990 CLP SOW
bis(2-Chloroethoxy)methane	SOIL/WATER	1990 CLP SOW
bis(2-Chloroethyl)ether	SOIL/WATER	1990 CLP SOW
bis(2-Ethylhexyl)phthalate	SOIL/WATER	1990 CLP SOW
Pesticides/PCBs		
4,4'-DDD	SOIL/WATER	1990 CLP SOW
4,4'-DDE	SOIL/WATER	1990 CLP SOW
4,4'-DDT	SOIL/WATER	1990 CLP SOW
Aldrin	SOIL/WATER	1990 CLP SOW
Aroclor-1016	SOIL/WATER	1990 CLP SOW
Aroclor-1221	SOIL/WATER	1990 CLP SOW
Aroclor-1232	SOIL/WATER	1990 CLP SOW
Aroclor-1242	SOIL/WATER	1990 CLP SOW
Aroclor-1248	SOIL/WATER	1990 CLP SOW
Aroclor-1254	SOIL/WATER	1990 CLP SOW
Aroclor-1260	SOIL/WATER	1990 CLP SOW
Dieldrin	SOIL/WATER	1990 CLP SOW
Endosulfan I	SOIL/WATER	1990 CLP SOW
Endosulfan II	SOIL/WATER	1990 CLP SOW
Endosulfan sulfate	SOIL/WATER	1990 CLP SOW
Endrin	SOIL/WATER	1990 CLP SOW
Endrin aldehyde	SOIL/WATER	1990 CLP SOW
Endrin ketone	SOIL/WATER	1990 CLP SOW
Heptachlor	SOIL/WATER	1990 CLP SOW

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

PARAMETER	MATRIX	METHOD
Heptachlor epoxide	SOIL/WATER	1990 CLP SOW
Methoxychlor	SOIL/WATER	1990 CLP SOW
Toxaphene	SOIL/WATER	1990 CLP SOW
alpha-BHC	SOIL/WATER	1990 CLP SOW
alpha-Chlordane	SOIL/WATER	1990 CLP SOW
beta-BHC	SOIL/WATER	1990 CLP SOW
delta-BHC	SOIL/WATER	1990 CLP SOW
gamma-BHC (Lindane)	SOIL/WATER	1990 CLP SOW
gamma-Chlordane	SOIL/WATER	1990 CLP SOW
Herbicides		
2,4,5-T	SOIL/WATER	SW8150
2,4,5-TP (Silvex)	SOIL/WATER	SW8150
2,4-D	SOIL/WATER	SW8150
2,4-DB	SOIL/WATER	SW8150
Dalapon	SOIL/WATER	SW8150
Dicamba	SOIL/WATER	SW8150
Dichlorprop	SOIL/WATER	SW8150
Dinoseb	SOIL/WATER	SW8150
MCPA	SOIL/WATER	SW8150
MCPP	SOIL/WATER	SW8150
General Chemistry		
Total Petroleum Hydrocarbon	SOIL	S3550/9071/418.1
Alkalinity	WATER	EPA310.1
Hardness	WATER	EPA130.2
Nitrate	WATER	EPA353.2/354.1
Nitrate/Nitrite	WATER	EPA353.2/354.1
Sulfate	WATER	EPA375.2
Sulfide	WATER	EPA376.2
Total Dissolved Solids	WATER	EPA160.1
Total Organic Carbon	WATER	EPA415.4
Total Petroleum Hydrocarbon	WATER	EPA418.1
Total Phosphorus	WATER	EPA365.2
Total Suspended Solids	WATER	EPA160.2
pH	WATER	EPA150.1
Radiological*		
Cesium-137	WATER	GAMMA SPEC

APPENDIX I-1 (Cont.) OFF-SITE SAMPLE LOG TRACKING

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

PARAMETER	MATRIX	METHOD
Gross Alpha	WATER	EPA9310
Gross Beta	WATER	EPA9310
Lead-210	WATER	ALPHA SPEC
Polonium-210	WATER	ALPHA SPEC
Potassium-40	WATER	GAMMA SPEC
Radium-226	WATER	GAMMA SPEC
Radium-228	WATER	GAMMA SPEC
Thorium-227	WATER	ALPHA SPEC
Thorium-228	WATER	ALPHA SPEC
Thorium-230	WATER	ALPHA SPEC
Thorium-232	WATER	ALPHA SPEC
Uranium-234	WATER	ALPHA SPEC
Uranium-238	WATER	ALPHA SPEC
NOTES:		
All analyses (except radiological parameters) were performed by		
Quality Analytical Laboratory, Gainesville, Florida.		
Radiological analysis of groundwater samples was performed by		
Environmental Science and Engineering (ESE), Gainesville, Florida.		
Cesium-137 and Potassium-40 by ESE SOP R-8.		
Radium-226 and Radium-228 by ESE SOP R-30.		
Thorium and Uranium isotopes by ESE SOP R-32.		
Lead-210 and Polonium-210 by ESE SOP R-22.		
Methods indicated for inorganics are equivalent to the CLP SOW.		
EPA methods in "Methods for Chemical Analysis of Water and Wastes",		
EPA-600/4-79-020, March 1993; SW methods in "Test Methods for		
Evaluating Solid Wastes; CLP Methods in USEPA Contract Laboratory		
Program, "Statement of Work for Organics Analysis and "Statement of		
Work for Inorganics Analysis".		

APPENDIX I-2

POSITIVE DETECTION TABLES

Appendix I-2

Table I-2-1. Summary of Positive Detections in Surface Soil Analytical Results
Target Compound List Organics and TPH

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Sample Location					S001				S002		S003		S004		S005	
Sample Identifier	Background Screening [1]	SCG [2]	RBC [3] for Residential Soil	RBC [3] for Industrial Soil	U1S00100		U1S00100D		U1S00200		U1S00300		U1S00400		U1S00500	
Sampling Date					4/20/95		4/20/95		4/20/95		4/20/95		4/20/95		4/20/95	
Volatile Organics, ug/kg																
Acetone		260,000	7,800,000 n	200,000,000 n	9	J	7	J	7	J	10	J	6	J	9	J
Semivolatile Organics, ug/kg																
Acenaphthene		2,800,000	4,700,000 n	120,000,000 n									100	J		
Anthracene		20,000,000	23,000,000 n	610,000,000 n									130	J		
Benzo(a)anthracene		1,400	880 c	7,800 c									480		190	J
Benzo(a)pyrene		100	88 c	780 c									400		200	J
Benzo(b)fluoranthene		1,400	880 c	7,800 c									410		250	J
Benzo(g,h,i)perylene		14,000	2,300,000 n	61,000,000 n							120	J	350		220	J
Benzo(k)fluoranthene		14,000	880 c	7,800 c									390		210	J
bis(2-Ethylhexyl)phthalate		48,000	46,000 c	410,000 c											210	J
Carbazole		42,000	32,000 c	290,000 c									93	J		
Chrysene		140,000	88,000 c	780,000 c									500		270	J
Dibenz(a,h)anthracene		100	88 c	780 c									120	J		
Fluoranthene		2,900,000	3,100,000 n	82,000,000 n					93	J			1100		490	
Indeno(1,2,3-cd)pyrene		1,400	880 c	7,800 c									280	J	160	J
Phenanthrene		1,700,000	2,300,000 n	61,000,000 n									620		150	J
Pyrene		2,200,000	2,300,000 n	61,000,000 n									1000		430	
Pesticides/PCBs, ug/kg																
4,4'-DDD		4,500	2,700 c	24,000 c									3.5			
4,4'-DDE		3,000	1,900 c	17,000 c	21	N	20	N	25	NJ			18			
4,4'-DDT		3,100	1,900 c	17,000 c	13		15		13				48		2.5	J
alpha-Chlordane		800	490 c	4,400 c	67	J	70	D	85	DJ			2.5	N	2.4	N
Aroclor-1260		900	83 c	740 c	120	J	64	J	79	J						
Dieldrin		70	40 c	360 c	180	D	170	D	6.7	J						
gamma-BHC (Lindane)		800	490 c	4,400 c	1.2	J										
gamma-Chlordane		800	490 c	4,400 c	40	D	43	D	53	D			2.1	J	2.5	J
Heptachlor epoxide		100	70 c	630 c	7.2		6.5		4.3							
General Chemistry, mg/kg																
Total Petroleum Hydrocarbons		ND	ND	ND	33.5		96.6		51.6		55.4		62.1		59.9	

See notes at end of table

Appendix I-2

Table I-2-1. Summary of Positive Detections in Surface Soil Analytical Results

Target Compound List Organics and TPH

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Sample Location									S006		S007		S008		S009		S010	
Sample Identifier	Background Screening [1]		SCG [2]		RBC [3] for Residential Soil		RBC [3] for Industrial Soil		U1S00600		U1S00700		U1S00800		U1S00900		U1S01000	
Sampling Date									4/20/95		4/20/95		4/20/95		4/20/95		4/20/95	
Volatile Organics, ug/kg																		
Acetone			260,000		7,800,000	n	200,000,000	n	11				6	J	9	J	18	J
Semivolatile Organics, ug/kg																		
Acenaphthene			2,800,000		4,700,000	n	120,000,000	n										
Anthracene			20,000,000		23,000,000	n	610,000,000	n										
Benzo(a)anthracene			1,400		880	c	7,800	c									120	J
Benzo(a)pyrene			100		88	c	780	c									1200	
Benzo(b)fluoranthene			1,400		880	c	7,800	c										
Benzo(g,h,i)perylene			14,000		2,300,000	n	61,000,000	n									2500	
Benzo(k)fluoranthene			14,000		880	c	7,800	c									4000	D
bis(2-Ethylhexyl)phthalate			48,000		46,000	c	410,000	c									280	J
Carbazole			42,000		32,000	c	290,000	c										
Chrysene			140,000		88,000	c	780,000	c									210	J
Dibenz(a,h)anthracene			100		88	c	780	c									760	
Fluoranthene			2,900,000		3,100,000	n	82,000,000	n									120	J
Indeno(1,2,3-cd)pyrene			1,400		880	c	7,800	c									2300	
Phenanthrene			1,700,000		2,300,000	n	61,000,000	n										
Pyrene			2,200,000		2,300,000	n	61,000,000	n									160	J
Pesticides/PCBs, ug/kg																		
4,4'-DDD			4,500		2,700	c	24,000	c										
4,4'-DDE			3,000		1,900	c	17,000	c	3.2	J	43	J	3.6	J	3.4	NJ		
4,4'-DDT			3,100		1,900	c	17,000	c	2	J	18	J						
alpha-Chlordane			800		490	c	4,400	c	7	J	43	J	16	J	20	J		
Aroclor-1260			900		83	c	740	c			150	J	50	J	84			
Dieldrin			70		40	c	360	c	4.4		89		98	D	15			
gamma-BHC (Lindane)			800		490	c	4,400	c										
gamma-Chlordane			800		490	c	4,400	c	5.4		36		9.4		11			
Heptachlor epoxide			100		70	c	630	c			6.7	J						
General Chemistry, mg/kg																		
Total Petroleum Hydrocarbons			ND		ND		ND		32.9		20.6		18.5		19		23.8	

See notes at end of table

Appendix I-2

Table I-2-1. Summary of Positive Detections in Surface Soil Analytical Results
Target Compound List Organics and TPH

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Sample Location					S011				S012		S013		S014	
Sample Identifier	Background Screening [1]	SCG [2]	RBC [3] for Residential Soil	RBC [3] for Industrial Soil	U1S01100		U1S01100D		U1S01200		U1S01300		U1S01400	
Sampling Date					4/20/95		4/20/95		4/20/95		4/20/95		4/20/95	
Volatile Organics, ug/kg														
Acetone		260,000	7,800,000 n	200,000,000 n	11	J	8	J	8	J	6	J	7	J
Semivolatile Organics, ug/kg														
Acenaphthene		2,800,000	4,700,000 n	120,000,000 n										
Anthracene		20,000,000	23,000,000 n	610,000,000 n										
Benzo(a)anthracene		1,400	880 c	7,800 c										
Benzo(a)pyrene		100	88 c	780 c										
Benzo(b)fluoranthene		1,400	880 c	7,800 c										
Benzo(g,h,i)perylene		14,000	2,300,000 n	61,000,000 n										
Benzo(k)fluoranthene		14,000	880 c	7,800 c										
bis(2-Ethylhexyl)phthalate		48,000	46,000 c	410,000 c	190	J								
Carbazole		42,000	32,000 c	290,000 c										
Chrysene		140,000	88,000 c	780,000 c										
Dibenz(a,h)anthracene		100	88 c	780 c										
Fluoranthene		2,900,000	3,100,000 n	82,000,000 n										
Indeno(1,2,3-cd)pyrene		1,400	880 c	7,800 c										
Phenanthrene		1,700,000	2,300,000 n	61,000,000 n										
Pyrene		2,200,000	2,300,000 n	61,000,000 n										
Pesticides/PCBs, ug/kg														
4,4'-DDD		4,500	2,700 c	24,000 c										
4,4'-DDE		3,000	1,900 c	17,000 c							1.8	J		
4,4'-DDT		3,100	1,900 c	17,000 c										
alpha-Chlordane		800	490 c	4,400 c					1.7	J	3.4	N	1.1	N
Aroclor-1260		900	83 c	740 c							35	J		
Dieldrin		70	40 c	360 c					3.8					
gamma-BHC (Lindane)		800	490 c	4,400 c										
gamma-Chlordane		800	490 c	4,400 c					1	J	2.1			
Heptachlor epoxide		100	70 c	630 c										
General Chemistry, mg/kg														
Total Petroleum Hydrocarbons		ND	ND	ND	29.9		31.5		16		13.7		10.1	

See notes at end of table

Appendix I-2

Table I-2-1. Summary of Positive Detections in Surface Soil Analytical Results
Target Compound List Organics and TPH

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

NOTES:

[1] The background screening value is twice the average of detected concentrations for inorganic analytes only.

[2] SCG = Soil Cleanup Goals for Florida (Florida Department of Environmental Protection memorandum, September 29, 1995).
Values indicated are from a residential scenario.

[3] RBC = Risk-Based Concentration Table, USEPA Region III, May 1996, R.L. Smith.
RBC for benzo(g,h,i)perylene and phenanthrene are not available, value is based on pyrene.
RBC for Aroclor-1260 is not available, value is based on polychlorinated biphenyls.

n = noncarcinogenic effects.
c = carcinogenic effects.
ND = Not determined.
FDEP = Florida Department of Environmental Protection.
PCB = polychlorinated biphenyl.
DDD = Dichlorodiphenyldichloroethane
DDE = Dichlorodiphenyldichloroethene
DDT = Dichlorodiphenyltrichloroethane
mg/kg = milligrams per kilogram.
ug/kg = micrograms per kilogram.
OSWER = Office of Solid Waste and Emergency Response.
USEPA = U.S. Environmental Protection Agency.
D = Indicates value was determined during a diluted reanalysis.
J = Reported concentration is an estimated quantity.
N = Presumptive presence of a compound at an estimated concentration.
TPH = Total Petroleum Hydrocarbons.
All organic compound concentrations in micrograms per kilogram (ug/kg) soil dry weight; TPH in milligrams per kilogram (mg/kg) soil dry weight.
Bold/shaded values indicate exceedance of the lower of residential SCG and residential RBC.
Blank space indicates analyte/compound was not detected at the reporting limit.

Appendix I-2

Table I-2-2. Summary of Positive Detections in Surface Soil Analytical Results

Target Analyte List Inorganics

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Sample Location					S001				S002		S003		S004		S005	
Sample Identifier	Background Screening [1]	SCG [2]	RBC [3] for Residential Soil	RBC [3] for Industrial Soil	U1S00100		U1S00100D		U1S00200		U1S00300		U1S00400		U1S00500	
Sampling Date					4/20/95		4/20/95		4/20/95		4/20/95		4/20/95		4/20/95	
Inorganics, mg/kg																
Aluminum	2,088	75,000	78,000 n	1,000,000 n	1,200		861		726		836		1,020		871	
Arsenic	1.04	0.8	0.43 c / 23 n	3.3 c / 610 n	2.5		2.9		1.8	B	0.42	J	0.63	J		
Barium	8.7	5,200	5,500 n	140,000 n	15.1	B	12.1	B	14.5	B	4.2	B	9.1	B	4.6	B
Cadmium	0.98	37	39 n	1000 n	2.1		1.1		1.5							
Calcium	25,295	ND	1,000,000	1,000,000	8,510	J	4,330	J	30,500	J	106,000	J	1,350	J	62,500	J
Chromium	4.6	290	390 n	10,000 n	16.1		14.1		15.5		4		3		3	
Copper	4.1	ND	3,100 n	82,000 n	14.4		11.3		11.6				5.1			
Iron	712	ND	23,000 n	610,000 n	664	J	574	J	378	J	439	J	944	J	439	J
Lead	14.5	500	400	400	15.6	J	19.2	J	24.3	J	5.5	J	22.5	J	2.2	J
Magnesium	328	ND	460,468	460,468	135	B	91.5	B	257	B	811	B	66.8	B	503	B
Manganese	8.1	370	1,800 n	47,000 n	8.7	J	7	J	9.3	J	11.7	J	8.6	J	8.1	J
Mercury	0.07	23	23 n	610 n	0.2		0.16		0.74		0.03	B	0.06		0.03	B
Potassium	157	ND	1,000,000	1,000,000					105	B						
Silver	1.8	390	390 n	10,000 n	3.5											
Thallium	2	ND	ND	ND												
Vanadium	3.1	490	550 n	14,000 n	1.3	J	0.98	J	1.9	J	5.8	J	1.8	J	3.5	J
Zinc	17.2	23,000	23,000 n	610,000 n	60.1		46.8		56.4		8.8		31.2		12.9	

See notes at end of table

Appendix I-2

Table I-2-2. Summary of Positive Detections in Surface Soil Analytical Results

Target Analyte List Inorganics

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Sample Location																		
									S006		S007		S008		S009		S010	
Sample Identifier	Background Screening [1]		SCG [2]		RBC [3] for Residential Soil		RBC [3] for Industrial Soil		U1S00600		U1S00700		U1S00800		U1S00900		U1S01000	
Sampling Date									4/20/95		4/20/95		4/20/95		4/20/95		4/20/95	
Inorganics, mg/kg																		
Aluminum	2,088		75,000		78,000	n	1,000,000	n	421		522		182		405		540	
Arsenic	1.04		0.8		0.43 c / 23 n		3.3 c / 610 n				1.4	B	1.3	B	1.8	J		
Barium	8.7		5,200		5,500	n	140,000	n	4.2	B	19.1	B	4.6	B	11.8	B	4	B
Cadmium	0.98		37		39	n	1000	n			1.4				0.8	B		
Calcium	25,295		ND		1,000,000		1,000,000		32,800	J	3,230	J	305	J	681	J	119,000	J
Chromium	4.6		290		390	n	10,000	n	2.4		26.8		5.2		9.8		3.8	
Copper	4.1		ND		3,100	n	82,000	n	2.7	B	15.2		5.3		8.2			
Iron	712		ND		23,000	n	610,000	n	150	J	409	J	142	J	133	J	271	J
Lead	14.5		500		400		400		1.4	J	14.1	J	7.7	J	3.6	J	6.7	J
Magnesium	328		ND		460,468		460,468		254	B	84.1	B					922	B
Manganese	8.1		370		1,800	n	47,000	n	4.7	J	6.5	J	2.4	J	1.9	J	10.4	J
Mercury	0.07		23		23	n	610	n	0.02	B	0.16		0.11		0.14			
Potassium	157		ND		1,000,000		1,000,000											
Silver	1.8		390		390	n	10,000	n			6							
Thallium	2		ND		ND		ND										0.39	J
Vanadium	3.1		490		550	n	14,000	n	1.5	J	0.76	J			0.54	J	5.2	J
Zinc	17.2		23,000		23,000	n	610,000	n	5.1		56.1		18.7		30.1		2.6	B

See notes at end of table

Appendix I-2

Table I-2-2. Summary of Positive Detections in Surface Soil Analytical Results

Target Analyte List Inorganics

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Sample Location					S011				S012		S013		S014	
Sample Identifier	Background Screening [1]	SCG [2]	RBC [3] for Residential Soil	RBC [3] for Industrial Soil	U1S01100		U1S01100D		U1S01200		U1S01300		U1S01400	
Sampling Date					4/20/95		4/20/95		4/20/95		4/20/95		4/20/95	
Inorganics, mg/kg														
Aluminum	2,088	75,000	78,000 n	1,000,000 n	265		214		510		380		946	
Arsenic	1.04	0.8	0.43 c / 23 n	3.3 c / 610 n					0.91	B	0.83	B	1	B
Barium	8.7	5,200	5,500 n	140,000 n	1.3	B	0.96	B	4.1	B	5.8	B	1.9	B
Cadmium	0.98	37	39 n	1000 n										
Calcium	25,295	ND	1,000,000	1,000,000	22,500	J	20,900	J	58,900	J	6,960	J	3,340	J
Chromium	4.6	290	390 n	10,000 n	1.3	B	1.1	B	4		3.5		1.5	B
Copper	4.1	ND	3,100 n	82,000 n					2.3	B	4.6	B		
Iron	712	ND	23,000 n	610,000 n	142	J	109	J	174	J	113	J	337	J
Lead	14.5	500	400	400	1.6	J	1.4	J	3.1	J	4.8	J	2.3	J
Magnesium	328	ND	460,468	460,468	190	B	176	B	445	B	92.3	B	59.5	B
Manganese	8.1	370	1,800 n	47,000 n	3.3	J	3.6	J	7.4	J	2.3	J	1.5	J
Mercury	0.07	23	23 n	610 n							0.06			
Potassium	157	ND	1,000,000	1,000,000										
Silver	1.8	390	390 n	10,000 n							3.3			
Thallium	2	ND	ND	ND										
Vanadium	3.1	490	550 n	14,000 n	1	J	1.3	J	2.7	J				
Zinc	17.2	23,000	23,000 n	610,000 n	4.3		3.3	B	5		22.6		2.8	J

See notes at end of table

Appendix I-2

Table I-2-2. Summary of Positive Detections in Surface Soil Analytical Results
Target Analyte List Inorganics

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

NOTES:

[1] The background screening value is twice the average of detected concentrations for inorganic analytes.

[2] SCG = Soil Cleanup Goals for Florida (Florida Department of Environmental Protection memorandum, September 29, 1995). Arsenic value is as revised in Applicability of Soil Cleanup Goals for Florida (FDEP memorandum, January 19, 1996). Values indicated are from a residential scenario.
Chromium values are for Chromium VI. Values for Chromium III are 78,000 n (residential soil) and 1,000,000 n (industrial soil).

[3] RBC = Risk-Based Concentration Table, USEPA Region III, May 1996, R.L. Smith. RBC for chromium is based on chromium VI. RBC for lead is not available, value is Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER directive 9355-4-12). For essential nutrients (calcium, magnesium) screening values were derived based on recommended daily allowances (RDAs).

n = noncarcinogenic effects.
c = carcinogenic effects.
ND = Not determined.
FDEP = Florida Department of Environmental Protection.
PCB = polychlorinated biphenyl.
mg/kg = milligrams per kilogram.
OSWER = Office of Solid Waste and Emergency Response.
USEPA = U.S. Environmental Protection Agency.
B = Reported concentration is between the instrument detection limit (IDL) and Contract Required Detection Limit (CRDL).
J = Reported concentration is an estimated quantity.
All inorganics results expressed in milligrams per kilogram (mg/kg) soil dry weight.
Bold/shaded values indicate exceedance of the higher of residential SCG and background.
Blank space indicates analyte/compound was not detected at the reporting limit.

Appendix I-2

Table I-2-3. Summary of Positive Detections in Groundwater Analytical Results
Target Compound List Organics and Herbicides

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Well ID									OLD-U1-01A		OLD-U1-02B		OLD-U1-03C		OLD-U1-05C		OLD-U1-11B		OLD-U1-12C		OLD-U1-14B	
Sample ID	Background Screening [1]		FDEPG		Primary FEDMCL		RBC[2] for Tap Water		U1G00101		U1G00201		U1G00301		U1G00501		U1G01101		U1G01201		U1G01401	
Sample Date									8/9/95		8/8/95		8/9/95		8/14/95		8/16/95		8/17/95		8/22/95	
Screen Interval bls (feet)									2.5-12.5		22.5-27.5		52.5-57.5		31.5-36.5		34.5-39.5		59.5-64.5		34.5-39.5	
Volatile organics, ug/L																						
Acetone			700	[3]	ND		3700	n													4	J
Carbon disulfide			700	[3]	ND		1,000	n														
Chlorobenzene			ND		ND		39	n											4	J	4	J
Semivolatile organics, ug/L																						
1,4-Dichlorobenzene			75	[4]	ND		0.44	c									1	J	8	J	1	J
bis(2-Ethylhexyl)phthalate			6	[4]	6		5				30		3	J	3	J					3	J
Dimethylphthalate			70,000	[3]	ND		370,000	n					7	J								
Naphthalene			7	[5]	ND		1500												3	J		
Phenol			10	[5]	ND		22,000	n							1	J						
Pesticides/PCBs, ug/L																						
4,4'-DDT			0	[6]	ND		0	c														
Herbicides ug/L																						
2,4-D			70	[4]	70		61	n	3.4													

See notes at end of table

Appendix I-2

Table I-2-3. Summary of Positive Detections in Groundwater Analytical Results
Target Compound List Organics and Herbicides

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Well ID					OLD-U1-15	OLD-U1-17B		OLD-U1-19A	OLD-U1-20B	OLD-U1-25A	OLD-U1-27C	
Sample ID	Background Screening [1]	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	U1G01501	U1G01701	U1G01701D	U1G01901	U1G02001	U1G02501	U1G02701	U1G02701D
Sample Date					8/22/95	8/17/95		8/23/95	8/23/95	8/8/95	8/7/95	
Screen Interval bls (feet)					49.0-54.0	29.5-34.5		12.5-22.5	29.5-34.5	9.5-19.5	57.5-62.5	
Volatile organics, ug/L												
Acetone		700 [3]	ND	3700 n							18	46
Carbon disulfide		700 [3]	ND	1,000 n							4 J	7 J
Chlorobenzene		ND	ND	39 n	5 J							
Semivolatile organics, ug/L												
1,4-Dichlorobenzene		75 [4]	ND	0.44 c		1 J	1 J					
bis(2-Ethylhexyl)phthalate		6 [4]	6	5				2 J	5 J			
Dimethylphthalate		70,000 [3]	ND	370,000 n								
Naphthalene		7 [5]	ND	1500								
Phenol		10 [5]	ND	22,000 n								
Pesticides/PCBs, ug/L												
4,4'-DDT		0 [6]	ND	0 c						0.06 J		
Herbicides ug/L												
2,4-D		70 [4]	70	61 n								

See notes at end of table

Appendix I-2

Table I-2-3. Summary of Positive Detections in Groundwater Analytical Results
Target Compound List Organics and Herbicides

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

NOTES:

[1] The background screening value is twice the average of detected concentrations for inorganic analytes only.
[2] RBC = Risk-Based Concentration Table, USEPA Region III, May 1996, R.L. Smith.
[3] Systemic Toxicant
[4] Primary Standard
[5] Organoleptic.
[6] Carcinogen

n = noncarcinogenic effects.
c = carcinogenic effects.
ND = Not determined.
ID = identifier.
USEPA = U.S. Environmental Protection Agency.
FDEPG = Florida Department of Environmental Protection, Groundwater Guidance Concentrations, June 1994.
FEDMCL= Federal Maximum Contaminant Levels, Primary Drinking Water Regulations and Health Advisories, February 1996.
J = Reported concentration is an estimated quantity.
G = unfiltered water sample.
H = filtered water sample.
ug/l = micrograms per liter.
Bold/shaded numbers indicate exceedance of groundwater guidance.
Blank space indicates analyte/compound was not detected at the reporting limit.
"A", "B", and "C" designations in the **Well ID** indicate shallow, intermediate and deep screened intervals, respectively, within the surficial aquifer.

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Well ID					OLD-U1-01A		OLD-U1-02B		OLD-U1-03C		OLD-U1-04A	
Sample ID	Background [1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	U1G00101	U1H00101	U1G00201	U1H00201	U1G00301	U1H00301	U1G00401	U1H00401
Sampling Date					8/9/95		8/8/95		8/9/95		8/14/95	
Screen interval, bls (ft.)					2.5-12.5		22.5-27.5		52.5-57.5		10.5-20.5	
Inorganics, ug/L												
Aluminum	4,067	200 [3]	ND	37,000 n	180 B	161 B	1760	1210	35700	11500	582	450
Arsenic	5	50 [4]	50	0.045/11 c/n								
Barium	31.4	2,000 [5]	2,000	2,600 n	5 B	4.6 B	25.9 B	17.4 B	596	353	8.4 B	6 B
Beryllium		4 [5]	4	0.016 c					7.1	8 B		
Cadmium	5.6	5 [5]	5	18 n					4.2 B			
Calcium	36,830	ND	ND	1,000,000	39400	36400	1860 B	1610 B	128000	94700	6670	6070
Chromium	7.8	100 [5]	100 [7]	180 [8] n					61.2	19.4		
Cobalt		ND	ND	2,200 n								
Copper	5.4	1,000 [3]	1,300 [6]	1,500 n	1.4 B		2.4 B	1.9 B	5.3 B	1.9 B		
Iron	1,227	300 [3]	ND	11,000 n	75.7 B	47 B	704	572	7870	2750	43.9 J	31.2 J
Lead	4	15 [5]	15 [9]	15	1.6 B				6	2.2 B		
Magnesium	4,560	ND	ND	118,807	2030 B	1830 B	934 B	934 B	3070 B	1320 B	428 B	384 B
Manganese	17	50 [3]	ND	840 n	1.4 B	0.95 B	5.5 B	4.7 B	116	82	0.86 B	0.86 B
Mercury	0.12	2 [5]	2	11 c				0.06 B	0.15 B			
Nickel		100 [5]	100	730 n								
Potassium	5,400	ND	ND	297,016	1240 B	1490 B	1560 B	1130 B	3370 B	2510 B	1130 B	893 B
Selenium	9.7	50 [5]	50	180 n								
Silver		100 [3]	ND	180 n								
Sodium	18,222	160,000 [5]	ND	396,022	4810 B	4290 B	6950	6330	46700	38200	1550 B	1510 B
Thallium	3.8	2 [5]	2	3 n								
Vanadium	20.6	49 [4]	ND	260 n	5.2 B	4.4 B			104	50.2		3.1 B
Zinc	4	5,000 [3]	ND	11,000 n					42.6		1.5 B	1.5 B

See notes at 1 of table

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Well ID					OLD-U1-05B				OLD-U1-06C				OLD-U1-07A				OLD-U1-08B	
Sample ID	Background [1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	U1G00501		U1H00501		U1G00601		U1H00601		U1G00701		U1H00701		U1H00801	
Sampling Date					8/14/95				8/15/95				8/15/95				8/15/95	
Screen interval, bls (ft.)					31.5-36.5				52.5-57.5				11.5-21.5				35.5-40.5	
Inorganics, ug/L																		
Aluminum	4,067	200 [3]	ND	37,000 n	545		268	J	5030				426		302		425	
Arsenic	5	50 [4]	50	0.045/11 c/n					14		14.5							
Barium	31.4	2,000 [5]	2,000	2,600 n	36.4	B	30	B	149	B			32.1	B	27.7	B	36.4	B
Beryllium		4 [5]	4	0.016 c					0.32	J								
Cadmium	5.6	5 [5]	5	18 n														
Calcium	36,830	ND	ND	1,000,000	1970	B	1790	B	15100				9190		8400		5640	
Chromium	7.8	100 [5]	100 [7]	180 [8] n					10.3									
Cobalt		ND	ND	2,200 n														
Copper	5.4	1,000 [3]	1,300 [6]	1,500 n	3.4	J			6	J								
Iron	1,227	300 [3]	ND	11,000 n	1210		881		2370				27.8	B			36.4	J
Lead	4	15 [5]	15 [9]	15					3.9		1.8	B						
Magnesium	4,560	ND	ND	118,807	1180	B	1070	B	2640	B			4550	B	4050	B	3380	B
Manganese	17	50 [3]	ND	840 n	9.3	B	8.4	B	15.6				1.5	B	1.1	B	4.9	B
Mercury	0.12	2 [5]	2	11 c														
Nickel		100 [5]	100	730 n														
Potassium	5,400	ND	ND	297,016	1070	B	1000	B	5870				3140	B	2820	B	2950	B
Selenium	9.7	50 [5]	50	180 n					0.9	B			0.9	J				
Silver		100 [3]	ND	180 n											2.8	B		
Sodium	18,222	160,000 [5]	ND	396,022	11100		9780		14000				13000		11900		13400	
Thallium	3.8	2 [5]	2	3 n							1.9	J			3.5	B	4.6	B
Vanadium	20.6	49 [4]	ND	260 n					9.6	B							3.3	B
Zinc	4	5,000 [3]	ND	11,000 n	1.2	B	4.3	B	5.5	B			2	B	2.6	B	1.9	B

See notes at end of table

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Well ID					OLD-U1-09C		OLD-U1-10A		OLD-U1-10A		OLD-U1-11B	
Sample ID	Background [1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	U1G00901	U1H00901	U1G01001	U1H01001	U1G01001D	U1H01001D	U1G01101	U1H01101
Sampling Date					8/21/95		8/16/95		8/16/95		8/16/95	
Screen interval, bls (ft.)					51.5-56.5		12.5-22.5				34.5-39.5	
Inorganics, ug/L												
Aluminum	4,067	200 [3]	ND	37,000 n	257 J	154 J	139 J	97.5 J		97.5 J	1280	746
Arsenic	5	50 [4]	50	0.045/11 c/n								
Barium	31.4	2,000 [5]	2,000	2,600 n	29.8 B	24.7 B	14.3 B	13.9 B		14 B	27.2 B	21.9 B
Beryllium		4 [5]	4	0.016 c								
Cadmium	5.6	5 [5]	5	18 n								
Calcium	36,830	ND	ND	1,000,000	12500	11000	12700	11700		11500	3890 B	3480 B
Chromium	7.8	100 [5]	100 [7]	180 [8] n			3.1 B	2.9 B		2.4 B		
Cobalt		ND	ND	2,200 n								
Copper	5.4	1,000 [3]	1,300 [6]	1,500 n		1.4 J						
Iron	1,227	300 [3]	ND	11,000 n	1020	862					330	193
Lead	4	15 [5]	15 [9]	15								
Magnesium	4,560	ND	ND	118,807	4290 B	3970 B	2100 B	1800 B		1790 B	1500 B	1310 B
Manganese	17	50 [3]	ND	840 n	15.8	13 B	3.6 B	4 B		4 B	11.4 B	10.3 B
Mercury	0.12	2 [5]	2	11 c								
Nickel		100 [5]	100	730 n								
Potassium	5,400	ND	ND	297,016	3480 B	2890 B	2880 B	2620 B	444 B	2620 B	2430 B	2160 B
Selenium	9.7	50 [5]	50	180 n			2.9 J	2.3 J	3 J	2.4 J		
Silver		100 [3]	ND	180 n								
Sodium	18,222	160,000 [5]	ND	396,022	11700	10400	6470	5950		6000	11800	10600
Thallium	3.8	2 [5]	2	3 n						2.6 B		
Vanadium	20.6	49 [4]	ND	260 n								
Zinc	4	5,000 [3]	ND	11,000 n		3.9 B	1.2 B	2.5 B		2.2 B	2.9 B	2.8 B

See notes at end of table

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Well ID							OLD-U1-12C				OLD-U1-13A				OLD-U1-14B				OLD-U1-15C			
Sample ID	Background [1] Screening		FDEPG	Primary * FEDMCL		RBC[2] for Tap Water		U1G01201		U1H01201		U1G01301		U1H01301		U1G01401		U1H01401		U1G01501		U1H01501	
Sampling Date								8/17/95				8/24/95				8/22/95				8/22/95			
Screen interval, bls (ft.)								59.5-64.5				12.5-22.5				34.5-39.5				49.0-54.0			
Inorganics, ug/L																							
Aluminum	4,067		200 [3]	ND		37,000	n	1390		937		181	J	121	J	2110		1730		1010		658	
Arsenic	5		50 [4]	50		0.045/11	c/n																
Barium	31.4		2,000 [5]	2,000		2,600	n	30.8	B	22.8	B	29.4	B	25.9	B	28.4	B	23.9	B	32.4	B	26.2	B
Beryllium			4 [5]	4		0.016	c													0.21	J		
Cadmium	5.6		5 [5]	5		18	n																
Calcium	36,830		ND	ND		1,000,000		2110	B	1920	B	18200		16400		19100		17300		13500		11700	
Chromium	7.8		100 [5]	100 [7]		180 [8]	n	2.5	B							4.7	B	2.9	B	3.1	B	2.1	B
Cobalt			ND	ND		2,200	n																
Copper	5.4		1,000 [3]	1,300 [6]		1,500	n	3.4	J					6.4	J								
Iron	1,227		300 [3]	ND		11,000	n	642		516						123		97	B	687		515	
Lead	4		15 [5]	15 [9]		15																	
Magnesium	4,560		ND	ND		118,807		876	B	783	B	937	B	839	B	3870	B	3500	B	2160	B	1890	B
Manganese	17		50 [3]	ND		840	n	2.8	B	2.9	B	9.6	B	8.1	B					28.5		24	
Mercury	0.12		2 [5]	2		11	c					0.04	B			0.04	B			0.04	B		
Nickel			100 [5]	100		730	n																
Potassium	5,400		ND	ND		297,016		3280	B	2570	B	3340	B	2690	B	4160	B	3450	B	2450	B	2190	B
Selenium	9.7		50 [5]	50		180	n					3.5	J	3.9	J	1.3	B	1	J				
Silver			100 [3]	ND		180	n							2.8	B								
Sodium	18,222		160,000 [5]	ND		396,022		11800		10500		10500		9770		5890		5620		11100		9960	
Thallium	3.8		2 [5]	2		3	n																
Vanadium	20.6		49 [4]	ND		260	n	4.6	B							13.9	B	11.6	B	5.4	B	5.9	B
Zinc	4		5,000 [3]	ND		11,000	n	2.1	B	2.8	B	2	B	1.9	B	1.6	B	3	B	5.1	B	3.9	B

See notes at end of table

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Well ID					OLD-U1-16A				OLD-U1-17B				OLD-U1-17B				OLD-U1-18C			
Sample ID	Background[1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	U1G01601		U1H01601		U1G01701		U1H01701		U1G01701D		U1H01701D		U1G01801		U1H01801	
Sampling Date					8/18/95				8/17/95				8/17/95				8/25/95			
Screen interval, bls (ft.)					9.5-19.5				29.5-34.5								42.5-47.5			
Inorganics, ug/L																				
Aluminum	4,067	200[3]	ND	37,000 n	99.1	J	64	J	1070		1650		1110		1650		1030		446	
Arsenic	5	50[4]	50	0.045/11 c/n																
Barium	31.4	2,000[5]	2,000	2,600 n	7.6	B	6.4	B	33.7	B	31.8	B	33.6	B	32.4	B	19.7	B	13.4	B
Beryllium		4[5]	4	0.016 c																
Cadmium	5.6	5[5]	5	18 n																
Calcium	36,830	ND	ND	1,000,000	5440		4890	B	7400		6620		7470		6700		8200		7230	
Chromium	7.8	100[5]	100[7]	180[8] n											2.9	B				
Cobalt		ND	ND	2,200 n																
Copper	5.4	1,000[3]	1,300[6]	1,500 n					5.6	J										
Iron	1,227	300[3]	ND	11,000 n	75.1	J	45.3	J	**2420**		**1870**		**2440**		**1890**		600		271	
Lead	4	15[5]	15[9]	15																
Magnesium	4,560	ND	ND	118,807	1550	B	1380	B	2230	B	2000	B	2200	B	2020	B	662	B	587	B
Manganese	17	50[3]	ND	840 n	2.2	B	1.1	B	15.2		13.1	B	15.2		13.8	B	5.7	B	5	B
Mercury	0.12	2[5]	2	11 c					0.06	B			0.06	B	0.04	B				
Nickel		100[5]	100	730 n																
Potassium	5,400	ND	ND	297,016	1630	B	1160	B	1550	B	1440	B	1500	B	1490	B	917	B	1110	B
Selenium	97	50[5]	50	180 n																
Silver		100[3]	ND	180 n											2.7	B				
Sodium	18,222	160,000[5]	ND	396,022	7210		6260		19700		19800		19400		20200		4400	B	4130	B
Thallium	3.8	2[5]	2	3 n																
Vanadium	20.6	49[4]	ND	260 n																
Zinc	4	5,000[3]	ND	11,000 n	1.5	B	1.9	B	4.8	B	5.5	B	3.8	B	5.6	B			3.2	B

See notes at end of table

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Well ID					OLD-U1-19A				OLD-U1-20B				OLD-U1-21C				OLD-U1-22A			
Sample ID	Background [1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	U1G01901		U1H01901		U1G02001		U1H02001		U1G02101		U1H02101		U1G02201		U1H02201	
Sampling Date					8/23/95				8/23/95				8/3/95				8/3/95			
Screen interval, bls (ft.)					12.5-22.5				29.5-34.5				45.5-50.5				9.5-19.5			
Inorganics, ug/L																				
Aluminum	4,067	200 [3]	ND	37,000 n	62.4	J	32.6	J	450		412		475		292		78.5	B	36	B
Arsenic	5	50 [4]	50	0.045/11 c/n																
Barium	31.4	2,000 [5]	2,000	2,600 n			5.3	B	8.3	B	8.5	B	12.7	B	10.3	B	3.6	B		
Beryllium		4 [5]	4	0.016 c																
Cadmium	5.6	5 [5]	5	18 n																
Calcium	36,830	ND	ND	1,000,000	13900		14000		18700		16100		4080	B	3580	B	35000		31500	
Chromium	7.8	100 [5]	100 [7]	180 [8] n																
Cobalt		ND	ND	2,200 n																
Copper	5.4	1,000 [3]	1,300 [6]	1,500 n													1.4	B	1.4	B
Iron	1,227	300 [3]	ND	11,000 n	10.2	J			414		414		326		234		9.4	B		
Lead	4	15 [5]	15 [9]	15																
Magnesium	4,560	ND	ND	118,807	3750	B	3620	B	3220	B	2770	B	821	B	740	B	1200	B	1080	B
Manganese	17	50 [3]	ND	840 n			2.3	B	8.8	B	9.3	B	11.2	B	9.9	B	5.8	B	5.1	B
Mercury	0.12	2 [5]	2	11 c																
Nickel		100 [5]	100	730 n																
Potassium	5,400	ND	ND	297,016	1300	B	1170	B	1850	B	1650	B	1000	B	959	B	888	B	540	B
Selenium	9.7	50 [5]	50	180 n																
Silver		100 [3]	ND	180 n																
Sodium	18,222	160,000 [5]	ND	396,022	5590		5460		12200		11700		9860		8730		1590	B	1470	B
Thallium	3.8	2 [5]	2	3 n																
Vanadium	20.6	49 [4]	ND	260 n													5.5	B	5.5	B
Zinc	4	5,000 [3]	ND	11,000 n			7.9	B					2.7	B	2.5	B				

See notes at end of table

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Well ID					OLD-U1-23B		OLD-U1-24C		OLD-U1-25A		OLD-U1-26B	
Sample ID	Background [1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	U1G02301	U1H02301	U1G02401	U1H02401	U1G02501	U1H02501	U1G02601	U1H02601
Sampling Date					8/3/95		8/4/95		8/8/95		8/4/95	
Screen interval, bls (ft.)					34.5-39.5		64.5-69.5		9.5-19.5		44.5-49.5	
Inorganics, ug/L												
Aluminum	4,067	200 [3]	ND	37,000 n	621	339	1690	676	1360	1130	1180	**6220**
Arsenic	5	50 [4]	50	0.045/11 c/n								
Barium	31.4	2,000 [5]	2,000	2,600 n	25.8 B	22.3 B	32.3 B	18.3 B	9.2 B	7 B	105 B	153 B
Beryllium		4 [5]	4	0.016 c							1.8 B	2 B
Cadmium	5.6	5 [5]	5	18 n								
Calcium	36,830	ND	ND	1,000,000	9510	8500	2680 B	2490 B	5280	4950 B	9010	7910
Chromium	7.8	100 [5]	100 [7]	180 [8] n							4 B	
Cobalt		ND	ND	2,200 n				3.1 B		3.9 B		
Copper	5.4	1,000 [3]	1,300 [6]	1,500 n	1.4 B		1.6 B	2.3 B	2 B	3 B	1.6 B	1.6 B
Iron	1,227	300 [3]	ND	11,000 n	**1980**	**1760**	808	297	111	86.7 B	**2760**	**2820**
Lead	4	15 [5]	15 [9]	15			3.1		1.5 B			6.1
Magnesium	4,560	ND	ND	118,807	824 B	733 B	664 B	577 B	1700 B	1550 B	2200 B	1820 B
Manganese	17	50 [3]	ND	840 n	1.7 B	1.1 B	3.1 B	2.7 B	2.3 B	1.3 B	44.4	47.4
Mercury	0.12	2 [5]	2	11 c								
Nickel		100 [5]	100	730 n						11.4 B		
Potassium	5,400	ND	ND	297,016	3040 B	2550 B	456 B		2000 B	2010 B	5120	2320 B
Selenium	9.7	50 [5]	50	180 n								
Silver		100 [3]	ND	180 n								
Sodium	18,222	160,000 [5]	ND	396,022	14400	13100	4480 B	4380 B	5170	4690 B	16300	20900
Thallium	3.8	2 [5]	2	3 n								
Vanadium	20.6	49 [4]	ND	260 n	6.6 B	5.6 B	3.7 B		4.7 B	4.7 B	5.2 B	11.2 B
Zinc	4	5,000 [3]	ND	11,000 n							23.9	30.2

See notes at end of table

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

Well ID					OLD-U1-27C		OLD-U1-27C		OLD-U1-28B		OLD-U1-29C	
Sample ID	Background [1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	U1G02701	U1H02701	U1G02701D	U1H02701D	U1G02801	U1H02801	U1G02901	U1H02901
Sampling Date					8/7/95		8/7/95		8/28/96	8/28/96	8/28/96	8/28/96
Screen interval, bls (ft.)					57.5-62.5							
Inorganics, ug/L												
Aluminum	4,067	200 [3]	ND	37,000 n	**8700**	**4410**	**6250**	**4890**	**101000**	1180	**21100**	209
Arsenic	5	50 [4]	50	0.045/11 c/n					4.6	3.6	3.3	2.9
Barium	31.4	2,000 [5]	2,000	2,600 n	145 B	101 B	138 B	106 B	870	45.4	240	107
Beryllium		4 [5]	4	0.016 c	2.6 B	1.1 B	2.6 B	1.1 B				
Cadmium	5.6	5 [5]	5	18 n								
Calcium	36,830	ND	ND	1,000,000	47800	26900	43700	26800	13700	318	8480	4550
Chromium	7.8	100 [5]	100 [7]	180 [8] n	12.8				**121**		44.3	
Cobalt		ND	ND	2,200 n								
Copper	5.4	1,000 [3]	1,300 [6]	1,500 n	1.8 B	2.2 B		1.9 B	29.6			
Iron	1,227	300 [3]	ND	11,000 n	**1320**	650	**1290**	716	**8030**	262	**5850**	254
Lead	4	15 [5]	15 [9]	15					**91.8**	5.1	6	2
Magnesium	4,560	ND	ND	118,807	715 B	562 B	728 B	585 B	3580	120	2210	775
Manganese	17	50 [3]	ND	840 n	24.1	10.4 B	22.8	10.6 B	**93.3**	4.6	11.1	2.7
Mercury	0.12	2 [5]	2	11 c		0.05 B		0.05 B	0.6			
Nickel		100 [5]	100	730 n								
Potassium	5,400	ND	ND	297,016	28100	18200	25700	17900	3770	1670	8320	6830
Selenium	9.7	50 [5]	50	180 n					19			
Silver		100 [3]	ND	180 n								
Sodium	18,222	160,000 [5]	ND	396,022	24600	16900	23100	16900	34100	28200	7790	8620
Thallium	3.8	2 [5]	2	3 n		2.1 J		3 J				
Vanadium	20.6	49 [4]	ND	260 n	19.5 B	19.5 B	19.5 B	9.5 B	**81.1**	16.8	31	
Zinc	4	5,000 [3]	ND	11,000 n					28.3	52.4	23.5	54.7

See notes at end of table

Appendix I-2

Table I-2-4. Summary of Positive Detections in Groundwater Analytical Results
Target Analyte List Metals

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, FL

NOTES:

[1] Groundwater background screening value is twice the average of detected concentrations for inorganic analytes.
[2] RBC = Risk-Based Concentration Table, USEPA Region III, May 1996, R.L. Smith. RBC for chromium is based on chromium VI. RBC for lead is not available, value is treatment technology action limit for lead in drinking water distribution system identified in Drinking Water Standards and Health Advisories (USEPA, 1995). For essential nutrients (calcium, magnesium, potassium, and sodium) screening values were derived based on recommended daily allowances (RDAs).
[3] Secondary Standard.
[4] Systemic Toxicant
[5] Primary Standard
[6] Value is preliminary action level.
[7] Value shown is for total chromium compounds.
[8] Value shown is for Chromium VI. Value for Chromium III is 37,000 n.
[9] Treatment technique requirement. Value shown is the action level, to be measured at the tap. Value shown is the value to recommend as a preliminary cleanup goal.

n = noncarcinogenic effects.
c = carcinogenic effects.
ND = Not determined.
ID = identifier.
USEPA = U.S. Environmental Protection Agency.
FDEPG = Florida Department of Environmental Protection, Groundwater Guidance Concentrations, June 1994.
FEDMCL= Federal Maximum Contaminant Levels, Primary Drinking Water Regulations and Health Advisories, February 1996.
B = Reported concentration is between the instrument detection limit (IDL) and the contract required detection limit (CRDL).
J = Reported concentration is an estimated quantity.
G = unfiltered water sample.
H = filtered water sample.
ug/l = micrograms per liter.
Bold/shaded numbers indicate exceedance of groundwater guidance and background.
Blank space indicates analyte/compound was not detected at the reporting limit.
"A", "B", and "C" designations in the **Well ID** indicate shallow, intermediate and deep screened intervals, respectively, within the surficial aquifer.

Appendix I-2

Table I-2-5. Summary of Positive Detections in Groundwater Analytical Results

Radiological Parameters

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Well ID				OLD-OR-01A		OLD-U1-01A	OLD-U1-02B	OLD-U1-03C			OLD-U1-04A
Sample Identifier	Background Screening [1]	FDEPG	FEDMCL	ORG00103	ORH00103	U1G00101	U1G00201	U1G00301	U1G00303	U1H00303	U1G00401
Sampling Date				10/16/95		8/9/95	8/8/95	8/9/95	10/19/95		8/14/95
Screen Interval bls (feet)				2.5-12.5		2.5-12.5	22.5-27.5	52.5-57.5			10.5-20.5
Radiological, pCi/L											
Gross Alpha	13	15	15	4.9	2.1	2 J	8.7 J	257 J	50.4	33.9	3.4
Gross Alpha, Counting Error	ND	ND	ND	2.7	2	1.5	2.5	116	5.9	4	1.5
Gross Beta	9.5	ND	ND	6.6	5.2	4.8 J	7.4 J	240 J	58.5	24.6	6.3
Gross Beta, Counting Error	ND	ND	ND	2.6	2	1.9	2	30.4	6.1	2.7	1.9
Cesium-137	ND	ND	ND	0.83	0.66	NA	NA	NA	-0.51	0.26	NA
Cesium-137, Uncertainty	ND	ND	ND	1.65	2.02	NA	NA	NA	1.51	1.52	NA
Lead-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Lead-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Potassium-40	ND	ND	ND	-20.2	-115	NA	NA	NA	5.88	65.2	NA
Potassium-40, Uncertainty	ND	ND	ND	29.8	62.5	NA	NA	NA	24.6	20.6	NA
Radium-226	ND	ND	ND	2.76	2.95	NA	NA	NA	8.83	4.61	NA
Radium-226, Uncertainty	ND	ND	ND	0.19	0.22	NA	NA	NA	0.23	0.2	NA
Radium-228	ND	ND	ND	0	1.67	NA	NA	NA	1.81	1.02	NA
Radium-228, Uncertainty	ND	ND	ND	0.78	0.55	NA	NA	NA	0.54	0.26	NA
Thorium-227	ND	ND	ND	0.01	0	NA	NA	NA	0.09	0.08	NA
Thorium-227, Uncertainty	ND	ND	ND	0.01	0.01	NA	NA	NA	0.02	0.02	NA
Thorium-228	ND	ND	ND	0.72	1.45	NA	NA	NA	0.91	1.18	NA
Thorium-228, Uncertainty	ND	ND	ND	0.1	0.17	NA	NA	NA	0.12	0.14	NA
Thorium-230	ND	ND	ND	1.46	0.84	NA	NA	NA	2.59	3.54	NA
Thorium-230, Uncertainty	ND	ND	ND	0.17	0.11	NA	NA	NA	0.29	0.38	NA
Thorium-232	ND	ND	ND	0.02	0.27	NA	NA	NA	0.12	0.27	NA
Thorium-232, Uncertainty	ND	ND	ND	0.01	0.05	NA	NA	NA	0.03	0.05	NA
Uranium-234	ND	ND	ND	0	0.05	NA	NA	NA	6.92	9.08	NA
Uranium-234, Uncertainty	ND	ND	ND	0.01	0.02	NA	NA	NA	0.74	0.95	NA
Uranium-238	ND	ND	ND	0.03	0.08	NA	NA	NA	8.72	9	NA
Uranium-238, Uncertainty	ND	ND	ND	0.02	0.04	NA	NA	NA	0.92	0.95	NA

See notes at end of table

Appendix I-2

Table I-2-5. Summary of Positive Detections in Groundwater Analytical Results
Radiological Parameters

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Well ID				OLD-U1-05B	OLD-U1-06C	OLD-U1-07A	OLD-U1-08B	OLD-U1-09C	OLD-U1-10A		OLD-U1-11B
Sample Identifier	Background Screening [1]	FDEPG	FEDMCL	U1G00501	U1G00601	U1G00701	U1G00801	U1G00901	U1G01001	U1G01001D	U1G01101
Sampling Date				8/14/95	8/15/95	8/15/95	8/15/95	8/21/95	8/16/95		8/16/95
Screen Interval bls (feet)				31.5-36.5	52.5-57.5	11.5-21.5	35.5-40.5	51.5-56.5	12.5-22.5		34.5-39.5
Radiological, pCi/L											
Gross Alpha	13	15	15	3	14.5	5.8	3.7	1.7	1.9	2.2	4.7
Gross Alpha, Counting Error	ND	ND	ND	1.6	4.2	2.2	1.7	1.3	1.4	1.5	2
Gross Beta	9.5	ND	ND	3.7	25.8	22.1	7.2	5.5	6.2	10.8	4.3
Gross Beta, Counting Error	ND	ND	ND	1.8	3.8	3.2	2	2	1.9	2.4	1.9
Cesium-137	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Cesium-137, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Lead-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Lead-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Potassium-40	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Potassium-40, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Radium-228	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Radium-228, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-228	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-228, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-232	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-232, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-234	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-234, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-238	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-238, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA

See notes a' of table

Appendix I-2

Table I-2-5. Summary of Positive Detections in Groundwater Analytical Results
Radiological Parameters

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Well ID				OLD-U1-12C	OLD-U1-13A	OLD-U1-14B			OLD-U1-15C	OLD-U1-16A
Sample Identifier	Background Screening [1]	FDEPG	FEDMCL	U1G01201	U1G01301	U1G01401	U1G01403	U1H01403	U1G01501	U1G01601
Sampling Date				8/17/95	8/25/95	8/22/95	10/18/95		8/22/95	8/18/95
Screen Interval bls (feet)				59.5-64.5	12.5-22.5	34.5-39.5			49.0-54.0	9.5-19.5
Radiological, pCi/L										
Gross Alpha	13	15	15	4.4		**28.9**	**37.8**	**28.9**	11.6	
Gross Alpha, Counting Error	ND	ND	ND	1.9	1.2	6.4	4.2	3.3	3.4	0.8
Gross Beta	9.5	ND	ND	**10.5**	3.9	**90.8**	**102**	**86.8**	**44.9**	3.8
Gross Beta, Counting Error	ND	ND	ND	2.4	2	9.9	10.4	8.9	5.3	1.8
Cesium-137	ND	ND	ND	NA	NA	NA	0.04	-1.09	NA	NA
Cesium-137, Uncertainty	ND	ND	ND	NA	NA	NA	1.37	1.42	NA	NA
Lead-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
Lead-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
Polonium-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
Polonium-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
Potassium-40	ND	ND	ND	NA	NA	NA	17.2	52.7	NA	NA
Potassium-40, Uncertainty	ND	ND	ND	NA	NA	NA	24.9	20.1	NA	NA
Radium-226	ND	ND	ND	NA	NA	NA	0	0	NA	NA
Radium-226, Uncertainty	ND	ND	ND	NA	NA	NA	0.66	0.69	NA	NA
Radium-228	ND	ND	ND	NA	NA	NA	0	0	NA	NA
Radium-228, Uncertainty	ND	ND	ND	NA	NA	NA	0.96	0.67	NA	NA
Thorium-227	ND	ND	ND	NA	NA	NA	0.45	0.5	NA	NA
Thorium-227, Uncertainty	ND	ND	ND	NA	NA	NA	0.06	0.07	NA	NA
Thorium-228	ND	ND	ND	NA	NA	NA	4.55	4.82	NA	NA
Thorium-228, Uncertainty	ND	ND	ND	NA	NA	NA	0.48	0.51	NA	NA
Thorium-230	ND	ND	ND	NA	NA	NA	2.42	2.35	NA	NA
Thorium-230, Uncertainty	ND	ND	ND	NA	NA	NA	0.27	0.27	NA	NA
Thorium-232	ND	ND	ND	NA	NA	NA	0.09	0.08	NA	NA
Thorium-232, Uncertainty	ND	ND	ND	NA	NA	NA	0.03	0.02	NA	NA
Uranium-234	ND	ND	ND	NA	NA	NA	1.48	1.34	NA	NA
Uranium-234, Uncertainty	ND	ND	ND	NA	NA	NA	0.19	0.19	NA	NA
Uranium-238	ND	ND	ND	NA	NA	NA	0.96	1.23	NA	NA
Uranium-238, Uncertainty	ND	ND	ND	NA	NA	NA	0.14	0.18	NA	NA

See notes at end of table

Appendix I-2

Table I-2-5. Summary of Positive Detections in Groundwater Analytical Results
Radiological Parameters

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Well ID				OLD-U1-17B		OLD-U1-18C	OLD-U1-19A	OLD-U1-20B	OLD-U1-21C	OLD-U1-22A	OLD-U1-23B
Sample Identifier	Background Screening [1]	FDEPG	FEDMCL	U1G01701	U1G01701D	U1G01801	U1G01901	U1G02001	U1G02101	U1G02201	U1G02301
Sampling Date				8/17/95		8/25/95	8/23/95	8/23/95	8/25/95	8/3/95	8/3/95
Screen Interval bls (feet)				29.5-34.5		42.5-47.5	12.5-22.5	29.5-34.5	45.5-50.5	9.5-19.5	34.5-39.5
Radiological, pCi/L											
Gross Alpha	13	15	15	3	2.6	3.5		2.6	2.6		1.6 J
Gross Alpha, Counting Error	ND	ND	ND	1.8	1.5	1.6	0.9	1.6	1.6	1	1.2
Gross Beta	9.5	ND	ND	9.1	3.9	6.2		4.2	3.4	3.4 J	5.3 J
Gross Beta, Counting Error	ND	ND	ND	2.4	1.7	1.7	1.6	1.8	2	1.9	1.8
Cesium-137	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Cesium-137, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Lead-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Lead-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Potassium-40	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Potassium-40, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Radium-228	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Radium-228, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-228	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-228, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-232	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-232, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-234	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-234, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-238	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-238, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA

See notes at end of table

Appendix I-2

Table I-2-5. Summary of Positive Detections in Groundwater Analytical Results
Radiological Parameters

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Well ID				OLD-U1-24C		OLD-U1-25A		OLD-U1-26B		
Sample Identifier	Background Screening [1]	FDEPG	FEDMCL	U1G02401		U1G02501		U1G02601	U1G02603	U1H02603
Sampling Date				8/4/95		8/8/95		8/4/95	10/16/95	
Screen Interval bls (feet)				64.5-69.5		9.5-19.5		44.5-49.5		
Radiological, pCi/L										
Gross Alpha	13	15	15	6	J	4.1	J	25.9	31.2	21.3
Gross Alpha, Counting Error	ND	ND	ND	2		1.8		9.7	8.6	4.2
Gross Beta	9.5	ND	ND	6.8	J	7.4	J	31.1 J	28.6	18.9
Gross Beta, Counting Error	ND	ND	ND	2.1		2.1		5.5	4.4	3.6
Cesium-137	ND	ND	ND	NA		NA		NA	-0.97	-1.2
Cesium-137, Uncertainty	ND	ND	ND	NA		NA		NA	1.4	1.47
Lead-210	ND	ND	ND	NA		NA		NA	NA	NA
Lead-210, Uncertainty	ND	ND	ND	NA		NA		NA	NA	NA
Polonium-210	ND	ND	ND	NA		NA		NA	NA	NA
Polonium-210, Uncertainty	ND	ND	ND	NA		NA		NA	NA	NA
Potassium-40	ND	ND	ND	NA		NA		NA	28.4	45.6
Potassium-40, Uncertainty	ND	ND	ND	NA		NA		NA	23.7	19.7
Radium-226	ND	ND	ND	NA		NA		NA	1.04	3.81
Radium-226, Uncertainty	ND	ND	ND	NA		NA		NA	0.26	0.43
Radium-228	ND	ND	ND	NA		NA		NA	0	2.03
Radium-228, Uncertainty	ND	ND	ND	NA		NA		NA	0.45	0.87
Thorium-227	ND	ND	ND	NA		NA		NA	0.06	0.04
Thorium-227, Uncertainty	ND	ND	ND	NA		NA		NA	0.02	0.01
Thorium-228	ND	ND	ND	NA		NA		NA	1.12	1.14
Thorium-228, Uncertainty	ND	ND	ND	NA		NA		NA	0.15	0.14
Thorium-230	ND	ND	ND	NA		NA		NA	2	2.42
Thorium-230, Uncertainty	ND	ND	ND	NA		NA		NA	0.24	0.27
Thorium-232	ND	ND	ND	NA		NA		NA	0.39	0.29
Thorium-232, Uncertainty	ND	ND	ND	NA		NA		NA	0.07	0.05
Uranium-234	ND	ND	ND	NA		NA		NA	3.85	4.8
Uranium-234, Uncertainty	ND	ND	ND	NA		NA		NA	0.43	0.52
Uranium-238	ND	ND	ND	NA		NA		NA	3.81	4.44
Uranium-238, Uncertainty	ND	ND	ND	NA		NA		NA	0.43	0.48

See notes at end of table

Appendix I-2

Table I-2-5. Summary of Positive Detections in Groundwater Analytical Results
Radiological Parameters

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Well ID				OLD-U1-27C				OLD-U1-28B		OLD-U1-29C	
Sample Identifier	Background Screening [1]	FDEPG	FEDMCL	U1G02701	U1G02701D	U1G02703	U1H02703	U1G02801	U1H02801	U1G02901	U1H02901
Sampling Date				8/7/95		10/17/95		28-Aug-96	28-Aug-96	28-Aug-96	28-Aug-96
Screen Interval bls (feet)				57.5-62.5							
Radiological, pCi/L											
Gross Alpha	13	15	15	47.6	46.2	53	31.4	44.2	4.49	22.9	3.75
Gross Alpha, Counting Error	ND	ND	ND	14.4	15.6	14.5	6.6	6.13	0.82	3.09	0.69
Gross Beta	9.5	ND	ND	69	87.6	57	21.6	31.7	6.67	32.1	10.7
Gross Beta, Counting Error	ND	ND	ND	7.9	9.5	6.2	5.6	4	0.96	3.54	1.34
Cesium-137	ND	ND	ND	NA	NA	-0.28	-1.29	NA	NA	NA	NA
Cesium-137, Uncertainty	ND	ND	ND	NA	NA	1.24	2	NA	NA	NA	NA
Lead-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	1.21	NA
Lead-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	0.54	NA
Polonium-210	ND	ND	ND	NA	NA	NA	NA	NA	NA	0.13	NA
Polonium-210, Uncertainty	ND	ND	ND	NA	NA	NA	NA	NA	NA	0.02	NA
Potassium-40	ND	ND	ND	NA	NA	7.74	-109	NA	NA	16.3	NA
Potassium-40, Uncertainty	ND	ND	ND	NA	NA	23.8	63.9	NA	NA	9.92	NA
Radium-226	ND	ND	ND	NA	NA	3.32	4.14	NA	NA	5.28	NA
Radium-226, Uncertainty	ND	ND	ND	NA	NA	0.21	0.2	NA	NA	0.13	NA
Radium-228	ND	ND	ND	NA	NA	1.76	1.26	NA	NA	NA	NA
Radium-228, Uncertainty	ND	ND	ND	NA	NA	0.38	0.43	NA	NA	NA	NA
Thorium-227	ND	ND	ND	NA	NA	0.04	0.05	NA	NA	NA	NA
Thorium-227, Uncertainty	ND	ND	ND	NA	NA	0.01	0.01	NA	NA	NA	NA
Thorium-228	ND	ND	ND	NA	NA	1.2	1.18	NA	NA	0.23	NA
Thorium-228, Uncertainty	ND	ND	ND	NA	NA	0.14	0.14	NA	NA	0.04	NA
Thorium-230	ND	ND	ND	NA	NA	3.43	4.5	NA	NA	1.74	NA
Thorium-230, Uncertainty	ND	ND	ND	NA	NA	0.37	0.48	NA	NA	0.2	NA
Thorium-232	ND	ND	ND	NA	NA	0.33	0.27	NA	NA	NA	NA
Thorium-232, Uncertainty	ND	ND	ND	NA	NA	0.05	0.05	NA	NA	NA	NA
Uranium-234	ND	ND	ND	NA	NA	7.74	8.18	NA	NA	5.59	NA
Uranium-234, Uncertainty	ND	ND	ND	NA	NA	0.83	0.88	NA	NA	0.58	NA
Uranium-238	ND	ND	ND	NA	NA	8.08	7.99	NA	NA	5.71	NA
Uranium-238, Uncertainty	ND	ND	ND	NA	NA	0.86	0.86	NA	NA	0.59	NA

See notes at end of table

Appendix I-2

Table I-2-5. Summary of Positive Detections in Groundwater Analytical Results
Radiological Parameters

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

NOTES:

[1] Groundwater background screening value is twice the average of detected concentrations for gross radioactivity.
Analytical results expressed in picocuries per liter (pCi/l)
FDEPG = Florida Department of Environmental Protection, Groundwater Guidance Concentrations, June 1994.
FEDMCL= Federal Maximum Contaminant Levels, Primary Drinking Water Regulations and Health Advisories, February 1996.
J = Reported concentration is an estimated quantity.
G = unfiltered water sample.
H = filtered water sample.
ND = Not determined
NA = Not analyzed
Bold/shaded numbers indicate exceedance of groundwater guidance and background.
Blank space indicates analyte/compound was not detected at the reporting limit.
"A", "B", and "C" designations in the Well ID indicate shallow, intermediate and deep screened intervals, respectively, within the surficial aquifer.

APPENDIX I-3

LABORATORY ANALYTICAL TABLES

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00100				U1S00100D				U1S00200				U1S00300		U1S00400		U1S00500	
Lab ID	G7395001		G7395001DL		G7395002		G7395002DL		G7395005		G7395005DL		G7395006		G7395007		G7395008	
Sampling Date	4/20/95				4/20/95				4/20/95				4/20/95		4/20/95		4/20/95	
Volatile organics, ug/kg																		
1,1,1-Trichloroethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
1,1,2,2-Tetrachloroethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
1,1,2-Trichloroethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
1,1-Dichloroethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
1,1-Dichloroethene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
1,2-Dichloroethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
1,2-Dichloroethene (total)	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
1,2-Dichloropropane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
2-Butanone	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
2-Hexanone	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
4-Methyl-2-pentanone	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Acetone	9	J	NA		7	J	NA		7	J	NA		10	J	6	J	9	J
Benzene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Bromodichloromethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Bromoform	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Bromomethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Carbon disulfide	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Carbon tetrachloride	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Chlorobenzene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Chloroethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Chloroform	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Chloromethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
cis-1,3-Dichloropropene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Dibromochloromethane	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Ethylbenzene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Methylene chloride	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Styrene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Tetrachloroethene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Toluene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
trans-1,3-Dichloropropene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Trichloroethene	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U
Vinyl chloride	12	U	NA		10	U	NA		10	U	NA		10	U	10	U	10	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00100		U1S00100D		U1S00200		U1S00300	U1S00400	U1S00500
Lab ID	G7395001	G7395001DL	G7395002	G7395002DL	G7395005	G7395005DL	G7395006	G7395007	G7395008
Sampling Date	4/20/95		4/20/95		4/20/95		4/20/95	4/20/95	4/20/95
Xylene (total)	12 U	NA	10 U	NA	10 U	NA	10 U	10 U	10 U
Semivolatile organics, ug/kg									
1,2,4-Trichlorobenzene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
1,2-Dichlorobenzene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
1,3-Dichlorobenzene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
1,4-Dichlorobenzene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2,2'-oxybis(1-Chloropropane)	340 UJ	NA	340 UJ	NA	340 UJ	NA	350 UJ	340 UJ	340 UJ
2,4,5-Trichlorophenol	850 U	NA	850 U	NA	840 U	NA	870 U	850 U	860 U
2,4,6-Trichlorophenol	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2,4-Dichlorophenol	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2,4-Dimethylphenol	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2,4-Dinitrophenol	850 U	NA	850 U	NA	840 U	NA	870 U	850 U	860 U
2,4-Dinitrotoluene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2,6-Dinitrotoluene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2-Chloronaphthalene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2-Chlorophenol	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2-Methylnaphthalene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2-Methylphenol	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
2-Nitroaniline	850 U	NA	850 U	NA	840 U	NA	870 U	850 U	860 U
2-Nitrophenol	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
3,3'-Dichlorobenzidine	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
3-Nitroaniline	850 U	NA	850 U	NA	840 U	NA	870 U	850 U	860 U
4,6-Dinitro-2-methylphenol	850 U	NA	850 U	NA	840 U	NA	870 U	850 U	860 U
4-Bromophenyl-phenylether	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
4-Chloro-3-methylphenol	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
4-Chloroaniline	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
4-Chlorophenyl-phenylether	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
4-Methylphenol	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
4-Nitroaniline	850 U	NA	850 U	NA	840 U	NA	870 U	850 U	860 U
4-Nitrophenol	850 U	NA	850 U	NA	840 U	NA	870 U	850 U	860 U
Acenaphthene	340 U	NA	340 U	NA	340 U	NA	350 U	100 J	340 U
Acenaphthylene	340 U	NA	340 U	NA	340 U	NA	350 U	340 U	340 U
Anthracene	340 U	NA	340 U	NA	340 U	NA	350 U	130 J	340 U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00100				U1S00100D				U1S00200				U1S00300		U1S00400		U1S00500	
Lab ID	G7395001		G7395001DL		G7395002		G7395002DL		G7395005		G7395005DL		G7395006		G7395007		G7395008	
Sampling Date	4/20/95				4/20/95				4/20/95				4/20/95		4/20/95		4/20/95	
Benzo(a)anthracene	340	U	NA		340	U	NA		340	U	NA		350	U	480		190	J
Benzo(a)pyrene	340	U	NA		340	U	NA		340	U	NA		350	U	400		200	J
Benzo(b)fluoranthene	340	U	NA		340	U	NA		340	U	NA		350	U	410		250	J
Benzo(g,h,i)perylene	340	U	NA		340	U	NA		340	U	NA		120	J	350		220	J
Benzo(k)fluoranthene	340	U	NA		340	U	NA		340	U	NA		350	U	390		210	J
bis(2-Chloroethoxy)methane	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
bis(2-Chloroethyl)ether	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
bis(2-Ethylhexyl)phthalate	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	210	J
Butylbenzylphthalate	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Carbazole	340	U	NA		340	U	NA		340	U	NA		350	U	93	J	340	U
Chrysene	340	U	NA		340	U	NA		340	U	NA		350	U	500		270	J
Di-n-butylphthalate	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Di-n-octylphthalate	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Dibenz(a,h)anthracene	340	U	NA		340	U	NA		340	U	NA		350	U	120	J	340	U
Dibenzofuran	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Diethylphthalate	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Dimethylphthalate	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Fluoranthene	340	U	NA		340	U	NA		93	J	NA		350	U	1100		490	
Fluorene	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Hexachlorobenzene	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Hexachlorobutadiene	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Hexachlorocyclopentadiene	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Hexachloroethane	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Indeno(1,2,3-cd)pyrene	340	U	NA		340	U	NA		340	U	NA		350	U	280	J	160	J
Isophorone	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
N-Nitroso-di-n-propylamine	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
N-Nitrosodiphenylamine (1)	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Naphthalene	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Nitrobenzene	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Pentachlorophenol	850	U	NA		850	U	NA		840	U	NA		870	U	850	U	860	U
Phenanthrene	340	U	NA		340	U	NA		340	U	NA		350	U	620		150	J
Phenol	340	U	NA		340	U	NA		340	U	NA		350	U	340	U	340	U
Pyrene	340	U	NA		340	U	NA		340	U	NA		350	U	1000		430	

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00100				U1S00100D				U1S00200				U1S00300		U1S00400		U1S00500	
Lab ID	G7395001		G7395001DL		G7395002		G7395002DL		G7395005		G7395005DL		G7395006		G7395007		G7395008	
Sampling Date	4/20/95				4/20/95				4/20/95				4/20/95		4/20/95		4/20/95	
Pesticides/PCBs, ug/kg																		
4,4'-DDD	3.4	U	34	UR	3.4	U	34	UR	3.5	U	35	UR	3.5	U	3.5		3.4	UJ
4,4'-DDE	21	NJ	21	DR	20	NJ	19	DR	25	NJ	27	DR	3.5	U	18		3.4	UJ
4,4'-DDT	13		12	DR	15		15	DR	13		16	DR	3.5	U	48		2.5	J
Aldrin	1.7	U	17	UR	1.7	U	17	UR	1.8	U	18	UR	1.8	U	1.7	U	1.8	UJ
alpha-BHC	1.7	U	17	UR	1.7	U	17	UR	1.8	U	18	UR	1.8	U	1.7	U	1.8	UJ
alpha-Chlordane	87	R	67	J	87	ER	70	DJ	100	ER	85	DJ	1.8	U	2.5	NJ	2.4	NJ
Aroclor-1016	34	U	340	UR	34	U	340	UR	35	U	350	UR	35	U	34	U	34	UJ
Aroclor-1221	68	U	680	UR	68	U	680	UR	71	U	710	UR	71	U	68	U	69	UJ
Aroclor-1232	34	U	340	UR	34	U	340	UR	35	U	350	UR	35	U	34	U	34	UJ
Aroclor-1242	34	U	340	UR	34	U	340	UR	35	U	350	UR	35	U	34	U	34	UJ
Aroclor-1248	34	U	340	UR	34	U	340	UR	35	U	350	UR	35	U	34	U	34	UJ
Aroclor-1254	34	U	340	UR	34	U	340	UR	35	U	350	UR	35	U	34	U	34	UJ
Aroclor-1260	120	J	340	UR	64	J	340	UR	79	J	350	UR	35	U	34	U	34	UJ
beta-BHC	1.7	U	17	UR	1.7	U	17	UR	1.8	U	18	UR	1.8	U	1.7	U	1.8	UJ
delta-BHC	1.7	U	17	UR	1.7	U	17	UR	1.8	U	18	UR	1.8	U	1.7	U	1.8	UJ
Dieldrin	150	R	180	D	140	R	170	D	6.7	J	17	DR	3.5	U	3.4	U	3.4	UJ
Endosulfan I	1.7	U	17	UR	1.7	U	17	UR	1.8	U	18	UR	1.8	U	1.7	U	1.8	UJ
Endosulfan II	3.4	U	34	UR	3.4	U	34	UR	3.5	U	35	UR	3.5	U	3.4	U	3.4	UJ
Endosulfan sulfate	3.4	U	34	UR	3.4	U	34	UR	3.5	U	35	UR	3.5	U	3.4	U	3.4	UJ
Endrin	3.4	U	34	UR	3.4	U	34	UR	3.5	U	35	UR	3.5	U	3.4	U	3.4	UJ
Endrin aldehyde	3.4	U	34	UR	3.4	U	34	UR	3.5	U	35	UR	3.5	U	3.4	U	3.4	UJ
Endrin ketone	3.4	U	34	UR	3.4	U	34	UR	3.5	U	35	UR	3.5	U	3.4	U	3.4	UJ
gamma-BHC (Lindane)	1.2	J	17	UR	1.7	U	17	UR	1.8	U	18	UR	1.8	U	1.7	U	1.8	UJ
gamma-Chlordane	48	R	40	D	48	ER	43	D	57	ER	53	D	1.8	U	2.1	J	2.5	J
Heptachlor	1.7	U	17	UR	1.7	U	17	UR	1.8	U	18	UR	1.8	U	1.7	U	1.8	UJ
Heptachlor epoxide	7.2		17	UR	6.5		17	UR	4.3		18	UR	1.8	U	1.7	U	1.8	UJ
Methoxychlor	17	U	170	UR	17	U	170	UR	18	U	180	UR	18	U	17	U	18	UJ
Toxaphene	170	U	1700	UR	170	U	1700	UR	180	U	1800	UR	180	U	170	U	180	UJ
Herbicides, ug/kg																		
2,4,5-T	41	U	NA		41	U	NA		40	U	NA		42	U	41	U	41	U
2,4,5-TP (Silvex)	34	U	NA		34	U	NA		36	U	NA		36	U	34	U	35	U
2,4-D	240	U	NA		240	U	NA		250	U	NA		250	U	240	U	250	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00100				U1S00100D				U1S00200				U1S00300		U1S00400		U1S00500	
Lab ID	G7395001		G7395001DL		G7395002		G7395002DL		G7395005		G7395005DL		G7395006		G7395007		G7395008	
Sampling Date	4/20/95				4/20/95				4/20/95				4/20/95		4/20/95		4/20/95	
2,4-DB	180	U	NA		180	U	NA		190	U	NA		190	U	180	U	190	U
Dalapon	1200	U	NA		1200	U	NA		1300	U	NA		1300	U	1200	U	1200	U
Dicamba	55	U	NA		55	U	NA		57	U	NA		57	U	55	U	56	U
Dichlorprop	130	U	NA		130	U	NA		140	U	NA		140	U	130	U	130	U
Dinoseb	14	U	NA		14	U	NA		15	U	NA		15	U	14	U	14	U
MCPA	51000	U	NA		51000	U	NA		53000	U	NA		53000	U	51000	U	51000	U
MCPP	41000	U	NA		41000	U	NA		42000	U	NA		42000	U	41000	U	41000	U
Inorganics, mg/kg																		
Aluminum	1200		NA		861		NA		726		NA		836		1020		871	
Antimony	7.1	U	NA		6.1	U	NA		6	U	NA		6.2	U	6	U	6.1	U
Arsenic	2.5		NA		2.9		NA		1.8	B	NA		0.42	J	0.63	J	0.39	UJ
Barium	15.1	B	NA		12.1	B	NA		14.5	B	NA		4.2	B	9.1	B	4.6	B
Beryllium	0.06	U	NA		0.04	U	NA		0.06	U	NA		0.06	U	0.08	U	0.06	U
Cadmium	2.1		NA		1.1		NA		1.5		NA		0.65	U	0.63	U	0.64	U
Calcium	8510	J	NA		4330	J	NA		30500	J	NA		106000	J	1350	J	62500	J
Chromium	16.1		NA		14.1		NA		15.5		NA		4		3		3	
Cobalt	0.7	U	NA		0.59	U	NA		0.59	U	NA		0.6	U	0.59	U	0.6	U
Copper	14.4		NA		11.3		NA		11.6		NA		1.2	U	5.1		1.6	U
Iron	664	J	NA		574	J	NA		378	J	NA		439	J	944	J	439	J
Lead	15.6	J	NA		19.2	J	NA		24.3	J	NA		5.5	J	22.5	J	2.2	J
Magnesium	135	B	NA		91.5	B	NA		257	B	NA		811	B	66.8	B	503	B
Manganese	8.7	J	NA		7	J	NA		9.3	J	NA		11.7	J	8.6	J	8.1	J
Mercury	0.2		NA		0.16		NA		0.74		NA		0.03	B	0.06		0.03	B
Nickel	3.4	U	NA		2.9	U	NA		2.9	U	NA		3	U	2.9	U	2.9	U
Potassium	107	U	NA		90.8	U	NA		105	B	NA		122	U	92.6	U	91.5	U
Selenium	0.55	UJ	NA		0.47	UJ	NA		0.47	UJ	NA		0.48	U	0.47	U	0.47	UJ
Silver	3.5		NA		2.8	U	NA		3.4	U	NA		0.54	U	0.8	U	0.54	U
Sodium	16.1	U	NA		8.6	U	NA		14	U	NA		31.8	U	11.6	U	22.8	U
Thallium	0.45	U	NA		0.38	U	NA		0.38	U	NA		0.39	U	0.38	U	0.38	U
Vanadium	1.3	J	NA		0.98	J	NA		1.9	J	NA		5.8	J	1.8	J	3.5	J
Zinc	60.1		NA		46.8		NA		56.4		NA		8.8		31.2		12.9	
General Chemistry, mg/kg																		
Total Petroleum Hydrocarbons	33.5		NA		96.6		NA		51.6		NA		55.4		62.1		59.9	

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00600		U1S00700		U1S00800		U1S00800		U1S00900		U1S01000		U1S01000		U1S01100		U1S01100D	
Lab ID	G7395009		G7395010		G7395011		G7395011DL		G7395012		G7395013		G7395013DL		G7395014		G7395015	
Sampling Date	4/20/95		4/20/95		4/20/95				4/20/95		4/20/95				4/20/95		4/20/95	
Volatile organics, ug/kg																		
1,1,1-Trichloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
1,1,2,2-Tetrachloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
1,1,2-Trichloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
1,1-Dichloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
1,1-Dichloroethene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
1,2-Dichloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
1,2-Dichloroethene (total)	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
1,2-Dichloropropane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
2-Butanone	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
2-Hexanone	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
4-Methyl-2-pentanone	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Acetone	11		10	U	6	J	NA		9	J	18	J	NA		11	J	8	J
Benzene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Bromodichloromethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Bromoform	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Bromomethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Carbon disulfide	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Carbon tetrachloride	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Chlorobenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Chloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Chloroform	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Chloromethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
cis-1,3-Dichloropropene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Dibromochloromethane	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Ethylbenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Methylene chloride	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Styrene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Tetrachloroethene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Toluene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
trans-1,3-Dichloropropene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Trichloroethene	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Vinyl chloride	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00600		U1S00700		U1S00800				U1S00900		U1S01000				U1S01100		U1S01100D	
Lab ID	G7395009		G7395010		G7395011		G7395011DL		G7395012		G7395013		G7395013DL		G7395014		G7395015	
Sampling Date	4/20/95		4/20/95		4/20/95				4/20/95		4/20/95				4/20/95		4/20/95	
Xylene (total)	10	U	10	U	10	U	NA		10	U	10	U	NA		10	U	10	U
Semivolatile organics, ug/kg																		
1,2,4-Trichlorobenzene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
1,2-Dichlorobenzene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
1,3-Dichlorobenzene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
1,4-Dichlorobenzene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2,2'-oxybis(1-Chloropropane)	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2,4,5-Trichlorophenol	850	U	850	U	850	U	NA		850	U	890	U	2200	UR	850	U	850	U
2,4,6-Trichlorophenol	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2,4-Dichlorophenol	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2,4-Dimethylphenol	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2,4-Dinitrophenol	850	U	850	U	850	U	NA		850	U	890	U	2200	UR	850	U	850	U
2,4-Dinitrotoluene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2,6-Dinitrotoluene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2-Chloronaphthalene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2-Chlorophenol	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2-Methylnaphthalene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2-Methylphenol	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
2-Nitroaniline	850	U	850	U	850	U	NA		850	U	890	U	2200	UR	850	U	850	U
2-Nitrophenol	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
3,3'-Dichlorobenzidine	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
3-Nitroaniline	850	U	850	U	850	U	NA		850	U	890	U	2200	UR	850	U	850	U
4,6-Dinitro-2-methylphenol	850	U	850	U	850	U	NA		850	U	890	U	2200	UR	850	U	850	U
4-Bromophenyl-phenylether	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
4-Chloro-3-methylphenol	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
4-Chloroaniline	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
4-Chlorophenyl-phenylether	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
4-Methylphenol	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
4-Nitroaniline	850	U	850	U	850	U	NA		850	U	890	U	2200	UR	850	U	850	U
4-Nitrophenol	850	U	850	U	850	U	NA		850	U	890	U	2200	UR	850	U	850	U
Acenaphthene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
Acenaphthylene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U
Anthracene	340	U	340	U	340	U	NA		340	U	350	U	890	UR	340	U	340	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00600	U1S00700	U1S00800		U1S00900	U1S01000		U1S01100	U1S01100D
Lab ID	G7395009	G7395010	G7395011	G7395011DL	G7395012	G7395013	G7395013DL	G7395014	G7395015
Sampling Date	4/20/95	4/20/95	4/20/95		4/20/95	4/20/95		4/20/95	4/20/95
Benzo(a)anthracene	340 U	340 U	340 U	NA	340 U	120 J	890 UR	340 U	340 U
Benzo(a)pyrene	340 U	340 U	340 U	NA	340 U	1200	1200 DR	340 U	340 U
Benzo(b)fluoranthene	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Benzo(g,h,i)perylene	340 U	340 U	340 U	NA	340 U	2500	2000 DR	340 U	340 U
Benzo(k)fluoranthene	340 U	340 U	340 U	NA	340 U	3400 ER	4000 D	340 U	340 U
bis(2-Chloroethoxy)methane	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
bis(2-Chloroethyl)ether	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
bis(2-Ethylhexyl)phthalate	340 U	340 U	340 U	NA	340 U	280 J	890 UR	190 J	340 U
Butylbenzylphthalate	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Carbazole	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Chrysene	340 U	340 U	340 U	NA	340 U	210 J	290 DR	340 U	340 U
Di-n-butylphthalate	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Di-n-octylphthalate	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Dibenz(a,h)anthracene	340 U	340 U	340 U	NA	340 U	760	630 DR	340 U	340 U
Dibenzofuran	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Diethylphthalate	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Dimethylphthalate	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Fluoranthene	340 U	340 U	340 U	NA	340 U	120 J	890 UR	340 U	340 U
Fluorene	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Hexachlorobenzene	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Hexachlorobutadiene	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Hexachlorocyclopentadiene	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Hexachloroethane	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Indeno(1,2,3-cd)pyrene	340 U	340 U	340 U	NA	340 U	2300	1900 DR	340 U	340 U
Isophorone	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
N-Nitroso-di-n-propylamine	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
N-Nitrosodiphenylamine (1)	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Naphthalene	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Nitrobenzene	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Pentachlorophenol	850 U	850 U	850 U	NA	850 U	890 U	2200 UR	850 U	850 U
Phenanthrene	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Phenol	340 U	340 U	340 U	NA	340 U	350 U	890 UR	340 U	340 U
Pyrene	340 U	340 U	340 U	NA	340 U	160 J	890 UR	340 U	340 U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00600		U1S00700		U1S00800		U1S00800		U1S00900		U1S01000		U1S01000		U1S01100		U1S01100D	
Lab ID	G7395009		G7395010		G7395011		G7395011DL		G7395012		G7395013		G7395013DL		G7395014		G7395015	
Sampling Date	4/20/95		4/20/95		4/20/95				4/20/95		4/20/95				4/20/95		4/20/95	
Pesticides/PCBs, ug/kg																		
4,4'-DDD	3.4	U	18	U	3.5	U	18	UR	3.4	U	3.5	U	NA		3.4	U	3.4	U
4,4'-DDE	3.2	J	43	J	3.6	J	18	UR	3.4	NJ	3.5	U	NA		3.4	U	3.4	U
4,4'-DDT	2	J	18	J	3.5	U	18	UR	3.4	U	3.5	U	NA		3.4	U	3.4	U
Aldrin	1.8	U	9.2	U	1.8	U	9.1	UR	1.7	U	1.8	U	NA		1.7	U	1.7	U
alpha-BHC	1.8	U	9.2	U	1.8	U	9.1	UR	1.7	U	1.8	U	NA		1.7	U	1.7	U
alpha-Chlordane	7	J	43	J	16	J	16	DR	20	J	1.8	U	NA		1.7	U	1.7	U
Aroclor-1016	34	U	180	U	35	U	180	UR	34	U	35	U	NA		34	U	34	U
Aroclor-1221	69	U	360	U	72	U	360	UR	68	U	71	U	NA		68	U	68	U
Aroclor-1232	34	U	180	U	35	U	180	UR	34	U	35	U	NA		34	U	34	U
Aroclor-1242	34	U	180	U	35	U	180	UR	34	U	35	U	NA		34	U	34	U
Aroclor-1248	34	U	180	U	35	U	180	UR	34	U	35	U	NA		34	U	34	U
Aroclor-1254	34	U	180	U	35	U	180	UR	34	U	35	U	NA		34	U	34	U
Aroclor-1260	34	U	150	J	50	J	180	UR	84		35	U	NA		34	U	34	U
beta-BHC	1.8	U	9.2	U	1.8	U	9.1	UR	1.7	U	1.8	U	NA		1.7	U	1.7	U
delta-BHC	1.8	U	9.2	U	1.8	U	9.1	UR	1.7	U	1.8	U	NA		1.7	U	1.7	U
Dieldrin	4.4		89		96	ER	98	D	15		3.5	U	NA		3.4	U	3.4	U
Endosulfan I	1.8	U	9.2	U	1.8	U	9.1	UR	1.7	U	1.8	U	NA		1.7	U	1.7	U
Endosulfan II	3.4	U	18	U	3.5	U	18	UR	3.4	U	3.5	U	NA		3.4	U	3.4	U
Endosulfan sulfate	3.4	U	18	U	3.5	U	18	UR	3.4	U	3.5	U	NA		3.4	U	3.4	U
Endrin	3.4	U	18	U	3.5	U	18	UR	3.4	U	3.5	U	NA		3.4	U	3.4	U
Endrin aldehyde	3.4	U	18	U	3.5	U	18	UR	3.4	U	3.5	U	NA		3.4	U	3.4	U
Endrin ketone	3.4	U	18	U	3.5	U	18	UR	3.4	U	3.5	U	NA		3.4	U	3.4	U
gamma-BHC (Lindane)	1.8	U	9.2	U	1.8	U	9.1	UR	1.7	U	1.8	U	NA		1.7	U	1.7	U
gamma-Chlordane	5.4		36		9.4		9.4	DR	11		1.8	U	NA		1.7	U	1.7	U
Heptachlor	1.8	U	9.2	U	1.8	U	9.1	UR	1.7	U	1.8	U	NA		1.7	U	1.7	U
Heptachlor epoxide	1.8	U	6.7	J	1.8	U	9.1	UR	1.7	U	1.8	U	NA		1.7	U	1.7	U
Methoxychlor	18	U	92	U	18	U	91	UR	17	U	18	U	NA		17	U	17	U
Toxaphene	180	U	920	U	180	U	910	UR	170	U	180	U	NA		170	U	170	U
Herbicides, ug/kg																		
2,4,5-T	41	U	43	U	43	U	NA		41	U	42	U	NA		41	U	41	U
2,4,5-TP (Silvex)	35	U	37	U	37	U	NA		35	U	36	U	NA		35	U	35	U
2,4-D	250	U	260	U	260	U	NA		240	U	250	U	NA		240	U	240	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S00600		U1S00700		U1S00800				U1S00900		U1S01000				U1S01100		U1S01100D	
Lab ID	G7395009		G7395010		G7395011		G7395011DL		G7395012		G7395013		G7395013DL		G7395014		G7395015	
Sampling Date	4/20/95		4/20/95		4/20/95				4/20/95		4/20/95				4/20/95		4/20/95	
2,4-DB	190	U	200	U	190	U	NA		180	U	190	U	NA		180	U	180	U
Dalapon	1200	U	1300	U	1300	U	NA		1200	U	1300	U	NA		1200	U	1200	U
Dicamba	56	U	59	U	58	U	NA		55	U	57	U	NA		55	U	55	U
Dichlorprop	130	U	140	U	140	U	NA		130	U	140	U	NA		130	U	130	U
Dinoseb	14	U	15	U	15	U	NA		14	U	15	U	NA		14	U	14	U
MCPA	51000	U	54000	U	54000	U	NA		51000	U	53000	U	NA		51000	U	51000	U
MCPP	41000	U	43000	U	43000	U	NA		41000	U	42000	U	NA		41000	U	41000	U
Inorganics, mg/kg																		
Aluminum	421		522		182		NA		405		540		NA		265		214	
Antimony	6.3	U	6.1	U	6.1	U	NA		6	U	6.2	U	NA		6	U	6	U
Arsenic	0.4	UJ	1.4	B	1.3	B	NA		1.8	J	0.4	U	NA		0.38	U	0.38	U
Barium	4.2	B	19.1	B	4.6	B	NA		11.8	B	4	B	NA		1.3	B	0.96	B
Beryllium	0.07	U	0.08	U	0.02	U	NA		0.02	U	0.05	U	NA		0.04	U	0.03	U
Cadmium	0.66	U	1.4		0.64	U	NA		0.8	B	0.65	U	NA		0.62	U	0.62	U
Calcium	32800	J	3230	J	305	J	NA		681	J	119000	J	NA		22500	J	20900	J
Chromium	2.4		26.8		5.2		NA		9.8		3.8		NA		1.3	B	1.1	B
Cobalt	0.61	U	0.59	U	0.6	U	NA		0.59	U	0.61	U	NA		0.58	U	0.58	U
Copper	2.7	B	15.2		5.3		NA		8.2		0.62	U	NA		0.45	U	0.28	U
Iron	150	J	409	J	142	J	NA		133	J	271	J	NA		142	J	109	J
Lead	1.4	J	14.1	J	7.7	J	NA		3.6	J	6.7	J	NA		1.6	J	1.4	J
Magnesium	254	B	84.1	B	21.5	U	NA		20.7	U	922	B	NA		190	B	176	B
Manganese	4.7	J	6.5	J	2.4	J	NA		1.9	J	10.4	J	NA		3.3	J	3.6	J
Mercury	0.02	B	0.16		0.11		NA		0.14		0.02	U	NA		0.02	U	0.02	U
Nickel	3	U	2.9	U	2.9	U	NA		2.9	U	3	U	NA		2.9	U	2.9	U
Potassium	113	U	93.8	U	91.2	U	NA		90.4	U	93.5	U	NA		89.3	U	89.3	U
Selenium	0.49	UJ	0.47	UJ	0.47	U	NA		0.47	U	4.8	UJ	NA		4.6	UJ	0.46	UJ
Silver	0.64	U	6		1.2	U	NA		2.2	U	0.55	U	NA		0.52	U	0.52	U
Sodium	13.7	U	10.9	U	8.5	U	NA		7.2	U	36.2	U	NA		13.5	U	10.8	U
Thallium	0.4	U	0.38	U	0.38	U	NA		0.38	UJ	0.39	J	NA		0.38	UJ	0.38	UJ
Vanadium	1.5	J	0.76	J	0.51	UJ	NA		0.54	J	5.2	J	NA		1	J	1.3	J
Zinc	5.1		56.1		18.7		NA		30.1		2.6	B	NA		4.3		3.3	B
General Chemistry, mg/kg																		
Total Petroleum Hydrocarbons	32.9		20.6		18.5		NA		19		23.8		NA		29.9		31.5	

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S01200		U1S01300		U1S01400	
Lab ID	G7395016		G7395017		G7395018	
Sampling Date	4/20/95		4/20/95		4/20/95	
Volatile organics, ug/kg						
1,1,1-Trichloroethane	11	U	10	U	10	U
1,1,2,2-Tetrachloroethane	11	U	10	U	10	U
1,1,2-Trichloroethane	11	U	10	U	10	U
1,1-Dichloroethane	11	U	10	U	10	U
1,1-Dichloroethene	11	U	10	U	10	U
1,2-Dichloroethane	11	U	10	U	10	U
1,2-Dichloroethene (total)	11	U	10	U	10	U
1,2-Dichloropropane	11	U	10	U	10	U
2-Butanone	11	U	10	U	10	U
2-Hexanone	11	U	10	U	10	U
4-Methyl-2-pentanone	11	U	10	U	10	U
Acetone	8	J	6	J	7	J
Benzene	11	U	10	U	10	U
Bromodichloromethane	11	U	10	U	10	U
Bromoform	11	U	10	U	10	U
Bromomethane	11	U	10	U	10	U
Carbon disulfide	11	U	10	U	10	U
Carbon tetrachloride	11	U	10	U	10	U
Chlorobenzene	11	U	10	U	10	U
Chloroethane	11	U	10	U	10	U
Chloroform	11	U	10	U	10	U
Chloromethane	11	U	10	U	10	U
cis-1,3-Dichloropropene	11	U	10	U	10	U
Dibromochloromethane	11	U	10	U	10	U
Ethylbenzene	11	U	10	U	10	U
Methylene chloride	11	U	10	U	10	U
Styrene	11	U	10	U	10	U
Tetrachloroethene	11	U	10	U	10	U
Toluene	11	U	10	U	10	U
trans-1,3-Dichloropropene	11	U	10	U	10	U
Trichloroethene	11	U	10	U	10	U
Vinyl chloride	11	U	10	U	10	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S01200		U1S01300		U1S01400	
Lab ID	G7395016		G7395017		G7395018	
Sampling Date	4/20/95		4/20/95		4/20/95	
Xylene (total)	11	U	10	U	10	U
Semivolatile organics, ug/kg						
1,2,4-Trichlorobenzene	350	U	340	U	340	U
1,2-Dichlorobenzene	350	U	340	U	340	U
1,3-Dichlorobenzene	350	U	340	U	340	U
1,4-Dichlorobenzene	350	U	340	U	340	U
2,2'-oxybis(1-Chloropropane)	350	U	340	U	340	U
2,4,5-Trichlorophenol	870	U	850	U	840	U
2,4,6-Trichlorophenol	350	U	340	U	340	U
2,4-Dichlorophenol	350	U	340	U	340	U
2,4-Dimethylphenol	350	U	340	U	340	U
2,4-Dinitrophenol	870	U	850	U	840	U
2,4-Dinitrotoluene	350	U	340	U	340	U
2,6-Dinitrotoluene	350	U	340	U	340	U
2-Chloronaphthalene	350	U	340	U	340	U
2-Chlorophenol	350	U	340	U	340	U
2-Methylnaphthalene	350	U	340	U	340	U
2-Methylphenol	350	U	340	U	340	U
2-Nitroaniline	870	U	850	U	840	U
2-Nitrophenol	350	U	340	U	340	U
3,3'-Dichlorobenzidine	350	U	340	U	340	U
3-Nitroaniline	870	U	850	U	840	U
4,6-Dinitro-2-methylphenol	870	U	850	U	840	U
4-Bromophenyl-phenylether	350	U	340	U	340	U
4-Chloro-3-methylphenol	350	U	340	U	340	U
4-Chloroaniline	350	U	340	U	340	U
4-Chlorophenyl-phenylether	350	U	340	U	340	U
4-Methylphenol	350	U	340	U	340	U
4-Nitroaniline	870	U	850	U	840	U
4-Nitrophenol	870	U	850	U	840	U
Acenaphthene	350	U	340	U	340	U
Acenaphthylene	350	U	340	U	340	U
Anthracene	350	U	340	U	340	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S01200		U1S01300		U1S01400	
Lab ID	G7395016		G7395017		G7395018	
Sampling Date	4/20/95		4/20/95		4/20/95	
Benzo(a)anthracene	350	U	340	U	340	U
Benzo(a)pyrene	350	U	340	U	340	U
Benzo(b)fluoranthene	350	U	340	U	340	U
Benzo(g,h,i)perylene	350	U	340	U	340	U
Benzo(k)fluoranthene	350	U	340	U	340	U
bis(2-Chloroethoxy)methane	350	U	340	U	340	U
bis(2-Chloroethyl)ether	350	U	340	U	340	U
bis(2-Ethylhexyl)phthalate	350	U	340	U	340	U
Butylbenzylphthalate	350	U	340	U	340	U
Carbazole	350	U	340	U	340	U
Chrysene	350	U	340	U	340	U
Di-n-butylphthalate	350	U	340	U	340	U
Di-n-octylphthalate	350	U	340	U	340	U
Dibenz(a,h)anthracene	350	U	340	U	340	U
Dibenzofuran	350	U	340	U	340	U
Diethylphthalate	350	U	340	U	340	U
Dimethylphthalate	350	U	340	U	340	U
Fluoranthene	350	U	340	U	340	U
Fluorene	350	U	340	U	340	U
Hexachlorobenzene	350	U	340	U	340	U
Hexachlorobutadiene	350	U	340	U	340	U
Hexachlorocyclopentadiene	350	U	340	U	340	U
Hexachloroethane	350	U	340	U	340	U
Indeno(1,2,3-cd)pyrene	350	U	340	U	340	U
Isophorone	350	U	340	U	340	U
N-Nitroso-di-n-propylamine	350	U	340	U	340	U
N-Nitrosodiphenylamine (1)	350	U	340	U	340	U
Naphthalene	350	U	340	U	340	U
Nitrobenzene	350	U	340	U	340	U
Pentachlorophenol	870	U	850	U	840	U
Phenanthrene	350	U	340	U	340	U
Phenol	350	U	340	U	340	U
Pyrene	350	U	340	U	340	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S01200		U1S01300		U1S01400	
Lab ID	G7395016		G7395017		G7395018	
Sampling Date	4/20/95		4/20/95		4/20/95	
Pesticides/PCBs, ug/kg						
4,4'-DDD	3.4	U	3.4	U	3.4	U
4,4'-DDE	3.4	U	1.8	J	3.4	U
4,4'-DDT	3.4	U	3.4	U	3.4	U
Aldrin	1.8	U	1.7	U	1.7	U
alpha-BHC	1.8	U	1.7	U	1.7	U
alpha-Chlordane	1.7	J	3.4	NJ	1.1	NJ
Aroclor-1016	34	U	34	U	34	U
Aroclor-1221	70	U	68	U	68	U
Aroclor-1232	34	U	34	U	34	U
Aroclor-1242	34	U	34	U	34	U
Aroclor-1248	34	U	34	U	34	U
Aroclor-1254	34	U	34	U	34	U
Aroclor-1260	34	U	35	J	34	U
beta-BHC	1.8	U	1.7	U	1.7	U
delta-BHC	1.8	U	1.7	U	1.7	U
Dieldrin	3.8		3.4	U	3.4	U
Endosulfan I	1.8	U	1.7	U	1.7	U
Endosulfan II	3.4	U	3.4	U	3.4	U
Endosulfan sulfate	3.4	U	3.4	U	3.4	U
Endrin	3.4	U	3.4	U	3.4	U
Endrin aldehyde	3.4	U	3.4	U	3.4	U
Endrin ketone	3.4	U	3.4	U	3.4	U
gamma-BHC (Lindane)	1.8	U	1.7	U	1.7	U
gamma-Chlordane	1	J	2.1		1.7	U
Heptachlor	1.8	U	1.7	U	1.7	U
Heptachlor epoxide	1.8	U	1.7	U	1.7	U
Methoxychlor	18	U	17	U	17	U
Toxaphene	180	U	170	U	170	U
Herbicides, ug/kg						
2,4,5-T	42	U	41	U	41	U
2,4,5-TP (Silvex)	35	U	35	U	35	U
2,4-D	250	U	240	U	240	U

Appendix I-3

Table I-3-1. Summary of Surface Soil Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1S01200		U1S01300		U1S01400	
Lab ID	G7395016		G7395017		G7395018	
Sampling Date	4/20/95		4/20/95		4/20/95	
2,4-DB	190	U	180	U	180	U
Dalapon	1300	U	1200	U	1200	U
Dicamba	56	U	55	U	55	U
Dichlorprop	140	U	130	U	130	U
Dinoseb	15	U	14	U	14	U
MCPA	52000	U	51000	U	51000	U
MCPP	42000	U	41000	U	41000	U
Inorganics, mg/kg						
Aluminum	510		380		946	
Antimony	6.3	U	6.1	U	6.1	U
Arsenic	0.91	B	0.83	B	1	B
Barium	4.1	B	5.8	B	1.9	B
Beryllium	0.06	U	0.04	U	0.03	U
Cadmium	0.66	U	0.64	U	0.64	U
Calcium	58900	J	6960	J	3340	J
Chromium	4		3.5		1.5	B
Cobalt	0.66	U	0.68	U	0.59	U
Copper	2.3	B	4.6	B	0.9	U
Iron	174	J	113	J	337	J
Lead	3.1	J	4.8	J	2.3	J
Magnesium	445	B	92.3	B	59.5	B
Manganese	7.4	J	2.3	J	1.5	J
Mercury	0.02	U	0.06		0.02	U
Nickel	3	U	2.9	U	2.9	U
Potassium	108	U	90.9	U	91	U
Selenium	0.49	UJ	0.47	UJ	0.47	UJ
Silver	0.56	U	3.3		0.53	U
Sodium	20.5	U	9.3	U	9.2	U
Thallium	0.4	U	0.38	UJ	0.38	U
Vanadium	2.7	J	0.51	UJ	1.3	UJ
Zinc	5		22.6		2.8	J
General Chemistry, mg/kg						
Total Petroleum Hydrocarbons	16		13.7		10.1	

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00101		U1G00201	U1G00301	U1G00303	U1G00401	U1G00501	U1G00601	U1G00701	U1G00801
Lab ID	G8192002	G8192002RE	G8186003	G8192003	G8616009	G8220003	G8220002	G8234002	G8234003	G8234004
Sampling Date	8/9/95	8/9/95	8/8/95	8/9/95	10/19/95	8/14/95	8/14/95	8/15/95	8/15/95	8/15/95
Volatile organics, ug/L										
1,1,1-Trichloroethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
1,1,2,2-Tetrachloroethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
1,1,2-Trichloroethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
1,1-Dichloroethene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
1,2-Dichloropropane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
2-Hexanone	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Acetone	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Benzene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Bromoform	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Bromomethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Carbon tetrachloride	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Chloroethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Chloromethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 UJ	10 UJ	10 UJ
cis-1,3-Dichloropropene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Methylene chloride	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Styrene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
trans-1,3-Dichloropropene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	10 U	NA	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00101		U1G00101		U1G00201		U1G00301		U1G00303		U1G00401		U1G00501		U1G00601		U1G00701		U1G00801	
Lab ID	G8192002		G8192002RE		G8186003		G8192003		G8616009		G8220003		G8220002		G8234002		G8234003		G8234004	
Sampling Date	8/9/95		8/9/95		8/8/95		8/9/95		10/19/95		8/14/95		8/14/95		8/15/95		8/15/95		8/15/95	
Xylene (total)	10	U	NA		10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
Semivolatile organics, ug/L																				
1,2,4-Trichlorobenzene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
1,2-Dichlorobenzene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
1,3-Dichlorobenzene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
1,4-Dichlorobenzene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2,2'-oxybis(1-Chloropropane)	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2,4,5-Trichlorophenol	25	U	25	UR	25	U	25	U	NA		25	U	25	U	25	U	25	U	25	U
2,4,6-Trichlorophenol	10	U	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2,4-Dichlorophenol	10	U	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2,4-Dimethylphenol	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2,4-Dinitrophenol	25	U	25	UR	25	U	25	U	NA		25	U	25	U	25	U	25	U	25	U
2,4-Dinitrotoluene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2,6-Dinitrotoluene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2-Chloronaphthalene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2-Chlorophenol	10	U	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2-Methylnaphthalene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2-Methylphenol	10	U	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
2-Nitroaniline	25	UJ	25	UR	25	U	25	U	NA		25	U	25	U	25	U	25	U	25	U
2-Nitrophenol	10	U	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
3-Nitroaniline	25	UJ	25	UR	25	U	25	U	NA		25	U	25	U	25	U	25	U	25	U
4,6-Dinitro-2-methylphenol	25	UJ	25	UR	25	U	25	U	NA		25	U	25	U	25	U	25	U	25	U
4-Bromophenyl-phenylether	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
4-Chloro-3-methylphenol	10	U	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
4-Chloroaniline	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
4-Chlorophenyl-phenylether	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
4-Methylphenol	10	U	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
4-Nitroaniline	25	U	25	UR	25	U	25	U	NA		25	U	25	U	25	U	25	U	25	U
4-Nitrophenol	25	U	25	UR	25	U	25	U	NA		25	U	25	U	25	U	25	U	25	U
Acenaphthene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
Acenaphthylene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U
Anthracene	10	UJ	10	UR	10	U	10	U	NA		10	U	10	U	10	U	10	U	10	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00101		U1G00201	U1G00301	U1G00303	U1G00401	U1G00501	U1G00601	U1G00701	U1G00801
Lab ID	G8192002	G8192002RE	G8186003	G8192003	G8616009	G8220003	G8220002	G8234002	G8234003	G8234004
Sampling Date	8/9/95	8/9/95	8/8/95	8/9/95	10/19/95	8/14/95	8/14/95	8/15/95	8/15/95	8/15/95
Benzo(a)anthracene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	10 UJ	10 UR	30	3 J	NA	10 U	3 J	10 U	10 U	10 U
Butylbenzylphthalate	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Carbazole	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Chrysene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Dimethylphthalate	10 UJ	10 UR	10 U	7 J	NA	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Fluorene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Isophorone	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine (1)	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 UR	25 U	25 U	NA	25 U	25 U	25 U	25 U	25 U
Phenanthrene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U
Phenol	10 U	10 UR	10 U	10 U	NA	10 U	1 J	10 U	10 U	10 U
Pyrene	10 UJ	10 UR	10 U	10 U	NA	10 U	10 U	10 U	10 U	10 U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00101		U1G00101		U1G00201		U1G00301		U1G00303		U1G00401		U1G00501		U1G00601		U1G00701		U1G00801	
Lab ID	G8192002		G8192002RE		G8186003		G8192003		G8616009		G8220003		G8220002		G8234002		G8234003		G8234004	
Sampling Date	8/9/95		8/9/95		8/8/95		8/9/95		10/19/95		8/14/95		8/14/95		8/15/95		8/15/95		8/15/95	
Pesticides/PCBs, ug/L																				
4,4'-DDD	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
4,4'-DDE	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
4,4'-DDT	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
Aldrin	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
alpha-BHC	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	UJ	0.05	UJ
alpha-Chlordane	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
Aroclor-1016	1	U	NA		1	U	1	UJ	NA		1	UJ	1	U	1	UJ	1	U	1	U
Aroclor-1221	2	U	NA		2	U	2	UJ	NA		2	UJ	2	U	2	UJ	2	U	2	U
Aroclor-1232	1	U	NA		1	U	1	UJ	NA		1	UJ	1	U	1	UJ	1	U	1	U
Aroclor-1242	1	U	NA		1	U	1	UJ	NA		1	UJ	1	U	1	UJ	1	U	1	U
Aroclor-1248	1	U	NA		1	U	1	UJ	NA		1	UJ	1	U	1	UJ	1	U	1	U
Aroclor-1254	1	U	NA		1	U	1	UJ	NA		1	UJ	1	U	1	UJ	1	U	1	U
Aroclor-1260	1	U	NA		1	U	1	UJ	NA		1	UJ	1	U	1	UJ	1	U	1	U
beta-BHC	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
delta-BHC	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
Dieldrin	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
Endosulfan I	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
Endosulfan II	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
Endosulfan sulfate	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
Endrin	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
Endrin aldehyde	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
Endrin ketone	0.1	U	NA		0.1	U	0.1	UJ	NA		0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U
gamma-BHC (Lindane)	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
gamma-Chlordane	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
Heptachlor	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
Heptachlor epoxide	0.05	U	NA		0.05	U	0.05	UJ	NA		0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U
Methoxychlor	0.5	U	NA		0.5	U	0.5	UJ	NA		0.5	UJ	0.5	U	0.5	UJ	0.5	U	0.5	U
Toxaphene	5	U	NA		5	U	5	UJ	NA		5	UJ	5	U	5	UJ	5	U	5	U
Herbicides, ug/L																				
2,4,5-T	0.5	U	NA		0.5	U	0.5	U	NA		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2,4,5-TP (Silvex)	0.5	U	NA		0.5	U	0.5	U	NA		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2,4-D	3.4		NA		2.5	U	2.5	U	NA		2.5	U	2.5	U	2.5	U	2.5	U	2.5	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00101		U1G00201	U1G00301	U1G00303	U1G00401	U1G00501	U1G00601	U1G00701	U1G00801
Lab ID	G8192002	G8192002RE	G8186003	G8192003	G8616009	G8220003	G8220002	G8234002	G8234003	G8234004
Sampling Date	8/9/95	8/9/95	8/8/95	8/9/95	10/19/95	8/14/95	8/14/95	8/15/95	8/15/95	8/15/95
2,4-DB	2.5 U	NA	2.5 U	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Dalapon	5 U	NA	5 U	5 U	NA	5 U	5 U	5 U	5 U	5 U
Dicamba	0.5 U	NA	0.5 U	0.5 U	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dichlorprop	2.5 U	NA	2.5 U	2.5 U	NA	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Dinoseb	0.5 UJ	NA	0.5 UJ	0.5 UJ	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
MCPA	250 U	NA	250 U	250 U	NA	250 U	250 U	250 U	250 U	250 U
MCPP	250 U	NA	250 U	250 U	NA	250 U	250 U	250 U	250 U	250 U
Inorganics, ug/L										
Aluminum	180 B	NA	1760	35,700	NA	582	545	5030	426	24.7 UJ
Antimony	24.3 U	NA	24.3 U	24.3 U	NA	24.3 U	24.3 U	24.3 U	24.3 U	24.3 U
Arsenic	1.5 U	NA	1.5 U	14.8 UJ	NA	1.5 UJ	1.9 UJ	14	1.5 U	1.5 UJ
Barium	5 B	NA	25.9 B	596	NA	8.4 B	36.4 B	149 B	32.1 B	0.5 U
Beryllium	0.2 U	NA	0.2 U	7.1	NA	0.2 UJ	0.2 UJ	0.32 J	0.2 UJ	0.2 UJ
Cadmium	2.4 U	NA	2.4 U	4.2 B	NA	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Calcium	39400	NA	1860 B	128,000	NA	6670	1970 B	15100	9190	15.7 UJ
Chromium	2 U	NA	2.6 U	61.2	NA	2 U	2 U	10.3	2 U	2 U
Cobalt	3 U	NA	3 U	3.0 U	NA	3 U	3 U	3 U	3 U	3 U
Copper	1.4 B	NA	2.4 B	5.3 B	NA	2.5 U	3.4 J	6 J	1.7 U	1.4 UJ
Iron	75.7 B	NA	704	7,870	NA	43.9 J	1210	2370	27.8 B	6.1 UJ
Lead	1.6 B	NA	1.3 U	6.0	NA	1.3 U	1.3 U	3.9	1.3 U	1.3 U
Magnesium	2030 B	NA	934 B	3,070 B	NA	428 B	1180 B	2640 B	4550 B	28 U
Manganese	1.4 B	NA	5.5 B	116.0	NA	0.86 B	9.3 B	15.6	1.5 B	0.5 U
Mercury	0.04 U	NA	0.06 U	0.15 U	NA	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Nickel	11.2 U	NA	11.2 U	11.2 U	NA	11.2 U	11.2 U	11.2 U	11.2 U	11.2 U
Potassium	1240 B	NA	1560 B	3,370 B	NA	1130 B	1070 B	5870	3140 B	403 U
Selenium	0.61 UJ	NA	0.61 UJ	0.6 UJ	NA	0.61 U	0.61 U	0.9 B	0.9 J	0.61 U
Silver	2.4 U	NA	2.4 U	2.4 U	NA	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U
Sodium	4810 B	NA	6950	46,700.0	NA	1550 B	11100	14000	13000	231 U
Thallium	1.9 UJ	NA	1.9 UJ	1.9 UJ	NA	1.9 U	1.9 UJ	1.9 UJ	1.9 U	1.9 UJ
Vanadium	5.2 B	NA	2.9 U	104.0	NA	2.9 U	2.9 U	9.6 B	2.9 U	2.9 U
Zinc	1.2 U	NA	2 U	42.6	NA	1.5 B	1.2 B	5.5 B	2 B	1.2 U
Radiological, pCi/L										
Gross Alpha	2 J	NA	8.7 J	257 J	50.4	3.4	3	14.5	5.8	3.7

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00101		U1G00201	U1G00301	U1G00303	U1G00401	U1G00501	U1G00601	U1G00701	U1G00801
Lab ID	G8192002	G8192002RE	G8186003	G8192003	G8616009	G8220003	G8220002	G8234002	G8234003	G8234004
Sampling Date	8/9/95	8/9/95	8/8/95	8/9/95	10/19/95	8/14/95	8/14/95	8/15/95	8/15/95	8/15/95
Gross Alpha, Counting Error	1.5	NA	2.5	116	5.9	1.5	1.6	4.2	2.2	1.7
Gross Beta	4.8 J	NA	7.4 J	240 J	58.5	6.3	3.7	25.8	22.1	7.2
Gross Beta, Counting Error	1.9	NA	2	30.4	6.1	1.9	1.8	3.8	3.2	2
Cesium-137	NA	NA	NA	NA	-0.51	NA	NA	NA	NA	NA
Cesium-137, Uncertainty	NA	NA	NA	NA	1.51	NA	NA	NA	NA	NA
Lead-210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead-210, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium-40	NA	NA	NA	NA	5.88	NA	NA	NA	NA	NA
Potassium-40, Uncertainty	NA	NA	NA	NA	24.6	NA	NA	NA	NA	NA
Radium-226	NA	NA	NA	NA	8.83	NA	NA	NA	NA	NA
Radium-226, Uncertainty	NA	NA	NA	NA	0.23	NA	NA	NA	NA	NA
Radium-228	NA	NA	NA	NA	1.81	NA	NA	NA	NA	NA
Radium-228, Uncertainty	NA	NA	NA	NA	0.54	NA	NA	NA	NA	NA
Thorium-227	NA	NA	NA	NA	0.09	NA	NA	NA	NA	NA
Thorium-227, Uncertainty	NA	NA	NA	NA	0.02	NA	NA	NA	NA	NA
Thorium-228	NA	NA	NA	NA	0.91	NA	NA	NA	NA	NA
Thorium-228, Uncertainty	NA	NA	NA	NA	0.12	NA	NA	NA	NA	NA
Thorium-230	NA	NA	NA	NA	2.59	NA	NA	NA	NA	NA
Thorium-230, Uncertainty	NA	NA	NA	NA	0.29	NA	NA	NA	NA	NA
Thorium-232	NA	NA	NA	NA	0.12	NA	NA	NA	NA	NA
Thorium-232, Uncertainty	NA	NA	NA	NA	0.03	NA	NA	NA	NA	NA
Uranium-234	NA	NA	NA	NA	6.92	NA	NA	NA	NA	NA
Uranium-234, Uncertainty	NA	NA	NA	NA	0.74	NA	NA	NA	NA	NA
Uranium-238	NA	NA	NA	NA	8.72	NA	NA	NA	NA	NA
Uranium-238, Uncertainty	NA	NA	NA	NA	0.92	NA	NA	NA	NA	NA
General Chemistry, mg/L										
Alkalinity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrate/Nitrite	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH (units)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00101		U1G00201		U1G00301		U1G00303		U1G00401		U1G00501		U1G00601		U1G00701		U1G00801	
Lab ID	G8192002	G8192002RE	G8186003		G8192003		G8616009		G8220003		G8220002		G8234002		G8234003		G8234004	
Sampling Date	8/9/95	8/9/95	8/8/95		8/9/95		10/19/95		8/14/95		8/14/95		8/15/95		8/15/95		8/15/95	
Sulfate	NA	NA	NA		NA		NA		NA		NA		NA		NA		NA	
Sulfide	NA	NA	NA		NA		NA		NA		NA		NA		NA		NA	
Total Dissolved Solids	NA	NA	NA		NA		422		NA		NA		NA		NA		NA	
Total Organic Carbon	NA	NA	NA		NA		NA		NA		NA		NA		NA		NA	
Total Phosphorus	NA	NA	NA		NA		NA		NA		NA		NA		NA		NA	
Total Suspended Solids	NA	NA	NA		NA		NA		NA		NA		NA		NA		NA	
Total Petroleum Hydrocarbons	1	U	NA	1	U	1	U	NA	1	U	1	U	1	U	1	U	1	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00901		U1G01001		U1G01001D		U1G01101		U1G01201		U1G01301		U1G01401		U1G01403		U1G01501	
Lab ID	G8272002		G8238003		G8238002		G8238004		G8255002		G8299002		G8276003		G8616007		G8276002	
Sampling Date	8/21/95		8/16/95		8/16/95		8/16/95		8/17/95		8/24/95		8/22/95		10/18/95		8/22/95	
Volatile organics, ug/L																		
1,1,1-Trichloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,1,2,2-Tetrachloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,1,2-Trichloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,1-Dichloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,1-Dichloroethene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,2-Dichloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,2-Dichloroethene (total)	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,2-Dichloropropane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2-Butanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2-Hexanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
4-Methyl-2-pentanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Acetone	10	U	10	U	10	U	10	U	13	U	10	U	4	J	NA		10	U
Benzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Bromodichloromethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Bromoform	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Bromomethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Carbon disulfide	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Carbon tetrachloride	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Chlorobenzene	10	U	10	U	10	U	10	U	4	J	10	U	4	J	NA		5	J
Chloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Chloroform	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Chloromethane	10	U	10	UJ	10	UJ	10	UJ	10	U	10	U	10	U	NA		10	U
cis-1,3-Dichloropropene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Dibromochloromethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Ethylbenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Methylene chloride	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Styrene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Tetrachloroethene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Toluene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
trans-1,3-Dichloropropene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Trichloroethene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Vinyl chloride	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00901		U1G01001		U1G01001D		U1G01101		U1G01201		U1G01301		U1G01401		U1G01403		U1G01501	
Lab ID	G8272002		G8238003		G8238002		G8238004		G8255002		G8299002		G8276003		G8616007		G8276002	
Sampling Date	8/21/95		8/16/95		8/16/95		8/16/95		8/17/95		8/24/95		8/22/95		10/18/95		8/22/95	
Xylene (total)	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Semivolatile organics, ug/L																		
1,2,4-Trichlorobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,2-Dichlorobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,3-Dichlorobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
1,4-Dichlorobenzene	10	U	10	U	10	U	1	J	8	J	10	U	1	J	NA		10	U
2,2'-oxybis(1-Chloropropane)	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2,4,5-Trichlorophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		25	U
2,4,6-Trichlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2,4-Dichlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2,4-Dimethylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2,4-Dinitrophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		25	U
2,4-Dinitrotoluene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2,6-Dinitrotoluene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2-Chloronaphthalene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2-Chlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2-Methylnaphthalene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2-Methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
2-Nitroaniline	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		25	U
2-Nitrophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
3,3'-Dichlorobenzidine	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
3-Nitroaniline	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		25	U
4,6-Dinitro-2-methylphenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		25	U
4-Bromophenyl-phenylether	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
4-Chloro-3-methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
4-Chloroaniline	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
4-Chlorophenyl-phenylether	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
4-Methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
4-Nitroaniline	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		25	U
4-Nitrophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		25	U
Acenaphthene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Acenaphthylene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Anthracene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00901		U1G01001		U1G01001D		U1G01101		U1G01201		U1G01301		U1G01401		U1G01403		U1G01501	
Lab ID	G8272002		G8238003		G8238002		G8238004		G8255002		G8299002		G8276003		G8616007		G8276002	
Sampling Date	8/21/95		8/16/95		8/16/95		8/16/95		8/17/95		8/24/95		8/22/95		10/18/95		8/22/95	
Benzo(a)anthracene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Benzo(a)pyrene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Benzo(b)fluoranthene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Benzo(g,h,i)perylene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Benzo(k)fluoranthene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
bis(2-Chloroethoxy)methane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
bis(2-Chloroethyl)ether	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
bis(2-Ethylhexyl)phthalate	10	U	10	U	10	U	10	U	10	U	10	U	3	J	NA		10	U
Butylbenzylphthalate	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Carbazole	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Chrysene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Di-n-butylphthalate	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Di-n-octylphthalate	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Dibenz(a,h)anthracene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Dibenzofuran	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Diethylphthalate	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Dimethylphthalate	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Fluoranthene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Fluorene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Hexachlorobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Hexachlorobutadiene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Hexachlorocyclopentadiene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Hexachloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Indeno(1,2,3-cd)pyrene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Isophorone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
N-Nitroso-di-n-propylamine	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
N-Nitrosodiphenylamine (1)	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Naphthalene	10	U	10	U	10	U	10	U	3	J	10	U	10	U	NA		10	U
Nitrobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Pentachlorophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		25	U
Phenanthrene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Phenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U
Pyrene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		10	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00901		U1G01001		U1G01001D		U1G01101		U1G01201		U1G01301		U1G01401		U1G01403		U1G01501	
Lab ID	G8272002		G8238003		G8238002		G8238004		G8255002		G8299002		G8276003		G8616007		G8276002	
Sampling Date	8/21/95		8/16/95		8/16/95		8/16/95		8/17/95		8/24/95		8/22/95		10/18/95		8/22/95	
Pesticides/PCBs, ug/L																		
4,4'-DDD	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
4,4'-DDE	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
4,4'-DDT	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
Aldrin	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
alpha-BHC	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	NA		0.05	UJ
alpha-Chlordane	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
Aroclor-1016	1	U	1	U	1	U	1	UJ	1	UJ	1	U	1	U	NA		1	U
Aroclor-1221	2	U	2	U	2	U	2	UJ	2	UJ	2	U	2	U	NA		2	U
Aroclor-1232	1	U	1	U	1	U	1	UJ	1	UJ	1	U	1	U	NA		1	U
Aroclor-1242	1	U	1	U	1	U	1	UJ	1	UJ	1	U	1	U	NA		1	U
Aroclor-1248	1	U	1	U	1	U	1	UJ	1	UJ	1	U	1	U	NA		1	U
Aroclor-1254	1	U	1	U	1	U	1	UJ	1	UJ	1	U	1	U	NA		1	U
Aroclor-1260	1	U	1	U	1	U	1	UJ	1	UJ	1	U	1	U	NA		1	U
beta-BHC	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
delta-BHC	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
Dieldrin	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
Endosulfan I	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
Endosulfan II	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
Endosulfan sulfate	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
Endrin	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
Endrin aldehyde	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
Endrin ketone	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	NA		0.1	U
gamma-BHC (Lindane)	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
gamma-Chlordane	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
Heptachlor	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
Heptachlor epoxide	0.05	U	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.05	U	0.05	U	NA		0.05	U
Methoxychlor	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ	0.5	U	0.5	U	NA		0.5	U
Toxaphene	5	U	5	U	5	U	5	UJ	5	UJ	5	U	5	U	NA		5	U
Herbicides, ug/L																		
2,4,5-T	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA		0.5	U
2,4,5-TP (Silvex)	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA		0.5	U
2,4-D	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	NA		2.5	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00901		U1G01001		U1G01001D		U1G01101		U1G01201		U1G01301		U1G01401		U1G01403		U1G01501	
Lab ID	G8272002		G8238003		G8238002		G8238004		G8255002		G8299002		G8276003		G8616007		G8276002	
Sampling Date	8/21/95		8/16/95		8/16/95		8/16/95		8/17/95		8/24/95		8/22/95		10/18/95		8/22/95	
2,4-DB	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	NA		2.5	U
Dalapon	5	U	5	U	5	U	5	U	5	U	5	U	5	U	NA		5	U
Dicamba	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA		0.5	U
Dichlorprop	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	NA		2.5	U
Dinoseb	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA		0.5	U
MCPA	250	U	250	U	250	U	250	U	250	U	250	U	250	U	NA		250	U
MCPP	250	U	250	U	250	U	250	U	250	U	250	U	250	U	NA		250	U
Inorganics, ug/L																		
Aluminum	257	J	139	J	24.7	UJ	1280		1390		181	J	2110		NA		1010	
Antimony	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	NA		24.3	U
Arsenic	2.4	U	1.5	U	1.5	UJ	1.5	U	1.5	U	3.8	U	2.4	U	NA		2.4	U
Barium	29.8	B	14.3	B	0.5	U	27.2	B	30.8	B	29.4	B	28.4	B	NA		32.4	B
Beryllium	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	NA		0.21	J
Cadmium	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	NA		2.4	U
Calcium	12500		12700		15.7	UJ	3890	B	2110	B	18200		19100		NA		13500	
Chromium	2	U	3.1	B	2	U	2	U	2.5	B	2	U	4.7	B	NA		3.1	B
Cobalt	3	U	3	U	3	U	3	U	3	U	3	U	3	U	NA		3	U
Copper	1.4	UJ	1.6	U	1.4	UJ	2.7	U	3.4	J	3.2	U	2	U	NA		2.4	U
Iron	1020		6.1	UJ	6.1	UJ	330		642		6.1	UJ	123		NA		687	
Lead	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	NA		1.3	U
Magnesium	4290	B	2100	B	28	U	1500	B	876	B	937	B	3870	B	NA		2160	B
Manganese	15.8		3.6	B	0.5	U	11.4	B	2.8	B	9.6	B	0.5	U	NA		28.5	
Mercury	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	B	0.04	B	NA		0.04	B
Nickel	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	NA		11.2	U
Potassium	3480	B	2880	B	444	B	2430	B	3280	B	3340	B	4160	B	NA		2450	B
Selenium	0.61	U	2.9	J	3	J	0.61	U	0.61	U	3.5	J	1.3	B	NA		0.61	U
Silver	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	NA		2.4	U
Sodium	11700		6470		220	U	11800		11800		10500		5890		NA		11100	
Thallium	1.9	UJ	1.9	UJ	1.9	UJ	1.9	U	1.9	UJ	1.9	UJ	1.9	UJ	NA		1.9	UJ
Vanadium	2.9	U	2.9	U	2.9	U	2.9	U	4.6	B	2.9	U	13.9	B	NA		5.4	B
Zinc	1.3	U	1.2	B	1.2	U	2.9	B	2.1	B	2	B	1.6	B	NA		5.1	B
Radiological, pCi/L																		
Gross Alpha	1.7		1.9		2.2		4.7		4.4		1	U	28.9		37.8		11.6	

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00901	U1G01001	U1G01001D	U1G01101	U1G01201	U1G01301	U1G01401	U1G01403	U1G01501
Lab ID	G8272002	G8238003	G8238002	G8238004	G8255002	G8299002	G8276003	G8616007	G8276002
Sampling Date	8/21/95	8/16/95	8/16/95	8/16/95	8/17/95	8/24/95	8/22/95	10/18/95	8/22/95
Gross Alpha, Counting Error	1.3	1.4	1.5	2	1.9	1.2	6.4	4.2	3.4
Gross Beta	5.5	6.2	10.8	4.3	10.5	3.9	90.8	102	44.9
Gross Beta, Counting Error	2	1.9	2.4	1.9	2.4	2	9.9	10.4	5.3
Cesium-137	NA	NA	NA	NA	NA	NA	NA	0.04	NA
Cesium-137, Uncertainty	NA	NA	NA	NA	NA	NA	NA	1.37	NA
Lead-210	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead-210, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210	NA	NA	NA	NA	NA	NA	NA	NA	NA
Polonium-210, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium-40	NA	NA	NA	NA	NA	NA	NA	17.2	NA
Potassium-40, Uncertainty	NA	NA	NA	NA	NA	NA	NA	24.9	NA
Radium-226	NA	NA	NA	NA	NA	NA	NA	0	NA
Radium-226, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.66	NA
Radium-228	NA	NA	NA	NA	NA	NA	NA	0	NA
Radium-228, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.96	NA
Thorium-227	NA	NA	NA	NA	NA	NA	NA	0.45	NA
Thorium-227, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.06	NA
Thorium-228	NA	NA	NA	NA	NA	NA	NA	4.55	NA
Thorium-228, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.48	NA
Thorium-230	NA	NA	NA	NA	NA	NA	NA	2.42	NA
Thorium-230, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.27	NA
Thorium-232	NA	NA	NA	NA	NA	NA	NA	0.09	NA
Thorium-232, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.03	NA
Uranium-234	NA	NA	NA	NA	NA	NA	NA	1.48	NA
Uranium-234, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.19	NA
Uranium-238	NA	NA	NA	NA	NA	NA	NA	0.96	NA
Uranium-238, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.14	NA
General Chemistry, mg/L									
Alkalinity	NA	2	2	15	4	NA	NA	NA	NA
Hardness	NA	44	44	17	11	NA	NA	NA	NA
Nitrate	NA	1.6	1.6	0.04	0.02 U	NA	NA	NA	NA
Nitrate/Nitrite	NA	1.6	1.6	0.04	0.02 U	NA	NA	NA	NA
pH (units)	NA	4.95	5	5.5	5.15	NA	NA	NA	NA

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G00901		U1G01001		U1G01001D		U1G01101		U1G01201		U1G01301		U1G01401		U1G01403		U1G01501	
Lab ID	G8272002		G8238003		G8238002		G8238004		G8255002		G8299002		G8276003		G8616007		G8276002	
Sampling Date	8/21/95		8/16/95		8/16/95		8/16/95		8/17/95		8/24/95		8/22/95		10/18/95		8/22/95	
Sulfate	NA		35.2		33.2		18.1		16.1		NA		NA		NA		NA	
Sulfide	NA		0.5	U	0.5	U	0.5	U	0.5	U	NA		NA		NA		NA	
Total Dissolved Solids	NA		136		132		128		116		NA		NA		202		NA	
Total Organic Carbon	NA		1.3		1.4		5.6		8.6		NA		NA		NA		NA	
Total Phosphorus	NA		0.01	U	0.01	U	0.19		0.4		NA		NA		NA		NA	
Total Suspended Solids	NA		1	U	1	U	14		1		NA		NA		NA		NA	
Total Petroleum Hydrocarbons	1	U	1	U	1	U	1	U	1	U	1	U	1	U	NA		1	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G01601		U1G01701		U1G01701D		U1G01801		U1G01901		U1G02001		U1G02101		U1G02201		U1G02301	
Lab ID	G8261002		G8255003		G8255004		G8306004		G8285004		G8285002		G8306002		G8149002		G8149003	
Sampling Date	8/18/95		8/17/95		8/17/95		8/25/95		8/23/95		8/23/95		8/25/95		8/3/95		8/3/95	
Volatile organics, ug/L																		
1,1,1-Trichloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1,2,2-Tetrachloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1,2-Trichloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1-Dichloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,1-Dichloroethene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichloroethene (total)	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichloropropane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Butanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Hexanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Methyl-2-pentanone	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Acetone	10	U	10	U	15	U	10	U	10	U	10	U	10	U	10	U	10	U
Benzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Bromodichloromethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Bromoform	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Bromomethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Carbon disulfide	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Carbon tetrachloride	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Chlorobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Chloroethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Chloroform	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Chloromethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
cis-1,3-Dichloropropene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Dibromochloromethane	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Ethylbenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Methylene chloride	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Styrene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Tetrachloroethene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Toluene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
trans-1,3-Dichloropropene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Trichloroethene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Vinyl chloride	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G01601		U1G01701		U1G01701D		U1G01801		U1G01901		U1G02001		U1G02101		U1G02201		U1G02301	
Lab ID	G8261002		G8255003		G8255004		G8306004		G8285004		G8285002		G8306002		G8149002		G8149003	
Sampling Date	8/18/95		8/17/95		8/17/95		8/25/95		8/23/95		8/23/95		8/25/95		8/3/95		8/3/95	
Xylene (total)	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Semivolatile organics, ug/L																		
1,2,4-Trichlorobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,2-Dichlorobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,3-Dichlorobenzene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
1,4-Dichlorobenzene	10	U	1	J	1	J	10	U	10	U	10	U	10	U	10	U	10	U
2,2'-oxybis(1-Chloropropane)	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4,5-Trichlorophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
2,4,6-Trichlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dichlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dimethylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,4-Dinitrophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
2,4-Dinitrotoluene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2,6-Dinitrotoluene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Chloronaphthalene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Chlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Methylnaphthalene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
2-Nitroaniline	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
2-Nitrophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
3-Nitroaniline	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
4,6-Dinitro-2-methylphenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
4-Bromophenyl-phenylether	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Chloro-3-methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Chloroaniline	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Chlorophenyl-phenylether	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
4-Nitroaniline	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
4-Nitrophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U
Acenaphthene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Acenaphthylene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U
Anthracene	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G01601	U1G01701	U1G01701D	U1G01801	U1G01901	U1G02001	U1G02101	U1G02201	U1G02301
Lab ID	G8261002	G8255003	G8255004	G8306004	G8285004	G8285002	G8306002	G8149002	G8149003
Sampling Date	8/18/95	8/17/95	8/17/95	8/25/95	8/23/95	8/23/95	8/25/95	8/3/95	8/3/95
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	10 U	10 U	10 U	10 U	2 J	5 J	10 U	10 U	10 U
Butylbenzylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dimethylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine (1)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G01601		U1G01701		U1G01701D		U1G01801		U1G01901		U1G02001		U1G02101		U1G02201		U1G02301	
Lab ID	G8261002		G8255003		G8255004		G8306004		G8285004		G8285002		G8306002		G8149002		G8149003	
Sampling Date	8/18/95		8/17/95		8/17/95		8/25/95		8/23/95		8/23/95		8/25/95		8/3/95		8/3/95	
Pesticides/PCBs, ug/L																		
4,4'-DDD	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
4,4'-DDE	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
4,4'-DDT	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
Aldrin	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
alpha-BHC	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ
alpha-Chlordane	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Aroclor-1016	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1221	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Aroclor-1232	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1242	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1248	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1254	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Aroclor-1260	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
beta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
delta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Dieldrin	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
Endosulfan I	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Endosulfan II	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
Endosulfan sulfate	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
Endrin	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
Endrin aldehyde	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
Endrin ketone	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
gamma-BHC (Lindane)	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
gamma-Chlordane	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Heptachlor epoxide	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Methoxychlor	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
Toxaphene	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Herbicides, ug/L																		
2,4,5-T	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
2,4,5-TP (Silvex)	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
2,4-D	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

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G01601		U1G01701		U1G01701D		U1G01801		U1G01901		U1G02001		U1G02101		U1G02201		U1G02301	
Lab ID	G8261002		G8255003		G8255004		G8306004		G8285004		G8285002		G8306002		G8149002		G8149003	
Sampling Date	8/18/95		8/17/95		8/17/95		8/25/95		8/23/95		8/23/95		8/25/95		8/3/95		8/3/95	
2,4-DB	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
Dalapon	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Dicamba	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
Dichlorprop	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
Dinoseb	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	UJ
MCPA	250	U	250	U	250	U	250	U	250	U	250	U	250	U	250	U	250	U
MCPP	250	U	250	U	250	U	250	U	250	U	250	U	250	U	250	U	250	U
Inorganics, ug/L																		
Aluminum	99.1	J	1070		1110		1030		62.4	J	450		475		78.5	B	621	
Antimony	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U
Arsenic	2.7	U	1.9	U	1.5	U	2	U	3.3	U	2.4	U	2.6	U	1.5	U	1.5	U
Barium	7.6	B	33.7	B	33.6	B	19.7	B	6.1	U	8.3	B	12.7	B	3.6	B	25.8	B
Beryllium	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	U	0.2	U
Cadmium	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
Calcium	5440		7400		7470		8200		13900		18700		4080	B	35000		9510	
Chromium	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Cobalt	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Copper	2.1	U	5.6	J	3.2	U	1.4	UJ	1.8	U	2.4	U	1.4	UJ	1.4	B	1.4	B
Iron	75.1	J	2420		2440		600		10.2	J	414		326		9.4	B	1980	
Lead	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
Magnesium	1550	B	2230	B	2200	B	662	B	3750	B	3220	B	821	B	1200	B	824	B
Manganese	2.2	B	15.2		15.2		5.7	B	2.1	U	8.8	B	11.2	B	5.8	B	1.7	B
Mercury	0.04	U	0.06	B	0.06	B	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Nickel	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U
Potassium	1630	B	1550	B	1500	B	917	B	1300	B	1850	B	1000	B	888	B	3040	B
Selenium	0.61	U	0.61	U	0.61	U	0.61	U	0.61	UJ	0.61	U	0.61	U	1.6	UJ	0.61	UJ
Silver	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
Sodium	7210		19700		19400		4400	B	5590		12200		9860		1590	B	14400	
Thallium	1.9	UJ	1.9	UJ	1.9	UJ	1.9	UJ	1.9	UJ	1.9	UJ	1.9	UJ	1.9	U	1.9	UJ
Vanadium	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	5.5	B	6.6	B
Zinc	1.5	B	4.8	B	3.8	B	2	U	1.2	U	1.2	U	2.7	B	1.2	U	2.9	U
Radiological, pCi/L																		
Gross Alpha	1	U	3		2.6		3.5		1	U	2.6		2.6		1	U	1.6	J

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G01601		U1G01701		U1G01701D		U1G01801		U1G01901		U1G02001		U1G02101		U1G02201		U1G02301	
Lab ID	G8261002		G8255003		G8255004		G8306004		G8285004		G8285002		G8306002		G8149002		G8149003	
Sampling Date	8/18/95		8/17/95		8/17/95		8/25/95		8/23/95		8/23/95		8/25/95		8/3/95		8/3/95	
Gross Alpha, Counting Error	0.8		1.8		1.5		1.6		0.9		1.6		1.6		1		1.2	
Gross Beta	3.8		9.1		3.9		6.2		3	U	4.2		3.4		3.4	J	5.3	J
Gross Beta, Counting Error	1.8		2.4		1.7		1.7		1.6		1.8		2		1.9		1.8	
Cesium-137	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Cesium-137, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Lead-210	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Lead-210, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Polonium-210	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Polonium-210, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Potassium-40	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Potassium-40, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Radium-226	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Radium-226, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Radium-228	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Radium-228, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Thorium-227	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Thorium-227, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Thorium-228	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Thorium-228, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Thorium-230	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Thorium-230, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Thorium-232	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Thorium-232, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Uranium-234	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Uranium-234, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Uranium-238	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Uranium-238, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
General Chemistry, mg/L																		
Alkalinity	9		24		23		14		NA		NA		NA		NA		NA	
Hardness	24		35		34		26		NA		NA		NA		NA		NA	
Nitrate	0.26		0.02	U	0.02	U	0.02	U	NA		NA		NA		NA		NA	
Nitrate/Nitrite	0.26		0.02	U	0.02	U	0.02	U	NA		NA		NA		NA		NA	
pH (units)	5.25		5.5		5.5		5.9		NA		NA		NA		NA		NA	

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G01601		U1G01701		U1G01701D		U1G01801		U1G01901		U1G02001		U1G02101		U1G02201		U1G02301	
Lab ID	G8261002		G8255003		G8255004		G8306004		G8285004		G8285002		G8306002		G8149002		G8149003	
Sampling Date	8/18/95		8/17/95		8/17/95		8/25/95		8/23/95		8/23/95		8/25/95		8/3/95		8/3/95	
Sulfate	15		16.7		16.8		2.2		NA		NA		NA		NA		NA	
Sulfide	0.5		0.5	U	0.6		0.9		NA		NA		NA		NA		NA	
Total Dissolved Solids	66		152		160		72		NA		NA		NA		NA		NA	
Total Organic Carbon	1.6		8.2		7.7		4.2		NA		NA		NA		NA		NA	
Total Phosphorus	0.01	U	0.19		0.18		0.52		NA		NA		NA		NA		NA	
Total Suspended Solids	1	U	1	U	1	U	6		NA		NA		NA		NA		NA	
Total Petroleum Hydrocarbons	1	U	1	U	1	U	3.5		2.6		1	U	2.7		1	U	1	U

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G02401		U1G02501		U1G02601		U1G02603		U1G02701		U1G02701D		U1G02703		U1G02801		U1G02901	
Lab ID	G8160003		G8186002		G8160004		G8616003		G8178002		G8178003		G8616005		ABBOW*2		ABBOW3/10	
Sampling Date	8/4/95		8/8/95		8/4/95		10/16/95		8/7/95		8/7/95		10/17/95		28-Aug-96		28-Aug-96	
Volatile organics, ug/L																		
1,1,1-Trichloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,1,2,2-Tetrachloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,1,2-Trichloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,1-Dichloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,1-Dichloroethene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,2-Dichloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,2-Dichloroethene (total)	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,2-Dichloropropane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2-Butanone	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2-Hexanone	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
4-Methyl-2-pentanone	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Acetone	10	U	10	U	10	U	NA		18		46		NA		NA		NA	
Benzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Bromodichloromethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Bromoform	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Bromomethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Carbon disulfide	10	U	10	U	10	U	NA		4	J	7	J	NA		NA		NA	
Carbon tetrachloride	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Chlorobenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Chloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Chloroform	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Chloromethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
cis-1,3-Dichloropropene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Dibromochloromethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Ethylbenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Methylene chloride	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Styrene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Tetrachloroethene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Toluene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
trans-1,3-Dichloropropene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Trichloroethene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Vinyl chloride	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G02401		U1G02501		U1G02601		U1G02603		U1G02701		U1G02701D		U1G02703		U1G02801		U1G02901	
Lab ID	G8160003		G8186002		G8160004		G8616003		G8178002		G8178003		G8616005		ABBOW*2		ABBOW3/10	
Sampling Date	8/4/95		8/8/95		8/4/95		10/16/95		8/7/95		8/7/95		10/17/95		28-Aug-96		28-Aug-96	
Xylene (total)	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Semivolatile organics, ug/L																		
1,2,4-Trichlorobenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,2-Dichlorobenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,3-Dichlorobenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
1,4-Dichlorobenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2,2'-oxybis(1-Chloropropane)	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2,4,5-Trichlorophenol	25	U	25	U	25	U	NA		25	U	25	U	NA		NA		NA	
2,4,6-Trichlorophenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2,4-Dichlorophenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2,4-Dimethylphenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2,4-Dinitrophenol	25	U	25	U	25	U	NA		25	U	25	U	NA		NA		NA	
2,4-Dinitrotoluene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2,6-Dinitrotoluene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2-Chloronaphthalene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2-Chlorophenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2-Methylnaphthalene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2-Methylphenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
2-Nitroaniline	25	U	25	U	25	U	NA		25	U	25	U	NA		NA		NA	
2-Nitrophenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
3,3'-Dichlorobenzidine	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
3-Nitroaniline	25	U	25	U	25	U	NA		25	U	25	U	NA		NA		NA	
4,6-Dinitro-2-methylphenol	25	U	25	U	25	U	NA		25	U	25	U	NA		NA		NA	
4-Bromophenyl-phenylether	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
4-Chloro-3-methylphenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
4-Chloroaniline	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
4-Chlorophenyl-phenylether	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
4-Methylphenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
4-Nitroaniline	25	U	25	U	25	U	NA		25	U	25	U	NA		NA		NA	
4-Nitrophenol	25	U	25	U	25	U	NA		25	U	25	U	NA		NA		NA	
Acenaphthene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Acenaphthylene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Anthracene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G02401		U1G02501		U1G02601		U1G02603		U1G02701		U1G02701D		U1G02703		U1G02801		U1G02901	
Lab ID	G8160003		G8186002		G8160004		G8616003		G8178002		G8178003		G8616005		ABBOW*2		ABBOW3/10	
Sampling Date	8/4/95		8/8/95		8/4/95		10/16/95		8/7/95		8/7/95		10/17/95		28-Aug-96		28-Aug-96	
Benzo(a)anthracene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Benzo(a)pyrene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Benzo(b)fluoranthene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Benzo(g,h,i)perylene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Benzo(k)fluoranthene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
bis(2-Chloroethoxy)methane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
bis(2-Chloroethyl)ether	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
bis(2-Ethylhexyl)phthalate	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Butylbenzylphthalate	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Carbazole	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Chrysene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Di-n-butylphthalate	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Di-n-octylphthalate	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Dibenz(a,h)anthracene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Dibenzofuran	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Diethylphthalate	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Dimethylphthalate	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Fluoranthene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Fluorene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Hexachlorobenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Hexachlorobutadiene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Hexachlorocyclopentadiene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Hexachloroethane	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Indeno(1,2,3-cd)pyrene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Isophorone	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
N-Nitroso-di-n-propylamine	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
N-Nitrosodiphenylamine (1)	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Naphthalene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Nitrobenzene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Pentachlorophenol	25	U	25	U	25	U	NA		25	U	25	U	NA		NA		NA	
Phenanthrene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Phenol	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	
Pyrene	10	U	10	U	10	U	NA		10	U	10	U	NA		NA		NA	

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G02401		U1G02501		U1G02601		U1G02603		U1G02701		U1G02701D		U1G02703		U1G02801		U1G02901	
Lab ID	G8160003		G8186002		G8160004		G8616003		G8178002		G8178003		G8616005		ABBOW*2		ABBOW3/10	
Sampling Date	8/4/95		8/8/95		8/4/95		10/16/95		8/7/95		8/7/95		10/17/95		28-Aug-96		28-Aug-96	
Pesticides/PCBs, ug/L																		
4,4'-DDD	0.1	U	0.1	U	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
4,4'-DDE	0.1	U	0.1	U	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
4,4'-DDT	0.1	U	0.06	J	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
Aldrin	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
alpha-BHC	0.05	UJ	0.05	UJ	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
alpha-Chlordane	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
Aroclor-1016	1	U	1	U	1	UJ	NA		1	UJ	1	UJ	NA		NA		NA	
Aroclor-1221	2	U	2	U	2	UJ	NA		2	UJ	2	UJ	NA		NA		NA	
Aroclor-1232	1	U	1	U	1	UJ	NA		1	UJ	1	UJ	NA		NA		NA	
Aroclor-1242	1	U	1	U	1	UJ	NA		1	UJ	1	UJ	NA		NA		NA	
Aroclor-1248	1	U	1	U	1	UJ	NA		1	UJ	1	UJ	NA		NA		NA	
Aroclor-1254	1	U	1	U	1	UJ	NA		1	UJ	1	UJ	NA		NA		NA	
Aroclor-1260	1	U	1	U	1	UJ	NA		1	UJ	1	UJ	NA		NA		NA	
beta-BHC	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
delta-BHC	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
Dieldrin	0.1	U	0.1	U	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
Endosulfan I	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
Endosulfan II	0.1	U	0.1	U	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
Endosulfan sulfate	0.1	U	0.1	U	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
Endrin	0.1	U	0.1	U	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
Endrin aldehyde	0.1	U	0.1	U	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
Endrin ketone	0.1	U	0.1	U	0.1	UJ	NA		0.1	UJ	0.1	UJ	NA		NA		NA	
gamma-BHC (Lindane)	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
gamma-Chlordane	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
Heptachlor	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
Heptachlor epoxide	0.05	U	0.05	U	0.05	UJ	NA		0.05	UJ	0.05	UJ	NA		NA		NA	
Methoxychlor	0.5	U	0.5	U	0.5	UJ	NA		0.5	UJ	0.5	UJ	NA		NA		NA	
Toxaphene	5	U	5	U	5	UJ	NA		5	UJ	5	UJ	NA		NA		NA	
Herbicides, ug/L																		
2,4,5-T	0.5	U	0.5	U	0.5	U	NA		0.5	U	0.5	U	NA		NA		NA	
2,4,5-TP (Silvex)	0.5	U	0.5	U	0.5	U	NA		0.5	U	0.5	U	NA		NA		NA	
2,4-D	2.5	U	2.5	U	2.5	U	NA		2.5	U	2.5	U	NA		NA		NA	

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G02401		U1G02501		U1G02601		U1G02603		U1G02701		U1G02701D		U1G02703		U1G02801		U1G02901	
Lab ID	G8160003		G8186002		G8160004		G8616003		G8178002		G8178003		G8616005		ABBOW*2		ABBOW3/10	
Sampling Date	8/4/95		8/8/95		8/4/95		10/16/95		8/7/95		8/7/95		10/17/95		28-Aug-96		28-Aug-96	
2,4-DB	2.5	U	2.5	U	2.5	U	NA		2.5	U	2.5	U	NA		NA		NA	
Dalapon	5	U	5	U	5	U	NA		5	U	5	U	NA		NA		NA	
Dicamba	0.5	U	0.5	U	0.5	U	NA		0.5	U	0.5	U	NA		NA		NA	
Dichlorprop	2.5	U	2.5	U	2.5	U	NA		2.5	U	2.5	U	NA		NA		NA	
Dinoseb	0.5	UJ	0.5	UJ	0.5	UJ	NA		0.5	UJ	0.5	UJ	NA		NA		NA	
MCPA	250	U	250	U	250	U	NA		250	U	250	U	NA		NA		NA	
MCPP	250	U	250	U	250	U	NA		250	U	250	U	NA		NA		NA	
Inorganics, ug/L																		
Aluminum	1690		1360		1180		NA		8700		8250		NA		101000		21100	
Antimony	24.3	U	24.3	U	24.3	U	NA		24.3	U	24.3	U	NA		50	U	50	U
Arsenic	3.8	U	1.5	UJ	5	U	NA		1.6	UJ	1.5	UJ	NA		4.6		3.3	
Barium	32.3	B	9.2	B	105	B	NA		145	B	138	B	NA		870		240	
Beryllium	0.2	U	0.2	U	1.8	B	NA		2.6	B	2.6	B	NA		4	U	4	U
Cadmium	2.4	U	2.4	U	2.4	U	NA		2.4	U	2.4	U	NA		5	U	5	U
Calcium	2680	B	5280		9010		NA		47800		43700		NA		13700		8480	
Chromium	3.4	U	2.2	U	4	B	NA		12.8		13	U	NA		121		44.3	
Cobalt	3	U	3	U	3	U	NA		3	U	3	U	NA		10	U	10	U
Copper	1.6	B	2	B	1.6	B	NA		1.8	B	1.4	U	NA		29.6		5	U
Iron	808		111		2760		NA		1320		1290		NA		8030		5850	
Lead	3.1		1.5	B	3.2	U	NA		1.3	U	1.3	U	NA		91.8	D	6	
Magnesium	664	B	1700	B	2200	B	NA		715	B	728	B	NA		3580		2210	
Manganese	3.1	B	2.3	B	44.4		NA		24.1		22.8		NA		93.3		11.1	
Mercury	0.04	U	0.07	U	0.04	U	NA		0.08	U	0.08	U	NA		0.6		0.1	U
Nickel	11.2	U	11.2	U	11.2	U	NA		11.2	U	11.2	U	NA		15	U	15	U
Potassium	456	B	2000	B	5120		NA		28100		25700		NA		3770		8320	
Selenium	0.61	UJ	0.61	UJ	0.61	UJ	NA		0.61	UJ	1.6	UJ	NA		19	D	2.5	U
Silver	2.4	U	2.4	U	2.4	U	NA		2.4	U	2.4	U	NA		5	U	5	U
Sodium	4480	B	5170		16300		NA		24600		23100		NA		34100		7790	
Thallium	1.9	U	1.9	U	1.9	UJ	NA		1.9	UJ	1.9	UJ	NA		2	U	2	U
Vanadium	3.7	B	4.7	B	5.2	B	NA		19.5	B	19.5	B	NA		81.1		31	
Zinc	3.7	U	2.2	U	23.9		NA		4.7	U	5.2	U	NA		28.3		23.5	
Radiological, pCi/L																		
Gross Alpha	6	J	4.1	J	25.9		31.2		47.6		46.2		53		44.2		22.9	

Appendix I-3

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Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G02401	U1G02501	U1G02601	U1G02603	U1G02701	U1G02701D	U1G02703	U1G02801	U1G02901
Lab ID	G8160003	G8186002	G8160004	G8616003	G8178002	G8178003	G8616005	ABBOW*2	ABBOW3/10
Sampling Date	8/4/95	8/8/95	8/4/95	10/16/95	8/7/95	8/7/95	10/17/95	28-Aug-96	28-Aug-96
Gross Alpha, Counting Error	2	1.8	9.7	8.6	14.4	15.6	14.5	6.13	3.09
Gross Beta	6.8 J	7.4 J	31.1 J	28.6	69	87.6	57	31.7	32.1
Gross Beta, Counting Error	2.1	2.1	5.5	4.4	7.9	9.5	6.2	4	3.54
Cesium-137	NA	NA	NA	-0.97	NA	NA	-0.28	NA	NA
Cesium-137, Uncertainty	NA	NA	NA	1.4	NA	NA	1.24	NA	NA
Lead-210	NA	NA	NA	NA	NA	NA	NA	NA	1.21
Lead-210, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	0.54
Polonium-210	NA	NA	NA	NA	NA	NA	NA	NA	0.13
Polonium-210, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	0.02
Potassium-40	NA	NA	NA	28.4	NA	NA	7.74	NA	16.3
Potassium-40, Uncertainty	NA	NA	NA	23.7	NA	NA	23.8	NA	9.92
Radium-226	NA	NA	NA	1.04	NA	NA	3.32	NA	5.28
Radium-226, Uncertainty	NA	NA	NA	0.26	NA	NA	0.21	NA	0.13
Radium-228	NA	NA	NA	0	NA	NA	1.76	NA	NA
Radium-228, Uncertainty	NA	NA	NA	0.45	NA	NA	0.38	NA	NA
Thorium-227	NA	NA	NA	0.06	NA	NA	0.04	NA	NA
Thorium-227, Uncertainty	NA	NA	NA	0.02	NA	NA	0.01	NA	NA
Thorium-228	NA	NA	NA	1.12	NA	NA	1.2	NA	0.23
Thorium-228, Uncertainty	NA	NA	NA	0.15	NA	NA	0.14	NA	0.04
Thorium-230	NA	NA	NA	2	NA	NA	3.43	NA	1.74
Thorium-230, Uncertainty	NA	NA	NA	0.24	NA	NA	0.37	NA	0.2
Thorium-232	NA	NA	NA	0.39	NA	NA	0.33	NA	NA
Thorium-232, Uncertainty	NA	NA	NA	0.07	NA	NA	0.05	NA	NA
Uranium-234	NA	NA	NA	3.85	NA	NA	7.74	NA	5.59
Uranium-234, Uncertainty	NA	NA	NA	0.43	NA	NA	0.83	NA	0.58
Uranium-238	NA	NA	NA	3.81	NA	NA	8.08	NA	5.71
Uranium-238, Uncertainty	NA	NA	NA	0.43	NA	NA	0.86	NA	0.59
General Chemistry, mg/L									
Alkalinity	NA	1 U	NA	NA	152	120	NA	NA	NA
Hardness	NA	21	44	NA	108	96	NA	NA	NA
Nitrate	NA	0.52	0.73	NA	0.09	0.07	NA	NA	NA
Nitrate/Nitrite	NA	0.52	NA	NA	0.09	0.07	NA	NA	NA
pH (units)	NA	4.5	8.9	NA	9.65	8.75	NA	NA	NA

Appendix I-3

Table I-3-2. Summary of Unfiltered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1G02401		U1G02501		U1G02601		U1G02603		U1G02701		U1G02701D		U1G02703		U1G02801		U1G02901	
Lab ID	G8160003		G8186002		G8160004		G8616003		G8178002		G8178003		G8616005		ABBOW*2		ABBOW3/10	
Sampling Date	8/4/95		8/8/95		8/4/95		10/16/95		8/7/95		8/7/95		10/17/95		28-Aug-96		28-Aug-96	
Sulfate	NA		15.2		9.5		NA		22.7		19.4		NA		NA		NA	
Sulfide	NA		0.5	U	1.2		NA		3.5		4.3		NA		NA		NA	
Total Dissolved Solids	NA		86		92		122		876		764		514		NA		NA	
Total Organic Carbon	NA		24.4		5		NA		26.1		23.5		NA		NA		NA	
Total Phosphorus	NA		0.19		3.6		NA		15		12.4		NA		NA		NA	
Total Suspended Solids	NA		1	U	900		NA		2		2		NA		NA		NA	
Total Petroleum Hydrocarbons	1	U	1	U	1	U	NA		1	U	1	U	NA		NA		NA	

Appendix I-3

Table I-3-3. Summary of Filtered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1H00101		U1H00201		U1H00301		U1H00303		U1H00401		U1H00501		U1H00601		U1H00701		U1H00801	
Lab ID	G8192002		G8186003		G8192003		G8616010		G8220005		G8220004		G8234005		G8234006		G8234007	
Sampling Date	8/9/95		8/8/95		8/9/95		10/19/95		8/14/95		8/14/95		8/15/95		8/15/95		8/15/95	
Inorganics, ug/L																		
Aluminum	161	B	1210		11500		NA		450		268	J	24.7	UJ	302		425	
Antimony	24.3	U	24.3	U	24.3	U	NA		24.3	U	24.3	U	24.3	U	24.3	U	24.3	U
Arsenic	1.5	U	1.5	U	14.8	U	NA		1.5	U	1.5	U	14.5		1.9	U	1.5	U
Barium	4.6	B	17.4	B	353		NA		6	B	30	B	0.5	U	27.7	B	36.4	B
Beryllium	0.2	UJ	0.2	U	5	B	NA		0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ
Cadmium	2.4	U	2.4	U	2.4	U	NA		2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
Calcium	36400		1610	B	94700		NA		6070		1790	B	15.7	UJ	8400		5640	
Chromium	2	U	2.3	U	19.4		NA		2	U	2	U	2	U	2	U	2	U
Cobalt	3	U	3	U	3	U	NA		3	U	3	U	3	U	3	U	3	U
Copper	2.4	U	1.9	B	1.9	B	NA		1.6	U	1.5	U	1.4	UJ	1.4	UJ	1.4	UJ
Iron	47	B	572		2750		NA		31.2	J	881		6.1	UJ	6.1	UJ	36.4	J
Lead	1.3	U	1.3	U	2.2	B	NA		1.3	U	1.3	U	1.8	B	1.3	U	1.3	U
Magnesium	1830	B	934	B	1320	B	NA		384	B	1070	B	28	U	4050	B	3380	B
Manganese	0.95	B	4.7	B	82		NA		0.86	B	8.4	B	0.5	U	1.1	B	4.9	B
Mercury	0.04	U	0.06	B	0.11	U	NA		0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Nickel	11.2	U	11.2	U	11.2	U	NA		11.2	U	11.2	U	11.2	U	11.2	U	11.2	U
Potassium	1490	B	1130	B	2510	B	NA		893	B	1000	B	403	U	2820	B	2950	B
Selenium	0.6	U	0.6	U	0.6	U	NA		0.61	UR	0.61	UR	0.61	UR	0.61	UR	0.61	UR
Silver	2.4	U	2.4	U	2.4	U	NA		2.4	U	2.4	U	2.4	U	2.8	B	2.4	U
Sodium	4290	B	6330		38200		NA		1510	B	9780		214	U	11900		13400	
Thallium	1.9	UJ	1.9	U	1.9	UJ	NA		1.9	U	1.9	U	1.9	J	3.5	B	4.6	B
Vanadium	4.4	B	2.9	U	50.2		NA		3.1	B	2.9	U	2.9	U	2.9	U	3.3	B
Zinc	1.4	U	3.2	U	11.3	U	NA		1.5	B	4.3	B	1.2	U	2.6	B	1.9	B
Radiological, pCi/L																		
Gross Alpha	NA		NA		NA		33.9		NA		NA		NA		NA		NA	
Gross Alpha, Counting Error	NA		NA		NA		4		NA		NA		NA		NA		NA	
Gross Beta	NA		NA		NA		24.6		NA		NA		NA		NA		NA	
Gross Beta, Counting Error	NA		NA		NA		2.7		NA		NA		NA		NA		NA	
Cesium-137	NA		NA		NA		0.26		NA		NA		NA		NA		NA	
Cesium-137, Uncertainty	NA		NA		NA		1.52		NA		NA		NA		NA		NA	
Potassium-40	NA		NA		NA		65.2		NA		NA		NA		NA		NA	
Potassium-40, Uncertainty	NA		NA		NA		20.6		NA		NA		NA		NA		NA	

Appendix I-3

Table I-3-3. Summary of Filtered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1H00101	U1H00201	U1H00301	U1H00303	U1H00401	U1H00501	U1H00601	U1H00701	U1H00801
Lab ID	G8192002	G8186003	G8192003	G8616010	G8220005	G8220004	G8234005	G8234006	G8234007
Sampling Date	8/9/95	8/8/95	8/9/95	10/19/95	8/14/95	8/14/95	8/15/95	8/15/95	8/15/95
Radium-226	NA	NA	NA	4.61	NA	NA	NA	NA	NA
Radium-226, Uncertainty	NA	NA	NA	0.2	NA	NA	NA	NA	NA
Radium-228	NA	NA	NA	1.02	NA	NA	NA	NA	NA
Radium-228, Uncertainty	NA	NA	NA	0.26	NA	NA	NA	NA	NA
Thorium-227	NA	NA	NA	0.08	NA	NA	NA	NA	NA
Thorium-227, Uncertainty	NA	NA	NA	0.02	NA	NA	NA	NA	NA
Thorium-228	NA	NA	NA	1.18	NA	NA	NA	NA	NA
Thorium-228, Uncertainty	NA	NA	NA	0.14	NA	NA	NA	NA	NA
Thorium-230	NA	NA	NA	3.54	NA	NA	NA	NA	NA
Thorium-230, Uncertainty	NA	NA	NA	0.38	NA	NA	NA	NA	NA
Thorium-232	NA	NA	NA	0.27	NA	NA	NA	NA	NA
Thorium-232, Uncertainty	NA	NA	NA	0.05	NA	NA	NA	NA	NA
Uranium-234	NA	NA	NA	9.08	NA	NA	NA	NA	NA
Uranium-234, Uncertainty	NA	NA	NA	0.95	NA	NA	NA	NA	NA
Uranium-238	NA	NA	NA	9	NA	NA	NA	NA	NA
Uranium-238, Uncertainty	NA	NA	NA	0.95	NA	NA	NA	NA	NA

Appendix I-3

Table I-3-3. Summary of Filtered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1H00901		U1H01001		U1H01001D		U1H01101		U1H01201		U1H01301		U1H01401		U1H01403		U1H01501	
Lab ID	G8272004		G8238007		G238005		G8238007		G8255005		G8299003		G8276005		G8616008		G8276004	
Sampling Date	8/21/95		8/16/95		8/16/95		8/16/95		8/17/95		8/24/95		8/22/95		10/18/95		8/22/95	
Inorganics, ug/L																		
Aluminum	154	J	97.5	J	97.5	J	746		937		121	J	1730		NA		658	
Antimony	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	NA		24.3	U
Arsenic	3.4	U	1.5	U	1.5	U	1.5	U	1.6	U	1.5	U	2.1	U	NA		3.7	U
Barium	24.7	B	13.9	B	14	B	21.9	B	22.8	B	25.9	B	23.9	B	NA		26.2	B
Beryllium	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	NA		0.2	UJ
Cadmium	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	NA		2.4	U
Calcium	11000		11700		11500		3480	B	1920	B	16400		17300		NA		11700	
Chromium	2	U	2.9	B	2.4	B	2	U	2	U	2	U	2.9	B	NA		2.1	B
Cobalt	3	U	3	U	3	U	3	U	3	U	3	U	3	U	NA		3	U
Copper	1.4	J	1.4	UJ	1.4	UJ	1.4	U	1.4	UJ	6.4	J	1.7	U	NA		1.4	UJ
Iron	862		6.1	UJ	6.1	UJ	193		516		6.1	UJ	97	B	NA		515	
Lead	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	NA		1.3	U
Magnesium	3970	B	1800	B	1790	B	1310	B	783	B	839	B	3500	B	NA		1890	B
Manganese	13	B	4	B	4	B	10.3	B	2.9	B	8.1	B	0.5	U	NA		24	
Mercury	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	NA		0.04	U
Nickel	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	NA		11.2	U
Potassium	2890	B	2620	B	2620	B	2160	B	2570	B	2690	B	3450	B	NA		2190	B
Selenium	0.61	UR	2.3	J	2.4	J	0.61	UR	0.61	UR	3.9	J	1	J	NA		0.61	UR
Silver	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.8	B	2.4	U	NA		2.4	U
Sodium	10400		5950		6000		10600		10500		9770		5620		NA		9960	
Thallium	1.9	UJ	1.9	UJ	2.6	B	1.9	UJ	1.9	U	1.9	UJ	1.9	U	NA		1.9	UJ
Vanadium	2.9	U	2.9	U	2.9	U	2.9	U	2.9	UJ	2.9	U	11.6	B	NA		5.9	B
Zinc	3.9	B	2.5	B	2.2	B	2.8	B	2.8	B	1.9	B	3	B	NA		3.9	B
Radiological, pCi/L																		
Gross Alpha	NA		NA		NA		NA		NA		NA		NA		28.9		NA	
Gross Alpha, Counting Error	NA		NA		NA		NA		NA		NA		NA		3.3		NA	
Gross Beta	NA		NA		NA		NA		NA		NA		NA		86.8		NA	
Gross Beta, Counting Error	NA		NA		NA		NA		NA		NA		NA		8.9		NA	
Cesium-137	NA		NA		NA		NA		NA		NA		NA		-1.09		NA	
Cesium-137, Uncertainty	NA		NA		NA		NA		NA		NA		NA		1.42		NA	
Potassium-40	NA		NA		NA		NA		NA		NA		NA		52.7		NA	
Potassium-40, Uncertainty	NA		NA		NA		NA		NA		NA		NA		20.1		NA	

Appendix I-3

Table I-3-3. Summary of Filtered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1H00901	U1H01001	U1H01001D	U1H01101	U1H01201	U1H01301	U1H01401	U1H01403	U1H01501
Lab ID	G8272004	G8238007	G238005	G8238007	G8255005	G8299003	G8276005	G8616008	G8276004
Sampling Date	8/21/95	8/16/95	8/16/95	8/16/95	8/17/95	8/24/95	8/22/95	10/18/95	8/22/95
Radium-226	NA	NA	NA	NA	NA	NA	NA	0	NA
Radium-226, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.69	NA
Radium-228	NA	NA	NA	NA	NA	NA	NA	0	NA
Radium-228, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.67	NA
Thorium-227	NA	NA	NA	NA	NA	NA	NA	0.5	NA
Thorium-227, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.07	NA
Thorium-228	NA	NA	NA	NA	NA	NA	NA	4.82	NA
Thorium-228, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.51	NA
Thorium-230	NA	NA	NA	NA	NA	NA	NA	2.35	NA
Thorium-230, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.27	NA
Thorium-232	NA	NA	NA	NA	NA	NA	NA	0.08	NA
Thorium-232, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.02	NA
Uranium-234	NA	NA	NA	NA	NA	NA	NA	1.34	NA
Uranium-234, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.19	NA
Uranium-238	NA	NA	NA	NA	NA	NA	NA	1.23	NA
Uranium-238, Uncertainty	NA	NA	NA	NA	NA	NA	NA	0.18	NA

Appendix I-3

Table I-3-3. Summary of Filtered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1H01601		U1H01701		U1H01701D		U1H01801		U1H01901		U1H02001		U1H02101		U1H02201		U1H02301	
Lab ID	G8261003		G8255006		G8255007		G8306005		G8285005		G8285003		G8149003		G8149002		G8149003	
Sampling Date	8/18/95		8/17/95		8/17/95		8/25/95		8/23/95		8/23/95		8/3/95		8/3/95		8/3/95	
Inorganics, ug/L																		
Aluminum	64	J	1650		1650		446		32.6	J	412		292		36	B	339	
Antimony	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U	24.3	U
Arsenic	1.5	U	3.1	U	1.9	U	1.5	U	2.8	UJ	1.9	U	1.5	U	1.5	U	1.5	U
Barium	6.4	B	31.8	B	32.4	B	13.4	B	5.3	B	8.5	B	10.3	B	3.4	U	22.3	B
Beryllium	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	UJ	0.2	U	0.2	U
Cadmium	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
Calcium	4890	B	6620		6700		7230		14000		16100		3580	B	31500		8500	
Chromium	2	U	2	U	2.9	B	2	U	2	U	2	U	2	U	2	U	2	U
Cobalt	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U	3	U
Copper	3	U	1.9	U	1.4	UJ	1.8	U	1.4	UJ	1.8	U	1.4	UJ	1.4	B	1.4	U
Iron	45.3	J	1870		1890		271		6.1	UJ	414		234		6.1	U	1760	
Lead	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
Magnesium	1380	B	2000	B	2020	B	587	B	3620	B	2770	B	740	B	1080	B	733	B
Manganese	1.1	B	13.1	B	13.8	B	5	B	2.3	B	9.3	B	9.9	B	5.1	B	1.1	B
Mercury	0.04	U	0.04	U	0.04	B	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Nickel	11.2	U	11.2	U	12.7	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U	11.2	U
Potassium	1160	B	1440	B	1490	B	1110	B	1170	B	1650	B	959	B	540	B	2550	B
Selenium	0.61	UR	0.61	UR	0.61	UR	0.61	UR	0.61	UR	0.61	UR	0.61	UR	0.6	UJ	0.6	U
Silver	2.4	U	2.4	U	2.7	B	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U	2.4	U
Sodium	6260		19800		20200		4130	B	5460		11700		8730		1470	B	13100	
Thallium	1.9	UJ	1.9	UJ	1.9	UJ	1.9	UJ	1.9	U	1.9	U	1.9	UJ	18.7	UJ	1.9	UJ
Vanadium	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	5.5	B	5.6	B
Zinc	1.9	B	5.5	B	5.6	B	3.2	B	7.9	B	1.3	U	2.5	B	3.8	U	5.5	U
Radiological, pCi/L																		
Gross Alpha	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Gross Alpha, Counting Error	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Gross Beta	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Gross Beta, Counting Error	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Cesium-137	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Cesium-137, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Potassium-40	NA		NA		NA		NA		NA		NA		NA		NA		NA	
Potassium-40, Uncertainty	NA		NA		NA		NA		NA		NA		NA		NA		NA	

Appendix I-3

Table I-3-3. Summary of Filtered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1H01601	U1H01701	U1H01701D	U1H01801	U1H01901	U1H02001	U1H02101	U1H02201	U1H02301
Lab ID	G8261003	G8255006	G8255007	G8306005	G8285005	G8285003	G8149003	G8149002	G8149003
Sampling Date	8/18/95	8/17/95	8/17/95	8/25/95	8/23/95	8/23/95	8/3/95	8/3/95	8/3/95
Radium-226	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-228	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-228, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-228	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-228, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-230, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-232	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-232, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-234	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-234, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-238	NA	NA	NA	NA	NA	NA	NA	NA	NA
Uranium-238, Uncertainty	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix I-3

Table I-3-3. Summary of Filtered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1H02401		U1H02501		U1H02601		U1H02603		U1H02701		U1H02701D		U1H02703		U1H02801		U1H02901	
Lab ID	G8160003		G8186002		G8186004		G8616004		G8178002		G8178003		G8616006		ABBOW*1		ABBOW*4	
Sampling Date	8/4/95		8/8/95		8/4/95		10/16/95		8/7/95		8/7/95		10/17/95		8/28/96		8/28/96	
Inorganics, ug/L																		
Aluminum	676		1130		6220		NA		4410		4890		NA		1180		209	
Antimony	24.3	U	24.3	U	24.3	U	NA		24.3	U	24.3	U	NA		50	U	50	U
Arsenic	1.7	U	1.5	U	5.7	U	NA		1.5	U	1.5	U	NA		3.6		2.9	
Barium	18.3	B	7	B	153	B	NA		101	B	106	B	NA		45.4		107	
Beryllium	0.2	U	0.2	U	2	B	NA		1.1	B	1.1	B	NA		4	U	4	U
Cadmium	2.4	U	2.4	U	2.4	U	NA		2.4	U	2.4	U	NA		5	U	5	U
Calcium	2490	B	4950	B	7910		NA		26900		26800		NA		318		4550	
Chromium	2	U	5	U	7.9	U	NA		8.7	U	9	U	NA		10	U	10	U
Cobalt	3.1	B	3.9	B	3	U	NA		3	U	3	U	NA		10	U	10	U
Copper	2.3	B	3	B	1.6	B	NA		2.2	B	1.9	B	NA		5	U	5	U
Iron	297		86.7	B	2820		NA		650		716		NA		262		254	
Lead	1.3	UJ	1.3	U	6.1		NA		1.3	U	1.3	U	NA		5.1		2	
Magnesium	577	B	1550	B	1820	B	NA		562	B	585	B	NA		120		775	
Manganese	2.7	B	1.3	B	47.4		NA		10.4	B	10.6	B	NA		4.6		2.7	
Mercury	0.04	U	0.08	U	0.04	U	NA		0.05	B	0.05	B	NA		0.1	U	0.1	U
Nickel	11.2	U	11.4	B	11.2	U	NA		11.2	U	11.2	U	NA		15	U	15	U
Potassium	403	U	2010	B	2320	B	NA		18200		17900		NA		1670		6830	
Selenium	0.6	U	0.6	U	0.6	U	NA		0.6	U	0.6	U	NA		2.5	U	2.5	U
Silver	2.4	U	2.4	U	2.4	U	NA		2.4	U	2.4	U	NA		5	U	5	U
Sodium	4380	B	4690	B	20900		NA		16900		16900		NA		28200		8620	
Thallium	1.9	UJ	1.9	U	1.9	UJ	NA		2.1	J	3	J	NA		2	U	2	U
Vanadium	2.9	U	4.7	B	11.2	B	NA		19.5	B	9.5	B	NA		16.8		10	U
Zinc	11.1	U	1.5	U	30.2		NA		9.5	U	10.4	U	NA		52.4		54.7	
Radiological, pCi/L																		
Gross Alpha	NA		NA		NA		21.3		NA		NA		31.4		4.49		3.75	
Gross Alpha, Counting Error	NA		NA		NA		4.2		NA		NA		6.6		0.82		0.69	
Gross Beta	NA		NA		NA		18.9		NA		NA		21.6		6.67		10.7	
Gross Beta, Counting Error	NA		NA		NA		3.6		NA		NA		5.6		0.96		1.34	
Cesium-137	NA		NA		NA		-1.2		NA		NA		-1.29		NA		NA	
Cesium-137, Uncertainty	NA		NA		NA		1.47		NA		NA		2		NA		NA	
Potassium-40	NA		NA		NA		45.6		NA		NA		-109		NA		NA	
Potassium-40, Uncertainty	NA		NA		NA		19.7		NA		NA		63.9		NA		NA	

Appendix I-3

Table I-3-3. Summary of Filtered Groundwater Analytical Results

Remedial Investigation/Feasibility Study
Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, FL

Sample ID	U1H02401	U1H02501	U1H02601	U1H02603	U1H02701	U1H02701D	U1H02703	U1H02801	U1H02901
Lab ID	G8160003	G8186002	G8186004	G8616004	G8178002	G8178003	G8616006	ABBOW*1	ABBOW*4
Sampling Date	8/4/95	8/8/95	8/4/95	10/16/95	8/7/95	8/7/95	10/17/95	8/28/96	8/28/96
Radium-226	NA	NA	NA	3.81	NA	NA	4.14	NA	NA
Radium-226, Uncertainty	NA	NA	NA	0.43	NA	NA	0.2	NA	NA
Radium-228	NA	NA	NA	2.03	NA	NA	1.26	NA	NA
Radium-228, Uncertainty	NA	NA	NA	0.87	NA	NA	0.43	NA	NA
Thorium-227	NA	NA	NA	0.04	NA	NA	0.05	NA	NA
Thorium-227, Uncertainty	NA	NA	NA	0.01	NA	NA	0.01	NA	NA
Thorium-228	NA	NA	NA	1.14	NA	NA	1.18	NA	NA
Thorium-228, Uncertainty	NA	NA	NA	0.14	NA	NA	0.14	NA	NA
Thorium-230	NA	NA	NA	2.42	NA	NA	4.5	NA	NA
Thorium-230, Uncertainty	NA	NA	NA	0.27	NA	NA	0.48	NA	NA
Thorium-232	NA	NA	NA	0.29	NA	NA	0.27	NA	NA
Thorium-232, Uncertainty	NA	NA	NA	0.05	NA	NA	0.05	NA	NA
Uranium-234	NA	NA	NA	4.8	NA	NA	8.18	NA	NA
Uranium-234, Uncertainty	NA	NA	NA	0.52	NA	NA	0.88	NA	NA
Uranium-238	NA	NA	NA	4.44	NA	NA	7.99	NA	NA
Uranium-238, Uncertainty	NA	NA	NA	0.48	NA	NA	0.86	NA	NA

NOTES:

NA = Identified parameter not analyzed.
Sample ID = Sample Identifier
Lab ID = Laboratory identifier

Units:

mg/kg	milligram per kilogram
ug/kg	microgram per kilogram
mg/L	milligram per liter
ug/L	microgram per liter
pCi/L	picocuries per liter

The following validation qualifiers are used in this Appendix.

U	The analyte/compound was analyzed for but was not detected above the reported sample quantitation limit
J	The analyte/compound was positively identified and the associated numerical value is an estimated concentration of the analyte/compound in the sample.
N	The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
JN	The analysis indicates the presence of a compound that has been tentatively identified, and the associated numerical value represents an estimated concentration.
UJ	The analyte/compound was not detected above the reported sample quantitation limit. The reported quantitation limit, however, is approximate and may or may not represent the actual limit of quantitation necessary to accurately measure the analyte/compound in the sample.
R	The sample results are rejected because of serious deficiencies in meeting quality control criteria.

The following laboratory qualifiers are typically dropped upon validation but are retained here to provide additional information on their associated numerical values.

B	The analyte was positively identified and the associated numerical value is an estimated concentration because the detection was below the contract required detection limit (CRDL) and above the instrument detection limit.
E	The reported value for the compound exceeds the linear calibration range for that compound. Therefore, the sample have been reanalyzed at an appropriate dilution (sample identifiers ending in DL).
D	The reported value for the compound has been quantified at a secondary dilution factor. This value typically is used in favor of E qualified values. When this applies, the E qualifier are flagged ER; D qualified values that are rejected in favor of the original results are flagged DR.

APPENDIX I-4

ANALYTICAL DATA PARCC REPORTS

PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, AND COMPLETENESS FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT, OPERABLE UNIT I, NAVAL TRAINING CENTER- ORLANDO, ORLANDO FLORIDA

NAVAL TRAINING CENTER - ORLANDO
ORLANDO, FLORIDA

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November 1995

TABLE OF CONTENTS
Precision, Accuracy, Representativeness,
Comparability, and Completeness
Operable Unit I, NTC Orlando

Section	Title	Page No.
1.0	INTRODUCTION	1-1
2.0	PRECISION	2-1
2.1	Groundwater Matrix	2-35
2.2	Surface Soil Matrix	2-36
3.0	ACCURACY	3-1
3.1	Ground and QC Water Matrix	3-1
3.2	Surface Soil Matrix	3-11
4.0	REPRESENTATIVENESS	4-1
4.1	Trip Blanks	4-20
4.2	Equipment Rinseate Blanks	4-20
4.3	Field Blanks	4-21
4.4	Method Blanks	4-21
4.5	Holding Times	4-22
5.0	COMPARABILITY	5-1
6.0	COMPLETENESS	6-1
7.0	PARCC SUMMARY	7-1
7.1	QC Matrix	7-1
7.2	Groundwater Matrix	7-1
7.3	Surface Soil Matrix	7-1
REFERENCES		
APPENDICES		
Appendix A:	Calibration Summary	
Appendix B:	Serial Dilution Summary	
Appendix C:	Summary of Rejected Data	

LIST OF TABLES
Precision, Accuracy, Representativeness,
Comparability, and Completeness
Operable Unit I - NTC Orlando

Tables	Title	Page No.
2-1	Volatile Organic Compounds, Groundwater Sample and Duplicate Precision	2-2
2-2	Semivolatile Organic Compounds, Groundwater Sample and Duplicate Precision	2-3
2-3	Pesticides/PCBs, Groundwater Sample and Duplicate Precision	2-4
2-4	Herbicides, Groundwater Sample and Duplicate Precision	2-5
2-5	Total Metals, Groundwater Sample and Duplicate Precision	2-6
2-6	Dissolved Metals, Groundwater Sample and Duplicate Precision	2-8
2-7	TPH, Groundwater Sample and Duplicate Precision	2-9
2-8	Gross Alpha/Gross Beta, Groundwater Sample and Duplicate Precision	2-10
2-9	Volatile Organic Compounds, Surface Soil Sample and Duplicate Precision	2-11
2-10	Semivolatile Organic Compounds, Surface Soil Sample and Duplicate Precision	2-12
2-11	Pesticides/PCBs, Surface Soil Sample and Duplicate Precision	2-13
2-12	Herbicides, Surface Soil Sample and Duplicate Precision	2-14
2-13	Total Metals, Surface Soil Sample and Duplicate Precision	2-15
2-14	Total Petroleum Hydrocarbons, Surface Soil Sample and Duplicate Precision	2-16
2-15	Volatile Organic Compounds, Groundwater Matrix Spike and Matrix Spike Duplicates	2-17
2-16	Semivolatile Organic Compounds, Groundwater Matrix Spike and Matrix Spike Duplicates	2-18
2-17	Pesticide/PCBs, Groundwater Matrix Spike and Matrix Spike Duplicates	2-20
2-18	Herbicides, Groundwater Matrix Spike and Matrix Spike Duplicates	2-22
2-19	Metals, Groundwater Matrix Spike and Matrix Duplicates	2-24
2-20	Dissolved Metals, Groundwater Matrix Spike and Matrix Duplicates	2-26
2-21	Gross Alpha/Gross Beta, Groundwater Matrix Spike and Matrix Duplicates	2-28
2-22	GC/MS Volatile Organic Compounds, Surface Soil Matrix Spike and Matrix Spike Duplicates	2-29
2-23	Semivolatile Organic Compounds, Surface Soil Matrix Spike and Matrix Spike Duplicates	2-30
2-24	Pesticides/PCBs, Surface Soil Matrix Spike and Matrix Spike Duplicates	2-31
2-25	Herbicides, Surface Soil Matrix Spike and Matrix Spike Duplicates	2-32
2-26	Metals, Surface Soil Matrix Spike and Matrix Duplicates	2-33
2-27	Total Petroleum Hydrocarbons, Surface Soil Matrix Spike and Matrix Spike Duplicates	2-34
3-1	Volatile Surrogate Recoveries in QC and Groundwater Water Matrix	3-2
3-2	Semivolatile Surrogate Recoveries in QC and Groundwater Matrix	3-4
3-3	Pesticides/PCBs Surrogate Recoveries in QC and Groundwater Matrix	3-5
3-4	Herbicides Surrogate Recoveries in QC and Groundwater Matrix	3-6
3-5	Volatile Surrogate Recoveries in Surface Soil Matrix	3-7
3-6	Semivolatile Surrogate Recoveries in Surface Soil Matrix	3-8
3-7	Pesticides/PCBs Surrogate Recoveries in Surface Soil Matrix	3-9
3-8	Herbicides Surrogate Recoveries in Surface Soil Matrix	3-10
4-1	Volatiles Detected in Trip Blanks	4-2
4-2	Volatiles Detected in Rinseate Blanks	4-3
4-3	Semivolatiles Detected in Rinseate Blanks	4-4
4-4	Pesticide/PCBs Detected in Rinseate Blanks	4-5
4-5	Chlorinated Herbicides Detected in Rinseate Blanks	4-6
4-6	Metals Detected in Rinseate Blanks	4-7

LIST OF TABLES
Precision, Accuracy, Representativeness,
Comparability, and Completeness
Operable Unit I - NTC Orlando

Tables	Title	Page No.
4-7	Gross Alpha/Gross Beta Detected in Rinseate Blanks	4-8
4-8	Volatiles Detected in Field Blanks	4-9
4-9	Semivolatiles Detected in Field Blanks	4-10
4-10	Pesticide/PCBs Detected in Field Blanks	4-11
4-11	Herbicides Detected in Field Blanks	4-12
4-12	Metals Detected in Field Blanks	4-13
4-13	Gross Alpha/Gross Beta Detected in Field Blanks	4-14
4-14	Volatiles Detected in Method Blanks	4-15
4-15	Semivolatiles Detected in Method Blanks	4-16
4-16	Pesticide/PCBs Detected in Method Blanks	4-17
4-17	Chlorinated Herbicides Detected in Method Blanks	4-18
4-18	Metals Detected in Method Blanks	4-19
5-1	USEPA Procedure (CLP and SW-846 Methodologies)	5-1
6-1	Completion Goal (>80 Percent)	6-1
7-1	PARCCs Criteria Summary, QC Samples	7-2
7-2	PARCCs Criteria Summary, Groundwater Samples	7-3
7-3	PARCCs Criteria Summary, Surface Soil Samples	7-4

Appendix A
Calibration Criteria Summary

Operable Unit I - NTC Orlando

Tables	Title	Page No.
A-1	Volatile Organic Compounds, Initial and Continuing Calibration Outlier Summary	Appendix A
A-2	Semivolatile Organic Compounds, Initial and Continuing Calibration Outlier Summary	Appendix A
A-3	Pesticides/PCBs, Initial and Continuing Calibration Outlier Summary	Appendix A
A-4	Chlorinated Herbicide Compounds, Initial and Continuing Calibration Outlier Summary	Appendix A

Appendix B
Serial Dilution Summary

Operable Unit I - NTC Orlando

Tables	Title	Page No.
B-1	Metals, Groundwater Sample Serial Dilution Summary	Appendix B
B-2	Dissolved Metals, Groundwater Sample Serial Dilution Summary	Appendix B
B-3	Metals, Surface Soil Sample Serial Dilution Summary	Appendix B

Appendix C
Rejected Data Summary

Operable Unit I - NTC Orlando

Tables	Title	Page No.
C-1	GC/MS Volatile Organic Compounds, Rejected Data Summary	Appendix C
C-2	Semivolatile Organic Compounds, Rejected Data Summary	Appendix C
C-3	Pesticide/PCBs, Rejected Data Summary	Appendix C
C-4	Herbicides, Rejected Data Summary	Appendix C
C-5	Total Metals, Rejected Data Summary	Appendix C
C-6	Dissolved Metals, Rejected Data Summary	Appendix C
C-7	Gross Alpha/Gross Beta, Rejected Data Summary	Appendix C
C-8	Total Petroleum Hydrocarbons, Rejected Data Summary	Appendix C

1.0 INTRODUCTION

Prior to evaluating the data from the Remedial Investigation/Feasibility Study Report, Operable Unit 1, NTC Orlando for precision, accuracy, representativeness, comparability, and completeness (PARCC) criteria the laboratory reviewed the data package and the data also were independently reviewed and validated using the Naval Energy and Environmental and Support Activity (NEESA) guidance document 20.2-047B (1988) entitled, *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Program*. Before the laboratory released the chemical analytical results, both the sample and laboratory QC data were carefully reviewed in order to verify sample identity, instrument calibration, detection limits, dilution factors, numerical computations, accuracy of transcriptions, and chemical interpretations. Additionally, the QC data were reduced and spike recoveries were included in control charts, and the resulting data were reviewed to ascertain whether they were within the laboratory defined limits for accuracy and precision. The data were compiled into NEESA Level C data packages and any nonconforming data were discussed in the data package cover letter and case narrative.

The Level C data packages were then reviewed and validated by Heartland Environmental Services, Inc., Missouri (Heartland). Data validation is the technical review of a data package using criteria established in the data quality objectives, the quality assurance project plan and guidance documents prepared by the United States Environmental Protection Agency (USEPA) for the validation of organic and inorganic analytical data (USEPA 1990a and 1990b) as specified by NEESA document 20.2-047B. The data review and validation process is independent of the laboratory's checks because it is impossible to repeat the review conducted by the laboratory.

Samples that did not meet the acceptance limit criteria were qualified with a flag; single letter abbreviations that indicate a problem with the data. Data qualifiers used by the validators when amending the data include the following.

U — Undetected. The analyte was not detected above the contract required quantitation limit (CRQL). The "U" designator also is used to qualify laboratory contaminants. The "U" designator is applied to an environmental sample when the laboratory contaminant is detected in an environmental sample at a concentration less than 5 times (10 X for common contaminants) the value of the concentration detected in any corresponding field QC blank, method blank or preparation blanks.

J — Estimated. The analyte was present, but the reported value may not be accurate or precise. The "J" designator is used to qualify an analyte that was present at a concentration between the CRQL and method detection limit (MDL) or the data "failed" some of the analytical validation criteria but did not require rejections of the data. When combined with the U designator, the quantitation limit is estimated.

R — Rejected. Data was rejected by the data validator during comparison of the NEESA Level C data package with the analytical functional guideline criteria. The "R" designator indicates a significant variance in acceptable laboratory performance. Either re-analysis or re-sampling and analysis would be necessary to determine the presence or absence of the target analyte(s).

Once the data were reviewed and validated according to the guidance presented in NEESA document 20.2-047B, the data were evaluated by Heartland using the PARCCs criteria included in the Data Quality Objectives (DQOs) of the Project Operations Plan for Site Investigations, NTC - Orlando, Orlando, Florida. The following sections present a brief description of PARCCs criteria.

Precision. Precision is a measure of the agreement or repeatability of a set of replicate results obtained from duplicate laboratory analyses of samples collected from the same location/depth interval. Precision was calculated from laboratory analytical data and cannot be measured directly. Precision is expressed as the Relative Percent Difference (RPD) between analytical values for two samples divided by the average of their analytical values. Precision is calculated using the expression:

$$RPD = (D1-D2) / (\tfrac{1}{2}(D1+D2)) \times 100$$

D1 and D2 are the reported values for the duplicate sample pair. Precision was evaluated using field duplicate samples and laboratory split samples (for example, MS/MSD samples).

Precision for environmental samples and their duplicates was assessed using a maximum RPD of 20 percent for water matrices and 35 percent for soil matrices. Precision for MS/MSD/MD samples was assessed by using the target analyte specific RPD criteria for the spiked compounds and the sample duplicates.

Accuracy. Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. Accuracy can be calculated from the analytical data and was not measured directly. Accuracy is used to identify the bias in a given measurement system (i.e. laboratory conditions, sample matrix, and sampling conditions). Accuracy is assessed by reviewing the Percent Recovery (%R) between the true value of the spike analyte and the actual analytical value. Accuracy is calculated using the equation:

$$\%R = ((A-B)/C) \times 100$$

A = Measured concentration of the spiked analyte.
B = Measured concentration of the spiked compound in the unspiked sample.
C = True concentration of the spiked analyte.

For the organic analyses, each of the samples was spiked with a surrogate compound; and for inorganic analyses, each chosen matrix spike and matrix duplicate pair was spiked with a known reference material before digestion. Each of these approaches provides a measure of the matrix effects on the analytical accuracy.

Representativeness. Representativeness is a qualitative measure of the degree to which sample data accurately and precisely represent a characteristic environmental condition. Representativeness is a subjective parameter and is used to evaluate the efficacy of the sampling plan design. Representativeness was evaluated using the field and laboratory QC blank sample results. QC blank samples are equipment rinseate blanks, field blanks, trip blanks, laboratory method blanks for organic analysis and laboratory preparation blanks for inorganic analysis. Positive detection of target analytes in the QC blank samples identify contaminants that possibly were introduced to the associated environmental sample during sample collection, transport or laboratory analysis. Representativeness was also evaluated used the defined extraction and analytical holding time requirements set forth in the Work Plan for NTC Orlando or the analytical methodology.

Comparability. Comparability is qualitative measure designed to express the confidence with which one data set may be compared to another. Factors that affect comparability are: sample collection and handling techniques, sample matrix type, and analytical method. Comparability is limited by the other PARCC parameters because only when precision and accuracy are known can data sets be compared with confidence.

Completeness. Completeness is defined as the percentage of measurements that are judged to be valid compared to the total number of measurements made. Valid usable data are values that were not qualified as rejected (R qualifier) during data validation. A goal of 80 percent usable data was established in the Work Plan for NTC, Orlando. Completeness equals the total number of analytes for each matrix minus the total number of rejected analytes divided by the total number of analytes multiplied by 100.

2.0 PRECISION

The following section describes the evaluation of precision for volatile organic compounds, semivolatile organic compounds, polynuclear aromatic hydrocarbons, pesticides and polychlorinated biphenyls (PCBs), metals, total petroleum hydrocarbons (TPH), and gross alpha/gross beta. Duplicate samples are evaluated for precision only when contaminants are detected in both the environmental sample and the sample's duplicate. A ND in the RPD column of the spreadsheet indicates that a RPD calculation was not required because one result was a non-detect and the other result was less than the compound/analyte CRQL/CRDL. Environmental samples and their respective duplicates may not exhibit positive results for all compounds found at or near the contract required quantitation limit (CRQL) or detection limit (CRDL) because of low levels of contamination found at a site. Duplicates with Relative Percent Differences (RPDs) within control limits indicate adequate sampling practices and/or good analytical precision. Duplicates with RPDs outside the control limits may result from inappropriate sampling procedures, matrix interferences, or non-homogeneity of the sample matrix. In addition, poor precision can be attributed to deviation(s) from the analytical methodology or to poor reproducibility of target analyte concentrations at or near the required quantitation or detection limits (CRQLs or CRDLs). The acceptance criteria for evaluating precision of field duplicates analytical results is a RPD of 20 for water matrices and 35 for soil matrices.

The percent of duplicate samples collected for the analytical parameters and sample matrices was less than ten percent (10%) for the volatile fraction for the groundwater matrix. It is recommended that 10% field duplicates are collected to ensure a representative base for assessing sampling. The following Sections summarize the evaluation of analytical precision for the water and soil matrices for the following analytical groups:

- GC/MS volatile organic compounds (GC/MS VOCs);
- GC/MS Semivolatile organic compounds (GC/MS SVOCs);
- pesticides, PCBs,;
- herbicides;
- metals, TPH, and;
- gross alpha/gross beta.

Duplicate precision was assessed using both environmental sample and associated duplicates and matrix spike (MS)/matrix spike duplicates (MSDs) pairs for organic fractions, and matrix duplicate pairs (MD pairs) for the metals and TPH fractions.

Tabulation of the results of assessing duplicate precision and duplicate frequency are presented in Tables 2-1 through 2-8 for the groundwater matrix, and Tables 2-9 through 2-14 for the surface soil matrix. The results of the evaluation of precision for MS/MSD samples is provided in Tables 2-15 through 2-21 for the groundwater matrix, and Tables 2-22 through 2-27 for the surface soil matrix.

In addition, to assess whether instrument calibration for volatile, semivolatile, pesticide, and herbicide analytical methods resulted in non-compliant duplicate precision, tables were made of initial and continuing calibration outliers for each sample delivery group (SDG) and are included in Appendix A. To assess the potential for non-compliance in metals analytical data, caused by physical and/or chemical interferences and indicated by non-compliant serial dilution results, tables were prepared of serial dilution results. These are included in Appendix B.

TABLE 2 - 1
VOLATILE ORGANIC COMPOUNDS
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-3	U1G02701	WATER	18	ACETONE	18	46	20%	88%
				CARBON DISULFIDE	4	7	20%	55%
U1-4	UIG01001	WATER	18	NO COMPOUNDS DETECTED				
	U1G01701			NO COMPOUNDS DETECTED				
	TOTAL SAMPLES		36					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
8.3%	2	2	50.0%

TABLE 2 - 2
SEMIVOLATILE ORGANIC COMPOUNDS
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-3	U1G02701	WATER	9	NO COMPOUNDS DETECTED				
U1-4	UIG01001	WATER	18	NO COMPOUNDS DETECTED				
	U1G01701			1,4-DICHLOROBENZENE	1	1	20%	0%
	TOTAL SAMPLES		27					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
11.1%	3	0	100.0%

TABLE 2 - 3
PESTICIDES/PCBS
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-3	U1G02701	WATER	9	NO COMPOUNDS DETECTED				
U1-4	UIG01001	WATER	18	NO COMPOUNDS DETECTED				
	U1G01701			NO COMPOUNDS DETECTED				
	TOTAL SAMPLES		27					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
11.1%	3	0	100.0%

TABLE 2 - 4
HERBICIDES
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-3	U1G02701	WATER	9	NO COMPOUNDS DETECTED				
U1-4	U1G01701	WATER	17	NO COMPOUNDS DETECTED				
	TOTAL SAMPLES		26					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
7.7%	2	0	100.0%

TABLE 2 - 5
TOTAL METALS
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-3	U1G02701	WATER	9	ALUMINUM	8700	8250	20%	5%
				BARIUM	145	138	20%	5%
				BERYLLIUM	2.6	2.6	20%	0%
				CALCIUM	47800	43700	20%	9%
				CHROMIUM	12.8	13	20%	2%
				COPPER	1.8	0	20%	ND
				IRON	1320	1290	20%	2%
				MAGNESIUM	715	728	20%	2%
				MANGANESE	24.1	22.8	20%	6%
				POTASSIUM	28100	25700	20%	9%
				SODIUM	24600	23100	20%	6%
				VANADIUM	19.5	19.5	20%	0%

TABLE 2 - 5, CONTINUED
TOTAL METALS
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-4	U1G01001	WATER	18	ALUMINUM	139	0	20%	ND
				BARIUM	14.3	0	20%	ND
				CALCIUM	12700	0	20%	200%
				CHROMIUM	3.1	0	20%	ND
				MAGNESIUM	2100	0	20%	ND
				MANGANESE	3.6	0	20%	ND
				POTASSIUM	2880	444	20%	147%
				SELENIUM	2.9	3	20%	3%
				SODIUM	6470	0	20%	200%
				ZINC	2	0	20%	ND
	U1G01701			ALUMINUM	1070	1110	20%	4%
				BARIUM	33.7	33.6	20%	0%
				CALCIUM	7400	7470	20%	1%
				COPPER	5.6	0	20%	ND
				IRON	2420	2440	20%	1%
				MAGNESIUM	2230	2200	20%	1%
				MANGANESE	15.2	15.2	20%	0%
				MERCURY	0.06	0.06	20%	0%
				POTASSIUM	1550	1500	20%	3%
				SODIUM	19700	19400	20%	2%
				ZINC	4.8	3.8	20%	23%
	TOTAL SAMPLES		27					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
11.1%	29	4	87.9%

TABLE 2 - 6
DISOLVED METALS
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-3	U1H02701	WATER	9	ALUMINUM	4410	4890	20%	10%
				BARIUM	101	106	20%	5%
				BERYLLIUM	1.1	1.1	20%	0%
				CALCIUM	26900	26800	20%	0%
				COPPER	2.2	1.9	20%	15%
				IRON	650	716	20%	10%
				MAGNESIUM	562	585	20%	4%
				MANGANESE	10.4	10.6	20%	2%
				MERCURY	0.05	0.05	20%	0%
				POTASSIUM	18200	17900	20%	2%
				SODIUM	16900	16900	20%	0%
				THALLIUM	2.1	3	20%	35%
				VANADIUM	9.3	9.5	20%	2%

TABLE 2 - 6, CONTINUED
DISOLVED METALS
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-4	U1H01001	WATER	18	ALUMINUM	97.5	97.5	20%	0%
				BARIUM	13.9	14	20%	1%
				CALCIUM	11700	11500	20%	2%
				CHROMIUM	2.9	2.4	20%	19%
				MAGNESIUM	1800	1790	20%	1%
				MANGANESE	4	4	20%	0%
				POTASSIUM	2620	2620	20%	0%
				SELENIUM	2.3	2.4	20%	4%
				SODIUM	5950	6000	20%	1%
				ZINC	2.5	2.2	20%	13%
	U1H01701			ALUMINUM	1650	1650	20%	0%
				BARIUM	31.8	32.4	20%	2%
				CALCIUM	6620	6700	20%	1%
				CHROMIUM	0	2.9	20%	ND
				IRON	1870	1890	20%	1%
				MAGNESIUM	2000	2020	20%	1%
				MANGANESE	13.1	13.8	20%	5%
				MERCURY	0	0.04	20%	ND
				POTASSIUM	1440	1490	20%	3%
				SILVER	0	2.7	20%	ND
				SODIUM	19800	20200	20%	2%
				ZINC	5.5	5.6	20%	2%
	TOTAL SAMPLES		27					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
11.1%	34	1	97.1%

TABLE 2 - 7
TOTAL PETROLEUM HYDROCARBONS
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-3	U1G02701	WATER	9	NO COMPOUNDS DETECTED				
U1-4	U1G01001	WATER	18	NO COMPOUNDS DETECTED				
	U1G01701			NO COMPOUNDS DETECTED				
	TOTAL SAMPLES		27					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
11.1%	3	0	100.0%

TABLE 2 - 8
GROSS ALPHA AND GROSS BETA
GROUNDWATER SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-3	U1G02701	WATER	9	ALPHA, GROSS	47.6	46.2	20%	3%
				ALPHA, GR., CT.ERROR	14.4	15.6	20%	8%
				BETA, GROSS	69.0	87.6	20%	24%
				BETA, GR., CT.ERROR	7.9	9.5	20%	18%
	U1G02501			ALPHA, GROSS	4.1	4.7	20%	14%
				ALPHA, GR., CT.ERROR	1.8	1.8	20%	0%
				BETA, GROSS	7.4	7.0	20%	6%
				BETA, GR., CT.ERROR	2.1	1.9	20%	10%
	U1G00301			ALPHA, GROSS	257.0	281.0	20%	9%
				ALPHA, GR., CT.ERROR	116.0	125.0	20%	7%
				BETA, GROSS	240.0	247.0	20%	3%
				BETA, GR., CT.ERROR	30.4	29.3	20%	4%
U1-4	U1G01001	WATER	18	ALPHA, GROSS	1.9	2.2	20%	15%
				ALPHA, GR., CT.ERROR	1.4	1.5	20%	7%
				BETA, GROSS	6.2	10.8	20%	54%
				BETA, GR., CT.ERROR	1.9	2.4	20%	23%
	U1G01701			ALPHA, GROSS	3.0	2.6	20%	14%
				ALPHA, GR., CT.ERROR	1.8	1.5	20%	18%
				BETA, GROSS	9.1	3.9	20%	80%
				BETA, GR., CT.ERROR	2.4	1.7	20%	34%
	U1G00701			ALPHA, GROSS	5.8	6.3	20%	8%
				ALPHA, GR., CT.ERROR	2.2	2.2	20%	0%
				BETA, GROSS	22.1	27.7	20%	22%
				BETA, GR., CT.ERROR	3.2	3.4	20%	6%
	TOTAL SAMPLES		27					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
22.2%	18	6	75.0%

TABLE 2 - 9
VOLATILE ORGANIC COMPOUNDS
SURFACE SOIL SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
UI-1	U1S00100	SOIL	14	ACETONE	9	7	35%	25%
	U1S01100			ACETONE	11	8	35%	32%
	TOTAL SAMPLES		14					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
14.3%	2	0	100.0%

TABLE 2 - 10
SEMIVOLATILE ORGANIC COMPOUNDS
SURFACE SOIL SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-1	U1S00100	SOIL	14	NO COMPOUNDS DETECTED				
	U1S01100			BIS(2ETHYLHEXYL)PHTHALATE	190	0	35%	ND
	TOTAL SAMPLES		14					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
14.3%	2	0	100.0%

TABLE 2 - 11
PESTICIDES/PCBS
SURFACE SOIL SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-1	U1S00100	SOIL	14	GAMMA-BHC	1.2	0	35%	ND
				HEPTACHLOR EPOXIDE	7.2	6.5	35%	10%
				DIELDRIN	180	170	35%	6%
				4,4'-DDE	21	20	35%	5%
				4,4'-DDT	13	15	35%	14%
				ALPHA CHLORDANE	67	70	35%	4%
				GAMMA CHLORDANE	40	43	35%	7%
				AROCLOR-1260	120	64	35%	61%
	U1S01100			NO COMPOUNDS DETECTED				
	TOTAL SAMPLES		14					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
14.3%	8	1	88.9%

TABLE 2 - 12
HERBICIDES
SURFACE SOIL SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-1	U1S00100	SOIL	14	NO COMPOUNDS DETECTED				
	U1S01100			NO COMPOUNDS DETECTED				
	TOTAL SAMPLES		14					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
14.3%	2	0	100.0%

TABLE 2 - 13
TOTAL METALS
SURFACE SOIL SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-1	U1S00100	SOIL	14	ALUMINUM	1200	861	35%	33%
				ARSENIC	2.5	2.9	35%	15%
				BARIUM	15.1	12.1	35%	22%
				CADMIUM	2.1	1.1	35%	63%
				CALCIUM	8510	4330	35%	65%
				CHROMIUM	16.1	14.1	35%	13%
				COPPER	14.4	11.3	35%	24%
				IRON	664	574	35%	15%
				LEAD	15.6	19.2	35%	21%
				MAGNESIUM	135	91.5	35%	38%
				MANGANESE	8.7	7	35%	22%
				MERCURY	0.2	0.16	35%	22%
				SILVER	3.5	0	35%	200%
				VANADIUM	1.3	0.98	35%	28%
				ZINC	60.1	46.8	35%	25%
	U1S01100			ALUMINUM	265	214	35%	21%
				BARIUM	1.3	0.96	35%	30%
				CALCIUM	22500	20900	35%	7%
				CHROMIUM	1.3	1.1	35%	17%
				IRON	142	109	35%	26%
				LEAD	1.6	1.4	35%	13%
				MAGNESIUM	190	176	35%	8%
				MANGANESE	3.3	3.6	35%	9%
				VANADIUM	1	1.3	35%	26%
				ZINC	4.3	3.3	35%	26%
	TOTAL SAMPLES		14					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
14.3%	21	4	84.0%

TABLE 2 - 14
TOTAL PETROLEUM HYDROCARBONS
SURFACE SOIL SAMPLE AND DUPLICATE PRECISION
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	MATRIX	NO. ASSC. SAMPLES	COMPOUND	SAMPLE CONC.	DUP CONC	MAX RPD	RPD
U1-1	U1S00100	SOIL	14	TPH	33.5	96.6	35%	97%
	U1S01100			TPH	29.9	31.5	35%	5%
	TOTAL SAMPLES		14					

% OF DUPLICATES COLLECTED	RPD IN	RPD OUT	% WITHIN RPD LIMIT
14.3%	1	1	50.0%

TABLE 2 - 15
VOLATILE ORGANICS COMPOUNDS
GROUNDWATER SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02501* MSD = MATRIX SPIKE DUPLICATE RPD = RELATIVE PERCENT DIFFERENCE		SDG U1-3		
		MS	MSD	
		%R	%R	%RPD
VOA COMPOUNDS	UNITS			
1,1-DICHLOROETHENE	µg/L	102	92	10
TRICHLOROETHENE	µg/L	108	100	8
BENZENE	µg/L	112	104	7
TOLUENE	µg/L	108	100	8
CHLOROBENZENE	µg/L	110	102	8

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-3: U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301

MS = MATRIX SPIKE *SAMPLE U1G02001* MSD = MATRIX SPIKE DUPLICATE RPD = RELATIVE PERCENT DIFFERENCE		SDG U1-4		
		MS	MSD	
		%R	%R	%RPD
VOA COMPOUNDS	UNITS			
1,1-DICHLOROETHENE	µg/L	92	90	2
TRICHLOROETHENE	µg/L	98	98	0
BENZENE	µg/L	100	100	0
TOLUENE	µg/L	96	94	2
CHLOROBENZENE	µg/L	98	98	0

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-4: U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801

COMPOUND	ADVISORY LIMITS	RPD
	%R WATER	WATER
1,1-DICHLOROETHENE	61%-145%	14
TRICHLOROETHENE	71%-120%	14
BENZENE	76%-127%	11
TOLUENE	76%-125%	13
CHLOROBENZENE	75%-130%	13

TABLE 2 - 16
SEMIVOLATILE ORGANICS COMPOUNDS
GROUNDWATER SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02501*		SDG U1-3		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	%RPD
SVOA COMPOUNDS	UNITS			
PHENOL	µg/L	71	77	8
2-CHLOROPHENOL	µg/L	72	79	9
1,4-DICHLOROBENZENE	µg/L	74	74	0
N-NITROSO-DI-N-PROPYLAMINE	µg/L	74	84	13
1,2,4-TRICHLOROBENZENE	µg/L	76	74	3
4-CHLORO-3-METHYLPHENOL	µg/L	69	79	14
ACENAPHTHENE	µg/L	80	80	0
4-NITROPHENOL	µg/L	77	75	3
2,4-DINITROTOLUENE	µg/L	74	76	3
PENTACHLOROPHENOL	µg/L	81	84	4
PYRENE	µg/L	60	60	0

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-3: U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301

COMPOUND	ADVISORY LIMITS	RPD
	% R WATER	WATER
PHENOL	12%-110%	42
2-CHLOROPHENOL	27%-123%	40
1,4-DICHLOROBENZENE	36%-97%	28
N-NITROSO-DI-N-PROP.(1)	41%-116%	38
1,2,4-TRICHLOROBENZENE	39%-98%	28
4-CHLORO-3-METHYLPHENOL	23%-97%	42
ACENAPHTHENE	46%-118%	31
4-NITROPHENOL	10%-80%	50
2,4-DINITROTOLUENE	24%-96%	38
PENTACHLOROPHENOL	9%-103%	50
PYRENE	26%-127%	31

TABLE 2 - 16, CONTINUED
SEMIVOLATILE ORGANICS COMPOUNDS
GROUNDWATER SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02001*		SDG U1-4		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	%RPD
SVOA COMPOUNDS	UNITS			
PHENOL	µg/L	81	81	0
2-CHLOROPHENOL	µg/L	75	76	1
1,4-DICHLOROBENZENE	µg/L	84	84	0
N-NITROSO-DI-N-PROPYLAMINE	µg/L	88	98	11
1,2,4-TRICHLOROBENZENE	µg/L	84	84	0
4-CHLORO-3-METHYLPHENOL	µg/L	85	92	8
ACENAPHTHENE	µg/L	88	86	2
4-NITROPHENOL	µg/L	109*	115*	5
2,4-DINITROTOLUENE	µg/L	86	90	4
PENTACHLOROPHENOL	µg/L	111*	116*	4
PYRENE	µg/L	70	74	6

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-4: U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801

COMPOUND	ADVISORY LIMITS	RPD
	% R WATER	WATER
PHENOL	12%-110%	42
2-CHLOROPHENOL	27%-123%	40
1,4-DICHLOROBENZENE	36%-97%	28
N-NITROSO-DI-N-PROP.(1)	41%-116%	38
1,2,4-TRICHLOROBENZENE	39%-98%	28
4-CHLORO-3-METHYLPHENOL	23%-97%	42
ACENAPHTHENE	46%-118%	31
4-NITROPHENOL	10%-80%	50
2,4-DINITROTOLUENE	24%-96%	38
PENTACHLOROPHENOL	9%-103%	50
PYRENE	26%-127%	31

TABLE 2 - 17
PESTICIDES/PCBS
GROUNDWATER SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02501* MSD = MATRIX SPIKE DUPLICATE RPD = RELATIVE PERCENT DIFFERENCE		SDG U1-3		
		MS	MSD	
		%R	%R	%RPD
PEST COMPOUNDS	UNITS			
GAMMA-BHC (LINDANE)	µg/L	72	74	3
HEPTACHLOR	µg/L	68	69	1
ALDRIN	µg/L	65	64	2
DIELDRIN	µg/L	71	78	9
ENDRIN	µg/L	80	89	11
4,4'-DDT	µg/L	68	77	12

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-3: U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301

COMPOUND	ADVISORY LIMITS	RPD
	% R WATER	WATER
GAMMA-BHC (LINDANE)	56%-123%	15
HEPTACHLOR	40%-131%	20
ALDRIN	40%-120%	22
DIELDRIN	52%-126%	18
ENDRIN	56%-121%	21
4,4'-DDT	38%-127%	27

TABLE 2 - 17, CONTINUED
PESTICIDES/PCBS
GROUNDWATER SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02001* MSD = MATRIX SPIKE DUPLICATE RPD = RELATIVE PERCENT DIFFERENCE		SDG U1-4		
		MS	MSD	
		%R	%R	%RPD
PEST COMPOUNDS	UNITS			
GAMMA-BHC (LINDANE)	µg/L	90	92	2
HEPTACHLOR	µg/L	85	92	8
ALDRIN	µg/L	77	84	9
DIELDRIN	µg/L	96	97	1
ENDRIN	µg/L	129*	130*	1
4,4'-DDT	µg/L	99	98	1

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-4: U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801

COMPOUND	ADVISORY LIMITS	RPD
	% R WATER	WATER
GAMMA-BHC (LINDANE)	56%-123%	15
HEPTACHLOR	40%-131%	20
ALDRIN	40%-120%	22
DIELDRIN	52%-126%	18
ENDRIN	56%-121%	21
4,4'-DDT	38%-127%	27

TABLE 2 - 18
HERBICIDES
GROUNDWATER SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02501*		SDG U1-3		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	%RPD
HERB COMPOUNDS	UNITS			
2,4-D	µg/L	94	95	1.0
2,4-DB	µg/L	89	88	2.0
2,4,5-T	µg/L	86	88	2.0
2,4,5-TP (SILVEX)	µg/L	85	88	3.0
DALAPON	µg/L	59	57	5
DICAMBA	µg/L	86	88	2.0
DICHLORPROP (2,4-DP)	µg/L	77	77	1.0
DINOSEB	µg/L	21*	32*	41
MCPA	µg/L	71	73	3.0
MCPP	µg/L	98	98	0.0

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-3: U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301

QC LIMITS WERE NOT PROVIDED BY THE LABORATORY. DEFAULT LIMITS OF 50-150% FOR RECOVERIES AND 50% FOR RPDS WERE APPLIED.

TABLE 2 - 18,CONTINUED
HERBICIDES
GROUNDWATER SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02001* MSD = MATRIX SPIKE DUPLICATE RPD = RELATIVE PERCENT DIFFERENCE		SDG U1-4		
		MS	MSD	
		%R	%R	%RPD
HERB COMPOUNDS	UNITS			
DALAPON	µg/L	67	62	9
DICAMBA	µg/L	82	81	2
MCPP	µg/L	96	93	3
MCPA	µg/L	90	87	3
2,4-DP	µg/L	80	79	1
2,4-D	µg/L	90	86	5
SILVEX	µg/L	85	83	2
2,4,5-T	µg/L	88	90	2
2,4-DB	µg/L	85	85	0
DINOSEB	µg/L	49*	31*	44

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-4: U1G00501, U1G00401, U1G00701, U1G00801, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801

QC LIMITS WERE NOT PROVIDED BY THE LABORATORY. DEFAULT LIMITS OF 50-150% FOR RECOVERIES AND 50% FOR RPDS WERE APPLIED.

TABLE 2 - 19
TOTAL METALS
GROUNDWATER SAMPLE MATRIX SPIKE/ DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02501*		SDG U1-3	
MD = MATRIX DUPLICATE		MS	MD
RPD = RELATIVE PERCENT DIFFERENCE		%R	RPD
METALS COMPOUNDS	UNITS		
ALUMINUM	µg/L	109	0.7
ANTIMONY	µg/L	99.3	NC
ARSENIC	µg/L	101	NC
BARIUM	µg/L	103	2.7
BERYLLIUM	µg/L	99.3	NC
CADMIUM	µg/L	94.4	NC
CALCIUM	µg/L	NR	1.1
CHROMIUM	µg/L	99.8	200
COBALT	µg/L	98.6	NC
COPPER	µg/L	102	46.5
IRON	µg/L	103	1.7
LEAD	µg/L	98.2	4.0
MAGNESIUM	µg/L	NR	0.9
MANGANESE	µg/L	101	8.8
MERCURY	µg/L	98.8	4.3
NICKEL	µg/L	102	NC
POTASSIUM	µg/L	NR	6.9
SELENIUM	µg/L	47.0*	NC
SILVER	µg/L	94.7	NC
SODIUM	µg/L	NR	0.9
THALLIUM	µg/L	82.4	NC
VANADIUM	µg/L	93.7	5.6
ZINC	µg/L	101	52.2

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

NC DENOTES THAT BOTH SAMPLES ARE NON-DETECT AND A RPD CANNOT BE CALCULATED.
NR DENOTES THAT A MATRIX SPIKE RECOVERY CALCULATION IS NOT REQUIRED.

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-3: U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301

COMPOUND	ADVISORY LIMITS		RPD
	%R WATER		WATER
ALL COMPOUNDS	75%-125%		+/-20 OR +/-CRDL

+/- CRDL = RPD Limits applicable only on values 5 times the Contract Required Detection Limit (CRDL)
NOTE: SOME VALUES WERE ROUNDED TO LIMIT SIGNIFICANT FIGURES TO THREE (3).

TABLE 2 - 19, CONTINUED
TOTAL METALS
GROUNDWATER SAMPLE MATRIX SPIKE/ DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1G02001*		SDG U1-4	
MD = MATRIX DUPLICATE		MS	MD
RPD = RELATIVE PERCENT DIFFERENCE		%R	RPD
METALS COMPOUNDS	UNITS		
ALUMINUM	µg/L	94.2	2.7
ANTIMONY	µg/L	99.4	NC
ARSENIC	µg/L	109	39.8
BARIUM	µg/L	94.2	1.1
BERYLLIUM	µg/L	95.4	NC
CADMIUM	µg/L	104	NC
CALCIUM	µg/L	NR	1.9
CHROMIUM	µg/L	96.6	NC
COBALT	µg/L	93.8	NC
COPPER	µg/L	93.5	86.1
IRON	µg/L	96.4	1.2
LEAD	µg/L	95.6	NC
MAGNESIUM	µg/L	NR	1.8
MANGANESE	µg/L	95.4	2.3
MERCURY	µg/L	103	NC
NICKEL	µg/L	99.4	NC
POTASSIUM	µg/L	NR	11.2
SELENIUM	µg/L	111	NC
SILVER	µg/L	93.5	NC
SODIUM	µg/L	NR	2.3
THALLIUM	µg/L	75.2	NC
VANADIUM	µg/L	90.8	NC
ZINC	µg/L	96.8	200

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

NC DENOTES THAT BOTH SAMPLES ARE NON-DETECT AND A RPD CANNOT BE CALCULATED.
NR DENOTES THAT A MATRIX SPIKE RECOVERY CALCULATION IS NOT REQUIRED.

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-4: U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801

COMPOUND	ADVISORY LIMITS		RPD
	%R WATER		WATER
ALL COMPOUNDS	75%-125%		+/-20 OR +/-CRDL

+/- CRDL = RPD Limits applicable only on values 5 times the Contract Required Detection Limit (CRDL)
NOTE: SOME VALUES WERE ROUNDED TO LIMIT SIGNIFICANT FIGURES TO THREE (3).

TABLE 2 - 20
DISSOLVED METALS
GROUNDWATER SAMPLE MATRIX SPIKE/ DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1H02501*		SDG U1-3	
MD = MATRIX DUPLICATE		MS	MD
RPD = RELATIVE PERCENT DIFFERENCE		%R	RPD
METALS COMPOUNDS	UNITS		
ALUMINUM	µg/L	94.8	0.1
ANTIMONY	µg/L	88.6	NC
ARSENIC	µg/L	95.2	NC
BARIUM	µg/L	87.7	4.3
BERYLLIUM	µg/L	89.6	NC
CADMIUM	µg/L	92.4	NC
CALCIUM	µg/L	NR	0.9
CHROMIUM	µg/L	88.2	200
COBALT	µg/L	87.8	200
COPPER	µg/L	87.8	200
IRON	µg/L	92.0	3.9
LEAD	µg/L	85.7	NC
MAGNESIUM	µg/L	NR	0.6
MANGANESE	µg/L	89.9	0.0
MERCURY	µg/L	101	40.0
NICKEL	µg/L	87.9	200
POTASSIUM	µg/L	NR	16.6
SELENIUM	µg/L	81.0	NC
SILVER	µg/L	85.1	NC
SODIUM	µg/L	NR	1.5
THALLIUM	µg/L	78.4	200
VANADIUM	µg/L	82.9	39.8
ZINC	µg/L	91.2	18.5

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

NC DENOTES THAT BOTH SAMPLES ARE NON-DETECT AND A RPD CANNOT BE CALCULATED.
NR DENOTES THAT A MATRIX SPIKE RECOVERY CALCULATION IS NOT REQUIRED.

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-3: U1H02201, U1H02301, U1H02401, U1H02601, U1H02701, U1H02701D, U1H02501, U1H00201, U1H00101, U1H00301

COMPOUND	ADVISORY LIMITS		RPD
	%R WATER		WATER
ALL COMPOUNDS	75%-125%		+/-20 OR +/-CRDL

+/- CRDL = RPD Limits applicable only on values 5 times the Contract Required Detection Limit (CRDL)
NOTE: SOME VALUES WERE ROUNDED TO LIMIT SIGNIFICANT FIGURES TO THREE (3).

TABLE 2 - 20, CONTINUED
DISSOLVED METALS
GROUNDWATER SAMPLE MATRIX SPIKE/ DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1H02001*		SDG U1-4	
MD = MATRIX DUPLICATE		MS	MD
RPD = RELATIVE PERCENT DIFFERENCE		%R	RPD
METALS COMPOUNDS	UNITS		
ALUMINUM	µg/L	83.2	3.9
ANTIMONY	µg/L	89.2	NC
ARSENIC	µg/L	87.0	200
BARIUM	µg/L	84.2	20.8
BERYLLIUM	µg/L	85.3	NC
CADMIUM	µg/L	90.9	NC
CALCIUM	µg/L	NR	0.4
CHROMIUM	µg/L	86.2	NC
COBALT	µg/L	84.3	NC
COPPER	µg/L	84.2	200
IRON	µg/L	85.2	1.8
LEAD	µg/L	91.4	NC
MAGNESIUM	µg/L	NR	0.6
MANGANESE	µg/L	85.1	7.2
MERCURY	µg/L	100	NC
NICKEL	µg/L	89.5	NC
POTASSIUM	µg/L	NR	14.6
SELENIUM	µg/L	10.0*	NC
SILVER	µg/L	82.7	NC
SODIUM	µg/L	NR	1.1
THALLIUM	µg/L	103	NC
VANADIUM	µg/L	81.7	NC
ZINC	µg/L	87.3	21.6

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

NC DENOTES THAT BOTH SAMPLES ARE NON-DETECT AND A RPD CANNOT BE CALCULATED.
NR DENOTES THAT A MATRIX SPIKE RECOVERY CALCULATION IS NOT REQUIRED.

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-4: U1H00501, U1H00401, U1H00601, U1H00701, U1H00801, U1H01001D, U1H01001, U1H01101, U1H01201, U1H01701, U1H01701D, U1H01601, U1H00901, U1H01501, U1H01401, U1H02001, U1H01901, U1H01301, U1H02101, U1H01801

COMPOUND	ADVISORY LIMITS		RPD
	%R WATER		WATER
ALL COMPOUNDS	75%-125%		+/-20 OR +/-CRDL

+/- CRDL = RPD Limits applicable only on values 5 times the Contract Required Detection Limit (CRDL)
NOTE: SOME VALUES WERE ROUNDED TO LIMIT SIGNIFICANT FIGURES TO THREE (3).

TABLE 2 - 21
GROSS ALPHA AND GROSS BETA
GROUNDWATER SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1H02501*		SDG U1-3		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	%RPD
COMPOUNDS	UNITS			
GROSS ALPHA	PCI/L	122.5	106.0	14.4
GROSS BETA	PCI/L	124.2*	115.4	7.3

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-3: U1H02201, U1H02301, U1H02401, U1H02601, U1H02701, U1H02701D, U1H02501, U1H02501D, U1H00201, U1H00101, U1H00301, U1H00301D

MS = MATRIX SPIKE *SAMPLE U1H02001*		SDG U1-4		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	%RPD
COMPOUNDS	UNITS			
GROSS ALPHA	PCI/L	92.8	92.4	0.4
GROSS BETA	PCI/L	117.8	106.4	10.2

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-4: U1G00501, U1G00401, U1G00601, U1G00701, U1G00701D, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801

COMPOUND	ADVISORY LIMITS	RPD
	% R WATER	WATER
GROSS ALPHA	50%-124%	37
GROSS BETA	76%-118%	21

TABLE 2 - 22
VOLATILE ORGANICS COMPOUNDS
SURFACE SOIL SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1S00100*		SDG U1-1		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	%RPD
VOA COMPOUNDS	UNITS			
1,1-DICHLOROETHENE	µg/Kg	92	93	1
BENZENE	µg/Kg	93	98	5
TRICHLOROETHENE	µg/Kg	92	95	3
TOLUENE	µg/Kg	93	98	5
CHLOROBENZENE	µg/Kg	93	95	2

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-1: U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400

COMPOUND	ADVISORY LIMITS		RPD
	%R SOIL		SOIL
1,1-DICHLOROETHENE	59%-172%		22
BENZENE	66%-142%		21
TRICHLOROETHENE	62%-137%		24
TOLUENE	59%-139%		21
CHLOROBENZENE	60%-133%		21

TABLE 2 - 23
SEMIVOLATILE ORGANICS COMPOUNDS
SURFACE SOIL SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1S00100* MSD = MATRIX SPIKE DUPLICATE RPD = RELATIVE PERCENT DIFFERENCE		SDG U1-1		
		MS	MSD	
		%R	%R	%RPD
SVOA COMPOUNDS	UNITS			
PHENOL	µg/Kg	65	58	11
2-CHLOROPHENOL	µg/Kg	62	58	7
1,4-DICHLOROBENZENE	µg/Kg	65	65	0
N-NITROSO-DI-N-PROPYLAMINE	µg/Kg	76	70	8
1,2,4-TRICHLOROBENZENE	µg/Kg	70	65	7
4-CHLORO-3-METHYLPHENOL	µg/Kg	69	65	6
ACENAPHTHENE	µg/Kg	70	70	0
4-NITROPHENOL	µg/Kg	69	69	0
2,4-DINITROTOLUENE	µg/Kg	76	76	0
PENTACHLOROPHENOL	µg/Kg	69	65	6
PYRENE	µg/Kg	70	70	0

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-1: U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400

COMPOUND	ADVISORY LIMITS	RPD
	% R SOIL	SOIL
PHENOL	26%-90%	35
2-CHLOROPHENOL	25%-102%	50
1,4-DICHLOROBENZENE	28%-104%	27
N-NITROSO-DI-N-PROP.(1)	41%-126%	38
1,2,4-TRICHLOROBENZENE	38%-107%	23
4-CHLORO-3-METHYLPHENOL	26%-103%	33
ACENAPHTHENE	31%-137%	19
4-NITROPHENOL	11%-114%	50
2,4-DINITROTOLUENE	28%-89%	47
PENTACHLOROPHENOL	17%-109%	47
PYRENE	35%-142%	36

TABLE 2 - 24
PESTICIDES/PCBS
SURFACE SOIL SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPI *SAMPLE U1S00100*		SDG U1-1		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	%RPD
PEST COMPOUNDS	UNITS			
GAMMA-BHC (LINDANE)	µg/Kg	92	91	1
HEPTACHLOR	µg/Kg	96	92	4
ALDRIN	µg/Kg	98	94	4
DIELDRIN	µg/Kg	74	153*	70*
ENDRIN	µg/Kg	107	105	2
4,4'-DDT	µg/Kg	89	89	0

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-1: U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400

COMPOUND	ADVISORY LIMITS	RPD
	% R SOIL	SOIL
GAMMA-BHC (LINDANE)	46%-127%	50
HEPTACHLOR	35%-130%	31
ALDRIN	34%-132%	43
DIELDRIN	31%-134%	38
ENDRIN	42%-139%	45
4,4'-DDT	23%-134%	50

TABLE 2 - 25
HERBICIDES
SURFACE SOIL SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1S00100*		SDG U1-1		
MSD = MATRIX SPIKE DUPLICATE		MS	MSD	
RPD = RELATIVE PERCENT DIFFERENCE		%R	%R	%RPD
HERB COMPOUNDS	UNITS			
2,4-D	µg/Kg	103	103	0
2,4-DB	µg/Kg	120	118	2.1
2,4,5-T	µg/Kg	103	120	16
2,4,5-TP (SILVEX)	µg/Kg	98	100	2.5
DALAPON	µg/Kg	280*	320*	13
DICAMBA	µg/Kg	100	103	2.5
DICHLORPROP (2,4-DP)	µg/Kg	100	98	2.5
DINOSEB	µg/Kg	40	47	16
MCPA	µg/Kg	108	135	23
MCPP	µg/Kg	105	108	2.4

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-1: U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400

QC LIMITS WERE NOT PROVIDED BY THE LABORATORY. DEFAULT LIMITS OF 50-150% FOR RECOVERIES AND 50% FOR RPDS WERE APPLIED.

TABLE 2 - 26
TOTAL METALS
SURFACE SOIL SAMPLE MATRIX SPIKE/ DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1S00100*		SDG U1-1	
MD = MATRIX DUPLICATE		MS	MD
RPD = RELATIVE PERCENT DIFFERENCE		%R	RPD
METALS COMPOUNDS	UNITS		
ALUMINUM	mg/Kg	NR	31.3*
ANTIMONY	mg/Kg	88.7	NC
ARSENIC	mg/Kg	92.4	18.2
BARIUM	mg/Kg	85.2	29.6
BERYLLIUM	mg/Kg	83.4	37.3
CADMIUM	mg/Kg	90.0	41.2
CALCIUM	mg/Kg	NR	81.2*
CHROMIUM	mg/Kg	113.6	24.0*
COBALT	mg/Kg	79.3	NC
COPPER	mg/Kg	83.5	33.8
IRON	mg/Kg	NR	35.7*
LEAD	mg/Kg	70.0*	31.9*
MAGNESIUM	mg/Kg	NR	48.7
MANGANESE	mg/Kg	80.4	29.4
MERCURY	mg/Kg	96.6	3.9
NICKEL	mg/Kg	88.3	NC
POTASSIUM	mg/Kg	NR	200
SELENIUM	mg/Kg	76.0	NC
SILVER	mg/Kg	99.2	12.2
SODIUM	mg/Kg	NR	43.6
THALLIUM	mg/Kg	80.2	NC
VANADIUM	mg/Kg	74.4*	33.1
ZINC	mg/Kg	92.4	30.5*

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

NC DENOTES THAT BOTH SAMPLES ARE NON-DETECT AND A RPD CANNOT BE CALCULATED.
NR DENOTES THAT A MATRIX SPIKE RECOVERY CALCULATION IS NOT REQUIRED.

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-1: U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400

COMPOUND	ADVISORY LIMITS		RPD
	%R SOIL		SOIL
ALL COMPOUNDS	75%-125%		+/-20 OR +/-CRDL

+/- CRDL = RPD Limits applicable only on values 5 times the Contract Required Detection Limit (CRDL)
NOTE: SOME VALUES WERE ROUNDED TO LIMIT SIGNIFICANT FIGURES TO THREE (3).

TABLE 2 - 27
TOTAL PETROLEUM HYDROCARBONS
SURFACE SOIL SAMPLE MATRIX SPIKE/MATRIX SPIKE DUPLICATES
OPERABLE UNIT 1, NTC ORLANDO

MS = MATRIX SPIKE *SAMPLE U1S00100*		SDG U1-1	
MSD = MATRIX SPIKE DUPLICATE		MS	MSD
RPD = RELATIVE PERCENT DIFFERENCE		%R	%RPD
TPH COMPOUNDS	UNITS		
TPH	mg/Kg	106	24.4

*** DENOTES VALUE NOT WITHIN QA/QC ADVISORY LIMITS**

CORRESPONDING SDG AND ASSOCIATED SAMPLES

U1-1: U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400

COMPOUND	ADVISORY LIMITS		RPD
	% R SOIL		SOIL
TPH	75%-125%		20

2.1 Groundwater Matrix

No target compounds requiring RPD calculation were detected in either the groundwater samples or associated duplicates for the pesticides/PCBs (Table 2-3), herbicides (Table 2-4) or TPH (Table 2-7) fractions. Therefore, no precision assessment was conducted for those parameters.

The volatile analysis of the field duplicate pairs of samples U1G01001 and U1G01701 exhibited no positive results for target compounds (Table 2-1). The volatile analysis of the field duplicate pair of sample U1G02701 exhibited non-compliant RPDs for the two (2) compounds detected (Table 2-1). The non-compliant compounds were acetone and carbon disulfide. The compound carbon disulfide was detected at concentrations below the CRQL in both the field sample and the field duplicate sample. The non-compliance for carbon disulfide can be attributed to the low concentrations detected. Acetone is a common laboratory contaminant which was detected in some of the trip blanks associated with the samples in this project. Although acetone was not detected in the QC blanks associated with the field duplicate pair, its presence in the laboratory as a common contaminant could affect precision measurements. The non-compliance for the compound acetone could be attributed to blank contamination.

The semivolatile analysis of the field duplicate pairs of samples U1G02701 and U1G01001 did not exhibit positive results for target compounds (Table 2-2). The semivolatile analysis of the field duplicate pair of sample U1G01701 exhibited acceptable precision for the one (1) compound detected, 1,4-dichlorobenzene (Table 2-2).

The total metals analysis of the field duplicate pair of sample U1G02701 exhibited acceptable precision for all analytes requiring RPD calculation (Table 2-5).

Three (3) of the four (4) target analytes requiring RPD calculation in the metals analysis of the field duplicate pair of sample U1G01001 exhibited non-compliant RPDs (Table 2-5). The target analytes with non-compliant RPDs were calcium, potassium, and sodium. The analyte potassium was detected at concentrations below the CRDL in both the original sample and the field duplicate sample. The non-compliance for potassium can be attributed to the low concentrations detected. The analyte sodium was detected in the method blank associated with the field duplicate pair (Table 4-18). The concentration of sodium in the field duplicate sample was within the action level of five (5) times the blank contamination level for amendment to U. The concentration of sodium in the original field sample was above the action level. The non-compliance for sodium can be attributed to laboratory contamination. The analyte calcium was detected in the associated method blank at a negative concentration (Table 4-18). This indicates that instrumental anomalies are affecting the analysis for that analyte. Both the positive and non-detect results for calcium were qualified as estimated. The non-compliance for calcium can be attributed to instrument anomalies. Assessment of the serial dilution data indicates that criteria was met for the non-compliant compounds (Appendix B, Table B-1).

One (1) of the ten (10) target analytes detected in the metals analysis of the field duplicate pair of sample U1G01701 exhibited a non-compliant RPD (Table 2-5). The target analyte with a non-compliant RPD was zinc. The analyte was detected at concentrations below the CRDL in both the original sample and the field duplicate sample. The non-compliance for zinc can be attributed to the low concentrations detected. Assessment of the serial dilution data indicates that criteria was met for the non-compliant compounds (Appendix B, Table B-1).

One (1) of the thirteen (13) target analytes detected in the metals analysis of the field duplicate pair of sample U1H02701 exhibited a non-compliant RPD (Table 2-6). The target analyte with a non-compliant RPD was thallium. The analyte was detected at concentrations below the CRDL in both the

original sample and the field duplicate sample. The non-compliance for thallium can be attributed to the low concentrations detected. Assessment of the serial dilution data indicates that criteria was met for the non-compliant compounds (Appendix B, Table B-2).

The dissolved metals analysis of the field duplicate pair of sample U1H01001 and U1H01701 exhibited acceptable precision for all analytes requiring RPD calculation (Table 2-6).

The field duplicate pairs of samples U1G02501 and U1G00301, analyzed for the gross alpha/gross beta fraction exhibited acceptable precision for the results obtained (Table 2-8).

The field duplicate pairs of samples U1G02701and U1G00701 analyzed for the gross alpha/gross beta fraction exhibited non-compliant precision results for gross beta (Table 2-8). The non-compliances were slight (24% & 22%) and may be attributed to laboratory inconsistencies.

The field duplicate pairs of samples U1G00101 and U1G01701 analyzed for the gross alpha/gross beta fraction exhibited non-compliant precision results for gross beta (Table 2-8). The non-compliances were greater than 50% in both field duplicate pairs. The non-compliance may be attributed to laboratory and/or field inconsistencies.

The evaluation of precision of the groundwater matrix for the MS/MSD samples is provided in Tables 2-15 through 2-21. All MS/MSD sample pairs analyzed for the groundwater fraction exhibited acceptable RPDs between spike compounds.

Based on assessment of duplicate precision evaluation criteria, the groundwater matrix analytical data was acceptable for each SDG.

2.2 Surface Soil Matrix

No target compounds requiring RPD calculation were detected in either the surface soil samples or associated duplicates for the semivolatiles fraction (Table 2-10) or the herbicides fraction (Table 2-12). Therefore, no precision assessment was conducted for that parameter.

The volatile analysis of the field duplicate pairs of samples U1S00100 and U1S01100 exhibited acceptable precision for the one (1) target compound detected, acetone, (Table 2-9).

The pesticide/PCB analysis of the field duplicate pair of sample U1S00100 exhibited a non-compliant RPD for one (1) of the seven (7) compounds detected (Table 2-11). The non-compliant compound was AR1260. The RPD value was 61%. The non-compliance may be attributed to field and/or laboratory inconsistencies The reported positive results for AR1260 in the field duplicate pair were qualified as estimated, J, due to non-compliant precision results.

The metals analysis of the field duplicate pair of sample U1S01100 exhibited acceptable precision for all of the detected target analytes (Table 2-13).

The metals analysis of the field duplicate pair of sample U1S00100 exhibited non-compliant RPDs for four (4) of the fifteen (15) target analytes requiring RPD calculation (Table 2-13). The non-compliant analytes were cadmium, calcium, magnesium, and silver. The analyte magnesium was detected at concentrations less than the analyte CRDL in both the original sample and the field duplicate. The non-compliance for magnesium can be attributed to the low concentrations detected. The analyte calcium exhibited non-compliance in the MD analysis (Table 2-26). This indicates potential matrix interference. The non-compliance for calcium may be attributed to potential matrix interferences. The analyte silver

was detected in the method blank associated with the field duplicate pair (Table 4-18). The concentration of silver in the field duplicate sample was within the five times (5X) the blank contamination level limit for amendment to non-detect. However, the concentration silver in the original field sample was above the action limit. The non-compliance for silver can be attriubuted to laboratory contamination. Assessment of the serial dilution data indicates that criteria was met for the non-compliant compounds (Appendix B, Table B-3).

The TPH analysis of the field duplicate pair of sample U1S01100 exhibited a compliant RPD (Table 2-14).

The TPH analysis of the field duplciate pair of sample U1S00100 exhibited a non-compliant RPD (Table 2-14). The method utilized for TPH, 418.1, does not lend itself well to precision measurements. The potential for extraction losses when using this method is significant. The non-compliance for the compound may be attributed to the methodology employed.

The evaluation of precision for the surface soil matrix for the MS/MSD samples is provided in Tables 2-22 through 2-27. All MS/MSD sample pairs analyzed for the surface soil matrix exhibited acceptable precision between spike results with the exception of the metals MD pair.

The metals analysis of the MD of sample U1S00100 exhibited non-compliant RPDs for the analytes aluminum, calcium, chromium, iron, lead, and zinc (Table 2-26). The analytes aluminum, chromium, lead, and zinc didn't require qualifications because the RPD result was not greater than 35%. Positive results reported for calcium and iron in associated samples were appropriately qualified as estimated, J.

Based on assessment of duplicate precision evaluation criteria, the surface soil matrix analytical data was acceptable for each SDG with the noted potential for bias in the PCB AR1260 results in the field duplicate pair and in the metals analytes calcium and zinc.

3.0 ACCURACY

The assessment of accuracy is evaluated by comparison of the percent recovery (%R) computed from the known concentration of analyte spikes and their recovered concentration versus the analytical method acceptance criteria. Spike recoveries provide an indication of bias, where the reported data may either overestimate or underestimate the actual concentration of detected compounds and/or the detection limits. Recoveries outside acceptable criteria may be caused by factors such as matrix interference, poor analytical precision, or instrument calibration.

The following Sections summarize the evaluation of analytical accuracy for the water and soil matrices for the following analytical groups:

- GC/MS volatile organic compounds (GC/MS VOCs);
- GC/MS semivolatile organic compounds (SVOCs);
- pesticides, PCBS,;
- herbicides;
- metals, TPH, and gross alpha/gross beta.

Accuracy was assessed using MS and MSD samples for organic analyses and MS samples for inorganic analyses for each matrix, as well as surrogate compound recoveries for those analytical fraction which utilize them. The results of the evaluation of accuracy for the MS/MSD samples is provided in Tables 2-15 through 2-21 for the groundwater matrix and Tables 2-22 through 2-27 for the surface soil matrix. The results of the evaluation of accuracy for the surrogates in the samples are provided in Table 3-1 through 3-4 for the groundwater and QC water matrices and Tables 3-5 through 3-8 for the surface soil matrix.

3.1 Groundwater and QC Water Matrix

All MS/MSD sample pairs analyzed for volatiles and herbicides exhibited acceptable recoveries of spike compounds (Tables 2-15 and 2-18).

The surrogate recoveries for volatiles and herbicides were acceptable (Tables 3-1and 3-4).

The MS/MSD of sample U1G02001analyzed for semivolatile organics had non-compliant %Rs for 4-nitrophenol and pentachlorophenol in the MS and the MSD (Table 2-16). However, based on the assessment of additional QC criteria the analytical data did not require qualification.

Twelve (12) semivolatile samples exhibited surrogate recoveries which were outside the acceptable criteria for accuracy (Table 3-2). In eleven (11) of the twelve (12) samples qualifications were not required because the National Functional Guidelines and the SOW allows one (1) surrogate compound per fraction to exceed the QC limits as long as the recovery is above 10%. In sample U1G00101 two (2) base/neutral fraction surrogates were recovered below the QC limits. Therefore, all positive and non-detect analytical results for the base/neutral fraction in sample U1G00101 were appropriately qualified as estimated, J/UJ.

The MS/MSD of sample U1G02001analyzed for pesticide/PCBs had non-compliant %Rs for endrin in the MS and the MSD (Table 2-17). However, based on the assessment of additional QC criteria the analytical data did not require qualification.

The pesticides/PCB TCMX surrogate recoveries were below the QC limits in four (4) field samples and one (1) MS/MSD pair (Table 3-3). The surrogate DCB was recovered below the QC limits in four (4) field samples. This indicates that reported results for the target compounds in those field water

TABLE 3-1
SURROGATE % RECOVERIES
VOLATILE GROUNDWATER SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	SMC1	SMC2	SMC3	TOTAL OUT
U1-1	U1P01903	91	92	91	0
	U1P03203	90	92	91	0
	U1P01003	89	92	92	0
	TRIPBLANK	91	91	92	0
	U1R00001	91	90	89	0
	U1T00001	91	90	88	0
U1-2	U1P03903	90	96	86	0
	U1P03904	89	97	86	0
	U1P03603	88	96	87	0
	U1P05205D	102	102	98	0
	U1P05205DDL	101	103	100	0
	U1P03604	93	95	94	0
	U1P05902	101	103	103	0
	U1P05901	101	104	102	0
U1-3	U1T00002	99	95	99	0
	U1R00002	97	95	93	0
	U1T00003	94	96	97	0
	U1G02201	94	96	97	0
	U1G02301	94	95	98	0
	U1T00004	95	96	100	0
	U1Y00001	94	95	99	0
	U1G02401	96	95	99	0
	U1G02601	95	95	100	0
	U1T00005	104	98	103	0
	U1G02701	105	98	104	0
	U1G02701D	105	98	104	0
	U1T00006	100	98	101	0
	U1G02501	100	96	101	0
	U1G02501MS	101	98	102	0
	U1G02501MSD	101	98	102	0
	U1G00201	101	98	103	0
	U1T00007	103	96	102	0
	U1G00101	102	97	102	0
	U1G00301	106	96	102	0

TABLE 3-1, CONTINUED
SURROGATE % RECOVERIES
VOLATILE GROUNDWATER SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	SMC1	SMC2	SMC3	TOTAL OUT
U1-4	U1T00008	110	97	104	0
	U1G00501	110	96	103	0
	U1G00401	111	97	103	0
	U1T00009	104	97	100	0
	U1G00601	103	96	100	0
	U1G00701	104	96	101	0
	U1G00801	103	97	101	0
	U1T00010	103	96	100	0
	U1G01001D	105	97	101	0
	U1G01001	104	96	101	0
	U1G01101	106	96	99	0
	U1T00011	101	96	97	0
	U1G01201	103	95	98	0
	U1G01701	104	95	97	0
	U1G01701D	105	96	98	0
	U1T00012	108	95	99	0
	U1G01601	108	94	99	0
	U1T00013	103	93	94	0
	U1G00901	105	93	96	0
	U1R00003	106	92	95	0
	U1T00014	107	92	97	0
	U1G01501	108	92	97	0
	U1G01401	109	92	97	0
	U1T00015	109	93	97	0
	U1G02001	109	92	96	0
	U1G02001MS	109	93	97	0
	U1G02001MSD	110	93	97	0
	U1G01901	110	92	97	0
	U1T00016	95	91	92	0
	U1G01301	99	90	93	0
	U1T00017	99	90	94	0
	U1G02101	101	90	95	0
	U1G01801	102	89	95	0

SMC1 = 1,2 - DICHLOROETHANE - D4 QC LIMITS 76% - 114%
SMC2 = TOLUENE - D8 QC LIMITS 88% - 110%
SMC3 = BROMOFLUOROBENZENE QC LIMITS 86% - 115%

D - INDICATES SURROGATE DILUTED OUT
* - INDICATES VALUE OUTSIDE QC LIMITS

# SAMPLES	% REC IN	%REC OUT	% TOTAL IN
67	201	0	100.0%

TABLE 3 - 2
SURROGATE % RECOVERIES
SEMIVOLATILE GROUNDWATER WATER SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	S1	S2	S3	S4	S5	S6	S7	S8	TOTAL OUT
U1-1	U1R00001	70	80	79	78	76	77	86	94	0
U1-3	U1R00002	80	74	78	84	84	84	91	86	0
	U1G02201	73	68	76	75	77	76	77	77	0
	U1Y00001	76	72	80	81	79	84	79	79	0
	U1G02401	76	66	69	76	76	82	77	32*	1
	U1G02501MS	78	68	75	79	77	77	79	32*	1
	U1G02501MSD	79	73	79	80	82	81	79	35	0
	U1G00201	79	77	79	79	78	78	85	37	0
	U1G02301	91	82	93	82	86	94	104	49	0
	U1G02701D	101	85	101	89	94	99	89	25*	1
	U1G02501	109	98	109	93	95	97	106	37	0
	U1G00301	104	100	111*	93	96	98	106	13*	2
	U1G02601	79	80	81	81	95	85	89	32*	1
	U1G02701	76	76	80	78	92	77	86	35	0
	U1G00101	38	39	70	39	44	41*	36	23*	2
	U1G00101RE	75	82	75	82	93	89	88	65	0
U1-4	U1G00501	104	104	113*	93	97	110	120	46	1
	U1G00401	95	93	105	91	92	101	98	63	0
	U1G00601	104	98	111*	94	92	105	113	45	1
	U1G00701	99	93	110	100	96	112	105	137	0
	U1G00801	81	76	84	73	76	96	88	49	0
	U1G01001D	75	78	76	78	98	79	78	75	0
	U1G01001	71	71	72	75	92	83	75	78	0
	U1G01101	75	76	78	77	89	82	85	38	0
	U1G01201	72	71	72	74	91	82	83	49	0
	U1G01701	72	73	75	73	89	76	85	35	0
	U1G01701D	67	71	71	71	84	74	88	37	0
	U1G01601	69	71	72	73	93	74	80	64	0
	U1G01901	73	75	73	81	87	81	84	52	0
	U1G00901	72	76	75	82	87	84	90	66	0
	U1R00003	74	79	77	83	88	84	87	68	0
	U1G01301	74	87	72	83	97	88	89	94	0
	U1G02101	69	76	70	78	86	75	83	25*	1
	U1G01801	71	80	71	81	93	88	86	40	0
	U1G02001	84	86	82	86	107	91	93	37	0
	U1G02001MS	85	81	75	87	91	89	83	42	0
	U1G02001MSD	86	81	75	87	100	84	84	29*	1
	U1G01501	79	75	75	80	104	92	82	28*	1
	U1G01401	74	72	74	79	101	89	84	31*	1

S1 = 2-FLUOROPHENOL QC LIMITS 21% - 110%
S2 = PHENOL-D5 QC LIMITS 10% - 110%
S3 = 2-CHLOROPHENOL-D4 QC LIMITS 33% - 110% ADVISORY
S4 = 1,2-DICHLOROBENZENE-D4 QC LIMITS 16% - 110% ADVISORY
S5 = NITROBENZENE-D5 QC LIMITS 35% - 114%
S6 = 2-FLUOROBIPHENYL QC LIMITS 43% - 116%
S7 = 2,4,6-TRIBROMOPHENOL QC LIMITS 10% - 123%
S8 = TERPHENYL-D14 QC LIMITS 33% - 141%

D - INDICATES SURROGATE DILUTED OUT
* - INDICATES VALUE OUTSIDE QC LIMITS
NA - INDICATES SURROGATE SPIKE NOT REQUIRED FOR METHOD UTILIZED.

# SAMPLES	% REC IN	%REC OUT	% TOTAL IN
39	298	14	95.5%

TABLE 3 - 3
SURROGATE % RECOVERIES
PESTICIDE/PCB GROUNDWATER SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	TCX1	TCX2	DCB1	DCB2	TOTAL OUT
U1-1	U1R00001	75	82	69	69	0
U1-3	U1G00101	82	82	104	104	0
	U1G00201	88	84	70	69	0
	U1G00301	82	78	37*	36*	2
	U1G02201	76	76	102	101	0
	U1G02301	85	82	106	104	0
	U1G02401	67	66	94	93	0
	U1G02501	66	68	68	68	0
	U1G02601	62	60	51*	50*	2
	U1G02701	69	68	54*	54*	2
	U1G02701D	64	63	51*	49*	2
	U1R00002	84	85	110	108	0
	U1Y00001	94	92	114	113	0
	U1G02501MS	58*	59*	70	68	2
	U1G02501MSD	57*	58*	73	70	2
U1-4	U1G00401	58*	54*	88	82	2
	U1G00501	74	70	95	88	0
	U1G00601	56*	56*	86	78	2
	U1G00701	70	68	112	103	0
	U1G00801	77	71	102	94	0
	U1G00901	68	64	102	94	0
	U1G01001	69	67	102	96	0
	U1G01001D	88	80	112	104	0
	U1G01101	58*	54*	90	82	2
	U1G01201	56*	49*	106	97	2
	U1G01301	76	76	104	96	0
	U1G01401	64	65	76	68	0
	U1G01501	92	79	103	94	0
	U1G01601	84	81	108	100	0
	U1G01701	66	61	88	80	0
	U1G01701D	74	72	76	69	0
	U1G01801	80	77	88	81	0
	U1G01901	84	77	109	100	0
	U1G02001	76	70	105	96	0
	U1G02101	74	74	86	78	0
	U1R00003	77	74	106	97	0
	U1G02001MS	72	71	104	95	0
	U1G02001MSD	74	72	99	91	0

TCX = TETRACHLORO-M-XYLENE QC LIMITS 60% - 150%
DCB = DECACHLOROBIPHENYL QC LIMITS 60% - 150%

D - INDICATES SURROGATE DILUTED OUT
* - INDICATES VALUE OUTSIDE QC LIMITS

TCX1 - COLUMN 1
TCX2 - COLUMN 2
DCB 1 - COLUMN 1
DCB 2 - COLUMN 2

# SAMPLES	% REC IN	%REC OUT	% TOTAL IN
38	132	20	86.8%

TABLE 3 - 4
SURROGATE % RECOVERIES
HERBICIDE GROUNDWATER SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	DCAA	TOTAL OUT
U1-1	U1R00001	108	0
U1-3	U1R00002	97	0
	U1G02201	98	0
	U1G02301	105	0
	U1Y00001	101	0
	U1G02401	107	0
	U1G02601	93	0
	U1G02701	90	0
	U1G02701D	102	0
	U1G02501	58	0
	U1G02501MS	86	0
	U1G02501MSD	86	0
	U1G00201	84	0
	U1G00101	97	0
	U1G00301	75	0
U1-4	U1G00501	107	0
	U1G00401	98	0
	U1G00601	93	0
	U1G00701	97	0
	U1G00801	94	0
	U1G01001D	97	0
	U1G01001	97	0
	U1G01101	93	0
	U1G01201	95	0
	U1G01701	88	0
	U1G01701D	97	0
	U1G01601	78	0
	U1G00901	101	0
	U1R00003	91	0
	U1G01501	92	0
	U1G01401	96	0
	U1G02001	89	0
	U1G02001MS	99	0
	U1G02001MSD	95	0
	U1G01901	93	0
	U1G01301	86	0
	U1G02101	78	0
	U1G01801	86	0

DCAA = 2,4-DICHLOROPHENYLACETIC ACID
QC LIMITS 47% - 125%

D - INDICATES SURROGATE DILUTED OUT
* - INDICATES VALUE OUTSIDE QC LIMITS

# SAMPLES	% REC IN	%REC OUT	% TOTAL IN
38	38	0	100.0%

TABLE 3-5
SURROGATE % RECOVERIES
VOLATILE SURFACE SOIL SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	SMC1	SMC2	SMC3	TOTAL OUT
U1-1	U1S00100	88	92	87	0
	U1S00100MS	88	92	88	0
	U1S00100MSD	87	94	85	0
	U1S00100D	86	99	83	0
	U1S00200	88	96	84	0
	U1S00300	87	97	82	0
	U1S00400	88	98	82	0
	U1S00500	88	94	86	0
	U1S00600	88	93	87	0
	U1S00800	88	94	86	0
	U1S00900	88	94	84	0
	U1S01000	89	94	86	0
	U1S01100	88	92	87	0
	U1S01100D	88	93	87	0
	U1S01200	89	92	89	0
	U1S01300	88	94	86	0
	U1S01400	89	99	85	0
	U1S00700	88	97	83	0

SMC1 = 1,2 - DICHLOROETHANE - D4 QC LIMITS 70% - 121%
SMC2 = TOLUENE - D8 QC LIMITS 84% - 138%
SMC3 = BROMOFLUOROBENZENE QC LIMITS 59% - 113%

D - INDICATES SURROGATE DILUTED OUT
* - INDICATES VALUE OUTSIDE QC LIMITS

# SAMPLES	% REC IN	%REC OUT	% TOTAL IN
18	54	0	100.0%

TABLE 3 - 6
SURROGATE % RECOVERIES
SEMIVOLATILE SURFACE SOIL SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	S1	S2	S3	S4	S5	S6	S7	S8	TOTAL OUT
U1-1	U1S00100	64	70	64	73	74	72	66	87	0
	U1S00100MS	69	69	65	76	70	70	72	89	0
	U1S00100MSD	63	64	60	72	67	67	66	83	0
	U1S00100D	61	66	61	66	73	69	64	66	0
	U1S00200	63	69	63	68	73	69	74	78	0
	U1S00300	63	72	63	63	64	61	66	55	0
	U1S00400	57	58	55	58	62	58	61	64	0
	U1S00500	66	68	64	70	76	71	72	80	0
	U1S00600	75	69	69	73	79	82	72	84	0
	U1S00700	83	78	76	76	85	89	92	100	0
	U1S00800	72	68	66	72	78	79	70	85	0
	U1S00900	74	71	69	78	84	83	73	95	0
	U1S01000	77	68	68	73	80	80	84	96	0
	U1S01100	56	48	50	56	60	63	54	63	0
	U1S01100D	72	64	64	70	75	78	73	86	0
	U1S01300	57	49	51	54	58	60	59	69	0
	U1S01400	74	65	66	73	81	83	83	88	0
	U1S01200	54	51	50	51	45	53	58	61	0
	U1S01200DL	66D	73D	69D	78D	77D	79D	78D	81D	0

S1 = 2-FLUOROPHENOL	QC LIMITS 25% - 121%	
S2 = PHENOL-D5	QC LIMITS 24% - 113%	
S3 = 2-CHLOROPHENOL-D4	QC LIMITS 20% - 130%	ADVISORY
S4 = 1,2-DICHLOROBENZENE-D4	QC LIMITS 20% - 130%	ADVISORY
S5 = NITROBENZENE-D5	QC LIMITS 23% - 120%	
S6 = 2-FLUOROBIPHENYL	QC LIMITS 30% - 115%	
S7 = 2,4,6-TRIBROMOPHENOL	QC LIMITS 19% - 122%	
S8 = TERPHENYL-D14	QC LIMITS 18% - 137%	

D - INDICATES SURROGATE DILUTED OUT
* - INDICATES VALUE OUTSIDE QC LIMITS
NA - INDICATES SURROGATE SPIKE NOT REQUIRED FOR METHOD UTILIZED.

# SAMPLES	% REC IN	%REC OUT	% TOTAL IN
19	152	0	100.0%

TABLE 3 - 7
SURROGATE % RECOVERIES
PESTICIDE/PCB SURFACE SOIL SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	TCX1	TCX2	DCB1	DCB2	TOTAL OUT
U1-1	U1S00100	79	81	75	79	0
	U1S00100D	76	78	73	75	0
	U1S00100DDL	83	88	95	93	0
	U1S00100MS	89	92	96	98	0
	U1S00100MSD	84	86	93	93	0
	U1S00100DL	81	86	92	91	0
	U1S00200	77	78	66	70	0
	U1S00200DL	88	93	98	99	0
	U1S00300	71	74	70	70	0
	U1S00400	67	74	73	70	0
	U1S00500	56*	65	63	60	1
	U1S00600	79	80	81	81	0
	U1S00700	76	77	87	84	0
	U1S00800	76	77	70	70	0
	U1S00800DL	78	78	87	83	0
	U1S00900	75	76	71	71	0
	U1S01000	77	77	74	73	0
	U1S01100	79	78	67	67	0
	U1S01100D	81	79	71	71	0
	U1S01200	78	77	74	73	0
	U1S01300	78	77	65	66	0
	U1S01400	80	84	76	76	0

TCX = TETRACHLORO-M-XYLENE QC LIMITS 60% - 150%
DCB = DECACHLOROBIPHENYL QC LIMITS 60% - 150%

D - INDICATES SURROGATE DILUTED OUT
* - INDICATES VALUE OUTSIDE QC LIMITS

TCX1 - COLUMN 1
TCX2 - COLUMN 2
DCB 1 - COLUMN 1
DCB 2 - COLUMN 2

# SAMPLES	% REC IN	%REC OUT	% TOTAL IN
22	87	1	98.9%

TABLE 3 - 8
SURROGATE % RECOVERIES
HERBICIDE SURFACE SOIL SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDG	SAMPLE ID	DCAA	TOTAL OUT
U1-1	U1S00100	116	0
	U1S00100D	121	0
	U1S00200	117	0
	U1S00300	110	0
	U1S00400	110	0
	U1S00500	116	0
	U1S00600	108	0
	U1S00700	113	0
	U1S00800	109	0
	U1S00900	105	0
	U1S01000	108	0
	U1S01100	113	0
	U1S01100D	104	0
	U1S01200	109	0
	U1S01300	87	0
	U1S01400	101	0
	U1S00100MS	132	0
	U1S00100MSD	126	0

DCAA = 2,4-DICHLOROPHENYLACETIC ACID
QC LIMITS 50%-150%

D - INDICATES SURROGATE DILUTED OUT
* - INDICATES VALUE OUTSIDE QC LIMITS

# SAMPLES	% REC IN	%REC OUT	% TOTAL IN
18	18	0	100.0%

samples could be biased low. Therefore, all reported positive and non-detect results in samples exhibiting the non-compliant recoveries were appropriately qualified as estimated, J/UJ.

The herbicide MS/MSD pairs of samples U1G02501 and U1G02001 exhibited dinoseb recoveries which were below the QC limits in the MS and the MSD (Table 2-18). The blank spike samples which were submitted with the sample SDGs also exhibited recoveries below 50%. Therefore, reported positive and non-detect results reported for dinoseb in associated samples were qualified as estimated, J/UJ.

The metals analysis of the MS sample U1G02501 exhibited acceptable recoveries for all analytes except selenium (Table 2-19). The analyte was recovered below the QC limit. This indicates that reported results for selenium in associated samples may be underestimated. Therefore, all positive and non-detect results for selenium in associated samples were qualified as estimated, J/UJ.

The dissolved metals analysis of the MS sample U1H02001 exhibited acceptable recoveries for all analytes except selenium (Table 2-20). The analyte was recovered below 30%. This indicates that reported positive results for selenium in associated samples are underestimated and non-detect results are unreliable. Therefore, all positive results for selenium in associated samples were qualified as estimated, J, and all non-detect results were rejected, R. This constituted the rejection of sixteen (16) dissolved metals data points. The completion goal for the fraction and matrix was still met.

The gross alpha/gross beta analysis of the MS/MSD pair of sample U1G02501 exhibited a recovery above the QC limits for gross beta in the MS. However, based on the assessment of additional QC criteria, the analytical data did not require qualification.

Based on assessment of MS/MSD and surrogate sample accuracy evaluation criteria, the groundwater matrix analytical data was acceptable for each SDG with the following exceptions. The compound dinoseb in the herbicides samples may be biased low. Results in the noted semivolatile sample and pesticide/PCBs samples may be underestimated due to non-compliant surrogate recoveries. In the metals fraction, the low recoveries of the analyte selenium which resulted in the qualification of positive and non-detect results in one (1) SDG and the rejection of sixteen (16) data points in another SDG. The completion goal was met.

3.2 Surface Soil Matrix

All MS/MSD sample pairs analyzed for volatiles, semivolatiles, and TPH exhibited acceptable recoveries of spike compounds (Tables 2-22, 2-23, and 2-27).

The surrogate recoveries for volatiles, semivolatiles, and herbicides were acceptable (Tables 3-5, 3-6, and 3-8).

The MS/MSD pair of sample U1S00100 analyzed for pesticides exhibited a non-compliant recovery for dieldrin in the MSD (Table 2-24). The compound was recovered above the QC limits. However, based on the assessment of additional QC criteria, the analytical data did not require qualification.

The pesticide/PCB surrogate TCMX was recovered below the QC limits in one (1) field sample, U1S00500. This indicates that reported results for the target compounds in that field soil sample could be biased low. Therefore, all reported positive and non-detect results in the sample exhibiting the non-compliant recovery were appropriately qualified as estimated, J/UJ

The MS/MSD pair of sample U1S00100 analyzed for herbicides exhibited recoveries above the QC limits for the compound dalapon (Table 2-25). There were no positive results detected for dalapon in

the associated samples. Therefore, based on the assessment of additional QC criteria, the analytical data did not require qualification.

The MS of sample U1S00100 analyzed for metals exhibited a recovery for lead which was below the QC limit (Table 2-26). This indicates that reported results in associated samples may be underestimated. Therefore, positive results for lead in associated samples were qualified as estimated, J, and non-detect results were qualified as estimated, UJ.

Based on assessment of MS/MSD and surrogate sample accuracy evaluation criteria, the surface soil matrix analytical data was acceptable for each SDG with the following exceptions. Results in the noted pesticide/PCB sample may be underestimated due to non-compliant surrogate recoveries. In the metals fraction, the low recovery of the analyte lead resulted in the qualification of positive and non-detect results in one (1) SDG.

4.0 REPRESENTATIVENESS

Representativeness of the environmental sample analytical data was assessed using trip blanks, field blanks, equipment rinseate blanks, and laboratory method blanks. The environmental samples and associated blanks were analyzed for the following target analyte groups:

- GC/MS volatile organic compounds (GC/MS VOCs);
- GC/MS semivolatile organic compounds (SVOCs);
- pesticides, PCBS,;
- chlorinated herbicides;
- metals; and
- gross alpha/gross beta.

The trip blank samples were analyzed for only volatile organic target analytes. Field blanks, equipment rinseate blanks, and laboratory method blanks were analyzed for target analytes in each listed category. The assessment of representativeness is summarized in tabular form for each type of blank, trip blank results are summarized in Table 4-1, rinseate blank results are summarized in Tables 4-2 through 4-7, field blank results are summarized in Tables 4-8 through 4-13 and method blank results are summarized in Tables 4-14 through 4-18.

If contaminants were detected in a blank, corrective actions were made for the chemical analytical data during data validation by Heartland. The corrective action consisted of amending the laboratory reported results for organic and inorganic target analytes by the criteria. The following describes the Validation Qualifier code in the blank summary tables.

Organic Target Analytes

- CRDL Validation Qualifier. If a sample result for the blank contaminant was less than the CRQL and less than 5 times the blank value (10 times for common laboratory contaminants), the sample result was rejected and amended as estimated non-detected at the CRQL for the target compound.

- U Validation Qualifier. If a sample result for the blank contaminant was greater than the sample CRQL and less than 5 times the blank value (10 times for common laboratory contaminants), the sample result for the blank contaminant was amended as non detect at the concentration reported in the sample results.

- No Action (NA). If a sample result for the blank contaminant was greater than the CRQL and 5 time the blank value (10 times for common laboratory contaminants), the result was not amended.

Inorganic Target Analytes

- U Validation Qualifier. If a sample result for the blank contaminant was less than the IDL and less than 5 times the blank value, the sample result was amended as non-detected.

- UJ Validation Qualifier. If a sample result for the blank contaminant was less than the sample IDL when the absolute value of the negative blank value was greater than the IDL, the sample result for the blank contaminant was amended as estimated non-detected.

TABLE 4 - 1
VOLATILES DETECTED IN TRIP BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	TB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	TRIPBLANK	U1P01003, U1P01903, U1P03203	NO CONTAMINATION FOUND			
	U1T00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	NO CONTAMINATION FOUND			
U1-3	U1T00002	U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301	NO CONTAMINATION FOUND			
	U1T00003		NO CONTAMINATION FOUND			
	U1T00004		NO CONTAMINATION FOUND			
	U1T00005		NO CONTAMINATION FOUND			
	U1T00006		NO CONTAMINATION FOUND			
	U1T00007		NO CONTAMINATION FOUND			
U1-4	U1T00008	U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			
	U1T00011		NO CONTAMINATION FOUND			
	U1T00012		NO CONTAMINATION FOUND			
	U1T00015		NO CONTAMINATION FOUND			
	U1T00016		NO CONTAMINATION FOUND			
	U1T00017		NO CONTAMINATION FOUND			
	U1T00009	U1G00601, U1G00701, U1G00801	METHYLENE CHLORIDE	4	µg/L	CRQL
	U1T00010	U1G01001D, U1G01001, U1G01101	METHYLENE CHLORIDE	4	µg/L	CRQL
	U1T00013	U1G01201, U1G01701D	ACETONE	11	µg/L	U
		U1G00901				
		U1G01201, U1G01701D	METHYLENE CHLORIDE	6	µg/L	
		U1G00901				CRQL
	U1T00014	U1G01301	ACETONE	9	µg/L	CRQL

TABLE 4 - 2
VOLATILES DETECTED IN EQUIPMENT RINSEATE BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	RB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	U1R00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	NO CONTAMINATION FOUND			
U1-3	U1R00002	U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301	NO CONTAMINATION FOUND			
U1-4	U1R00003	U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	METHYLENE CHLORIDE	7	µg/L	

TABLE 4 - 3
SEMIVOLATILES DETECTED IN EQUIPMENT RINSEATE BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	RB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	U1R00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	NO CONTAMINATION FOUND			
U1-3	U1R00002	U1G02201, U1G02301, U1G02401, U1G02601, U1G02501, U1G00201, U1G00101, U1G00301	PHENOL	1	µg/L	
		U1G02701, U1G02701D,				CRQL
U1-4	U1R00003	U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 4
PESTICIDES/PCBS DETECTED IN EQUIPMENT RINSEATE BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	RB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	U1R00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	NO CONTAMINATION FOUND			
U1-3	U1R00002	U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301	NO CONTAMINATION FOUND			
U1-4	U1R00003	U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 5
HERBICIDES DETECTED IN EQUIPMENT RINSEATE BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	RB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	U1R00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	NO CONTAMINATION FOUND			
U1-3	U1R00002	U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301	NO CONTAMINATION FOUND			
U1-4	U1R00003	U1G00501, U1G00401, U1G00701, U1G00801, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 6
TOTAL METALS DETECTED IN EQUIPMENT RINSEATE BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	RB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	U1R00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	BERYLLIUM	0.17	µg/L	
			CALCIUM	46.9	µg/L	
			SILVER	3.6	µg/L	
			ZINC	2.6	µg/L	
U1-3	U1R00002	U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301	BERYLLIUM	0.3	µg/L	
			MANGANESE	0.75	µg/L	
			VANADIUM	3.2	µg/L	
		U1G02201, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00301	COPPER	1.4	µg/L	
		U1G00101, U1G02301				U
U1-4	U1R00003	U1G00501, U1G00401, U1G00701, U1G00801, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	BARIUM	0.56	µg/L	
			SILVER	2.5	µg/L	
			ZINC	1.4	µg/L	

TABLE 4 - 7
GROSS ALPHA AND GROSS BETA DETECTED IN EQUIPMENT RINSEATE BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	RB CONC.	UNITS	VALIDATION QUALIFIER
U1-3	U1R00002	U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301	NO CONTAMINATION FOUND			
U1-4	U1R00003	U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 8
VOLATILES DETECTED IN FIELD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	FB CONC.	UNITS	VALIDATION QUALIFIER
U1-3	U1Y00001	U1P01003, U1P01903, U1P03203 U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400 U1P05205D, U1P03903, U1P03904, U1P03603, U1P03604, U1P05902, U1P05901 U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301 U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 9
SEMIVOLATILES DETECTED IN FIELD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	FB CONC.	UNITS	VALIDATION QUALIFIER
U1-3	U1Y00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400 U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301 U1G00501, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	PHENOL	1.0	µg/L	
		U1G00401				CRQL

TABLE 4 - 10
PESTICIDES/PCBS DETECTED IN FIELD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	FB CONC.	UNITS	VALIDATION QUALIFIER
U1-3	U1Y00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400 U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301 U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 11
HERBICIDES DETECTED IN FIELD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	FB CONC.	UNITS	VALIDATION QUALIFIER
U1-3	U1Y00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400 U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301 U1G00501, U1G00401, U1G00701, U1G00801, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 12
TOTAL METALS DETECTED IN FIELD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	FB CONC.	UNITS	VALIDATION QUALIFIER
U1-3	U1Y00001	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400 U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301 U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	ALUMINUM	25.3	µg/L	

TABLE 4 - 13
GROSS ALPHA AND GROSS BETA DETECTED IN FIELD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	FB CONC.	UNITS	VALIDATION QUALIFIER
U1-3	U1Y00001	U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301 U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 14
VOLATILES DETECTED IN METHOD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	MB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	VBLKHB	U1P01003, U1P01903, U1P03203, TRIPBLANK	NO CONTAMINATION FOUND			
	VBLKH9	U1R00001, U1T00001	NO CONTAMINATION FOUND			
	VBLKH6	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400, U1S00100MS, U1S00100MSD	NO CONTAMINATION FOUND			
U1-2	VBLKHM	U1P03903, U1P03904, U1P03603	NO CONTAMINATION FOUND			
	VBLKHP	U1P05205D, U1P05205DDL	NO CONTAMINATION FOUND			
	VBLKHR	U1P03604	NO CONTAMINATION FOUND			
	VBLKIO	U1P05902, U1P05901	NO CONTAMINATION FOUND			
U1-3	VBLKKD	U1T00002, U1R00002	NO CONTAMINATION FOUND			
	VBLKKG	U1T00003, U1G02201, U1G02301, U1T00004, UY00001, U1G02401, U1G02601	NO CONTAMINATION FOUND			
	VBLKKH	U1T00005, U1G02701, U1G02701D	NO CONTAMINATION FOUND			
	VBLKKI	U1T00006, U1G02501, U1G02501MS, U1G02501MSD, U1G00201, U1T00007, U1G00101, U1G00301	NO CONTAMINATION FOUND			
U1-4	VBLKKN	U1T00008, U1G00501, U1G00401	NO CONTAMINATION FOUND			
	VBLKKP	U1T00009, U1G00601, U1G00701, U1G00801, U1T00010, U1G01001D U1G01001, U1G01101	NO CONTAMINATION FOUND			
	VBLKKS	U1T00011, U1G01201, U1G01701, U1G01701D, U1T00012, U1G01601	NO CONTAMINATION FOUND			
	VBLKKX	U1T00013, U1G00901, U1R00003, U1T00014, U1G01501, U1G01401, U1T00015, U1G02001, U1G02001MS, U1G02001MSD, U1G01901	NO CONTAMINATION FOUND			
	VBLKKZ	U1T00016, U1G01301, U1T00017, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 15
SEMIVOLATILES DETECTED IN METHOD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	MB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	SBLKVT	U1R00001	NO CONTAMINATION FOUND			
	SBLKVP	U1S00100, U1S00100MS, U1S00100MSD, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500	NO CONTAMINATION FOUND			
	SBLKVQ	U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01300, U1S01400, U1S01200, U1S01300DL	NO CONTAMINATION FOUND			
U1-3	SBLK18	U1R00002	NO CONTAMINATION FOUND			
	SBLK19	U1G02201, U1Y00001, U1G02401, U1G02301, U1G02601	NO CONTAMINATION FOUND			
	SBLK20	U1G02701D, U1G02701	NO CONTAMINATION FOUND			
	SBLK21	U1G00201 U1G02501, U1G02501MS, U1G02501MSD	PHENOL	2	µg/L	CRQL
	SBLK22	U1G00301, U1G00101	NO CONTAMINATION FOUND			
	SBLK32	U1G00101RE	NO CONTAMINATION FOUND			
U1-4	SBLK23	U1G00501, U1G00401, U1G00601, U1G00701	NO CONTAMINATION FOUND			
	SBLK24	U1G00801, U1G01001D, U1G01001, U1G01101	NO CONTAMINATION FOUND			
	SBLK25	U1G01201, U1G01701, U1G01701D, U1G01601	NO CONTAMINATION FOUND			
	SBLK26	U1G01901, U1G00901, U1R00003, U1G02001, U1G02001MS, U1G02001MSD, U1G01501, U1G01401	NO CONTAMINATION FOUND			
	SBLK32	U1G01301, U1G02101, U1G01801	NO CONTAMINATION FOUND			

TABLE 4 - 16
PESTICIDES/PCBS DETECTED IN METHOD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	MB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	PBLKW1_04-24	U1R00001	NO CONTAMINATION FOUND			
	PBLKS2_04-25	U1S00100, U1S00100D, U1S00100DDL U1S00100MS, U1S00100MSD, U1S00100DL, U1S00200, U1S00200DL U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00800DL, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	NO CONTAMINATION FOUND			
U1-3	PBLK04	U1R00002	NO CONTAMINATION FOUND			
	PBLK07	U1G02201, U1G02301	NO CONTAMINATION FOUND			
	PBLK08	U1G02401, U1G02601, U1Y00001	NO CONTAMINATION FOUND			
	PBLK09	U1G02701, U1G02701D	NO CONTAMINATION FOUND			
	PBLK10	U1G00201, U1G02501, U1G02501MS, U1G02501MSD	NO CONTAMINATION FOUND			
	PBLK14	U1G00101, U1G00301	NO CONTAMINATION FOUND			
U1-4	PBLK17	U1G00401, U1G00501, U1G00601, U1G00701, U1G00801	NO CONTAMINATION FOUND			
	PBLK22	U1G01001, U1G01001D, U1G01101, U1G01201, U1G01601, U1G01701, U1G01701D	NO CONTAMINATION FOUND			
	PBLK23	U1G00901, U1R00003	NO CONTAMINATION FOUND			
	PBLK25	U1G01401, U1G01501	NO CONTAMINATION FOUND			
	PBLK28	U1G01301, U1G01901, U1G02001, U1G02001MS, U1G02001MSD	NO CONTAMINATION FOUND			
	PBLK29	U1G01801, U1G02101	NO CONTAMINATION FOUND			

TABLE 4 - 17
HERBICIDES DETECTED IN METHOD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	MB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	HWB10425	U1R00001	NO CONTAMINATION FOUND			
	HSB10426	U1S00100, U1S00100D, U1S00100MS, U1S00100MSD, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	NO CONTAMINATION FOUND			
U1-3	W08045B1	U1R00002	NO CONTAMINATION FOUND			
	W08075B1	U1G02201, U1G02301	NO CONTAMINATION FOUND			
	W08085B1	U1G02401, U1G02601, U1Y00001	NO CONTAMINATION FOUND			
	W08095B1	U1G02701, U1G02701D	NO CONTAMINATION FOUND			
	W08105B1	U1G00201, U1G02501, U1G02501MS, U1G02501MSD	NO CONTAMINATION FOUND			
	W08145B1	U1G00101, U1G00301	NO CONTAMINATION FOUND			
U1-4	W08175B1	U1G00401, U1G00501, U1G00601, U1G00701, U1G00801	NO CONTAMINATION FOUND			
	W08225B1	U1G01001, U1G01001D, U1G01101, U1G01201, U1G01601, U1G01701, U1G01701D	NO CONTAMINATION FOUND			
	W08245B1	U1G00901, U1R00003 U1G01401, U1G01501	NO CONTAMINATION FOUND			
	W08285B1	U1G01301, U1G01901, U1G02001, U1G02001MS, U1G02001MSD	NO CONTAMINATION FOUND			
	W08295B1	U1G01801, U1G02101	NO CONTAMINATION FOUND			

TABLE 4 - 18
METALS DETECTED IN METHOD BLANKS
OPERABLE UNIT 1, NTC ORLANDO

SDG NUMBER	BLANK ID	RELATED ENVIRONMENTAL SAMPLES	CONTAMINANT	MB CONC.	UNITS	VALIDATION QUALIFIER
U1-1	PBS	U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	BERYLLIUM	0.05	mg/kg	U
		U1S01200, U1S01300	COBALT	0.78	mg/kg	U
		U1S00300, U1S00300, U1S00500, U1S01100, U1S01400	COPPER	0.46	mg/kg	U
		U1S00800, U1S00900	MAGNESIUM	7.31	mg/kg	U
		U1S00200, U1S00300, U1S00400, U1S00600, U1S00700, U1S01200	POTASSIUM	159	mg/kg	U
		U1S00100D, U1S00400, U1S00600, U1S00800, U1S00900	SILVER	0.56	mg/kg	U
		U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400	SODIUM	9.12	mg/kg	U
			ALUMINUM	5.25	mg/kg	
			BARIUM	0.19	mg/kg	
			ZINC	0.32	mg/kg	
	PBW	U1R00001	COPPER	4.4	µg/L	U
			POTASSIUM	642	µg/L	
			SODIUM	31.8	µg/L	
U1-3	PBW	U1H02201, U1H02601, U1R00002	BARIUM	0.68	µg/L	U
		U1G00201, U1G02401, U1G02501, U1G02701D, U1H00201, U1H02501 U1H02601, U1H02701, U1H02701D U1R00002, U1Y00001	CHROMIUM	2.61	µg/L	U
		U1G00201, U1G00301, U1G02501, U1G02701, U1G02701D, U1H00301 U1H02501	MERCURY	0.04	µg/L	U
		U1R00002, U1Y00001	SODIUM	75.5	µg/L	U
		U1G00201, U1G02301, U1G02401, U1G02501, U1G02701, U1G02701D, U1H00101, U1H00201, U1H00301, U1H02201, U1H02301, U1H02401, U1H02501, U1H02701, U1H02701D U1R00002, U1Y00001	ZINC	2.05	µg/L	U
			CALCIUM	40.9	µg/L	
U1-4	PBW	U1G00901, U1G01301, U1G01401 U1G01501, U1G01601, U1G01701 U1G01801, U1G01901, U1G02001 U1G02101, U1H00701, U1H00901 U1H01201, U1H01401, U1H01501 U1H01701, U1H01701D, U1H02001 U1R00003	ARSENIC	1.87	µg/L	U
		U1H01701D	NICKEL	11.5	µg/L	U
		U1G00801, U1G01001D, U1H00601 U1R00003	SODIUM	234	µg/L	U
		U1G01001, U1G01301, U1G01601 U1G01901, U1H00501, U1H00901 U1H01001, U1H01001D, U1H01301 U1H01601, U1H01901, U1R00003	ALUMINUM	-28.9	µg/L	J
		U1G00801, U1G01001D, U1H00601				UJ
		U1G00601, U1G01501	BERYLLIUM	-0.34	µg/L	J
		U1G00401, U1G00501, U1G00701, U1G00801, U1G00901, U1G01001, U1G01001D, U1G01101, U1G01201, U1G01301, U1G01401, U1G01601, U1G01701, U1G01701D, U1G01801, U1G01901, U1G02001, U1G02101, U1H00401, U1H00501, U1H00601, U1H00701, U1H00801, U1H00901 U1H01001, U1H01001D, U1H01101 U1H01201, U1H01301, U1H01401 U1H01501, U1H01601, U1H01701 U1H01701D, U1H01801, U1H01901 U1H02001, U1H02101, U1R00003				UJ
		U1G00801, U1G01001D, U1H00601 U1R00003	CALCIUM	-17.6	µg/L	UJ
		U1G00501, U1G00601, U1G01201 U1G01701, U1H00901, U1H01301 U1R00003	COPPER	-1.67	µg/L	J
		U1G00801, U1G00901, U1G01001D U1G01801, U1G02101, U1H00601, U1H00701, U1H00801, U1H01001 U1H01001D, U1H01201, U1H01501 U1H01701D, U1H01901, U1H02101				UJ
		U1G00401, U1G01601, U1G01901 U1H00401, U1H00801, U1H01601	IRON	-9.08		J
		U1G00801, U1G01001, U1G01001D U1G01301, U1H00601, U1H00701 U1H01001, U1H01001D, U1H01301 U1H01901, U1R00003				UJ

- J Validation Qualifier. If a sample result for the blank contaminant was greater than the IDL and less than 10 times the blank value, when the absolute of the negative blank value id greater than the IDL the result was amended as estimated at the laboratory value.

4.1 Trip Blanks

Trip blanks consist of a volatile organic sample container which is filled with analyte free water at the laboratory and shipped to the site with the other VOA sample containers. Trip blanks are kept with the investigative samples throughout the sampling event and are packaged and shipped with the investigative samples. The trip blank bottles were not opened at the site or anytime prior to laboratory analysis.

Target compounds and analytes detected in the field blank samples consisted of:

- Volatiles (Table 4-1)
  - Methylene chloride
  - Acetone

The methylene chloride and acetone detected in the trip blank are common laboratory contaminants. Some of the VOA samples required qualification due to the trip blank contamination. Based on the assessment of the trip blank results for representativeness, the analytical data is acceptable.

4.2 Equipment Rinseate Blanks

The equipment rinseate blank is a sample of organic free water which has been used to rinse the sampling equipment. A precleaned equipment blank was performed onsite before sampling was begun by rinsing clean sampling equipment. The integrity of the rinseate blanks was not compromised. Pesticide/PCBS, herbicides, or gross alpha/gross beta target compounds were not detected in the rinseate blank samples (Tables 4-4, 4-5, and 4-7). Target analytes detected in the equipment rinseate blank samples consisted of:

- Volatiles (Table 4-2)
  - Methylene chloride
- Semivolatiles (Table 4-3)
  - Phenol
- Metals (Table 4-6)
  - Beryllium
  - Calcium
  - Silver
  - Zinc
  - Manganese
  - Copper
  - Vanadium
  - Barium

The detected methylene chloride is a common laboratory contaminant and can be attributed to laboratory contamination. Phenol is an unusual contaminant and may be due to carryover or glassware problems. The metals analytes can be attributed to the water source, the water treatment system that

was used to make the deionized water, or laboratory artifacts. Some of the organic and metals sample data required qualification due to the rinseate blank contamination.

Based on assessment of equipment rinseate blanks for representativeness the analytical data was acceptable for the SDG.

4.3 Field Blanks

The field blank was prepared at the site at the beginning of the current project and placed in containers that were similar to those used for the environmental samples. Volatiles, pesticide/PCBS, herbicides, and gross alpha/gross beta target compounds were not detected in the field blank samples (Tables 4-8, 4-10, 4-11, and 4-13). Target compounds and analytes detected in the field blank samples consisted of:

- Semivolatiles (Table 4-9)
  - Phenol
- Metals (Table 4-10)
  - aluminum

The phenol may be due to carryover in the instrument. The metals analyte can be attributed to the water source, the water treatment system that was used to make the deionized water, or laboratory artifacts. Some of the organic sample data required qualification due to the field blank contamination.

Based on assessment of field blanks for representativeness the analytical data was acceptable for the SDGs.

4.4 Method Blanks

The method blanks were samples of deionized water prepared by the laboratory at the time of analysis. Method blanks undergo the same analytical process as the corresponding environmental samples and associated field blanks. The purpose of the method blank is to assess the potential for target compounds and analytes to "contaminate" the sample during analysis. Volatiles, pesticides/PCBS and herbicides target compounds were not detected in method blank samples (Tables 4-14, 4-16 and 4-17). Target analytes detected in the method blank samples consisted of:

- GC/MS Semivolatiles (Table 4-19)
  - Phenol
- Metals (Table 4-18)
  - Beryllium
  - Cobalt
  - Copper
  - Magnesium
  - Potassium
  - Silver
  - Sodium
  - Zinc
  - Chromium
  - Mercury
  - Calcium
  - Arsenic

Nickel
Iron
Barium

The semivolatile compound phenol may be due to instrument carryover. The metals analytes can be attributed to the water source, the water treatment system that was used to make the deionized water, or laboratory artifacts. Some of the metals analytes were negative in concentration and can be attributed to instrumentation anomalies.

Because target analytes were detected in some of the method blanks, some of the analytical results were qualified. However, based on assessment of method blanks for representativeness the analytical data was acceptable for each SDG.

4.5 Holding Times

Holding times requirements are utilized in an effort to minimize the degradation or concentration of constituents in a particular matrix over time. The stability of the constituents is determined to the best extent and then a reasonable time limit is imposed under which the samples must be extracted or prepared and then analyzed. The holding times regulations assume that the samples have been properly preserved according to the guidelines, either at the laboratory or in the field. Analytical results from samples with holding time violations are qualified as estimated, J/UJ, due to the potential for compromising the integrity of the samples.

All holding times requirements, extraction and analytical, were met for all samples, for all analytical fractions.

5.0 COMPARABILITY

Comparability is qualitative measure designed to express the confidence with which one data set may be compared to another. The analytical samples were collected and transported to the chemical analytical laboratory in accordance with standard procedures and were analyzed in conformance with acceptable USEPA procedures (Refer to Table 5-1 below). The analytical data are reported in standard units (micrograms per liter, micrograms per kilogram, etc.).

The methods used to collect the environmental samples and the methods used to analyze the samples should assure comparability of the analytical data.

TABLE 5-1
USEPA Procedures (CLP or SW-846 Methodologies)

U.S. EPA Method	Description
CLP, OLM01.8	Volatile Organics
CLP, OLM01.8	Semivolatile Organics
CLP, OLM01.8, SOW 3/90	Pesticides/PCBS
SW-846, Method 8150	Herbicides
CLP, ILMO2.1	Metals
SW-846, 418.1	Total Petroleum Hydrocarbons
Scintillation Counter	Alpha/Beta Scan 8310

6.0 COMPLETENESS

Completeness is the quantitative measure of the amount of data obtained from a measurement process compared with the amount expected to be obtained under the conditions of measurement. The completeness goal for laboratory analysis for this project was 80 percent useable data. Unusable analytical data are those results reported by the laboratory but rejected during the data validation process. A summary of the completeness goal for Operable Unit 1 - NTC Orlando is provided in Table 6-1. For more detailed completeness goal tables, please refer to Appendix C.

TABLE 6-1
COMPLETION GOAL (>80%)

	QC	GW	SS	OVERALL
GC/MS Volatiles	100.0	100.0	100.0	100.0
Semivolatiles	100.0	100.0	100.0	100.0
Pesticide/PCBS	100.0	100.0	100.0	100.0
Herbicides	100.0	100.0	100.0	100.0
Metals	100.0	100.0	100.0	100.0
Dissolved Metals	98.6	97.6	NA	98.1
Alpha/Beta scan	100.0	100.0	NA	100.0
TPH	100.0	100.0	100.0	100.0

MATRIX KEY

QC = QC Samples
GW = Groundwater Samples
SS = Surface Soil Samples

The analytical data met the 80 percent completeness goal for every fraction. The narrative following describes any extenuating factors involved in the data resolution.

VOAs, Semivolatiles, Pesticide/PCBs, and Herbicides Target compounds for the volatile, semivolatile, pesticide/PCB and herbicide fractions were qualified because of non-compliant calibrations. Volatile, semivolatile, pesticide/PCB and herbicide compounds did not always meet the initial and/or continuing calibration criteria for RSD (Relative Standard Deviation), and %D (Percent Difference). All results qualified for calibration % RSD and % D deficiencies (J/UJ) are considered to be useable. For the compounds in the volatile and semivolatile analyses that did not meet calibration criteria, all positive results are qualified as estimated (J) (%Ds >25%) and all non detect results are qualified as estimated (UJ) (>50% D <90%) due to calibration deficiencies. For the pesticide/PCB analyses that did not meet calibration criteria, all positive results are qualified as estimated (J) and all non-detect results are qualified as estimated (UJ) (%RSDs >20%). For the herbicide analyses that did not meet calibration criteria, qualifications were not required because there were no positive results reported for the non-compliant compound in the associate sample.

All Organic Fractions Some samples required dilution to accurately quantitate target compounds. Some samples were rejected in favor of results obtained from re-extraction analyses. The rejections in these cases are not considered in the completion results for the project because they do not impact the final completion goal.

Gross Alpha/Gross Beta Some of the gross alpha/beta results in SDG U1-3 were qualified as estimated for various reasons including but not limited to blank activity above the detection limit, missing instrument checks, and high sample density. All data qualified for this reason is considered to be useable.

Serial Dilutions Some metals data in SDG U1-1 was qualified as estimated, J, because the analyte manganese did not always meet the QC criteria. All positive results reported for the non-compliant analytes in associated samples were qualified as estimated, J. All data qualified for serial dilution deficiencies is considered usable.

Graphite Furnace MSAs Some metals data was qualified as estimated, J, or J/UJ because the analytes arsenic, lead, thallium and selenium did not always meet the QC criteria. All data qualified for serial dilution deficiencies is considered usable.

7.0 PARCC SUMMARY

The purpose of evaluating the quality of the analytical data using the PARCC criteria was to address the qualification of the data in regards to evaluation of the presence, magnitude and characteristics of hazardous substances at NTC Orlando. Overall, the chemical analytical data are acceptable and exceeded the completion goal of 80 percent. Tables 7-1 through 7-3 provides a tabulation of the assessment of PARCC criteria each SDG for quality control samples, groundwater samples, and surface soil samples, respectively.

7.1 QC Samples

One (1) metals data point for selenium in a groundwater field duplicate sample was rejected due to MS %R less than 30%. The completion goal was met.

7.2 Groundwater Samples

Fifteen (15) metals data points for selenium in groundwater field samples were rejected due to MS %R less than 30%. The completion goal was met.

7.3 Surface Soil Samples

No data points were rejected. The completion goal was met.

TABLE 7 - 1
PARCC CRITERIA SUMMARY
QUALITY CONTROL SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDGs	PRECISION	ACCURACY	REPRESENT-ATIVENESS	COMPARABILITY	COMPLETENESS
U1-1	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE
U1-2	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE
U1-3	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE
U1-4	ACCEPTABLE	ACCEPTABLE (1) WITH REJECTIONS	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE (1) WITH REJECTIONS

(1) One (1) field duplicate data point for selenium rejected due to MS %R less than 30%. The completion goal was met.

TABLE 7 - 2
PARCC CRITERIA SUMMARY
GROUNDWATER SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDGs	PRECISION	ACCURACY	REPRESENT-ATIVENESS	COMPARABILITY	COMPLETENESS
U1-1	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE
U1-2	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE
U1-3	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE
U1-4	ACCEPTABLE	ACCEPTABLE (1) WITH REJECTIONS	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE (1) WITH REJECTIONS

(1) Fifteen (15) field duplicate data points for selenium rejected due to MS %R less than 30%. The completion goal was met.

TABLE 7 - 3
PARCC CRITERIA SUMMARY
SURFACE SOIL SAMPLES
OPERABLE UNIT 1, NTC ORLANDO

SDGs	PRECISION	ACCURACY	REPRESENT-ATIVENESS	COMPARABILITY	COMPLETENESS
U1-1	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE	ACCEPTABLE

REFERENCES

ABB-ES, (1995). Remedial Investigation and Feasibility Study (RI/FS) Workplan, Operable Unit 1, North Grinder Landfill, Naval Training Center - Orlando, Orlando, Florida.

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NEESA, 1988., Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program, Naval Energy and Environmental Support, 20.2-047B, June 1988.

USEPA, 1989., Risk Assessment Guidance for Superfund Volume I Human Health Manual (Part a), Interim Final, United States Environmental Protection Agency, 1989.

USEPA, 1988b., National Functional Guidelines for Organic Data Review, United States Environmental Protection Agency, July 1988.

USEPA, 1988a., Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses, United States Environmental Protection Agency, July 1988.

USEPA, 1990a., Guidance for Data Usability in Risk Assessment, United States Environmental Protection Agency, EPA 540 G-90/008, October 1990.

USEPA, 1986., Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, September 1986.

USEPA, 1990c., Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, United States Environmental Protection Agency Contracts Laboratory Program, Document No. ILM02.1, July 1988.

USEPA, 1990c., Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration, United States Environmental Protection Agency Contracts Laboratory Program, Document No. OLM01.8, June 1992.

APPENDIX A

CALIBRATION SUMMARY

TABLE A - 1
INITIAL AND CONTINUING CALIBRATION
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT 1, NTC ORLANDO

ICAL = INITIAL CALIBRATION = %RSD	SDG U1-1		SDG U1-2	SDG U1-3			SDG U1-4		
CCAL = CONTINUING CALIBRATION = %D	**ICAL1**	**CCAL1**	**ICAL1**	**ICCAL1**	**CCAL3**	**CCAL4**	**CCAL1**	**CCAL2**	**CCAL5**
DATE	04/20/95	04/28/95	05/22/95	08/01/95	08/10/95	08/11/95	08/16/95	08/17/95	08/28/95
INSTRUMENT ID	HPW	HPW	HPW	FINZ	HPW	HPW	HPW	HPW	HPW
CALIBRATION CRITERIA	%RSD	%D	%RSD	%RSD	%D	%D	%D	RRF/%D	RRF/%D
CHLOROETHANE		-35.1						-27.4	
DICHLORODIFLUOROMETHANE		-59.3			-77.1		-66.7	-174	
CHLOROMETHANE		-34.3		31.7	-32.6	-52.6	-44.5	-87.6	
VINYL CHLORIDE		-38.0							
TRICHLOROFLUOROMETHANE		-29.9						-32.3	
VINLY ACETATE		-27.4							
1,2-DICHLOROETHANE		-39.9							
BROMOMETHANE								-26.7	
2-CHLOROETHYLVINYL ETHER			32.3						100.0
ACROLEIN									-37.3
ACETONE		-47.5	31.1						
2-BUTANONE		-28.1							
2-HEXANONE	47.6								

SDGS, STANDARDS, AND ASSOCIATED SAMPLES

SDG U1-1
ICAL1: NONE
CCAL1: U1S00100, U1S00100MS, U1S00100MSD, U1S00100D, U1S00200, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400, U1S00700

SDG U1-2
ICAL1: NONE

SDG U1-3
ICAL1: NONE
CCAL3: U1T00005, U1G02701, U1G02701D
CCAL4: U1T00006, U1G02501, U1G02501MS, U1G02501MSD, U1G00201 U1T00007, U1G00101, U1G00301

SDG U1-4
CCAL1: U1T00008, U1G00501, U1G00401
CCAL2: U1T00009, U1G00601, U1G00701, U1G00801, U1T00010, U1G01001D, U1G01001, U1G01101
CCAL5: U1T00016, U1G01301, U1T00017, U1G02101, U1G01801

TABLE A - 2
INITIAL AND CONTINUING CALIBRATION
SEMIVOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT 1, NTC ORLANDO

ICAL = INITIAL CALIBRATION = %RSD	SDG U1-1			SDG U1-3			SDG U1-4		
CCAL = CONTINUING CALIBRATION = %D	**CCAL1**	**CCAL2**	**CCAL3**	**CCAL1**	**CCAL3**	**CCAL4**	**CCAL2**	**CCAL3**	**CCAL4**
DATE	05/09/95	05/10/95	05/11/95	08/19/95	08/24/95	08/29/95	08/24/95	08/29/95	08/31/95
INSTRUMENT ID	HPW	HPW	HPW	HPX	HPX	HPX	HPX	HPX	HPX
CALIBRATION CRITERIA	%D	%D	%D	%D	%D	%D	%D	%D	%D
N-NITROSODIMETHYLAMINE	-43.5								
2,2'-OXYBIS(1-CHLOROPROPANE)	-53.3	-45.6							
NITROBENZENE	-28.2				35.4		35.4		
1,2-DIPHENYLHYDRAZINE	-26.7				38.0		38.0		
DI-N-OCTYLPHTHALATE		-36.8	-38.3		27.5		27.5		
BENZO(G,H,I)PERYLENE	27.6								
BENZOIC ACID		28.7		-38.3					37.7
HEXACHLOROBUTADIENE					-27.3		-27.6		
HEXACHLOROCYCLOPENTADIENE	-30.7								
2,6-DINITROTOLUENE				-27.7					
2,4-DINITROPHENOL		31.6		-50.9		28.8		28.8	78.6
4-NITROPHENOL				-27.4	30.3		30.3		34.7
2-NITROANILINE	-28.5				36.3		36.3		
4,6-DINITRO-2-METHYLPHENOL				-31.9					57.4
2,4-DINITROTOLUENE				-35.0					
BENZIDINE				-38.4					
2,4,5-TRICHLOROPHENOL					27.6		-27.6		
PENTACHLOROPHENOL									26.1
2-NITROPHENOL					27.3		27.3		
BENZO(B)FLUORANTHENE			-31.8						

SDGS, STANDARDS, AND ASSOCIATED SAMPLES

SDG U1-1

CCAL1: U1S00100, U1S00100MS, U1S00100MSD, U1S00100D, U1S00200
U1S00300, U1S00400, U1S00500

CCAL2: U1S00600, U1S00700, U1S00800, U1S00900, U1S01000,
U1S01100, U1S01100D, U1S01300, U1S01400, U1S01200

CCAL3: U1S01000DL

SDG U1-3

CCAL1: U1R00002, U1G02201, U1Y00001, U1G02401, U1G02501MS, U1G02501MSD, U1G00201

CCAL3: U1G02601, U1G02701, U1G00101

CCAL4: U1G00101RE

SDG U1-4

CCAL2: U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601

CCAL3: U1G01301, U1G02101, U1G01801

CCAL4: U1G02001, U1G02001MS, U1G02001MSD, U1G01501, U1G01401

TABLE A - 3
INITIAL AND CONTINUING CALIBRATION
PESTICIDES/PCBS
OPERABLE UNIT 1, NTC ORLANDO

ICAL = INITIAL CALIBRATION = %RSD	SDG U1-3	SDG U1-4
CCAL = CONTINUING CALIBRATION = %D	**ICAL1**	**ICAL1**
DATE	08/16/95	08/16/95
INSTRUMENT ID	H8907A	H8907A
CALIBRATION CRITERIA	%RSD	%RSD
ALPHA-BHC	20.2	20.2

SDGS, STANDARDS, AND ASSOCIATED SAMPLES

SDG U1-3

ICAL1: U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301 U1R00002, U1Y00001, U1G02501MS, U1G02501MSD

SDG U1-4

ICAL1: U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801 U1R00003, U1G02001MS, U1G02001MSD

TABLE A - 4
INITIAL AND CONTINUING CALIBRATION
HERBICIDES
OPERABLE UNIT 1, NTC ORLANDO

ICAL = INITIAL CALIBRATION = %RSD *CCAL = CONTINUING CALIBRATION = %D*	SDG U1-1 **ICAL1**	SDG U1-3 **ICAL1**	SDG U1-4 **CCAL1**
DATE	05/01/95	08/23/95	09/12/95
INSTRUMENT ID	VARIAN03400	V3400A	V3400A
CALIBRATION CRITERIA	%RSD	R2	%D
MCPP	27.0		21.0
MCPA	27.0	0.994/0.9976	19.0

SDGS, STANDARDS, AND ASSOCIATED SAMPLES

SDG U1-1

ICAL1: U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400 U1S00100MS, U1S00100MSD, U1R00001

SDG U1-3

ICAL1: U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301 U1R00002, U1Y00001, U1G02501MS, U1G02501MSD

SDG U1-4

CCAL1: U1G02001, U1G01901, U1G01301, U1G02101, U1G01801 U1G02001MS, U1G02001MSD

APPENDIX B

SERIAL DILUTION SUMMARY

TABLE B - 1
GROUNDWATER SAMPLE SERIAL DILUTION
TOTAL METALS SUMMARY TABLE
OPERABLE UNIT 1, NTC ORLANDO

SAMPLE U1G02501		SDG U1-3
%D = PERCENT DIFFERENCE		%D
METALS ANALYTES	UNITS	
ALUMINUM	µg/L	2.7
ANTIMONY	µg/L	NC
ARSENIC	µg/L	NA
BARIUM	µg/L	7.2
BERYLLIUM	µg/L	NC
CADMIUM	µg/L	NC
CALCIUM	µg/L	0.4
CHROMIUM	µg/L	100
COBALT	µg/L	NC
COPPER	µg/L	100
IRON	µg/L	6.8
LEAD	µg/L	NA
MAGNESIUM	µg/L	6.7
MANGANESE	µg/L	34.4
MERCURY	µg/L	NA
NICKEL	µg/L	NC
POTASSIUM	µg/L	33.3
SELENIUM	µg/L	NA
SILVER	µg/L	NC
SODIUM	µg/L	1.3
THALLIUM	µg/L	NA
VANADIUM	µg/L	100
ZINC	µg/L	100

*** - INDICATES VALUE OUTSIDE QC LIMITS**
NC DENOTES NO CALCULATION DUE TO NON-DETECT RESULTS IN BOTH SAMPLES
NA DENOTES COMPOUND NOT ANALYZED FOR

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-3: U1G02201, U1G02301, U1G02401, U1G02601, U1G02701, U1G02701D, U1G02501, U1G00201, U1G00101, U1G00301

ANALYTE	RPD
	WATER/SOIL
ALL ICP ANALYTES	+/-10%

+/-10% RULE ONLY APPLIES TO RESULTS GREATER THAN 50 TIMES THE IDL
(SOME VALUES ROUNDED TO LIMIT %Ds TO THREE (3) SIGNIFICANT FIGURES)

TABLE B - 1, CONTINUED
GROUNDWATER SAMPLE SERIAL DILUTION
TOTAL METALS SUMMARY TABLE
OPERABLE UNIT 1, NTC ORLANDO

SAMPLE U1G02001		SDG U1-4
%D = PERCENT DIFFERENCE		%D
METALS ANALYTES	UNITS	
ALUMINUM	µg/L	54.3
ANTIMONY	µg/L	NC
ARSENIC	µg/L	NA
BARIUM	µg/L	2.1
BERYLLIUM	µg/L	NC
CADMIUM	µg/L	NC
CALCIUM	µg/L	2.2
CHROMIUM	µg/L	NC
COBALT	µg/L	NC
COPPER	µg/L	100
IRON	µg/L	9.2
LEAD	µg/L	NA
MAGNESIUM	µg/L	4.0
MANGANESE	µg/L	14.7
MERCURY	µg/L	NA
NICKEL	µg/L	NC
POTASSIUM	µg/L	28.0
SELENIUM	µg/L	NA
SILVER	µg/L	NC
SODIUM	µg/L	2.4
THALLIUM	µg/L	NA
VANADIUM	µg/L	NC
ZINC	µg/L	NC

*** - INDICATES VALUE OUTSIDE QC LIMITS**
NC DENOTES NO CALCULATION DUE TO NON-DETECT RESULTS IN BOTH SAMPLES
NA DENOTES COMPOUND NOT ANALYZED FOR

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-4: U1G00501, U1G00401, U1G00601, U1G00701, U1G00801, U1G01001D, U1G01001, U1G01101, U1G01201, U1G01701, U1G01701D, U1G01601, U1G00901, U1G01501, U1G01401, U1G02001, U1G01901, U1G01301, U1G02101, U1G01801

ANALYTE	RPD
	WATER/SOIL
ALL ICP ANALYTES	+/-10%

+/-10% RULE ONLY APPLIES TO RESULTS GREATER THAN 50 TIMES THE IDL
(SOME VALUES ROUNDED TO LIMIT %Ds TO THREE (3) SIGNIFICANT FIGURES)

TABLE B - 2
GROUNDWATER SAMPLE SERIAL DILUTION
DISSOLVED METALS SUMMARY TABLE
OPERABLE UNIT 1, NTC ORLANDO

SAMPLE U1H02501		SDG U1-3
%D = PERCENT DIFFERENCE		%D
METALS ANALYTES	UNITS	
ALUMINUM	µg/L	4.6
ANTIMONY	µg/L	NC
ARSENIC	µg/L	NA
BARIUM	µg/L	7.1
BERYLLIUM	µg/L	NC
CADMIUM	µg/L	NC
CALCIUM	µg/L	2.1
CHROMIUM	µg/L	100
COBALT	µg/L	100
COPPER	µg/L	100
IRON	µg/L	8.9
LEAD	µg/L	NA
MAGNESIUM	µg/L	7.2
MANGANESE	µg/L	180
MERCURY	µg/L	NA
NICKEL	µg/L	100
POTASSIUM	µg/L	100
SELENIUM	µg/L	NA
SILVER	µg/L	NC
SODIUM	µg/L	3.4
THALLIUM	µg/L	NA
VANADIUM	µg/L	469
ZINC	µg/L	100

*** - INDICATES VALUE OUTSIDE QC LIMITS**
NC DENOTES NO CALCULATION DUE TO NON-DETECT RESULTS IN BOTH SAMPLES
NA DENOTES COMPOUND NOT ANALYZED FOR

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-3: U1H02201, U1H02301, U1H02401, U1H02601, U1H02701, U1H02701D, U1H02501, U1H00201, U1H00101, U1H00301

ANALYTE	RPD
	WATER/SOIL
ALL ICP ANALYTES	+/-10%

+/-10% RULE ONLY APPLIES TO RESULTS GREATER THAN 50 TIMES THE IDL
(SOME VALUES ROUNDED TO LIMIT %Ds TO THREE (3) SIGNIFICANT FIGURES)

TABLE B - 2, CONTINUED
GROUNDWATER SAMPLE SERIAL DILUTION
DISSOLVED METALS SUMMARY TABLE
OPERABLE UNIT 1, NTC ORLANDO

SAMPLE U1H02001		SDG U1-4
%D = PERCENT DIFFERENCE		%D
METALS ANALYTES	UNITS	
ALUMINUM	µg/L	66.0
ANTIMONY	µg/L	NC
ARSENIC	µg/L	NA
BARIUM	µg/L	6.2
BERYLLIUM	µg/L	NC
CADMIUM	µg/L	NC
CALCIUM	µg/L	0.5
CHROMIUM	µg/L	NC
COBALT	µg/L	NC
COPPER	µg/L	100
IRON	µg/L	6.5
LEAD	µg/L	NA
MAGNESIUM	µg/L	4.0
MANGANESE	µg/L	4.8
MERCURY	µg/L	NA
NICKEL	µg/L	NC
POTASSIUM	µg/L	68.6
SELENIUM	µg/L	NA
SILVER	µg/L	NC
SODIUM	µg/L	0.5
THALLIUM	µg/L	NA
VANADIUM	µg/L	NC
ZINC	µg/L	100

*** - INDICATES VALUE OUTSIDE QC LIMITS**
NC DENOTES NO CALCULATION DUE TO NON-DETECT RESULTS IN BOTH SAMPLES
NA DENOTES COMPOUND NOT ANALYZED FOR

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-4: U1H00501, U1H00401, U1H00601, U1H00701, U1H00801, U1H01001D, U1H01001, U1H01101, U1H01201, U1H01701, U1H01701D, U1H01601, U1H00901, U1H01501, U1H01401, U1H02001, U1H01901, U1H01301, U1H02101, U1H01801

ANALYTE	RPD
	WATER/SOIL
ALL ICP ANALYTES	+/-10%

+/-10% RULE ONLY APPLIES TO RESULTS GREATER THAN 50 TIMES THE IDL
(SOME VALUES ROUNDED TO LIMIT %Ds TO THREE (3) SIGNIFICANT FIGURES)

TABLE B - 3
SURFACE SOIL SAMPLE SERIAL DILUTION
TOTAL METALS SUMMARY TABLE
OPERABLE UNIT 1, NTC ORLANDO

SAMPLE U1S00100		SDG U1-1
%D = PERCENT DIFFERENCE		%D
METALS ANALYTES	UNITS	
ALUMINUM	µg/L	9.0
ANTIMONY	µg/L	NC
ARSENIC	µg/L	NA
BARIUM	µg/L	9.9
BERYLLIUM	µg/L	108
CADMIUM	µg/L	100
CALCIUM	µg/L	8.7
CHROMIUM	µg/L	20.5
COBALT	µg/L	NC
COPPER	µg/L	7.1
IRON	µg/L	9.3
LEAD	µg/L	NA
MAGNESIUM	µg/L	4.4
MANGANESE	µg/L	13.7*
MERCURY	µg/L	NA
NICKEL	µg/L	NC
POTASSIUM	µg/L	NC
SELENIUM	µg/L	NA
SILVER	µg/L	27.1
SODIUM	µg/L	157
THALLIUM	µg/L	NA
VANADIUM	µg/L	100
ZINC	µg/L	9.2

*** - INDICATES VALUE OUTSIDE QC LIMITS**
NC DENOTES NO CALCULATION DUE TO NON-DETECT RESULTS IN BOTH SAMPLES
NA DENOTES COMPOUND NOT ANALYZED FOR

CORRESPONDING SDG'S AND ASSOCIATED SAMPLES

U1-1: U1S00100, U1S00100D, U1S00200, U1S00300, U1S00400, U1S00500, U1S00600, U1S00700, U1S00800, U1S00900, U1S01000, U1S01100, U1S01100D, U1S01200, U1S01300, U1S01400

ANALYTE	RPD
	WATER/SOIL
ALL ICP ANALYTES	+/-10%

+/-10% RULE ONLY APPLIES TO RESULTS GREATER THAN 50 TIMES THE IDL
(SOME VALUES ROUNDED TO LIMIT %Ds TO THREE (3) SIGNIFICANT FIGURES)

APPENDIX C

REJECTED DATA SUMMARY

TABLE C-1
VOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT 1, NTC ORLANDO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATRIX		
	QC	GW	SS	QC	GW	SS
U1-1	5	3	14	0	0	0
U1-2	1	6	0	0	0	0
U1-3	9	9	0	0	0	0
U1-4	13	18	0	0	0	0
GRAND TOTAL	28	36	14	0	0	0
COMPLETION GOAL (>80%)				100.0%	100.0%	100.0%

OVERALL COMPLETENESS
100.0%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES
SS = SURFACE SOILS

* 33 TARGET COMPOUNDS PER SAMPLE

TABLE C-2
SEMIVOLATILE ORGANIC COMPOUNDS
OPERABLE UNIT 1, NTC ORLANDO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATRIX		
	QC	GW	SS	QC	GW	SS
U1-1	3	0	14	0	0	0
U1-2	0	0	0	0	0	0
U1-3	3	9	0	0	0	0
U1-4	3	18	0	0	0	0
GRAND TOTAL	9	27	14	0	0	0
COMPLETION GOAL (>80%)				100.0%	100.0%	100.0%

OVERALL COMPLETENESS
100.0%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES
SS = SURFACE SOILS

*** 64 TARGET COMPOUNDS PER SAMPLE**

TABLE C-3
PESTICIDES/PCBS
OPERABLE UNIT 1, NTC ORLANDO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATRIX		
	QC	GW	SS	QC	GW	SS
U1-1	3	0	14	0	0	0
U1-2	0	0	0	0	0	0
U1-3	3	9	0	0	0	0
U1-4	3	18	0	0	0	0
GRAND TOTAL	9	27	14	0	0	0
COMPLETION GOAL (>80%)				100.0%	100.0%	100.0%

OVERALL COMPLETENESS
100.0%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES
SS = SURFACE SOILS

* 28 TARGET COMPOUNDS PER SAMPLE

TABLE C-4
HERBICIDES
OPERABLE UNIT 1, NTC ORLANDO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATRIX		
	QC	GW	SS	QC	GW	SS
U1-1	3	0	14	0	0	0
U1-2	0	0	0	0	0	0
U1-3	3	9	0	0	0	0
U1-4	2	17	0	0	0	0
GRAND TOTAL	8	26	14	0	0	0
COMPLETION GOAL (>80%)				100.0%	100.0%	100.0%

OVERALL COMPLETENESS
100.0%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES
SS = SURFACE SOILS

*** 10 TARGET COMPOUNDS PER SAMPLE**

TABLE C-5
TOTAL METALS
OPERABLE UNIT 1, NTC ORLANDO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATRIX		
	QC	GW	SS	QC	GW	SS
U1-1	3	0	14	0	0	0
U1-2	0	0	0	0	0	0
U1-3	3	9	0	0	0	0
U1-4	3	18	0	0	0	0
GRAND TOTAL	9	27	14	0	0	0
COMPLETION GOAL (>80%)				100.0%	100.0%	100.0%

OVERALL COMPLETENESS
100.0%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES
SS = SURFACE SOILS

* 23 TARGET ANALYTES PER SAMPLE

TABLE C-6
DISSOLVED METALS
OPERABLE UNIT 1, NTC ORLANDO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATRIX		
	QC	GW	SS	QC	GW	SS
U1-1	0	0	0	0	0	0
U1-2	0	0	0	0	0	0
U1-3	1	9	0	0	0	0
U1-4	2	18	0	1	15	0
GRAND TOTAL	3	27	NA	1	15	0
COMPLETION GOAL (>80%)				98.6%	97.6%	NA

OVERALL COMPLETENESS
98.1%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES
SS = SURFACE SOILS

*** 23 TARGET ANALYTES PER SAMPLE**

TABLE C-7
GROSS ALPHA/GROSS BETA
OPERABLE UNIT 1, NTC ORLANDO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATRIX		
	QC	GW	SS	QC	GW	SS
U1-1	0	0	0	0	0	0
U1-2	0	0	0	0	0	0
U1-3	3	9	0	0	0	0
U1-4	3	18	0	0	0	0
GRAND TOTAL	6	27	NA	0	0	0
COMPLETION GOAL (>80%)				100.0%	100.0%	NA

OVERALL COMPLETENESS
100.0%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES
SS = SURFACE SOILS

*** 2 TARGET NUCLIDES PER SAMPLE**

TABLE C-8
TOTAL PETROLEUM HYDROCARBONS
OPERABLE UNIT 1, NTC ORLANDO

SDG	# SAMPLES/MATRIX			# OF COMPOUNDS REJECTED PER MATRIX		
	QC	GW	SS	QC	GW	SS
U1-1	2	0	14	0	0	0
U1-2	0	0	0	0	0	0
U1-3	1	9	0	0	0	0
U1-4	3	18	0	0	0	0
GRAND TOTAL	6	27	14	0	0	0
COMPLETION GOAL (>80%)				100.0%	100.0%	100.0%

OVERALL COMPLETENESS
100.0%

MATRIX KEY

QC = QC SAMPLES
GW = GROUND WATER SAMPLES
SS = SURFACE SOILS

*** 1 TARGET COMPOUND PER SAMPLE**

APPENDIX I-5

ANALYTICAL DATA STATISTICAL EVALUATION

Appendix I-5. Statistical Evaluation of OU 1 Analytical Data Using Non-Parametric Statistics

I.5.1 Introduction

The statistical evaluation approach for OU 1 analytical data primarily uses nonparametric statistical methods, which include (1) the Mann-Whitney U Test, and (2) the outside value test. Nonparametric statistics, also called distribution-free tests, require less restrictive assumptions about the underlying distributions such as the assumption of normality and equal variance, which usually are difficult to meet especially in small environmental samples. These statistical tests, described below, were performed on the OU 1 analytical data in conjunction with the background analytical values obtained during the background sampling program (Background Sampling Report, ABB-ES, 1995), and FDEP's statewide background groundwater quality database (gross alpha and gross beta only). OU 1 analytical values rejected through data validation were excluded from the procedure, but all other nonrejected values, including below detection limit results, were included. Field duplicate sample results were arbitrarily included as separate and distinct entities.

I.5.2 Statistical Evaluation Approach

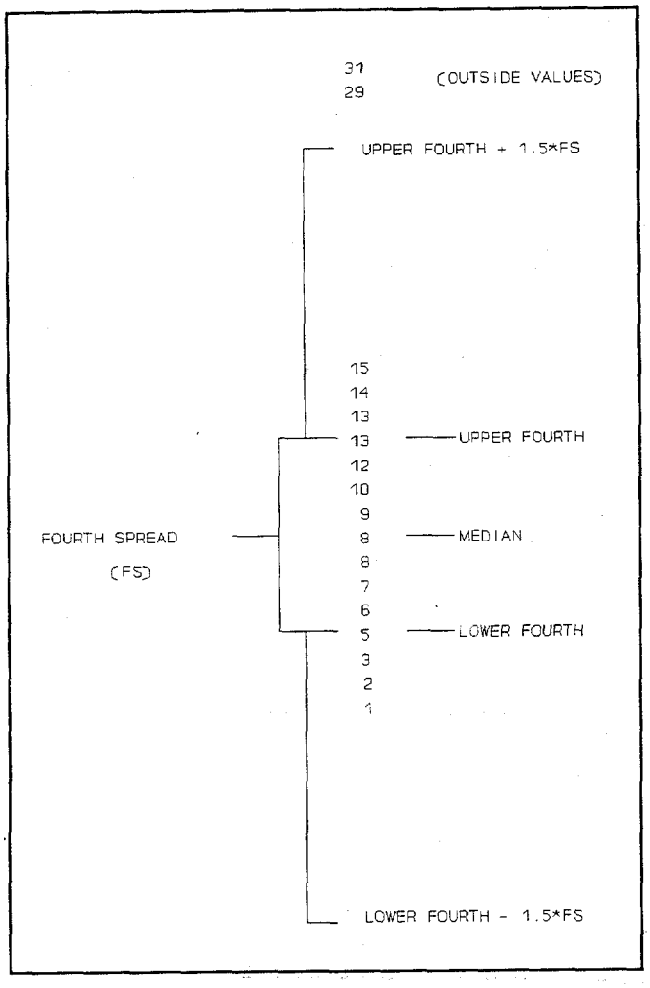
I.5.2.1 The Mann-Whitney U Test Procedure

The Mann-Whitney U test procedure was performed in order to gain a better understanding of underlying value distributions and systematic differences (such as varying detection limits) between the OU 1 data set and the established NTC Orlando main base background data set (Background Sampling Report, ABB-ES, 1995). The OU 1 and FDEP's groundwater background data sets for gross-alpha and gross-beta set were also compared using the same procedure. The U test, a non-parametric analog of the better known parametric Student's t test, determines if two samples are likely to have been drawn from a single population (at some confidence level). This procedure was used to determine whether an analyte/compound detected in the site samples is significantly above background so as to be considered potentially affected by site activities; otherwise, the detected analyte/compound could be considered not significantly different from expected background values. For some analytes/compounds where population differences were found significant, Box and Whisker plots were used to graphically show the population comparisons.

For each media, results from each analytical parameter for OU 1 samples and background samples were analyzed. The first determination was whether or not the two were likely derived from the same population. If this assumption was not rejected (with a 95% confidence level), then no further analysis was done for that analyte, that is, there was no reason to believe there was any difference between the background and the field samples. If, on the other hand, this assumption was dismissed (they were not derived from the same population; they are different populations) then a determination of which sample group had a larger central value was made. This determination was based on the relative values of the median of each group. If more than fifty percent of both the background and field samples are below detection limits (BDL), then the test is essentially comparing detection limit populations. Cases of different detection limit populations are noted in the results below. Any analyte whose background median was larger than the field sample's median was dismissed as not being of

further concern. Any analyte whose field sample median was larger than the background's median was considered to be potentially affected by site activities.

I.5.2.2 The Outside Value Identification Test



The outside value test was done for each sampled media (surface soils and groundwater) to determine if they represented consistent populations. This examination was performed by identifying points in need of closer scrutiny through the use of a non-parametric outside value identification method based on the definition of a "fourth spread" described in **Understanding Robust and Exploratory Data Analysis**, D. C. Hoaglin, F. Mosteller, and J.W. Tukey, John Wiley and Sons, Inc. 1983. This method is based on the definition of a "fourth spread" which is the numerical difference between the lower fourth and upper fourth. (For all practical purposes, the lower fourth and upper fourth correspond to the twenty-fifth and seventy-fifth percentiles which are the values that are greater than or equal to twenty-five percent of the values and greater than or equal to seventy-five percent of the values, respectively.) By using the distance between fourths as an indicator to the "natural spread" of the values, extreme values at either end of the distribution have no effect on the measurement of the spread of the population around its central value. Any value that lies more than 1.5 times the fourth spread above the upper fourth value or 1.5 times the fourth spread below the lower fourth is considered an "outside value" deserving further consideration (See Fig 1). These values are not true statistical outliers, but are distributed far enough from the sample's central value to be questioned. The resulting outside values were then evaluated to determine if there were any known factors that could explain anomalous results. A sample with several outside values in the OU 1 data set could assist in identifying areas of "hot spots" or contaminated zones.

I.5.3 Guide to the Interpretion of Statistical Results

In the pages that follow, descriptive statistics for each media are presented first. The descriptive statistics include the minimum and maximum reported detection levels, the minimum and maximum levels reported, the above detection level average values, the median of all values above and below detection levels, and the number of detections versus total number of samples.

Results of the Mann-Whitney U test and non-parametric outside values test for each media are reported in three major sections: the header information, the summary information, and the detail (by analyte) information.

The header consist of a 'points used' listing which gives the sample location identifier and group affiliations for every sample used in the analysis. In the example below, the OU 1 samples are identified with a '1' and background samples with a 'bk',

```
 Points used:
 ou  location
 1   U1S00100
 1   U1S00100D
 1   U1S00200
...
 bk  ORS00101
 bk  ORS00201
 bk  ORS00301
...
```

The summary information begins with a listing of each analyte found to contain groups from different parent populations and an interpretation of which group tends to have higher values. 'Different Detection Limits' indicates a comparison dominated by comparisons of detection levels instead of analytical values, e.g.,

```
 Parameters with different populations:
 ACETONE                        Group bk Higher
 ALUMINUM                       Group bk Higher
 ARSENIC                        Group 1 Higher
 CADMIUM                        Different Detection Limits
...
```

This section continues with a 'by location outside values count' listing which summarizes the number of lower and upper outside values each sample location contains. Locations with a relatively large number of low or high outside values indicates an area in need of closer scrutiny.

```
 Outside values - locations counts
 location, low values, high values:
U1S00100                    1.0000        29.0000
U1S00100D                   1.0000        27.0000
U1S00200                    2.0000        31.0000
...
```

Next come the individual analyte detail listings. Below is an example of a single detail (results for one parameter) from the output of a comparison of two groups of data (OU 1 and group bk) for the parameter zinc.

```
-------------------------------------------------------------
 ZINC
-----------------------------

bk       *****   ***    *  *   *
1             ***   **** ** *** ****
 group1:  1
 min, median, max, bdl/tot :          2.6000 B          15.8000          60.1000       0 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.4200 B           3.5000 B         31.5000       0 /   11
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-------------------------------------------------------
lowcut =          -7.5500
lq     =           1.3000
median =           3.5000 B
uq     =           7.2000
hicut  =          16.0500
```

```
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        18.7000 U1S00800
        22.6000 U1S01300
        30.1000 U1S00900
        31.2000 U1S00400
        46.8000 U1S00100D
        56.1000 U1S00700
        56.4000 U1S00200
        60.1000 U1S00100
```

Below is an explanation for each section. First is the header, which tells the reader which parameter is being compared.

```
-------------------------------------------------------------
 ZINC
-----------------------------
```

Next are two rows of .'s and *'s -- these are a graphical representation of the ranking of values, increasing values to the right. (.'s represent below detection limit [BDL] values while *'s represent above detection limit [ADL] values.) In the example below, all values for group bk and 1 are ADLs with group bk having the five lowest values and group 1 having the four highest values. This display is limited to a 70 character bar (to fit on the page), so each character can represent more than one value (actually, each character exactly represents (total number in both groups)/70, rounded up to the next larger integer). Hits take precedence over a BDL (ie., if the character contains both ADL and BDL values, then it is a *).

```
bk       *****   ***    *  *   *
1            ***   **** ** *** ****
```

Next comes a brief descriptive statistics report for each group. Included in this report are the minimum, median, and maximum values in each group (including any appropriate value qualifiers), and a listing of the number of BDL values and total number of values included for the group in the analysis.

```
 group1:  1
 min, median, max, bdl/tot :        2.6000 B        15.8000        60.1000      0 /   16
 group2:  bk
 min, median, max, bdl/tot :        0.4200 B         3.5000 B       31.5000      0 /   11
```

Next comes a description of the results of a Mann-Whitney U test comparison for the two groups. This test determines if the two groups are likely to have been chosen from the same parent population.

```
>>> Different populations at alpha > 0.95
  Group 1 Higher
```

Possible outcomes (and their meaning) may include:

All analyses were BDLs	(No comparison of analytical values is possible since all values were below detection limits)
>>> Different populations at alpha= nnn <<<	(the groups are small and from different parent populations with more than 95% confidence)
Different populations at alpha= nnn	(the groups are small but not from different parent populations with more than 95% confidence)
>>> Different populations at alpha > 0.95	(the groups are large and from different parent populations with more than 95% confidence)

no evidence of different populations at alpha=.95 (the groups are large but not from different parent populations with more than 95% confidence)

And a determination of which group tends to have higher values. If many of the values are BDL, then this determination might be that the comparison reflects groups with different detection limits and not necessarily different actual analytical values.

Next, a fourth spread nonparametric outside value check is done to identify points with suspect values which should be further examined. These are not necessarily "bad" points, but their values are sufficiently extreme to warrant closer scrutiny before using them in further data analyses. The median, lower quartile (lq), upper quartile (uq), the lower cut off value (locut), and the upper cut off value (hicut) are then listed for the background group. (For descriptions of these values, see **Understanding Robust and Exploratory Data Analysis**, D. C. Hoaglin, F. Mosteller, and J.W. Tukey, John Wiley and Sons, Inc. 1983.) Following these listings is a list of non-background values that fall outside of the interval between the lower cut off value and the upper cut off value. If no values fall outside, then '<<NONE FOUND>>' will be listed.

```
Outside values test group relative to background group
------------------------------------------------------
lowcut =          -7.5500
lq     =           1.3000
median =           3.5000 B
uq     =           7.2000
hicut  =          16.0500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        18.7000 U1S00800
        22.6000 U1S01300
```

Next come the detail reports on each individual location and the summary of outside values by analyte. The location detail report begins with a listing of the location identifier and the total number of low and hi outside values. The comes a details listing of all analytical values (including parameter name, value and value qualifiers) which are low outside values. Following these is a report detailing the same information for high outside values.

```
 Outside values - location details:

U1S01100              low:    1.0000     hi:  1.0000
 H Selenium                                     4.6000 UJ
 L bis(2-Ethylhexyl)phthalate                 190.0000 J
```

Finally comes the summary of outside values by analytical parameter. The first numerical column enumerates the low outside values while the second column does the same for high outside values.

```
 Outside values - parameters counts
 parameter, low values, high values:
Benzo(a)anthracene                          2.0000          3.0000
Benzo(a)pyrene                              1.0000          2.0000
...
```

Following are the statistical results presented by media, surface soils in Section I.5.4 and groundwater in Section I.5.5. Descriptive statistics for each OU 1 media are summarized first. Only those analytes and compounds that were detected at least once in the OU 1 data set are summarized in the Mann-Whitney U test comparison results and in the summary of outside values by analytical parameter.

I.5.4. Statistical Results - Surface Soils

Descriptive Statistics for NTC Orlando OU1 Surface Soils

Chem.name is chemical name
Min.dl is minimum reported detection level
Max.dl is maximum reported detection level
Min.lv is minimum level reported
Max.lv is maximum level reported
ADL.Avg is above detection level average value
Median is median of all values above and below detection level
Num.Det/Tot.Sample is number of detects / total number sampled

Chem.name	Min.dl	Max.dl	Min.lv	Max.lv	ADL.Avg	Median		Num.Det/Tot.Sample
1,1,1-Trichloroethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
1,1,2,2-Tetrachloroethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
1,1,2-Trichloroethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
1,1-Dichloroethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
1,1-Dichloroethene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
1,2,4-Trichlorobenzene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
1,2-Dichlorobenzene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
1,2-Dichloroethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
1,2-Dichloroethene (total	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
1,2-Dichloropropane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
1,3-Dichlorobenzene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
1,4-Dichlorobenzene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2,2'-oxybis(1-Chloropropa	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2,4,5-T	40.000	43.000	N/A	N/A	N/A	41.000	U	0/16
2,4,5-TP (Silvex)	34.000	37.000	N/A	N/A	N/A	35.000	U	0/16
2,4,5-Trichlorophenol	840.000	890.000	N/A	N/A	N/A	850.000	U	0/16
2,4,6-Trichlorophenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2,4-D	240.000	260.000	N/A	N/A	N/A	245.000	U	0/16
2,4-DB	180.000	200.000	N/A	N/A	N/A	185.000	U	0/16
2,4-Dichlorophenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2,4-Dimethylphenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2,4-Dinitrophenol	840.000	890.000	N/A	N/A	N/A	850.000	U	0/16
2,4-Dinitrotoluene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2,6-Dinitrotoluene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2-Butanone	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
2-Chloronaphthalene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2-Chlorophenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2-Hexanone	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
2-Methylnaphthalene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2-Methylphenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
2-Nitroaniline	840.000	890.000	N/A	N/A	N/A	850.000	U	0/16
2-Nitrophenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
3,3'-Dichlorobenzidine	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
3-Nitroaniline	840.000	890.000	N/A	N/A	N/A	850.000	U	0/16
4,4'-DDD	3.400	34.000	3.500	3.500	3.500	3.400	U	1/17
4,4'-DDE	3.400	3.500	1.800	43.000	15.444	3.450	U	9/16
4,4'-DDT	3.400	18.000	2.000	48.000	15.929	3.500	U	7/17
4,6-Dinitro-2-methylpheno	840.000	890.000	N/A	N/A	N/A	850.000	U	0/16
4-Bromophenyl-phenylether	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
4-Chloro-3-methylphenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
4-Chloroaniline	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
4-Chlorophenyl-phenylethe	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
4-Methyl-2-pentanone	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
4-Methylphenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
4-Nitroaniline	840.000	890.000	N/A	N/A	N/A	850.000	U	0/16
4-Nitrophenol	840.000	890.000	N/A	N/A	N/A	850.000	U	0/16
Acenaphthene	340.000	350.000	100.000	100.000	100.000	340.000	U	1/16
Acenaphthylene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Acetone	10.000	10.000	6.000	18.000	8.800	8.500	J	15/16
Aldrin	1.700	17.000	N/A	N/A	N/A	1.800	UJ	0/17
Aluminum	N/A	N/A	182.000	1200.000	618.688	531.000		16/16
Anthracene	340.000	350.000	130.000	130.000	130.000	340.000	U	1/16
Antimony	6.000	7.100	N/A	N/A	N/A	6.100	U	0/16
Aroclor-1016	34.000	340.000	N/A	N/A	N/A	34.000	U	0/17
Aroclor-1221	68.000	680.000	N/A	N/A	N/A	69.000	UJ	0/17
Aroclor-1232	34.000	340.000	N/A	N/A	N/A	34.000	U	0/17
Aroclor-1242	34.000	340.000	N/A	N/A	N/A	34.000	U	0/17
Aroclor-1248	34.000	340.000	N/A	N/A	N/A	34.000	U	0/17

Aroclor-1254	34.000	340.000	N/A	N/A	N/A	34.000	U	0/17
Aroclor-1260	34.000	350.000	35.000	150.000	83.143	35.000	J	7/18
Arsenic	0.380	0.400	0.420	2.900	1.408	0.870	B	11/16
Barium	N/A	N/A	0.960	19.100	7.335	4.600	B	16/16
Benzene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Benzo(a)anthracene	340.000	350.000	120.000	480.000	263.333	340.000	U	3/16
Benzo(a)pyrene	340.000	350.000	200.000	1200.000	600.000	340.000	U	3/16
Benzo(b)fluoranthene	340.000	350.000	250.000	410.000	330.000	340.000	U	2/16
Benzo(g,h,i)perylene	340.000	350.000	120.000	2500.000	797.500	340.000	U	4/16
Benzo(k)fluoranthene	340.000	350.000	210.000	4000.000	1533.333	340.000	U	3/16
Beryllium	0.020	0.080	N/A	N/A	N/A	0.055	U	0/16
Bromodichloromethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Bromoform	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Bromomethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Butylbenzylphthalate	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Cadmium	0.620	0.660	0.800	2.100	1.380	0.650	U	5/16
Calcium	N/A	N/A	305.000	119000.000	30112.875	14705.000	J	16/16
Carbazole	340.000	350.000	93.000	93.000	93.000	340.000	U	1/16
Carbon disulfide	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Carbon tetrachloride	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Chlorobenzene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Chloroethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Chloroform	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Chloromethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Chromium	N/A	N/A	1.100	26.800	7.194	3.900		16/16
Chrysene	340.000	350.000	210.000	500.000	326.667	340.000	U	3/16
Cobalt	0.580	0.700	N/A	N/A	N/A	0.595	U	0/16
Copper	0.280	1.600	2.300	15.200	8.070	3.650	B	10/16
Dalapon	1200.000	1300.000	N/A	N/A	N/A	1200.000	U	0/16
Di-n-butylphthalate	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Di-n-octylphthalate	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Dibenz(a,h)anthracene	340.000	350.000	120.000	760.000	440.000	340.000	U	2/16
Dibenzofuran	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Dibromochloromethane	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Dicamba	55.000	59.000	N/A	N/A	N/A	55.500	U	0/16
Dichlorprop	130.000	140.000	N/A	N/A	N/A	130.000	U	0/16
Dieldrin	3.400	3.500	3.800	180.000	79.656	3.800		9/17
Diethylphthalate	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Dimethylphthalate	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Dinoseb	14.000	15.000	N/A	N/A	N/A	14.000	U	0/16
Endosulfan I	1.700	17.000	N/A	N/A	N/A	1.800	UJ	0/17
Endosulfan II	3.400	34.000	N/A	N/A	N/A	3.400	U	0/17
Endosulfan sulfate	3.400	34.000	N/A	N/A	N/A	3.400	U	0/17
Endrin	3.400	34.000	N/A	N/A	N/A	3.400	U	0/17
Endrin aldehyde	3.400	34.000	N/A	N/A	N/A	3.400	U	0/17
Endrin ketone	3.400	34.000	N/A	N/A	N/A	3.400	U	0/17
Ethylbenzene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Fluoranthene	340.000	350.000	93.000	1100.000	450.750	340.000	U	4/16
Fluorene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Heptachlor	1.700	17.000	N/A	N/A	N/A	1.800	UJ	0/17
Heptachlor epoxide	1.700	18.000	4.300	7.200	6.175	1.800	U	4/18
Hexachlorobenzene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Hexachlorobutadiene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Hexachlorocyclopentadiene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Hexachloroethane	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Indeno(1,2,3-cd)pyrene	340.000	350.000	160.000	2300.000	913.333	340.000	U	3/16
Iron	N/A	N/A	109.000	944.000	338.625	304.000	J	16/16
Isophorone	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Lead	N/A	N/A	1.400	24.300	8.500	5.150	J	16/16
MCPA	51000.000	54000.000	N/A	N/A	N/A	51000.000	U	0/16
MCPP	41000.000	43000.000	N/A	N/A	N/A	41000.000	U	0/16
Magnesium	20.700	21.500	59.500	922.000	291.943	155.500	B	14/16
Manganese	N/A	N/A	1.500	11.700	6.088	6.750	J	16/16
Mercury	0.020	0.020	0.020	0.740	0.155	0.045		11/16
Methoxychlor	17.000	170.000	N/A	N/A	N/A	18.000	UJ	0/17
Methylene chloride	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
N-Nitroso-di-n-propylamin	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
N-Nitrosodiphenylamine (1	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Naphthalene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Nickel	2.900	3.400	N/A	N/A	N/A	2.900	U	0/16
Nitrobenzene	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Pentachlorophenol	840.000	890.000	N/A	N/A	N/A	850.000	U	0/16
Phenanthrene	340.000	350.000	150.000	620.000	385.000	340.000	U	2/16

Phenol	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
Potassium	89.300	122.000	105.000	105.000	105.000	92.050	U	1/16
Pyrene	340.000	350.000	160.000	1000.000	530.000	340.000	U	3/16
Selenium	0.460	4.800	N/A	N/A	N/A	0.470	U	0/16
Silver	0.520	3.400	3.300	6.000	4.267	0.720	U	3/16
Sodium	7.200	36.200	N/A	N/A	N/A	12.550	U	0/16
Styrene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Tetrachloroethene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Thallium	0.380	0.450	0.390	0.390	0.390	0.380	U	1/16
Toluene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Total Petroleum Hydrocarb	N/A	N/A	10.100	96.600	35.944	30.700		16/16
Toxaphene	170.000	1700.000	N/A	N/A	N/A	180.000	UJ	0/17
Trichloroethene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Vanadium	0.510	1.300	0.540	5.800	2.175	1.300	J	13/16
Vinyl chloride	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Xylene (total)	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
Zinc	N/A	N/A	2.600	60.100	22.925	15.800		16/16
alpha-BHC	1.700	17.000	N/A	N/A	N/A	1.800	UJ	0/17
alpha-Chlordane	1.700	1.800	1.100	87.000	31.238	3.400	NJ	13/17
beta-BHC	1.700	17.000	N/A	N/A	N/A	1.800	UJ	0/17
bis(2-Chloroethoxy)methan	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
bis(2-Chloroethyl)ether	340.000	350.000	N/A	N/A	N/A	340.000	U	0/16
bis(2-Ethylhexyl)phthalat	340.000	350.000	190.000	280.000	226.667	340.000	U	3/16
cis-1,3-Dichloropropene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16
delta-BHC	1.700	17.000	N/A	N/A	N/A	1.800	UJ	0/17
gamma-BHC (Lindane)	1.700	17.000	1.200	1.200	1.200	1.800	UJ	1/17
gamma-Chlordane	1.700	1.800	1.000	53.000	21.125	2.500	J	12/17
trans-1,3-Dichloropropene	10.000	12.000	N/A	N/A	N/A	10.000	U	0/16

LOCATIONS USED (Descriptive Stats):

U1S00100
U1S00100D
U1S00200
U1S00300
U1S00400
U1S00500
U1S00600
U1S00700
U1S00800
U1S00900
U1S01000
U1S01100
U1S01100D
U1S01200
U1S01300
U1S01400

NTC Orlando OU1 surface soils vs Basewide background excluding McCoy Annex

Points used (population comparisons):

ou	location
1	U1S00100
1	U1S00100D
1	U1S00200
1	U1S00300
1	U1S00400
1	U1S00500
1	U1S00600
1	U1S00700
1	U1S00800
1	U1S00900
1	U1S01000
1	U1S01100
1	U1S01100D
1	U1S01200
1	U1S01300
1	U1S01400
bk	ORS00101
bk	ORS00201
bk	ORS00301
bk	ORS00401
bk	ORS00501
bk	ORS01101
bk	ORS01201
bk	ORS01201D
bk	ORS01301
bk	ORS01401
bk	ORS01501

Parameters with different populations:

ACETONE	Group bk Higher
ALUMINUM	Group bk Higher
ARSENIC	Group 1 Higher
CADMIUM	Different Detection Limits
CALCIUM	Group 1 Higher
CHROMIUM	Group 1 Higher
COPPER	Group 1 Higher
MAGNESIUM	Group 1 Higher
POTASSIUM	Different Detection Limits
SILVER	Different Detection Limits
THALLIUM	Different Detection Limits
ZINC	Group 1 Higher
ALPHA-CHLORDANE	Group 1 Higher
GAMMA-CHLORDANE	Group 1 Higher

Outside values - locations counts
location, low values, high values:

U1S00100	1.0000	29.0000
U1S00100D	1.0000	27.0000
U1S00200	2.0000	31.0000
U1S00300	1.0000	20.0000
U1S00400	6.0000	33.0000
U1S00500	9.0000	23.0000
U1S00600	0.0000	22.0000
U1S00700	0.0000	50.0000
U1S00800	2.0000	24.0000
U1S00900	1.0000	25.0000
U1S01000	5.0000	26.0000
U1S01100	1.0000	17.0000
U1S01100D	2.0000	16.0000
U1S01200	2.0000	21.0000
U1S01300	1.0000	20.0000
U1S01400	3.0000	16.0000

```
-------------------------------------------------------------
 4,4'-DDD
-----------------------------

bk        .       ...   .. ..   . ..
1          .......   ...  .  ... *  .
 group1:  1
 min, median, max, bdl/tot :          3.4000 UJ        3.4000 U        18.0000 U    15 /   16
 group2:  bk
 min, median, max, bdl/tot :          3.3000 U         3.5000 U         17.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          3.2500
lq     =          3.4000 U
median =          3.5000 U
uq     =          3.5000 U
hicut  =          3.6500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U      18.0000 U1S00700


-------------------------------------------------------------
 4,4'-DDE
-----------------------------

1        ** ....  .  *. . *   *****
bk         .    .. ..  . . ***     *
 group1:  1
 min, median, max, bdl/tot :          1.8000 J         3.4500 U        43.0000 J     7 /   16
 group2:  bk
 min, median, max, bdl/tot :          3.3000 U         3.5000 U        130.0000       7 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         -2.6750
lq     =          3.4000 U
median =          3.5000 U
uq     =          7.4500
hicut  =         13.5250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        18.0000 U1S00400
 NJ     20.0000 U1S00100D
 NJ     21.0000 U1S00100
 NJ     25.0000 U1S00200
 J      43.0000 U1S00700


-------------------------------------------------------------
 4,4'-DDT
-----------------------------

1        ** ...  ...  ...     *****
bk         .   ..   ..   ..***     *
 group1:  1
 min, median, max, bdl/tot :          2.0000 J         3.4500 U        48.0000        9 /   16
 group2:  bk
 min, median, max, bdl/tot :          3.3000 U         3.5000 U         62.0000 J     7 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         -5.0750
lq     =          3.4000 U
median =          3.5000 U
uq     =          9.0500
hicut  =         17.5250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
```

```
 J       18.0000 U1S00700
         48.0000 U1S00400


-----------------------------------------------------------------
 ACENAPHTHENE
-----------------------------
1        *........ .   ...  ..   .
bk                 .....   ..  ... ..
 group1:  1
 min, median, max, bdl/tot :          100.0000 J         340.0000 U         350.0000 U    15 /   16
 group2:  bk
 min, median, max, bdl/tot :          340.0000 U         340.0000 U         360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          325.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          350.0000 U
hicut  =          365.0000
 Lower outside values:
 J      100.0000 U1S00400

 Upper outside values:
<< NONE FOUND>>

-----------------------------------------------------------------
 ACETONE
-----------------------------

bk        .           ----- . ---  .
1          ***********      . *   ** *
 group1:  1
 min, median, max, bdl/tot :            6.0000 J           8.5000           18.0000 J     1 /   16
 group2:  bk
 min, median, max, bdl/tot :            6.0000 UJ         10.0000 U          13.0000 UJ   11 /   11
>>> Different populations at alpha > 0.95
  Group bk Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =            8.5000
lq     =           10.0000 U
median =           10.0000 U
uq     =           11.0000 U
hicut  =           12.5000
 Lower outside values:
 J        6.0000 U1S00400
 J        6.0000 U1S01300
 J        6.0000 U1S00800
 J        7.0000 U1S00100D
 J        7.0000 U1S00200
 J        7.0000 U1S01400
 J        8.0000 U1S01200
 J        8.0000 U1S01100D

 Upper outside values:
 J       18.0000 U1S01000


-----------------------------------------------------------------
 ALUMINUM
-----------------------------

bk       **         * *     *** ****
1          ********* * *****   *
 group1:  1
 min, median, max, bdl/tot :          182.0000           531.0000          1200.0000      0 /   16
 group2:  bk
 min, median, max, bdl/tot :           69.4000          1080.0000          1940.0000      0 /   11
>>> Different populations at alpha > 0.95
  Group bk Higher
```

```
Outside values test group relative to background group
-----------------------------------------------------
lowcut =        -315.0000
lq     =         753.0000
median =        1080.0000
uq     =        1465.0000
hicut  =        2533.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>

-----------------------------------------------------------------
 ANTHRACENE
-----------------------------

1        *........ .   ...  ..   .
bk                . ...   ..  ... ..
 group1:  1
 min, median, max, bdl/tot :        130.0000 J        340.0000 U        350.0000 U    15 /   16
 group2:  bk
 min, median, max, bdl/tot :        340.0000 U        340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J     130.0000 U1S00400

 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 AROCLOR-1260
-----------------------------

bk       .  ..  .   ... ..  .       .
1         ..  .. ...   .  .* ******
 group1:  1
 min, median, max, bdl/tot :         34.0000 UJ        35.0000 U        150.0000 J     9 /   16
 group2:  bk
 min, median, max, bdl/tot :         33.0000 U         35.0000 U         170.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          32.5000
lq     =          34.0000 U
median =          35.0000 U
uq     =          35.0000 U
hicut  =          36.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J      50.0000 U1S00800
 J      64.0000 U1S00100D
 J      79.0000 U1S00200
        84.0000 U1S00900
 J     120.0000 U1S00100
 J     150.0000 U1S00700


-----------------------------------------------------------------
 ARSENIC
-----------------------------

bk       .. . * *  * *** **
1          . . . .. *   *  *********
 group1:  1
```

```
 min, median, max, bdl/tot :          0.3800 U          0.8700          2.9000      5 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.3200 U          0.4100 B         0.7500 B     3 /   11
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          0.1175
lq     =          0.3800 U
median =          0.4100 B
uq     =          0.5550
hicut  =          0.8175
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       0.8300 U1S01300
 B       0.9100 U1S01200
 B       1.0000 U1S01400
 B       1.3000 U1S00800
 B       1.4000 U1S00700
 J       1.8000 U1S00900
 B       1.8000 U1S00200
         2.5000 U1S00100
         2.9000 U1S00100D


-----------------------------------------------------------------
 BARIUM
-----------------------------

bk       * *  *****      ** * *
1         * **     ******  * * *****
 group1:  1
 min, median, max, bdl/tot :          0.9600 B          4.6000          19.1000 B    0 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.4100 B          2.9000 B         10.0000 B    0 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         -0.5500
lq     =          2.6000
median =          2.9000 B
uq     =          4.7000
hicut  =          7.8500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       9.1000 U1S00400
 B      11.8000 U1S00900
 B      12.1000 U1S00100D
 B      14.5000 U1S00200
 B      15.1000 U1S00100
 B      19.1000 U1S00700


-----------------------------------------------------------------
 BENZO(A)ANTHRACENE
-----------------------------

1        **. . .........    . .    *
bk          . .         .... . ....
 group1:  1
 min, median, max, bdl/tot :        120.0000 J        340.0000 U       480.0000     13 /   16
 group2:  bk
 min, median, max, bdl/tot :        340.0000 U        340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =        325.0000
lq     =        340.0000 U
median =        340.0000 U
uq     =        350.0000 U
hicut  =        365.0000
```

```
 Lower outside values:
 J     120.0000 U1S01000
 J     190.0000 U1S00500

 Upper outside values:
       480.0000 U1S00400


-------------------------------------------------------------
 BENZO(A)PYRENE
-----------------------------

1        *...... ..  . ..   ..    **
bk               .  .. .  ...  ....
 group1:  1
 min, median, max, bdl/tot :         200.0000 J         340.0000 U       1200.0000       13 /   16
 group2:  bk
 min, median, max, bdl/tot :         340.0000 U         340.0000 U         360.0000 U     11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J     200.0000 U1S00500

 Upper outside values:
       400.0000 U1S00400
      1200.0000 U1S01000


-------------------------------------------------------------
 BENZO(B)FLUORANTHENE
-----------------------------

1        *...... ..  . ..   ...    *
bk               .  .. .  ...  ....
 group1:  1
 min, median, max, bdl/tot :         250.0000 J         340.0000 U        410.0000       14 /   16
 group2:  bk
 min, median, max, bdl/tot :         340.0000 U         340.0000 U         360.0000 U     11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J     250.0000 U1S00500

 Upper outside values:
       410.0000 U1S00400


-------------------------------------------------------------
 BENZO(G,H,I)PERYLENE
-----------------------------

bk       **  ..    .     .  . ... .
1          **  .... ..... .. .   * *
 group1:  1
 min, median, max, bdl/tot :         120.0000 J         340.0000 U       2500.0000       12 /   16
 group2:  bk
 min, median, max, bdl/tot :          91.0000 J         340.0000 U         360.0000 U      9 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
```

```
lq     =          340.0000 U
median =          340.0000 U
uq     =          350.0000 U
hicut  =          365.0000
 Lower outside values:
 J     120.0000 U1S00300
 J     220.0000 U1S00500

 Upper outside values:
      2500.0000 U1S01000


-----------------------------------------------------------------
 BENZO(K)FLUORANTHENE
-----------------------------

1        *...... ..  . ..   ..    **
bk               .  .. .  ...  ....
 group1:  1
 min, median, max, bdl/tot :         210.0000 J         340.0000 U       4000.0000 D    13 /   16
 group2:  bk
 min, median, max, bdl/tot :         340.0000 U         340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          325.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          350.0000 U
hicut  =          365.0000
 Lower outside values:
 J     210.0000 U1S00500

 Upper outside values:
       390.0000 U1S00400
 D    4000.0000 U1S01000


-----------------------------------------------------------------
 CADMIUM
-----------------------------

bk       ........*           * *
1                 ........... * ****
 group1:  1
 min, median, max, bdl/tot :           0.6200 U           0.6500 U          2.1000      11 /   16
 group2:  bk
 min, median, max, bdl/tot :           0.4200 U           0.4400 U          1.1000 B     8 /   11
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group
-----------------------------------------------------
lowcut =           0.3625
lq     =           0.4300 U
median =           0.4400 U
uq     =           0.4750 U
hicut  =           0.5425
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U        0.6200 U1S01100D
 U        0.6200 U1S01100
 U        0.6300 U1S00400
 U        0.6400 U1S00500
 U        0.6400 U1S00800
 U        0.6400 U1S01300
 U        0.6400 U1S01400
 U        0.6500 U1S01000
 U        0.6500 U1S00300
 U        0.6600 U1S00600
 U        0.6600 U1S01200
 B        0.8000 U1S00900
          1.1000 U1S00100D
```

```
        1.4000 U1S00700
        1.5000 U1S00200
        2.1000 U1S00100


-------------------------------------------------------------
 CALCIUM
-----------------------------

bk       ***** * * *  * *          *
1              * * * ** * **********
 group1:  1
 min, median, max, bdl/tot :        305.0000 J       14705.0000       119000.0000 J     0 /   16
 group2:  bk
 min, median, max, bdl/tot :         39.6000 B         390.0000 B      124000.0000       0 /   11
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =       -5135.0000
lq     =         190.0000
median =         390.0000 B
uq     =        3740.0000
hicut  =        9065.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J   20900.0000 U1S01100D
 J   22500.0000 U1S01100
 J   30500.0000 U1S00200
 J   32800.0000 U1S00600
 J   58900.0000 U1S01200
 J   62500.0000 U1S00500
 J  106000.0000 U1S00300
 J  119000.0000 U1S01000


-------------------------------------------------------------
 CARBAZOLE
-----------------------------

1        *........ .   ...  ..   .
bk                . ...   ..  ... ..
 group1:  1
 min, median, max, bdl/tot :          93.0000 J        340.0000 U        350.0000 U    15 /   16
 group2:  bk
 min, median, max, bdl/tot :        340.0000 U        340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J      93.0000 U1S00400

 Upper outside values:
<< NONE FOUND>>


-------------------------------------------------------------
 CHROMIUM
-----------------------------

bk       ** * * **** *  *     *
1          * * *    * ** ***** *****
 group1:  1
 min, median, max, bdl/tot :           1.1000 B           3.9000           26.8000       0 /   16
 group2:  bk
 min, median, max, bdl/tot :           0.6200 B           2.2000 B          5.6000       0 /   11
>>> Different populations at alpha > 0.95
```

```
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -0.7250
lq     =           1.3000
median =           2.2000 B
uq     =           2.6500
hicut  =           4.6750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
         5.2000 U1S00800
         9.8000 U1S00900
        14.1000 U1S00100D
        15.5000 U1S00200
        16.1000 U1S00100
        26.8000 U1S00700


-----------------------------------------------------------------
 CHRYSENE
-----------------------------

1        **. . .........    . .    *
bk          . .         .... . ....
 group1:  1
 min, median, max, bdl/tot :         210.0000 J         340.0000 U         500.0000       13 /   16
 group2:  bk
 min, median, max, bdl/tot :         340.0000 U         340.0000 U         360.0000 U     11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J     210.0000 U1S01000
 J     270.0000 U1S00500

 Upper outside values:
       500.0000 U1S00400


-----------------------------------------------------------------
 COPPER
-----------------------------

1        . .  .  .  . . * * ********
bk        * ** ** ** * * * *
 group1:  1
 min, median, max, bdl/tot :           0.2800 U           3.6500           15.2000        6 /   16
 group2:  bk
 min, median, max, bdl/tot :           0.3100 B           1.1000 B           3.1000 B      0 /   11
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -0.8500
lq     =           0.7100
median =           1.1000 B
uq     =           1.7500
hicut  =           3.3100
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       4.6000 U1S01300
         5.1000 U1S00400
         5.3000 U1S00800
         8.2000 U1S00900
        11.3000 U1S00100D
        11.6000 U1S00200
```

```
        14.4000 U1S00100
        15.2000 U1S00700

-------------------------------------------------------------
 DIBENZ(A,H)ANTHRACENE
-----------------------------

1        *.. .. ....... .    ..    *
bk          .  .       . ....  ....
 group1:  1
 min, median, max, bdl/tot :        120.0000 J        340.0000 U        760.0000      14 /   16
 group2:  bk
 min, median, max, bdl/tot :        340.0000 U        340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J     120.0000 U1S00400

 Upper outside values:
       760.0000 U1S01000


-------------------------------------------------------------
 DIELDRIN
-----------------------------

bk       . ..  .   . ... ..     *
1          .  .. ... .   .  ***** ***
 group1:  1
 min, median, max, bdl/tot :          3.4000 UJ         3.6500 U        180.0000 D     8 /   16
 group2:  bk
 min, median, max, bdl/tot :          3.3000 U          3.5000 U         95.0000      10 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =           3.2500
lq     =           3.4000 U
median =           3.5000 U
uq     =           3.5000 U
hicut  =           3.6500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
         3.8000 U1S01200
         4.4000 U1S00600
 J       6.7000 U1S00200
        15.0000 U1S00900
        89.0000 U1S00700
 D      98.0000 U1S00800
 D     170.0000 U1S00100D
 D     180.0000 U1S00100


-------------------------------------------------------------
 FLUORANTHENE
-----------------------------

1        **.... ...  ...   . .    **
bk             .   ..   ... . ....
 group1:  1
 min, median, max, bdl/tot :         93.0000 J        340.0000 U       1100.0000      12 /   16
 group2:  bk
 min, median, max, bdl/tot :        340.0000 U        340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
```

```
lowcut =          325.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          350.0000 U
hicut  =          365.0000
 Lower outside values:
 J       93.0000 U1S00200
 J      120.0000 U1S01000

 Upper outside values:
       490.0000 U1S00500
      1100.0000 U1S00400


-----------------------------------------------------------------
 HEPTACHLOR EPOXIDE
-----------------------------

bk        . . .          .......    .
1          .. . .........       ****
 group1:  1
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          7.2000      12 /   16
 group2:  bk
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =           1.6750
lq     =           1.7500 U
median =           1.8000 U
uq     =           1.8000 U
hicut  =           1.8750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
         4.3000 U1S00200
         6.5000 U1S00100D
 J       6.7000 U1S00700
         7.2000 U1S00100


-----------------------------------------------------------------
 INDENO(1,2,3-CD)PYRENE
-----------------------------

1        **.. ...... ...    . .    *
bk           .      .   .... . ....
 group1:  1
 min, median, max, bdl/tot :        160.0000 J        340.0000 U       2300.0000      13 /   16
 group2:  bk
 min, median, max, bdl/tot :        340.0000 U        340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J      160.0000 U1S00500
 J      280.0000 U1S00400

 Upper outside values:
      2300.0000 U1S01000


-----------------------------------------------------------------
 IRON
-----------------------------

bk       *   *   *  * **    **** *
1         *** *** ** *  ****    * **
```

```
 group1:  1
 min, median, max, bdl/tot :          109.0000 J          304.0000          944.0000 J     0 /   16
 group2:  bk
 min, median, max, bdl/tot :           25.6000            373.0000           575.0000       0 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         -166.0000
lq     =          233.0000
median =          373.0000
uq     =          499.0000
hicut  =          898.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J      944.0000 U1S00400


-----------------------------------------------------------------
 LEAD
-----------------------------

bk        **     **  *  **  ***    *
1           *****  ** **  **   **** *
 group1:  1
 min, median, max, bdl/tot :            1.4000 J            5.1500           24.3000 J     0 /   16
 group2:  bk
 min, median, max, bdl/tot :            1.1000             6.2000            23.2000       0 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =           -8.0500
lq     =            2.6000
median =            6.2000
uq     =            9.7000
hicut  =           20.3500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J       22.5000 U1S00400
 J       24.3000 U1S00200


-----------------------------------------------------------------
 MAGNESIUM
-----------------------------

bk        **  *****  **   *         *
1           ..      **  *** *********
 group1:  1
 min, median, max, bdl/tot :           20.7000 U          155.5000          922.0000 B     2 /   16
 group2:  bk
 min, median, max, bdl/tot :            6.5000 B           43.7000 B        1330.0000       0 /   11
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -33.2750
lq     =           33.8500
median =           43.7000 B
uq     =           78.6000
hicut  =          145.7250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B      176.0000 U1S01100D
 B      190.0000 U1S01100
 B      254.0000 U1S00600
 B      257.0000 U1S00200
 B      445.0000 U1S01200
 B      503.0000 U1S00500
 B      811.0000 U1S00300
 B      922.0000 U1S01000
```

```
-----------------------------------------------------------------
 MANGANESE
-----------------------------
bk        *** * *  ** *     **      *
1            * * **  * *****  ******
 group1:  1
 min, median, max, bdl/tot :          1.5000 J          6.7500          11.7000 J     0 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.3700 B          2.7000 B          12.5000       0 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -4.4750
lq     =           1.6000
median =           2.7000 B
uq     =           5.6500
hicut  =          11.7250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>

-----------------------------------------------------------------
 MERCURY
-----------------------------

bk        ..*      *****  **  *
1            .....*     **  ** ******
 group1:  1
 min, median, max, bdl/tot :          0.0200 U          0.0450          0.7400       5 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.0100 U          0.0200 B          0.0800       2 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -0.0150
lq     =           0.0150
median =           0.0200 B
uq     =           0.0350
hicut  =           0.0650
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
         0.1100 U1S00800
         0.1400 U1S00900
         0.1600 U1S00100D
         0.1600 U1S00700
         0.2000 U1S00100
         0.7400 U1S00200


-----------------------------------------------------------------
 PHENANTHRENE
-----------------------------

1        *...... ..  . ..   ...    *
bk              .  .. .  ...   ....
 group1:  1
 min, median, max, bdl/tot :        150.0000 J        340.0000 U        620.0000      14 /   16
 group2:  bk
 min, median, max, bdl/tot :        340.0000 U        340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J     150.0000 U1S00500
```

```
 Upper outside values:
       620.0000 U1S00400


-----------------------------------------------------------------
 POTASSIUM
-----------------------------

bk        .........**
1                    ...........*....
 group1:  1
 min, median, max, bdl/tot :          89.3000 U          92.0500 U         122.0000 U    15 /   16
 group2:  bk
 min, median, max, bdl/tot :          68.5000 U          70.8000 U          79.9000 B     9 /   11
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          64.9000
lq     =          69.5500 U
median =          70.8000 U
uq     =          72.6500 U
hicut  =          77.3000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U      89.3000 U1S01100
 U      89.3000 U1S01100D
 U      90.4000 U1S00900
 U      90.8000 U1S00100D
 U      90.9000 U1S01300
 U      91.0000 U1S01400
 U      91.2000 U1S00800
 U      91.5000 U1S00500
 U      92.6000 U1S00400
 U      93.5000 U1S01000
 U      93.8000 U1S00700
 B     105.0000 U1S00200
 U     107.0000 U1S00100
 U     108.0000 U1S01200
 U     113.0000 U1S00600
 U     122.0000 U1S00300


-----------------------------------------------------------------
 PYRENE
-----------------------------

1        *..... ...  ...   . .    **
bk             .   ..   ... . ....
 group1:  1
 min, median, max, bdl/tot :         160.0000 J         340.0000 U        1000.0000      13 /   16
 group2:  bk
 min, median, max, bdl/tot :         340.0000 U         340.0000 U         360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values:
 J     160.0000 U1S01000

 Upper outside values:
       430.0000 U1S00500
      1000.0000 U1S00400


-----------------------------------------------------------------
 SILVER
-----------------------------
```

```
bk        .........*          *
1                   ........... ..*.**
 group1:  1
 min, median, max, bdl/tot :          0.5200 U          0.7200 U          6.0000      13 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.4500 U          0.4600 U          1.3000 B     9 /   11
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          0.4175
lq     =          0.4550 U
median =          0.4600 U
uq     =          0.4800 U
hicut  =          0.5175
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       0.5200 U1S01100
 U       0.5200 U1S01100D
 U       0.5300 U1S01400
 U       0.5400 U1S00500
 U       0.5400 U1S00300
 U       0.5500 U1S01000
 U       0.5600 U1S01200
 U       0.6400 U1S00600
 U       0.8000 U1S00400
 U       1.2000 U1S00800
 U       2.2000 U1S00900
 U       2.8000 U1S00100D
         3.3000 U1S01300
 U       3.4000 U1S00200
         3.5000 U1S00100
         6.0000 U1S00700


-----------------------------------------------------------------
 THALLIUM
-----------------------------

bk        ..........                *
1                   ............*...
 group1:  1
 min, median, max, bdl/tot :          0.3800 UJ         0.3800 U          0.4500 U    15 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.2600 U          0.2800 U          1.0000 B    10 /   11
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          0.2475
lq     =          0.2700 U
median =          0.2800 U
uq     =          0.2850 U
hicut  =          0.3075
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 UJ      0.3800 U1S00900
 UJ      0.3800 U1S01100
 UJ      0.3800 U1S01100D
 UJ      0.3800 U1S01300
 U       0.3800 U1S00700
 U       0.3800 U1S01400
 U       0.3800 U1S00800
 U       0.3800 U1S00500
 U       0.3800 U1S00400
 U       0.3800 U1S00200
 U       0.3800 U1S00100D
 U       0.3900 U1S00300
 J       0.3900 U1S01000
 U       0.4000 U1S00600
```

```
 U        0.4000 U1S01200
 U        0.4500 U1S00100


-----------------------------------------------------------------
 VANADIUM
-----------------------------
1          ..  * *   * *.***  * **** *
bk           .* * *** *     ** *    *
 group1:  1
 min, median, max, bdl/tot :          0.5100 UJ          1.3000          5.8000 J     3 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.5100 U           0.9700 B          5.7000 B     1 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -0.5125
lq     =           0.7550
median =           0.9700 B
uq     =           1.6000
hicut  =           2.8675
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J       3.5000 U1S00500
 J       5.2000 U1S01000
 J       5.8000 U1S00300


-----------------------------------------------------------------
 ZINC
-----------------------------

bk       *****   ***    *  *   *
1              ***   **** ** *** ****
 group1:  1
 min, median, max, bdl/tot :          2.6000 B          15.8000          60.1000       0 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.4200 B           3.5000 B          31.5000       0 /   11
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -7.5500
lq     =           1.3000
median =           3.5000 B
uq     =           7.2000
hicut  =          16.0500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        18.7000 U1S00800
        22.6000 U1S01300
        30.1000 U1S00900
        31.2000 U1S00400
        46.8000 U1S00100D
        56.1000 U1S00700
        56.4000 U1S00200
        60.1000 U1S00100


-----------------------------------------------------------------
 ALPHA-CHLORDANE
-----------------------------

bk       * *...   .. .. *      *
1         *    ..*  .  . ****** ****
 group1:  1
 min, median, max, bdl/tot :          1.1000 NJ          2.9500          85.0000 DJ    4 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.6000 J           1.8000 U          20.0000       7 /   11
>>> Different populations at alpha > 0.95
```

```
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          1.5500
lq     =          1.7000 U
median =          1.8000 U
uq     =          1.8000 U
hicut  =          1.9500
 Lower outside values:
 NJ      1.1000 U1S01400

 Upper outside values:
 NJ      2.4000 U1S00500
 NJ      2.5000 U1S00400
 NJ      3.4000 U1S01300
 J       7.0000 U1S00600
 J      16.0000 U1S00800
 J      20.0000 U1S00900
 J      43.0000 U1S00700
 J      67.0000 U1S00100
 DJ     70.0000 U1S00100D
 DJ     85.0000 U1S00200


-----------------------------------------------------------------
 BIS(2-ETHYLHEXYL)PHTHALATE
-----------------------------

1        ***...... .   ....  .   .
bk                 . ...    .. ... ..
 group1:  1
 min, median, max, bdl/tot :        190.0000 J        340.0000 U        350.0000 U    13 /   16
 group2:  bk
 min, median, max, bdl/tot :        340.0000 U        340.0000 U        360.0000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =        325.0000
lq     =        340.0000 U
median =        340.0000 U
uq     =        350.0000 U
hicut  =        365.0000
 Lower outside values:
 J     190.0000 U1S01100
 J     210.0000 U1S00500
 J     280.0000 U1S01000

 Upper outside values:
<< NONE FOUND>>

-----------------------------------------------------------------
 GAMMA-BHC (LINDANE)
-----------------------------

1        *..  . ..........  .      .
bk          .. .          .. ......
 group1:  1
 min, median, max, bdl/tot :          1.2000 J          1.7500 U          9.2000 U    15 /   16
 group2:  bk
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    11 /   11
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          1.6750
lq     =          1.7500 U
median =          1.8000 U
uq     =          1.8000 U
hicut  =          1.8750
 Lower outside values:
 J       1.2000 U1S00100

 Upper outside values:
 U       9.2000 U1S00700
```

```
-----------------------------------------------------------------
 GAMMA-CHLORDANE
-----------------------------
bk        * *. ..  . . ..*      *
1          *  .  .. . .   ****** ****
 group1:  1
 min, median, max, bdl/tot :          1.0000 J          2.3000          53.0000 D     5 /   16
 group2:  bk
 min, median, max, bdl/tot :          0.8400 J          1.8000 U          13.0000       7 /   11
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          1.5500
lq     =          1.7000 U
median =          1.8000 U
uq     =          1.8000 U
hicut  =          1.9500
 Lower outside values:
 J       1.0000 U1S01200

 Upper outside values:
 J       2.1000 U1S00400
         2.1000 U1S01300
 J       2.5000 U1S00500
         5.4000 U1S00600
         9.4000 U1S00800
        11.0000 U1S00900
        36.0000 U1S00700
 D      40.0000 U1S00100
 D      43.0000 U1S00100D
 D      53.0000 U1S00200
```

Outside values - location details:

U1S00100	low:	1.0000	hi:		29.0000
L gamma-BHC (Lindane)				1.2000	J
H 2,4,5-T				41.0000	U
H 2,4,5-TP (Silvex)				34.0000	U
H 2,4-DB				180.0000	U
H 4,4'-DDE				21.0000	NJ
H Antimony				7.1000	U
H Aroclor-1260				120.0000	J
H Arsenic				2.5000	
H Barium				15.1000	B
H Beryllium				0.0600	U
H Cadmium				2.1000	
H Chromium				16.1000	
H Cobalt				0.7000	U
H Copper				14.4000	
H Dalapon				1200.0000	U
H Dicamba				55.0000	U
H Dieldrin				180.0000	D
H Heptachlor epoxide				7.2000	
H MCPA				51000.0000	U
H MCPP				41000.0000	U
H Mercury				0.2000	
H Nickel				3.4000	U
H Potassium				107.0000	U
H Selenium				0.5500	UJ
H Silver				3.5000	
H Sodium				16.1000	U
H Thallium				0.4500	U
H Zinc				60.1000	
H alpha-Chlordane				67.0000	J
H gamma-Chlordane				40.0000	D
U1S00100D	low:	1.0000	hi:		27.0000
L Acetone				7.0000	J
H 2,4,5-T				41.0000	U
H 2,4,5-TP (Silvex)				34.0000	U
H 2,4-DB				180.0000	U
H 4,4'-DDE				20.0000	NJ
H Antimony				6.1000	U
H Aroclor-1260				64.0000	J
H Arsenic				2.9000	
H Barium				12.1000	B
H Cadmium				1.1000	
H Chromium				14.1000	
H Cobalt				0.5900	U
H Copper				11.3000	
H Dalapon				1200.0000	U
H Dicamba				55.0000	U
H Dieldrin				170.0000	D
H Heptachlor epoxide				6.5000	
H MCPA				51000.0000	U
H MCPP				41000.0000	U
H Mercury				0.1600	
H Nickel				2.9000	U
H Potassium				90.8000	U
H Silver				2.8000	U
H Sodium				8.6000	U
H Thallium				0.3800	U
H Zinc				46.8000	
H alpha-Chlordane				70.0000	DJ
H gamma-Chlordane				43.0000	D
U1S00200	low:	2.0000	hi:		31.0000
L Acetone				7.0000	J
L Fluoranthene				93.0000	J
H 2,4,5-T				40.0000	U
H 2,4,5-TP (Silvex)				36.0000	U

H 2,4-DB	190.0000	U
H 4,4'-DDE	25.0000	NJ
H Antimony	6.0000	U
H Aroclor-1260	79.0000	J
H Arsenic	1.8000	B
H Barium	14.5000	B
H Beryllium	0.0600	U
H Cadmium	1.5000	
H Calcium	30500.0000	J
H Chromium	15.5000	
H Cobalt	0.5900	U
H Copper	11.6000	
H Dalapon	1300.0000	U
H Dicamba	57.0000	U
H Dieldrin	6.7000	J
H Heptachlor epoxide	4.3000	
H Lead	24.3000	J
H MCPA	53000.0000	U
H MCPP	42000.0000	U
H Magnesium	257.0000	B
H Mercury	0.7400	
H Nickel	2.9000	U
H Potassium	105.0000	B
H Silver	3.4000	U
H Sodium	14.0000	U
H Thallium	0.3800	U
H Zinc	56.4000	
H alpha-Chlordane	85.0000	DJ
H gamma-Chlordane	53.0000	D

U1S00300 low: 1.0000 hi: 20.0000

L Benzo(g,h,i)perylene	120.0000	J
H 2,4,5-T	42.0000	U
H 2,4,5-TP (Silvex)	36.0000	U
H 2,4-DB	190.0000	U
H Antimony	6.2000	U
H Beryllium	0.0600	U
H Cadmium	0.6500	U
H Calcium	106000.0000	J
H Cobalt	0.6000	U
H Dalapon	1300.0000	U
H Dicamba	57.0000	U
H MCPA	53000.0000	U
H MCPP	42000.0000	U
H Magnesium	811.0000	B
H Nickel	3.0000	U
H Potassium	122.0000	U
H Selenium	0.4800	U
H Silver	0.5400	U
H Sodium	31.8000	U
H Thallium	0.3900	U
H Vanadium	5.8000	J

U1S00400 low: 6.0000 hi: 33.0000

L Acenaphthene	100.0000	J
L Acetone	6.0000	J
L Anthracene	130.0000	J
L Carbazole	93.0000	J
L Dibenz(a,h)anthracene	120.0000	J
L Indeno(1,2,3-cd)pyrene	280.0000	J
H 2,4,5-T	41.0000	U
H 2,4,5-TP (Silvex)	34.0000	U
H 2,4-DB	180.0000	U
H 4,4'-DDE	18.0000	
H 4,4'-DDT	48.0000	
H Antimony	6.0000	U
H Barium	9.1000	B
H Benzo(a)anthracene	480.0000	
H Benzo(a)pyrene	400.0000	
H Benzo(b)fluoranthene	410.0000	
H Benzo(k)fluoranthene	390.0000	

H	Beryllium	0.0800	U
H	Cadmium	0.6300	U
H	Chrysene	500.0000	
H	Cobalt	0.5900	U
H	Copper	5.1000	
H	Dalapon	1200.0000	U
H	Dicamba	55.0000	U
H	Fluoranthene	1100.0000	
H	Iron	944.0000	J
H	Lead	22.5000	J
H	MCPA	51000.0000	U
H	MCPP	41000.0000	U
H	Nickel	2.9000	U
H	Phenanthrene	620.0000	
H	Potassium	92.6000	U
H	Pyrene	1000.0000	
H	Silver	0.8000	U
H	Sodium	11.6000	U
H	Thallium	0.3800	U
H	Zinc	31.2000	
H	alpha-Chlordane	2.5000	NJ
H	gamma-Chlordane	2.1000	J

U1S00500 low: 9.0000 hi: 23.0000

L	Benzo(a)anthracene	190.0000	J
L	Benzo(a)pyrene	200.0000	J
L	Benzo(b)fluoranthene	250.0000	J
L	Benzo(g,h,i)perylene	220.0000	J
L	Benzo(k)fluoranthene	210.0000	J
L	Chrysene	270.0000	J
L	Indeno(1,2,3-cd)pyrene	160.0000	J
L	Phenanthrene	150.0000	J
L	bis(2-Ethylhexyl)phthalate	210.0000	J
H	2,4,5-T	41.0000	U
H	2,4,5-TP (Silvex)	35.0000	U
H	2,4-DB	190.0000	U
H	Antimony	6.1000	U
H	Beryllium	0.0600	U
H	Cadmium	0.6400	U
H	Calcium	62500.0000	J
H	Cobalt	0.6000	U
H	Dalapon	1200.0000	U
H	Dicamba	56.0000	U
H	Fluoranthene	490.0000	
H	MCPA	51000.0000	U
H	MCPP	41000.0000	U
H	Magnesium	503.0000	B
H	Nickel	2.9000	U
H	Potassium	91.5000	U
H	Pyrene	430.0000	
H	Silver	0.5400	U
H	Sodium	22.8000	U
H	Thallium	0.3800	U
H	Vanadium	3.5000	J
H	alpha-Chlordane	2.4000	NJ
H	gamma-Chlordane	2.5000	J

U1S00600 low: 0.0000 hi: 22.0000

H	2,4,5-T	41.0000	U
H	2,4,5-TP (Silvex)	35.0000	U
H	2,4-DB	190.0000	U
H	Antimony	6.3000	U
H	Beryllium	0.0700	U
H	Cadmium	0.6600	U
H	Calcium	32800.0000	J
H	Cobalt	0.6100	U
H	Dalapon	1200.0000	U
H	Dicamba	56.0000	U
H	Dieldrin	4.4000	
H	MCPA	51000.0000	U
H	MCPP	41000.0000	U

H Magnesium	254.0000	B
H Nickel	3.0000	U
H Potassium	113.0000	U
H Selenium	0.4900	UJ
H Silver	0.6400	U
H Sodium	13.7000	U
H Thallium	0.4000	U
H alpha-Chlordane	7.0000	J
H gamma-Chlordane	5.4000	

U1S00700 low: 0.0000 hi: 50.0000

H 2,4,5-T	43.0000	U
H 2,4,5-TP (Silvex)	37.0000	U
H 2,4-DB	200.0000	U
H 4,4'-DDD	18.0000	U
H 4,4'-DDE	43.0000	J
H 4,4'-DDT	18.0000	J
H Aldrin	9.2000	U
H Antimony	6.1000	U
H Aroclor-1016	180.0000	U
H Aroclor-1221	360.0000	U
H Aroclor-1232	180.0000	U
H Aroclor-1242	180.0000	U
H Aroclor-1248	180.0000	U
H Aroclor-1254	180.0000	U
H Aroclor-1260	150.0000	J
H Arsenic	1.4000	B
H Barium	19.1000	B
H Beryllium	0.0800	U
H Cadmium	1.4000	
H Chromium	26.8000	
H Cobalt	0.5900	U
H Copper	15.2000	
H Dalapon	1300.0000	U
H Dicamba	59.0000	U
H Dieldrin	89.0000	
H Endosulfan I	9.2000	U
H Endosulfan II	18.0000	U
H Endosulfan sulfate	18.0000	U
H Endrin	18.0000	U
H Endrin aldehyde	18.0000	U
H Endrin ketone	18.0000	U
H Heptachlor	9.2000	U
H Heptachlor epoxide	6.7000	J
H MCPA	54000.0000	U
H MCPP	43000.0000	U
H Mercury	0.1600	
H Methoxychlor	92.0000	U
H Nickel	2.9000	U
H Potassium	93.8000	U
H Silver	6.0000	
H Sodium	10.9000	U
H Thallium	0.3800	U
H Toxaphene	920.0000	U
H Zinc	56.1000	
H alpha-BHC	9.2000	U
H alpha-Chlordane	43.0000	J
H beta-BHC	9.2000	U
H delta-BHC	9.2000	U
H gamma-BHC (Lindane)	9.2000	U
H gamma-Chlordane	36.0000	

U1S00800 low: 2.0000 hi: 24.0000

L Acetone	6.0000	J
L Beryllium	0.0200	U
H 2,4,5-T	43.0000	U
H 2,4,5-TP (Silvex)	37.0000	U
H 2,4-DB	190.0000	U
H Antimony	6.1000	U
H Aroclor-1260	50.0000	J
H Arsenic	1.3000	B

H	Cadmium	0.6400	U
H	Chromium	5.2000	
H	Cobalt	0.6000	U
H	Copper	5.3000	
H	Dalapon	1300.0000	U
H	Dicamba	58.0000	U
H	Dieldrin	98.0000	D
H	MCPA	54000.0000	U
H	MCPP	43000.0000	U
H	Mercury	0.1100	
H	Nickel	2.9000	U
H	Potassium	91.2000	U
H	Silver	1.2000	U
H	Sodium	8.5000	U
H	Thallium	0.3800	U
H	Zinc	18.7000	
H	alpha-Chlordane	16.0000	J
H	gamma-Chlordane	9.4000	

U1S00900 low: 1.0000 hi: 25.0000

L	Beryllium	0.0200	U
H	2,4,5-T	41.0000	U
H	2,4,5-TP (Silvex)	35.0000	U
H	2,4-DB	180.0000	U
H	Antimony	6.0000	U
H	Aroclor-1260	84.0000	
H	Arsenic	1.8000	J
H	Barium	11.8000	B
H	Cadmium	0.8000	B
H	Chromium	9.8000	
H	Cobalt	0.5900	U
H	Copper	8.2000	
H	Dalapon	1200.0000	U
H	Dicamba	55.0000	U
H	Dieldrin	15.0000	
H	MCPA	51000.0000	U
H	MCPP	41000.0000	U
H	Mercury	0.1400	
H	Nickel	2.9000	U
H	Potassium	90.4000	U
H	Silver	2.2000	U
H	Sodium	7.2000	U
H	Thallium	0.3800	UJ
H	Zinc	30.1000	
H	alpha-Chlordane	20.0000	J
H	gamma-Chlordane	11.0000	

U1S01000 low: 5.0000 hi: 26.0000

L	Benzo(a)anthracene	120.0000	J
L	Chrysene	210.0000	J
L	Fluoranthene	120.0000	J
L	Pyrene	160.0000	J
L	bis(2-Ethylhexyl)phthalate	280.0000	J
H	2,4,5-T	42.0000	U
H	2,4,5-TP (Silvex)	36.0000	U
H	2,4-DB	190.0000	U
H	Acetone	18.0000	J
H	Antimony	6.2000	U
H	Benzo(a)pyrene	1200.0000	
H	Benzo(g,h,i)perylene	2500.0000	
H	Benzo(k)fluoranthene	4000.0000	D
H	Beryllium	0.0500	U
H	Cadmium	0.6500	U
H	Calcium	119000.0000	J
H	Cobalt	0.6100	U
H	Dalapon	1300.0000	U
H	Dibenz(a,h)anthracene	760.0000	
H	Dicamba	57.0000	U
H	Indeno(1,2,3-cd)pyrene	2300.0000	
H	MCPA	53000.0000	U
H	MCPP	42000.0000	U

H Magnesium	922.0000	B
H Nickel	3.0000	U
H Potassium	93.5000	U
H Selenium	4.8000	UJ
H Silver	0.5500	U
H Sodium	36.2000	U
H Thallium	0.3900	J
H Vanadium	5.2000	J

U1S01100 low: 1.0000 hi: 17.0000

L bis(2-Ethylhexyl)phthalate	190.0000	J
H 2,4,5-T	41.0000	U
H 2,4,5-TP (Silvex)	35.0000	U
H 2,4-DB	180.0000	U
H Antimony	6.0000	U
H Cadmium	0.6200	U
H Calcium	22500.0000	J
H Dalapon	1200.0000	U
H Dicamba	55.0000	U
H MCPA	51000.0000	U
H MCPP	41000.0000	U
H Magnesium	190.0000	B
H Nickel	2.9000	U
H Potassium	89.3000	U
H Selenium	4.6000	UJ
H Silver	0.5200	U
H Sodium	13.5000	U
H Thallium	0.3800	UJ

U1S01100D low: 2.0000 hi: 16.0000

L Acetone	8.0000	J
L Beryllium	0.0300	U
H 2,4,5-T	41.0000	U
H 2,4,5-TP (Silvex)	35.0000	U
H 2,4-DB	180.0000	U
H Antimony	6.0000	U
H Cadmium	0.6200	U
H Calcium	20900.0000	J
H Dalapon	1200.0000	U
H Dicamba	55.0000	U
H MCPA	51000.0000	U
H MCPP	41000.0000	U
H Magnesium	176.0000	B
H Nickel	2.9000	U
H Potassium	89.3000	U
H Silver	0.5200	U
H Sodium	10.8000	U
H Thallium	0.3800	UJ

U1S01200 low: 2.0000 hi: 21.0000

L Acetone	8.0000	J
L gamma-Chlordane	1.0000	J
H 2,4,5-T	42.0000	U
H 2,4,5-TP (Silvex)	35.0000	U
H 2,4-DB	190.0000	U
H Antimony	6.3000	U
H Arsenic	0.9100	B
H Beryllium	0.0600	U
H Cadmium	0.6600	U
H Calcium	58900.0000	J
H Cobalt	0.6600	U
H Dalapon	1300.0000	U
H Dicamba	56.0000	U
H Dieldrin	3.8000	
H MCPA	52000.0000	U
H MCPP	42000.0000	U
H Magnesium	445.0000	B
H Nickel	3.0000	U
H Potassium	108.0000	U
H Selenium	0.4900	UJ

H Silver	0.5600	U	
H Sodium	20.5000	U	
H Thallium	0.4000	U	

U1S01300 low: 1.0000 hi: 20.0000

L Acetone	6.0000	J
H 2,4,5-T	41.0000	U
H 2,4,5-TP (Silvex)	35.0000	U
H 2,4-DB	180.0000	U
H Antimony	6.1000	U
H Arsenic	0.8300	B
H Cadmium	0.6400	U
H Cobalt	0.6800	U
H Copper	4.6000	B
H Dalapon	1200.0000	U
H Dicamba	55.0000	U
H MCPA	51000.0000	U
H MCPP	41000.0000	U
H Nickel	2.9000	U
H Potassium	90.9000	U
H Silver	3.3000	
H Sodium	9.3000	U
H Thallium	0.3800	UJ
H Zinc	22.6000	
H alpha-Chlordane	3.4000	NJ
H gamma-Chlordane	2.1000	

U1S01400 low: 3.0000 hi: 16.0000

L Acetone	7.0000	J
L Beryllium	0.0300	U
L alpha-Chlordane	1.1000	NJ
H 2,4,5-T	41.0000	U
H 2,4,5-TP (Silvex)	35.0000	U
H 2,4-DB	180.0000	U
H Antimony	6.1000	U
H Arsenic	1.0000	B
H Cadmium	0.6400	U
H Cobalt	0.5900	U
H Dalapon	1200.0000	U
H Dicamba	55.0000	U
H MCPA	51000.0000	U
H MCPP	41000.0000	U
H Nickel	2.9000	U
H Potassium	91.0000	U
H Silver	0.5300	U
H Sodium	9.2000	U
H Thallium	0.3800	U

Outside values - parameters counts
parameter, low values, high values:

2,4,5-T	0.0000	16.0000
2,4,5-TP (Silvex)	0.0000	16.0000
2,4-DB	0.0000	16.0000
4,4'-DDD	0.0000	1.0000
4,4'-DDE	0.0000	5.0000
4,4'-DDT	0.0000	2.0000
Acenaphthene	1.0000	0.0000
Acetone	8.0000	1.0000
Aldrin	0.0000	1.0000
Anthracene	1.0000	0.0000
Antimony	0.0000	16.0000
Aroclor-1016	0.0000	1.0000
Aroclor-1221	0.0000	1.0000
Aroclor-1232	0.0000	1.0000
Aroclor-1242	0.0000	1.0000
Aroclor-1248	0.0000	1.0000
Aroclor-1254	0.0000	1.0000
Aroclor-1260	0.0000	6.0000
Arsenic	0.0000	9.0000
Barium	0.0000	6.0000

Benzo(a)anthracene	2.0000	1.0000
Benzo(a)pyrene	1.0000	2.0000
Benzo(b)fluoranthene	1.0000	1.0000
Benzo(g,h,i)perylene	2.0000	1.0000
Benzo(k)fluoranthene	1.0000	2.0000
Beryllium	4.0000	9.0000
Cadmium	0.0000	16.0000
Calcium	0.0000	8.0000
Carbazole	1.0000	0.0000
Chromium	0.0000	6.0000
Chrysene	2.0000	1.0000
Cobalt	0.0000	14.0000
Copper	0.0000	8.0000
Dalapon	0.0000	16.0000
Dibenz(a,h)anthracene	1.0000	1.0000
Dicamba	0.0000	16.0000
Dieldrin	0.0000	8.0000
Endosulfan I	0.0000	1.0000
Endosulfan II	0.0000	1.0000
Endosulfan sulfate	0.0000	1.0000
Endrin	0.0000	1.0000
Endrin aldehyde	0.0000	1.0000
Endrin ketone	0.0000	1.0000
Fluoranthene	2.0000	2.0000
Heptachlor	0.0000	1.0000
Heptachlor epoxide	0.0000	4.0000
Indeno(1,2,3-cd)pyrene	2.0000	1.0000
Iron	0.0000	1.0000
Lead	0.0000	2.0000
MCPA	0.0000	16.0000
MCPP	0.0000	16.0000
Magnesium	0.0000	8.0000
Mercury	0.0000	6.0000
Methoxychlor	0.0000	1.0000
Nickel	0.0000	16.0000
Phenanthrene	1.0000	1.0000
Potassium	0.0000	16.0000
Pyrene	1.0000	2.0000
Selenium	0.0000	6.0000
Silver	0.0000	16.0000
Sodium	0.0000	16.0000
Thallium	0.0000	16.0000
Toxaphene	0.0000	1.0000
Vanadium	0.0000	3.0000
Zinc	0.0000	8.0000
alpha-BHC	0.0000	1.0000
alpha-Chlordane	1.0000	10.0000
beta-BHC	0.0000	1.0000
bis(2-Ethylhexyl)phthalate	3.0000	0.0000
delta-BHC	0.0000	1.0000
gamma-BHC (Lindane)	1.0000	1.0000
gamma-Chlordane	1.0000	10.0000

Points used:
U1S00100
U1S00100D
U1S00200
U1S00300
U1S00400
U1S00500
U1S00600
U1S00700
U1S00800
U1S00900
U1S01000
U1S01100
U1S01100D
U1S01200
U1S01300
U1S01400

```
 Outside values locations counts
 location, low values, high values:
U1S00100                    1.0000        40.0000
U1S00100D                   0.0000         2.0000
U1S00200                    9.0000         3.0000
U1S00300                    1.0000        59.0000
U1S00400                    5.0000        11.0000
U1S00500                    9.0000         2.0000
U1S00700                    0.0000        25.0000
U1S01000                    5.0000        63.0000
U1S01100                    1.0000         1.0000
U1S01200                    0.0000        91.0000
U1S01300                    0.0000         1.0000
U1S01400                    8.0000         0.0000


-----------------------------------------------------------------
 4,4'-DDD
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          3.2500
lq     =          3.4000 U
median =          3.4000 U
uq     =          3.5000 U
hicut  =          3.6500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U      18.0000 U1S00700


-----------------------------------------------------------------
 4,4'-DDE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =        -20.0000
lq     =          3.4000 U
median =          3.4500 U
uq     =         19.0000
hicut  =         42.4000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J      43.0000 U1S00700


-----------------------------------------------------------------
 4,4'-DDT
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =        -11.0000
lq     =          3.4000 U
median =          3.4500 U
uq     =         13.0000
hicut  =         27.4000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        48.0000 U1S00400
```

```
-----------------------------------------------------------------
 ACENAPHTHENE
-----------------------------
```

```
Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          340.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          340.0000 U
hicut  =          340.0000
 Lower outside values:
 J      100.0000 U1S00400

 Upper outside values:
 U      350.0000 U1S01200
 U      350.0000 U1S00300
 U      350.0000 U1S01000
```

```
-----------------------------------------------------------------
 ACETONE
-----------------------------
```

```
Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            2.5000
lq     =            7.0000
median =            8.5000
uq     =           10.0000 U
hicut  =           14.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J       18.0000 U1S01000
```

```
-----------------------------------------------------------------
 ALDRIN
-----------------------------
```

```
Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            1.5500
lq     =            1.7000 U
median =            1.7500 U
uq     =            1.8000 U
hicut  =            1.9500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U        9.2000 U1S00700
```

```
-----------------------------------------------------------------
 ALUMINUM
-----------------------------
```

```
Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -317.7500
lq     =          392.5000
median =          531.0000
uq     =          866.0000
hicut  =         1576.2500
 Lower outside values:
```

```
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 ANTHRACENE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          340.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          340.0000 U
hicut  =          340.0000
 Lower outside values:
 J     130.0000 U1S00400

 Upper outside values:
 U     350.0000 U1S01200
 U     350.0000 U1S00300
 U     350.0000 U1S01000


-----------------------------------------------------------------
 AROCLOR-1260
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -22.2500
lq     =          34.0000 U
median =          35.0000 U
uq     =          71.5000
hicut  =         127.7500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J     150.0000 U1S00700


-----------------------------------------------------------------
 ARSENIC
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -1.4000
lq     =           0.4000 U
median =           0.8700
uq     =           1.6000
hicut  =           3.4000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 BARIUM
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -7.8000
lq     =           4.0500
```

```
median =          4.6000
uq     =         11.9500
hicut  =         23.8000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 BENZO(A)ANTHRACENE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         340.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         340.0000 U
hicut  =         340.0000
 Lower outside values:
 J     120.0000 U1S01000
 J     190.0000 U1S00500

 Upper outside values:
 U     350.0000 U1S01200
 U     350.0000 U1S00300
       480.0000 U1S00400


-----------------------------------------------------------------
 BENZO(A)PYRENE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         332.5000
lq     =         340.0000 U
median =         340.0000 U
uq     =         345.0000 U
hicut  =         352.5000
 Lower outside values:
 J     200.0000 U1S00500

 Upper outside values:
       400.0000 U1S00400
      1200.0000 U1S01000


-----------------------------------------------------------------
 BENZO(B)FLUORANTHENE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         332.5000
lq     =         340.0000 U
median =         340.0000 U
uq     =         345.0000 U
hicut  =         352.5000
 Lower outside values:
 J     250.0000 U1S00500

 Upper outside values:
       410.0000 U1S00400
```

```
-----------------------------------------------------------------
 BENZO(G,H,I)PERYLENE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          340.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          340.0000 U
hicut  =          340.0000
 Lower outside values:
 J      120.0000 U1S00300
 J      220.0000 U1S00500

 Upper outside values:
 U      350.0000 U1S01200
        350.0000 U1S00400
       2500.0000 U1S01000


-----------------------------------------------------------------
 BENZO(K)FLUORANTHENE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          332.5000
lq     =          340.0000 U
median =          340.0000 U
uq     =          345.0000 U
hicut  =          352.5000
 Lower outside values:
 J      210.0000 U1S00500

 Upper outside values:
        390.0000 U1S00400
 D     4000.0000 U1S01000


-----------------------------------------------------------------
 CADMIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            0.1750
lq     =            0.6400 U
median =            0.6500 U
uq     =            0.9500
hicut  =            1.4150
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
          1.5000 U1S00200
          2.1000 U1S00100


-----------------------------------------------------------------
 CALCIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =       -60562.5000
lq     =         3285.0000
```

```
median =        14705.0000
uq     =        45850.0000
hicut  =       109697.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J  119000.0000 U1S01000


-----------------------------------------------------------------
 CARBAZOLE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          340.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          340.0000 U
hicut  =          340.0000
 Lower outside values:
 J      93.0000 U1S00400

 Upper outside values:
 U     350.0000 U1S01200
 U     350.0000 U1S00300
 U     350.0000 U1S01000


-----------------------------------------------------------------
 CHROMIUM
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -11.1750
lq     =           2.7000
median =           3.9000
uq     =          11.9500
hicut  =          25.8250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        26.8000 U1S00700


-----------------------------------------------------------------
 CHRYSENE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          340.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          340.0000 U
hicut  =          340.0000
 Lower outside values:
 J     210.0000 U1S01000
 J     270.0000 U1S00500

 Upper outside values:
 U     350.0000 U1S01200
 U     350.0000 U1S00300
       500.0000 U1S00400
```

```
-----------------------------------------------------------------
 COPPER
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -12.0000
lq     =            1.0500 U
median =            3.6500
uq     =            9.7500
hicut  =           22.8000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 DIBENZ(A,H)ANTHRACENE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          340.0000
lq     =          340.0000 U
median =          340.0000 U
uq     =          340.0000 U
hicut  =          340.0000
 Lower outside values:
 J      120.0000 U1S00400

 Upper outside values:
 U      350.0000 U1S01200
 U      350.0000 U1S00300
        760.0000 U1S01000


-----------------------------------------------------------------
 DIELDRIN
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -69.5000
lq     =            3.4000 U
median =            3.6500 U
uq     =           52.0000
hicut  =          124.9000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 D      170.0000 U1S00100D
 D      180.0000 U1S00100


-----------------------------------------------------------------
 FLUORANTHENE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          332.5000
lq     =          340.0000 U
median =          340.0000 U
uq     =          345.0000 U
hicut  =          352.5000
```

```
 Lower outside values:
 J      93.0000 U1S00200
 J     120.0000 U1S01000

 Upper outside values:
       490.0000 U1S00500
      1100.0000 U1S00400


-----------------------------------------------------------------
 HEPTACHLOR EPOXIDE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -0.3250
lq     =           1.7000 U
median =           1.8000 U
uq     =           3.0500 U
hicut  =           5.0750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
         6.5000 U1S00100D
 J       6.7000 U1S00700
         7.2000 U1S00100


-----------------------------------------------------------------
 INDENO(1,2,3-CD)PYRENE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         340.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         340.0000 U
hicut  =         340.0000
 Lower outside values:
 J     160.0000 U1S00500
 J     280.0000 U1S00400

 Upper outside values:
 U     350.0000 U1S00300
 U     350.0000 U1S01200
      2300.0000 U1S01000


-----------------------------------------------------------------
 IRON
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =        -303.5000
lq     =         142.0000
median =         304.0000
uq     =         439.0000
hicut  =         884.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J     944.0000 U1S00400
```

```
-----------------------------------------------------------------
 LEAD
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -16.6500
lq     =            2.2500
median =            5.1500
uq     =           14.8500
hicut  =           33.7500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 MAGNESIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -337.8750
lq     =           75.4500
median =          155.5000
uq     =          351.0000
hicut  =          764.3250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B     811.0000 U1S00300
 B     922.0000 U1S01000


-----------------------------------------------------------------
 MANGANESE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           -5.8500
lq     =            2.8500
median =            6.7500
uq     =            8.6500
hicut  =           17.3500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 MERCURY
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           -0.1750
lq     =            0.0200 U
median =            0.0450
uq     =            0.1500
hicut  =            0.3450
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
         0.7400 U1S00200
```

PHENANTHRENE

Outside values relative to own group for group: 1

```
lowcut =          332.5000
lq     =          340.0000 U
median =          340.0000 U
uq     =          345.0000 U
hicut  =          352.5000
 Lower outside values:
 J      150.0000 U1S00500

 Upper outside values:
        620.0000 U1S00400
```

POTASSIUM

Outside values relative to own group for group: 1

```
lowcut =           68.1250
lq     =           90.8500 U
median =           92.0500 U
uq     =          106.0000 U
hicut  =          128.7250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

PYRENE

Outside values relative to own group for group: 1

```
lowcut =          332.5000
lq     =          340.0000 U
median =          340.0000 U
uq     =          345.0000 U
hicut  =          352.5000
 Lower outside values:
 J      160.0000 U1S01000

 Upper outside values:
        430.0000 U1S00500
       1000.0000 U1S00400
```

SILVER

Outside values relative to own group for group: 1

```
lowcut =           -3.2250
lq     =            0.5400 U
median =            0.7200 U
uq     =            3.0500 U
hicut  =            6.8150
```

```
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 THALLIUM
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          0.3650
lq     =          0.3800 U
median =          0.3800 U
uq     =          0.3900 U
hicut  =          0.4050
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       0.4500 U1S00100


-----------------------------------------------------------------
 VANADIUM
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -1.2750
lq     =          0.8700
median =          1.3000
uq     =          2.3000
hicut  =          4.4450
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J       5.2000 U1S01000
 J       5.8000 U1S00300


-----------------------------------------------------------------
 ZINC
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =        -46.8750
lq     =          4.6500
median =         15.8000
uq     =         39.0000
hicut  =         90.5250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 ALPHA-CHLORDANE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =        -42.8750
lq     =          1.7500 U
median =          2.9500
```

```
uq     =          31.5000
hicut  =          76.1250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 DJ     85.0000 U1S00200


-----------------------------------------------------------------
 BIS(2-ETHYLHEXYL)PHTHALATE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         340.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         340.0000 U
hicut  =         340.0000
 Lower outside values:
 J     190.0000 U1S01100
 J     210.0000 U1S00500
 J     280.0000 U1S01000

 Upper outside values:
 U     350.0000 U1S00300
 U     350.0000 U1S01200


-----------------------------------------------------------------
 GAMMA-BHC (LINDANE)
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           1.5500
lq     =           1.7000 U
median =           1.7500 U
uq     =           1.8000 U
hicut  =           1.9500
 Lower outside values:
 J       1.2000 U1S00100

 Upper outside values:
 U       9.2000 U1S00700


-----------------------------------------------------------------
 GAMMA-CHLORDANE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -30.8750
lq     =           1.7500 U
median =           2.3000
uq     =          23.5000
hicut  =          56.1250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

Outside values - location details:

U1S00100		1.0000	40.0000
H	1,1,1-Trichloroethane		12.0000 U
H	1,1,2,2-Tetrachloroethane		12.0000 U
H	1,1,2-Trichloroethane		12.0000 U
H	1,1-Dichloroethane		12.0000 U
H	1,1-Dichloroethene		12.0000 U
H	1,2-Dichloroethane		12.0000 U
H	1,2-Dichloroethene (total)		12.0000 U
H	1,2-Dichloropropane		12.0000 U
H	2-Butanone		12.0000 U
H	2-Hexanone		12.0000 U
H	4-Methyl-2-pentanone		12.0000 U
H	Antimony		7.1000 U
H	Benzene		12.0000 U
H	Bromodichloromethane		12.0000 U
H	Bromoform		12.0000 U
H	Bromomethane		12.0000 U
H	Cadmium		2.1000
H	Carbon disulfide		12.0000 U
H	Carbon tetrachloride		12.0000 U
H	Chlorobenzene		12.0000 U
H	Chloroethane		12.0000 U
H	Chloroform		12.0000 U
H	Chloromethane		12.0000 U
H	Cobalt		0.7000 U
H	Dibromochloromethane		12.0000 U
H	Dieldrin		180.0000 D
H	Ethylbenzene		12.0000 U
H	Heptachlor epoxide		7.2000
H	Methylene chloride		12.0000 U
H	Nickel		3.4000 U
H	Selenium		0.5500 UJ
H	Styrene		12.0000 U
H	Tetrachloroethene		12.0000 U
H	Thallium		0.4500 U
H	Toluene		12.0000 U
H	Trichloroethene		12.0000 U
H	Vinyl chloride		12.0000 U
H	Xylene (total)		12.0000 U
H	cis-1,3-Dichloropropene		12.0000 U
L	gamma-BHC (Lindane)		1.2000 J
H	trans-1,3-Dichloropropene		12.0000 U
U1S00100D		0.0000	2.0000
H	Dieldrin		170.0000 D
H	Heptachlor epoxide		6.5000
U1S00200		9.0000	3.0000
L	2,4,5-Trichlorophenol		840.0000 U
L	2,4-Dinitrophenol		840.0000 U
L	2-Nitroaniline		840.0000 U
L	3-Nitroaniline		840.0000 U
L	4,6-Dinitro-2-methylphenol		840.0000 U
L	4-Nitroaniline		840.0000 U
L	4-Nitrophenol		840.0000 U
H	Cadmium		1.5000
L	Fluoranthene		93.0000 J
H	Mercury		0.7400
L	Pentachlorophenol		840.0000 U
H	alpha-Chlordane		85.0000 DJ
U1S00300		1.0000	59.0000
H	1,2,4-Trichlorobenzene		350.0000 U
H	1,2-Dichlorobenzene		350.0000 U
H	1,3-Dichlorobenzene		350.0000 U
H	1,4-Dichlorobenzene		350.0000 U
H	2,2'-oxybis(1-Chloropropane)		350.0000 UJ
H	2,4,5-Trichlorophenol		870.0000 U
H	2,4,6-Trichlorophenol		350.0000 U
H	2,4-Dichlorophenol		350.0000 U

H	2,4-Dimethylphenol	350.0000	U
H	2,4-Dinitrophenol	870.0000	U
H	2,4-Dinitrotoluene	350.0000	U
H	2,6-Dinitrotoluene	350.0000	U
H	2-Chloronaphthalene	350.0000	U
H	2-Chlorophenol	350.0000	U
H	2-Methylnaphthalene	350.0000	U
H	2-Methylphenol	350.0000	U
H	2-Nitroaniline	870.0000	U
H	2-Nitrophenol	350.0000	U
H	3,3'-Dichlorobenzidine	350.0000	U
H	3-Nitroaniline	870.0000	U
H	4,6-Dinitro-2-methylphenol	870.0000	U
H	4-Bromophenyl-phenylether	350.0000	U
H	4-Chloro-3-methylphenol	350.0000	U
H	4-Chloroaniline	350.0000	U
H	4-Chlorophenyl-phenylether	350.0000	U
H	4-Methylphenol	350.0000	U
H	4-Nitroaniline	870.0000	U
H	4-Nitrophenol	870.0000	U
H	Acenaphthene	350.0000	U
H	Acenaphthylene	350.0000	U
H	Anthracene	350.0000	U
H	Benzo(a)anthracene	350.0000	U
L	Benzo(g,h,i)perylene	120.0000	J
H	Butylbenzylphthalate	350.0000	U
H	Carbazole	350.0000	U
H	Chrysene	350.0000	U
H	Di-n-butylphthalate	350.0000	U
H	Di-n-octylphthalate	350.0000	U
H	Dibenz(a,h)anthracene	350.0000	U
H	Dibenzofuran	350.0000	U
H	Diethylphthalate	350.0000	U
H	Dimethylphthalate	350.0000	U
H	Fluorene	350.0000	U
H	Hexachlorobenzene	350.0000	U
H	Hexachlorobutadiene	350.0000	U
H	Hexachlorocyclopentadiene	350.0000	U
H	Hexachloroethane	350.0000	U
H	Indeno(1,2,3-cd)pyrene	350.0000	U
H	Isophorone	350.0000	U
H	Magnesium	811.0000	B
H	N-Nitroso-di-n-propylamine	350.0000	U
H	N-Nitrosodiphenylamine (1)	350.0000	U
H	Naphthalene	350.0000	U
H	Nitrobenzene	350.0000	U
H	Pentachlorophenol	870.0000	U
H	Phenol	350.0000	U
H	Vanadium	5.8000	J
H	bis(2-Chloroethoxy)methane	350.0000	U
H	bis(2-Chloroethyl)ether	350.0000	U
H	bis(2-Ethylhexyl)phthalate	350.0000	U
U1S00400		5.0000	11.0000
H	4,4'-DDT	48.0000	
L	Acenaphthene	100.0000	J
L	Anthracene	130.0000	J
H	Benzo(a)anthracene	480.0000	
H	Benzo(a)pyrene	400.0000	
H	Benzo(b)fluoranthene	410.0000	
H	Benzo(g,h,i)perylene	350.0000	
H	Benzo(k)fluoranthene	390.0000	
L	Carbazole	93.0000	J
H	Chrysene	500.0000	
L	Dibenz(a,h)anthracene	120.0000	J
H	Fluoranthene	1100.0000	
L	Indeno(1,2,3-cd)pyrene	280.0000	J
H	Iron	944.0000	J
H	Phenanthrene	620.0000	
H	Pyrene	1000.0000	
U1S00500		9.0000	2.0000
L	Benzo(a)anthracene	190.0000	J

L	Benzo(a)pyrene	200.0000	J
L	Benzo(b)fluoranthene	250.0000	J
L	Benzo(g,h,i)perylene	220.0000	J
L	Benzo(k)fluoranthene	210.0000	J
L	Chrysene	270.0000	J
H	Fluoranthene	490.0000	
L	Indeno(1,2,3-cd)pyrene	160.0000	J
L	Phenanthrene	150.0000	J
H	Pyrene	430.0000	
L	bis(2-Ethylhexyl)phthalate	210.0000	J

U1S00700	0.0000	25.0000	
H	4,4'-DDD	18.0000	U
H	4,4'-DDE	43.0000	J
H	Aldrin	9.2000	U
H	Aroclor-1016	180.0000	U
H	Aroclor-1221	360.0000	U
H	Aroclor-1232	180.0000	U
H	Aroclor-1242	180.0000	U
H	Aroclor-1248	180.0000	U
H	Aroclor-1254	180.0000	U
H	Aroclor-1260	150.0000	J
H	Chromium	26.8000	
H	Endosulfan I	9.2000	U
H	Endosulfan II	18.0000	U
H	Endosulfan sulfate	18.0000	U
H	Endrin	18.0000	U
H	Endrin aldehyde	18.0000	U
H	Endrin ketone	18.0000	U
H	Heptachlor	9.2000	U
H	Heptachlor epoxide	6.7000	J
H	Methoxychlor	92.0000	U
H	Toxaphene	920.0000	U
H	alpha-BHC	9.2000	U
H	beta-BHC	9.2000	U
H	delta-BHC	9.2000	U
H	gamma-BHC (Lindane)	9.2000	U

U1S01000	5.0000	63.0000	
H	1,2,4-Trichlorobenzene	350.0000	U
H	1,2-Dichlorobenzene	350.0000	U
H	1,3-Dichlorobenzene	350.0000	U
H	1,4-Dichlorobenzene	350.0000	U
H	2,2'-oxybis(1-Chloropropane)	350.0000	U
H	2,4,5-Trichlorophenol	890.0000	U
H	2,4,6-Trichlorophenol	350.0000	U
H	2,4-Dichlorophenol	350.0000	U
H	2,4-Dimethylphenol	350.0000	U
H	2,4-Dinitrophenol	890.0000	U
H	2,4-Dinitrotoluene	350.0000	U
H	2,6-Dinitrotoluene	350.0000	U
H	2-Chloronaphthalene	350.0000	U
H	2-Chlorophenol	350.0000	U
H	2-Methylnaphthalene	350.0000	U
H	2-Methylphenol	350.0000	U
H	2-Nitroaniline	890.0000	U
H	2-Nitrophenol	350.0000	U
H	3,3'-Dichlorobenzidine	350.0000	U
H	3-Nitroaniline	890.0000	U
H	4,6-Dinitro-2-methylphenol	890.0000	U
H	4-Bromophenyl-phenylether	350.0000	U
H	4-Chloro-3-methylphenol	350.0000	U
H	4-Chloroaniline	350.0000	U
H	4-Chlorophenyl-phenylether	350.0000	U
H	4-Methylphenol	350.0000	U
H	4-Nitroaniline	890.0000	U
H	4-Nitrophenol	890.0000	U
H	Acenaphthene	350.0000	U
H	Acenaphthylene	350.0000	U
H	Acetone	18.0000	J
H	Anthracene	350.0000	U
L	Benzo(a)anthracene	120.0000	J
H	Benzo(a)pyrene	1200.0000	

H	Benzo(g,h,i)perylene	2500.0000	
H	Benzo(k)fluoranthene	4000.0000	D
H	Butylbenzylphthalate	350.0000	U
H	Calcium	119000.0000	J
H	Carbazole	350.0000	U
L	Chrysene	210.0000	J
H	Di-n-butylphthalate	350.0000	U
H	Di-n-octylphthalate	350.0000	U
H	Dibenz(a,h)anthracene	760.0000	
H	Dibenzofuran	350.0000	U
H	Diethylphthalate	350.0000	U
H	Dimethylphthalate	350.0000	U
L	Fluoranthene	120.0000	J
H	Fluorene	350.0000	U
H	Hexachlorobenzene	350.0000	U
H	Hexachlorobutadiene	350.0000	U
H	Hexachlorocyclopentadiene	350.0000	U
H	Hexachloroethane	350.0000	U
H	Indeno(1,2,3-cd)pyrene	2300.0000	
H	Isophorone	350.0000	U
H	Magnesium	922.0000	B
H	N-Nitroso-di-n-propylamine	350.0000	U
H	N-Nitrosodiphenylamine (1)	350.0000	U
H	Naphthalene	350.0000	U
H	Nitrobenzene	350.0000	U
H	Pentachlorophenol	890.0000	U
H	Phenol	350.0000	U
L	Pyrene	160.0000	J
H	Selenium	4.8000	UJ
H	Sodium	36.2000	U
H	Vanadium	5.2000	J
H	bis(2-Chloroethoxy)methane	350.0000	U
H	bis(2-Chloroethyl)ether	350.0000	U
L	bis(2-Ethylhexyl)phthalate	280.0000	J
U1S01100	1.0000	1.0000	
H	Selenium	4.6000	UJ
L	bis(2-Ethylhexyl)phthalate	190.0000	J
U1S01200	0.0000	91.0000	
H	1,1,1-Trichloroethane	11.0000	U
H	1,1,2,2-Tetrachloroethane	11.0000	U
H	1,1,2-Trichloroethane	11.0000	U
H	1,1-Dichloroethane	11.0000	U
H	1,1-Dichloroethene	11.0000	U
H	1,2,4-Trichlorobenzene	350.0000	U
H	1,2-Dichlorobenzene	350.0000	U
H	1,2-Dichloroethane	11.0000	U
H	1,2-Dichloroethene (total)	11.0000	U
H	1,2-Dichloropropane	11.0000	U
H	1,3-Dichlorobenzene	350.0000	U
H	1,4-Dichlorobenzene	350.0000	U
H	2,2'-oxybis(1-Chloropropane)	350.0000	U
H	2,4,5-Trichlorophenol	870.0000	U
H	2,4,6-Trichlorophenol	350.0000	U
H	2,4-Dichlorophenol	350.0000	U
H	2,4-Dimethylphenol	350.0000	U
H	2,4-Dinitrophenol	870.0000	U
H	2,4-Dinitrotoluene	350.0000	U
H	2,6-Dinitrotoluene	350.0000	U
H	2-Butanone	11.0000	U
H	2-Chloronaphthalene	350.0000	U
H	2-Chlorophenol	350.0000	U
H	2-Hexanone	11.0000	U
H	2-Methylnaphthalene	350.0000	U
H	2-Methylphenol	350.0000	U
H	2-Nitroaniline	870.0000	U
H	2-Nitrophenol	350.0000	U
H	3,3'-Dichlorobenzidine	350.0000	U
H	3-Nitroaniline	870.0000	U
H	4,6-Dinitro-2-methylphenol	870.0000	U
H	4-Bromophenyl-phenylether	350.0000	U
H	4-Chloro-3-methylphenol	350.0000	U

H	4-Chloroaniline		350.0000 U
H	4-Chlorophenyl-phenylether		350.0000 U
H	4-Methyl-2-pentanone		11.0000 U
H	4-Methylphenol		350.0000 U
H	4-Nitroaniline		870.0000 U
H	4-Nitrophenol		870.0000 U
H	Acenaphthene		350.0000 U
H	Acenaphthylene		350.0000 U
H	Anthracene		350.0000 U
H	Benzene		11.0000 U
H	Benzo(a)anthracene		350.0000 U
H	Benzo(g,h,i)perylene		350.0000 U
H	Bromodichloromethane		11.0000 U
H	Bromoform		11.0000 U
H	Bromomethane		11.0000 U
H	Butylbenzylphthalate		350.0000 U
H	Carbazole		350.0000 U
H	Carbon disulfide		11.0000 U
H	Carbon tetrachloride		11.0000 U
H	Chlorobenzene		11.0000 U
H	Chloroethane		11.0000 U
H	Chloroform		11.0000 U
H	Chloromethane		11.0000 U
H	Chrysene		350.0000 U
H	Cobalt		0.6600 U
H	Di-n-butylphthalate		350.0000 U
H	Di-n-octylphthalate		350.0000 U
H	Dibenz(a,h)anthracene		350.0000 U
H	Dibenzofuran		350.0000 U
H	Dibromochloromethane		11.0000 U
H	Diethylphthalate		350.0000 U
H	Dimethylphthalate		350.0000 U
H	Ethylbenzene		11.0000 U
H	Fluorene		350.0000 U
H	Hexachlorobenzene		350.0000 U
H	Hexachlorobutadiene		350.0000 U
H	Hexachlorocyclopentadiene		350.0000 U
H	Hexachloroethane		350.0000 U
H	Indeno(1,2,3-cd)pyrene		350.0000 U
H	Isophorone		350.0000 U
H	Methylene chloride		11.0000 U
H	N-Nitroso-di-n-propylamine		350.0000 U
H	N-Nitrosodiphenylamine (1)		350.0000 U
H	Naphthalene		350.0000 U
H	Nitrobenzene		350.0000 U
H	Pentachlorophenol		870.0000 U
H	Phenol		350.0000 U
H	Styrene		11.0000 U
H	Tetrachloroethene		11.0000 U
H	Toluene		11.0000 U
H	Trichloroethene		11.0000 U
H	Vinyl chloride		11.0000 U
H	Xylene (total)		11.0000 U
H	bis(2-Chloroethoxy)methane		350.0000 U
H	bis(2-Chloroethyl)ether		350.0000 U
H	bis(2-Ethylhexyl)phthalate		350.0000 U
H	cis-1,3-Dichloropropene		11.0000 U
H	trans-1,3-Dichloropropene		11.0000 U
U1S01300		0.0000	1.0000
H	Cobalt		0.6800 U
U1S01400		8.0000	0.0000
L	2,4,5-Trichlorophenol		840.0000 U
L	2,4-Dinitrophenol		840.0000 U
L	2-Nitroaniline		840.0000 U
L	3-Nitroaniline		840.0000 U
L	4,6-Dinitro-2-methylphenol		840.0000 U
L	4-Nitroaniline		840.0000 U
L	4-Nitrophenol		840.0000 U
L	Pentachlorophenol		840.0000 U

Outside values parameters counts

parameter, low values, high values:

1,1,1-Trichloroethane	0.0000	2.0000
1,1,2,2-Tetrachloroethane	0.0000	2.0000
1,1,2-Trichloroethane	0.0000	2.0000
1,1-Dichloroethane	0.0000	2.0000
1,1-Dichloroethene	0.0000	2.0000
1,2,4-Trichlorobenzene	0.0000	3.0000
1,2-Dichlorobenzene	0.0000	3.0000
1,2-Dichloroethane	0.0000	2.0000
1,2-Dichloroethene (total)	0.0000	2.0000
1,2-Dichloropropane	0.0000	2.0000
1,3-Dichlorobenzene	0.0000	3.0000
1,4-Dichlorobenzene	0.0000	3.0000
2,2'-oxybis(1-Chloropropane)	0.0000	3.0000
2,4,5-Trichlorophenol	2.0000	3.0000
2,4,6-Trichlorophenol	0.0000	3.0000
2,4-Dichlorophenol	0.0000	3.0000
2,4-Dimethylphenol	0.0000	3.0000
2,4-Dinitrophenol	2.0000	3.0000
2,4-Dinitrotoluene	0.0000	3.0000
2,6-Dinitrotoluene	0.0000	3.0000
2-Butanone	0.0000	2.0000
2-Chloronaphthalene	0.0000	3.0000
2-Chlorophenol	0.0000	3.0000
2-Hexanone	0.0000	2.0000
2-Methylnaphthalene	0.0000	3.0000
2-Methylphenol	0.0000	3.0000
2-Nitroaniline	2.0000	3.0000
2-Nitrophenol	0.0000	3.0000
3,3'-Dichlorobenzidine	0.0000	3.0000
3-Nitroaniline	2.0000	3.0000
4,4'-DDD	0.0000	1.0000
4,4'-DDE	0.0000	1.0000
4,4'-DDT	0.0000	1.0000
4,6-Dinitro-2-methylphenol	2.0000	3.0000
4-Bromophenyl-phenylether	0.0000	3.0000
4-Chloro-3-methylphenol	0.0000	3.0000
4-Chloroaniline	0.0000	3.0000
4-Chlorophenyl-phenylether	0.0000	3.0000
4-Methyl-2-pentanone	0.0000	2.0000
4-Methylphenol	0.0000	3.0000
4-Nitroaniline	2.0000	3.0000
4-Nitrophenol	2.0000	3.0000
Acenaphthene	1.0000	3.0000
Acenaphthylene	0.0000	3.0000
Acetone	0.0000	1.0000
Aldrin	0.0000	1.0000
Anthracene	1.0000	3.0000
Antimony	0.0000	1.0000
Aroclor-1016	0.0000	1.0000
Aroclor-1221	0.0000	1.0000
Aroclor-1232	0.0000	1.0000
Aroclor-1242	0.0000	1.0000
Aroclor-1248	0.0000	1.0000
Aroclor-1254	0.0000	1.0000
Aroclor-1260	0.0000	1.0000
Benzene	0.0000	2.0000
Benzo(a)anthracene	2.0000	3.0000
Benzo(a)pyrene	1.0000	2.0000
Benzo(b)fluoranthene	1.0000	1.0000
Benzo(g,h,i)perylene	2.0000	3.0000
Benzo(k)fluoranthene	1.0000	2.0000
Bromodichloromethane	0.0000	2.0000
Bromoform	0.0000	2.0000
Bromomethane	0.0000	2.0000
Butylbenzylphthalate	0.0000	3.0000
Cadmium	0.0000	2.0000
Calcium	0.0000	1.0000
Carbazole	1.0000	3.0000
Carbon disulfide	0.0000	2.0000
Carbon tetrachloride	0.0000	2.0000
Chlorobenzene	0.0000	2.0000
Chloroethane	0.0000	2.0000

Chloroform	0.0000	2.0000
Chloromethane	0.0000	2.0000
Chromium	0.0000	1.0000
Chrysene	2.0000	3.0000
Cobalt	0.0000	3.0000
Di-n-butylphthalate	0.0000	3.0000
Di-n-octylphthalate	0.0000	3.0000
Dibenz(a,h)anthracene	1.0000	3.0000
Dibenzofuran	0.0000	3.0000
Dibromochloromethane	0.0000	2.0000
Dieldrin	0.0000	2.0000
Diethylphthalate	0.0000	3.0000
Dimethylphthalate	0.0000	3.0000
Endosulfan I	0.0000	1.0000
Endosulfan II	0.0000	1.0000
Endosulfan sulfate	0.0000	1.0000
Endrin	0.0000	1.0000
Endrin aldehyde	0.0000	1.0000
Endrin ketone	0.0000	1.0000
Ethylbenzene	0.0000	2.0000
Fluoranthene	2.0000	2.0000
Fluorene	0.0000	3.0000
Heptachlor	0.0000	1.0000
Heptachlor epoxide	0.0000	3.0000
Hexachlorobenzene	0.0000	3.0000
Hexachlorobutadiene	0.0000	3.0000
Hexachlorocyclopentadiene	0.0000	3.0000
Hexachloroethane	0.0000	3.0000
Indeno(1,2,3-cd)pyrene	2.0000	3.0000
Iron	0.0000	1.0000
Isophorone	0.0000	3.0000
Magnesium	0.0000	2.0000
Mercury	0.0000	1.0000
Methoxychlor	0.0000	1.0000
Methylene chloride	0.0000	2.0000
N-Nitroso-di-n-propylamine	0.0000	3.0000
N-Nitrosodiphenylamine (1)	0.0000	3.0000
Naphthalene	0.0000	3.0000
Nickel	0.0000	1.0000
Nitrobenzene	0.0000	3.0000
Pentachlorophenol	2.0000	3.0000
Phenanthrene	1.0000	1.0000
Phenol	0.0000	3.0000
Pyrene	1.0000	2.0000
Selenium	0.0000	3.0000
Sodium	0.0000	1.0000
Styrene	0.0000	2.0000
Tetrachloroethene	0.0000	2.0000
Thallium	0.0000	1.0000
Toluene	0.0000	2.0000
Toxaphene	0.0000	1.0000
Trichloroethene	0.0000	2.0000
Vanadium	0.0000	2.0000
Vinyl chloride	0.0000	2.0000
Xylene (total)	0.0000	2.0000
alpha-BHC	0.0000	1.0000
alpha-Chlordane	0.0000	1.0000
beta-BHC	0.0000	1.0000
bis(2-Chloroethoxy)methane	0.0000	3.0000
bis(2-Chloroethyl)ether	0.0000	3.0000
bis(2-Ethylhexyl)phthalate	3.0000	2.0000
cis-1,3-Dichloropropene	0.0000	2.0000
delta-BHC	0.0000	1.0000
gamma-BHC (Lindane)	1.0000	1.0000
trans-1,3-Dichloropropene	0.0000	2.0000

I.5.5. Statistical Results - GROUND WATER

Unfiltered Samples

Chem.name is chemical name
Min.dl is minimum reported detection level
Max.dl is maximum reported detection level
Min.lv is minimum level reported
Max.lv is maximum level reported
ADL.Avg is above detection level average value
Median is median of all values above and below detection level
Num.Det/Tot.Sample is number of detects / total number sampled

Chemical name	Min.dl	Max.dl	Min.lv	Max.lv	ADL.Avg	Median	No.Det/ Tot.Sample
1,1,1-Trichloroethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,1,2,2-Tetrachloroethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,1,2-Trichloroethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,1-Dichloroethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,1-Dichloroethene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,2,4-Trichlorobenzene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,2-Dichlorobenzene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,2-Dichloroethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,2-Dichloroethene (total)	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,2-Dichloropropane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,3-Dichlorobenzene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
1,4-Dichlorobenzene	10.000	10.000	1.000	8.000	2.400	10.000 U	5/30
2,2'-oxybis(1-Chloropropa	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2,4,5-T	0.500	0.500	N/A	N/A	N/A	0.500 U	0/30
2,4,5-TP (Silvex)	0.500	0.500	N/A	N/A	N/A	0.500 U	0/30
2,4,5-Trichlorophenol	25.000	25.000	N/A	N/A	N/A	25.000 U	0/30
2,4,6-Trichlorophenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2,4-D	2.500	2.500	3.400	3.400	3.400	2.500 U	1/30
2,4-DB	2.500	2.500	N/A	N/A	N/A	2.500 U	0/30
2,4-Dichlorophenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2,4-Dimethylphenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2,4-Dinitrophenol	25.000	25.000	N/A	N/A	N/A	25.000 U	0/30
2,4-Dinitrotoluene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2,6-Dinitrotoluene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2-Butanone	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2-Chloronaphthalene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2-Chlorophenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2-Hexanone	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2-Methylnaphthalene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2-Methylphenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
2-Nitroaniline	25.000	25.000	N/A	N/A	N/A	25.000 U	0/30
2-Nitrophenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
3,3'-Dichlorobenzidine	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
3-Nitroaniline	25.000	25.000	N/A	N/A	N/A	25.000 U	0/30
4,4'-DDD	0.100	0.100	N/A	N/A	N/A	0.100 U	0/30
4,4'-DDE	0.100	0.100	N/A	N/A	N/A	0.100 U	0/30
4,4'-DDT	0.100	0.100	0.055	0.055	0.055	0.100 U	1/30
4,6-Dinitro-2-methylpheno	25.000	25.000	N/A	N/A	N/A	25.000 U	0/30
4-Bromophenyl-phenylether	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
4-Chloro-3-methylphenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
4-Chloroaniline	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
4-Chlorophenyl-phenylethe	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
4-Methyl-2-pentanone	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
4-Methylphenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
4-Nitroaniline	25.000	25.000	N/A	N/A	N/A	25.000 U	0/30
4-Nitrophenol	25.000	25.000	N/A	N/A	N/A	25.000 U	0/30
Acenaphthene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Acenaphthylene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Acetone	10.000	15.000	4.000	46.000	22.667	10.000 U	3/30
Aldrin	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
Alkalinity	1.000	1.000	2.000	152.000	36.500	14.000	10/11
Aluminum	24.700	24.700	62.400	101000.000	6628.867	1020.000	30/32
Anthracene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Antimony	24.300	50.000	N/A	N/A	N/A	24.300 U	0/32
Aroclor-1016	1.000	1.000	N/A	N/A	N/A	1.000 U	0/30
Aroclor-1221	2.000	2.000	N/A	N/A	N/A	2.000 U	0/30

Aroclor-1232	1.000	1.000	N/A	N/A	N/A	1.000 U	0/30
Aroclor-1242	1.000	1.000	N/A	N/A	N/A	1.000 U	0/30
Aroclor-1248	1.000	1.000	N/A	N/A	N/A	1.000 U	0/30
Aroclor-1254	1.000	1.000	N/A	N/A	N/A	1.000 U	0/30
Aroclor-1260	1.000	1.000	N/A	N/A	N/A	1.000 U	0/30
Arsenic	1.500	14.800	3.300	14.000	7.300	1.900 U	3/32
Barium	0.500	6.100	3.600	870.000	94.124	28.900 B	29/32
Benzene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Benzo(a)anthracene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Benzo(a)pyrene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Benzo(b)fluoranthene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Benzo(g,h,i)perylene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Benzo(k)fluoranthene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Beryllium	0.200	4.000	0.210	7.100	2.438	0.200 UJ	6/32
Bromodichloromethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Bromoform	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Bromomethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Butylbenzylphthalate	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Cadmium	2.400	5.000	4.200	4.200	4.200	2.400 U	1/32
Calcium	15.700	15.700	1860.000	128000.000	17484.667	9100.000	30/32
Carbazole	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Carbon disulfide	10.000	10.000	4.000	7.000	5.500	10.000 U	2/30
Carbon tetrachloride	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Cesium-137	N/A	N/A	-0.972	0.038	-0.431	-0.396	4/4
Cesium-137, Uncertainty	N/A	N/A	1.240	1.510	1.380	1.385	4/4
Chlorobenzene	10.000	10.000	4.000	5.000	4.333	10.000 U	3/30
Chloroethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Chloroform	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Chloromethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Chromium	2.000	13.000	2.500	121.000	26.700	2.000 U	10/32
Chrysene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Cobalt	3.000	10.000	N/A	N/A	N/A	3.000 U	0/32
Copper	1.400	5.000	1.400	29.600	4.779	2.000 B	14/32
Dalapon	5.000	5.000	N/A	N/A	N/A	5.000 U	0/30
Di-n-butylphthalate	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Di-n-octylphthalate	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Dibenz(a,h)anthracene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Dibenzofuran	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Dibromochloromethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Dicamba	0.500	0.500	N/A	N/A	N/A	0.500 U	0/30
Dichlorprop	2.500	2.500	N/A	N/A	N/A	2.500 U	0/30
Dieldrin	0.100	0.100	N/A	N/A	N/A	0.100 U	0/30
Diethylphthalate	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Dimethylphthalate	10.000	10.000	7.000	7.000	7.000	10.000 U	1/30
Dinoseb	0.500	0.500	N/A	N/A	N/A	0.500 U	0/30
Endosulfan I	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
Endosulfan II	0.100	0.100	N/A	N/A	N/A	0.100 U	0/30
Endosulfan sulfate	0.100	0.100	N/A	N/A	N/A	0.100 U	0/30
Endrin	0.100	0.100	N/A	N/A	N/A	0.100 U	0/30
Endrin aldehyde	0.100	0.100	N/A	N/A	N/A	0.100 U	0/30
Endrin ketone	0.100	0.100	N/A	N/A	N/A	0.100 U	0/30
Ethylbenzene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Fluoranthene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Fluorene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Gross Alpha	1.000	1.000	1.600	257.000	23.084	4.250	32/36
Gross Beta	3.000	3.000	3.400	240.000	29.866	7.400 J	35/36
Hardness	N/A	N/A	11.000	108.000	42.000	34.500	12/12
Heptachlor	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
Heptachlor epoxide	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
Hexachlorobenzene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Hexachlorobutadiene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Hexachlorocyclopentadiene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Hexachloroethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Indeno(1,2,3-cd)pyrene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Iron	6.100	6.100	9.400	8030.000	1555.254	621.000	28/32
Isophorone	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Lead	1.300	3.200	1.500	91.800	16.271	1.300 U	7/32
Lead-210	N/A	N/A	1.210	1.210	1.210	1.210	1/1
MCPA	250.000	250.000	N/A	N/A	N/A	250.000 U	0/30
MCPP	250.000	250.000	N/A	N/A	N/A	250.000 U	0/30
Magnesium	28.000	28.000	428.000	4550.000	1960.633	1625.000 B	30/32
Manganese	0.500	2.100	0.860	116.000	17.456	7.300 B	28/32
Mercury	0.040	0.150	0.040	0.600	0.140	0.040 U	6/32

Methoxychlor	0.500	0.500	N/A	N/A	N/A	0.500 U	0/30
Methylene chloride	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
N-Nitroso-di-n-propylamin	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
N-Nitrosodiphenylamine (1	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Naphthalene	10.000	10.000	3.000	3.000	3.000	10.000 U	1/30
Nickel	11.200	15.000	N/A	N/A	N/A	11.200 U	0/32
Nitrate	0.020	0.020	0.040	1.600	0.614	0.080	8/12
Nitrate/Nitrite	0.020	0.020	0.040	1.600	0.597	0.070	7/11
Nitrobenzene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Pentachlorophenol	25.000	25.000	N/A	N/A	N/A	25.000 U	0/30
Phenanthrene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Phenol	10.000	10.000	1.000	1.000	1.000	10.000 U	1/30
Polonium-210	N/A	N/A	0.130	0.130	0.130	0.130	1/1
Potassium	403.000	403.000	444.000	28100.000	4096.290	2215.000 B	31/32
Potassium-40	N/A	N/A	5.880	28.400	15.104	16.300	5/5
Pyrene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Radium-226	N/A	N/A	0.000	8.830	3.694	3.320	5/5
Radium-228	N/A	N/A	0.000	1.810	0.893	0.880	4/4
Selenium	0.600	2.500	0.900	19.000	4.500	0.610 U	7/32
Silver	2.400	5.000	N/A	N/A	N/A	2.400 U	0/32
Sodium	220.000	231.000	1550.000	46700.000	12575.333	10800.000	30/32
Styrene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Sulfate	N/A	N/A	2.200	35.200	18.342	16.750	12/12
Sulfide	0.500	0.500	0.500	4.300	1.833	0.500	6/12
Tetrachloroethene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Thallium	1.900	2.000	N/A	N/A	N/A	1.900 UJ	0/32
Thorium-227	N/A	N/A	0.041	0.446	0.159	0.075	4/4
Thorium-228	N/A	N/A	0.230	4.550	1.602	1.120	5/5
Thorium-230	N/A	N/A	1.740	3.430	2.436	2.420	5/5
Thorium-232	N/A	N/A	0.086	0.386	0.229	0.223	4/4
Toluene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Total Dissolved Solids	N/A	N/A	66.000	876.000	252.500	134.000	16/16
Total Organic Carbon	N/A	N/A	1.300	26.100	9.800	6.650	12/12
Total Petroleum Hydrocarb	1.000	1.000	2.600	3.500	2.933	1.000 U	3/41
Total Phosphorus	0.010	0.010	0.180	15.000	3.630	0.190	9/12
Total Suspended Solids	1.000	1.000	1.000	900.000	154.167	1.000	6/12
Toxaphene	5.000	5.000	N/A	N/A	N/A	5.000 U	0/30
Trichloroethene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Uranium-234	N/A	N/A	1.480	7.740	5.116	5.590	5/5
Uranium-238	N/A	N/A	0.956	8.720	5.455	5.710	5/5
Vanadium	2.900	2.900	3.700	104.000	21.300	2.900 U	15/32
Vinyl chloride	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Xylene (total)	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
Zinc	1.200	5.200	1.200	42.600	8.678	2.050 B	18/32
alpha-BHC	0.050	0.050	N/A	N/A	N/A	0.050 UJ	0/30
alpha-Chlordane	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
beta-BHC	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
bis(2-Chloroethoxy)methan	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
bis(2-Chloroethyl)ether	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
bis(2-Ethylhexyl)phthalat	10.000	10.000	2.000	30.000	7.667	10.000 U	6/30
cis-1,3-Dichloropropene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30
delta-BHC	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
gamma-BHC (Lindane)	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
gamma-Chlordane	0.050	0.050	N/A	N/A	N/A	0.050 U	0/30
pH	N/A	N/A	4.500	9.650	6.213	5.500	12/12
trans-1,3-Dichloropropene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/30

LOCATIONS USED: Unfiltered Groundwater Samples

location
U1G00101
U1G00201
U1G00301
U1G00303
U1G00401
U1G00501
U1G00601
U1G00701
U1G00801
U1G00901
U1G01001
U1G01001D
U1G01101
U1G01201
U1G01301
U1G01401
U1G01403
U1G01501
U1G01601
U1G01701
U1G01701D
U1G01801
U1G01901
U1G02001
U1G02101
U1G02201
U1G02301
U1G02401
U1G02501
U1G02601
U1G02603
U1G02701
U1G02701D
U1G02703
U1G02801
U1G02901

GROUNDWATER - Unfiltered DPT Samples, Level C Volatile Organics Data from Confirmatory Samples

Chem.name is chemical name
Min.dl is minimum reported detection level
Max.dl is maximum reported detection level
Min.lv is minimum level reported
Max.lv is maximum level reported
ADL.Avg is above detection level average value
Median is median of all values above and below detection level
Num.Det/Tot.Sample is number of detects / total number sampled

Chemical name	Min.dl	Max.dl	Min.lv	Max.lv	ADL.Avg	Median	Num.Det/Tot.Sample
1,1,1-Trichloroethane	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
1,1,2,2-Tetrachloroethane	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
1,1,2-Trichloroethane	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
1,1-Dichloroethane	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
1,1-Dichloroethene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
1,2-Dichloroethane	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
1,2-Dichloroethene (total)	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
1,2-Dichloropropane	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
1-Pentene	33.000	33.000	N/A	N/A	N/A	33.000 U	0/1
2-Butanone	10.000	10.000	N/A	N/A	N/A	10.000 U	0/10
2-Hexanone	10.000	10.000	N/A	N/A	N/A	10.000 U	0/10
4-Methyl-2-pentanone	10.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Acetone	10.000	10.000	8.000	280.000	65.833	10.000 U	6/10
Benzene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Bromodichloromethane	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Bromoform	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Bromomethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Carbon disulfide	5.000	5.000	2.000	120.000	47.429	6.500 J	7/10
Carbon tetrachloride	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Chlorobenzene	5.000	10.000	2.000	2.000	2.000	10.000 U	1/10
Chloroethane	10.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Chloroform	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Chloromethane	10.000	10.000	6.000	6.000	6.000	10.000 U	1/10
Dibromochloromethane	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Ethylbenzene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Methylene chloride	5.000	10.000	2.000	2.000	2.000	10.000 U	1/10
Propene	N/A	N/A	130.000	130.000	130.000	130.000 NJ	1/1
Styrene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Tetrachloroethene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Toluene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Trichloroethene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Vinyl chloride	10.000	10.000	N/A	N/A	N/A	10.000 U	0/10
Xylene (total)	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
cis-1,3-Dichloropropene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10
trans-1,3-Dichloropropene	5.000	10.000	N/A	N/A	N/A	10.000 U	0/10

LOCATIONS USED:

location
U1P01003
U1P01903
U1P03203
U1P03603
U1P03604
U1P03903
U1P03904
U1P05205D
U1P05901
U1P05902

GROUNDWATER - Filtered Samples

Chem.name is chemical name
Min.dl is minimum reported detection level
Max.dl is maximum reported detection level
Min.lv is minimum level reported
Max.lv is maximum level reported
ADL.Avg is above detection level average value
Median is median of all values above and below detection level
Num.Det/Tot.Sample is number of detects / total number sampled

Chem.name	Min.dl	Max.dl	Min.lv	Max.lv	ADL.Avg	Median		Num.Det/Tot.Sample
Aluminum	24.700	24.700	32.600	11500.000	1370.761	435.500		31/32
Antimony	24.300	50.000	N/A	N/A	N/A	24.300	U	0/32
Arsenic	1.500	14.800	2.900	14.500	7.000	1.500	U	3/32
Barium	0.500	3.400	4.600	353.000	43.883	22.550	B	30/32
Beryllium	0.200	4.000	1.100	5.000	2.300	0.200	UJ	4/32
Cadmium	2.400	5.000	N/A	N/A	N/A	2.400	U	0/32
Calcium	15.700	15.700	318.000	94700.000	13311.226	7570.000		31/32
Cesium-137	N/A	N/A	-1.290	0.264	-0.829	-1.145		4/4
Cesium-137, Uncertainty	N/A	N/A	1.420	2.000	1.603	1.495		4/4
Chromium	2.000	10.000	2.100	19.400	5.433	2.000	U	6/32
Cobalt	3.000	10.000	3.100	3.900	3.500	3.000	U	2/32
Copper	1.400	5.000	1.400	6.400	2.400	1.600	B	10/32
Gross Alpha	N/A	N/A	3.750	33.900	20.623	25.100		6/6
Gross Alpha, Counting Err	N/A	N/A	3.300	6.600	4.525	4.100		4/4
Gross Beta	N/A	N/A	6.670	86.800	28.212	20.250		6/6
Gross Beta, Counting Erro	N/A	N/A	2.700	8.900	5.200	4.600		4/4
Iron	6.100	6.100	31.200	2820.000	722.824	258.000		25/32
Lead	1.300	1.300	1.800	6.100	3.440	1.300	U	5/32
Magnesium	28.000	28.000	120.000	4050.000	1605.452	1315.000	B	31/32
Manganese	0.500	0.500	0.860	82.000	10.320	4.800	B	30/32
Mercury	0.040	0.110	0.040	0.060	0.050	0.040	U	4/32
Nickel	11.200	15.000	11.400	11.400	11.400	11.200	U	1/32
Potassium	403.000	403.000	540.000	18200.000	3166.067	2085.000	B	30/32
Potassium-40	N/A	N/A	-109.000	65.200	13.625	49.150		4/4
Potassium-40, Uncertainty	N/A	N/A	19.700	63.900	31.075	20.350		4/4
Radium-226	N/A	N/A	0.000	4.610	3.140	3.975		4/4
Radium-226, Uncertainty	N/A	N/A	0.200	0.690	0.380	0.315		4/4
Radium-228	N/A	N/A	0.000	2.030	1.078	1.140		4/4
Radium-228, Uncertainty	N/A	N/A	0.260	0.870	0.558	0.550		4/4
Selenium	0.600	2.500	1.000	3.900	2.400	0.600	U	4/16
Silver	2.400	5.000	2.700	2.800	2.767	2.400	U	3/32
Sodium	214.000	214.000	1470.000	38200.000	11150.000	9775.000		31/32
Thallium	1.900	18.700	1.900	4.600	2.950	1.900	U	6/32
Thorium-227	N/A	N/A	0.036	0.504	0.169	0.068		4/4
Thorium-227, Uncertainty	N/A	N/A	0.011	0.067	0.028	0.017		4/4
Thorium-228	N/A	N/A	1.140	4.820	2.080	1.180		4/4
Thorium-228, Uncertainty	N/A	N/A	0.138	0.514	0.235	0.144		4/4
Thorium-230	N/A	N/A	2.350	4.500	3.202	2.980		4/4
Thorium-230, Uncertainty	N/A	N/A	0.266	0.480	0.349	0.326		4/4
Thorium-232	N/A	N/A	0.081	0.291	0.225	0.265		4/4
Thorium-232, Uncertainty	N/A	N/A	0.023	0.049	0.042	0.048		4/4
Uranium-234	N/A	N/A	1.340	9.080	5.850	6.490		4/4
Uranium-234, Uncertainty	N/A	N/A	0.194	0.954	0.636	0.698		4/4
Uranium-238	N/A	N/A	1.230	9.000	5.665	6.215		4/4
Uranium-238, Uncertainty	N/A	N/A	0.181	0.946	0.617	0.671		4/4
Vanadium	2.900	10.000	3.100	50.200	11.638	2.900	U	13/32
Zinc	1.200	11.300	1.500	54.700	9.390	3.200	B	21/32

LOCATIONS USED:

U1H00101
U1H00201
U1H00301
U1H00303
U1H00401
U1H00501
U1H00601
U1H00701
U1H00801
U1H00901
U1H01001
U1H01001D
U1H01101
U1H01201
U1H01301
U1H01401
U1H01403
U1H01501
U1H01601
U1H01701
U1H01701D
U1H01801
U1H01901
U1H02001
U1H02101
U1H02201
U1H02301
U1H02401
U1H02501
U1H02601
U1H02603
U1H02701
U1H02701D
U1H02703
U1H02801
U1H02901

Population comparison OU1(expanded) vs. background - unfiltered only

Points used:

1	U1G00101
1	U1G00201
1	U1G00301
1	U1G00303
1	U1G00401
1	U1G00501
1	U1G00601
1	U1G00701
1	U1G00801
1	U1G00901
1	U1G01001
1	U1G01001D
1	U1G01101
1	U1G01201
1	U1G01301
1	U1G01401
1	U1G01403
1	U1G01501
1	U1G01601
1	U1G01701
1	U1G01701D
1	U1G01801
1	U1G01901
1	U1G02001
1	U1G02101
1	U1G02201
1	U1G02301
1	U1G02401
1	U1G02501
1	U1G02601
1	U1G02603
1	U1G02701
1	U1G02701D
1	U1G02703
1	U1G02801
1	U1G02901
bk	ORG00101
bk	ORG00201
bk	ORG00201D
bk	ORG00301
bk	ORG00401
bk	ORG00501
bk	ORG00601
bk	ORG00701
bk	ORG00701D
bk	ORG00801
bk	ORG00901
bk	ORG01001

Parameters with different populations:

ANTIMONY	Different Detection Limits
BARIUM	Group 1 Higher
CADMIUM	Different Detection Limits
GROSS BETA	Group 1 Higher
POTASSIUM	Group 1 Higher
SELENIUM	Different Detection Limits
THALLIUM	Different Detection Limits

location	low values BDL/total	high values BDL/total
U1G00101	1/1	6/7
U1G00201	1/1	6/8
U1G00301	1/1	7/22
U1G00303	0/0	0/2
U1G00401	1/1	7/7
U1G00501	1/1	6/8
U1G00601	0/1	6/13
U1G00701	0/1	6/7
U1G00801	1/1	6/7
U1G00901	1/1	6/6
U1G01001	0/0	6/7
U1G01001D	0/0	6/8
U1G01101	1/1	7/7
U1G01201	1/1	6/8
U1G01301	0/0	7/8
U1G01401	0/1	7/9
U1G01403	0/0	0/2
U1G01501	1/1	7/10
U1G01601	1/1	7/7
U1G01701	1/1	6/9
U1G01701D	1/1	7/8
U1G01801	1/1	6/6
U1G01901	1/1	6/6
U1G02001	1/1	7/7
U1G02101	1/1	6/6
U1G02201	1/1	6/6
U1G02301	1/1	6/6
U1G02401	1/1	6/8
U1G02501	1/1	6/9
U1G02601	1/1	8/15
U1G02603	0/0	0/2
U1G02701	1/1	6/14
U1G02701D	1/1	7/13
U1G02703	0/0	0/2
U1G02801	0/0	7/20
U1G02901	0/0	9/19

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-----------------------------------------------------------------
 ALUMINUM
-----------------------------
bk        .*     **     *     **           **** *
1          ..***  ***** *****  ***********    * *****
 group1:  1
 min, median, max, bdl/tot :          24.7000 UJ       1020.0000       101000.0000       2 /   32
 group2:  bk
 min, median, max, bdl/tot :          14.6000 U         829.0000         7260.0000       1 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =       -4651.2500
lq     =         116.5000
median =         829.0000
uq     =        3295.0000
hicut  =        8062.7500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      8250.0000 U1G02701D
      8700.0000 U1G02701
     21100.0000 U1G02901
     35700.0000 U1G00301
    101000.0000 U1G02801


-----------------------------------------------------------------
 ANTIMONY
-----------------------------
bk        .........***
1                     ..............................
 group1:  1
 min, median, max, bdl/tot :          24.3000 U          24.3000 U          50.0000 U    32 /   32
 group2:  bk
 min, median, max, bdl/tot :           1.2000 U           1.2000 U           2.2000 B     9 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group
-----------------------------------------------------
lowcut =           1.0500
lq     =           1.2000 U
median =           1.2000 U
uq     =           1.3000 U
hicut  =           1.4500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U      24.3000 U1G02401                    U      24.3000 U1G00701
 U      24.3000 U1G01201                    U      24.3000 U1G01101
 U      24.3000 U1G02501                    U      24.3000 U1G02201
 U      24.3000 U1G01401                    U      24.3000 U1G01301
 U      24.3000 U1G02601                    U      24.3000 U1G01701
 U      24.3000 U1G01601                    U      24.3000 U1G00101
 U      24.3000 U1G02701                    U      24.3000 U1G00601
 U      24.3000 U1G01701D                   U      24.3000 U1G00501
 U      24.3000 U1G02701D                   U      24.3000 U1G00401
 U      24.3000 U1G01001D                   U      24.3000 U1G00301
 U      24.3000 U1G01001                    U      24.3000 U1G00201
 U      24.3000 U1G02101                    U      24.3000 U1G01801
 U      24.3000 U1G00901                    U      24.3000 U1G01901
 U      24.3000 U1G02301                    U      24.3000 U1G02001
 U      24.3000 U1G00801                    U      50.0000 U1G02801
 U      24.3000 U1G01501                    U      50.0000 U1G02901
```

```
-----------------------------------------------------------------
 ARSENIC
-----------------------------
1        ...... . .. . ... .. ...  ......   .* ..*.*.
bk             . . . .   . *   **      ***  *
 group1:  1
 min, median, max, bdl/tot :          1.5000 UJ          .9000 U          14.8000 UJ   29 /   32
 group2:  bk
 min, median, max, bdl/tot :          1.5000 U           1.8500           3.7000 B      5 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -0.3750
lq     =           1.5000 U
median =           1.8500
uq     =           2.7500
hicut  =           4.6250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       5.0000 U1G02601
        14.0000 U1G00601
 UJ     14.8000 U1G00301


-----------------------------------------------------------------
 BARIUM
-----------------------------
1        .. *  * .***   * **  *********** *** *******
bk         * ** *    *** *  **           *   *
 group1:  1
 min, median, max, bdl/tot :          0.5000 U          28.9000          870.0000      3 /   32
 group2:  bk
 min, median, max, bdl/tot :          2.0000 B           8.8000           71.0000 B    0 /   12
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =         -12.1250
lq     =           4.9000
median =           8.8000
uq     =          16.2500
hicut  =          33.2750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B      33.6000 U1G01701D
 B      33.7000 U1G01701
 B      36.4000 U1G00501
 B     105.0000 U1G02601
 B     138.0000 U1G02701D
 B     145.0000 U1G02701
 B     149.0000 U1G00601
       240.0000 U1G02901
       596.0000 U1G00301
       870.0000 U1G02801


-----------------------------------------------------------------
 BERYLLIUM
-----------------------------
1        ....................   . . .  ..     *****..*
bk                          ... . . ..  .....
 group1:  1
 min, median, max, bdl/tot :          0.2000 UJ          0.2000 U          7.1000       26 /   32
 group2:  bk
 min, median, max, bdl/tot :          0.2000 U           0.2000 U          0.2000 U     12 /   12
no evidence of different populations at alpha=.95
```

```
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          0.2000
lq     =          0.2000 U
median =          0.2000 U
uq     =          0.2000 U
hicut  =          0.2000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J       0.2100 U1G01501
 J       0.3200 U1G00601
 B       1.8000 U1G02601
 B       2.6000 U1G02701D
 B       2.6000 U1G02701
 U       4.0000 U1G02801
 U       4.0000 U1G02901
         7.1000 U1G00301


-------------------------------------------------------------
 CADMIUM
-----------------------------

bk       ...........                          *
1                   ............................ *..
 group1:  1
 min, median, max, bdl/tot :          2.4000 U          2.4000 U          5.0000 U    31 /   32
 group2:  bk
 min, median, max, bdl/tot :          2.1000 U          2.1000 U          2.8000 B    11 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          2.1000
lq     =          2.1000 U
median =          2.1000 U
uq     =          2.1000 U
hicut  =          2.1000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       2.4000 U1G01101                    U       2.4000 U1G02601
 U       2.4000 U1G01201                    U       2.4000 U1G02701
 U       2.4000 U1G01301                    U       2.4000 U1G02701D
 U       2.4000 U1G01401                    U       2.4000 U1G00901
 U       2.4000 U1G01501                    U       2.4000 U1G00801
 U       2.4000 U1G01601                    U       2.4000 U1G00701
 U       2.4000 U1G01701                    U       2.4000 U1G00601
 U       2.4000 U1G00201                    U       2.4000 U1G00501
 U       2.4000 U1G01001                    U       2.4000 U1G00401
 U       2.4000 U1G02301                    U       2.4000 U1G01901
 U       2.4000 U1G00101                    U       2.4000 U1G01701D
 U       2.4000 U1G02101                    U       2.4000 U1G01801
 U       2.4000 U1G02201                    U       2.4000 U1G02001
 U       2.4000 U1G01001D                   B       4.2000 U1G00301
 U       2.4000 U1G02401                    U       5.0000 U1G02801
 U       2.4000 U1G02501                    U       5.0000 U1G02901


-------------------------------------------------------------
 CALCIUM
-----------------------------

1        ..*** ***  *** ****** ****** * ***   * * ***
bk           *   **   *      *      * *   *** * *
 group1:  1
 min, median, max, bdl/tot :         15.7000 UJ       9100.0000       128000.0000       2 /   32
 group2:  bk
 min, median, max, bdl/tot :       2660.0000 B       15550.0000        42500.0000       0 /   12
no evidence of different populations at alpha=.95
```

```
Outside values test group relative to background group
-----------------------------------------------------
lowcut =      -27375.0000
lq     =        5970.0000
median =       15550.0000
uq     =       28200.0000
hicut  =       61545.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
    128000.0000 U1G00301


-----------------------------------------------------------------
 CESIUM-137
-----------------------------

 not enough samples


-----------------------------------------------------------------
 CHROMIUM
-----------------------------

bk       ......                    **  *    * **
1                ....................  *. **.* *  **.***
 group1:  1
 min, median, max, bdl/tot :          2.0000 U          2.0000 U        121.0000      22 /   32
 group2:  bk
 min, median, max, bdl/tot :          1.9000 U          2.1500 U          6.0000 B     6 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -0.7250
lq     =           1.9000 U
median =           2.1500 U
uq     =           3.6500
hicut  =           6.2750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        10.3000 U1G00601
        12.8000 U1G02701
 U      13.0000 U1G02701D
        44.3000 U1G02901
        61.2000 U1G00301
       121.0000 U1G02801


-----------------------------------------------------------------
 COBALT
-----------------------------

bk       ............
1                    ...............................
 group1:  1
 min, median, max, bdl/tot :          3.0000 U          3.0000 U         10.0000 U    32 /   32
 group2:  bk
 min, median, max, bdl/tot :          2.6000 U          2.6000 U          2.6000 U    12 /   12
 ALL ANALYSES WERE BDLs

Outside values test group relative to background group
-----------------------------------------------------
lowcut =          2.6000
lq     =          2.6000 U
median =          2.6000 U
uq     =          2.6000 U
hicut  =          2.6000
 Lower outside values:
<< NONE FOUND>>
```

```
 Upper outside values:
 U       3.0000 U1G01101                    U       3.0000 U1G02701
 U       3.0000 U1G00101                    U       3.0000 U1G02701D
 U       3.0000 U1G01301                    U       3.0000 U1G00801
 U       3.0000 U1G02101                    U       3.0000 U1G01001
 U       3.0000 U1G01501                    U       3.0000 U1G00901
 U       3.0000 U1G02201                    U       3.0000 U1G00501
 U       3.0000 U1G01701                    U       3.0000 U1G00701
 U       3.0000 U1G02301                    U       3.0000 U1G00601
 U       3.0000 U1G01001D                   U       3.0000 U1G00201
 U       3.0000 U1G01401                    U       3.0000 U1G00401
 U       3.0000 U1G01601                    U       3.0000 U1G00301
 U       3.0000 U1G01701D                   U       3.0000 U1G01801
 U       3.0000 U1G01201                    U       3.0000 U1G01901
 U       3.0000 U1G02401                    U       3.0000 U1G02001
 U       3.0000 U1G02501                    U      10.0000 U1G02801
 U       3.0000 U1G02601                    U      10.0000 U1G02901


-----------------------------------------------------------------
 COPPER
-----------------------------

1        ......***         .**.. * .*...*....** .****
bk                 .........     * *            *
 group1:  1
 min, median, max, bdl/tot :          1.4000 UJ          2.0000 U          29.6000      18 /   32
 group2:  bk
 min, median, max, bdl/tot :          1.5000 U           1.5000 U           3.6000 B     9 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-------------------------------------------------------
lowcut =           1.2750
lq     =           1.5000 U
median =           1.5000 U
uq     =           1.6500 U
hicut  =           1.8750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       2.0000 U1G01401
 B       2.0000 U1G02501
 U       2.1000 U1G01601
 U       2.4000 U1G01501
 U       2.4000 U1G02001
 B       2.4000 U1G00201
 U       2.5000 U1G00401
 U       2.7000 U1G01101
 U       3.2000 U1G01701D
 U       3.2000 U1G01301
 J       3.4000 U1G01201
 J       3.4000 U1G00501
 U       5.0000 U1G02901
 B       5.3000 U1G00301
 J       5.6000 U1G01701
 J       6.0000 U1G00601
        29.6000 U1G02801


-----------------------------------------------------------------
 GROSS ALPHA in PCi/L
-----------------------------

1        ..   .. *****  *********** * *  * ** ***********
bk          ...  *     **           * * ** *  *
 group1:  1
 min, median, max, bdl/tot :          1.0000 U           4.2500          257.0000 J     4 /   36
 group2:  bk
 min, median, max, bdl/tot :          1.0000 U           3.9000           16.2000       3 /   12
no evidence of different populations at alpha=.95
```

```
Outside values test group relative to background group
------------------------------------------------------
lowcut =          -9.0000
lq     =           1.0500 U
median =           3.9000
uq     =           7.7500
hicut  =          17.8000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        22.9000 U1G02901
        25.9000 U1G02601
        28.9000 U1G01401
        31.2000 U1G02603
        37.8000 U1G01403
        44.2000 U1G02801
        46.2000 U1G02701D
        47.6000 U1G02701
        50.4000 U1G00303
        53.0000 U1G02703
 J     257.0000 U1G00301


-----------------------------------------------------------------
 GROSS BETA in PCi/L
-----------------------------

bk        .... ...*        **   *  *
1            .     ********  *** ** **********************
 group1:  1
 min, median, max, bdl/tot :          3.0000 U          7.4000          240.0000 J     1 /   36
 group2:  bk
 min, median, max, bdl/tot :          3.0000 U          3.0000 U          6.3000       7 /   12
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
------------------------------------------------------
lowcut =           0.9000
lq     =           3.0000 U
median =           3.0000 U
uq     =           4.4000
hicut  =           6.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J       6.8000 U1G02401
         7.2000 U1G00801
 J       7.4000 U1G02501
 J       7.4000 U1G00201
         9.1000 U1G01701
        10.5000 U1G01201
        10.8000 U1G01001D
        22.1000 U1G00701
        25.8000 U1G00601
        28.6000 U1G02603
 J      31.1000 U1G02601
        31.7000 U1G02801
        32.1000 U1G02901
        44.9000 U1G01501
        57.0000 U1G02703
        58.5000 U1G00303
        69.0000 U1G02701
        87.6000 U1G02701D
        90.8000 U1G01401
       102.0000 U1G01403
 J     240.0000 U1G00301
```

```
-------------------------------------------------------------
 IRON
-----------------------------

1        ....**  * *****    *********   ***  ********
bk             ** *     ****         ***   **
 group1:  1
 min, median, max, bdl/tot :          6.1000 UJ       621.0000        8030.0000       4 /   32
 group2:  bk
 min, median, max, bdl/tot :         16.0000 B        285.5000        1540.0000       0 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =       -1327.7500
lq     =         119.9000
median =         285.5000
uq     =        1085.0000
hicut  =        2532.6500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      2760.0000 U1G02601
      5850.0000 U1G02901
      7870.0000 U1G00301
      8030.0000 U1G02801


-------------------------------------------------------------
 LEAD
-----------------------------

1        ...... ..... ... ....  .... ..    **  *.****
bk             .    .   .    ..    .  ....  **
 group1:  1
 min, median, max, bdl/tot :          1.3000 U          1.3000 U        91.8000 D    25 /   32
 group2:  bk
 min, median, max, bdl/tot :          1.3000 U          1.3000 U         2.3000 B    10 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =           1.3000
lq     =           1.3000 U
median =           1.3000 U
uq     =           1.3000 U
hicut  =           1.3000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       1.5000 U1G02501
 B       1.6000 U1G00101
         3.1000 U1G02401
 U       3.2000 U1G02601
         3.9000 U1G00601
         6.0000 U1G00301
         6.0000 U1G02901
 D      91.8000 U1G02801


-------------------------------------------------------------
 MAGNESIUM
-----------------------------

1        ..*** * * ********  * * ********  ** **** *
bk            * * *        ** * *        **  *    * *
 group1:  1
 min, median, max, bdl/tot :         28.0000 U       1625.0000        4550.0000 B     2 /   32
 group2:  bk
 min, median, max, bdl/tot :        713.0000 B       1725.0000        4930.0000 B     0 /   12
no evidence of different populations at alpha=.95
```

```
Outside values test group relative to background group
-----------------------------------------------------
lowcut =        -1963.7500
lq     =         1152.5000
median =         1725.0000
uq     =         3230.0000
hicut  =         6346.2500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 MANGANESE
-----------------------------

1        ...****.**  * ** * **** * ***     **********
bk                 ** *  * *    * *   *****
 group1:  1
 min, median, max, bdl/tot :          0.5000 U          7.3000          116.0000       4 /   32
 group2:  bk
 min, median, max, bdl/tot :          2.4000 B         10.1500           14.1000 B     0 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -7.6500
lq     =           4.2000
median =          10.1500
uq     =          12.1000
hicut  =          23.9500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        24.1000 U1G02701
        28.5000 U1G01501
        44.4000 U1G02601
        93.3000 U1G02801
       116.0000 U1G00301


-----------------------------------------------------------------
 MERCURY
-----------------------------

bk       .....*                      **   ***    *
1              ....................***  .**   .... .*
 group1:  1
 min, median, max, bdl/tot :          0.0400 U          0.0400 U          0.6000       26 /   32
 group2:  bk
 min, median, max, bdl/tot :          0.0200 U          0.0400            0.1200 B      5 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -0.0400
lq     =           0.0200 U
median =           0.0400
uq     =           0.0600
hicut  =           0.1200
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       0.1500 U1G00301
         0.6000 U1G02801
```

```
-----------------------------------------------------------------
 NICKEL
-----------------------------
bk        .............
1                     ...............................
 group1:  1
 min, median, max, bdl/tot :          11.2000 U          11.2000 U          15.0000 U    32 /   32
 group2:  bk
 min, median, max, bdl/tot :           9.1000 U           9.1000 U           9.1000 U    12 /   12
 ALL ANALYSES WERE BDLs

Outside values test group relative to background group
-------------------------------------------------------
lowcut =          9.1000
lq     =          9.1000 U
median =          9.1000 U
uq     =          9.1000 U
hicut  =          9.1000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U      11.2000 U1G01101                    U      11.2000 U1G02701
 U      11.2000 U1G00101                    U      11.2000 U1G02701D
 U      11.2000 U1G01301                    U      11.2000 U1G00801
 U      11.2000 U1G02101                    U      11.2000 U1G01001
 U      11.2000 U1G01501                    U      11.2000 U1G00901
 U      11.2000 U1G02201                    U      11.2000 U1G00501
 U      11.2000 U1G01701                    U      11.2000 U1G00701
 U      11.2000 U1G02301                    U      11.2000 U1G00601
 U      11.2000 U1G01001D                   U      11.2000 U1G00201
 U      11.2000 U1G01401                    U      11.2000 U1G00401
 U      11.2000 U1G01601                    U      11.2000 U1G00301
 U      11.2000 U1G01701D                   U      11.2000 U1G01801
 U      11.2000 U1G01201                    U      11.2000 U1G01901
 U      11.2000 U1G02401                    U      11.2000 U1G02001
 U      11.2000 U1G02501                    U      15.0000 U1G02801
 U      11.2000 U1G02601                    U      15.0000 U1G02901


-----------------------------------------------------------------
 POTASSIUM
-----------------------------

bk        ..... *  *    *    *                ** *
1               . ** **** **** ****************  * ****
 group1:  1
 min, median, max, bdl/tot :         403.0000 U        2215.0000        28100.0000       1 /   32
 group2:  bk
 min, median, max, bdl/tot :         339.0000 U         584.5000         5460.0000       5 /   12
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-------------------------------------------------------
lowcut =       -3907.5000
lq     =         339.0000 U
median =         584.5000
uq     =        3170.0000
hicut  =        7416.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      8320.0000 U1G02901
     25700.0000 U1G02701D
     28100.0000 U1G02701
```

POTASSIUM-40

---

not enough samples

RADIUM-226

---

not enough samples

RADIUM-228

---

not enough samples

SELENIUM

```
1        .......................***..          .***  *
bk                                     ..........    **
 group1:  1
 min, median, max, bdl/tot :          0.6000 UJ          0.6100 U          19.0000 D    25 /   32
 group2:  bk
 min, median, max, bdl/tot :          2.0000 U           2.0000 U           5.4000      10 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          2.0000
lq     =          2.0000 U
median =          2.0000 U
uq     =          2.0000 U
hicut  =          2.0000
 Lower outside values:
 UJ      0.6000 U1G00301                    U       0.6100 U1G01101
 UJ      0.6100 U1G00201                    U       0.6100 U1G01501
 UJ      0.6100 U1G02401                    U       0.6100 U1G01601
 UJ      0.6100 U1G02301                    U       0.6100 U1G01701
 UJ      0.6100 U1G02601                    U       0.6100 U1G01701D
 UJ      0.6100 U1G02501                    U       0.6100 U1G01801
 UJ      0.6100 U1G00101                    U       0.6100 U1G02001
 UJ      0.6100 U1G01901                    U       0.6100 U1G02101
 UJ      0.6100 U1G02701                    J       0.9000 U1G00701
 U       0.6100 U1G00501                    B       0.9000 U1G00601
 U       0.6100 U1G00801                    B       1.3000 U1G01401
 U       0.6100 U1G00401                    UJ      1.6000 U1G02201
 U       0.6100 U1G01201                    UJ      1.6000 U1G02701D
 U       0.6100 U1G00901

 Upper outside values:
 U       2.5000 U1G02901
 J       2.9000 U1G01001
 J       3.0000 U1G01001D
 J       3.5000 U1G01301
 D      19.0000 U1G02801
```

```
-----------------------------------------------------------------
 SILVER
-----------------------------
bk        ............
1                    ..............................
 group1:  1
 min, median, max, bdl/tot :          2.4000 U          2.4000 U          5.0000 U    32 /   32
 group2:  bk
 min, median, max, bdl/tot :          2.2000 U          2.2000 U          2.2000 U    12 /   12
 ALL ANALYSES WERE BDLs

Outside values test group relative to background group
-------------------------------------------------------
lowcut =          2.2000
lq     =          2.2000 U
median =          2.2000 U
uq     =          2.2000 U
hicut  =          2.2000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       2.4000 U1G01101                    U       2.4000 U1G02701
 U       2.4000 U1G00101                    U       2.4000 U1G02701D
 U       2.4000 U1G01301                    U       2.4000 U1G00801
 U       2.4000 U1G02101                    U       2.4000 U1G01001
 U       2.4000 U1G01501                    U       2.4000 U1G00901
 U       2.4000 U1G02201                    U       2.4000 U1G00501
 U       2.4000 U1G01701                    U       2.4000 U1G00701
 U       2.4000 U1G02301                    U       2.4000 U1G00601
 U       2.4000 U1G01001D                   U       2.4000 U1G00201
 U       2.4000 U1G01401                    U       2.4000 U1G00401
 U       2.4000 U1G01601                    U       2.4000 U1G00301
 U       2.4000 U1G01701D                   U       2.4000 U1G01801
 U       2.4000 U1G01201                    U       2.4000 U1G01901
 U       2.4000 U1G02401                    U       2.4000 U1G02001
 U       2.4000 U1G02501                    U       5.0000 U1G02801
 U       2.4000 U1G02601                    U       5.0000 U1G02901


-----------------------------------------------------------------
 SODIUM
-----------------------------

1         ..  **  ***** ** * * **************   ** ****
bk          **  **     *  * * *             ***  *
 group1:  1
 min, median, max, bdl/tot :        220.0000 U      10800.0000        46700.0000       2 /   32
 group2:  bk
 min, median, max, bdl/tot :        814.0000 B       6970.0000        19800.0000       0 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-------------------------------------------------------
lowcut =      -18950.0000
lq     =        3010.0000
median =        6970.0000
uq     =       17650.0000
hicut  =       39610.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
     46700.0000 U1G00301
```

```
-----------------------------------------------------------------
 THALLIUM
-----------------------------
bk        ...........                              *
1                    ............................ ..
 group1:  1
 min, median, max, bdl/tot :          1.9000 UJ          1.9000 U          2.0000 U    32 /   32
 group2:  bk
 min, median, max, bdl/tot :          1.3000 U           1.3000 U          1.9000 B    11 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group
-------------------------------------------------------
lowcut =          1.3000
lq     =          1.3000 U
median =          1.3000 U
uq     =          1.3000 U
hicut  =          1.3000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 UJ      1.9000 U1G00801                    UJ      1.9000 U1G02601
 UJ      1.9000 U1G00901                    UJ      1.9000 U1G02701
 UJ      1.9000 U1G01201                    UJ      1.9000 U1G02701D
 UJ      1.9000 U1G01001                    UJ      1.9000 U1G00301
 UJ      1.9000 U1G01001D                   UJ      1.9000 U1G00201
 UJ      1.9000 U1G01301                    UJ      1.9000 U1G01701
 UJ      1.9000 U1G00601                    UJ      1.9000 U1G01601
 UJ      1.9000 U1G01701D                   UJ      1.9000 U1G02001
 UJ      1.9000 U1G01801                    U       1.9000 U1G02501
 UJ      1.9000 U1G01901                    U       1.9000 U1G02401
 UJ      1.9000 U1G00101                    U       1.9000 U1G02201
 UJ      1.9000 U1G02101                    U       1.9000 U1G01101
 UJ      1.9000 U1G01401                    U       1.9000 U1G00701
 UJ      1.9000 U1G02301                    U       1.9000 U1G00401
 UJ      1.9000 U1G01501                    U       2.0000 U1G02801
 UJ      1.9000 U1G00501                    U       2.0000 U1G02901


-----------------------------------------------------------------
 THORIUM-227
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 not enough samples


-----------------------------------------------------------------
 THORIUM-228
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 not enough samples


-----------------------------------------------------------------
 THORIUM-230
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 not enough samples


-----------------------------------------------------------------
 THORIUM-232
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 not enough samples
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-----------------------------------------------------------------
 URANIUM-234
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 not enough samples


-----------------------------------------------------------------
 URANIUM-238
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 not enough samples


-----------------------------------------------------------------
 VANADIUM
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bk        .                  **       * ** **** **
1          ..................  ******* *  *    *  *****
 group1:  1
 min, median, max, bdl/tot :          2.9000 U          2.9000 U        104.0000      17 /   32
 group2:  bk
 min, median, max, bdl/tot :          2.5000 U          9.9500           19.2000 B     1 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -9.0250
lq     =           4.5500
median =           9.9500
uq     =          13.6000
hicut  =          27.1750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        31.0000 U1G02901
        81.1000 U1G02801
       104.0000 U1G00301


-----------------------------------------------------------------
 ZINC
-----------------------------

bk        .          **   **    *  *   ** *   **
1          ......**.  ***  ..** *. *.*  . *.*  *.*****
 group1:  1
 min, median, max, bdl/tot :          1.2000 U          2.0500           42.6000      14 /   32
 group2:  bk
 min, median, max, bdl/tot :          1.1000 U          2.1000            5.0000 B     1 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -1.4500
lq     =           1.5500
median =           2.1000
uq     =           3.5500
hicut  =           6.5500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        23.5000 U1G02901
        23.9000 U1G02601
        28.3000 U1G02801
        42.6000 U1G00301
```

Outside values - location details:

U1G00101 low: 1/1 hi: 6/7

L Selenium	0.6100	UJ
H Antimony	24.3000	U
H Cadmium	2.4000	U
H Cobalt	3.0000	U
H Lead	1.6000	B
H Nickel	11.2000	U
H Silver	2.4000	U
H Thallium	1.9000	UJ

U1G00201 low: 1/1 hi: 6/8

L Selenium	0.6100	UJ
H Antimony	24.3000	U
H Cadmium	2.4000	U
H Cobalt	3.0000	U
H Copper	2.4000	B
H Gross Beta	7.4000	J
H Nickel	11.2000	U
H Silver	2.4000	U
H Thallium	1.9000	UJ

U1G00301 low: 1/1 hi: 7/22

L Selenium	0.6000	UJ
H Aluminum	35700.0000	
H Antimony	24.3000	U
H Arsenic	14.8000	UJ
H Barium	596.0000	
H Beryllium	7.1000	
H Cadmium	4.2000	B
H Calcium	128000.0000	
H Chromium	61.2000	
H Cobalt	3.0000	U
H Copper	5.3000	B
H Gross Alpha	257.0000	J
H Gross Beta	240.0000	J
H Iron	7870.0000	
H Lead	6.0000	
H Manganese	116.0000	
H Mercury	0.1500	U
H Nickel	11.2000	U
H Silver	2.4000	U
H Sodium	46700.0000	
H Thallium	1.9000	UJ
H Vanadium	104.0000	
H Zinc	42.6000	

U1G00303 low: 0/0 hi: 0/2

H Gross Alpha	50.4000	
H Gross Beta	58.5000	

U1G00401 low: 1/1 hi: 7/7

L Selenium	0.6100	U
H Antimony	24.3000	U
H Cadmium	2.4000	U
H Cobalt	3.0000	U
H Copper	2.5000	U
H Nickel	11.2000	U
H Silver	2.4000	U
H Thallium	1.9000	U

U1G00501 low: 1/1 hi: 6/8

L Selenium	0.6100	U
H Antimony	24.3000	U
H Barium	36.4000	B

H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Copper		3.4000 J
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G00601	low: 0/1 hi: 6/13	
L Selenium		0.9000 B
H Antimony		24.3000 U
H Arsenic		14.0000
H Barium		149.0000 B
H Beryllium		0.3200 J
H Cadmium		2.4000 U
H Chromium		10.3000
H Cobalt		3.0000 U
H Copper		6.0000 J
H Gross Beta		25.8000
H Lead		3.9000
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G00701	low: 0/1 hi: 6/7	
L Selenium		0.9000 J
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Gross Beta		22.1000
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 U
U1G00801	low: 1/1 hi: 6/7	
L Selenium		0.6100 U
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Gross Beta		7.2000
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G00901	low: 1/1 hi: 6/6	
L Selenium		0.6100 U
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G01001	low: 0/0 hi: 6/7	
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Nickel		11.2000 U
H Selenium		2.9000 J
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G01001D	low: 0/0 hi: 6/8	
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Gross Beta		10.8000
H Nickel		11.2000 U

H Selenium			3.0000 J
H Silver			2.4000 U
H Thallium			1.9000 UJ
U1G01101	low: 1/1	hi: 7/7	
L Selenium			0.6100 U
H Antimony			24.3000 U
H Cadmium			2.4000 U
H Cobalt			3.0000 U
H Copper			2.7000 U
H Nickel			11.2000 U
H Silver			2.4000 U
H Thallium			1.9000 U
U1G01201	low: 1/1	hi: 6/8	
L Selenium			0.6100 U
H Antimony			24.3000 U
H Cadmium			2.4000 U
H Cobalt			3.0000 U
H Copper			3.4000 J
H Gross Beta			10.5000
H Nickel			11.2000 U
H Silver			2.4000 U
H Thallium			1.9000 UJ
U1G01301	low: 0/0	hi: 7/8	
H Antimony			24.3000 U
H Cadmium			2.4000 U
H Cobalt			3.0000 U
H Copper			3.2000 U
H Nickel			11.2000 U
H Selenium			3.5000 J
H Silver			2.4000 U
H Thallium			1.9000 UJ
U1G01401	low: 0/1	hi: 7/9	
L Selenium			1.3000 B
H Antimony			24.3000 U
H Cadmium			2.4000 U
H Cobalt			3.0000 U
H Copper			2.0000 U
H Gross Alpha			28.9000
H Gross Beta			90.8000
H Nickel			11.2000 U
H Silver			2.4000 U
H Thallium			1.9000 UJ
U1G01403	low: 0/0	hi: 0/2	
H Gross Alpha			37.8000
H Gross Beta			102.0000
U1G01501	low: 1/1	hi: 7/10	
L Selenium			0.6100 U
H Antimony			24.3000 U
H Beryllium			0.2100 J
H Cadmium			2.4000 U
H Cobalt			3.0000 U
H Copper			2.4000 U
H Gross Beta			44.9000
H Manganese			28.5000
H Nickel			11.2000 U
H Silver			2.4000 U
H Thallium			1.9000 UJ
U1G01601	low: 1/1	hi: 7/7	
L Selenium			0.6100 U

H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Copper		2.1000 U
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G01701	low: 1/1 hi: 6/9	
L Selenium		0.6100 U
H Antimony		24.3000 U
H Barium		33.7000 B
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Copper		5.6000 J
H Gross Beta		9.1000
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G01701D	low: 1/1 hi: 7/8	
L Selenium		0.6100 U
H Antimony		24.3000 U
H Barium		33.6000 B
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Copper		3.2000 U
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G01801	low: 1/1 hi: 6/6	
L Selenium		0.6100 U
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G01901	low: 1/1 hi: 6/6	
L Selenium		0.6100 UJ
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G02001	low: 1/1 hi: 7/7	
L Selenium		0.6100 U
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Copper		2.4000 U
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ
U1G02101	low: 1/1 hi: 6/6	
L Selenium		0.6100 U
H Antimony		24.3000 U
H Cadmium		2.4000 U
H Cobalt		3.0000 U
H Nickel		11.2000 U
H Silver		2.4000 U
H Thallium		1.9000 UJ

U1G02201	low:	1/1	hi:	6/6		
L	Selenium				1.6000	UJ
H	Antimony				24.3000	U
H	Cadmium				2.4000	U
H	Cobalt				3.0000	U
H	Nickel				11.2000	U
H	Silver				2.4000	U
H	Thallium				1.9000	U
U1G02301	low:	1/1	hi:	6/6		
L	Selenium				0.6100	UJ
H	Antimony				24.3000	U
H	Cadmium				2.4000	U
H	Cobalt				3.0000	U
H	Nickel				11.2000	U
H	Silver				2.4000	U
H	Thallium				1.9000	UJ
U1G02401	low:	1/1	hi:	6/8		
L	Selenium				0.6100	UJ
H	Antimony				24.3000	U
H	Cadmium				2.4000	U
H	Cobalt				3.0000	U
H	Gross Beta				6.8000	J
H	Lead				3.1000	
H	Nickel				11.2000	U
H	Silver				2.4000	U
H	Thallium				1.9000	U
U1G02501	low:	1/1	hi:	6/9		
L	Selenium				0.6100	UJ
H	Antimony				24.3000	U
H	Cadmium				2.4000	U
H	Cobalt				3.0000	U
H	Copper				2.0000	B
H	Gross Beta				7.4000	J
H	Lead				1.5000	B
H	Nickel				11.2000	U
H	Silver				2.4000	U
H	Thallium				1.9000	U
U1G02601	low:	1/1	hi:	8/15		
L	Selenium				0.6100	UJ
H	Antimony				24.3000	U
H	Arsenic				5.0000	U
H	Barium				105.0000	B
H	Beryllium				1.8000	B
H	Cadmium				2.4000	U
H	Cobalt				3.0000	U
H	Gross Alpha				25.9000	
H	Gross Beta				31.1000	J
H	Iron				2760.0000	
H	Lead				3.2000	U
H	Manganese				44.4000	
H	Nickel				11.2000	U
H	Silver				2.4000	U
H	Thallium				1.9000	UJ
H	Zinc				23.9000	

U1G02603 low: 0/0 hi: 0/2

H Gross Alpha	31.2000	
H Gross Beta	28.6000	

U1G02701 low: 1/1 hi: 6/14

L Selenium	0.6100	UJ
H Aluminum	8700.0000	
H Antimony	24.3000	U
H Barium	145.0000	B
H Beryllium	2.6000	B
H Cadmium	2.4000	U
H Chromium	12.8000	
H Cobalt	3.0000	U
H Gross Alpha	47.6000	
H Gross Beta	69.0000	
H Manganese	24.1000	
H Nickel	11.2000	U
H Potassium	28100.0000	
H Silver	2.4000	U
H Thallium	1.9000	UJ

U1G02701D low: 1/1 hi: 7/13

L Selenium	1.6000	UJ
H Aluminum	8250.0000	
H Antimony	24.3000	U
H Barium	138.0000	B
H Beryllium	2.6000	B
H Cadmium	2.4000	U
H Chromium	13.0000	U
H Cobalt	3.0000	U
H Gross Alpha	46.2000	
H Gross Beta	87.6000	
H Nickel	11.2000	U
H Potassium	25700.0000	
H Silver	2.4000	U
H Thallium	1.9000	UJ

U1G02703 low: 0/0 hi: 0/2

H Gross Alpha	53.0000	
H Gross Beta	57.0000	

U1G02801 low: 0/0 hi: 7/20

H Aluminum	101000.0000	
H Antimony	50.0000	U
H Barium	870.0000	
H Beryllium	4.0000	U
H Cadmium	5.0000	U
H Chromium	121.0000	
H Cobalt	10.0000	U
H Copper	29.6000	
H Gross Alpha	44.2000	
H Gross Beta	31.7000	
H Iron	8030.0000	
H Lead	91.8000	D
H Manganese	93.3000	
H Mercury	0.6000	
H Nickel	15.0000	U
H Selenium	19.0000	D
H Silver	5.0000	U
H Thallium	2.0000	U
H Vanadium	81.1000	
H Zinc	28.3000	

U1G02901 low: 0/0 hi: 9/19

H Aluminum	21100.0000	
H Antimony	50.0000	U
H Barium	240.0000	
H Beryllium	4.0000	U
H Cadmium	5.0000	U
H Chromium	44.3000	
H Cobalt	10.0000	U
H Copper	5.0000	U
H Gross Alpha	22.9000	
H Gross Beta	32.1000	
H Iron	5850.0000	
H Lead	6.0000	
H Nickel	15.0000	U
H Potassium	8320.0000	
H Selenium	2.5000	U
H Silver	5.0000	U
H Thallium	2.0000	U
H Vanadium	31.0000	
H Zinc	23.5000	

Outside values - parameters counts

parameter	low values BDL/total	high values: BDL/total
Aluminum	0/0	0/5
Antimony	0/0	32/32
Arsenic	0/0	2/3
Barium	0/0	0/10
Beryllium	0/0	2/8
Cadmium	0/0	31/32
Calcium	0/0	0/1
Chromium	0/0	1/6
Cobalt	0/0	32/32
Copper	0/0	9/17
Gross Alpha	0/0	0/11
Gross Beta	0/0	0/21
Iron	0/0	0/4
Lead	0/0	1/8
Manganese	0/0	0/5
Mercury	0/0	1/2
Nickel	0/0	32/32
Potassium	0/0	0/3
Selenium	24/27	1/5
Silver	0/0	32/32
Sodium	0/0	0/1
Thallium	0/0	32/32
Vanadium	0/0	0/3
Zinc	0/0	0/4

OUTSIDE VALUES TEST FOR UNFILTERED GROUNDWATER

Points used:
U1G00101
U1G00201
U1G00301
U1G00303
U1G00401
U1G00501
U1G00601
U1G00701
U1G00801
U1G00901
U1G01001
U1G01001D
U1G01101
U1G01201
U1G01301
U1G01401
U1G01403
U1G01501
U1G01601
U1G01701
U1G01701D
U1G01801
U1G01901
U1G02001
U1G02101
U1G02201
U1G02301
U1G02401
U1G02501
U1G02601
U1G02603
U1G02701
U1G02701D
U1G02703
U1G02801
U1G02901

Outside values locations counts
location, low values, high values:

U1G00101	0.0000	3.0000
U1G00201	0.0000	2.0000
U1G00301	2.0000	17.0000
U1G00501	2.0000	0.0000
U1G00601	0.0000	8.0000
U1G00701	0.0000	1.0000
U1G01001	0.0000	1.0000
U1G01001D	0.0000	1.0000
U1G01101	1.0000	1.0000
U1G01201	3.0000	1.0000
U1G01301	0.0000	1.0000
U1G01401	4.0000	2.0000
U1G01403	0.0000	2.0000
U1G01501	1.0000	1.0000
U1G01701	1.0000	2.0000
U1G01701D	1.0000	2.0000
U1G01901	1.0000	0.0000
U1G02001	1.0000	0.0000
U1G02201	0.0000	1.0000
U1G02401	0.0000	1.0000
U1G02501	1.0000	2.0000
U1G02601	0.0000	7.0000
U1G02701	1.0000	9.0000
U1G02701D	1.0000	11.0000
U1G02801	0.0000	19.0000
U1G02901	1.0000	17.0000

1,4-DICHLOROBENZENE

Outside values relative to own group for group: 1

```
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values:
 J       1.0000 U1G01401
 J       1.0000 U1G01701D
 J       1.0000 U1G01101
 J       1.0000 U1G01701
 J       8.0000 U1G01201

 Upper outside values:
<< NONE FOUND>>
```

2,4-D

Outside values relative to own group for group: 1

```
lowcut =           2.5000
lq     =           2.5000 U
median =           2.5000 U
uq     =           2.5000 U
hicut  =           2.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        3.4000 U1G00101
```

4,4'-DDT

Outside values relative to own group for group: 1

```
lowcut =           0.1000
lq     =           0.1000 UJ
median =           0.1000 U
uq     =           0.1000 U
hicut  =           0.1000
 Lower outside values:
 J       0.0550 U1G02501

 Upper outside values:
<< NONE FOUND>>
```

ACETONE

Outside values relative to own group for group: 1

```
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
```

```
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values:
 J       4.0000 U1G01401
 Upper outside values:
 U      13.0000 U1G01201
 U      15.0000 U1G01701D
        18.0000 U1G02701
        46.0000 U1G02701D


-----------------------------------------------------------------
 ALUMINUM
-----------------------------
```

```
Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =       -2040.0000
lq     =         219.0000
median =        1020.0000
uq     =        1725.0000
hicut  =        3984.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      5030.0000 U1G00601
      8250.0000 U1G02701D
      8700.0000 U1G02701
     21100.0000 U1G02901
     35700.0000 U1G00301
    101000.0000 U1G02801


-----------------------------------------------------------------
 ANTIMONY
-----------------------------
```

```
Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          24.3000
lq     =          24.3000 U
median =          24.3000 U
uq     =          24.3000 U
hicut  =          24.3000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U      50.0000 U1G02801
 U      50.0000 U1G02901


-----------------------------------------------------------------
 ARSENIC
-----------------------------
```

```
Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -0.7500
lq     =           1.5000 U
median =           1.9000 U
uq     =           3.0000 U
hicut  =           5.2500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        14.0000 U1G00601
 UJ     14.8000 U1G00301
```

```
-----------------------------------------------------------------
 BARIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -30.5750
lq     =            8.8000
median =           28.9000
uq     =           35.0500
hicut  =           74.4250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B      105.0000 U1G02601
 B      138.0000 U1G02701D
 B      145.0000 U1G02701
 B      149.0000 U1G00601
        240.0000 U1G02901
        596.0000 U1G00301
        870.0000 U1G02801


-----------------------------------------------------------------
 BERYLLIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            0.1925
lq     =            0.2000 U
median =            0.2000 U
uq     =            0.2050 U
hicut  =            0.2125
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J        0.3200 U1G00601
 B        1.8000 U1G02601
 B        2.6000 U1G02701
 B        2.6000 U1G02701D
 U        4.0000 U1G02801
 U        4.0000 U1G02901
          7.1000 U1G00301


-----------------------------------------------------------------
 CADMIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            2.4000
lq     =            2.4000 U
median =            2.4000 U
uq     =            2.4000 U
hicut  =            2.4000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B        4.2000 U1G00301
 U        5.0000 U1G02801
 U        5.0000 U1G02901
```

```
-----------------------------------------------------------------
 CALCIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =      -13275.0000
lq     =        4680.0000
median =        9100.0000
uq     =       16650.0000
hicut  =       34605.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
     35000.0000 U1G02201
     39400.0000 U1G00101
     43700.0000 U1G02701D
     47800.0000 U1G02701
    128000.0000 U1G00301


-----------------------------------------------------------------
 CARBON DISULFIDE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values:
 J       4.0000 U1G02701
 J       7.0000 U1G02701D
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 CESIUM-137
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -1.6655
lq     =          -0.7400
median =          -0.3960
uq     =          -0.1230
hicut  =           0.8025
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 CHLOROBENZENE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
```

```
 Lower outside values:
 J       4.0000 U1G01401
 J       4.0000 U1G01201
 J       5.0000 U1G01501
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 CHROMIUM
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -0.5500
lq     =           2.0000 U
median =           2.0000 U
uq     =           3.7000 U
hicut  =           6.2500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        10.3000 U1G00601
        12.8000 U1G02701
 U      13.0000 U1G02701D
        44.3000 U1G02901
        61.2000 U1G00301
       121.0000 U1G02801


-----------------------------------------------------------------
 COBALT
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           3.0000
lq     =           3.0000 U
median =           3.0000 U
uq     =           3.0000 U
hicut  =           3.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U      10.0000 U1G02801
 U      10.0000 U1G02901


-----------------------------------------------------------------
 COPPER
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -1.3000
lq     =           1.4000
median =           2.0000 U
uq     =           3.2000 U
hicut  =           5.9000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J       6.0000 U1G00601
        29.6000 U1G02801
```

```
-----------------------------------------------------------------
 DIMETHYLPHTHALATE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values:
 J       7.0000 U1G00301

 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 GROSS ALPHA
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -35.1000
lq     =           2.4000
median =           4.2500
uq     =          27.4000
hicut  =          64.9000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 J     257.0000 U1G00301


-----------------------------------------------------------------
 GROSS BETA
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -36.4750
lq     =           4.5500
median =           7.4000
uq     =          31.9000
hicut  =          72.9250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        87.6000 U1G02701D
        90.8000 U1G01401
       102.0000 U1G01403
 J     240.0000 U1G00301


-----------------------------------------------------------------
 IRON
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =       -2326.2500
lq     =          59.5000
median =         621.0000
uq     =        1650.0000
hicut  =        4035.7500
```

```
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      5850.0000 U1G02901
      7870.0000 U1G00301
      8030.0000 U1G02801


-----------------------------------------------------------------
 LEAD
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           1.1500
lq     =           1.3000 U
median =           1.3000 U
uq     =           1.4000 U
hicut  =           1.5500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       1.6000 U1G00101
         3.1000 U1G02401
 U       3.2000 U1G02601
         3.9000 U1G00601
         6.0000 U1G00301
         6.0000 U1G02901
 D      91.8000 U1G02801


-----------------------------------------------------------------
 MAGNESIUM
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =       -1596.2500
lq     =         822.5000
median =        1625.0000
uq     =        2435.0000
hicut  =        4853.7500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 MANGANESE
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -17.7250
lq     =           2.1500 U
median =           7.3000
uq     =          15.4000
hicut  =          35.2750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        44.4000 U1G02601
        93.3000 U1G02801
       116.0000 U1G00301
```

MERCURY

Outside values relative to own group for group: 1

```
lowcut =          0.0100
lq     =          0.0400 U
median =          0.0400 U
uq     =          0.0600 U
hicut  =          0.0900
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       0.1000 U1G02901
 U       0.1500 U1G00301
         0.6000 U1G02801
```

NAPHTHALENE

Outside values relative to own group for group: 1

```
lowcut =         10.0000
lq     =         10.0000 U
median =         10.0000 U
uq     =         10.0000 U
hicut  =         10.0000
 Lower outside values:
 J       3.0000 U1G01201
 Upper outside values:
<< NONE FOUND>>
```

NICKEL

Outside values relative to own group for group: 1

```
lowcut =         11.2000
lq     =         11.2000 U
median =         11.2000 U
uq     =         11.2000 U
hicut  =         11.2000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U      15.0000 U1G02801
 U      15.0000 U1G02901
```

PHENOL

Outside values relative to own group for group: 1

```
lowcut =         10.0000
lq     =         10.0000 U
median =         10.0000 U
uq     =         10.0000 U
hicut  =         10.0000
 Lower outside values:
 J       1.0000 U1G00501
```

```
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 POTASSIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =       -2175.0000
lq     =        1185.0000
median =        2215.0000
uq     =        3425.0000
hicut  =        6785.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      8320.0000 U1G02901
     25700.0000 U1G02701D
     28100.0000 U1G02701


-----------------------------------------------------------------
 POTASSIUM-40 in  PCI/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -6.4500
lq     =           7.7400
median =          16.3000
uq     =          17.2000
hicut  =          31.3900
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 RADIUM-226 in  PCI/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -5.3200
lq     =           1.0400
median =           3.3200
uq     =           5.2800
hicut  =          11.6400
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

```
-----------------------------------------------------------------
 RADIUM-228 in  PCI/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -2.6775
lq     =           0.0000
median =           0.8800
uq     =           1.7850
hicut  =           4.4625
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 SELENIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -0.1250
lq     =           0.6100 U
median =           0.6100 U
uq     =           1.1000
hicut  =           1.8350
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       2.5000 U1G02901
 J       2.9000 U1G01001
 J       3.0000 U1G01001D
 J       3.5000 U1G01301
 D      19.0000 U1G02801


-----------------------------------------------------------------
 SILVER
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           2.4000
lq     =           2.4000 U
median =           2.4000 U
uq     =           2.4000 U
hicut  =           2.4000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       5.0000 U1G02801
 U       5.0000 U1G02901


-----------------------------------------------------------------
 SODIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =       -7850.0000
lq     =        5380.0000
median =       10800.0000
uq     =       14200.0000
hicut  =       27430.0000
```

```
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
     34100.0000 U1G02801
     46700.0000 U1G00301


-----------------------------------------------------------------
 THALLIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            1.9000
lq     =            1.9000 U
median =            1.9000 U
uq     =            1.9000 U
hicut  =            1.9000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       2.0000 U1G02801
 U       2.0000 U1G02901


-----------------------------------------------------------------
 THORIUM-227 in  PCI/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           -0.2718
lq     =            0.0515
median =            0.0750
uq     =            0.2670
hicut  =            0.5903
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 THORIUM-228 in  PCI/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            0.4800
lq     =            0.9120
median =            1.1200
uq     =            1.2000
hicut  =            1.6320
 Lower outside values:
         0.2300 U1G02901

 Upper outside values:
         4.5500 U1G01403
```

THORIUM-230 in PCI/L

Outside values relative to own group for group: 1

```
lowcut =          1.1150
lq     =          2.0000
median =          2.4200
uq     =          2.5900
hicut  =          3.4750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

THORIUM-232 in PCI/L

Outside values relative to own group for group: 1

```
lowcut =         -0.2777
lq     =          0.1025
median =          0.2225
uq     =          0.3560
hicut  =          0.7362
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

URANIUM-234 in PCI/L

Outside values relative to own group for group: 1

```
lowcut =         -0.7550
lq     =          3.8500
median =          5.5900
uq     =          6.9200
hicut  =         11.5250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

URANIUM-238 in PCI/L

Outside values relative to own group for group: 1

```
lowcut =         -2.5950
lq     =          3.8100
median =          5.7100
uq     =          8.0800
hicut  =         14.4850
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

```
-----------------------------------------------------------------
 VANADIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -1.8250
lq     =           2.9000 U
median =           2.9000 U
uq     =           6.0500
hicut  =          10.7750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B      13.9000 U1G01401
 B      19.5000 U1G02701
 B      19.5000 U1G02701D
        31.0000 U1G02901
        81.1000 U1G02801
       104.0000 U1G00301


-----------------------------------------------------------------
 ZINC
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -4.0000
lq     =           1.2500 U
median =           2.0500
uq     =           4.7500 U
hicut  =          10.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        23.5000 U1G02901
        23.9000 U1G02601
        28.3000 U1G02801
        42.6000 U1G00301


-----------------------------------------------------------------
 BIS(2-ETHYLHEXYL)PHTHALATE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values:
 J       2.0000 U1G01901
 J       3.0000 U1G01401
 J       3.0000 U1G00501
 J       3.0000 U1G00301
 J       5.0000 U1G02001
 Upper outside values:
        30.0000 U1G00201
```

Outside values - location details:

U1G00101	0.0000	3.0000	
H 2,4-D		3.4000	
H Calcium		39400.0000	
H Lead		1.6000	B
U1G00201	0.0000	2.0000	
H Mercury		0.0600	U
H bis(2-Ethylhexyl)phthalate		30.0000	
U1G00301	2.0000	17.0000	
H Aluminum		35700.0000	
H Arsenic		14.8000	UJ
H Barium		596.0000	
H Beryllium		7.1000	
H Cadmium		4.2000	B
H Calcium		128000.0000	
H Chromium		61.2000	
H Copper		5.3000	B
L Dimethylphthalate		7.0000	J
H Gross Alpha		257.0000	J
H Gross Beta		240.0000	J
H Iron		7870.0000	
H Lead		6.0000	
H Manganese		116.0000	
H Mercury		0.1500	U
H Sodium		46700.0000	
H Vanadium		104.0000	
H Zinc		42.6000	
L bis(2-Ethylhexyl)phthalate		3.0000	J
U1G00501	2.0000	0.0000	
L Phenol		1.0000	J
L bis(2-Ethylhexyl)phthalate		3.0000	J
U1G00601	0.0000	8.0000	
H Aluminum		5030.0000	
H Arsenic		14.0000	
H Barium		149.0000	B
H Beryllium		0.3200	J
H Chromium		10.3000	
H Copper		6.0000	J
H Lead		3.9000	
H Vanadium		9.6000	B
U1G00701	0.0000	1.0000	
H Magnesium		4550.0000	B
U1G01001	0.0000	1.0000	
H Selenium		2.9000	J
U1G01001D	0.0000	1.0000	
H Selenium		3.0000	J
U1G01101	1.0000	1.0000	
L 1,4-Dichlorobenzene		1.0000	J
H Total Suspended Solids		14.0000	
U1G01201	3.0000	1.0000	
L 1,4-Dichlorobenzene		8.0000	J
H Acetone		13.0000	U
L Chlorobenzene		4.0000	J
L Naphthalene		3.0000	J
U1G01301	0.0000	1.0000	
H Selenium		3.5000	J
U1G01401	4.0000	2.0000	
L 1,4-Dichlorobenzene		1.0000	J
L Acetone		4.0000	J
L Chlorobenzene		4.0000	J

H Gross Beta		90.8000	
H Vanadium		13.9000	B
L bis(2-Ethylhexyl)phthalate		3.0000	J
U1G01403	0.0000	1.0000	
H Gross Beta		102.0000	
H Thorium-228		4.5500	
U1G01501	1.0000	1.0000	
H Beryllium		0.2100	J
L Chlorobenzene		5.0000	J
U1G01701	1.0000	2.0000	
L 1,4-Dichlorobenzene		1.0000	J
H Copper		5.6000	J
H Mercury		0.0600	B
U1G01701D	1.0000	2.0000	
L 1,4-Dichlorobenzene		1.0000	J
H Acetone		15.0000	U
H Mercury		0.0600	B
U1G01901	1.0000	0.0000	
L bis(2-Ethylhexyl)phthalate		2.0000	J
U1G02001	1.0000	0.0000	
L bis(2-Ethylhexyl)phthalate		5.0000	J
U1G02201	0.0000	1.0000	
H Calcium		35000.0000	
H Selenium		1.6000	UJ
U1G02401	0.0000	1.0000	
H Lead		3.1000	
U1G02501	1.0000	2.0000	
L 4,4'-DDT		0.0550	J
H Lead		1.5000	B
H Mercury		0.0700	U
U1G02601	0.0000	7.0000	
H Arsenic		5.0000	U
H Barium		105.0000	B
H Beryllium		1.8000	B
H Lead		3.2000	U
H Manganese		44.4000	
H Total Suspended Solids		900.0000	
H Zinc		23.9000	
U1G02701	1.0000	9.0000	
H Acetone		18.0000	
H Aluminum		8700.0000	
H Barium		145.0000	B
H Beryllium		2.6000	B
H Calcium		47800.0000	
L Carbon disulfide		4.0000	J
H Chromium		12.8000	
H Mercury		0.0800	U
H Potassium		28100.0000	
H Vanadium		19.5000	B
U1G02701D	1.0000	11.0000	
H Acetone		46.0000	
H Aluminum		8250.0000	
H Barium		138.0000	B
H Beryllium		2.6000	B
H Calcium		43700.0000	
L Carbon disulfide		7.0000	J
H Chromium		13.0000	U
H Gross Beta		87.6000	
H Mercury		0.0800	U
H Potassium		25700.0000	

H Selenium		1.6000	UJ
H Vanadium		19.5000	B
U1G02801	0.0000	19.0000	
H Aluminum		101000.0000	
H Antimony		50.0000	U
H Barium		870.0000	
H Beryllium		4.0000	U
H Cadmium		5.0000	U
H Chromium		121.0000	
H Cobalt		10.0000	U
H Copper		29.6000	
H Iron		8030.0000	
H Lead		91.8000	D
H Manganese		93.3000	
H Mercury		0.6000	
H Nickel		15.0000	U
H Selenium		19.0000	D
H Silver		5.0000	U
H Sodium		34100.0000	
H Thallium		2.0000	U
H Vanadium		81.1000	
H Zinc		28.3000	
U1G02901	1.0000	17.0000	
H Aluminum		21100.0000	
H Antimony		50.0000	U
H Barium		240.0000	
H Beryllium		4.0000	U
H Cadmium		5.0000	U
H Chromium		44.3000	
H Cobalt		10.0000	U
H Iron		5850.0000	
H Lead		6.0000	
H Mercury		0.1000	U
H Nickel		15.0000	U
H Potassium		8320.0000	
H Selenium		2.5000	U
H Silver		5.0000	U
H Thallium		2.0000	U
L Thorium-228		0.2300	
H Vanadium		31.0000	
H Zinc		23.5000	

Outside values parameters counts
parameter, low values, high values:

1,4-Dichlorobenzene	5.0000	0.0000
2,4-D	0.0000	1.0000
4,4'-DDT	1.0000	0.0000
Acetone	1.0000	4.0000
Aluminum	0.0000	6.0000
Antimony	0.0000	2.0000
Arsenic	0.0000	3.0000
Barium	0.0000	7.0000
Beryllium	0.0000	7.0000
Cadmium	0.0000	3.0000
Calcium	0.0000	5.0000
Carbon disulfide	2.0000	0.0000
Chlorobenzene	3.0000	0.0000
Chromium	0.0000	6.0000
Cobalt	0.0000	2.0000
Copper	0.0000	3.0000
Dimethylphthalate	1.0000	0.0000
Gross Alpha	0.0000	1.0000
Gross Beta	0.0000	4.0000
Iron	0.0000	3.0000
Lead	0.0000	7.0000
Magnesium	0.0000	1.0000
Manganese	0.0000	3.0000

Mercury	0.0000	7.0000	
Nickel	0.0000	2.0000	
Naphthalene	1.0000	0.0000	
Phenol	1.0000	0.0000	
Potassium	0.0000	3.0000	
Selenium	0.0000	5.0000	
Silver	0.0000	2.0000	
Sodium	0.0000	2.0000	
Thallium	0.0000	2.0000	
Thorium-228	1.0000	1.0000	
Total Suspended Solids	0.0000	2.0000	
Vanadium	0.0000	6.0000	
Zinc	0.0000	4.0000	
bis(2-Ethylhexyl)phthalate	5.0000	1.0000	OUTSIDE VALUES TEST FOR UNFILTERED DPT

GROUND WATER: DPT Samples

Points used:
U1P01003
U1P01903
U1P03203
U1P03603
U1P03604
U1P03903
U1P03904
U1P05205D
U1P05901
U1P05902

Outside values locations counts
location, low values, high values:

U1P01003	1.0000	0.0000
U1P03903	0.0000	1.0000
U1P05205D	0.0000	1.0000

ACETONE

Outside values relative to own group for group: 1

```
lowcut =          4.0000
lq     =         10.0000 U
median =         10.0000 U
uq     =         14.0000
hicut  =         20.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        70.0000 U1P03903
 D     280.0000 U1P05205D
```

CARBON DISULFIDE

Outside values relative to own group for group: 1

```
lowcut =        -83.5000
lq     =          5.0000 U
median =          6.5000 U
uq     =         64.0000
hicut  =        152.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

CHLOROBENZENE

Outside values relative to own group for group: 1

```
lowcut =          -2.5000
lq     =           5.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          17.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

CHLOROMETHANE

Outside values relative to own group for group: 1

```
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values:
 J       6.0000 U1P01003
 Upper outside values:
<< NONE FOUND>>
```

METHYLENE CHLORIDE

Outside values relative to own group for group: 1

```
lowcut =          -2.5000
lq     =           5.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          17.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

Outside values - location details:

U1P01003	1.0000	0.0000	
L Chloromethane		6.0000 J	
U1P03903	0.0000	1.0000	
H Acetone		70.0000	
U1P05205D	0.0000	1.0000	
H Acetone		280.0000 D	

Outside values parameters counts
parameter, low values, high values:

Acetone	0.0000	2.0000
Chloromethane	1.0000	0.0000

OUTSIDE VALUES TEST FOR FILTERED GROUNDWATER

Points used:
U1H00101
U1H00201
U1H00301
U1H00303
U1H00401
U1H00501
U1H00601
U1H00701
U1H00801
U1H00901
U1H01001
U1H01001D
U1H01101
U1H01201
U1H01301
U1H01401
U1H01403
U1H01501
U1H01601
U1H01701
U1H01701D
U1H01801
U1H01901
U1H02001
U1H02101
U1H02201
U1H02301
U1H02401
U1H02501
U1H02601
U1H02603
U1H02701
U1H02701D
U1H02703
U1H02801
U1H02901

Outside values locations counts
location, low values, high values:

U1H00101	0.0000	1.0000
U1H00201	0.0000	1.0000
U1H00301	0.0000	12.0000
U1H00601	0.0000	2.0000
U1H00701	0.0000	3.0000
U1H00801	0.0000	1.0000
U1H00901	0.0000	1.0000
U1H01001D	0.0000	1.0000
U1H01301	0.0000	2.0000
U1H01401	0.0000	1.0000
U1H01403	0.0000	1.0000
U1H01501	0.0000	1.0000
U1H01701	0.0000	1.0000
U1H01701D	0.0000	3.0000
U1H02201	0.0000	1.0000
U1H02301	0.0000	1.0000
U1H02401	0.0000	1.0000
U1H02501	0.0000	4.0000
U1H02601	0.0000	10.0000
U1H02701	0.0000	8.0000
U1H02701D	0.0000	7.0000
U1H02801	0.0000	13.0000
U1H02901	0.0000	13.0000

```
-----------------------------------------------------------------
 ALUMINUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =        -1398.7500
lq     =          157.5000
median =          435.5000
uq     =         1195.0000
hicut  =         2751.2500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      4410.0000 U1H02701
      4890.0000 U1H02701D
      6220.0000 U1H02601
     11500.0000 U1H00301


-----------------------------------------------------------------
 ANTIMONY
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           24.3000
lq     =           24.3000 U
median =           24.3000 U
uq     =           24.3000 U
hicut  =           24.3000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       50.0000 U1H02801
 U       50.0000 U1H02901


-----------------------------------------------------------------
 ARSENIC
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           -0.5250
lq     =            1.5000 U
median =            1.5000 U
uq     =            2.8500 U
hicut  =            4.8750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U        5.7000 U1H02601
         14.5000 U1H00601
 U       14.8000 U1H00301
```

```
-----------------------------------------------------------------
 BARIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -24.6500
lq     =            9.4000
median =           22.5500
uq     =           32.1000
hicut  =           66.1500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B      101.0000 U1H02701
 B      106.0000 U1H02701D
        107.0000 U1H02901
 B      153.0000 U1H02601
        353.0000 U1H00301


-----------------------------------------------------------------
 BERYLLIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            0.2000
lq     =            0.2000 U
median =            0.2000 U
uq     =            0.2000 U
hicut  =            0.2000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B        1.1000 U1H02701
 B        1.1000 U1H02701D
 B        2.0000 U1H02601
 U        4.0000 U1H02801
 U        4.0000 U1H02901
 B        5.0000 U1H00301


-----------------------------------------------------------------
 CADMIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            2.4000
lq     =            2.4000 U
median =            2.4000 U
uq     =            2.4000 U
hicut  =            2.4000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U        5.0000 U1H02801
 U        5.0000 U1H02901
```

```
-----------------------------------------------------------------
 CALCIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =      -12412.5000
lq     =        4065.0000
median =        7570.0000
uq     =       15050.0000
hicut  =       31527.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
     36400.0000 U1H00101
     94700.0000 U1H00301


-----------------------------------------------------------------
 CESIUM-137 in  PCi/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -2.4930
lq     =          -1.2450
median =          -1.1450
uq     =          -0.4130
hicut  =           0.8350
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 CHROMIUM
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           0.6500
lq     =           2.0000 U
median =           2.0000 U
uq     =           2.9000
hicut  =           4.2500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       5.0000 U1H02501
 U       7.9000 U1H02601
 U       8.7000 U1H02701
 U       9.0000 U1H02701D
 U      10.0000 U1H02801
 U      10.0000 U1H02901
        19.4000 U1H00301


-----------------------------------------------------------------
 COBALT
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           3.0000
lq     =           3.0000 U
median =           3.0000 U
```

```
uq     =          3.0000 U
hicut  =          3.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       3.1000 U1H02401
 B       3.9000 U1H02501
 U      10.0000 U1H02801
 U      10.0000 U1H02901


-----------------------------------------------------------------
 COPPER
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          0.4250
lq     =          1.4000 U
median =          1.6000 U
uq     =          2.0500
hicut  =          3.0250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 U       5.0000 U1H02801
 U       5.0000 U1H02901
 J       6.4000 U1H01301


-----------------------------------------------------------------
 GROSS ALPHA in  PCi/L
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =        -35.8750
lq     =          4.4900
median =         25.1000
uq     =         31.4000
hicut  =         71.7650
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 GROSS BETA in  PCi/L
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =        -10.1500
lq     =         10.7000
median =         20.2500
uq     =         24.6000
hicut  =         45.4500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
       86.8000 U1H01403


-----------------------------------------------------------------
 IRON
```

```
-----------------------------

Outside values relative to own group for group: 1
-----------------------------------------------------
lowcut =        -940.0000
lq     =          33.8000
median =         258.0000
uq     =         683.0000
hicut  =        1656.8000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      1760.0000 U1H02301
      1870.0000 U1H01701
      1890.0000 U1H01701D
      2750.0000 U1H00301
      2820.0000 U1H02601


-----------------------------------------------------------------
 LEAD
-----------------------------

Outside values relative to own group for group: 1
-----------------------------------------------------
lowcut =           1.3000
lq     =           1.3000 U
median =           1.3000 U
uq     =           1.3000 U
hicut  =           1.3000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       1.8000 U1H00601
         2.0000 U1H02901
 B       2.2000 U1H00301
         5.1000 U1H02801
         6.1000 U1H02601


-----------------------------------------------------------------
 MAGNESIUM
-----------------------------

Outside values relative to own group for group: 1
-----------------------------------------------------
lowcut =       -1076.2500
lq     =         736.5000
median =        1315.0000
uq     =        1945.0000
hicut  =        3757.7500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B    3970.0000 U1H00901
 B    4050.0000 U1H00701
```

```
-----------------------------------------------------------------
 MANGANESE
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -11.0250
lq     =            1.8000
median =            4.8000
uq     =           10.3500
hicut  =           23.1750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        24.0000 U1H01501
        47.4000 U1H02601
        82.0000 U1H00301


-----------------------------------------------------------------
 MERCURY
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =            0.0400
lq     =            0.0400 U
median =            0.0400 U
uq     =            0.0400 U
hicut  =            0.0400
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       0.0500 U1H02701
 B       0.0500 U1H02701D
 B       0.0600 U1H00201
 U       0.0800 U1H02501
 U       0.1000 U1H02801
 U       0.1000 U1H02901
 U       0.1100 U1H00301


-----------------------------------------------------------------
 NICKEL
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =           11.2000
lq     =           11.2000 U
median =           11.2000 U
uq     =           11.2000 U
hicut  =           11.2000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B      11.4000 U1H02501
 U      12.7000 U1H01701D
 U      15.0000 U1H02801
 U      15.0000 U1H02901
```

POTASSIUM

Outside values relative to own group for group: 1

```
lowcut =       -1120.0000
lq     =        1145.0000
median =        2085.0000
uq     =        2655.0000
hicut  =        4920.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
      6830.0000 U1H02901
     17900.0000 U1H02701D
     18200.0000 U1H02701
```

POTASSIUM-40 in PCi/L

Outside values relative to own group for group: 1

```
lowcut =        -167.6750
lq     =         -31.7000
median =          49.1500
uq     =          58.9500
hicut  =         194.9250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

RADIUM-226 in PCi/L

Outside values relative to own group for group: 1

```
lowcut =          -1.8000
lq     =           1.9050
median =           3.9750
uq     =           4.3750
hicut  =           8.0800
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

RADIUM-228 in PCi/L

Outside values relative to own group for group: 1

```
lowcut =          -1.1925
lq     =           0.5100
median =           1.1400
uq     =           1.6450
hicut  =           3.3475
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

SELENIUM

Outside values relative to own group for group: 1

```
lowcut =          -2.0250
lq     =           0.6000 U
median =           0.6000 U
uq     =           2.3500
hicut  =           4.9750
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

SILVER

Outside values relative to own group for group: 1

```
lowcut =           2.4000
lq     =           2.4000 U
median =           2.4000 U
uq     =           2.4000 U
hicut  =           2.4000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       2.7000 U1H01701D
 B       2.8000 U1H01301
 B       2.8000 U1H00701
 U       5.0000 U1H02801
 U       5.0000 U1H02901
```

SODIUM

Outside values relative to own group for group: 1

```
lowcut =       -6025.0000
lq     =        5540.0000
median =        9775.0000
uq     =       13250.0000
hicut  =       24815.0000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
     28200.0000 U1H02801
     38200.0000 U1H00301
```

THALLIUM

Outside values relative to own group for group: 1

```
lowcut =           1.8250
lq     =           1.9000 U
median =           1.9000 U
uq     =           1.9500 U
hicut  =           2.0250
 Lower outside values:
<< NONE FOUND>>
```

```
 Upper outside values:
 J        2.1000 U1H02701
 B        2.6000 U1H01001D
 J        3.0000 U1H02701D
 B        3.5000 U1H00701
 B        4.6000 U1H00801
 UJ      18.7000 U1H02201


-----------------------------------------------------------------
 THORIUM-227 in  PCi/L
-----------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -0.3323
lq     =           0.0435
median =           0.0675
uq     =           0.2940
hicut  =           0.6698
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 THORIUM-228 in  PCi/L
------------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -1.6000
lq     =           1.1600
median =           1.1800
uq     =           3.0000
hicut  =           5.7600
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 THORIUM-230 in  PCi/L
------------------------------


Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          -0.0675
lq     =           2.3850
median =           2.9800
uq     =           4.0200
hicut  =           6.4725
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>
```

```
-----------------------------------------------------------------
 THORIUM-232 in  PCi/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =          0.0155
lq     =          0.1730
median =          0.2650
uq     =          0.2780
hicut  =          0.4355
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 URANIUM-234 in  PCi/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -5.2700
lq     =          3.0700
median =          6.4900
uq     =          8.6300
hicut  =         16.9700
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 URANIUM-238 in  PCi/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -5.6550
lq     =          2.8350
median =          6.2150
uq     =          8.4950
hicut  =         16.9850
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
<< NONE FOUND>>


-----------------------------------------------------------------
 VANADIUM in  UG/L
-----------------------------

Outside values relative to own group for group: 1
-------------------------------------------------------
lowcut =         -1.3750
lq     =          2.9000 U
median =          2.9000 U
uq     =          5.7500
hicut  =         10.0250
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
 B       11.2000 U1H02601
 B       11.6000 U1H01401
         16.8000 U1H02801
 B       19.5000 U1H02701
         50.2000 U1H00301

-----------------------------------------------------------------
```

ZINC

Outside values relative to own group for group: 1

```
lowcut =          -5.0000
lq     =           2.0500
median =           3.2000 U
uq     =           6.7500
hicut  =          13.8000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        30.2000 U1H02601
        52.4000 U1H02801
        54.7000 U1H02901
```

Outside values - location details:

U1H00101	0.0000	1.0000	
H Calcium		36400.0000	
U1H00201	0.0000	1.0000	
H Mercury		0.0600	B
U1H00301	0.0000	12.0000	
H Aluminum		11500.0000	
H Arsenic		14.8000	U
H Barium		353.0000	
H Beryllium		5.0000	B
H Calcium		94700.0000	
H Chromium		19.4000	
H Iron		2750.0000	
H Lead		2.2000	B
H Manganese		82.0000	
H Mercury		0.1100	U
H Sodium		38200.0000	
H Vanadium		50.2000	
U1H00601	0.0000	2.0000	
H Arsenic		14.5000	
H Lead		1.8000	B
U1H00701	0.0000	3.0000	
H Magnesium		4050.0000	B
H Silver		2.8000	B
H Thallium		3.5000	B
U1H00801	0.0000	1.0000	
H Thallium		4.6000	B
U1H00901	0.0000	1.0000	
H Magnesium		3970.0000	B
U1H01001D	0.0000	1.0000	
H Thallium		2.6000	B
U1H01301	0.0000	2.0000	
H Copper		6.4000	J
H Silver		2.8000	B
U1H01401	0.0000	1.0000	
H Vanadium		11.6000	B
U1H01403	0.0000	1.0000	
H Gross Beta		86.8000	
U1H01501	0.0000	1.0000	
H Manganese		24.0000	
U1H01701	0.0000	1.0000	
H Iron		1870.0000	
U1H01701D	0.0000	3.0000	
H Iron		1890.0000	
H Nickel		12.7000	U
H Silver		2.7000	B
U1H02201	0.0000	1.0000	
H Thallium		18.7000	UJ
U1H02301	0.0000	1.0000	
H Iron		1760.0000	
U1H02401	0.0000	1.0000	
H Cobalt		3.1000	B
U1H02501	0.0000	4.0000	

H Chromium		5.0000	U
H Cobalt		3.9000	B
H Mercury		0.0800	U
H Nickel		11.4000	B
U1H02601	0.0000	10.0000	
H Aluminum		6220.0000	
H Arsenic		5.7000	U
H Barium		153.0000	B
H Beryllium		2.0000	B
H Chromium		7.9000	U
H Iron		2820.0000	
H Lead		6.1000	
H Manganese		47.4000	
H Vanadium		11.2000	B
H Zinc		30.2000	
U1H02701	0.0000	8.0000	
H Aluminum		4410.0000	
H Barium		101.0000	B
H Beryllium		1.1000	B
H Chromium		8.7000	U
H Mercury		0.0500	B
H Potassium		18200.0000	
H Thallium		2.1000	J
H Vanadium		19.5000	B
U1H02701D	0.0000	7.0000	
H Aluminum		4890.0000	
H Barium		106.0000	B
H Beryllium		1.1000	B
H Chromium		9.0000	U
H Mercury		0.0500	B
H Potassium		17900.0000	
H Thallium		3.0000	J
U1H02801	0.0000	13.0000	
H Antimony		50.0000	U
H Beryllium		4.0000	U
H Cadmium		5.0000	U
H Chromium		10.0000	U
H Cobalt		10.0000	U
H Copper		5.0000	U
H Lead		5.1000	
H Mercury		0.1000	U
H Nickel		15.0000	U
H Silver		5.0000	U
H Sodium		28200.0000	
H Vanadium		16.8000	
H Zinc		52.4000	
U1H02901	0.0000	13.0000	
H Antimony		50.0000	U
H Barium		107.0000	
H Beryllium		4.0000	U
H Cadmium		5.0000	U
H Chromium		10.0000	U
H Cobalt		10.0000	U
H Copper		5.0000	U
H Lead		2.0000	
H Mercury		0.1000	U
H Nickel		15.0000	U
H Potassium		6830.0000	
H Silver		5.0000	U
H Zinc		54.7000	

Outside values parameters counts
parameter, low values, high values:

Aluminum	0.0000	4.0000
Antimony	0.0000	2.0000
Arsenic	0.0000	3.0000
Barium	0.0000	5.0000
Beryllium	0.0000	6.0000
Cadmium	0.0000	2.0000
Calcium	0.0000	2.0000
Chromium	0.0000	7.0000
Cobalt	0.0000	4.0000
Copper	0.0000	3.0000
Gross Beta	0.0000	1.0000
Iron	0.0000	5.0000
Lead	0.0000	5.0000
Magnesium	0.0000	2.0000
Manganese	0.0000	3.0000
Mercury	0.0000	7.0000
Nickel	0.0000	4.0000
Potassium	0.0000	3.0000
Silver	0.0000	5.0000
Sodium	0.0000	2.0000
Thallium	0.0000	6.0000
Vanadium	0.0000	5.0000
Zinc	0.0000	3.0000

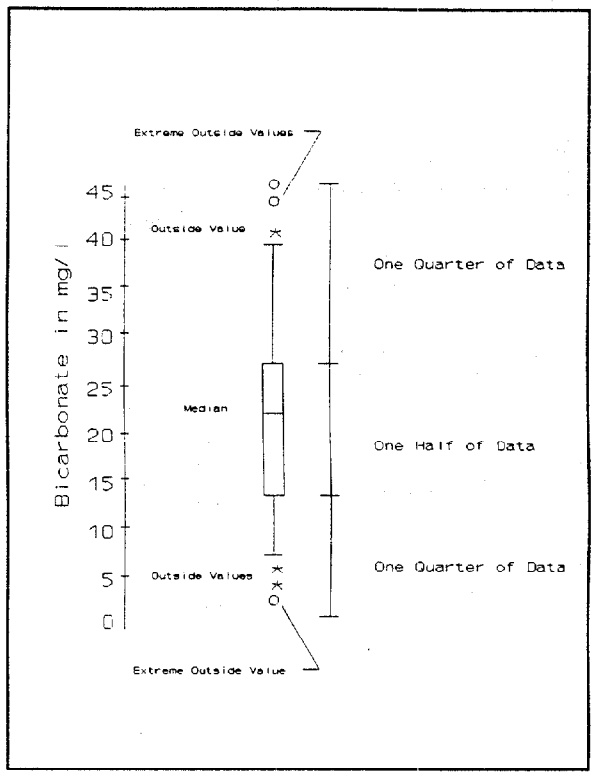
In addition to the Mann-Whitney U-test, Box and Whisker plots were also constructed to better depict the relationships of various parameters between the background and the field samples for each parameter for each media. For the purpose of these plots, all values below detection limits (BDLs) are taken to be equal to this detection limit.

Box and whisker plots are a simple, graphical summary of a parameter's values for a batch of data. They were first described by J.W. Tukey in his 1977 book Exploratory Data Analysis (Reading, Mass.:Addison-Wesley).

In the following figures, each figure represents a parameter for a single medium. There are two box and whisker plots per figure, one for background values and another for actual site samples.

To make a Box and Whisker plot, a set of data is sorted in ascending order. A few key values are determined from the sorted data set. Then these key values are plotted on a graph to form a figure called a Box and Whisker plot.

A box and whisker plot consists of a central box, two "whiskers", one on each side of the box, and possibly some circles and/or stars beyond the ends of the whiskers (see figure on right).



Standard Box and Whisker Plot

The box is a graphical representation of the middle half of the values within a set of data. One quarter of the data falls above the upper edge of the box (the upper hinge) while one quarter of the data falls below the lower edge (the lower hinge). A horizontal line within the box represents the "middle" data value (called the median). Exactly one half of data falls above this line and one half falls below it.

To understand the whiskers above and below the box, an understanding of some key terminology is required. Almost all data sets consist of a number of different values -- not all have exactly the same value. This difference of values is the inherent variability or "spread" of the data set. This spread is unique for each data set. A good description of this spread is the difference in values of the upper and lower hinges (as described above). This difference is determined by subtracting the value for which exactly 25 percent of the data set is less from the value for which exactly 25 percent is greater. This value is called the "hinge spread".
For most data sets, almost all values for the set will be less than the upper hinge value plus 1.5 times the hinge spread and greater than the lower hinge value minus 1.5 times the hinge spread. These are called the inner fences because they contain all of the well-behaved data points for a data set. The whiskers extending above and below the box mark all the points that fall outside the box but between the inner fences.

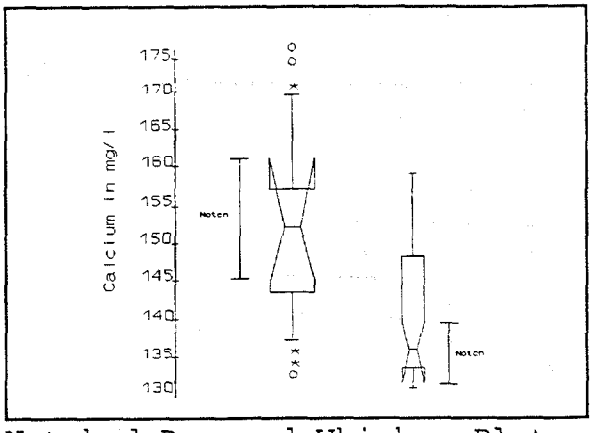
For many reasons, data points may fall outside inner fences. These points are not necessarily "bad" points and may actually belong to the data set. However, they are

suspicious.

Points that fall outside the inner fences are further classified by the calculation of "outer fences". Outer fences are defined much as inner fences, except they are moved out to THREE times the hinge spread above and below the hinges. Points that fall outside the outer fences are prime suspects and deserve close scrutiny.

In a box and whisker plot, points that fall outside the outer fences are designated individually with small circles, while points that fall between the inner and outer fence are marked with stars.

There is a modified box and whisker plot that conveys even more information, especially when comparisons of data sets are undertaken (see fig ??). These are "notched" box plots. Notched box plots were first described by McGill, Tukey, and Larsen (1978) in "Variations of box plots", The American Statistician, 32, 12-16.



Notched Box and Whisker Plot

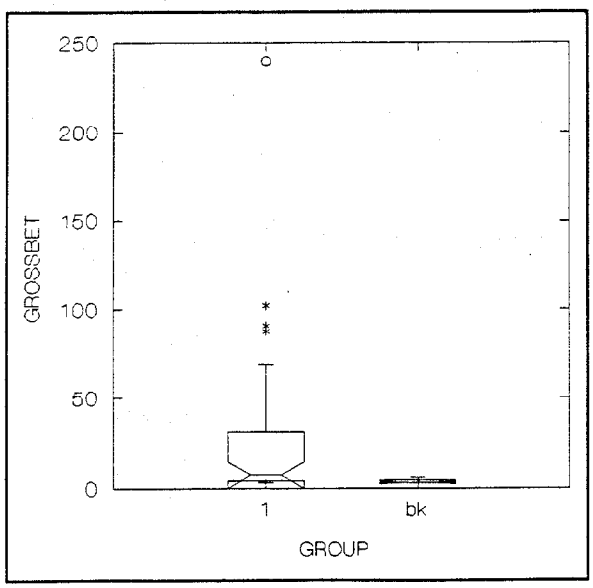
The "notched area" represents the interval within which the median can be placed with a 95 percent confidence. This means if the data set was repeatedly re-collected, 95 percent of the time the median of each new data set would fall within the notched area. (Notice that the confidence interval may extend past the hinge points, thereby giving a somewhat bizarre looking, but informative, figure.)

These notched box plots can be used to compare whether two or more data sets are different. This comparison is based on the assumption that two groups of data are not different if their medians are close enough together. The notched box plot graphically described what is "close enough" -- it is the same "notched area" just described. By putting two (or more) notched box plots in the same picture, they can be compared.

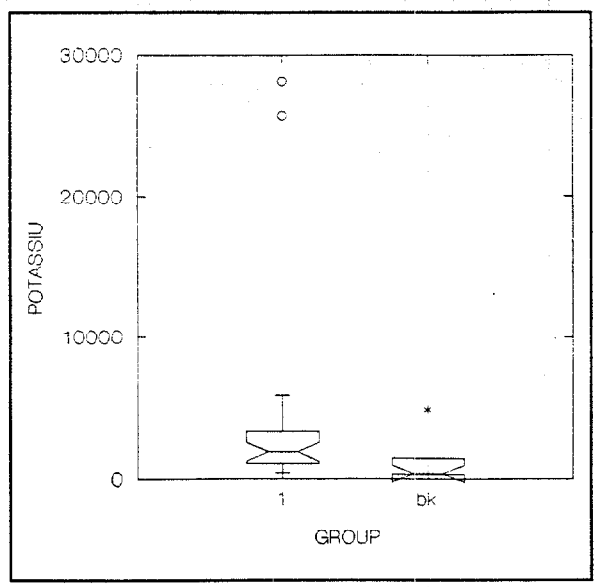
If two plots have NO overlap in their "notched areas" (as in this figure), then there is 95 percent confidence that they have different medians and actually represent different groups of data. However, if two figures have ANY overlap in their notched boxes, there is 95 percent confidence that they are NOT different groups of data.

Results of the Mann-Whitney U tests (illustrated by notched box and whisker plots, where appropriate) follow.

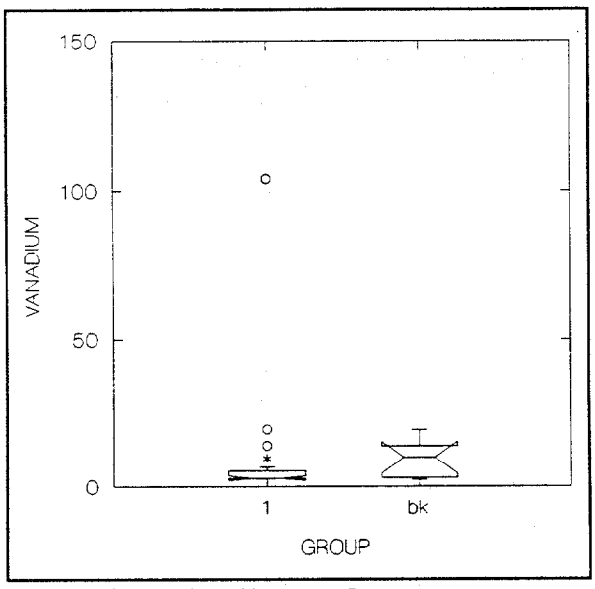
Selected Box and Whisker Plots



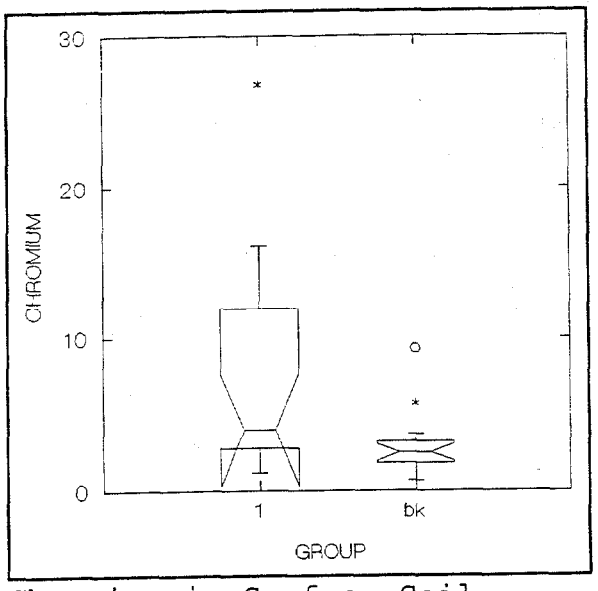
Gross Beta in Groundwater



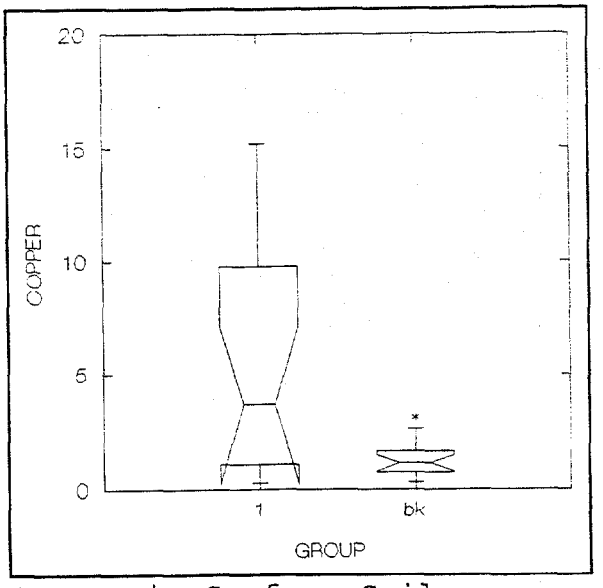
Potassium in Groundwater



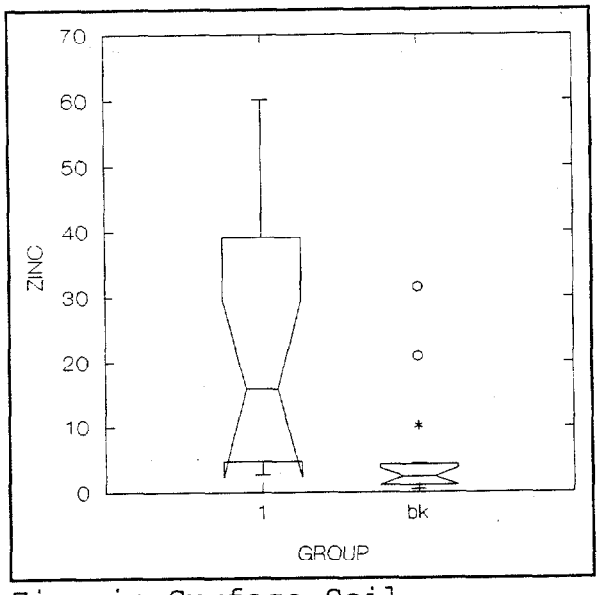
Vanadium in Groundwater



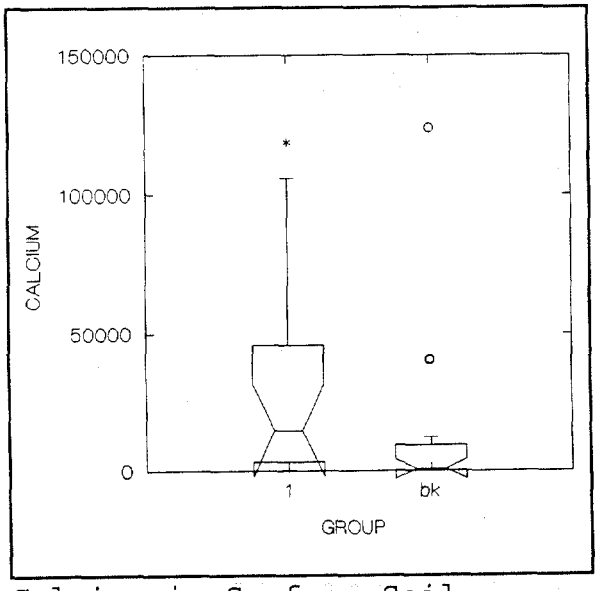
Chromium in Surface Soil



Copper in Surface Soil



Zinc in Surface Soil



Calcium in Surface Soil

Statistical Evaluation of OU 1 Versus St. Johns' Water Management District Gross Alpha and Gross Beta Levels in Shallow Aquifer

The following gross alpha and gross beta data were obtained from FDEP's statewide background groundwater quality database, courtesy of Cindy Cosper in the Tallahassee, Florida office. The data represent groundwater samples collected by FDEP in 1986 and 1987 from 73 background monitoring wells installed in the surficial aquifer within the St. Johns River Water Management District (SJRWMD). The number of monitoring wells located in each county are listed below.

Alachua	2	Okeechobee	2
Baker	1	Orange	6
Brevard	3	Osceola	5
Clay	2	Polk	3
Duval	5	Putnam	4
Flagler	8	St. Johns	5
Indian River	7	St. Lucie	3
Lake	2	Seminole	5
Marion	1	Volusia	8
Nassua	1		

GROSS ALPHA AND GROSS BETA DATA SET
St. Johns River Water Management District

WELL_ID	WELL DEPTH (ft bls)	GROSS ALPHA		GROSS BETA	
SL-0123	14	6.40		18.00	
PG-0010	30	13.00		8.10	
PG-0005	30	4.30		4.00	
MR-0189	6	23.00		19.00	
OK-0055	22	2.00	U	3.00	U
IR-0279	53	2.00	U	3.00	U
IR-0277	55	2.00	U	10.00	
IR0350	19	2.00	U	3.00	U
IR0283	53	21.00		62.00	
IR0285	41	9.00		8.00	
IR0275	49	2.00	U	3.00	U
MR-0028	8	21.00		13.00	
IR0290	35	2.00	U	3.00	U
BR0644	30	7.00		23.00	
OS-0003	28	3.20		4.30	
LMS	26	4.60	U	4.60	U
OS-0179	18	2.00	U	3.00	U
PO-0002	15	50.00		492.00	
OSWQ-01	78	1.20		0.00	U
OS0171	19	2.00	U	3.00	U
MR-0162	8	8.70		4.70	
BR0643	45	2.00	U	3.00	U
OR-0010	29	18.00		11.00	
L-0050	35	2.00	U	3.00	U
OR-0003	18	6.00		12.00	
OR-0016	10	2.00	U	3.00	U
OR0248	8	2.00	U	3.00	U
MASCOTTE	30	2.00	U	3.00	U
OR0264	15	2.00	U	3.00	U
BR0584	40	4.00		13.00	
OR0107	40	2.00	U	3.00	U
S-0002	50	2.00	U	3.00	U
S-0045	37	2.00	U	3.00	U
S-0035	35	2.00	U	20.00	
S-0032	50	2.00	U	3.00	U
S-0027	55	2.00	U	7.00	
V-0166	35	2.00	U	3.00	U
V-0167	40	99.00		61.00	
V-0197	30	39.00		20.00	

WELL_ID	WELL DEPTH (ft bls)	GROSS ALPHA		GROSS BETA	
V-0109	21	21.00		31.00	
V-0087	20	8.00		11.00	
M-0045	10	9.00		13.00	
V-0063	25	73.00		105.00	
V-0088	20	39.00		28.00	
F-0252	21	5.00		3.00	U
F-0175	17	9.00		3.00	U
F-0177	43	7.00		3.00	U
P-0470	55	2.00	U	3.00	U
P-0473	45	28.00		43.00	
F-0226	24	2.00	U	6.00	
F-0205	24	23.00		10.00	
F-0248	30	2.00	U	3.00	U
P-0475	85	15.00		11.00	
P-0511	62	4.00		3.00	U
F-0227	11	5.00		3.00	U
F-0234	14	24.00		10.00	
SJ0499	44	2.00	U	3.00	U
R20T09SEC270102	31	2.00	U	8.00	
SJ0517	45	4.00		3.00	U
C-0125	40	2.00	U	3.00	U
R19T07SEC23102	40	2.00	U	8.00	
V-0199	86	2.00	U	3.00	U
SJ0028	60	2.00	U	8.00	
C-0126	40	21.00		11.00	
SJ0503	58	2.00	U	3.00	U
SJ0032	60	2.00	U	3.00	U
D4578	46	2.00	U	3.00	U
31923003	45	7.00		12.00	
D-4566	55	2.00	U	7.00	
D-0009	34	3.00		3.00	U
D-0012	44	2.00	U	11.00	
D-0011	24	6.00		8.00	
N-0018	33	10.00		20.00	

Notes:
U = Gross alpha and gross beta not detected.

NTC ORLANDO OU1 UNFILTERED GW vs SJRWMD DISTRICT-WIDE BACKGROUND

Points used:

ou	location	ou	location	ou	location
1	U1G00101	bk	OR0248	bk	C-0125
1	U1G00201	bk	OR0264	bk	C-0126
1	U1G00303	bk	OS-0003	bk	D-0009
1	U1G00401	bk	OS-0179	bk	D-0011
1	U1G00501	bk	OS0171	bk	D-0012
1	U1G00601	bk	OSWQ-01	bk	D-4566
1	U1G00701	bk	P-0470	bk	D4578
1	U1G00801	bk	P-0473	bk	F-0175
1	U1G00901	bk	P-0475	bk	F-0177
1	U1G01001	bk	P-0511	bk	F-0205
1	U1G01001D	bk	PG-0005	bk	F-0226
1	U1G01101	bk	PG-0010	bk	F-0227
1	U1G01201	bk	PO-0002	bk	F-0234
1	U1G01301	bk	R19T07SEC23102	bk	F-0248
1	U1G01401	bk	R20T09SEC270102	bk	F-0252
1	U1G01403	bk	S-0002	bk	IR-0277
1	U1G01501	bk	S-0027	bk	IR-0279
1	U1G01601	bk	S-0032	bk	IR0275
1	U1G01701	bk	S-0035	bk	IR0283
1	U1G01701D	bk	S-0045	bk	IR0285
1	U1G01801	bk	SJ0028	bk	IR0290
1	U1G01901	bk	SJ0032	bk	IR0350
1	U1G02001	bk	SJ0499	bk	L-0050
1	U1G02101	bk	SJ0503	bk	LMS
1	U1G02201	bk	SJ0517	bk	M-0045
1	U1G02301	bk	SL-0123	bk	MASCOTTE
1	U1G02401	bk	V-0063	bk	MR-0028
1	U1G02501	bk	V-0087	bk	MR-0162
1	U1G02601	bk	V-0088	bk	MR-0189
1	U1G02603	bk	V-0109	bk	N-0018
1	U1G02701	bk	V-0166	bk	OK-0055
1	U1G02701D	bk	V-0167	bk	OR-0003
1	U1G02703	bk	V-0197	bk	OR-0010
		bk	V-0199	bk	OR-0016
		bk	31923003	bk	OR0107
		bk	BR0584		
		bk	BR0643		
		bk	BR0644		

```
-----------------------------------------------------------------
 GROSS ALPHA
-----------------------------
1         ..**                  ******* *****   *  **    ******
bk         * ...................  ** ***.**************** *** *
 group1:  1
 min, median, max, bdl/tot :          1.0000 U          3.7000          53.0000      4 /   33
 group2:  bk
 min, median, max, bdl/tot :          1.2000            3.0000          99.0000     36 /   73
no evidence of different populations at alpha=.95
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -8.5000
lq     =           2.0000 U
median =           3.0000
uq     =           9.0000
hicut  =          19.5000
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        25.9000 U1G02601
        28.9000 U1G01401
        31.2000 U1G02603
        37.8000 U1G01403
        46.2000 U1G02701D
        47.6000 U1G02701
        50.4000 U1G00303
        53.0000 U1G02703


-----------------------------------------------------------------
 GROSS BETA
-----------------------------
bk        .................   *** *  * ****************** ** **
1          .                ***** **** **  * **       *********
 group1:  1
 min, median, max, bdl/tot :          3.0000 U          7.2000         102.0000      1 /   33
 group2:  bk
 min, median, max, bdl/tot :          3.0000 U          4.6500 U       492.0000     34 /   72
>>> Different populations at alpha > 0.95
  Group 1 Higher
Outside values test group relative to background group
-----------------------------------------------------
lowcut =          -9.7500
lq     =           3.0000 U
median =           4.6500 U
uq     =          11.5000
hicut  =          24.2500
 Lower outside values:
<< NONE FOUND>>
 Upper outside values:
        25.8000 U1G00601
        28.6000 U1G02603
 J      31.1000 U1G02601
        44.9000 U1G01501
        57.0000 U1G02703
        58.5000 U1G00303
        69.0000 U1G02701
        87.6000 U1G02701D
        90.8000 U1G01401
       102.0000 U1G01403

 Parameters with different populations:
 GROSS BETA                        Group 1 Higher
```

Outside values - locations counts
location, low values, high values:

U1G00303	0.0000	2.0000
U1G00601	0.0000	1.0000
U1G01401	0.0000	2.0000
U1G01403	0.0000	2.0000
U1G01501	0.0000	1.0000
U1G02601	0.0000	2.0000
U1G02603	0.0000	2.0000
U1G02701	0.0000	2.0000
U1G02701D	0.0000	2.0000
U1G02703	0.0000	2.0000

Outside values - location details:

U1G00303	low:	0.0000	hi:	2.0000
H GROSS ALPHA			50.4000	
H GROSS BETA			58.5000	
U1G00601	low:	0.0000	hi:	1.0000
H GROSS BETA			25.8000	
U1G01401	low:	0.0000	hi:	2.0000
H GROSS ALPHA			28.9000	
H GROSS BETA			90.8000	
U1G01403	low:	0.0000	hi:	2.0000
H GROSS ALPHA			37.8000	
H GROSS BETA			102.0000	
U1G01501	low:	0.0000	hi:	1.0000
H GROSS BETA			44.9000	
U1G02601	low:	0.0000	hi:	2.0000
H GROSS ALPHA			25.9000	
H GROSS BETA			31.1000 J	
U1G02603	low:	0.0000	hi:	2.0000
H GROSS ALPHA			31.2000	
H GROSS BETA			28.6000	
U1G02701	low:	0.0000	hi:	2.0000
H GROSS ALPHA			47.6000	
H GROSS BETA			69.0000	
U1G02701D	low:	0.0000	hi:	2.0000
H GROSS ALPHA			46.2000	
H GROSS BETA			87.6000	
U1G02703	low:	0.0000	hi:	2.0000
H GROSS ALPHA			53.0000	
H GROSS BETA			57.0000	

Outside values - parameters counts
parameter, low values, high values:

GROSS ALPHA	0.0000	8.0000
GROSS BETA	0.0000	10.0000

APPENDIX I-6

RADIONUCLIDE ACTIVITY AND INORGANIC EVALUATION

Appendix I-6

Gross Radioactivity - Inorganic Comparisons

List of Tables and Figures

Tables

I-6-1 Summary of calculated correlation coefficients, Gross Radioactivity and Selected Inorganics

I-6-2 Analytical data for selected inorganics and gross radioactivity levels in groundwater.

I-6-3 Analytical data used in bar-line plots and correlation calculations.

Figures

I-6-1 Gross radioactivity versus aluminum concentrations in groundwater.

I-6-2 Gross radioactivity versus barium concentrations in groundwater.

I-6-3 Gross radioactivity versus beryllium concentrations in groundwater.

I-6-4 Gross radioactivity versus chromium concentrations in groundwater.

I-6-5 Gross radioactivity versus vanadium concentrations in groundwater.

I-6-6 Gross radioactivity versus turbidity in groundwater.

Appendix I-6

Gross Radioactivity - Inorganic Comparisons

In Chapter 4 (Nature and Extent of Contamination), the hypothesis was presented that it is likely the leachate from the landfill caused the dissolution of some of the mineral components in the Hawthorn sediments, leading to both an increase in gross radioactivity and the amount of metals in solution, which also increases turbidity. Exploratory data analysis using the bar-line plot combinations shown in the succeeding Figures I-6-1 to I-6-6 do appear to show that high gross radioactivity measurements are accompanied by high inorganic concentrations and high turbidity, particularly in the deep wells. The plots also show that gross beta is more variable than gross alpha, which is probably due to the affect of other sources contributing to gross beta than uranium-238 decay (e.g. potassium-40). Therefore, the plots are arranged in order of increasing gross alpha for each screened interval group.

A correlation study can determine whether two data sets move together, i.e., whether large values of one variable are associated with large values of another variable (e.g., gross alpha versus aluminum in groundwater). As discussed in most statistics books (e.g., Walpole, R.E. and R.H. Myers, Probability and Statistics for Engineers and Scientists, 2nd edition, Collier-MacMillan Publishers), the correlation coefficient is scaled independent of the unit of measure with values ranging from ±1 to 0. A value of +1 implies a perfect positive linear relationship between the two variables, a value of -1 implies a perfect negative relationship, while values near zero indicate little or no correlation. Table I-6-1 provides the results of these calculations, using a spreadsheet program. As shown, correlations between gross alpha and associated metals are strongly positive. However, when both variables are very high, the correlation becomes more skewed, lowering the coefficient. This may be attributable in part to higher measurement variability at higher concentrations. Factoring out the three highest outlier concentrations detected in samples from OLD-U1-03, -28, and -29 provided generally higher correlation coefficients (Table I-6-1). The correlation between gross alpha and turbidity is also strongly positive. Correlation coefficients between gross beta and selected metals and turbidity are also positive, but less so than with gross alpha.

Table I-6-1. Summary of Calculated Correlation Coefficients
Gross Radioactivity and Selected Parameters

Remedial Investigation Report, Operable Unit 1, North Grinder Landfill
Naval Training Center, Orlando
Orlando, Florida

Parameter	Gross Alpha		Gross Beta	
	n = 29	n = 26	n = 29	n = 26
Aluminum	0.66	0.83	0.30	0.62
Barium	0.78	0.75	0.40	0.51
Beryllium	0.82	0.85	0.55	0.53
Chromium	0.72	0.83	0.36	0.68
Vanadium	0.81	0.86	0.50	0.83
Turbidity	0.88	0.82	0.55	0.47

NOTE:
n = number of sample sets used
For the purpose of calculating correlation coefficients, nondetected analytes were taken at half the detection limits.
Calculations in the "n = 26" column were made by factoring out the 3 highest outlier concentrations for samples from OLD-U1-03, -28, and -29.
See also additional notes in Table I-6-2 and I-6-3.

Appendix I-6. Gross Radioactivity-Inorganic Comparisons

Table I-6-2. Analytical data for selected inorganics and gross radioactivity levels in groundwater

Identifier	Gross Alpha, pCi/L		Gross Beta, pCi/L		Aluminum, ug/L		Barium, ug/L		Vanadium, ug/L		Beryllium, ug/L		Chromium, ug/L		Turbidity, NTU	
U1G00101	2	J	4.8	J	180	B	5	B	5.2	B	0.2	U	2	U	15.4	
U1G00201	8.7	J	7.4	J	1760		25.9	B	2.9	U	0.2	U	2.6	U	100.7	
U1G00301*	257	J	240	J	35700		596		104		7.1		61.2		201	
U1G00303*	**50.4**		**58.5**		NA		NA		NA		NA		NA		11.35	
U1G00401	3.4		6.3		582		8.4	B	2.9	U	0.2	UJ	2	U	9.62	
U1G00501	3		3.7		545		36.4	B	2.9	U	0.2	UJ	2	U	58.6	
U1G00601	14.5		25.8		5030		149	B	9.6	B	0.32	J	10.3		1.79	
U1G00701	5.8		22.1		426		32.1	B	2.9	U	0.2	UJ	2	U	10.36	
U1G00801**	3.7		7.2		**425**		**36.4**	**B**	**3.3**	**B**	0.2	UJ	2	U	2.77	
U1G00901	1.7		5.5		257	J	29.8	B	2.9	U	0.2	UJ	2	U	0.58	
U1G01001	1.9		6.2		139	J	14.3	B	2.9	U	0.2	UJ	3.1	B	14.92	
U1G01001D	2.2		10.8		24.7	UJ	0.5	U	2.9	U	0.2	UJ	2	U	22.2	
U1G01101	4.7		4.3		1280		27.2	B	2.9	U	0.2	UJ	2	U	1.56	
U1G01201	4.4		10.5		1390		30.8	B	4.6	B	0.2	UJ	2.5	B	11.3	
U1G01301	1	U	3.9		181	J	29.4	B	2.9	U	0.2	UJ	2	U	13.72	
U1G01401	28.9		90.8		2110		28.4	B	13.9	B	0.2	UJ	4.7	B	2.38	
U1G01403	37.8		102		NA		NA		NA		NA		NA		9.78	
U1G01501	11.6		44.9		1010		32.4	B	5.4	B	0.21	J	3.1	B	24.8	
U1G01601	1	U	3.8		99.1	J	7.6	B	2.9	U	0.2	UJ	2	U	1.32	
U1G01701	3		9.1		1070		33.7	B	2.9	U	0.2	UJ	2	U	3.65	
U1G01701D	2.6		3.9		1110		33.6	B	2.9	U	0.2	UJ	2	U	3.64	
U1G01801	3.5		6.2		1030		19.7	B	2.9	U	0.2	UJ	2	U	8.98	
U1G01901	1	U	3	U	62.4	J	6.1	U	2.9	U	0.2	UJ	2	U	8.29	
U1G02001	2.6		4.2		450		8.3	B	2.9	U	0.2	UJ	2	U	28.5	
U1G02101	2.6		3.4		475		12.7	B	2.9	U	0.2	UJ	2	U	35.7	
U1G02201	1	U	3.4	J	78.5	B	3.6	B	5.5	B	0.2	U	2	U	144.9	
U1G02301	1.6	J	5.3	J	621		25.8	B	6.6	B	0.2	U	2	U	201	
U1G02401	6	J	6.8	J	1690		32.3	B	3.7	B	0.2	U	3.4	U	201	
U1G02501	4.1	J	7.4	J	1360		9.2	B	4.7	B	0.2	U	2.2	U	201	
U1G02601	25.9		31.1	J	1180		105	B	5.2	B	1.8	B	4	B	144.9	
U1G02603	31.2		28.6		NA		NA		NA		NA		NA		201	
U1G02701	47.6		69		8700		145	B	19.5	B	2.6	B	12.8		201	
U1G02701D	46.2		87.6		8250		138	B	19.5	B	2.6	B	13	U	201	
U1G02703	53		57		NA		NA		NA		NA		NA		201	
U1G02801	44.2		31.7		101000		870		81.1		4	U	121		201	
U1G02901	22.9		32.1		21100		240		31		4	U	44.3		201	

NOTES:

* Gross alpha/beta from resampling of Well OLD-U1-03C (U1G00303) resulted in significantly lower levels (about 5 times lower) compared with the initial sample results (U1G00301). These resampling results for OLD-U1-03C (bolded entries) were utilized in the gross radioactivity - inorganic comparisons.

**For unfiltered sample U1G00801, inorganic results appear to be anomalous (all non-detects) compared to the filtered sample (U1H00801). The detected filtered inorganic results for aluminum, barium and vanadium were therefore used as proxy concentrations in the comparisons (bolded entries).

Appendix I-6 (Cont). Gross Radioactivity - Inorganic Comparisons

Table I-6-3. Analytical data used in bar-line plots and correlation calculations.

Identifier	Gross Alpha, pCi/L	Gross Beta, pCi/L	Aluminum, ug/L	Barium, ug/L	Vanadium, ug/L	Beryllium, ug/L	Chromium, ug/L	Turbidity, NTU
U1G01301	0.5	3.9	181	29.4	1.45	0.1	1	1.56
U1G01601	0.5	3.8	99.1	7.6	1.45	0.1	1	2.38
U1G01901	0.5	1.5	62.4	3.05	1.45	0.1	1	1.32
U1G02201	0.5	3.4	78.5	3.6	5.5	0.1	2	8.98
U1G01001	1.9	6.2	139	14.3	1.45	0.1	3.1	0.58
U1G00101	2	4.8	180	5	5.2	0.1	1	15.4
U1G00401	3.4	6.3	582	8.4	1.45	0.1	1	11.35
U1G02501	4.1	7.4	1360	9.2	4.7	0.1	1	35.7
U1G00701	5.8	22.1	426	32.1	1.45	0.1	1	1.79
U1G02301	1.6	5.3	621	25.8	6.6	0.1	1	8.29
U1G02001	2.6	4.2	450	8.3	1.45	0.1	1	3.65
U1G00501	3	3.7	545	36.4	1.45	0.1	1	9.62
U1G01701	3	9.1	1070	33.7	1.45	0.1	1	9.78
U1G00801	3.7	7.2	425	36.4	3.3	0.1	1	10.36
U1G01101	4.7	4.3	1280	27.2	1.45	0.1	1	14.92
U1G00201	8.7	7.4	1760	25.9	1.45	0.1	1.3	100.7
U1G02601	25.9	31.1	1180	105	5.2	1.8	4	144.9
U1G01401	28.9	90.8	2110	28.4	13.9	0.1	4.7	11.3
U1G02801	44.2	31.7	101000	870	81.1	2	121	201
U1G00901	1.7	5.5	257	29.8	1.45	0.1	1	2.77
U1G02101	2.6	3.4	475	12.7	1.45	0.1	1	3.64
U1G01801	3.5	6.2	1030	19.7	1.45	0.1	1	24.8
U1G01201	4.4	10.5	1390	30.8	4.6	0.1	2.5	22.2
U1G02401	6	6.8	1690	32.3	3.7	0.1	1.7	28.5
U1G01501	11.6	44.9	1010	32.4	5.4	0.21	3.1	13.72
U1G00601	14.5	25.8	5030	149	9.6	0.32	10.3	58.6
U1G02901	22.9	32.1	21100	240	31	2	44.3	201
U1G02701	47.6	69	8700	145	19.5	2.6	12.8	201
U1G00301	50.4	58.5	35700	596	104	7.1	61.2	201

NOTE: Nondetected results (U qualifier) presented in Table I-6-2 are taken at one-half the detection limit.

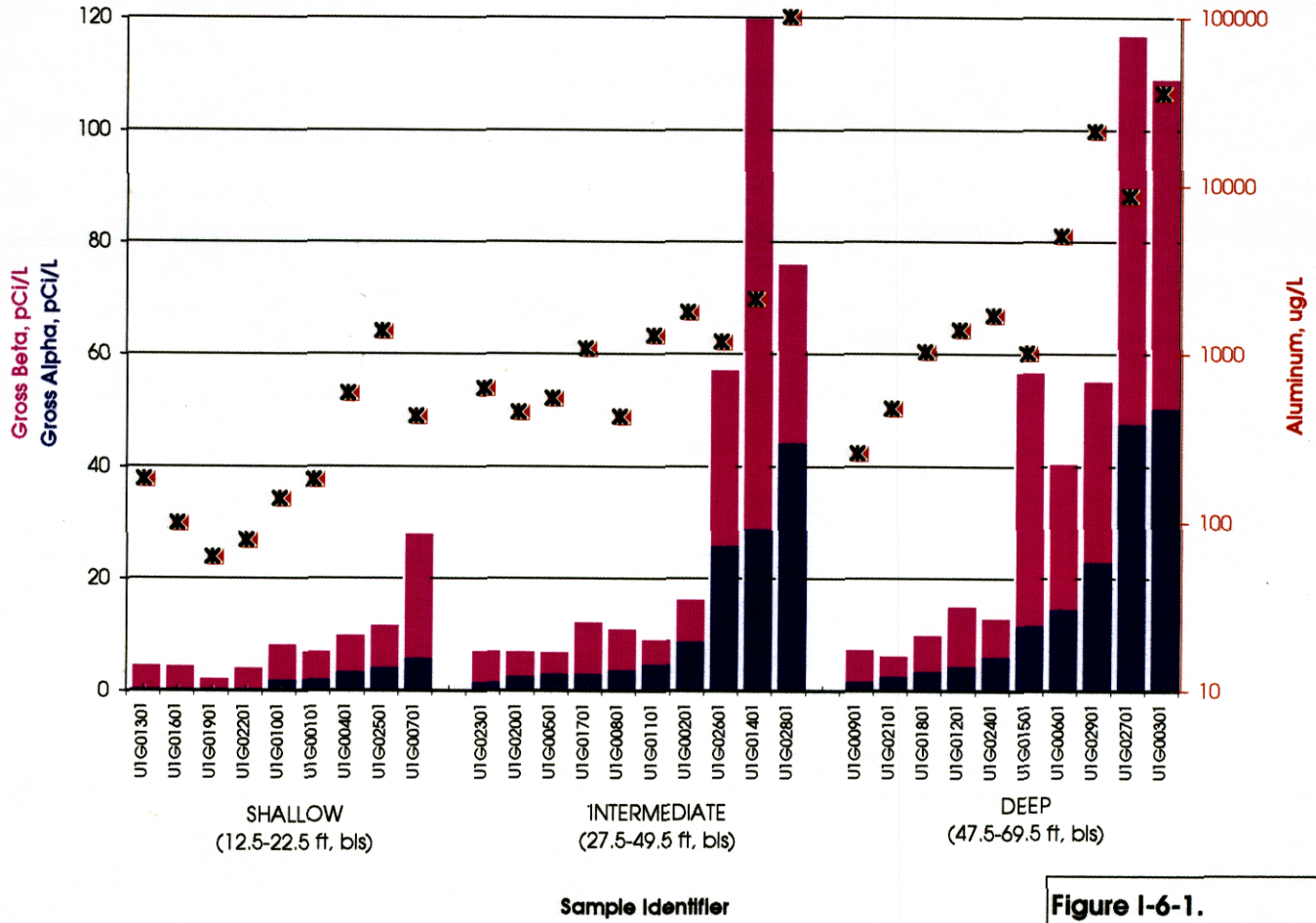


Figure I-6-1.
Gross Radioactivity versus Aluminum Concentrations in Groundwater.

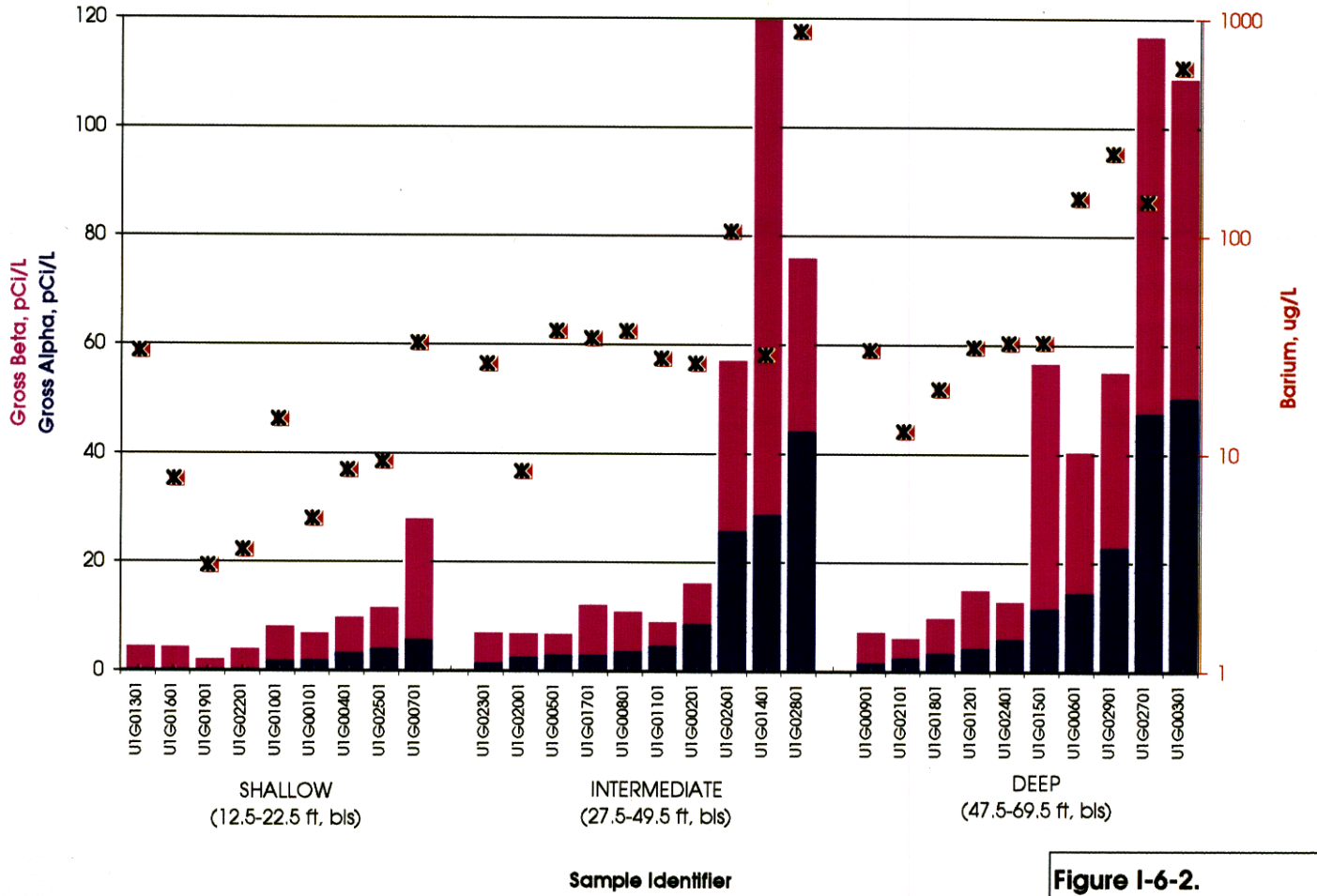


Figure I-6-2.
Gross Radioactivity versus Barium Concentrations in Groundwater.

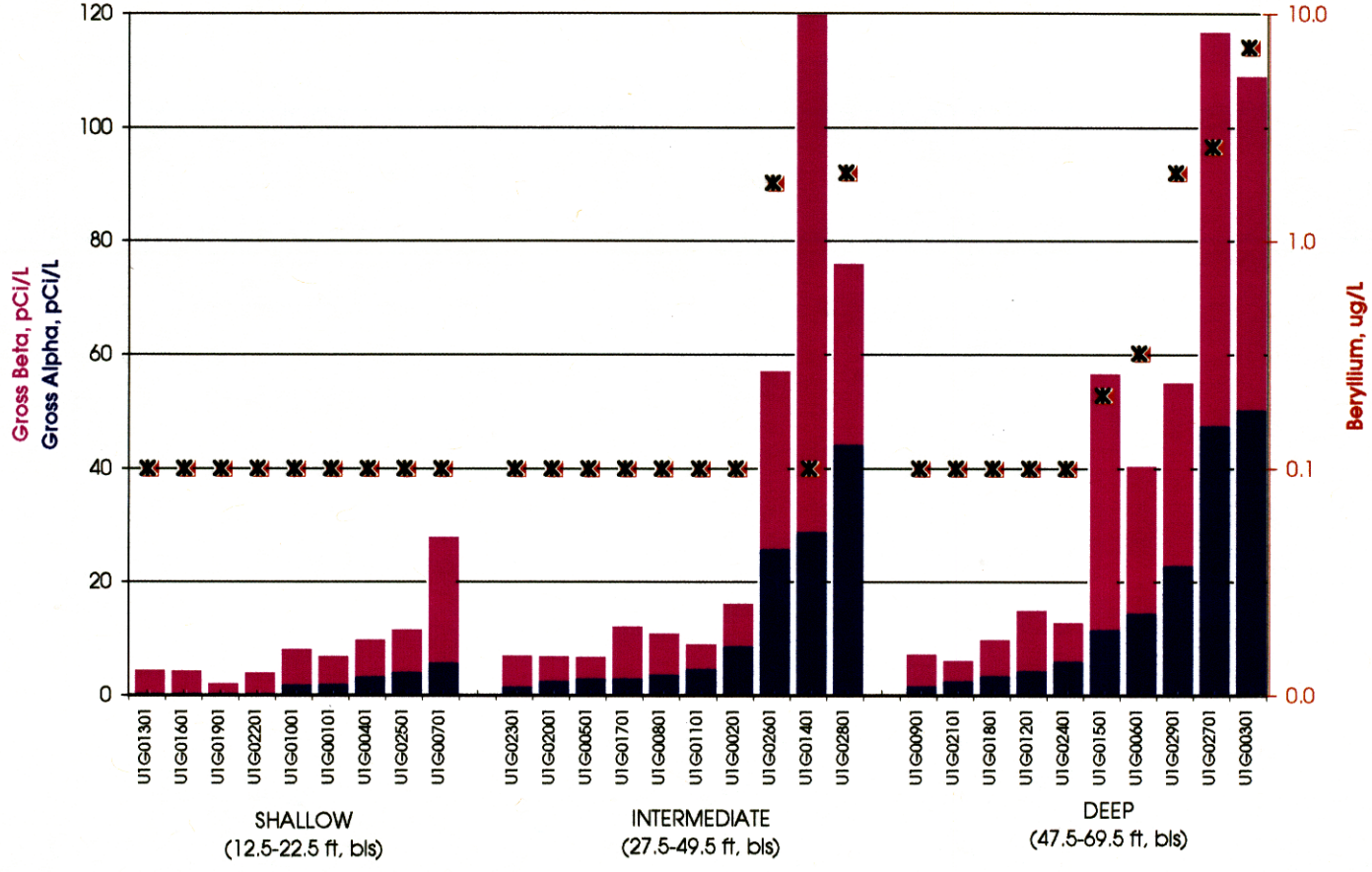


Figure I-6-3.
Gross Radioactivity versus Beryllium Concentrations in Groundwater.

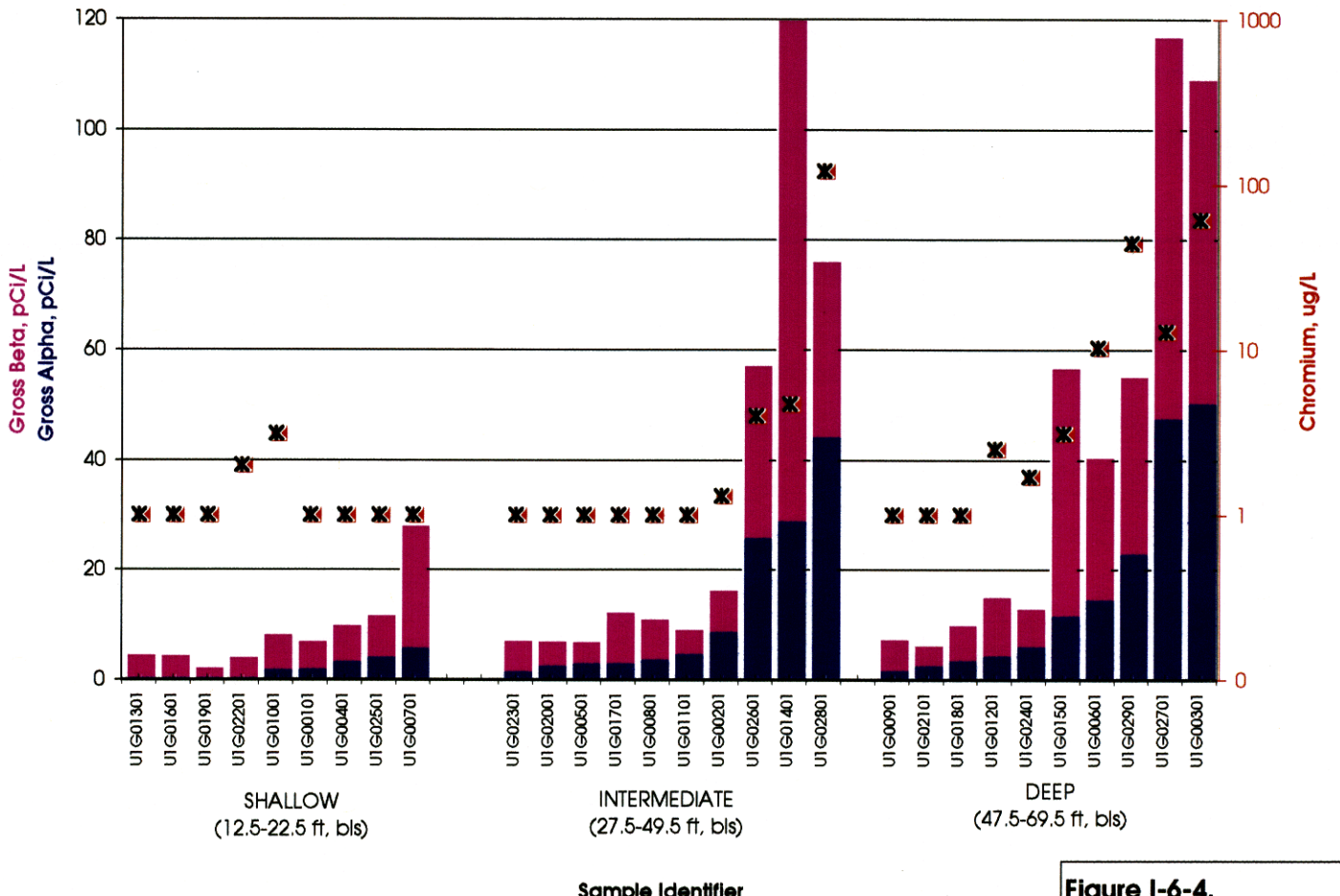


Figure I-6-4.
Gross Radioactivity versus Chromium Concentrations in Groundwater.

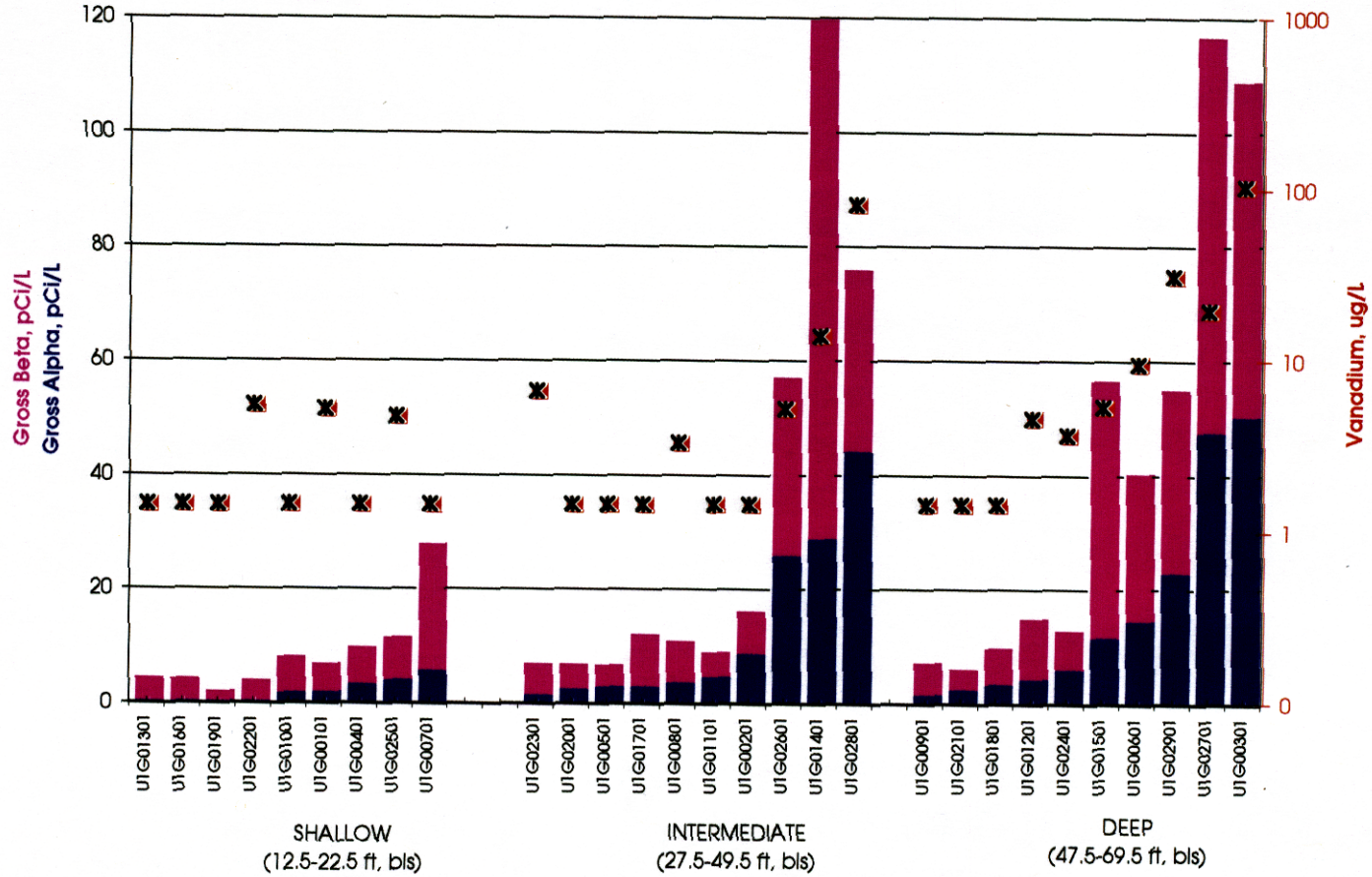


Figure I-6-5.
Gross Radioactivity versus Vanadium Concentrations in Groundwater.

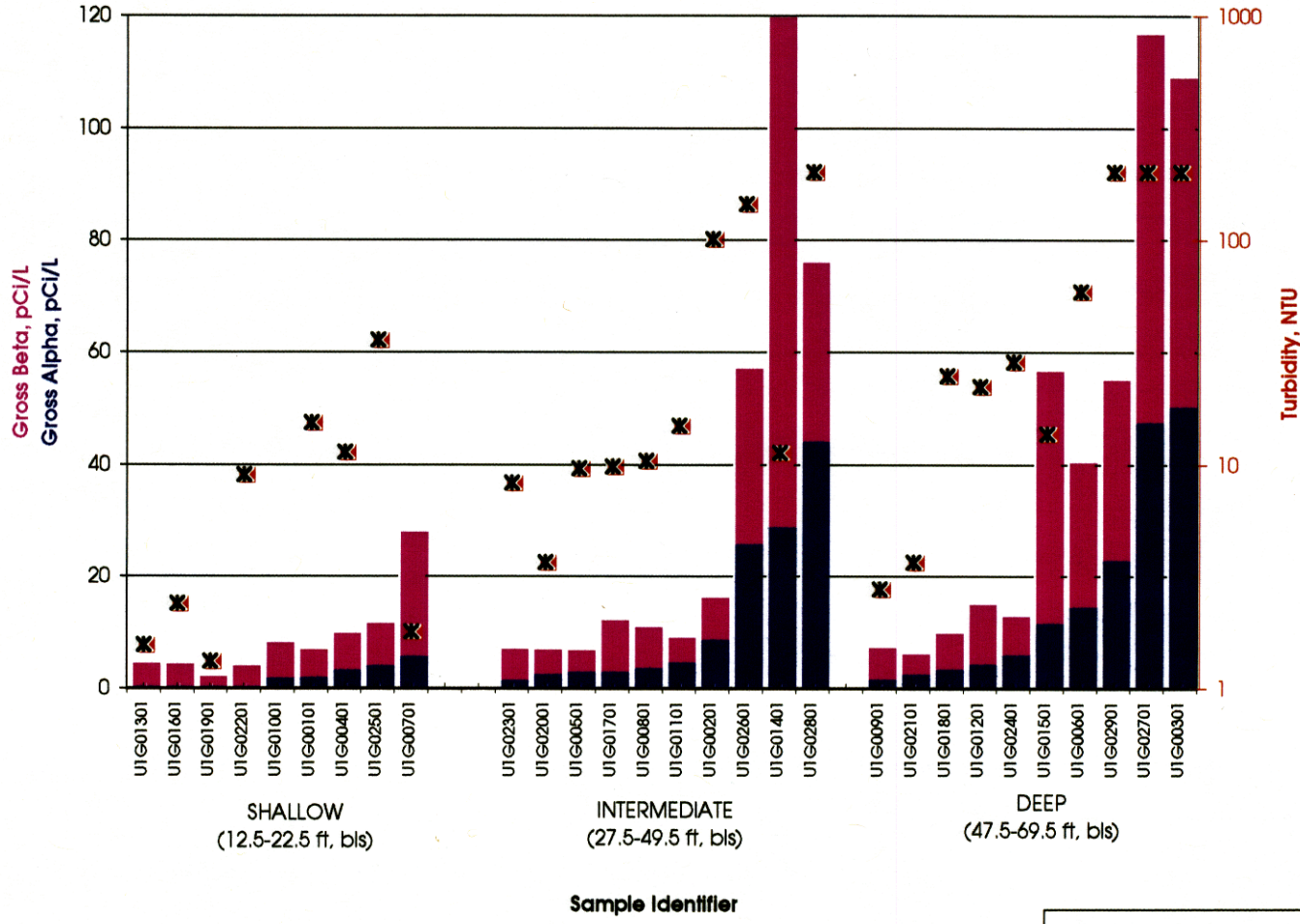


Figure I-6-6.
Gross Radioactivity versus Turbidity in Groundwater.

APPENDIX J

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT TABLES

Appendix J-1	Risk-Based Screening Concentrations
Appendix J-2	Florida Soil Cleanup Goals
Appendix J-3	Human Health Chemical of Potential Concern Essential Nutrients
Appendix J-4	Physical Characteristics of Exposed Populations
Appendix J-5	Risk Calculating Spreadsheet
Appendix J-6	Fugitive Air Emissions Modeling
Appendix J-7	Soil Dermal Absorption Equations
Appendix J-8	Dose-Response Values
Appendix J-9	Toxicity Profiles

APPENDIX J-1

RISK-BASED SCREENING CONCENTRATIONS

U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA) REGION III
CONTAMINANT OF POTENTIAL CONCERN SCREENING GUIDANCE

HUMAN HEALTH BASELINE RISK ASSESSMENT
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region III
841 Chestnut Street
Philadelphia, Pennsylvania 19107

October 20, 1995

SUBJECT: Risk-Based Concentration Table, July - December 1995

FROM: Roy L. Smith, Ph.D.
Office of RCRA
Technical & Program Support Branch (3HW70)

TO: RBC Table mailing list

Attached is the EPA Region III risk-based concentration (RBC) table, which we distribute semi-annually to all interested parties.

IMPORTANT MESSAGE

EPA Region III has established a homepage on the World Wide Web which you can find at http://earth1.epa.gov:80/ or http://www.epa.gov/. Our homepage will soon include the RBC table in downloadable form. We strongly encourage all RBC table users having Internet access to obtain the table electronically rather than on paper. In this way, users can obtain the most current issue immediately in a form that can be used directly as input for risk assessment calculations. This distribution method will also save large amounts of paper and cost substantially less.

For those lacking Internet access, it's once again time to re-register to receive a paper copy of the RBC table. We need to hear from you periodically to ensure that you still have an interest and that we have your correct address. Please fax your registration request to Vanessa Sizer at 215-597-9890, including your name, address, and phone number. Please don't phone to re-register; we need hard copy to document your continued interest. If we don't hear from you by March 30, 1996, we'll assume you no longer need a paper copy. Thanks for your cooperation.

CONTENTS, USES, AND LIMITATIONS OF THE RBC TABLE

The table contains reference doses and carcinogenic potency slopes (obtained from IRIS through September 1, 1995, HEAST through May 1995, the EPA-NCEA Superfund Health Risk Technical Support Center, and other EPA sources) for nearly 600 chemicals. These toxicity constants have been combined with "standard" exposure scenarios to calculate RBCs--chemical concentrations corresponding to fixed levels of risk (*i.e.*, a hazard quotient of 1, or lifetime cancer risk of 10^{-6}, whichever occurs at a lower concentration) in water, air, fish tissue, and soil.

The RBC table also includes soil screening levels (SSLs) for protection of groundwater

and air. Most SSLs were obtained directly from EPA/OSWER's proposed SSL guidance document, to which we have added some additional SSLs based on the same methodology. Sources of SSLs are noted in the table. SSLs incorporate the same exposure assumptions as RBCs, plus additional assumptions needed for inter-media extrapolation. SSLs are therefore distinct from RBCs, and should be used only in the framework proposed in the OSWER document (available from NTIS as document numbers 9355.4-1, PB95-965530, or EPA540/R-94/105).

The Region III toxicologists use RBCs to screen sites not yet on the NPL, respond rapidly to citizen inquiries, and spot-check formal baseline risk assessments. The background materials provide the complete basis for all the calculations, with the intent of showing users exactly how the RBCs were developed. Simply put, RBCs are risk assessments run in reverse. For a single contaminant in a single medium, under standard default exposure assumptions, the RBC corresponds to the target risk or hazard quotient.

RBCs also have several important limitations. Specifically excluded from consideration are (1) transfers from soil to air and groundwater, and (2) cumulative risk from multiple contaminants or media. Also, the toxicity information in the table has been assembled by hand, and (despite extensive checking and years of use) may contain errors. It's advisable to cross-check before relying on any RfDs or CPSs in the table. If you find any errors, please send me a note.

Many users want to know if the risk-based concentrations can be used as valid no-action levels or cleanup levels, especially for soils. The answer is a bit complex. First, it is important to realize that the RBC table does not constitute regulation or guidance, and should not be viewed as a substitute for a site-specific risk assessment. For sites where:

1. A single medium is contaminated;
2. A single contaminant contributes nearly all of the health risk;
3. Volatilization or leaching of that contaminant from soil is expected not to be significant;
4. The exposure scenarios used in the RBC table are appropriate for the site;
5. The fixed risk levels used in the RBC table are appropriate for the site; and
6. Risk to ecological receptors is expected not to be significant;

the risk-based concentrations would probably be protective as no-action levels or cleanup goals. However, to the extent that a site deviates from this description, as most do, the RBCs would not necessarily be appropriate.

To summarize, the table should generally not be used to (1) set cleanup or no-action levels at CERCLA sites or RCRA Corrective Action sites, (2) substitute for EPA guidance for preparing baseline risk assessments, or (3) determine if a waste is hazardous under RCRA.

ANSWERS TO FREQUENTLY ASKED QUESTIONS

To help you better understand the RBC table, here are answers to our most often-asked questions:

1. How can the age-adjusted inhalation factor (11.66) be less than either the inhalation rate for a child (12) or for an adult (20)?

Age-adjusted factors are not intake rates, but rather partial calculations which have different units than intake rates do. The fact that these partial calculations have values similar to intake rates is really coincidental, an artifact of the similar magnitude of years of exposure and time-averaged body weight.

2. Why does arsenic appear in the RBC table separately as a carcinogen and a non-carcinogen, while other contaminants do not?

Arsenic is double-entered to ensure that the risk assessor realizes that non-carcinogenic concerns are significant for arsenic. Otherwise, one might be tempted to accept a 1e-4 risk (37 ppm in residential soil), when the oral reference dose would be exceeded at 23 ppm.

Also, EPA has a little-known risk management policy for arsenic (dating from 1988) that suggests that arsenic-related cancer risks of up to 1e-3 can be accepted because the cancers are squamous cell carcinomas with a low mortality rate. Thus, noncarcinogenic RBCs represent an important limitation on acceptable arsenic concentrations.

3. Many contaminants have no inhaled reference dose or carcinogenic potency slope in IRIS, yet these numbers appear in the RBC table with IRIS given as the source. Where did the numbers come from?

Most inhaled reference doses and potency slopes in the RBC table are converted from reference concentrations and unit risk values which do appear in IRIS. These conversions assume 70-kg persons inhaling 20 m^3/d. For example, the inhalation unit risk for arsenic (4.3e-3 risk per $\mu g/m^3$) is divided by 20 m^3/d and multiplied by 70 kg times 1000 μg/mg, yielding a CPSi of 15.1 risk per mg/kg/d.

4. Why does the RBC table base soil RBCs for cadmium and manganese on reference doses that apply only to drinking water?

The RBC table's use of the drinking water RfDs for cadmium and manganese reflects (1) the limited space available in the already-crowded table, and (2) the intended use of the table as a screening tool rather than a source of cleanup levels (thereby making false positives acceptable). For a formal risk assessment, Region III would use the food RfDs for soil ingestion.

At this time, only two substances (as far as we know) have distinct oral RfDs for water and food--cadmium and manganese. Adding the two food RfDs to the table would require an entire column, which would be about 99.9% blank. The table has become so crowded that it would be difficult to accommodate another column. Also, we given this problem a relatively low

priority because the table's primary purpose is to identify environmental problems needing further study. RBCs were never intended for uncritical use as cleanup levels, merely to identify potential problems which need a closer look.

5. What is the source of the child inhalation rate of 12 m3/d?

The calculation comes from basic physiology. It's a scaling of the mass-specific 20 m3/d rate for adults from a body mass of 70 kg to 15 kg, using the 2/3 power of mass, as follows:

Let: IRcm = mass-specific child inhalation rate (m3/kg/d)
IRc = child inhalation rate (m3/d)

20 m3/d ÷ 70kg = 0.286 m3/kg/d (mass-specific adult inhalation rate)

$0.286 \text{ m3/kg/d} \times (70^{.67}) = (\text{IRcm}) \times (15^{.67})$

$\text{IRcm} = (0.286) \times (70^{.67}) \div (15^{.67}) = 0.286 \times 2.807 = 0.803 \text{ m3/kg/d}$

IRc = IRcm x 15kg = 0.803 m3/kg/d x 15kg = 12.04 m3/d

A short (but algebraically equivalent) way to do the conversion:

$20 \times (15 \div 70)^{.333} = 11.97$ (different from, but actually more correct than, 12.04 because of rounding error in the long form).

6. Can the oral RfDs in the RBC table be applied to dermal exposure?

Not directly. EPA's Office of Research and Development is working on dermal RfDs for some substances, but has not yet produced any final values. When dermal RfDs do appear, they will undoubtedly be based on absorbed dose rather than administered dose. Oral RfDs are (usually) based on administered dose and therefore tacitly include a GI absorption factor. Thus, any use of oral RfDs in dermal risk calculations would have to involve removing this absorption factor.

*7. The exposure variables table in the RBC background document lists the averaging time for non-carcinogens as "ED*365". What does that mean?*

ED is exposure duration, in years. Multiplying ED by 365 simply converts the duration to days. In fact, the ED term is included in both the numerator and denominator of the RBC algorithms for non-cancer risk, canceling it altogether. We expressed the algorithm this way to allow users to realize this. The total exposure is really corrected only by EF (days exposed per year) divided by 365. (Note that this explanation applies to noncarcinogenic risk only; for carcinogens, exposure is pro-rated over the number of days in a 70-year life span.)

8. Why is inorganic lead not included in the RBC table?

The reason lead is missing from the RBC table is simple, and fundamental: EPA has no

reference dose or potency slope for inorganic lead, so it wasn't possible to calculate risk-based concentrations. EPA considers lead a special case because:

(1) Lead is ubiquitous in all media, so human exposure comes from multiple sources. Comparing single-medium exposures with a reference dose would be misleading.

(2) If EPA did develop a reference dose for lead by the same methods other reference doses, we would probably find that most people already exceed it. Since EPA already knows this and is moving aggressively to lower lead releases nationally, such findings at individual sites would be irrelevant and unduly alarming.

(3) EPA decided to take a new approach to separate important lead exposures from trivial ones. EPA developed a computer model (the IEUBK model) which predicts children's blood lead concentrations using lead levels in various media as inputs. The idea is to evaluate a child's entire environment, and reduce lead exposures in the most cost-effective way.

On the practical side, there are several EPA policies which effectively substitute for RBCs. The EPA Office of Solid Waste has released a detailed directive on risk assessment and cleanup of residential soil lead. The directive recommends that soil lead levels less than 400 ppm be considered safe for residential use. Above that level, the document suggests collecting certain types of data and modeling children's blood lead with the IEUBK model. For the purposes of the RBC table, the de facto residential soil number would be 400 mg/kg. For water, we suggest 15 ppb (from the national EPA Action Level), and for air, the National Ambient Air Quality Standard.

9. Where did the potency slopes for carcinogenic PAHs come from?

The source of the potency slopes for PAHs is "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons", Final Draft, EPA Environmental Criteria and Assessment Office, Cincinnati, OH. It's available from NTIS as document number ECAO-CIN-842 (March, 1993). The slopes are expressed in terms of order-of-magnitude equivalence factors relating the compounds to benzo[a]pyrene; we have converted these TEQs to potency slopes to fit the format of the table.

10. May I please have a copy of the January 1991 RBC table?

We're sorry, but no. The RBC table doesn't represent regulation or guidance, so past issues should have no legal importance. Each time we update the table we destroy all obsolete copies, electronic and paper. We do this to ensure that only one set of RBCs, that based on current information, exists at any time.

11. I've noticed that some soil RBCs are 1 million parts per million. Since some of these substances are liquids, that's obviously ridiculous. What is that basis for these calculations?

A soil RBC of 1 million parts per million means that no amount of the contaminant in soil will cause a receptor to exceed the oral reference dose by incidental ingestion of soil. In

fact, some contaminants would have RBCs of more than 1 million ppm, but the algorithms cap concentrations at 100%. The reason we retain these admittedly impossible numbers is to let users see that the contaminant is not a threat via soil ingestion.

However, it's important to realize that the RBC calculations do not consider the potential of soil contaminants to leach to groundwater or escape to air by volatilization or dust entrainment. To consider these inter-media transfers, it's necessary to either monitor air and groundwater, or to use a model. Measured or modeled air and groundwater concentrations should then be compared to the RBCs for air and tap water.

We have begun to incorporate inter-media transfers into the RBC table in the form of soil screening levels (SSLs). However, EPA Headquarters has proposed only about a hundred SSLs so far, so the list is still rather short.

12. Please elaborate on the meaning of the 'W' source code in the table.

The "W" code means that a reference dose or potency slope for a contaminant is currently not present on either IRIS or HEAST, but that it once was present on either IRIS or HEAST and was removed. Such withdrawal usually indicates that consensus on the number no longer exists among EPA scientists, but not that EPA believes the contaminant to be unimportant. Older versions of the RBC table had separate codes for IRIS and HEAST withdrawals, but we changed to a single code for both because, after all, it hardly matters.

We retain withdrawn numbers in the table because we still need to deal with these contaminants during the sometimes very long delays before replacement numbers are ready. We take the position that for the purpose of screening an obsolete RBC is better than none at all. The 'W' code should serve as a clear warning that before making any serious decision involving that contaminant you will need to develop an interim value based on current scientific understanding.

If you are assessing risks at a site where a major contaminant is coded "W", consider working with your Regional EPA risk assessor to develop a current toxicity constant. If the site is being studied under CERCLA, the EPA-NCEA Regional Technical Support group may be able to assist.

13. Can I get copies of supporting documents for interim toxicity constants which are coded "E" in the RBC table?

Unfortunately, Region 3 does not have a complete set of supporting documents. The EPA-NCEA Superfund Health Risk Technical Support Center prepares these interim toxicity constants in response to site-specific requests from Regional risk assessors, and sends the documentation only to the requestor. The RBC tables contain only the interim values (those with "E" codes) that we've either requested ourselves or otherwise obtained copies of. There may be many more interim values of which we are unaware. Also, we don't receive automatic updates when NCEA revisits a contaminant, so it's likely that some interim values in the RBC table are obsolete.

It has been NCEA's policy to deny requests for documentation of interim toxicity constants. Although Region 3 has sometimes provided this documentation on request, for the above-stated reasons we have no assurance that the documentation, or even the interim numbers, are current. We've decided to discontinue distributing information that may be misleading. If one of the "E"-coded contaminants is a major risk contributor at your site, we strongly suggest that you work with EPA to develop an up-to-date reference dose or slope factor.

Changes in This Issue of the RBC Table

New or revised EPA toxicity constants are now marked with "**" before the contaminant name. This is to help users quickly pick out substances with new RBCs. Formerly these contaminants were printed in underlined boldface type that copied badly. A new basis code, "M" for MCL, has been added to the upper right corner of each page. This code denotes soil screening levels for groundwater protection that are based on EPA Maximum Contaminant Levels.

If you want to raise issues or get answers to questions about the RBC table, please call the Technical Support Help Line at 215-597-1116. The line has a voice mail system to take your calls if we're not available. We'll return your call as soon as we can. Please limit calls to RBC issues; if you have a question about applying RBCs to a site, please call the EPA Regional office handling the project. Thanks for your help and cooperation, and we hope the RBC table continues to be a useful resource.

Attachment

EPA Region III Risk-Based Concentration Table
Background Information

Roy L. Smith, Ph.D.
Toxicologist
October 4, 1995

Development of Risk-Based Concentrations

General

Separate carcinogenic and non-carcinogenic risk-based concentrations were calculated for each compound for each pathway. The concentration in the table is the lower of the two, rounded to two significant figures. The following terms and values were used in the calculations:

Exposure variables	**Value**	**Symbol**
General:		
Carcinogenic potency slope oral (risk per mg/kg/d):	*	CPSo
Carcinogenic potency slope inhaled (risk per mg/kg/d):	*	CPSi
Reference dose oral (mg/kg/d):	*	RfDo
Reference dose inhaled (mg/kg/d):	*	RfDi
Target cancer risk:	1e-06	TR
Target hazard quotient:	1	THQ
Body weight, adult (kg):	70	BWa
Body weight, age 1-6 (kg):	15	BWc
Averaging time carcinogens (d):	25550	ATc
Averaging time non-carcinogens (d):	ED*365	ATn
Inhalation, adult (m3/d):	20	IRAa
Inhalation, child (m3/d):	12	IRAc
Inhalation factor, age-adjusted (m3-y/kg-d):	11.66	IFAadj
Tap water ingestion, adult (L/d):	2	IRWa
Tap water ingestion, age 1-6 (L/d):	1	IRWc
Tap water ingestion factor, age-adjusted (L-y/kg-d):	1.09	IFWadj
Fish ingestion (g/d):	54	IRF
Soil ingestion, adult (mg/d):	100	IRSa
Soil ingestion, age 1-6 (mg/d):	200	IRSc
Soil ingestion factor, age adjusted (mg-y/kg-d):	114.29	IFSadj
Residential:		
Exposure frequency (d/y):	350	EFr
Exposure duration, total (y):	30	EDtot
Exposure duration, age 1-6 (y):	6	EDc
Volatilization factor (L/m3):	0.5	K

Exposure variables	Value	Symbol
Occupational:		
Exposure frequency (d/y):	250	EFo
Exposure duration (y):	25	EDo
Fraction of contaminated soil ingested (unitless)	0.5	FC

*: Contaminant-specific toxicological constants. The priority among sources of toxicological constants was as follows: (1) IRIS, (2) HEAST, (3) HEAST alternative method, (4) EPA-NCEA Superfund Health Risk Technical Support Center, (5) withdrawn from IRIS or HEAST, and (6) other EPA documents. Each source was used only if numbers from higher-priority sources were unavailable. The EPA Superfund Health Risk Technical Support Center, part of the EPA National Center for Environmental Assessment in Cincinnati, develops provisional RfDs and CPSs on request for contaminants not in IRIS or HEAST. These provisional values are labeled "E = EPA-NCEA provisional" in the table. It is possible they may be obsolete. If one of the "E" constants is important to a Superfund risk assessment, consider requesting, through a Regional risk assessor, a new provisional value.

Age-adjusted factors

Because contact rates with tap water, ambient air, and residential soil are different for children and adults, carcinogenic risks during the first 30 years of life were calculated using age-adjusted factors. These factors approximated the integrated exposure from birth until age 30 by combining contact rates, body weights, and exposure durations for two age groups - small children and adults. The age-adjusted factor for soil was obtained from RAGS IB; the others were developed by analogy.

Air inhalation

$$IFAadj \quad \frac{m^3 \cdot y}{kg \cdot d} = \frac{EDc \cdot IRAc}{BWc} + \frac{(EDtot - EDc) \cdot IRAa}{BWa}$$

Tap water ingestion

$$IFWadj \quad \frac{L \cdot y}{kg \cdot d} = \frac{EDc \cdot IRWc}{BWc} + \frac{(EDtot - EDc) \cdot IRWa}{BWa}$$

Soil ingestion

$$IFSadj \quad \frac{mg \cdot y}{kg \cdot d} = \frac{EDc \cdot IRSc}{BWc} + \frac{(EDtot - EDc) \cdot IRSa}{BWa}$$

Residential water

Volatilization terms were calculated only for compounds with a mark in the "VOC" column. Compounds having a Henry's Law constant greater than 10^{-5} were considered volatile. The list may be incomplete, but is unlikely to include false positives. The equations and the volatilization factor (K, above) were obtained from RAGS IB. Oral potency slopes and reference doses were used for both oral and inhaled exposures for volatile compounds lacking inhalation values. Inhaled potency slopes were substituted for unavailable oral potency slopes only for volatile compounds; inhaled RfDs were substituted for unavailable

oral RfDs for both volatile and non-volatile compounds. RBCs for carcinogens were based on combined childhood and adult exposure; for non-carcinogens RBCs were based on adult exposure.

Carcinogens

$$RBC\ \frac{\mu g}{L} = \frac{TR \cdot ATc \cdot 1000\ \frac{\mu g}{mg}}{EFr \cdot ([K \cdot IFAadj \cdot CPSi] + [IFWadj \cdot CPSo])}$$

Non-carcinogens

$$RBC\ \frac{\mu g}{L} = \frac{THQ \cdot BWa \cdot ATn \cdot 1000\ \frac{\mu g}{mg}}{EFr \cdot EDtot \cdot \left(\frac{K \cdot IRAa}{RfDi} + \frac{IRWa}{RfDo}\right)}$$

Ambient air

Oral potency slopes and references were used where inhalation values were not available. RBCs for carcinogens were based on combined childhood and adult exposure; for non-carcinogens RBCs were based on adult exposure.

Carcinogens

$$RBC\ \frac{\mu g}{m^3} = \frac{TR \cdot ATc \cdot 1000\ \frac{\mu g}{mg}}{EFr \cdot IFAadj \cdot CPSi}$$

Non-carcinogens

$$RBC\ \frac{\mu g}{m^3} = \frac{THQ \cdot RfDi \cdot BWa \cdot ATn \cdot 1000\ \frac{\mu g}{mg}}{EFr \cdot EDtot \cdot IRAa}$$

Edible fish

All RBCs were based on adult exposure.

Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot BWa \cdot ATc}{EFr \cdot EDtot \cdot \frac{IRF}{1000\ \frac{g}{kg}} \cdot CPSo}$$

Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ \cdot RfDo \cdot BWa \cdot ATn}{EFr \cdot EDtot \cdot \frac{IRF}{1000\ \frac{g}{kg}}}$$

Commercial/industrial soil ingestion

- RBCs were based on adult occupational exposure, including an assumption that only 50% of total soil ingestion is work-related.

Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR\ BWa\ ATc}{EFo\ EDo \cdot \frac{IRSa}{10^6\ \frac{mg}{kg}} \cdot FC \cdot CPSo}$$

Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ\ RfDo \cdot BWa \cdot ATn}{EFo \cdot EDo \cdot \frac{IRSa}{10^6\ \frac{mg}{kg}} \cdot FC}$$

Residential soil ingestion

RBCs for carcinogens were based on combined childhood and adult exposure; RBCs for non-carcinogens were based on childhood exposure only.

Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot ATc}{EFr \cdot \frac{IFSadj}{10^6\ \frac{mg}{kg}} \cdot CPSo}$$

Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ\ RfDo \cdot BWc \cdot ATn}{EFr \cdot EDc \cdot \frac{IRSc}{10^6\ \frac{mg}{kg}}}$$

Development of Soil Screening Levels

General

In December 1994 the EPA Office of Solid Waste and Emergency Response proposed Soil Screening Guidance (Document 9355.4-1, PB95-963530, EPA540/R-94/101, available through NTIS at 703-487-4650). This draft document provides (1) a framework in which soil screening levels are to be used, (2) a detailed methodology for calculating soil screening levels, and (3) soil screening levels for 107 substances.

Consistent with this new guidance, the risk-based concentration table now includes two columns of generic soil screening levels (SSLs). OSWER's 107 proposed soil screening levels have been added verbatim. In addition, the proposed SSL methodology has been used to calculate soil screening levels for more substances, which are also included in the

new table. The table clearly distinguishes the OSWER SSLs from the "unofficial" ones.

These SSLs provide reasonable maximum estimates of transfers of contaminants from soil to other media. One column contains soil concentrations protective of groundwater quality; the other contains soil concentrations protective of air quality. "Protective" is defined in the same terms as the risk-based concentrations for tap water and air -- that residential contact scenarios will yield a fixed upper bound risk of 10^{-6} or a fixed hazard quotient of 1 (whichever occurs at the lower concentration).

OSWER's SSLs should be used only within the framework proposed in the guidance document. The additional SSLs included in the RBC table are intended for the same uses (although they obviously carry less weight than the formally proposed numbers).

The SSLs are based on the following assumptions:

Input variables	**Value**	**Symbol***
Surface soil moisture content (g/g)	0.1	W_s
Vadose zone soil moisture content (kg/kg)	0.2	W_v
Surface soil bulk density (g/cm^3)	1.5	ρ_{bs}
Vadose zone soil bulk density (kg/L)	1.5	ρ_{bv}
Surface soil particle density (g/cm^3)	2.65	ρ_{ss}
Vadose zone soil particle density (g/cm^3)	2.65	ρ_{sv}
Total surface soil porosity (L pore /L soil)	0.43	N_s
Total vadose zone soil porosity (L pore/L soil)	0.43	N_v
Air-filled surface soil porosity (L air/L soil)	0.28	θ_{as}
Water-filled surface soil porosity (L water/L soil)	0.15	θ_{ws}
Air-filled vadose zone soil porosity (L air/L soil)	0.13	θ_{av}
Water-filled vadose zone soil porosity (L water/L soil)	0.30	θ_{wv}
Organic carbon fraction of surface soil (g/g)	0.006	FOC_s
Organic carbon fraction of vadose zone soil (g/g)	0.002	FOC_v
Dispersion factor for 0.5 acres (g/m^{2}s per kg/m^3)	35.1	Q/C
Particulate emission factor (m^3/kg)	6.79e+08	PEF
Exposure interval (s)	9.50e+08	T
Dilution-attenuation factor (unitless)	10	DAF

*: Symbols were adjusted, variables were rearranged, and derived and chemical-specific variables were omitted for simplicity and clarity. Presentation of the input variables in a single table using the same terms as in the OSWER SSL document would have been confusing. The terms used here are generally similar to OSWER's, and can easily be compared with the SSL guidance document.

With two exceptions described in the following section, SSL calculations were based on the same algorithms presented in the OSWER draft SSL guidance document. For details of the calculations (and for general background information on SSLs), I strongly recommend

consulting that document. The "unofficial" SSLs were developed under the following conditions:

Soil Screening Levels for Inhalation

Inhaled reference doses and potency slopes were used if available. If inhalation values were not available, oral RfDs and potency slopes were substituted. SSLs were calculated only for substances for which aqueous solubility, Koc, Henry's Law constant, and diffusivity in air were available. SSLs were calculated only for substances for which a volatilization factor could be calculated. This was done because OSWER's large proposed particulate emission factor rendered it pointless to estimate SSLs for particulate emissions alone. The final calculated SSL shown in the RBC table is the smaller of the risk-based SSL and the soil saturation concentration. All calculated SSLs were rounded to 2 significant figures.

The OSWER risk algorithms for inhalation were revised in order to be consistent with the rest of the RBC table. Only calculated SSLs were affected by this; SSLs proposed by OSWER are presented verbatim. Calculated SSLs for inhalation of carcinogens were based on an integrated lifetime exposure rather than adult exposure. SSLs for inhalation of noncarcinogens were based on adult exposure for 350 days per year rather than 365 days per year. The following algorithms were used to calculate inhalation SSLs:

Carcinogens

$$SSL \ \frac{mg}{kg} = \frac{TR \cdot ATc}{EFr \cdot IFAadj \cdot \left(\frac{1}{VF} + \frac{1}{PEF}\right) \cdot CPSi}$$

Non-carcinogens

$$SSL \ \frac{mg}{kg} = \frac{THQ \cdot BWa \cdot ATn \cdot RfDi}{EFr \cdot EDtot \cdot IRAa \cdot \left(\frac{1}{VF} + \frac{1}{PEF}\right)}$$

Soil Screening Levels for Groundwater Use

All algorithms were as proposed by OSWER. MCLs were used as target groundwater concentrations if available. If MCLs were unavailable the risk-based concentration in the "tap water" column of the RBC table was used as the target groundwater concentration. All SSLs for groundwater are based on a dilution-attenuation factor (DAF) of 10. Since these SSLs scale linearly with DAF, the SSLs for DAF=1 would be ten times lower. They were omitted to conserve space. All groundwater SSLs were rounded to 2 significant figures and capped at unity.

Sources: I=IRIS H=HEAST A=HEAST alternate W=Withdrawn from IRIS or HEAST E=EPA-NCEA Regional Support provisional value O=Other EPA documents.

Basis: C=carcinogenic effects N=noncarcinogenic effects E=EPA draft Soil Screening Level S=soil saturation concentration M=EPA MCL.

Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Soil Ingestion: Residential mg/kg	Soil Screening Levels, Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Acephate	30560191	4.00E-03 I		8.70E-03 I			7.7 C	0.72 C	0.36 C	660 C	73 C		
Acetaldehyde	75070		2.57E-03 I		7.70E-03 I		94 N	0.81 C					
Acetochlor	34256821	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Acetone	67641	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	62000 E	8 E
Acetone cyanohydrin	75865	7.00E-02 H	4.00E-02 A				2600 N	150 N	95 N	140000 N	5500 N		
Acetonitrile	75078	6.00E-03 I	1.43E-02 A				220 N	52 N	8.1 N	12000 N	470 N		
Acetophenone	98862	1.00E-01 I	5.71E-06 W			☒	0.042 N	0.021 N	140 N	200000 N	7800 N		
Acifluorfen	62476599	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Acrolein	107028	2.00E-02 H	5.71E-06 I				730 N	0.021 N	27 N	41000 N	1600 N		
Acrylamide	79061	2.00E-04 I		4.50E+00 I	4.55E+00 I		0.015 C	0.0014 C	0.0007 C	1.3 C	0.14 C		
Acrylic acid	79107	5.00E-01 I	2.86E-04 I				18000 N	1 N	680 N	1E+06 N	39000 N		
Acrylonitrile	107131	1.00E-03 H	5.71E-04 I	5.40E-01 I	2.38E-01 I		0.12 C	0.026 C	0.0058 C	11 C	1.2 C		
Alachlor	15972608	1.00E-02 I		8.00E-02 H			0.84 C	0.078 C	0.039 C	72 C	8 C		
Alar	1596845	1.50E-01 I					5500 N	550 N	200 N	310000 N	12000 N		
Aldicarb	116063	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N	570 S	0.036 M
Aldicarb sulfone	1646884	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Aldrin	309002	3.00E-05 I		1.70E+01 I	1.71E+01 I		0.004 C	0.00037 C	0.00019 C	0.34 C	0.038 C	0.5 E	0.005 E
Ally	74223646	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Allyl alcohol	107186	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Allyl chloride	107051	5.00E-02 W	2.86E-04 I				1800 N	1 N	68 N	100000 N	3900 N		
Aluminum	7429905	1.00E+00 E					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Aluminum phosphide	20859738	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Amdro	67485294	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Ametryn	834128	9.00E-03 I					330 N	33 N	12 N	18000 N	700 N		
m-Aminophenol	591275	7.00E-02 H					2600 N	260 N	95 N	140000 N	5500 N		
4-Aminopyridine	504245	2.00E-05 H					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Amitraz	33089611	2.50E-03 I					91 N	9.1 N	3.4 N	5100 N	200 N		
Ammonia	7664417		2.86E-02 I				1000 N	100 N					
Ammonium sulfamate	7773060	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Aniline	62533		2.86E-04 I	5.70E-03 I			10 N	1 N	0.55 C	1000 C	110 C	45 N	0.031 N
Antimony and compounds	7440360	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Antimony pentoxide	1314609	5.00E-04 H					18 N	1.8 N	0.68 N	1000 N	39 N		
Antimony potassium tartrate	304610	9.00E-04 H					33 N	3.3 N	1.2 N	1800 N	70 N		
Antimony tetroxide	1332316	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
Antimony trioxide	1309644	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
Apollo	74115245	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Aramite	140578	5.00E-02 H		2.50E-02 I	2.49E-02 I		2.7 C	0.25 C	0.13 C	230 C	26 C		
Arsenic	7440382	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N	380 E	15 E
**Arsenic (as carcinogen)	7440382			1.50E+00 I	1.51E+01 I		0.045 C	0.00041 C	0.0021 C	3.8 C	0.43 C	380 E	15 E

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Arsine	7784421		1.43E-05 I				0.52 N	0.052 N					
Assure	76578148	9.00E-03 I					330 N	33 N	12 N	18000 N	700 N		
Asulam	3337711	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Atrazine	1912249	3.50E-02 I		2.22E-01 H			0.3 C	0.028 C	0.014 C	26 C	2.9 C		
Avermectin B1	65195553	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Azobenzene	103333			1.10E-01 I	1.08E-01 I		0.61 C	0.058 C	0.029 C	52 C	5.8 C		
Barium and compounds	7440393	7.00E-02 I	1.43E-04 A				2600 N	0.52 N	95 N	140000 N	5500 N	350000 E	32 E
Baygon	114261	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Bayleton	43121433	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Baythroid	68359375	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Benefin	1861401	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N		
Benomyl	17804352	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Bentazon	25057890	2.50E-03 I					91 N	9.1 N	3.4 N	5100 N	200 N		
Benzaldehyde	100527	1.00E-01 I				☒	610 N	370 N	140 N	200000 N	7800 N		
Benzene	71432		1.71E-03 E	2.90E-02 I	2.90E-02 I	☒	0.36 C	0.22 C	0.11 C	200 C	22 C	0.5 E	0.02 E
Benzenethiol	108985	1.00E-05 H					0.37 N	0.037 N	0.014 N	20 N	0.78 N		
Benzidine	92875	3.00E-03 I		2.30E+02 I	2.35E+02 I		0.00029 C	0.00003 C	0.00001 C	0.025 C	0.0028 C	1.3 C	1.100E-06 C
Benzoic acid	65850	4.00E+00 I					150000 N	15000 N	5400 N	1E+06 N	310000 N	320 S	280 E
Benzotrichloride	98077			1.30E+01 I			0.0052 C	0.00048 C	0.00024 C	0.44 C	0.049 C	0.012 C	0.000073 C
Benzyl alcohol	100516	3.00E-01 H					11000 N	1100 N	410 N	610000 N	23000 N		
Benzyl chloride	100447			1.70E-01 I		☒	0.062 C	0.037 C	0.019 C	34 C	3.8 C	0.5 C	0.00036 C
Beryllium and compounds	7440417	5.00E-03 I		4.30E+00 I	8.40E+00 I		0.016 C	0.00075 C	0.00073 C	1.3 C	0.15 C	690 E	180 E
Bidrin	141662	1.00E-04 I					3.7 N	0.37 N	0.14 N	200 N	7.8 N		
Biphenthrin (Talstar)	82657043	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
1,1-Biphenyl	92524	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N	9000 S	110 N
Bis(2-chloroethyl)ether	111444			1.10E+00 I	1.16E+00 I	☒	0.0092 C	0.0054 C	0.0029 C	5.2 C	0.58 C	0.3 E	0.0003 E
Bis(2-chloroisopropyl)ether	39638329	4.00E-02 I		7.00E-02 H	3.50E-02 H	☒	0.26 C	0.18 C	0.045 C	82 C	9.1 C		
Bis(chloromethyl)ether	542881			2.20E+02 I	2.17E+02 I	☒	0.00005 C	0.00003 C	0.00001 C	0.026 C	0.0029 C	0.00004 C	1.000E-07 C
Bis(2-chloro-1-methylethyl)ether				7.00E-02 W	7.00E-02 W		0.96 C	0.089 C	0.045 C	82 C	9.1 C		
Bis(2-ethylhexyl)phthalate (DEHP)	117817	2.00E-02 I		1.40E-02 I			4.8 C	0.45 C	0.23 C	410 C	46 C	210 E	11 E
Bisphenol A	80057	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Boron (and borates)	7440428	9.00E-02 I	5.71E-03 H				3300 N	21 N	120 N	180000 N	7000 N		
Boron trifluoride	7637072		2.00E-04 H				7.3 N	0.73 N					
Bromodichloromethane	75274	2.00E-02 I		6.20E-02 I		☒	0.17 C	0.1 C	0.051 C	92 C	10 C	1800 E	0.3 E
Bromoethene	593602				1.10E-01 H	☒	0.096 C	0.057 C					
Bromoform (tribromomethane)	75252	2.00E-02 I		7.90E-03 I	3.85E-03 I	☒	2.4 C	1.6 C	0.4 C	720 C	81 C	46 E	0.5 E
Bromomethane	74839	1.40E-03 I	1.43E-03 I			☒	8.7 N	5.2 N	1.9 N	2900 N	110 N	2 E	0.1 E
4-Bromophenyl phenyl ether	101553	5.80E-02 O					2100 N	210 N	78 N	120000 N	4500 N		
Bromophos	2104963	5.00E-03 H					180 N	18 N	6.8 N	10000 N	390 N		

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Bromoxynil	1689845	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Bromoxynil octanoate	1689992	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
1,3-Butadiene	106990				9.80E-01 I	☒	0.011 C	0.0064 C				0.0013 C	0.000072 C
1-Butanol	71363	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	9700 E	8 E
Butyl benzyl phthalate	85687	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N	530 E	68 E
Butylate	2008415	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
sec-Butylbenzene	135988	1.00E-02 E				☒	61 N	37 N	14 N	20000 N	780 N	80 S	0.27 M
tert-Butylbenzene	104518	1.00E-02 E				☒	61 N	37 N	14 N	20000 N	780 N		0.27 M
Butylphthalyl butylglycolate	85701	1.00E+00 I					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Cacodylic acid	75605	3.00E-03 H					110 N	11 N	4.1 N	6100 N	230 N		
**Cadmium and compounds	7440439	5.00E-04 I	5.71E-05 E		6.30E+00 I		18 N	0.00099 C	0.68 N	1000 N	39 N	920 E	6 E
Caprolactam	105602	5.00E-01 I					18000 N	1800 N	680 N	1E+06 N	39000 N		
Captafol	2425061	2.00E-03 I		8.60E-03 H			7.8 C	0.73 C	0.37 C	670 C	74 C		
Captan	133062	1.30E-01 I		3.50E-03 H			19 C	1.8 C	0.9 C	1600 C	180 C		
Carbaryl	63252	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	0.34 S	23 N
Carbofuran	1563662	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
**Carbon disulfide	75150	1.00E-01 I	2.00E-01 I			☒	1000 N	730 N	140 N	200000 N	7800 N	11 E	14 E
Carbon tetrachloride	56235	7.00E-04 I	5.71E-04 E	1.30E-01 I	5.25E-02 I	☒	0.16 C	0.12 C	0.024 C	44 C	4.9 C	0.2 E	0.03 E
Carbosulfan	55285148	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Carboxin	5234684	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Chloral	75876	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Chloramben	133904	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
Chloranil	118752			4.03E-01 H			0.17 C	0.016 C	0.0078 C	14 C	1.6 C		
Chlordane	57749	6.00E-05 I		1.30E+00 I	1.29E+00 I		0.052 C	0.0049 C	0.0024 C	4.4 C	0.49 C	10 E	2 E
Chlorimuron-ethyl	90982324	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Chlorine	7782505	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Chlorine dioxide	10049044		5.71E-05 I				2.1 N	0.21 N					
Chloroacetaldehyde	107200	6.90E-03 O					250 N	25 N	9.3 N	14000 N	540 N		
Chloroacetic acid	79118	2.00E-03 H					73 N	7.3 N	2.7 N	4100 N	160 N		
2-Chloroacetophenone	532274		8.57E-06 I				0.31 N	0.031 N					
4-Chloroaniline	106478	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N	1200 S	0.3 E
Chlorobenzene	108907	2.00E-02 I	5.71E-03 A			☒	39 N	21 N	27 N	41000 N	1600 N	94 E	0.6 E
Chlorobenzilate	510156	2.00E-02 I		2.70E-01 H	2.70E-01 H		0.25 C	0.023 C	0.012 C	21 C	2.4 C		
p-Chlorobenzoic acid	74113	2.00E-01 H					7300 N	730 N	270 N	410000 N	16000 N		
4-Chlorobenzotrifluoride	98566	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N	86 N	7.5 N
2-Chloro-1,3-butadiene	126998	2.00E-02 A	2.00E-03 H			☒	14 N	7.3 N	27 N	41000 N	1600 N		
1-Chlorobutane	109693	4.00E-01 H				☒	2400 N	1500 N	540 N	820000 N	31000 N		
Chlorodibromomethane	124481	2.00E-02 I		8.40E-02 I		☒	0.13 C	0.075 C	0.038 C	68 C	7.6 C	1900 E	0.2 E
**1-Chloro-1,1-difluoroethane	75683	I	1.43E+01			☒	87000 N	52000 N					

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Chlorodifluoromethane	75456		1.43e+01 I			☒	87000 N	52000 N					
Chloroethane	75003	4.00E-01 E	2.86E+00 I			☒	8600 N	10000 N	540 N	820000 N	31000 N	2600 S	33 N
2-Chloroethyl vinyl ether	110758	2.50E-02 O				☒	150 N	91 N	34 N	51000 N	2000 N		
Chloroform	67663	1.00E-02 I		6.10E-03 I	8.05E-02 I	☒	0.15 C	0.078 C	0.52 C	940 C	100 C	0.2 E	0.3 E
Chloromethane	74873			1.30E-02 H	6.30E-03 H	☒	1.4 C	0.99 C	0.24 C	440 C	49 C	0.063 C	0.0066 C
4-Chloro-2,2-methylaniline hydrochloride	3165933			4.60E-01 H			0.15 C	0.014 C	0.0069 C	12 C	1.4 C		
4-Chloro-2-methylaniline	95692			5.80E-01 H			0.12 C	0.011 C	0.0054 C	9.9 C	1.1 C		
beta-Chloronaphthalene	91587	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N	2.8 S	140 N
o-Chloronitrobenzene	88733			2.50E-02 H		☒	0.42 C	0.25 C	0.13 C	230 C	26 C		
p-Chloronitrobenzene	100005			1.80E-02 H		☒	0.59 C	0.35 C	0.18 C	320 C	35 C		
2-Chlorophenol	95578	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N	53000 E	2 E
2-Chloropropane	75296		2.86E-02 H			☒	170 N	100 N				22 N	0.64 N
Chlorothalonil	1897456	1.50E-02 I		1.10E-02 H			6.1 C	0.57 C	0.29 C	520 C	58 C		
o-Chlorotoluene	95498	2.00E-02 I				☒	120 N	73 N	27 N	41000 N	1600 N	1200 N	5.6 N
Chlorpropham	101213	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Chlorpyrifos	2921882	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Chlorpyrifos-methyl	5598130	1.00E-02 H					370 N	37 N	14 N	20000 N	780 N		
Chlorsulfuron	64902723	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Chlorthiophos	60238564	8.00E-04 H					29 N	2.9 N	1.1 N	1600 N	63 N		
Chromium III and compounds	16065831	1.00E+00 I	5.71E-07 W				37000 N	0.0021 N	1400 N	1E+06 N	78000 N		
Chromium VI and compounds	18540299	5.00E-03 I			4.20E+01 I		180 N	0.00015 C	6.8 N	10000 N	390 N	140 E	19 E
Coal tar	8001589				2.20E+00 W			0.0028 C					
Cobalt	7440484	6.00E-02 E					2200 N	220 N	81 N	120000 N	4700 N		
Coke Oven Emissions	8007452				2.17E+00 I			0.0029 C					
**Copper and compounds	7440508	4.00E-02 E					1500 N	150 N	54 N	82000 N	3100 N		
Crotonaldehyde	123739	1.00E-02 W		1.90E+00 H	1.90E+00 W		0.035 C	0.0033 C	0.0017 C	3 C	0.34 C		
Cumene	98828	4.00E-02 I	2.57E-03 H				1500 N	9.4 N	54 N	82000 N	3100 N	81 N	65 N
Cyanides:													
Barium cyanide	542621	1.00E-01 W					3700 N	370 N	140 N	200000 N	7800 N		
Calcium cyanide	592018	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Copper cyanide	544923	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Cyanazine	21725462	2.00E-03 H		8.40E-01 H			0.08 C	0.0075 C	0.0038 C	6.8 C	0.76 C		
Cyanogen	460195	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Cyanogen bromide	506683	9.00E-02 I					3300 N	330 N	120 N	180000 N	7000 N		
Cyanogen chloride	506774	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Free cyanide	57125	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Hydrogen cyanide	74908	2.00E-02 I	8.57E-04 I				730 N	3.1 N	27 N	41000 N	1600 N		
Potassium cyanide	151508	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Potassium silver cyanide	506616	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		

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Silver cyanide	506649	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Sodium cyanide	143339	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
**Thiocyanate		2.00E-02 E					730 N	73 N	27 N	41000 N	1600 N		
Zinc cyanide	557211	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Cyclohexanone	108941	5.00E+00 I				☒	30000 N	18000 N	6800 N	1E+06 N	390000 N		
Cyclohexlamine	108918	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Cyhalothrin/Karate	68085858	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Cypermethrin	52315078	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Cyromazine	66215278	7.50E-03 I					270 N	27 N	10 N	15000 N	590 N		
Dacthal	1861321	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Dalapon	75990	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Danitol	39515418	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
DDD	72548			2.40E-01 I			0.28 C	0.026 C	0.013 C	24 C	2.7 C	37 S	0.7 E
DDE	72559			3.40E-01 I			0.2 C	0.018 C	0.0093 C	17 C	1.9 C	10 S	0.5 E
DDT	50293	5.00E-04 I		3.40E-01 I	3.40E-01 I		0.2 C	0.018 C	0.0093 C	17 C	1.9 C	80 E	1 E
Decabromodiphenyl ether	1163195	1.00E-02 I				☒	61 N	37 N	14 N	20000 N	780 N		
Demeton	8065483	4.00E-05 I					1.5 N	0.15 N	0.054 N	82 N	3.1 N		
Diallate	2303164			6.10E-02 H		☒	0.17 C	0.1 C	0.052 C	94 C	10 C		
Diazinon	333415	9.00E-04 H					33 N	3.3 N	1.2 N	1800 N	70 N	5400 S	2.8 N
Dibenzofuran	132649	4.00E-03 E					150 N	15 N	5.4 N	8200 N	310 N	120 S	120 N
1,4-Dibromobenzene	106376	1.00E-02 I				☒	61 N	37 N	14 N	20000 N	780 N		
1,2-Dibromo-3-chloropropane	96128		5.71E-05 I	1.40E+00 H	2.42E-03 H	☒	0.048 C	0.21 N	0.0023 C	4.1 C	0.46 C	1.9 N	0.00061 M
1,2-Dibromoethane	106934		5.71E-05 H	8.50E+01 I	7.70E-01 I	☒	0.00075 C	0.0081 C	0.00004 C	0.067 C	0.0075 C	0.0058 C	0.00018 M
Dibutyl phthalate	84742	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	100 E	120 E
Dicamba	1918009	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
1,2-Dichlorobenzene	95501	9.00E-02 I	4.00E-02 A			☒	270 N	150 N	120 N	180000 N	7000 N	300 E	6 E
1,3-Dichlorobenzene	541731	8.90E-02 O				☒	540 N	320 N	120 N	180000 N	7000 N		
1,4-Dichlorobenzene	106467		2.29E-01 I	2.40E-02 H		☒	0.44 C	0.26 C	0.13 C	240 C	27 C	7700 E	1 E
3,3'-Dichlorobenzidine	91941			4.50E-01 I			0.15 C	0.014 C	0.007 C	13 C	1.4 C	52 S	0.01 E
1,4-Dichloro-2-butene	764410				9.30E+00 H	☒	0.0011 C	0.00067 C					
Dichlorodifluoromethane	75718	2.00E-01 I	5.71E-02 A			☒	390 N	210 N	270 N	410000 N	16000 N	37 N	7.5 N
1,1-Dichloroethane	75343	1.00E-01 H	1.43E-01 A			☒	810 N	520 N	140 N	200000 N	7800 N	980 E	11 E
1,2-Dichloroethane (EDC)	107062		2.86E-03 E	9.10E-02 I	9.10E-02 I	☒	0.12 C	0.069 C	0.035 C	63 C	7 C	0.3 E	0.01 E
1,1-Dichloroethylene	75354	9.00E-03 I		6.00E-01 I	1.75E-01 I	☒	0.044 C	0.036 C	0.0053 C	9.5 C	1.1 C	0.04 E	0.03 E
1,2-Dichloroethylene (cis)	156592	1.00E-02 H				☒	61 N	37 N	14 N	20000 N	780 N	1500 E	0.2 E
1,2-Dichloroethylene (trans)	156605	2.00E-02 I				☒	120 N	73 N	27 N	41000 N	1600 N	3600 E	0.3 E
1,2-Dichloroethylene (mixture)	540590	9.00E-03 H				☒	55 N	33 N	12 N	18000 N	700 N		
2,4-Dichlorophenol	120832	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N	4800 S	0.5 E
2,4-Dichlorophenoxyacetic Acid (2,4-D)	94757	1.00E-02 I				☒	61 N	37 N	14 N	20000 N	780 N	7000 S	1.7 M

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4-(2,4-Dichlorophenoxy)butyric Acid	94826	8.00E-03 I					290 N	29 N	11 N	16000 N	630 N		
1,2-Dichloropropane	78875		1.14E-03 I	6.80E-02 H		☒	0.16 C	0.092 C	0.046 C	84 C	9.4 C	11 E	0.02 E
2,3-Dichloropropanol	616239	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
1,3-Dichloropropene	542756	3.00E-04 I	5.71E-03 I	1.75E-01 H	1.30E-01 H	☒	0.077 C	0.048 C	0.018 C	33 C	3.7 C	0.1 E	0.001 E
Dichlorvos	62737	5.00E-04 I	1.43E-04 I	2.90E-01 I			0.23 C	0.022 C	0.011 C	20 C	2.2 C	3.5 C	0.00072 C
Dicofol	115322			4.40E-01 W			0.15 C	0.014 C	0.0072 C	13 C	1.5 C		
Dicyclopentadiene	77736	3.00E-02 H	5.71E-05 A			☒	0.42 N	0.21 N	41 N	61000 N	2300 N		
Dieldrin	60571	5.00E-05 I		1.60E+01 I	1.61E+01 I		0.0042 C	0.00039 C	0.0002 C	0.36 C	0.04 C	2 E	0.001 E
Diesel emissions			1.43E-03 I				52 N	5.2 N					
Diethyl phthalate	84662	8.00E-01 I					29000 N	2900 N	1100 N	1E+06 N	63000 N	520 E	110 E
Diethylene glycol, monobutyl ether	112345		5.71E-03 H				210 N	21 N					
Diethylene glycol, monoethyl ether	111900	2.00E+00 H					73000 N	7300 N	2700 N	1E+06 N	160000 N		
Diethylformamide	617845	1.10E-02 H					400 N	40 N	15 N	22000 N	860 N		
Di(2-ethylhexyl)adipate	103231	6.00E-01 I		1.20E-03 I			56 C	5.2 C	2.6 C	4800 C	530 C		
Diethylstilbestrol	56531			4.70E+03 H			0.00001 C	1E-06 C	7E-07 C	0.0012 C	0.00014 C		
Difenzoquat (Avenge)	43222486	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Diflubenzuron	35367385	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
1,1-Difluoroethane	75376		1.14E+01 I			☒	69000 N	42000 N					
Diisopropyl methylphosphonate (DIMP)	1445756	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Dimethipin	55290647	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Dimethoate	60515	2.00E-04 I					7.3 N	0.73 N	0.27 N	410 N	16 N		
3,3'-Dimethoxybenzidine	119904			1.40E-02 H			4.8 C	0.45 C	0.23 C	410 C	46 C		
Dimethylamine	124403		5.71E-06 W				0.21 N	0.021 N					
2,4-Dimethylaniline hydrochloride	21436964			5.80E-01 H			0.12 C	0.011 C	0.0054 C	9.9 C	1.1 C		
2,4-Dimethylaniline	95681			7.50E-01 H			0.09 C	0.0083 C	0.0042 C	7.6 C	0.85 C		
N-N-Dimethylaniline	121697	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
3,3'-Dimethylbenzidine	119937			9.20E+00 H			0.0073 C	0.00068 C	0.00034 C	0.62 C	0.069 C	29 C	0.00039 C
N,N-Dimethylformamide	68122	1.00E-01 H	8.57E-03 I				3700 N	31 N	140 N	200000 N	7800 N		
1,1-Dimethylhydrazine	57147			2.60E+00 W	3.50E+00 W		0.026 C	0.0018 C	0.0012 C	2.2 C	0.25 C		
1,2-Dimethylhydrazine	540738			3.70E+01 W	3.70E+01 W		0.0018 C	0.00017 C	0.00009 C	0.15 C	0.017 C		
2,4-Dimethylphenol	105679	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N	5400 S	3 E
2,6-Dimethylphenol	576261	6.00E-04 I					22 N	2.2 N	0.81 N	1200 N	47 N		
3,4-Dimethylphenol	95658	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Dimethyl phthalate	131113	1.00E+01 H					370000 N	37000 N	14000 N	1E+06 N	780000 N	1600 E	1200 E
Dimethyl terephthalate	120616	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
1,2-Dinitrobenzene	528290	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
1,3-Dinitrobenzene	99650	1.00E-04 I					3.7 N	0.37 N	0.14 N	200 N	7.8 N		
1,4-Dinitrobenzene	100254	4.00E-04 H					15 N	1.5 N	0.54 N	820 N	31 N		
4,6-Dinitro-o-cyclohexyl phenol	131895	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		

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2,4-Dinitrophenol	51285	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N	360 N	0.1 E
Dinitrotoluene mixture				6.80E-01 I			0.099 C	0.0092 C	0.0046 C	8.4 C	0.94 C		
2,4-Dinitrotoluene	121142	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N	120 S	0.2 E
2,6-Dinitrotoluene	606202	1.00E-03 H					37 N	3.7 N	1.4 N	2000 N	78 N	370 S	0.1 E
Dinoseb	88857	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
di-n-Octyl phthalate	117840	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N	1000000 S	1000000 E
1,4-Dioxane	123911			1.10E-02 I			6.1 C	0.57 C	0.29 C	520 C	58 C		
Diphenamid	957517	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Diphenylamine	122394	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
1,2-Diphenylhydrazine	122667			8.00E-01 I	7.70E-01 I		0.084 C	0.0081 C	0.0039 C	7.2 C	0.8 C		
Diquat	85007	2.20E-03 I					80 N	8 N	3 N	4500 N	170 N		
Direct black 38	1937377			8.60E+00 H			0.0078 C	0.00073 C	0.00037 C	0.67 C	0.074 C		
Direct blue 6	2602462			8.10E+00 H			0.0083 C	0.00077 C	0.00039 C	0.71 C	0.079 C		
Direct brown 95	16071866			9.30E+00 H			0.0072 C	0.00067 C	0.00034 C	0.62 C	0.069 C		
Disulfoton	298044	4.00E-05 I					1.5 N	0.15 N	0.054 N	82 N	3.1 N		
1,4-Dithiane	505293	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Diuron	330541	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Dodine	2439103	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Endosulfan	115297	6.00E-03 I					220 N	22 N	8.1 N	12000 N	470 N	1 S	3 E
Endothall	145733	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Endrin	72208	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N	16 S	0.4 E
Epichlorohydrin	106898	2.00E-03 H	2.86E-04 I	9.90E-03 I	4.20E-03 I		6.8 C	1 N	0.32 C	580 C	65 C		
1,2-Epoxybutane	106887		5.71E-03 I				210 N	21 N					
Ethephon (2-chloroethyl phosphonic acid)	16672870	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Ethion	563122	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
2-Ethoxyethanol acetate	111159	3.00E-01 A					11000 N	1100 N	410 N	610000 N	23000 N		
2-Ethoxyethanol	110805	4.00E-01 H	5.71E-02 I				15000 N	210 N	540 N	820000 N	31000 N		
Ethyl acrylate	140885			4.80E-02 H			1.4 C	0.13 C	0.066 C	120 C	13 C		
EPTC (S-Ethyl dipropylthiocarbamate)	759944	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Ethyl acetate	141786	9.00E-01 I					33000 N	3300 N	1200 N	1E+06 N	70000 N		
Ethylbenzene	100414	1.00E-01 I	2.86E-01 I			☒	1300 N	1000 N	140 N	200000 N	7800 N	260 E	5 E
Ethylene cyanohydrin	109784	3.00E-01 H					11000 N	1100 N	410 N	610000 N	23000 N		
Ethylene diamine	107153	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N		
Ethylene glycol	107211	2.00E+00 I					73000 N	7300 N	2700 N	1E+06 N	160000 N		
Ethylene glycol, monobutyl ether	111762		5.71E-03 H				210 N	21 N					
Ethylene oxide	75218			1.02E+00 H	3.50E-01 H		0.066 C	0.018 C	0.0031 C	5.6 C	0.63 C		
Ethylene thiourea (ETU)	96457	8.00E-05 I		1.19E-01 H			0.57 C	0.053 C	0.027 C	48 C	5.4 C		
Ethyl ether	60297	2.00E-01 I				☒	1200 N	730 N	270 N	410000 N	16000 N		
Ethyl methacrylate	97632	9.00E-02 H					3300 N	330 N	120 N	180000 N	7000 N		

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Ethyl p-nitrophenyl phenylphosphorothioate	2104645	1.00E-05 I					0.37 N	0.037 N	0.014 N	20 N	0.78 N		
Ethylnitrosourea	759739			1.40E+02 W			0.00048 C	0.00005 C	0.00002 C	0.041 C	0.0046 C		
Ethylphthalyl ethyl glycolate	84720	3.00E+00 I					110000 N	11000 N	4100 N	1E+06 N	230000 N		
Express	10120	8.00E-03 I					290 N	29 N	11 N	16000 N	630 N		
Fenamiphos	22224926	2.50E-04 I					9.1 N	0.91 N	0.34 N	510 N	20 N		
Fluometuron	2164172	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Fluoride	7782414	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N		
Fluoridone	59756604	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Flurprimidol	56425913	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Flutolanil	66332965	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N		
Fluvalinate	69409945	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Folpet	133073	1.00E-01 I		3.50E-03 I			19 C	1.8 C	0.9 C	1600 C	180 C		
Fomesafen	72178020			1.90E-01 I			0.35 C	0.033 C	0.017 C	30 C	3.4 C		
Fonofos	944229	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Formaldehyde	50000	2.00E-01 I			4.55E-02 I		7300 N	0.14 C	270 N	410000 N	16000 N		
Formic Acid	64186	2.00E+00 H					73000 N	7300 N	2700 N	1E+06 N	160000 N		
Fosetyl-al	39148248	3.00E+00 I					110000 N	11000 N	4100 N	1E+06 N	230000 N		
Furan	110009	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Furazolidone	67458			3.80E+00 H			0.018 C	0.0016 C	0.00083 C	1.5 C	0.17 C		
Furfural	98011	3.00E-03 I	1.43E-02 A				110 N	52 N	4.1 N	6100 N	230 N		
Furium	531828			5.00E+01 H			0.0013 C	0.00013 C	0.00006 C	0.11 C	0.013 C		
Furmecyclox	60568050			3.00E-02 I			2.2 C	0.21 C	0.11 C	190 C	21 C		
Glufosinate-ammonium	77182822	4.00E-04 I					15 N	1.5 N	0.54 N	820 N	31 N		
Glycidaldehyde	765344	4.00E-04 I	2.86E-04 H				15 N	1 N	0.54 N	820 N	31 N		
Glyphosate	1071836	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Haloxyfop-methyl	69806402	5.00E-05 I					1.8 N	0.18 N	0.068 N	100 N	3.9 N		
Harmony	79277273	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
HCH (alpha)	319846			6.30E+00 I	6.30E+00 I		0.011 C	0.00099 C	0.0005 C	0.91 C	0.1 C	0.9 E	0.0004 E
HCH (beta)	319857			1.80E+00 I	1.80E+00 I		0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C	16 E	0.002 E
HCH (gamma) Lindane	58899	3.00E-04 I		1.30E+00 H			0.052 C	0.0048 C	0.0024 C	4.4 C	0.49 C	4.2 C	0.006 E
HCH-technical	608731			1.80E+00 I	1.79E+00 I		0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C		
Heptachlor	76448	5.00E-04 I		4.50E+00 I	4.55E+00 I ☒		0.0023 C	0.0014 C	0.0007 C	1.3 C	0.14 C	0.3 E	0.06 E
Heptachlor epoxide	1024573	1.30E-05 I		9.10E+00 I	9.10E+00 I ☒		0.0012 C	0.00069 C	0.00035 C	0.63 C	0.07 C	1 E	0.03 E
Hexabromobenzene	87821	2.00E-03 I			☒		12 N	7.3 N	2.7 N	4100 N	160 N		
Hexachlorobenzene	118741	8.00E-04 I		1.60E+00 I	1.61E+00 I ☒		0.0066 C	0.0039 C	0.002 C	3.6 C	0.4 C	1 E	0.8 E
Hexachlorobutadiene	87683	2.00E-04 H		7.80E-02 I	7.70E-02 I ☒		0.14 C	0.081 C	0.04 C	73 C	8.2 C	1 E	0.1 E
Hexachlorocyclopentadiene	77474	7.00E-03 I	2.00E-05 H		☒		0.15 N	0.073 N	9.5 N	14000 N	550 N	2 E	10 E
Hexachlorodibenzo-p-dioxin mixture	19408743			6.20E+03 I	4.55E+03 I		0.00001 C	1E-06 C	5E-07 C	0.0009 C	0.0001 C		
Hexachloroethane	67721	1.00E-03 I		1.40E-02 I	1.40E-02 I ☒		0.75 C	0.45 C	0.23 C	410 C	46 C	49 E	0.2 E

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Hexachlorophene	70304	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Hexahydro-1,3,5-trinitro-1,3,5-triazine	121824	3.00E-03 I		1.10E-01 I			0.61 C	0.057 C	0.029 C	52 C	5.8 C		
1,6-Hexamethylene diisocyanate	822060		2.86E-06 I				0.1 N	0.01 N					
n-Hexane	110543	6.00E-02 H	5.71E-02 I			☒	350 N	210 N	81 N	120000 N	4700 N	32 N	13 N
Hexazinone	51235042	3.30E-02 I					1200 N	120 N	45 N	67000 N	2600 N		
Hydrazine, hydrazine sulfate	302012			3.00E+00 I	1.71E+01 I		0.022 C	0.00037 C	0.0011 C	1.9 C	0.21 C		
**Hydrogen chloride	7647010		5.71E-03 I				210 N	21 N					
**Hydrogen sulfide	7783064	3.00E-03 I	2.85E-04 I				110 N	1 N	4.1 N	6100 N	230 N		
Hydroquinone	123319	4.00E-02 H					1500 N	150 N	54 N	82000 N	3100 N		
Imazalil	35554440	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Imazaquin	81335377	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Iprodione	36734197	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
**Iron	7439896	3.00E-01 E					11000 N	1100 N	410 N	610000 N	23000 N		
Isobutanol	78831	3.00E-01 I				☒	1800 N	1100 N	410 N	610000 N	23000 N		
Isophorone	78591	2.00E-01 I		9.50E-04 I			71 C	6.6 C	3.3 C	6000 C	670 C	3400 E	0.2 E
Isopropalin	33820530	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
Isopropyl methyl phosphonic acid	1832548	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Isoxaben	82558507	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Kepone	143500			1.80E+01 E			0.0037 C	0.00035 C	0.00018 C	0.32 C	0.035 C		
Lactofen	77501634	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Linuron	330552	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Lithium	7439932	2.00E-02 E					730 N	73 N	27 N	41000 N	1600 N		
Londax	83056996	2.00E-01 I					7300 N	730 N	270 N	410000 N	16000 N		
Malathion	121755	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Maleic anhydride	108316	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Maleic hydrazide	123331	5.00E-01 I					18000 N	1800 N	680 N	1E+06 N	39000 N		
Malononitrile	109773	2.00E-05 H					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Mancozeb	8018017	3.00E-02 H					1100 N	110 N	41 N	61000 N	2300 N		
Maneb	12427382	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Manganese and compounds	7439965	5.00E-03 I	1.43c-05 I				180 N	0.052 N	6.8 N	10000 N	390 N		
Mephosfolan	950107	9.00E-05 H					3.3 N	0.33 N	0.12 N	180 N	7 N		
Mepiquat chloride	24307264	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
**Mercuric chloride	7487947	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Mercury (inorganic)	7439976	3.00E-04 H	8.57E-05 H				11 N	0.31 N	0.41 N	610 N	23 N	7 E	3 E
Mercury (methyl)	22967926	1.00E-04 I					3.7 N	0.37 N	0.14 N	200 N	7.8 N		
Merphos	150505	3.00E-05 I					1.1 N	0.11 N	0.041 N	61 N	2.3 N		
Merphos oxide	78488	3.00E-05 I					1.1 N	0.11 N	0.041 N	61 N	2.3 N		
Metalaxyl	57837191	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N		
Methacrylonitrile	126987	1.00E-04 I	2.00E-04 A				3.7 N	0.73 N	0.14 N	200 N	7.8 N		

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Methamidophos	10265926	5.00E-05 I					1.8 N	0.18 N	0.068 N	100 N	3.9 N		
Methanol	67561	5.00E-01 I					18000 N	1800 N	680 N	1E+06 N	39000 N		
Methidathion	950378	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Methomyl	16752775	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Methoxychlor	72435	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N	41 S	62 E
2-Methoxyethanol acetate	110496	2.00E-03 A					73 N	7.3 N	2.7 N	4100 N	160 N		
2-Methoxyethanol	109864	1.00E-03 H	5.71E-03 I				37 N	21 N	1.4 N	2000 N	78 N		
2-Methoxy-5-nitroaniline	99592			4.60E-02 H			1.5 C	0.14 C	0.069 C	120 C	14 C		
Methyl acetate	79209	1.00E+00 H					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Methyl acrylate	96333	3.00E-02 A					1100 N	110 N	41 N	61000 N	2300 N		
2-Methylaniline hydrochloride	636215			1.80E-01 H			0.37 C	0.035 C	0.018 C	32 C	3.5 C		
2-Methylaniline	95534			2.40E-01 H			0.28 C	0.026 C	0.013 C	24 C	2.7 C		
Methyl chlorocarbonate	79221	1.00E+00 W					37000 N	3700 N	1400 N	1E+06 N	78000 N		
4-(2-Methyl-4-chlorophenoxy) butyric acid	94815	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
2-Methyl-4-chlorophenoxyacetic acid	94746	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
2-(2-Methyl-14-chlorophenoxy)propionic acid	93652	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Methylcyclohexane	108872		8.57E-01 H				31000 N	3100 N				60 S	1500 N
Methylene bromide	74953	1.00E-02 A				☒	61 N	37 N	14 N	20000 N	780 N		
Methylene chloride	75092	6.00E-02 I	8.57E-01 H	7.50E-03 I	1.64E-03 I	☒	4.1 C	3.8 C	0.42 C	760 C	85 C	7 E	0.01 E
4,4'-Methylene bis(2-chloroaniline)	101144	7.00E-04 H		1.30E-01 H	1.30E-01 H		0.52 C	0.048 C	0.024 C	44 C	4.9 C		
4,4'-Methylenebisbenzeneamine	101779			2.50E-01 W			0.27 C	0.025 C	0.013 C	23 C	2.6 C		
4,4'-Methylene bis(N,N'-dimethyl)aniline	101611			4.60E-02 I			1.5 C	0.14 C	0.069 C	120 C	14 C		
4,4'-Methylenediphenyl isocyanate	101688		5.71E-06 I			☒	0.035 N	0.021 N					
Methyl ethyl ketone	78933	6.00E-01 I	2.86E-01 I			☒	1900 N	1000 N	810 N	1E+06 N	47000 N		
Methyl hydrazine	60344			1.10E+00 W			0.061 C	0.0057 C	0.0029 C	5.2 C	0.58 C		
Methyl isobutyl ketone	108101	8.00E-02 H	2.29E-02 A				2900 N	84 N	110 N	160000 N	6300 N		
Methyl methacrylate	80626	8.00E-02 H					2900 N	290 N	110 N	160000 N	6300 N		
2-Methyl-5-nitroaniline	99558			3.30E-02 H			2 C	0.19 C	0.096 C	170 C	19 C		
Methyl parathion	298000	2.50E-04 I					9.1 N	0.91 N	0.34 N	510 N	20 N	28 S	0.041 N
2-Methylphenol (o-cresol)	95487	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N	12000 S	6 E
3-Methylphenol (m-cresol)	103394	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
4-Methylphenol (p-cresol)	106445	5.00E-03 H					180 N	18 N	6.8 N	10000 N	390 N		
Methyl styrene (mixture)	25013154	6.00E-03 A	1.14E-02 A			☒	60 N	42 N	8.1 N	12000 N	470 N	100 N	1 N
Methyl styrene (alpha)	98839	7.00E-02 A				☒	430 N	260 N	95 N	140000 N	5500 N	8.8 S	7.5 N
Methyl tertbutyl ether (MTBE)	1634044	5.00E-03 E	8.57E-01 I			☒	180 N	3100 N	6.8 N	10000 N	390 N		
Metolaclor (Dual)	51218452	1.50E-01 H					5500 N	550 N	200 N	310000 N	12000 N		
Metribuzin	21087649	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Mirex	2385855	2.00E-04 I		1.80E+00 W			0.037 C	0.0035 C	0.0018 C	3.2 C	0.35 C		
Molinate	2212671	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		

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Molybdenum	7439987	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Monochloramine	10599903	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Naled	300765	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
2-Naphthylamine	91598			1.30e+02 E			0.00052 C	0.00005 C	0.00002 C	0.044 C	0.0049 C		
Napropamide	15299997	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
Nickel refinery dust					8.40E-01 I			0.0075 C					
Nickel and compounds	7440020	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N	6900 E	21 E
Nickel subsulfide	12035722				1.70E+00 I			0.0037 C					
Nitrapyrin	1929824	1.50E-03 W					55 N	5.5 N	2 N	3100 N	120 N		
Nitrate	14797558	1.60E+00 I					58000 N	5800 N	2200 N	1E+06 N	130000 N		
Nitric Oxide	10102439	1.00E-01 W					3700 N	370 N	140 N	200000 N	7800 N		
Nitrite	14797650	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
2-Nitroaniline	88744	6.00E-05 W	5.71E-05 H				2.2 N	0.21 N	0.081 N	120 N	4.7 N		
3-Nitroaniline	99092	3.00E-03 O					110 N	11 N	4.1 N	6100 N	230 N		
4-Nitroaniline	100016	3.00E-03 O					110 N	11 N	4.1 N	6100 N	230 N		
Nitrobenzene	98953	5.00E-04 I	5.71E-04 A			☒	3.4 N	2.1 N	0.68 N	1000 N	39 N	110 E	0.09 E
Nitrofurantoin	67209	7.00E-02 H					2600 N	260 N	95 N	140000 N	5500 N		
Nitrofurazone	59870			1.50E+00 H	9.40E+00 H		0.045 C	0.00067 C	0.0021 C	3.8 C	0.43 C		
Nitrogen dioxide	10102440	1.00E+00 W					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Nitroguanidine	556887	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N		
4-Nitrophenol	100027	6.20E-02 O					2300 N	230 N	84 N	130000 N	4800 N		
2-Nitropropane	79469		5.71E-03 I		9.40E+00 H		210 N	0.00067 C					
N-Nitrosodi-n-butylamine	924163			5.40E+00 I	5.60E+00 I		0.012 C	0.0011 C	0.00058 C	1.1 C	0.12 C		
N-Nitrosodiethanolamine	1116547			2.80E+00 I			0.024 C	0.0022 C	0.0011 C	2 C	0.23 C		
N-Nitrosodiethylamine	55185			1.50E+02 I	1.51E+02 I		0.00045 C	0.00004 C	0.00002 C	0.038 C	0.0043 C		
N-Nitrosodimethylamine	62759			5.10E+01 I	4.90E+01 I		0.0013 C	0.00013 C	0.00006 C	0.11 C	0.013 C		
N-Nitrosodiphenylamine	86306			4.90E-03 I			14 C	1.3 C	0.64 C	1200 C	130 C	29 C	0.2 E
N-Nitroso di-n-propylamine	621647			7.00E+00 I			0.0096 C	0.00089 C	0.00045 C	0.82 C	0.091 C	0.014 C	0.00002 E
N-Nitroso-N-methylethylamine	10595956			2.20E+01 I			0.0031 C	0.00028 C	0.00014 C	0.26 C	0.029 C		
N-Nitrosopyrrolidine	930552			2.10E+00 I	2.13E+00 I		0.032 C	0.0029 C	0.0015 C	2.7 C	0.3 C		
m-Nitrotoluene	99081	1.00E-02 H				☒	61 N	37 N	14 N	20000 N	780 N	460 S	0.42 N
o-Nitrotoluene	88722	1.00E-02 H				☒	61 N	37 N	14 N	20000 N	780 N	460 S	0.42 N
p-Nitrotoluene	99990	1.00E-02 H				☒	61 N	37 N	14 N	20000 N	780 N	460 S	0.42 N
Norflurazon	27314132	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
NuStar	85509199	7.00E-04 I					26 N	2.6 N	0.95 N	1400 N	55 N		
Octabromodiphenyl ether	32536520	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Octahydro-1357-tetranitro-1357-tetrazocine	2691410	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Octamethylpyrophosphoramide	152169	2.00E-03 H					73 N	7.3 N	2.7 N	4100 N	160 N		
Oryzalin	19044883	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		

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Oxadiazon	19666309	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Oxamyl	23135220	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Oxyfluorfen	42874033	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Paclobutrazol	76738620	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Paraquat	1910425	4.50E-03 I					160 N	16 N	6.1 N	9200 N	350 N		
Parathion	56382	6.00E-03 H					220 N	22 N	8.1 N	12000 N	470 N	110 S	3.9 N
Pebulate	1114712	5.00E-02 H					1800 N	180 N	68 N	100000 N	3900 N		
Pendimethalin	40487421	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N		
Pentabromo-6-chloro cyclohexane	87843			2.30E-02 H			2.9 C	0.27 C	0.14 C	250 C	28 C		
Pentabromodiphenyl ether	32534819	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Pentachlorobenzene	608935	8.00E-04 I				☒	4.9 N	2.9 N	1.1 N	1600 N	63 N	570 N	48 N
Pentachloronitrobenzene	82688	3.00E-03 I		2.60E-01 H		☒	0.041 C	0.024 C	0.012 C	22 C	2.5 C		
Pentachlorophenol	87865	3.00E-02 I		1.20E-01 I			0.56 C	0.052 C	0.026 C	48 C	5.3 C	7.9 C	0.2 E
Permethrin	52645531	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		
Phenmedipham	13684634	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Phenol	108952	6.00E-01 I					22000 N	2200 N	810 N	1E+06 N	47000 N	21000 S	49 E
m-Phenylenediamine	108452	6.00E-03 I					220 N	22 N	8.1 N	12000 N	470 N		
p-Phenylenediamine	106503	1.90E-01 H					6900 N	690 N	260 N	390000 N	15000 N		
Phenylmercuric acetate	62384	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
2-Phenylphenol	90437			1.94E-03 H			35 C	3.2 C	1.6 C	3000 C	330 C		
Phorate	298022	2.00E-04 H					7.3 N	0.73 N	0.27 N	410 N	16 N		
Phosmet	732116	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
**Phosphine	7803512	3.00E-04 I	8.57E-05 H				11 N	0.31 N	0.41 N	610 N	23 N		
**Phosphoric acid	7664382	I	2.86E-03				100 N	10 N					
Phosphorus (white)	7723140	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
p-Phthalic acid	100210	1.00E+00 H					37000 N	3700 N	1400 N	1E+06 N	78000 N		
Phthalic anhydride	85449	2.00E+00 I	3.43E-02 H				73000 N	130 N	2700 N	1E+06 N	160000 N		
Picloram	1918021	7.00E-02 I					2600 N	260 N	95 N	140000 N	5500 N		
Pirimiphos-methyl	29232937	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
Polybrominated biphenyls		7.00E-06 H		8.90E+00 H			0.0076 C	0.0007 C	0.00035 C	0.64 C	0.072 C		
Polychlorinated biphenyls (PCBs)	1336363			7.70E+00 I			0.0087 C	0.00081 C	0.00041 C	0.74 C	0.083 C		
Aroclor 1016	12674112	7.00E-05 I					2.6 N	0.26 N	0.095 N	140 N	5.5 N		
Aroclor 1254	11097691	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Polychlorinated terphenyls (PCTs)				4.50E+00 E			0.015 C	0.0014 C	0.0007 C	1.3 C	0.14 C		
Polynuclear aromatic hydrocarbons												110000 S	
Acenaphthene	83329	6.00E-02 I					2200 N	220 N	81 N	120000 N	4700 N	120 S	200 E
Anthracene	120127	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N	6.8 S	4300 E
Benz[a]anthracene	56553			7.30E-01 E	6.10E-01 E		0.092 C	0.01 C	0.0043 C	7.8 C	0.88 C	27 S	0.7 E
Benzo[b]fluoranthene	205992			7.30E-01 E	6.10E-01 E		0.092 C	0.01 C	0.0043 C	7.8 C	0.88 C	23 S	4 E

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Benzo[k]fluoranthene	207089			7.30E-02 E	6.10E-02 E		0.92 C	0.1 C	0.043 C	78 C	8.8 C		4 E
Benzo[a]pyrene	50328			7.30E+00 I	6.10E+00 W		0.0092 C	0.001 C	0.00043 C	0.78 C	0.088 C	11 S	4 E
Carbazole	86748			2.00E-02 H			3.4 C	0.31 C	0.16 C	290 C	32 C	11 S	0.5 E
Chrysene	218019			7.30E-03 E	6.10E-03 E		9.2 C	1 C	0.43 C	780 C	88 C	3.6 S	1 E
Dibenz[ah]anthracene	53703			7.30E+00 E	6.10E+00 E		0.0092 C	0.001 C	0.00043 C	0.78 C	0.088 C	7.2 S	11 E
Fluoranthene	206440	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N	68 S	980 E
Fluorene	86737	4.00E-02 I					1500 N	150 N	54 N	82000 N	3100 N	89 S	160 E
Indeno[1,2,3-cd]pyrene	193395			7.30E-01 E	6.10E-01 E		0.092 C	0.01 C	0.0043 C	7.8 C	0.88 C	280 S	35 E
Naphthalene	91203	4.00E-02 W					1500 N	150 N	54 N	82000 N	3100 N	180 S	30 E
Pyrene	129000	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N	56 S	1400 E
Prochloraz	67747095	9.00E-03 I		1.50E-01 I			0.45 C	0.042 C	0.021 C	38 C	4.3 C		
Profluralin	26399360	6.00E-03 H					220 N	22 N	8.1 N	12000 N	470 N		
Prometon	1610180	1.50E-02 I					550 N	55 N	20 N	31000 N	1200 N		
Prometryn	7287196	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Pronamide	23950585	7.50E-02 I					2700 N	270 N	100 N	150000 N	5900 N		
Propachlor	1918167	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Propanil	709988	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Propargite	2312358	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Propargyl alcohol	107197	2.00E-03 I					73 N	7.3 N	2.7 N	4100 N	160 N		
Propazine	139402	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Propham	122429	2.00E-02 I					730 N	73 N	27 N	41000 N	1600 N		
Propiconazole	60207901	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Propylene glycol	57556	2.00E+01 H					730000 N	73000 N	27000 N	1E+06 N	1000000 N		
Propylene glycol, monoethyl ether	52125538	7.00E-01 H					26000 N	2600 N	950 N	1E+06 N	55000 N		
Propylene glycol, monomethyl ether	107982	7.00E-01 H	5.71E-01 I				26000 N	2100 N	950 N	1E+06 N	55000 N		
Propylene oxide	75569		8.57E-03 I	2.40E-01 I	1.29E-02 I		0.28 C	0.49 C	0.013 C	24 C	2.7 C		
Pursuit	81335775	2.50E-01 I					9100 N	910 N	340 N	510000 N	20000 N		
Pydrin	51630581	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Pyridine	110861	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Quinalphos	13593038	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
Quinoline	91225			1.20E+01 H			0.0056 C	0.00052 C	0.00026 C	0.48 C	0.053 C		
Resmethrin	10463868	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
Ronnel	299843	5.00E-02 H					1800 N	180 N	68 N	100000 N	3900 N		
Rotenone	83794	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Savey	78587050	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Selenious Acid	7783008	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Selenium	7782492	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		3 E
Selenourea	630104	5.00E-03 H					180 N	18 N	6.8 N	10000 N	390 N		
Sethoxydim	74051802	9.00E-02 I					3300 N	330 N	120 N	180000 N	7000 N		

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Silver and compounds	7440224	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		
Simazine	122349	5.00E-03 I		1.20E-01 H			0.56 C	0.052 C	0.026 C	48 C	5.3 C		
Sodium azide	26628228	4.00E-03 I					150 N	15 N	5.4 N	8200 N	310 N		
Sodium diethyldithiocarbamate	148185	3.00E-02 I		2.70E-01 H			0.25 C	0.023 C	0.012 C	21 C	2.4 C		
Sodium fluoroacetate	62748	2.00E-05 I					0.73 N	0.073 N	0.027 N	41 N	1.6 N		
Sodium metavanadate	13718268	1.00E-03 H					37 N	3.7 N	1.4 N	2000 N	78 N		
Strontium, stable	7440246	6.00E-01 I					22000 N	2200 N	810 N	1E+06 N	47000 N		
Strychnine	57249	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Styrene	100425	2.00E-01 I	2.86E-01 I			☒	1600 N	1000 N	270 N	410000 N	16000 N	1400 E	2 E
Systhane	88671890	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
2,3,7,8-TCDD (dioxin)	1746016			1.56E+05 H	1.16E+05 H		4E-07 C	5E-08 C	C	4E-05 C	4E-06 C		
Tebuthiuron	34014181	7.00E-02 I					2600 N	260 N	95 N	140000 N	5500 N		
Temephos	3383968	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N		
Terbacil	5902512	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Terbufos	13071799	2.50E-05 H					0.91 N	0.091 N	0.034 N	51 N	2 N		
Terbutryn	886500	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
1,2,4,5-Tetrachlorobenzene	95943	3.00E-04 I				☒	1.8 N	1.1 N	0.41 N	610 N	23 N	91 N	0.69 N
1,1,1,2-Tetrachloroethane	630206	3.00E-02 I		2.60E-02 I	2.59E-02 I	☒	0.41 C	0.24 C	0.12 C	220 C	25 C		
1,1,2,2-Tetrachloroethane	79345			2.00E-01 I	2.03E-01 I	☒	0.052 C	0.031 C	0.016 C	29 C	3.2 C	0.4 E	0.001 E
Tetrachloroethylene (PCE)	127184	1.00E-02 I		5.20E-02 E	2.03E-03 E	☒	1.1 C	3.1 C	0.061 C	110 C	12 C	11 E	0.04 E
2,3,4,6-Tetrachlorophenol	58902	3.00E-02 I					1100 N	110 N	41 N	61000 N	2300 N		
p,a,a,a-Tetrachlorotoluene	5216251			2.00E+01 H		☒	0.00053 C	0.00031 C	0.00016 C	0.29 C	0.032 C		
Tetrachlorovinphos	961115	3.00E-02 I		2.40E-02 H			2.8 C	0.26 C	0.13 C	240 C	27 C		
Tetraethyldithiopyrophosphate	3689245	5.00E-04 I					18 N	1.8 N	0.68 N	1000 N	39 N		
Tetraethyl lead	78002	1.00E-07 I					0.0037 N	0.00037 N	0.00014 N	0.2 N	0.0078 N	0.00068 N	0.000034 N
**1,1,1,2-Tetrafluoroethane	811972	I	2.29E+01			☒	140000 N	84000 N					
Thallic oxide	1314325	7.00E-05 W					2.6 N	0.26 N	0.095 N	140 N	5.5 N		
Thallium													0.4 E
Thallium acetate	563688	9.00E-05 I					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium carbonate	6533739	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thallium chloride	7791120	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thallium nitrate	10102451	9.00E-05 I					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium selenite	12039520	9.00E-05 W					3.3 N	0.33 N	0.12 N	180 N	7 N		
Thallium sulfate	7446186	8.00E-05 I					2.9 N	0.29 N	0.11 N	160 N	6.3 N		
Thiobencarb	28249776	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
2-(Thiocyanomethylthio)-benzothiazole	21564170	3.00E-02 H					1100 N	110 N	41 N	61000 N	2300 N		
Thiofanox	39196184	3.00E-04 H					11 N	1.1 N	0.41 N	610 N	23 N		
Thiophanate-methyl	23564058	8.00E-02 I					2900 N	290 N	110 N	160000 N	6300 N		
Thiram	137268	5.00E-03 I					180 N	18 N	6.8 N	10000 N	390 N		

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Tin and compounds		6.00E-01 H					22000 N	2200 N	810 N	1E+06 N	47000 N		
Toluene	108883	2.00E-01 I	1.14E-01 I			☒	750 N	420 N	270 N	410000 N	16000 N	520 E	5 E
Toluene-2,4-diamine	95807			3.20E+00 H			0.021 C	0.002 C	0.00099 C	1.8 C	0.2 C		
Toluene-2,5-diamine	95705	6.00E-01 H					22000 N	2200 N	810 N	1E+06 N	47000 N		
Toluene-2,6-diamine	823405	2.00E-01 H					7300 N	730 N	270 N	410000 N	16000 N		
p-Toluidine	106490			1.90E-01 H			0.35 C	0.033 C	0.017 C	30 C	3.4 C		
Toxaphene	8001352			1.10E+00 I	1.12E+00 I		0.061 C	0.0056 C	0.0029 C	5.2 C	0.58 C	5 E	0.04 E
Tralomethrin	66841256	7.50E-03 I					270 N	27 N	10 N	15000 N	590 N		
Triallate	2303175	1.30E-02 I					470 N	47 N	18 N	27000 N	1000 N		
Triasulfuron	82097505	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
1,2,4-Tribromobenzene	615543	5.00E-03 I				☒	30 N	18 N	6.8 N	10000 N	390 N		
Tributyltin oxide (TBTO)	56359	3.00E-05 I					1.1 N	0.11 N	0.041 N	61 N	2.3 N		
2,4,6-Trichloroaniline hydrochloride	33663502			2.90E-02 H			2.3 C	0.22 C	0.11 C	200 C	22 C		
2,4,6-Trichloroaniline	634935			3.40E-02 H			2 C	0.18 C	0.093 C	170 C	19 C		
1,2,4-Trichlorobenzene	120821	1.00E-02 I	5.71c-02 H			☒	190 N	210 N	14 N	20000 N	780 N	240 E	2 E
1,1,1-Trichloroethane	71556	9.00E-02 W	2.86E-01 W			☒	1300 N	1000 N	120 N	180000 N	7000 N	980 E	0.9 E
1,1,2-Trichloroethane	79005	4.00E-03 I		5.70E-02 I	5.60E-02 I	☒	0.19 C	0.11 C	0.055 C	100 C	11 C	0.8 E	0.01 E
Trichloroethylene (TCE)	79016	6.00E-03 E		1.10E-02 W	6.00E-03 E	☒	1.6 C	1 C	0.29 C	520 C	58 C	3 E	0.02 E
Trichlorofluoromethane	75694	3.00E-01 I	2.00E-01 A			☒	1300 N	730 N	410 N	610000 N	23000 N	790 N	13 N
2,4,5-Trichlorophenol	95954	1.00E-01 I					3700 N	370 N	140 N	200000 N	7800 N	8200 S	120 E
2,4,6-Trichlorophenol	88062			1.10E-02 I	1.09E-02 I		6.1 C	0.57 C	0.29 C	520 C	58 C	150 C	0.06 E
2,4,5-Trichlorophenoxyacetic acid	93765	1.00E-02 I					370 N	37 N	14 N	20000 N	780 N		
2-(2,4,5-Trichlorophenoxy)propionic acid	93721	8.00E-03 I					290 N	29 N	11 N	16000 N	630 N		
1,1,2-Trichloropropane	598776	5.00E-03 I				☒	30 N	18 N	6.8 N	10000 N	390 N	13 N	0.14 N
1,2,3-Trichloropropane	96184	6.00E-03 I		7.00c+00 I		☒	0.0015 C	0.00089 C	0.00045 C	0.82 C	0.091 C	0.00003 C	6.000E-06 C
1,2,3-Trichloropropene	96195	5.00E-03 H				☒	30 N	18 N	6.8 N	10000 N	390 N		
1,1,2-Trichloro-1,2,2- trifluoroethane	76131	3.00E+01 I	8.57E+00 H			☒	59000 N	31000 N	41000 N	1E+06 N	1000000 N	2400 S	3100 N
Tridiphane	58138082	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Triethylamine	121448		2.00E-03 I				73 N	7.3 N					
Trifluralin	1582098	7.50E-03 I		7.70E-03 I			8.7 C	0.81 C	0.41 C	740 C	83 C		
**1,2,4-Trimethylbenzene	95636	5.00c-02 E				☒	300 N	180 N	68 N	100000 N	3900 N		
**1,3,5-Trimethylbenzene	108678	5.00c-02 E				☒	300 N	180 N	68 N	100000 N	3900 N	98 S	0.26 M
Trimethyl phosphate	512561			3.70E-02 H			1.8 C	0.17 C	0.085 C	150 C	17 C		
1,3,5-Trinitrobenzene	99354	5.00E-05 I					1.8 N	0.18 N	0.068 N	100 N	3.9 N		
Trinitrophenylmethylnitramine	479458	1.00E-02 H					370 N	37 N	14 N	20000 N	780 N		
2,4,6-Trinitrotoluene	118967	5.00E-04 I		3.00E-02 I			2.2 C	0.21 C	0.11 C	190 C	21 C		
Uranium (soluble salts)	7440611	3.00E-03 I					110 N	11 N	4.1 N	6100 N	230 N		
Vanadium	7440622	7.00E-03 H					260 N	26 N	9.5 N	14000 N	550 N		
Vanadium pentoxide	1314621	9.00E-03 I					330 N	33 N	12 N	18000 N	700 N		

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Contaminant	CAS	RfDo mg/kg/d	RfDi mg/kg/d	CPSo kg·d/mg	CPSi kg·d/mg	VOC	Risk-Based Concentrations: Tap Water µg/L	Ambient Air µg/m3	Fish mg/kg	Soil Ingestion: Industrial mg/kg	Residential mg/kg	Soil Screening Levels-Transfers from Soil to: Air mg/kg	Groundwater mg/kg
Vanadium sulfate	36907423	2.00E-02 H					730 N	73 N	27 N	41000 N	1600 N		
Vernam	1929777	1.00E-03 I					37 N	3.7 N	1.4 N	2000 N	78 N		
Vinclozolin	50471448	2.50E-02 I					910 N	91 N	34 N	51000 N	2000 N		
Vinyl acetate	108054	1.00E+00 H	5.71E-02 I				37000 N	210 N	1400 N	1E+06 N	78000 N	370 E	84 E
Vinyl bromide	593602		8.57E-04 I			☒	5.2 N	3.1 N				2 N	0.018 N
Vinyl chloride	75014			1.90E+00 H	3.00E-01 H	☒	0.019 C	0.021 C	0.0017 C	3 C	0.34 C	0.002 E	0.01 E
Warfarin	81812	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N	0.046 N	1800 N
m-Xylene	108323	2.00E+00 H	2.00E-01 W			☒	1400 N	730 N	2700 N	1E+06 N	160000 N	950 S	240 M
o-Xylene	9.55E+04	2.00E+00 H	2.00E-01 W			☒	1400 N	730 N	2700 N	1E+06 N	160000 N	730 S	1.50E+02 M
p-Xylene	1.06E+05		8.57E-02 W			☒	520 N	310 N				1000 S	2.20E+02 M
Xylene (mixed)	1.33E+06	2.00E+00 I				☒	12000 N	7300 N	2700 N	1E+06 N	160000 N	320 E	7.40E+01 E
Zinc	7.44E+06	3.00E-01 I					11000 N	1100 N	410 N	610000 N	23000 N		4.20E+04 E
Zinc phosphide	1.31E+06	3.00E-04 I					11 N	1.1 N	0.41 N	610 N	23 N		
Zineb	1.21E+07	5.00E-02 I					1800 N	180 N	68 N	100000 N	3900 N		

APPENDIX J-2

FLORIDA SOIL CLEANUP GOALS

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOIL CLEANUP GOALS FOR FLORIDA

REMEDIAL INVESTIGATION REPORT
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Florida Department of

Memorandum

Environmental Protection

TO: District Directors
Waste Program Administrators

FROM: John M. Ruddell, Director JMR
Division of Waste Management

DATE: September 29, 1995

SUBJECT: **Soil Cleanup Goals for Florida**

Attached, please find the soil cleanup goals that should be used when making cleanup decisions. These cleanup goals were developed by Dr. Stephen M. Roberts (UF toxicologist under contract to FDEP). The health-based cleanup goals (residential and industrial) are based on human toxicity using generalized exposure assumptions and are applicable to the upper two feet of soil. If the industrial scenario is warranted, the site should have a deed restriction for the more restrictive land use. If there is ground water contamination above Florida standards and minimum criteria or if there was a recent discharge, the leachability-based cleanup goals should also be considered using the applicable direct contact scenario (residential and industrial). The lowest of the two should be the final cleanup goal for the upper two feet of soil. For soil below two feet, the leachability-based goal should be applied if the parameters of concern are detected above the Florida criteria. In addition, until further notice and where appropriate, the metals should pass TCLP as an indication not only that the soil is not a hazardous waste, but also that the soil will not act as a source of groundwater contamination.

If any of the levels is below site-specific background or the QA acceptable Method Detection Limit (MDL), any of the latter two will suffice.

Site-specific soil characteristics such as porosity, carbon content, moisture content, and dry bulk density are needed to refine acceptable soil concentrations based on site-specific parameters.

If you have any questions, please call Ligia Mora-Applegate at SC 278-3935.

JMR/lm-a

Attachment

cc: Doug Jones
Bill Hinkley
Jim Crane
Satish Kastury

BUREAU OF WASTE CLEANUP

SEP 29 1995

TECHNICAL REVIEW SECTION

Soil Cleanup Goals

Based on Direct Exposure and Migration to Groundwater

September 27, 1995

The appended Table 1 contains acceptable soil concentrations for over 200 chemicals commonly found as contaminants at sites in Florida. Soil cleanup goal concentrations based on direct exposure have been calculated using exposure assumptions consistent with both residential and commercial/industrial land use, and are presented in Table 1. For situations in which there is evidence that soil may be serving as a source of contamination for groundwater, soil cleanup goal concentrations for organic chemicals based on leaching from soil to groundwater are also provided in this table.

For evaluation of direct exposure to contaminants in soils, intake from incidental ingestion, dermal contact, and inhalation is considered. Soil concentrations are calculated using the following equation:

$$Cs = \frac{TR \times BW \times AT}{EF \times ED \times FC \times [A + B + C]}$$

When calculating soil concentrations based on potential carcinogenicity:

- the ingestion component, A = $\left(SF_o \times IR_o \times 10^{-6} kg / mg\right)$
- the dermal component, B = $\left(SF_d \times SA \times AF \times DA \times 10^{-6} kg / mg\right)$
- and the inhalation component, C = $\left(SF_i \times IR_i \times \left(\frac{1}{VF} + \frac{1}{PEF}\right)\right)$

When calculating soil concentrations based on potential non-cancer health effects:

- the ingestion component, A = $\left(\frac{1}{RfD_o} \times IR_o \times 10^{-6} kg / mg\right)$
- the dermal component, B = $\left(\frac{1}{RfD_d} \times SA \times AF \times DA \times 10^{-6} kg / mg\right)$
- and the inhalation component, C = $\left(\frac{1}{RfD_i} \times IR_i \times \left(\frac{1}{VF} + \frac{1}{PEF}\right)\right)$

The equation variables and assumptions are summarized in Table 2. For most chemicals in Table 1, toxicity criteria (reference doses and slope factors) can be taken from IRIS (Integrated Risk Information System, USEPA). When toxicity criteria are unavailable from IRIS, other sources (e.g. HEAST, ECAO, OPP, and the toxicological literature) were used. Intake from all

routes should be assumed to contribute to toxic endpoints that are systemic in nature. For toxic endpoints that are route-specific (e.g. carcinogenicity from inhalation of hexavalent chromium), only the relevant intake pathway is included in the calculation of the soil cleanup goal. Dermal toxicity criteria were derived using route-to-route extrapolation from available criteria for other routes; for some chemicals, inhalation toxicity criteria can also be derived using this method. For carcinogens, soil cleanup goal concentrations should be calculated for both carcinogenic and non-carcinogenic health effects. Only the lower of the two value is shown in Table 1. These values are intended to be applicable only to soil contamination within 2 feet of land surface.

For leaching of organic contaminants from soil to groundwater, the following equation was used to calculate a soil cleanup goal:

$$Cs = Cw\left[K_d + \frac{(\theta_w + \theta_a H')}{\rho_b}\right]$$

The variables and assumed values are summarized below:

Variable	Definition	Assumed Value
Cw	target soil leachate concentration (mg/L)	chemical-specific
K_d	soil-water partition coefficient (cm^3/g)	$K_{oc} \times f_{oc}$ (organics)
q_w	water-filled soil porosity (L_{water}/L_{soil})	0.3
q_a	air-filled soil porosity (L_{air}/L_{soil})	0.13
r_b	dry soil bulk density (kg/L)	1.5
Koc	organic carbon partition coefficient (cm^3/g)	chemical-specific
f_{oc}	organic carbon content of soil (g/g)	0.002 (0.2%)
H'	dimensionless Henry's Law constant	chemical-specific

Soil concentrations based on partitioning to groundwater are not calculated in the same way for inorganics, and for some organic chemicals the necessary physical-chemical characteristics may be unavailable. Soil cleanup goals for this latter group of chemicals may become available in future updates.

Some risk-based values presented in Table 1 may be less than natural background concentrations for the chemicals in the soils. In such cases, the background concentration would represent a reasonable cleanup goal. Similarly, if the risk based value is less than the Method of Detection Limit (MDL), the MDL would become the operational cleanup goal for practical reasons.

The values in Table 1 were calculated using generic assumptions regarding exposure and soil characteristics and are intended to be broadly applicable to sites in Florida. In some situations it may be desirable to utilize site-specific assumptions in the development of cleanup goals for contaminants in soils. For example, site-specific soil characteristics might be used to refine estimates of acceptable soil concentrations based on both direct contact and leachability. The use of more limited exposure assumptions should be considered in the development of soil cleanup goals only when they can be reasonably assured to reflect both current and plausible future land use.

It is important to recognize that acceptable soil concentrations for individual chemicals will change over time in response to new information regarding the toxicity of the chemical, improvement in exposure modeling, etc. Accordingly, this list will be updated periodically to ensure that the most current information is available.

Table 1. SELECTED SOIL CLEAN-UP GOALS *

Current as of September 27, 1995

All values are presented in mg/kg (ppm)

Chemical Name	CAS	Residential	Industrial	Leaching **
Acenaphthene	83-32-9	2800	30000	2.0
Acenaphthylene	208-96-8	670	5600	11
Acetone	67-64-1	260	1800	1.4
Acrolein	107-02-8	0.4	2.7	0.3
Acrylonitrile	107-13-1	0.1	0.2	0.02
Alachlor	15972-60-8	14	56	NC
Aldrin	309-00-2	0.06	0.2	0.05
Aluminum	7429-90-5	75000	†	NC
Anthracene	120-12-7	20000	300000	890
Antimony	7440-36-0	26	220	NC
Arsenic	7440-38-2	0.7	3.1	NC
Atrazine	1912-24-9	4.9	20	0.02
Barium	7440-39-3	5200	84000	NC
Benzene	71-43-2	1.4	2.0	0.003
Benzo(a)anthracene	56-55-3	1.4	4.9	29
Benzo(a)pyrene	50-32-8	0.1	0.5	3.7
Benzo(b)fluoranthene	205-99-2	1.4	5.0	71
Benzo(g,h,i)perylene	191-24-2	14	50	320
Benzo(k)fluoranthene	207-08-9	14	48	44
Benzoic acid	65-85-0	130000	†	56
Beryllium	7440-41-7	0.2‡	1.0‡	NC
Bis(2-chloroethoxy)methane	111-91-1	170	3000	0.03
Bis(2-chloroethyl)ether	111-44-4	0.5	0.9	0.005
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	48	110	11
Boron	7440-42-8	7000	180000	NC
Bromodichloromethane	75-27-4	0.7	01	0.002
Bromoform	75-25-2	65	130	0.02
Butanone, 2- (MEK)	78-93-3	2200	15000	8.7
Butyl benzyl phthalate, N-	85-68-7	15000	310000	960
Cadmium	7440-43-9	37	600	NC
Carbaryl	63-25-2	7600	150000	4.6
Carbazole	86-74-8	42	120	0.4

Table 1. SELECTED SOIL CLEAN-UP GOALS *

Current as of September 27, 1995

All values are presented in mg/kg (ppm)

Chemical Name	CAS	Residential	Industrial	Leaching **
Carbofuran	1563-66-2	380	7700	0.1
Carbon disulfide	75-15-0	5.2	34	2.5
Carbon tetrachloride	56-23-5	0.6	0.8	0.02
Chlordane	57-74-9	0.8	3.0	2.1
Chloro-m-cresol, p-	59-50-7	140000	†	42
Chloroaniline, 4-	106-47-8	240	3300	0.08
Chlorobenzene	108-90-7	44	300	0.6
Chloroethylvinylether, 2-	110-75-8	100	690	0.002
Chloroform	67-66-3	0.6	0.8	0.02
Chloromethane	74-87-3	0.2	0.3	0.01
Chloronaphthalene, beta-	91-58-7	560	4000	57
Chlorophenol, 2-	95-57-8	280	3700	0.3
Chlorpyrifos	2921-88-2	190	2900	2.6
Chromium (hexavalent)	18540-29-9	290	430	NC
Chromium (trivalent)	16065-83-1	66000	540000	NC
Chrysene	218-01-9	140	500	31
Cobalt	7440-48-4	4700	110000	NC
Coumaphos	56-72-4	19	410	NC
Cyanide	57-12-5	1600	40000	NC
DDD, 4,4'-	72-54-8	4.5	17	0.2
DDE, 4,4'-	72-55-9	3.0	11	0.2
DDT, 4,4'-	50-29-3	3.1	12	0.5
Dalapon	75-99-0	1900	28000	0.4
Demeton	8065-48-3	3.1	64	NC
Di-n-Butylphthalate	84-74-2	7300	140000	23
Di-n-Octylphthalate	117-84-0	1500	32000	†
Diazinon	333-41-5	66	1300	0.04
Dibenz(a,h)anthracene	53-70-3	0.1	0.5	7.2
Dibenzofuran	132-64-9	240	3500	NC
Dibromochloromethane	124-48-1	1.2	1.7	0.004
Dibromoethane, 1,2- (EDB)	106-93-4	0.01	0.04	0.00006
Dicamba	1918-00-9	1700	23000	0.7

Table 1. SELECTED SOIL CLEAN-UP GOALS *

Current as of September 27, 1995

All values are presented in mg/kg (ppm)

Chemical Name	CAS	Residential	Industrial	Leaching **
Dichlorobenzene, 1,2-	95-50-1	820	6000	5.8
Dichlorobenzene, 1,3-	541-73-1	1700	13000	0.4
Dichlorobenzene, 1,4-	106-46-7	7.5	11	0.9
Dichloroethane, 1,1-	75-34-3	310	2100	2.3
Dichloroethane, 1,2- (EDC)	107-06-2	0.7	1.0	0.008
Dichloroethene, 1,1-	75-35-4	0.1	0.1	0.03
Dichloroethene, cis-1,2-	156-59-2	26	180	0.2
Dichloroethene, trans-1,2-	156-60-5	62	430	0.3
Dichlorophenol, 2,4-	120-83-2	220	4000	0.02
Dichlorophenoxy acetic acid, 2,4-	94-75-7	110	800	0.2
Dichlorophenoxy) butyric acid, 4-(2,4-	94-82-6	610	13000	NC
Dichloroprop	120-36-5	3.8	15	NC
Dichloropropane, 1,2-	78-87-5	0.8	1.2	0.02
Dichloropropene, 1,3-	542-75-6	0.3	0.4	0.003
Dichlorvos	62-73-7	3.8	15	0.0003
Dicofol (Kelthane)	115-32-2	2.5	10	NC
Dieldrin	60-57-1	0.07	0.3	0.02
Diethylphthalate	84-66-2	56000	970000	20
Dimethylformamide, N,N-	68-12-2	1800	27000	1.5
Dimethylphenol, 2,4-	105-67-9	1200	16000	1.8
Dimethylphthalate	131-11-3	630000	†	200
Dinitrotoluene, 2,4-	121-14-2	130	2000	0.0006
Dinitrotoluene, 2,6-	606-20-2	71	1300	0.0006
Dinoseb	88-85-7	43	470	0.4
Disulfoton	298-04-4	2.8	50	0.01
Diuron	330-54-1	130	2100	0.1
Endosulfan	115-29-7	390	5900	0.7
Endrin	72-20-8	23	470	0.4
Endrin aldehyde	7421-93-4	23	480	0.05
Ethoprop	13194-48-4	1.2	25	NC
Ethyl chloride	75-00-3	8200	56000	0.6
Ethyl dipropylthiocarbamate, S- (EPTC)	759-94-4	1900	38000	NC

Table 1. SELECTED SOIL CLEAN-UP GOALS *

Current as of September 27, 1995

All values are presented in mg/kg (ppm)

Chemical Name	CAS	Residential	Industrial	Leaching **
Ethyl p-nitrophenyl phenylphosphorothioate	2104-64-5	0.8	15	0.008
Ethylbenzene	100-41-4	1400	10000	0.2
Fenamiphos	22224-92-6	19	410	0.06
Fensulfothion	115-90-2	19	410	NC
Fenthion	55-38-9	3.8	80	NC
Fluoranthene	206-44-0	2900	48000	280
Fluorene	86-73-7	2400	30000	45
Fluoride	16984-58-8	4700	120000	NC
Guthion (Azinphos-methyl)	86-50-0	120	2500	0.1
Heptachlor	76-44-8	0.2	0.5	0.06
Heptachlor epoxide	1024-57-3	0.1	0.3	0.03
Hexachlorobenzene	118-74-1	0.6	1.6	0.8
Hexachlorobutadiene	87-68-3	3.1	4.9	2.1
Hexachlorocyclohexane, alpha-	319-84-6	0.2	0.6	0.002
Hexachlorocyclohexane, beta-	319-85-7	0.6	2.3	0.005
Hexachlorocyclohexane, delta-	319-86-8	23	470	0.007
Hexachlorocyclohexane, gamma-	58-89-9	0.8	3.0	0.006
Hexachloroethane	67-72-1	27	120	0.4
Hexane, n-	110-54-3	76	510	1.0
Hexazinone	51235-04-2	2500	52000	NC
Indeno(1,2,3-cd)pyrene	193-39-5	1.4	5.0	17
Lead	7439-92-1	500	1000	NC
Linuron	330-55-2	150	3200	NC
Lithium	743-99-32	1600	40000	NC
Malathion	121-75-5	1500	23000	1.1
Manganese	7439-96-5	370	5500	NC
Mercury	7439-97-6	23	480	NC
Merphos	150-50-5	2.3	48	NC
Mesurol (Methiocarb)	2032-65-7	310	4600	NC
Methomyl	16752-77-5	1900	41000	0.5
Methoxychlor	72-43-5	380	7800	62
Methyl parathion	298-00-0	19	350	0.1

Table 1. SELECTED SOIL CLEAN-UP GOALS *

Current as of September 27, 1995

All values are presented in mg/kg (ppm)

Chemical Name	CAS	Residential	Industrial	Leaching **
Methyl tert-butyl ether	1634-04-4	3800	27000	0.1
Methyl-2-pentanone, 4- (MIBK)	108-10-1	520	3700	1.1
Methyl-4-chlorophenoxy acetic acid, 2-	94-74-6	38	800	NC
Methyl-4-chlorophenoxy propionic acid, 2-	93-65-2	77	1600	NC
Methylene chloride	75-09-2	16	23	0.01
Methylnaphthalene, 1-	90-12-0	930	8400	NC
Methylnaphthalene, 2-	91-57-6	960	8800	NC
Methylphenol, 2- (o-cresol)	95-48-7	2600	32000	1.1
Methylphenol, 3- (m-cresol)	108-39-4	3400	55000	4.2
Methylphenol, 4- (p-cresol)	106-44-5	340	5500	0.4
Metribuzin	21087-64-9	1900	42000	NC
Mevinphos	7786-34-7	19	420	NC
Mirex	2385-85-5	0.4	0.8	0.01
Molybdenum	7439-98-7	390	9600	NC
Monuron	150-68-5	9.6	190	NC
Naled	300-76-5	150	3200	NC
Naphthalene	91-20-3	1300	12000	0.1
Nickel	7440-02-0	1500	26000	NC
Nickel subsulfide	12035-72-2	7000	10000	NC
Nitrate	14797-55-8	120000	†	NC
Nitrite	14797-65-0	7800	200000	NC
Nitroaniline, o-	88-74-4	4.0	73	0.02
Nitroaniline, p-	100-01-6	230	4700	NC
Nitrobenzene	98-95-3	22	250	0.04
Nitroso-di-n-propylamine, N-	621-64-7	0.02	0.03	0.009
Nitrosodimethylamine, N-	62-75-9	0.003	0.004	0.02
Nitrosodiphenylamine, N-	86-30-6	73	130	0.06
Oxamyl	23135-22-0	1900	42000	NC
Parathion	56-38-2	450	9000	3.9
Pentachlorophenol	87-86-5	5.4	12	0.01
Phenanthrene	85-01-8	1700	21000	2.8
Phenol	108-95-2	34000	440000	0.02

Table 1. SELECTED SOIL CLEAN-UP GOALS *

Current as of September 27, 1995

All values are presented in mg/kg (ppm)

Chemical Name	CAS	Residential	Industrial	Leaching **
Phorate	298-02-2	14	240	0.05
Polychlorinated biphenyls (PCBs)	1336-36-3	0.9	3.5	44
Propazine	139-40-2	1500	32000	2.3
Pyrene	129-00-0	2200	41000	290
Pyridine	110-86-1	0.5	3.2	0.02
Ronnel	299-84-3	3700	71000	NC
Selenium	7782-49-2	390	9900	NC
Silver	7440-22-4	390	9000	NC
Sodium diethyldithiocarbamate	148-18-5	4.1	17	NC
Strontium	7440-24-6	47000	†	NC
Styrene	100-42-5	4100	34000	2.0
Tetrachloroethane, 1,1,1,2-	630-20-6	5.9	8.9	0.003
Tetrachloroethane, 1,1,2,2-	79-34-5	0.9	1.4	0.0007
Tetrachloroethene (PCE)	127-18-4	12	28	0.03
Tetrachlorvinphos (Stirophos)	961-11-5	45	180	NC
Tetraethyl dithiopyrophosphate	3689-24-5	34	590	0.06
Tetraethylpyrophosphate (TEPP)	107-49-3	2.5	51	NC
Tin	7440-31-5	44000	670000	NC
Tokuthion	34643-46-4	68	1400	NC
Toluene	108-88-3	520	3500	0.2
Toxaphene	8001-35-2	0.9	3.0	0.04
Trichlorobenzene, 1,2,4-	120-82-1	590	8200	2.3
Trichloroethane, 1,1,1-	71-55-6	610	4300	0.9
Trichloroethane, 1,1,2-	79-00-5	2.0	3.0	0.02
Trichloroethene (TCE)	79-01-6	6.5	9.3	0.01
Trichlorofluoromethane	75-69-4	6.6	44	400
Trichlorophenol, 2,4,5-	95-95-4	7100	130000	0.1
Trichlorophenol, 2,4,6-	88-06-2	87	280	0.08
Trichlorophenoxy acetic acid, 2,4,5-	93-76-5	760	15000	NC
Trichlorophenoxy propionic acid, 2,4,5	93-72-1	610	13000	2.7
Trimethylbenzene, 1,2,3-	526-73-8	6.7	51	0.2
Trimethylbenzene, 1,2,4-	95-63-6	6.2	47	0.2

Table 1. SELECTED SOIL CLEAN-UP GOALS *

Current as of September 27, 1995

All values are presented in mg/kg (ppm)

Chemical Name	CAS	Residential	Industrial	Leaching **
Trimethylbenzene, 1,3,5-	108-67-8	3.7	27	0.1
Uranium, natural	7440-61-1	120	410	NC
Vanadium	7440-62-2	490	4800	NC
Vinyl acetate	108-05-4	180	1200	0.5
Vinyl chloride	75-01-4	0.005	0.007	0.005
Xylene, total	1330-20-7	13000	92000	0.1
Zinc	7440-66-6	23000	560000	NC

* Soil cleanup goals in these tables are based on human toxicity using generalized exposure assumptions. Some tabulated soil cleanup goals may be less than the minimum detection limit (MDL) for that chemical in soils; in such cases the MDL would be the applicable cleanup goal.

** TCLP for metals applies as appropriate.

NC = No Value Calculated

TCLP = Toxicity Leaching Characteristic Leaching Procedure.

† = Number exceeds 1E+06.

‡ = Based on dermal absorption of 0.0001

Table 2. Variables and Assumptions for Calculating Soil Cleanup Goals Based on Direct Exposure to Soil

Variable	Child Resident[1] (age 1-6 years)	Aggregate Resident[2] (age 1 - 30 yrs)	On-Site Worker[3]
BW (body weight)	15 kg	59 kg	70 kg
IRo (ingestion rate, oral)	200 mg/kg	120 mg/day	50 mg/day
IRi (inhalation rate)	10 m^3/day	15 m^3/day	20 m^3/day
FC (fraction from contam. source)	1.0 (100%)	1.0 (100%)	1.0 (100%)
EF (exposure frequency)	350 days/yr	350 days/yr	250 days/yr
ED (exposure duration)	6 yrs	30 yrs	25 yrs
SA (surface area of skin exposed)	1,800 cm^2/day	4,855 cm^2/day	2,300 cm^2/day
AF (adherence factor)	0.2 mg/cm^2	0.2 mg/cm^2	0.6 mg/cm2
AT (averaging time)			
• non-carcinogens	2,190 days	10,950	9,125 days
• carcinogens	25,550 days	25,550 days	25,550 days

[1] used in calculating soil cleanup goals based on non-cancer health effects for a residential scenario

[2] used in calculating soil cleanup goals based on potential carcinogenicity for a residential scenario.

[3] used in calculating soil cleanup goals based on both cancer and non-cancer health effects for commercial/industrial land use.

Variable	
TR (target risk)	1 x 10^{-6} for carcinogens; hazard quotient of 1.0 for non-carcinogens
DA (dermal absorption)	0.01 for organics; 0.001 for inorganics[4]
PEF (particulate emission factor)	1.24 E+09 m^3/kg
VF (volatilization factor)	compound specific[5]
SF (slope factor)	compound and route specific
RfD (reference dose)	compound and route specific

[4] based upon Region IV guidance

[5] refer to *Technical Background Document for Draft Soil Screening Level Guidance*, EPA 540/R-94/018, July 1994, for the method of calculation.

APPENDIX J-3

HUMAN HEALTH CHEMICAL OF POTENTIAL CONCERN
ESSENTIAL NUTRIENTS

DERIVATION OF ESSENTIAL NUTRIENT SCREENING VALUES

REMEDIAL INVESTIGATION REPORT
OPERABLE UNIT 1
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

APPENDIX J-3
DERIVATION OF ESSENTIAL NUTRIENT SCREENING VALUES

Certain inorganics (calcium, iron, magnesium, potassium, and sodium) that are present as naturally occurring constituents in soil and groundwater are required in limited intakes to maintain normal human physiological functions and are, therefore, considered essential nutrients. The Risk Assessment Guidance for Superfund (RAGS), Volume I, Part A, regarding the treatment of essential nutrients in selection of Human Health Contaminants of Potential Concern (HHCPC), states that essential nutrients need not be quantitatively evaluated in a public health risk assessment if they are 1) present at low concentrations (only slightly above background) and 2) toxic only at doses much higher than those that might be related to exposure at the site (USEPA, 1989). In this report, "only slightly above background" is interpreted to mean that the arithmetic mean of the site concentrations is less than two times the arithmetic mean of the background concentrations. The focus of this appendix is to present the technical approach for determining that an analyte is "toxic only at doses higher than those associated with exposures at the site" and a mechanism for making that determination by employing soil and groundwater screening concentrations. The screening concentrations are used to streamline the process and to eliminate the need to calculate essential nutrient doses as part of HHCPC selection at every site. If the maximum concentration of an essential nutrient does not exceed the appropriate screening concentration shown below, the essential nutrient is considered nontoxic. Essential nutrients are not retained as HHCPCs if they are detected at concentrations that are either consistent with background or do not exceed the screening concentrations.

With the exception of iron, for which USEPA Region III has published risk-based concentrations (RBCs), no published essential nutrient screening concentrations for use in risk assessment HHCPC selection are available. Therefore, ABB-ES has derived surface soil and groundwater screening concentrations of essential nutrients that, when contacted in accordance with the exposure assumptions described below, are not expected to result in adverse health effects. The screening concentrations for groundwater and surface soil are presented in Table J-2-1. The essential nutrient concentrations in surface soil and groundwater are to be compared directly to the nutrient screening concentrations for the purposes of HHCPC selection.

Although HHCPC screening values for iron have been recently published by USEPA Region III (USEPA, 1995a), an alternative HHCPC screening value for iron is presented in this appendix (Table J-3-1), as discussed below. As described below, screening concentrations for surface soil and groundwater represent conservative screening concentrations for other media. These surface soil and groundwater screening concentrations are used to screen subsurface soil, sediment and surface water, respectively.

Table J-3-1
Essential Nutrient Screening Concentrations for Surface Soil and Groundwater

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Essential Nutrient	Surface Soil Screening Concentration (mg/kg)	Groundwater Screening Concentration (µg/L)
Calcium	1,000,000 [1]	1,055,398
Iron	47,824	13,267
Magnesium	460,468	118,807
Potassium	1,000,000 [1]	297,016
Sodium	1,000,000 [1]	396,022

[1] Actual calculated screening concentration is greater than 1,000,000 mg/kg (Table J-2-5), indicating that this essential nutrient would not be present at toxic levels in surface soil.

DOCUMENTATION OF SURFACE SOIL AND GROUNDWATER SCREENING CONCENTRATIONS. The essential nutrient toxicity screening concentrations were derived in two steps: first, a "non-toxic" dose was identified for each essential nutrient; second, the soil and groundwater concentrations associated with the "non-toxic" doses were calculated using standard residential exposure assumptions. The details of the derivation of the screening values are presented below.

Identification of Non-Toxic Doses The identification of doses which are not toxic is often accomplished by identifying Reference Doses (RfDs) which are published by USEPA. These RfDs represent doses, including a margin of safety, to which even sensitive subpopulations could be exposed for a lifetime without adverse non-carcinogenic effects. Because no RfDs for calcium, iron, magnesium, potassium, or sodium are available in the Integrated Risk Information System (IRIS) (USEPA, 1996) or the Health Effects Assessment Summary Tables (HEAST) (USEPA, 1995b), other published non-toxic doses were sought out. Recommended Dietary Allowances (RDAs) prepared by the Food and Nutrition Board (FNB) of the National Research Council (NRC, 1989) have been selected here to represent non-toxic doses.

RDAs are defined by the FNB as "the levels of intake of essential nutrients that, on the basis of scientific knowledge, are judged by the Food and Nutrition Board to be adequate to meet the known nutrient needs of practically all healthy persons." It is assumed here, that since the RDA represents a requirement for good nutrition, that it also represents a dose which is non-toxic. Although some essential nutrients (arsenic for example) have been classified as carcinogens, none of the five nutrients discussed here have been classified as carcinogens. The available RDA data for calcium, iron, magnesium, potassium and sodium are presented in Table J-3-2. From this data set, RDAs for children were preferentially selected to coincide with the child exposure scenario. RDAs were converted from units of mg/day to units of mg/kg/day by dividing the RDA by the child resident body weight of 15 kg (USEPA, 1991). Dermal RDAs were developed by adjusting the oral RDA to compensate for the oral absorption efficiency in a manner similar to that presented in Appendix A of RAGS, Volume I, Part A (USEPA, 1989), and described in the human health risk assessment methodology of this document.

Table J-3-2
Recommended Dietary Allowances [1]

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Nutrient	RDA	Age (years)	Oral Absorption (%)	Typical dietary intake (mg/day)	Toxicity Threshold (mg/day)	Oral RDA (mg/kg/day) [2]	Dermal RDA (mg/kg/day) [3]
Calcium	800 (mg/day)	1-10	40	743 (average of all ages)	NA	53.3	21.2
	1200 (mg/day)	11-24		1179	NA		
	800 (mg/day)	>24		743 (average of all ages); 530 (women ages 35-50)	>2500		
Iron	10 (mg/day)	1-20	10-15	10-15	25-75 (NOAEL); 3000 (lethal)	0.67	0.067
	15 (mg/day)	>20		10-15	25-75 (NOAEL); 14000 (lethal)		
Magnesium	6 (mg/kg/day)	1-15	50	193 (age 1-5)	NA	6	3
	4.5 (mg/kg/day)	>15		207-329	NA		
Potassium	15-20 (mg/kg/day)	1-10	90	1500	NA	15	13.5
	1600-2000 (mg/day)	>20		2500	18000 (hyperkalemia)		
Sodium	300 (mg/day)	2-5	90 [4]	NA	NA	20	18
	500 (mg/day)	Adult		1800-5000	2400 (intake not to be exceeded)		

[1] All data from NRC (1989).
[2] Adjusted oral RDA calculated by dividing the RDA (mg/kg) by the bodyweight of a child ages 1-6 (15 kg) (USEPA, 1991); RDAs provided in mg/kg/day were not modified.
[3] Adjusted dermal RDA calculated by multiplying the oral RDA by the oral absorption efficiency (USEPA, 1989).
[4] Oral absorption data not available; value for potassium used as a surrogate based on physio-chemical similarities.

Notes: % = percent.
mg/day = milligrams per day.
mg/kg/day = milligrams per kilogram per day.

Iron RfD For iron, risk-based concentrations (RBC) have been published by USEPA Region III (USEPA, 1995a), and were derived using an approach similar to the one presented in this appendix, using a reference dose (RfD) published by EPA's National Center for Environmental Assessment (NCEA) (USEPA, 1994). The iron RfD developed by NCEA is also based on a "non-toxic" dose rather than a threshold dose for toxic effects. However, instead of being based on the RDA published by the NRC (1989), it is based on the upper-bound average daily iron intake measured in a population of 20,000 individuals aged 6 months to 74 years. Because this value (0.27 mg/kg/day) is an average value measured across a population of various ages with varying iron intake requirements, it is below the RDA for children aged 6 months to 10 years (0.67 mg/kg/day) (USEPA, 1994; see also Table J-2-2). Since children in this age group are more likely to be exposed to iron in soil via pica, it may be more appropriate to base the iron RfD on the required daily iron intake for this receptor age-group.

Calculation of Screening Concentrations Risk-based screening concentrations for essential nutrients were derived by estimating concentrations in soil and groundwater that correspond to the RDAs for a residential exposure scenario. When the dose is equal to the RDA, the hazard quotient for the situation would equal one. Risk calculation spreadsheets have been used to assist in the calculation of the screening concentrations. When the concentration of an essential nutrient and the associated hazard quotient are known, only a simple calculation is needed to identify the concentration associated with a hazard quotient of one. An arbitrary nutrient concentration has been entered into risk spreadsheets to derive associated hazard quotient values as shown in Tables J-3-3 and K-2-4. Once that information was available, the equality shown below was used to calculate screening soil concentration with the target hazard quotient equal to one.

Screening groundwater concentrations were calculated in a similar manner. The surface soil and groundwater risk assessment spreadsheets used to calculate the hazard quotients for each essential nutrient are based on the same methodology that was used to develop risk estimates for surface soil and groundwater in this report. The baseline soil concentration is arbitrary and is used only to establish a baseline hazard quotient to solve the equality.

To derive screening concentrations that would be protective to the majority of the exposed population, the exposure assumptions for the most sensitive receptor evaluated in this report (e.g, a child resident) were used. For groundwater, screening concentrations were based on ingestion of groundwater as drinking water. For surface soil, screening concentrations were based on ingestion of surface soil and dermal contact with surface soil. Child resident exposure to surface soil and groundwater used as drinking water is usually greater than or equal to oral and dermal exposure to media treated as soil and groundwater, respectively, for exposure assessment. Therefore, screening values for surface soil represent conservative screening values for sediment and subsurface soil, and screening values for groundwater used as drinking water represent conservative screening values for surface water. The exposure parameters for the child resident are presented the accompanying surface soil and groundwater screening concentration spreadsheets (Tables J-3-3 and J-3-4, respectively).

TABLE J-3-3
DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - ESSENTIAL NUTRIENTS - OU5
CHILD RESIDENT
NTC ORLANDO
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical specific	chemical-specific	
INGESTION RATE	IR	200	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992a
AGE-SPECIFIC SURFACE AREA	SA_i	age-specific	cm²	USEPA, 1989
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1995
CONVERSION FACTOR	CF	1.00E-06	kg/mg	SEE BELOW
BODY WEIGHT	BW	15	kg	USEPA, 1991
AGE-SPECIFIC BODY WEIGHT	BW_i	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	350	days/year *	USEPA, 1991
EXPOSURE DURATION	ED	6	years	USEPA, 1991
AGE-SPECIFIC EXPOSURE DURATION	ED_i	age-specific	years	Assumption
AGE-WEIGHTED SURFACE AREA [1]	$SA_{soil/adj}$	766	cm2-year/kg	Per USEPA, 1992a
DOSE ABSORBED PER EVENT	DA_{event}	chemical specific	mg/cm²-event	Per USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1991

* Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.
[1] In estimating the dermally absorbed dose for children age 1 through 6, the time-weighted, bodyweight normalized surface area exposed is calculated from surface area, exposure duration, and body weight for each of 6 age periods, age 1 through 6, per USEPA, 1992.
USEPA, 1989. Exposure Factors Handbook; EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992 and Dermal Exposure Appendix of this document.
USEPA, 1995. Supplemental Guidance to RAGS: Region IV Bulletins: "Exposure Assessment". Human Health Risk Assessment Bulletin No 3. November, 1995.
CF = 10E-09 kg/ug for organics

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / RECOMMEDED DIETARY ALLOWANCE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

$$\text{INTAKE-DERMAL} = (DA_{event} \times EF / AT \times 365\ \text{days/year}) \times SA_{soil/adj}$$

Where:

$$SA_{soil/adj} = SUM\ (SA_i \times ED_i / BW_i)$$
$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Note:
For noncarcinogenic effects: AT = ED

TABLE J-3-3, continued
DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - ESSENTIAL NUTRIENTS - OU5
CHILD RESIDENT
NTC ORLANDO
ORLANDO, FLORIDA

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CARCINOGENIC EFFECTS

COMPOUND [1]	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF (mg/kg-day)^-1	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] (mg/kg-day)^-1	CANCER RISK DERMAL	TOTAL CANCER RISK
SUMMARY CANCER RISK						0.0E+00				0E+00	0E+00

[1] Essential nutrients are not considered carcinogenic from exposure through the oral or dermal routes.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[3] Calculated from Oral RDAs.

TABLE J-3-3, continued
DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - ESSENTIAL NUTRIENTS - OU5
CHILD RESIDENT
NTC ORLANDO
ORLANDO, FLORIDA

appadj33	15-Mar-96

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RDA (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RDA [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Calcium	I	5000	mg/kg	6.4E-02	5.3E+01	1.2E-03	0.001	6.1E-04	2.1E+01	2.9E-05	1.2E-03
Iron	I	5000	mg/kg	6.4E-02	6.7E-01	9.5E-02	0.001	6.1E-04	6.7E-02	9.1E-03	1.0E-01
Magnesium	I	5000	mg/kg	6.4E-02	6.0E+00	1.1E-02	0.001	6.1E-04	3.0E+00	2.0E-04	1.1E-02
Potassium	I	5000	mg/kg	6.4E-02	1.5E+01	4.3E-03	0.001	6.1E-04	1.4E+01	4.5E-05	4.3E-03
Sodium	I	5000	mg/kg	6.4E-02	2.0E+01	3.2E-03	0.001	6.1E-04	1.8E+01	3.4E-05	3.2E-03
					SUMMARY HAZARD INDEX	1.1E-01				9E-03	1E-01

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from Oral RDAs.

TABLE J-3-4
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - ESSENTIAL NUTRIENTS - OU5
CHILD RESIDENT
NTC ORLANDO
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical specific	ug/liter	
INGESTION RATE	IR	0.79	liters/day	USEPA, 1989
BODY WEIGHT	BW	15	kg	USEPA, 1991
CONVERSION FACTOR	CR	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	6	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1991

USEPA, 1989. Exposure Factors Handbook, Final Report, EPA/600/8-89/043, May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / RECOMMENDED DIETARY ALLOWANCE (mg/kg-day)

$$INTAKE_{ing} = \frac{CW \times IR \times EF \times ED \times CF}{BW \times AT \times 365\ days/year}$$

NOTE:
For noncarcinogenic effects AT = ED

TABLE J-3-4, continued
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - ESSENTIAL NUTRIENTS - OU5
CHILD RESIDENT
NTC ORLANDO
ORLANDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND [1]	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
			TOTAL CANCER RISK		0E+00

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TABLE J-3-4, continued
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) – ESSENTIAL NUTRIENTS – OU5
CHILD RESIDENT
NTC ORLANDO
ORLANDO, FLORIDA

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	RECOMMENDED DIETARY ALLOWANCE (mg/kg-day)	HAZARD QUOTIENT INGESTION
Calcium	5000	ug/liter	2.5E-01	5.3E+01	4.7E-03
Iron	5000	ug/liter	2.5E-01	6.7E-01	3.8E-01
Magnesium	5000	ug/liter	2.5E-01	6.0E+00	4.2E-02
Potassium	5000	ug/liter	2.5E-01	1.5E+01	1.7E-02
Sodium	5000	ug/liter	2.5E-01	2.0E+01	1.3E-02
TOTAL HAZARD INDEX					5E-01

The calculated essential nutrient screening concentrations for surface soil and groundwater are presented in Table J-3-5. These values represent the concentrations of individual essential nutrients in media that, if contacted in accordance with the exposure parameters used to derive the screening concentration, would theoretically result in the receptor receiving their recommended dietary allowance of an essential nutrient solely from the contacted media. For some nutrients, the calculated screening concentrations exceed one million mg/kg (i.e., 100%). Such concentrations indicate that no concentration of nutrient in the particular media would result in an intake that exceeds the RDA, given the exposure assumptions on which the screening value is based. Because these screening concentrations do not take into account the additivity of exposures between media (and other dietary intakes, including food), a receptor exposed to essential nutrients that are present in multiple media at the screening concentrations would, in essence, be receiving more than their recommended dietary allowance of nutrient. However, data provided in Table J-3-2 indicate that the toxicity threshold for most essential nutrients is several times greater than the RDA; the RDA is not a toxicity threshold value. Therefore, these screening concentrations do not represent concentrations which, if exceeded, would necessarily result in deleterious effects.

Table J-3-5
Theoretical Essential Nutrient Screening Concentrations for Surface Soil and Groundwater

Essential Nutrient	Surface Soil Screening Concentration (mg/kg) [1]	Groundwater Screening Concentration (μg/L) [2]
Calcium	4,070,824 [3]	1,055,398
Iron	47,824	13,267
Magnesium	460,468	118,807
Potassium	1,160,864 [3]	297,016
Sodium	1,547,819 [3]	396,022

[1] Surface soil screening concentrations calculated as described in text, using RDAs presented in Table J-3-2 and the exposure parameters and risk calculations presented in Table J-2-3.
[2] Groundwater screening concentrations calculated as described in text, using RDAs presented in Table J-3-2 and the exposure parameters and risk calculations presented in Table J-3-4.
[3] The calculation of a screening concentration larger than 1,000,000 mg/kg indicates that no concentration results in an intake greater than the RDA, given the standard exposure parameters.

REFERENCES

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APPENDIX J-4

PHYSICAL CHARACTERISTICS OF EXPOSED POPULATIONS

HUMAN HEALTH EXPOSURE PARAMETERS

HUMAN HEALTH BASELINE RISK ASSESSMENT
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Table J-4-1
Exposure Parameters for Soil Ingestion and Inhalation
Trespasser and Recreational User (Child)

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Parameter	Symbol	Child Value (Age 6-16)	Units	Source
Soil Concentration	CS	Chemical Specific	Chemical Specific	
Air Concentration	CA	Chemical Specific	mg/m^3	Calculated
Soil Ingestion Rate	IR	100	mg/day	[2]
Fraction Ingested	FI	100%	unitless	Assumption
Exposure Frequency	EF	100	days/year	Assumption, [3]
Exposure Duration	ED	11	years	Assumption, [2]
Exposure Time [1]	ET	8	hours/day	Assumption
Averaging Time	AT			
Cancer		70	years	[2]
Noncancer		11	years	[2]
Inhalation Rate	IR	0.833	m^3/hour	[2]
Body Weight	BW	40	kg	[2]
Particulate Emission Factor	PEF	4.97×10^7	m^3/kg	[4]

[1] Exposure Time is a parameter used only in the inhalation of particulate dust scenario.
[2] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".
[3] Exposure Frequency = 2 days/week x 50 weeks/year = 100 days/year.
[4] See the Derivation of Particulate Emission Factor appendix of this document.

Notes: mg/m^3 = milligrams per cubic meter.
mg/day = milligrams per day.
% = percent.
m^3/hour = cubic meters per hour.
kg = kilogram.
m^3/kg = cubic meters per kilogram.

Table J-4-2
Exposure Parameters for Dermal Exposure to Soil
Trespasser and Recreational User (Child)

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Parameter	Symbol	Child Value (Age 6-16)	Units	Source
Soil Concentration	CS	Chemical Specific	Chemical Specific	
Dose Absorbed per Unit Area per Event	DA_{event}	Chemical Specific	mg/cm^2-event	Calculated per [1]
Adherence Factor (Soil-to-Skin)	AF	1.0	mg/cm^2-event	[2]
Absorption Fraction	ABS_d	Chemical Specific	unitless	[2]
Age-Specific Surface Area	SA_i	Age-Specific	cm^2	[3]
Exposure Frequency	EF	100	days/year	Assumption, [4]
Age-Specific Exposure Duration	ED_i	Age-Specific	years	[3]
Averaging Time	AT			
Cancer		70	years	[5]
Noncancer		11	years	[5]
Age-Specific Body Weight	BW_i	Age-Specific	kg	[3]
Age-Weighted Surface Area	$SA_{soil/adj}$	1,136	cm^2-year/kg	[6]

[1] USEPA, 1992. Dermal Exposure Assessment: Principals and Applications; EPA/600/8-91/011B; January, 1992.
[2] USEPA, 1995. Supplemental Guidance to RAGS: Region IV Bulletins. "Exposure Assessment". Human Health Risk Assessment Bulletin No. 3. November, 1995.
[3] To account for the changing body weights, skin surface areas, and exposure duration of a child age 6 through 16, 50th percentile values for each age are used to calculate for every year, then are averaged. See USEPA Exposure Factors Handbook, EPA\600\8-89\043, May 1989; See also 1992 Dermal Guidance Summary appendix of this document.
[4] Exposure Frequency = 2 days/week x 50 weeks/year = 100 days/year.
[5] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".
[6] In estimating the dermally absorbed dose for children age 6 through 16, the time-weighted, bodyweight normalized surface area exposed is calculated from the surface area, exposure duration, and body weight for each of 16 age periods, age 6 through 16, per [1]. Thus, $T = SA_i \times ED_i / BW_i$ where i is the age of the child.

Notes: mg/cm^2 = milligrams per square centimeter.
cm^2/year/kg = square centimeters per year per kilogram.

Table J-4-3
Exposure Parameters for Soil Ingestion and Inhalation
Trespasser and Recreational User (Adult)

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Soil Concentration	CS	Chemical Specific	Chemical Specific	
Air Concentration	CA	Chemical Specific	mg/m^3	Calculated
Soil Ingestion Rate	IR	100	mg/day	[2]
Fraction Ingested	FI	100%	unitless	Assumption
Exposure Frequency	EF	100	days/year	Assumption, [3]
Exposure Duration	ED	19	years	Assumption, [2],[4]
Exposure Time [1]	ET	8	hours/day	Assumption
Averaging Time	AT			
Cancer		70	years	[2]
Noncancer		19	years	[2],[4]
Inhalation Rate	IR	0.833	m^3/hour	[2]
Body Weight	BW	70	kg	[2]
Particulate Emission Factor	PEF	4.97×10^7	m^3/kg	[5]

[1] Exposure Time is a parameter used only in the inhalation of particulate dust scenario.
[2] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".
[3] Exposure Frequency = 2 days/week x 50 weeks/year = 100 days/year.
[4] Exposure durations assume use by nearby resident who lives at residence for 30 years; exposure duration is parsed between child recreational user/trespasser and adult recreational user/trespasser.
[5] See the Derivation of Particulate Emission Factor appendix of this document.

Notes: mg/m^3 = milligrams per cubic meter.
mg/day = milligrams per day.
% = percent.
m^3/hour = cubic meters per hour.
m^3/kg = cubic meters per kilogram.

Table J-4-4
Exposure Parameters for Dermal Exposure to Soil
Trespasser and Recreational User (Adult)

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Soil Concentration	CS	Chemical Specific	Chemical Specific	
Dose Absorbed per Unit Area per Event	DA_{event}	Chemical Specific	mg/cm^2-event	Calculated per [1]
Adherence Factor (Soil-to-Skin)	AF	1.0	mg/cm^2-event	[2]
Absorption Fraction	ABS_d	Chemical Specific	unitless	[2]
Surface Area	SA	5,750	cm^2	[1]
Exposure Frequency	EF	100	days/year	Assumption, [3]
Exposure Duration	ED	19	years	Assumption, [4]
Averaging Time	AT			
Cancer		70	years	[5]
Noncancer		19	years	[4]
Body Weight	BW	70	kg	[5]

[1] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
[2] USEPA, 1995. Supplemental Guidance to RAGS: Region IV Bulletins. "Exposure Assessment". Human Health Risk Assessment Bulletin No. 3. November, 1995.
[3] Exposure Frequency = 2 days/week x 50 weeks/year = 100 days/year.
[4] Exposure durations assume use by nearby resident who lives at residence for 30 years; exposure duration is parsed between child recreational user/trespasser and adult recreational user/trespasser.
[5] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".

Notes: mg/cm^2 = milligrams per square centimeter.
cm^2 = square centimeter.
kg = kilogram.

Table J-4-5
Exposure Parameters for Soil Ingestion and Inhalation
Site Worker (Adult)

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Soil Concentration	CS	Chemical Specific	Chemical Specific	
Air Concentration	CA	Chemical Specific	mg/m^3	Calculated
Soil Ingestion Rate	IR	100	mg/day	[2]
Fraction Ingested	FI	100%	unitless	Assumption
Exposure Frequency	EF	250	days/year	Assumption, [2]
Exposure Duration	ED	25	years	Assumption, [2]
Exposure Time [1]	ET	8	hours/day	Assumption, [2]
Averaging Time	AT			
Cancer		70	years	[2]
Noncancer		25	years	[2]
Inhalation Rate	IR	0.833	m^3/hour	[2]
Body Weight	BW	70	kg	[2]
Particulate Emission Factor	PEF	4.97×10^7	m^3/kg	[3]

[1] Exposure Time is a parameter used only in the inhalation of particulate dust scenario.
[2] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".
[3] See the Derivation of Particulate Emission Factor appendix of this document.

Notes: mg/m^3 = milligrams per cubic meter.
mg/day = milligrams per day.
% = percent.
m^3/hour = cubic meters per hour.
kg = kilogram.
m^3/kg = cubic meters per kilogram.

Table J-4-6
Exposure Parameters for Dermal Exposure to Soil
Site Worker (Adult)

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Soil Concentration	CS	Chemical Specific	Chemical Specific	
Dose Absorbed per Unit Area per Event	DA_{event}	Chemical Specific	mg/cm^2-event	Calculated per [1]
Adherence Factor (Soil-to-Skin)	AF	1.0	mg/cm^2-event	[2]
Absorption Fraction	ABS_d	Chemical Specific	unitless	[2]
Surface Area	SA	5,750	cm^2	[1]
Exposure Frequency	EF	250	days/year	Assumption, [3]
Exposure Duration	ED	25	years	Assumption, [3]
Averaging Time	AT			
Cancer		70	years	[3]
Noncancer		25	years	[3]
Body Weight	BW	70	kg	[3]

[1] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
[2] USEPA, 1995. Supplemental Guidance to RAGS: Region IV Bulletins. "Exposure Assessment". Human Health Risk Assessment Bulletin No. 3. November, 1995.
[3] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".

Notes: mg/cm^2 = milligrams per square centimeter.
cm^2 = square centimeter.
kg = kilogram.

Table J-4-7
Exposure Parameters for Ingestion and Inhalation Exposure to Soil
Excavation Worker (Adult)

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Soil Concentration	CS	Chemical Specific	Chemical Specific	
Air Concentration	CA	Chemical Specific	$\mu g/m^3$	Calculated
Soil Ingestion Rate	IR	480	mg/day	Assumption, [1]
Fraction Ingested	FI	100%	unitless	Assumption
Air Inhalation Rate	IR	2.5	m^3/hour	[1]
Exposure Time [1]	ET	8	hours/day	Assumption, [2]
Exposure Frequency	EF	30	days/year	Assumption, [2]
Exposure Duration	ED	1	year	Assumption, [2]
Particulate Emission Factor	PEF	4.97×10^7	m^3/kg	[3]
Averaging Time	AT			
Cancer		70	years	[1]
Noncancer		1	years	Assumption, [2]
Body Weight	BW	70	kg	[1]

[1] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors". Value is based on inhalation rate of 20 m^3 per 8-hour workday. ET is a parameter used only in the inhalation of particulate dust scenario.
[2] Assumes a work exposure of 8 hours per day, 5 days/week, over a period of 6 weeks = 30 days.
[3] See the Derivation of Particulate Emission Factor appendix to this document.

Notes: $\mu g/m^3$ = micrograms per cubic meter.
mg/day = milligrams per day.
m^3/hour = cubic meters per hour.
m^3/kg = cubic meters per kilogram.
kg = kilogram.

Table J-4-8
Exposure Parameters for Dermal Exposure to Soil
Excavation Worker (Adult)

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Soil Concentration	CS	Chemical Specific	Chemical Specific	
Dose Absorbed per Unit Area per Event	DA_{event}	Chemical Specific	mg/cm^2-event	Calculated per [1]
Adherence Factor (Soil-to-Skin)	AF	1.0	mg/cm^2-event	[2]
Absorption Fraction	ABS_d	Chemical Specific	unitless	[2]
Surface Area	SA	5,750	cm^2	[1]
Exposure Frequency	EF	30	days/year	Assumption, [3]
Exposure Duration	ED	1	years	Assumption, [3]
Averaging Time	AT			
Cancer		70	years	[4]
Noncancer		1	years	Assumption, [3]
Body Weight	BW	70	kg	[4]

[1] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
[2] USEPA, 1995. Supplemental Guidance to RAGS: Region IV Bulletins. "Exposure Assessment". Human Health Risk Assessment Bulletin No. 3. November, 1995.
[3] Assumes a work exposure of 8 hours per day, 5 days/week, over a period of 6 weeks = 30 days.
[4] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors".

Notes: mg/cm^2 = milligrams per square centimeter.

APPENDIX J-5

RISK CALCULATING SPREADSHEETS

RISK CALCULATIONS FOR THE HUMAN HEALTH BASELINE RISK ASSESSMENT

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

TABLE J-5.1
CURRENT USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
CHILD TRESSPASSER
NTC ORLANDO OU1
ORALNDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1992a
AGE-SPECIFIC SURFACE AREA	SA_i	age-specific	cm^2	USEPA, 1989
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-06	kg/mg	SEE BELOW
BODY WEIGHT	BW	40	kg	USEPA, 1991
AGE-SPECIFIC BODY WEIGHT	BW_i	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	100	days/year *	USEPA, 1991
EXPOSURE DURATION	ED	11	years	Assumption
AGE-SPECIFIC EXPOSURE DURATION	ED_i	age-specific	years	Assumption
AGE-WEIGHTED SURFACE AREA [1]	$SA_{soil/adj}$	1136	cm2-year/kg	Per USEPA, 1992a
DOSE ABSORBED PER EVENT	DA_{event}	chemical specific	mg/cm^2-event	Per USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	11	years	Assumption

* Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.
[1] In estimating the dermally absorbed dose for children age 6 through 16, the time-weighted, bodyweight normalized surface area exposed is calculated from surface area, exposure duration, and body weight for each of 11 age periods, age 6 through 16, per USEPA, 1992.
USEPA, 1989. Exposure Factors Handbook; EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992 and Dermal Exposure Appendix of this document.
USEPA, 1992b. USEPA Region IV Guidance Memo February 10, 1992.
CF = 10E-09 kg/ug for organics

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

$$\text{INTAKE-DERMAL} = (DA_{event} \times EF / AT \times 365\ \text{days/year}) \times SA_{soil/adj}$$

Where:

$$SA_{soil/adj} = SUM\ (SA_i \times ED_i / BW_i)$$
$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Note:
For noncarcinogenic effects: AT = ED

TABLE J-5.1, continued
CURRENT USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
CHILD TRESSPASSER
NTC ORLANDO OU1
ORALNDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] (mg/kg-day)^-1	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [1,3] (mg/kg-day)^-1	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	2.4E-09	7.3	1.8E-08	0.01	1.0E-09	8	8.0E-09	2.6E-08
Benzo(a)pyrene	O	340	ug/kg	3.7E-08	7.3	2.7E-07	0.01	1.5E-08	8	1.2E-07	3.9E-07
Benzo(b)fluoranthene	O	21.7	ug/kg	2.3E-09	7.3	1.7E-08	0.01	9.6E-10	8	7.7E-09	2.5E-08
Benzo(k)fluoranthene	O	6.02	ug/kg	6.5E-10	7.3	4.7E-09	0.01	2.7E-10	8	2.1E-09	6.9E-09
Chrysene	O	0.24	ug/kg	2.6E-11	7.3	1.9E-10	0.01	1.1E-11	8	8.5E-11	2.7E-10
Dibenz(a,h)anthracene	O	257	ug/kg	2.8E-08	7.3	2.0E-07	0.01	1.1E-08	8	9.1E-08	2.9E-07
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	4.6E-09	7.3	3.4E-08	0.01	1.9E-09	8	1.5E-08	4.9E-08
Aroclor-1260	O	78	ug/kg	8.4E-09	7.7	6.5E-08	0.01	3.5E-09	8.6	3.0E-08	9.4E-08
Dieldrin	O	175	ug/kg	1.9E-08	16	3.0E-07	0.06	4.7E-08	20	9.3E-07	1.2E-06
gamma-BHC (Lindane)	O	1.025	ug/kg	1.1E-10	1.3	1.4E-10	0.06	2.7E-10	2.6	7.1E-10	8.5E-10
Arsenic	I	2.1	mg/kg	2.3E-07	1.5	3.4E-07	0.001	9.3E-09	1.5	1.4E-08	3.5E-07
					SUMMARY CANCER RISK	**1E-06**				**1E-06**	**2E-06**

[1] The CSF for carcinogenic PAHs has been adjusted with a relative potency factor as specified in USEPA guidance (July 1993).
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992). Absorbtion factors for PCBs, cadmium, and dioxins are specified in USEPA Dermal Guidance (January 1992).
[3] Calculated from Oral CSFs.

ND = No data available

TABLE J-5.1, continued
CURRENT USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
CHILD TRESSPASSER
NTC ORLANDO OU1
ORALNDO, FLORIDA

NUCTSS	15-Mar-96

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	1.5E-07	ND		0.01	6.3E-08	ND		
Benzo(a)pyrene	O	340	ug/kg	2.3E-07	ND		0.01	9.6E-08	ND		
Benzo(b)fluoranthene	O	217	ug/kg	1.5E-07	ND		0.01	6.1E-08	ND		
Benzo(k)fluoranthene	O	602	ug/kg	4.1E-07	ND		0.01	1.7E-07	ND		
Chrysene	O	240	ug/kg	1.6E-07	ND		0.01	6.8E-08	ND		
Dibenz(a,h)anthracene	O	257	ug/kg	1.8E-07	ND		0.01	7.3E-08	ND		
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	2.9E-07	ND		0.01	1.2E-07	ND		
Aroclor-1260	O	78	ug/kg	5.3E-08	0.00002	2.7E-03	0.01	2.2E-08	0.000018	1.2E-03	3.9E-03
Dieldrin	O	175	ug/kg	1.2E-07	0.00005	2.4E-03	0.01	5.0E-08	0.00004	1.2E-03	3.6E-03
gamma-BHC (Lindane)	O	1.025	ug/kg	7.0E-10	0.0003	2.3E-06	0.01	2.9E-10	0.00015	1.9E-06	4.3E-06
Arsenic	I	2.1	mg/kg	1.4E-06	0.0003	4.8E-03	0.001	5.9E-08	0.00029	2.0E-04	5.0E-03
Total Petroleum Hydrocarbons	O	51.4	ug/kg	3.5E-08	ND		0.001	1.5E-09	ND		
					SUMMARY HAZARD INDEX	1E-02				3E-03	1E-02

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992). Absorbtion factors for PCBs, cadmium, and dioxins are specified in USEPA Dermal Guidance (January 1992).
[2] Calculated from Oral RfDs.
ND = No data available

TABLE J-5.2
CURRENT USE INHALATION OF PARTICULATE DUST – SURFACE SOIL – NORTH GRINDER LANDFILL
CHILD TRASSPASSER
NTC ORLANDO OU1
ORLANDO,FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical specific	chemical specific	
PART. EMISSION FACTOR	PEF	4.97E+07	m^3/kg	Appendix
CONCENTRATION AIR	CA	chemical specific	mg/m^3	
INHALATION RATE	IR	0.833	$m^3/hour$	USEPA, 1991
BODY WEIGHT	BW	40	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	100	days/year	Assumption
EXPOSURE DURATION	ED	11	years	Assumption
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	11	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
PEF has been derived in the Appendix to this report, Derivation of Particulate Emissions Factor

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE J-5.2, continued
CURRENT USE INHALATION OF PARTICULATE DUST - SURFACE SOIL - NORTH GRINDER LANDFILL
CHILD TRASSPASSER
NTC ORLANDO OU1
ORLANDO,FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	4.51E-10	3.2E-12	3.1	**1.0E-11**
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	4.9E-11	3.1	**1.5E-10**
Benzo(b)fluoranthene	O	21.7	ug/kg	4.37E-10	3.1E-12	3.1	**9.7E-12**
Benzo(k)fluoranthene	O	6.02	ug/kg	1.21E-10	8.7E-13	3.1	**2.7E-12**
Chrysene	O	0.24	ug/kg	4.83E-12	3.5E-14	3.1	**1.1E-13**
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	3.7E-11	3.1	**1.1E-10**
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	8.61E-10	6.2E-12	3.1	**1.9E-11**
Aroclor-1260	O	78	ug/kg	1.57E-09	1.1E-11	NE	
Dieldrin	O	175	ug/kg	3.52E-09	2.5E-11	16	**4.0E-10**
Arsenic	I	2.1	mg/kg	4.23E-08	3.0E-10	50	**1.5E-08**
						SUMMARY CANCER RISK	**2E-08**

Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
ND = No data available

TABLE J-5.2, continued
CURRENT USE INHALATION OF PARTICULATE DUST – SURFACE SOIL – NORTH GRINDER LANDFILL
CHILD TRASSPASSER
NTC ORLANDO OU1
ORLANDO,FLORIDA

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	4.51E-09	2.1E-10	ND	
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	3.1E-10	ND	
Benzo(b)fluoranthene	O	217	ug/kg	4.37E-09	2.0E-10	ND	
Benzo(k)fluoranthene	O	602	ug/kg	1.21E-08	5.5E-10	ND	
Chrysene	O	240	ug/kg	4.83E-09	2.2E-10	ND	
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	2.4E-10	ND	
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	8.61E-09	3.9E-10	ND	
Aroclor-1260	O	78	ug/kg	1.57E-09	7.2E-11	ND	
Dieldrin	O	175	ug/kg	3.52E-09	1.6E-10	ND	
gamma-BHC (Lindane)	O	1.025	ug/kg	2.06E-11	9.4E-13	ND	
Arsenic	I	2.1	mg/kg	4.23E-08	1.9E-09	ND	
Total Petroleum Hydrocarbons	I	51.4	mg/kg	1.03E-06	4.7E-08	ND	
						SUMMARY HAZARD INDEX	0E+00

ND = No data available

NUATSS6	15-Mar-96

TABLE J-5.3
CURRENT USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
ADULT TRESSPASSER
NTC ORLANDO OU1
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical specific	chemical specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992a
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1992b
SURFACE AREA EXPOSED	SA	5,750	cm²	USEPA, 1992a
DOSE ABSORBED PER EVENT	DA_{event}	chemical specific	mg/cm²-event	Per USEPA, 1992a
CONVERSION FACTOR	CF	1.00E-06	kg/mg	SEE BELOW
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	100	days/year *	Assumption
EXPOSURE DURATION	ED	19	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	19	years	USEPA, 1991

* Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1992b. USEPA Region IV Guidance Memo February 10, 1992.
CF = 10E-9 kg/ug for organics

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DAevent = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects: AT = ED

TABLE J-5.3, continued
CURRENT USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
ADULT TRESSPASSER
NTC ORLANDO OU1
ORLANDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF (mg/kg-day)^-1	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] (mg/kg-day)^-1	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	2.4E-09	7.3	1.7E-08	0.01	1.4E-09	8	1.1E-08	2.8E-08
Benzo(a)pyrene	O	340	ug/kg	3.6E-08	7.3	2.6E-07	0.01	2.1E-08	8	1.7E-07	4.3E-07
Benzo(b)fluoranthene	O	21.7	ug/kg	2.3E-09	7.3	1.7E-08	0.01	1.3E-09	8	1.1E-08	2.7E-08
Benzo(k)fluoranthene	O	6.02	ug/kg	6.4E-10	7.3	4.7E-09	0.01	3.7E-10	8	2.9E-09	7.6E-09
Chrysene	O	0.24	ug/kg	2.5E-11	7.3	1.9E-10	0.01	1.5E-11	8	1.2E-10	3.0E-10
Dibenz(a,h)anthracene	O	257	ug/kg	2.7E-08	7.3	2.0E-07	0.01	1.6E-08	8	1.3E-07	3.2E-07
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	4.5E-09	7.3	3.3E-08	0.01	2.6E-09	8	2.1E-08	5.4E-08
Aroclor-1260	O	78	ug/kg	8.3E-09	7.7	6.4E-08	0.01	4.8E-09	8.6	4.1E-08	1.0E-07
Dieldrin	O	175	ug/kg	1.9E-08	16	3.0E-07	0.01	1.1E-08	20	2.1E-07	5.1E-07
gamma-BHC (Lindane)	O	1.025	ug/kg	1.1E-10	1.3	1.4E-10	0.01	6.3E-11	2.6	1.6E-10	3.0E-10
Arsenic	I	2.1	mg/kg	2.2E-07	1.5	3.3E-07	0.001	1.3E-08	1.5	1.9E-08	3.5E-07
					SUMMARY CANCER RISK	1E-06				6E-07	2E-06

[1] Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[3] Calculated from Oral CSFs.
ND = No data available

TABLE J-5.3, continued

NUATSS6	15-Mar-96

CURRENT USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
ADULT TRESSPASSER
NTC ORLANDO OU1
ORLANDO,FLORIDA

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	8.8E-08	ND		0.01	5.0E-08	ND		
Benzo(a)pyrene	O	340	ug/kg	1.3E-07	ND		0.01	7.7E-08	ND		
Benzo(b)fluoranthene	O	217	ug/kg	8.5E-08	ND		0.01	4.9E-08	ND		
Benzo(k)fluoranthene	O	602	ug/kg	2.4E-07	ND		0.01	1.4E-07	ND		
Chrysene	O	240	ug/kg	9.4E-08	ND		0.01	5.4E-08	ND		
Dibenz(a,h)anthracene	O	257	ug/kg	1.0E-07	ND		0.01	5.8E-08	ND		
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	1.7E-07	ND		0.01	9.6E-08	ND		
Aroclor-1260	O	78	ug/kg	3.1E-08	0.00002	1.5E-03	0.01	1.8E-08	0.000018	9.8E-04	2.5E-03
Dieldrin	O	175	ug/kg	6.8E-08	0.00005	1.4E-03	0.01	3.9E-08	0.00004	9.8E-04	2.4E-03
gamma-BHC (Lindane)	O	1.025	ug/kg	4.0E-10	0.0003	1.3E-06	0.01	2.3E-10	0.00015	1.5E-06	2.9E-06
Arsenic	I	2.1	mg/kg	8.2E-07	0.0003	2.7E-03	0.001	4.7E-08	0.00029	1.6E-04	2.9E-03
Total Petroleum Hydrocarbons	I	51.4	mg/kg	2.0E-05	ND		0.001	1.2E-06	ND		
					SUMMARY HAZARD INDEX	6E-03				2E-03	8E-03

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from Oral RfDs.
ND = No data available

TABLE J-5.4
CURRENT USE USE INHALATION OF PARTICULATE DUST – SURFACE SOIL – NORTH GRINDER LANDFILL
ADULT TRESSPASSER
NTC ORLANDO OU1
ORLANDO,FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical specific	chemical specific	
PART. EMISSION FACTOR	PEF	4.97E+07	m^3/kg	Appendix
CONCENTRATION AIR	CA	chemical specific	mg/m^3	
INHALATION RATE	IR	0.833	m^3/hour	USEPA, 1991
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	100	days/year	Assumption
EXPOSURE DURATION	ED	19	years	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	19	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
PEF has been derived in the Appendix to this report, Derivation of Particulate Emissions Factor

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE J-5.4, continued
CURRENT USE USE INHALATION OF PARTICULATE DUST – SURFACE SOIL – NORTH GRINDER LANDFILL
ADULT TRESSPASSER
NTC ORLANDO OU1
ORLANDO,FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	4.51E-10	3.2E-12	3.1	**9.9E-12**
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	4.8E-11	3.1	**1.5E-10**
Benzo(b)fluoranthene	O	21.7	ug/kg	4.37E-10	3.1E-12	3.1	**9.6E-12**
Benzo(k)fluoranthene	O	6.02	ug/kg	1.21E-10	8.6E-13	3.1	**2.7E-12**
Chrysene	O	0.24	ug/kg	4.83E-12	3.4E-14	3.1	**1.1E-13**
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	3.7E-11	3.1	**1.1E-10**
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	8.61E-10	6.1E-12	3.1	**1.9E-11**
Aroclor-1260	O	78	ug/kg	1.57E-09	1.1E-11	NE	
Dieldrin	O	175	ug/kg	3.52E-09	2.5E-11	16	**4.0E-10**
Arsenic	I	2.1	mg/kg	4.23E-08	3.0E-10	50	**1.5E-08**
						SUMMARY CANCER RISK	**2E-08**

[1] Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
ND = No data available

TABLE J-5.4, continued
CURRENT USE USB INHALATION OF PARTICULATE DUST -- SURFACE SOIL -- NORTH GRINDER LANDFILL
ADULT TRESSPASSER
NTC ORLANDO OU1
ORLANDO,FLORIDA

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	4.51E-09	1.2E-10	ND	
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	1.8E-10	ND	
Benzo(b)fluoranthene	O	217	ug/kg	4.37E-09	1.1E-10	ND	
Benzo(k)fluoranthene	O	602	ug/kg	1.21E-08	3.2E-10	ND	
Chrysene	O	240	ug/kg	4.83E-09	1.3E-10	ND	
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	1.3E-10	ND	
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	8.61E-09	2.2E-10	ND	
Aroclor-1260	O	78	ug/kg	1.57E-09	4.1E-11	ND	
Dieldrin	O	175	ug/kg	3.52E-09	9.2E-11	ND	
gamma-BHC (Lindane)	O	1.025	ug/kg	2.06E-11	5.4E-13	ND	
Arsenic	I	2.1	mg/kg	4.23E-08	1.1E-09	ND	
Total Petroleum Hydrocarbons	I	51.4	mg/kg	1.03E-06	2.7E-08	ND	
						SUMMARY HAZARD INDEX	0E+00

ND = No data available

TABLE J-5.5
FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL CHILD
NTC ORLANDO OU1
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992a
AGE-SPECIFIC SURFACE AREA	SA_i	age-specific	cm²	USEPA, 1989
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-06	kg/mg	SEE BELOW
BODY WEIGHT	BW	40	kg	USEPA, 1991
AGE-SPECIFIC BODY WEIGHT	BW_i	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	100	days/year *	USEPA, 1991
EXPOSURE DURATION	ED	11	years	Assumption
AGE-SPECIFIC EXPOSURE DURATION	ED_i	age-specific	years	Assumption
AGE-WEIGHTED SURFACE AREA [1]	$SA_{soil/adj}$	1136	cm2-year/kg	Per USEPA, 1992a
DOSE ABSORBED PER EVENT	DA_{event}	chemical specific	mg/cm²-event	Per USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	11	years	Assumption

* Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.
[1] In estimating the dermally absorbed dose for children age 6 through 16, the time-weighted, bodyweight normalized surface area exposed is calculated from surface area, exposure duration, and body weight for each of 11 age periods, age 6 through 16, per USEPA, 1992.
USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992 and Dermal Exposure Appendix of this document.
USEPA, 1992b. USEPA Region IV Guidance Memo February 10, 1992.
CF = 10E-09 kg/ug for organics

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

$$\text{INTAKE-DERMAL} = (DA_{event} \times EF / AT \times 365\ \text{days/year}) \times SA_{soil/adj}$$

Where:

$$SA_{soil/adj} = SUM\ (SA_i \times ED_i / BW_i)$$
$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Note:
For noncarcinogenic effects: AT = ED

TABLE J-5.5, continued

RCS56	15-Mar-96

FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL CHILD
NTC ORLANDO OU1
ORLANDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] (mg/kg-day)^-1	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [1,3] (mg/kg-day)^-1	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	2.4E-09	7.3	1.8E-08	0.01	1.0E-09	8	8.0E-09	2.6E-08
Benzo(a)pyrene	O	340	ug/kg	3.7E-08	7.3	2.7E-07	0.01	1.5E-08	8	1.2E-07	3.9E-07
Benzo(b)fluoranthene	O	21.7	ug/kg	2.3E-09	7.3	1.7E-08	0.01	9.6E-10	8	7.7E-09	2.5E-08
Benzo(k)fluoranthene	O	6.02	ug/kg	6.5E-10	7.3	4.7E-09	0.01	2.7E-10	8	2.1E-09	6.9E-09
Chrysene	O	0.24	ug/kg	2.6E-11	7.3	1.9E-10	0.01	1.1E-11	8	8.5E-11	2.7E-10
Dibenz(a,h)anthracene	O	257	ug/kg	2.8E-08	7.3	2.0E-07	0.01	1.1E-08	8	9.1E-08	2.9E-07
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	4.6E-09	7.3	3.4E-08	0.01	1.9E-09	8	1.5E-08	4.9E-08
Aroclor-1260	O	78	ug/kg	8.4E-09	7.7	6.5E-08	0.01	3.5E-09	8.6	3.0E-08	9.4E-08
Dieldrin	O	175	ug/kg	1.9E-08	16	3.0E-07	0.01	7.8E-09	20	1.6E-07	4.6E-07
gamma-BHC (Lindane)	O	1.025	ug/kg	1.1E-10	1.3	1.4E-10	0.001	4.6E-12	2.6	1.2E-11	1.6E-10
Arsenic	I	2.1	mg/kg	2.3E-07	1.5	3.4E-07	0.001	9.3E-09	1.5	1.4E-08	3.5E-07
					SUMMARY CANCER RISK	1E-06				4E-07	2E-06

[1] The CSF for carcinogenic PAHs has been adjusted with a relative potency factor as specified in USEPA guidance (July 1993).
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992). Absorbtion factors for PCBs, cadmium, and dioxins are specified in USEPA Dermal Guidance (January 1992).
[3] Calculated from Oral CSFs.

ND = No data available

TABLE J-5.5, continued
FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL CHILD
NTC ORLANDO OU1
ORLANDO, FLORIDA

RCSS6	15-Mar-96

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	1.5E-07	ND		0.01	6.3E-08	ND		
Benzo(a)pyrene	O	340	ug/kg	2.3E-07	ND		0.01	9.6E-08	ND		
Benzo(a)fluoranthene	O	217	ug/kg	1.5E-07	ND		0.01	6.1E-08	ND		
Benzo(k)fluoranthene	O	602	ug/kg	4.1E-07	ND		0.01	1.7E-07	ND		
Chrysene	O	240	ug/kg	1.6E-07	ND		0.01	6.8E-08	ND		
Dibenz(a,h)anthracene	O	257	ug/kg	1.8E-07	ND		0.01	7.3E-08	ND		
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	2.9E-07	ND		0.01	1.2E-07	ND		
Aroclor-1260	O	78	ug/kg	5.3E-08	0.00002	2.7E-03	0.01	2.2E-08	0.000018	1.2E-03	3.9E-03
Dieldrin	O	196	ug/kg	1.3E-07	0.00005	2.7E-03	0.01	5.5E-08	0.00004	1.4E-03	4.1E-03
gamma-BHC (Lindane)	O	1.4	ug/kg	9.6E-10	0.0003	3.2E-06	0.01	4.0E-10	?		3.2E-06
Arsenic	I	2.1	mg/kg	1.4E-06	0.0003	4.8E-03	0.001	5.9E-08	0.00029	2.0E-04	5.0E-03
Total Petroleum Hydrocarbons	I	51.4	mg/kg	3.5E-05	ND		0.001	1.5E-06	ND		
				SUMMARY HAZAR	0.00005	1E-02				3E-03	1E-02

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992). Absorbtion factors f 0.0003
[2] Calculated from Oral RfDs. 0.0003
ND = No data available ND

TABLE J-5.6
FUTURE USE INHALATION OF PARTICULATE DUST - SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL CHILD
NTC ORLANDO OU1
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical specific	chemical specific	
PART. EMISSION FACTOR	PEF	4.93E+09	m^3/kg	USEPA, 1991a
CONCENTRATION AIR	CA	chemical specific	mg/m^3	
INHALATION RATE	IR	20	m^3/day	USEPA, 1995
BODY WEIGHT	BW	40	kg	USEPA, 1991b
EXPOSURE FREQUENCY	EF	100	days/year	USEPA, 1991b
EXPOSURE DURATION	ED	11	years	Assumption
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991b
NONCANCER	AT	11	years	Assumption

USEPA, 1991a. RAGS Volume 1, Part B, Development of Risk-Based Prelminary Remediation Goals.
USEPA, 1991b. *Human Health Evaluation Manual, Supplemental Guidance:* "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS: Region IV Bulletins: "Exposure Assessment" Human Health Risk Assessment Bulletin No 3. November, 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR (mg/kg-day) ^ -1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note:
For noncarcinogenic effects: AT = ED

TABLE J-5.6, continued
FUTURE USE INHALATION OF PARTICULATE DUST - SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL CHILD
NTC ORLANDO OU1
ORLANDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	4.54E-12	9.8E-14	3.1	3.0E-13
Benzo(a)pyrene	O	340	ug/kg	6.90E-11	1.5E-12	3.1	4.6E-12
Benzo(b)fluoranthene	O	21.7	ug/kg	4.40E-12	9.5E-14	3.1	2.9E-13
Benzo(k)fluoranthene	O	6.02	ug/kg	1.22E-12	2.6E-14	3.1	8.1E-14
Chrysene	O	0.24	ug/kg	4.87E-14	1.0E-15	3.1	3.2E-15
Dibenz(a,h)anthracene	O	257	ug/kg	5.21E-11	1.1E-12	3.1	3.5E-12
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	8.68E-12	1.9E-13	3.1	5.8E-13
Aroclor-1260	O	78	ug/kg	1.58E-11	3.4E-13	NE	
Dieldrin	O	175	ug/kg	3.55E-11	7.6E-13	16	1.2E-11
Arsenic	I	2.1	mg/kg	4.26E-10	9.2E-12	50	4.6E-10
						SUMMARY CANCER RISK	5E-10

ND = No data available

TABLE J-5.6, continued
FUTURE USE INHALATION OF PARTICULATE DUST - SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL CHILD
NTC ORLANDO OU1
ORLANDO, FLORIDA

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	4.54E-11	6.2E-12	ND	
Benzo(a)pyrene	O	340	ug/kg	6.90E-11	9.4E-12	ND	
Benzo(b)fluoranthene	O	217	ug/kg	4.40E-11	6.0E-12	ND	
Benzo(k)fluoranthene	O	602	ug/kg	1.22E-10	1.7E-11	ND	
Chrysene	O	240	ug/kg	4.87E-11	6.7E-12	ND	
Dibenz(a,h)anthracene	O	257	ug/kg	5.21E-11	7.1E-12	ND	
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	8.68E-11	1.2E-11	ND	
Aroclor-1260	O	78	ug/kg	1.58E-11	2.2E-12	ND	
Dieldrin	O	175	ug/kg	3.55E-11	4.9E-12	ND	
gamma-BHC (Lindane)	O	1.025	ug/kg	2.08E-13	2.8E-14	ND	
Arsenic	I	2.1	mg/kg	4.26E-10	5.8E-11	ND	
Total Petroleum Hydrocarbons	I	51.4	mg/kg	1.04E-08	1.4E-09	ND	
						SUMMARY HAZARD INDEX	0E+00

ND = No data available

NURASS6	15-Mar-96

TABLE J-5.7
FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL ADULT
NTC ORLANDO OU1
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical specific	chemical specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992a
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1992b
SURFACE AREA EXPOSED	SA	5,750	cm²	USEPA, 1992a
DOSE ABSORBED PER EVENT	DA_{event}	chemical specific	mg/cm²-event	Per USEPA, 1992a
CONVERSION FACTOR	CF	1.00E-06	kg/mg	SEE BELOW
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	100	days/year *	Assumption
EXPOSURE DURATION	ED	19	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	19	years	USEPA, 1991

* Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1992b. USEPA Region IV Guidance Memo February 10, 1992.
CF = 10E-9 kg/ug for organics

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DAevent = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects: AT = ED

TABLE J-5.7, continued

NURASS6	15-Mar-96

FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL ADULT
NTC ORLANDO OU1
ORLANDO,FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF (mg/kg-day)^-1	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] (mg/kg-day)^-1	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	2.4E-09	7.3	1.7E-08	0.01	1.4E-09	8	1.1E-08	2.8E-08
Benzo(a)pyrene	O	340	ug/kg	3.6E-08	7.3	2.6E-07	0.01	2.1E-08	8	1.7E-07	4.3E-07
Benzo(b)fluoranthene	O	21.7	ug/kg	2.3E-09	7.3	1.7E-08	0.01	1.3E-09	8	1.1E-08	2.7E-08
Benzo(k)fluoranthene	O	6.02	ug/kg	6.4E-10	7.3	4.7E-09	0.01	3.7E-10	8	2.9E-09	7.6E-09
Chrysene	O	0.24	ug/kg	2.5E-11	7.3	1.9E-10	0.01	1.5E-11	8	1.2E-10	3.0E-10
Dibenz(a,h)anthracene	O	257	ug/kg	2.7E-08	7.3	2.0E-07	0.01	1.6E-08	8	1.3E-07	3.2E-07
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	4.5E-09	7.3	3.3E-08	0.01	2.6E-09	8	2.1E-08	5.4E-08
Aroclor-1260	O	78	ug/kg	8.3E-09	7.7	6.4E-08	0.01	4.8E-09	8.6	4.1E-08	1.0E-07
Dieldrin	O	175	ug/kg	1.9E-08	16	3.0E-07	0.01	1.1E-08	20	2.1E-07	5.1E-07
gamma-BHC (Lindane)	O	1.025	ug/kg	1.1E-10	1.3	1.4E-10	0.01	6.3E-11	2.6	1.6E-10	3.0E-10
Arsenic	I	2.1	mg/kg	2.2E-07	1.5	3.3E-07	0.001	1.3E-08	1.5	1.9E-08	3.5E-07
				SUMMARY CANCER RISK		1E-06				6E-07	2E-06

[1] Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[3] Calculated from Oral CSFs.
ND = No data available

TABLE J-5.7, continued

NURASS6	15-Mar-96

FUTURE USB DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL – NORTH GRINDER LANDFILL
RECREATIONAL ADULT
NTC ORLANDO OU1
ORLANDO,FLORIDA

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	8.8E-08	ND		0.01	5.0E-08	ND		
Benzo(a)pyrene	O	340	ug/kg	1.3E-07	ND		0.01	7.7E-08	ND		
Benzo(b)fluoranthene	O	217	ug/kg	8.5E-08	ND		0.01	4.9E-08	ND		
Benzo(k)fluoranthene	O	602	ug/kg	2.4E-07	ND		0.01	1.4E-07	ND		
Chrysene	O	240	ug/kg	9.4E-08	ND		0.01	5.4E-08	ND		
Dibenz(a,h)anthracene	O	257	ug/kg	1.0E-07	ND		0.01	5.8E-08	ND		
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	1.7E-07	ND		0.01	9.6E-08	ND		
Aroclor-1260	O	78	ug/kg	3.1E-08	0.00002	1.5E-03	0.01	1.8E-08	0.000018	9.8E-04	2.5E-03
Dieldrin	O	175	ug/kg	6.8E-08	0.00005	1.4E-03	0.01	3.9E-08	0.00004	9.8E-04	2.4E-03
gamma-BHC (Lindane)	O	1.025	ug/kg	4.0E-10	0.0003	1.3E-06	0.01	2.3E-10	0.00015	1.5E-06	2.9E-06
Arsenic	I	2.1	mg/kg	8.2E-07	0.0003	2.7E-03	0.001	4.7E-08	0.00029	1.6E-04	2.9E-03
Total Petroleum Hydrocarbons	I	51.4	mg/kg	2.0E-05	ND		0.001	1.2E-06	ND		
					SUMMARY HAZARD INDEX	6E-03				2E-03	8E-03

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from Oral RfDs.
ND = No data available

TABLE J-5.8
FUTURE USE INHALATION OF PARTICULATE DUST – SURFACE SOIL – NORTH GRINDER LANDFILL
RECREATIONAL ADULT
NTC ORLANDO OU1
ORLANDO,FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical specific	chemical specific	
PART. EMISSION FACTOR	PEF	4.97E+07	m^3/kg	Appendix
CONCENTRATION AIR	CA	chemical specific	mg/m^3	
INHALATION RATE	IR	0.833	$m^3/hour$	USEPA, 1991
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	100	days/year	Assumption
EXPOSURE DURATION	ED	19	years	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	19	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
PEF has been derived in the Appendix to this report, Derivation of Particulate Emissions Factor

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE J-5.8, continued
FUTURE USE INHALATION OF PARTICULATE DUST - SURFACE SOIL - NORTH GRINDER LANDFILL
RECREATIONAL ADULT
NTC ORLANDO OU1
ORLANDO,FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	4.51E-10	3.2E-12	3.1	**9.9E-12**
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	4.8E-11	3.1	**1.5E-10**
Benzo(b)fluoranthene	O	21.7	ug/kg	4.37E-10	3.1E-12	3.1	**9.6E-12**
Benzo(k)fluoranthene	O	6.02	ug/kg	1.21E-10	8.6E-13	3.1	**2.7E-12**
Chrysene	O	0.24	ug/kg	4.83E-12	3.4E-14	3.1	**1.1E-13**
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	3.7E-11	3.1	**1.1E-10**
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	8.61E-10	6.1E-12	3.1	**1.9E-11**
Aroclor-1260	O	78	ug/kg	1.57E-09	1.1E-11	NE	
Dieldrin	O	175	ug/kg	3.52E-09	2.5E-11	16	**4.0E-10**
Arsenic	I	2.1	mg/kg	4.23E-08	3.0E-10	50	**1.5E-08**
						SUMMARY CANCER RISK	**2E-08**

[1] Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
ND = No data available

TABLE J-5.8, continued
FUTURE USE INHALATION OF PARTICULATE DUST – SURFACE SOIL – NORTH GRINDER LANDFILL
RECREATIONAL ADULT
NTC ORLANDO OU1
ORLANDO,FLORIDA

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	4.51E-09	1.2E-10	ND	
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	1.8E-10	ND	
Benzo(b)fluoranthene	O	217	ug/kg	4.37E-09	1.1E-10	ND	
Benzo(k)fluoranthene	O	602	ug/kg	1.21E-08	3.2E-10	ND	
Chrysene	O	240	ug/kg	4.83E-09	1.3E-10	ND	
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	1.3E-10	ND	
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	8.61E-09	2.2E-10	ND	
Aroclor-1260	O	78	ug/kg	1.57E-09	4.1E-11	ND	
Dieldrin	O	175	ug/kg	3.52E-09	9.2E-11	ND	
gamma-BHC (Lindane)	O	1.025	ug/kg	2.06E-11	5.4E-13	ND	
Arsenic	I	2.1	mg/kg	4.23E-08	1.1E-09	ND	
Total Petroleum Hydrocarbons	I	51.4	mg/kg	1.03E-06	2.7E-08	ND	
						SUMMARY HAZARD INDEX	0E+00

ND = No data available

TABLE J-5.9
FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
SITE WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

NUWRKSS	15-Mar-96

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical specific	chemical specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1992a
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1992b
SURFACE AREA EXPOSED	SA	5,750	cm^2	USEPA, 1992a
DOSE ABSORBED PER EVENT	DA_{event}	chemical specific	mg/cm^2-event	Per USEPA, 1992a
CONVERSION FACTOR	CF	1.00E-06	kg/mg	SEE BELOW
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	250	days/year *	Assumption
EXPOSURE DURATION	ED	25	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1991

* Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1992b. USEPA Region IV Guidance Memo February 10, 1992.
CF = 10E-9 kg/ug for organics

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DAevent = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects: AT = ED

TABLE J-5.9, continued

NUWRKSS	15-Mar-96

FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
SITE WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF (mg/kg-day)^-1	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] (mg/kg-day)^-1	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	7.8E-09	7.3	5.7E-08	0.01	4.5E-09	8	3.6E-08	9.3E-08
Benzo(a)pyrene	O	340	ug/kg	1.2E-07	7.3	8.7E-07	0.01	6.8E-08	8	5.5E-07	1.4E-06
Benzo(b)fluoranthene	O	21.7	ug/kg	7.6E-09	7.3	5.5E-08	0.01	4.4E-09	8	3.5E-08	9.0E-08
Benzo(k)fluoranthene	O	6.02	ug/kg	2.1E-09	7.3	1.5E-08	0.01	1.2E-09	8	9.7E-09	2.5E-08
Chrysene	O	0.24	ug/kg	8.4E-11	7.3	6.1E-10	0.01	4.8E-11	8	3.9E-10	1.0E-09
Dibenz(a,h)anthracene	O	257	ug/kg	9.0E-08	7.3	6.6E-07	0.01	5.2E-08	8	4.1E-07	1.1E-06
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	1.5E-08	7.3	1.1E-07	0.01	8.6E-09	8	6.9E-08	1.8E-07
Aroclor-1260	O	78	ug/kg	2.7E-08	7.7	2.1E-07	0.01	1.6E-08	8.6	1.3E-07	3.4E-07
Dieldrin	O	175	ug/kg	6.1E-08	16	9.8E-07	0.01	3.5E-08	20	7.0E-07	1.7E-06
gamma-BHC (Lindane)	O	1.025	ug/kg	3.6E-10	1.3	4.7E-10	0.01	2.1E-10	2.6	5.4E-10	1.0E-09
Arsenic	I	2.1	mg/kg	7.3E-07	1.5	1.1E-06	0.001	4.2E-08	1.5	6.3E-08	1.2E-06
					SUMMARY CANCER RISK	4E-06				2E-06	6E-06

[1] Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[3] Calculated from Oral CSFs.
ND = No data available

TABLE J-5.9, continued
FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
SITE WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

NUWRKSS	15-Mar-96

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	2.2E-07	ND		0.01	1.3E-07	ND		
Benzo(a)pyrene	O	340	ug/kg	3.3E-07	ND		0.01	1.9E-07	ND		
Benzo(b)fluoranthene	O	217	ug/kg	2.1E-07	ND		0.01	1.2E-07	ND		
Benzo(k)fluoranthene	O	602	ug/kg	5.9E-07	ND		0.01	3.4E-07	ND		
Chrysene	O	240	ug/kg	2.3E-07	ND		0.01	1.4E-07	ND		
Dibenz(a,h)anthracene	O	257	ug/kg	2.5E-07	ND		0.01	1.4E-07	ND		
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	4.2E-07	ND		0.01	2.4E-07	ND		
Aroclor-1260	O	78	ug/kg	7.6E-08	0.00002	3.8E-03	0.01	4.4E-08	0.000018	2.4E-03	6.3E-03
Dieldrin	O	175	ug/kg	1.7E-07	0.00005	3.4E-03	0.01	9.8E-08	0.00004	2.5E-03	5.9E-03
gamma-BHC (Lindane)	O	1.025	ug/kg	1.0E-09	0.0003	3.3E-06	0.01	5.8E-10	0.00015	3.8E-06	7.2E-06
Arsenic	I	2.1	mg/kg	2.1E-06	0.0003	6.8E-03	0.001	1.2E-07	0.00029	4.1E-04	7.3E-03
Total Petroleum Hydrocarbons	O	51.4	ug/kg	5.0E-08	ND		0.01	2.9E-08	ND		
					SUMMARY HAZARD INDEX	1E-02				5E-03	2E-02

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from Oral RfDs.
ND = No data available

TABLE J-5.10
FUTURE USE INHALATION OF PARTICULATE DUST -- SURFACE SOIL -- NORTH GRINDER LANDFILL
SITE WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical specific	chemical specific	
PART. EMISSION FACTOR	PEF	4.97E+07	m^3/kg	Appendix
CONCENTRATION AIR	CA	chemical specific	mg/m^3	
INHALATION RATE	IR	0.833	m^3/hour	USEPA, 1991
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	250	days/year	USEPA, 1991
EXPOSURE DURATION	ED	25	years	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
PEF has been derived in the Appendix to this report, Derivation of Particulate Emissions Factor

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFFRENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE J-5.10, continued
FUTURE USE INHALATION OF PARTICULATE DUST – SURFACE SOIL – NORTH GRINDER LANDFILL
SITE WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	4.51E-10	1.0E-11	3.1	**3.3E-11**
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	1.6E-10	3.1	**4.9E-10**
Benzo(b)fluoranthene	O	21.7	ug/kg	4.37E-10	1.0E-11	3.1	**3.2E-11**
Benzo(k)fluoranthene	O	6.02	ug/kg	1.21E-10	2.8E-12	3.1	**8.7E-12**
Chrysene	O	0.24	ug/kg	4.83E-12	1.1E-13	3.1	**3.5E-13**
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	1.2E-10	3.1	**3.7E-10**
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	8.61E-10	2.0E-11	3.1	**6.2E-11**
Aroclor-1260	O	78	ug/kg	1.57E-09	3.7E-11	NE	
Dieldrin	O	175	ug/kg	3.52E-09	8.2E-11	16	**1.3E-09**
Arsenic	I	2.1	mg/kg	4.23E-08	9.8E-10	50	**4.9E-08**
						SUMMARY CANCER RISK	**5E-08**

[1] Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
ND = No data available

TABLE J-5.10, continued
FUTURE USE INHALATION OF PARTICULATE DUST – SURFACE SOIL – NORTH GRINDER LANDFILL
SITE WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	4.51E-09	2.9E-10	ND	
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	4.5E-10	ND	
Benzo(b)fluoranthene	O	217	ug/kg	4.37E-09	2.8E-10	ND	
Benzo(k)fluoranthene	O	602	ug/kg	1.21E-08	7.9E-10	ND	
Chrysene	O	240	ug/kg	4.83E-09	3.1E-10	ND	
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	3.4E-10	ND	
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	8.61E-09	5.6E-10	ND	
Aroclor-1260	O	78	ug/kg	1.57E-09	1.0E-10	ND	
Dieldrin	O	175	ug/kg	3.52E-09	2.3E-10	ND	
gamma-BHC (Lindane)	O	1.025	ug/kg	2.06E-11	1.3E-12	ND	
Arsenic	I	2.1	mg/kg	4.23E-08	2.8E-09	ND	
Total Petroleum Hydrocarbons	I	51.4	mg/kg	1.03E-06	6.7E-08	ND	
						SUMMARY HAZARD INDEX	0E+00

ND = No data available

NUEXSS6	15-Mar-96

TABLE J-5.11
FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
EXCAVATION WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical specific	chemical specific	
INGESTION RATE	IR	480	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992a
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1992b
SURFACE AREA EXPOSED	SA	5,750	cm²	USEPA, 1992a
DOSE ABSORBED PER EVENT	DA_{event}	chemical specific	mg/cm²-event	Per USEPA, 1992a
CONVERSION FACTOR	CF	1.00E-06	kg/mg	SEE BELOW
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year *	Assumption
EXPOSURE DURATION	ED	1	years	Assumption
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	1	years	USEPA, 1991

* Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1992b. USEPA Region IV Guidance Memo February 10, 1992.
CF = 10E-9 kg/ug for organics

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$\text{INTAKE-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DAevent = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects: AT = ED

TABLE J-5.11, continued

NUEXSS6	15-Mar-96

FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
EXCAVATION WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF (mg/kg-day)^-1	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] (mg/kg-day)^-1	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	1.8E-10	7.3	1.3E-09	0.01	2.2E-11	8	1.7E-10	1.5E-09
Benzo(a)pyrene	O	340	ug/kg	2.7E-09	7.3	2.0E-08	0.01	3.3E-10	8	2.6E-09	2.3E-08
Benzo(b)fluoranthene	O	21.7	ug/kg	1.7E-10	7.3	1.3E-09	0.01	2.1E-11	8	1.7E-10	1.4E-09
Benzo(k)fluoranthene	O	6.02	ug/kg	4.8E-11	7.3	3.5E-10	0.01	5.8E-12	8	4.6E-11	4.0E-10
Chrysene	O	0.24	ug/kg	1.9E-12	7.3	1.4E-11	0.01	2.3E-13	8	1.9E-12	1.6E-11
Dibenz(a,h)anthracene	O	257	ug/kg	2.1E-09	7.3	1.5E-08	0.01	2.5E-10	8	2.0E-09	1.7E-08
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	3.4E-10	7.3	2.5E-09	0.01	4.1E-11	8	3.3E-10	2.8E-09
Aroclor-1260	O	78	ug/kg	6.3E-10	7.7	4.8E-09	0.01	7.5E-11	8.6	6.5E-10	5.5E-09
Dieldrin	O	175	ug/kg	1.4E-09	16	2.3E-08	0.01	1.7E-10	20	3.4E-09	2.6E-08
gamma-BHC (Lindane)	O	1.025	ug/kg	8.3E-12	1.3	1.1E-11	0.01	9.9E-13	2.6	2.6E-12	1.3E-11
Arsenic	I	2.1	mg/kg	1.7E-08	1.5	2.5E-08	0.001	2.0E-10	1.5	3.0E-10	2.6E-08
					SUMMARY CANCER RISK	9E-08				1E-08	1E-07

[1] Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[3] Calculated from Oral CSFs.
ND = No data available

TABLE J-5.11, continued
FUTURE USE DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - NORTH GRINDER LANDFILL
EXCAVATION WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

NUEXSS6	15-Mar-96

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	224	ug/kg	1.3E-07	ND		0.01	1.5E-08	ND		
Benzo(a)pyrene	O	340	ug/kg	1.9E-07	ND		0.01	2.3E-08	ND		
Benzo(b)fluoranthene	O	217	ug/kg	1.2E-07	ND		0.01	1.5E-08	ND		
Benzo(k)fluoranthene	O	602	ug/kg	3.4E-07	ND		0.01	4.1E-08	ND		
Chrysene	O	240	ug/kg	1.4E-07	ND		0.01	1.6E-08	ND		
Dibenz(a,h)anthracene	O	257	ug/kg	1.4E-07	ND		0.01	1.7E-08	ND		
Indeno(1,2,3-cd)pyrene	O	428	ug/kg	2.4E-07	ND		0.01	2.9E-08	ND		
Aroclor-1260	O	78	ug/kg	4.4E-08	0.00002	2.2E-03	0.01	5.3E-09	0.000018	2.9E-04	2.5E-03
Dieldrin	O	175	ug/kg	9.9E-08	0.00005	2.0E-03	0.01	1.2E-08	0.00004	3.0E-04	2.3E-03
gamma-BHC (Lindane)	O	1.025	ug/kg	5.8E-10	0.0003	1.9E-06	0.01	6.9E-11	0.00015	4.6E-07	2.4E-06
Arsenic	I	2.1	mg/kg	1.2E-06	0.0003	3.9E-03	0.001	1.4E-08	0.00029	4.9E-05	4.0E-03
Total Petroleum Hydrocarbons	O	51.4	ug/kg	2.9E-08	ND		0.01	3.5E-09	ND		
					SUMMARY HAZARD INDEX	8E-03				6E-04	9E-03

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from Oral RfDs.
ND = No data available

TABLE J-5.12
FUTURE USE INHALATION OF PARTICULATE DUST - SURFACE SOIL - NORTH GRINDER LANDFILL
EXCAVATION WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical specific	chemical specific	
PART. EMISSION FACTOR	PEF	4.97E+07	m^3/kg	Appendix
CONCENTRATION AIR	CA	chemical specific	mg/m^3	
INHALATION RATE	IR	2.5	m^3/hour	USEPA, 1991
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	30	days/year	USEPA, 1991
EXPOSURE DURATION	ED	1	years	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	1	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
PEF has been derived in the Appendix of this report, Derivation of Particulate Emissions Factor

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR (mg/kg-day)^-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE J--5.12, continued
FUTURE USE INHALATION OF PARTICULATE DUST -- SURFACE SOIL -- NORTH GRINDER LANDFILL
EXCAVATION WORKER
NTC ORLANDO OU1
ORLANDO, FLORIDA

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION [1]	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)anthracene	O	22.4	ug/kg	4.51E-10	1.5E-13	3.1	**4.7E-13**
Benzo(a)pyrene	O	340	ug/kg	6.84E-09	2.3E-12	3.1	**7.1E-12**
Benzo(b)fluoranthene	O	21.7	ug/kg	4.37E-10	1.5E-13	3.1	**4.5E-13**
Benzo(k)fluoranthene	O	6.02	ug/kg	1.21E-10	4.1E-14	3.1	**1.3E-13**
Chrysene	O	0.24	ug/kg	4.83E-12	1.6E-15	3.1	**5.0E-15**
Dibenz(a,h)anthracene	O	257	ug/kg	5.17E-09	1.7E-12	3.1	**5.4E-12**
Indeno(1,2,3-cd)pyrene	O	42.8	ug/kg	8.61E-10	2.9E-13	3.1	**9.0E-13**
Aroclor-1260	O	78	ug/kg	1.57E-09	5.3E-13	NE	
Dieldrin	O	175	ug/kg	3.52E-09	1.2E-12	16	**1.9E-11**
Arsenic	I	2.1	mg/kg	4.23E-08	1.4E-11	50	**7.1E-10**
						SUMMARY CANCER RISK	7E-10

[1] Exposure point concentrations for carcinogenic PAH compounds have been adjusted by application of USEPA Region IV Toxicity Equivalence Factors (February 10, 1992).
ND = No data available

APPENDIX J-6

FUGITIVE AIR EMISSIONS MODELING

DERIVATION OF PARTICULATE EMISSION FACTOR

HUMAN HEALTH BASELINE RISK ASSESSMENT
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

APPENDIX J-6
DERIVATION OF PARTICULATE EMISSION FACTOR

INTRODUCTION. This evaluation has been conducted to estimate levels of site contaminants that would occur in ambient air as a result of wind erosion at Naval Training Center (NTC), Orlando. To estimate atmospheric concentrations of fugitive air contaminants, a three step modelling process was conducted. In the first step, respirable particle-phase emission rates are calculated. In the second, contaminant emission rates on a unit area basis are calculated. In the third phase, downwind ambient concentrations are estimated using air dispersion modeling. Each of these steps are discussed below. This modeling has been conducted for a theoretical site with characteristics similar to those of NTC, Orlando. The ambient air PM10 concentration associated with the modelled scenario is approximately $17 \mu g/m^3$ (see Step 3). Calculations for the theoretical site are shown in the attached tables (Table 1).

STEP 1: ESTIMATION OF PM10 EMISSIONS FROM WIND EROSION. Emission rates for particle-phase contaminants were estimated using equations developed by the USEPA for wind erosion by Cowherd et al. (1985). Airborne respirable particulate matter is defined as particles with an aerodynamic diameter less than or equal to 10 μm and is denoted with the symbol PM_{10}. Ambient air concentrations were then estimated using air dispersion modeling.

The equations presented in Cowherd et al. (1985) are intended to provide a methodology for rapid assessment of the inhalation exposure to respirable particulate emissions from surface contamination sites under emergency situations. Consequently, the models are based on a number of simplifying assumptions and yield order-of-magnitude estimates of atmospheric concentrations. The results of this quantitative assessment of potential inhalation exposure at this site should be reviewed with this fact in mind.

For estimating emissions from wind erosion for surface areas not completely covered by vegetation, two emission factor equations have been developed by Cowherd et al. (1985). Selection of the appropriate equation depends on whether or not the contaminated site's surface material is classified as having a "limited reservoir" or an "unlimited reservoir" of erodible surface particles. The critical feature of "unlimited" erosion potential is that contaminated soil is entrained at a lower wind velocity than for the "limited" case. Surface soils containing a high percentage of silts and lacking either vegetation or large non-erodible elements are assumed to contain an unlimited reservoir of surface erodible particles. This is based on the aggregate size distribution of surface particles, which is best determined with a sieve size analysis. In the absence of such an analysis at NTC, Orlando, an unlimited reservoir was assumed. The application of the unlimited reservoir model to this site represents a conservative case as the surface soils are unlikely to contain a large percentage of silts because of the geological age of the soils (i.e., the majority of the silts have already been eroded).

A conservative estimate of the PM_{10} emission rate (E_{10}) for the contaminated surface with unlimited erosion potential was calculated using an emission factor

derived by Gillette (1981) based on field measurements of highly erodible soil. The following equation was used:

$$E_{10} = 1x10^{-5}\ (1-V)\ \left(\frac{[u]}{u_t}\right)^3 F(x)$$

where:
E_{10}=PM_{10} emission factor for wind erosion (g/m^2-sec)
$1x10^{-5}$=empirical constant (g/m^2-sec)
V=fraction of the contaminated surface area with continuous vegetative cover
[u]=mean annual wind speed (m/s)
u_t=threshold value of wind speed at 7 m (m/s)
F(x)=function to estimate unlimited erosion
x=dimensionless ratio = 0.886 u_t/[u].

and:

$$u_t = \frac{1}{0.4}\ x\ \ln\frac{z}{z_0}\ x\ u^*$$

where:
u^*=friction velocity
z=height above surface (m)
z_0=roughness height (m)

For values of x greater then 2:

$$F(x)=0.18\ (8\ x^3 + 12\ x)\ e^{-x^2}$$

All parameters in the above equation were calculated from site-specific data, where possible. The values used in estimating the emission factor for wind erosion are given in Step 1 of Table 1. The PM_{10} emission rate estimated for the wind erosion of the excavation scenario can be found in Step 2 of the table.

<u>STEP 2. ESTIMATION OF CONTAMINANT EMISSION RATES</u>. Contaminant-specific emission rates were estimated from (1) the PM_{10} emission rates, (2) the hypothetical mass fraction of each contaminant in surface soil, and (3) the exposed surface area of the contaminated soil. Contaminant emission rates of respirable particles were determined using the following equation:

$$Q_{10} = 1 \times f \times E_{10} \times A$$

where:
Q_{10}=contaminant emission rate as PM_{10} (μg/sec)
f=mass fraction of contaminant in PM_{10} emissions (mg contaminant/kg PM_{10})
E_{10}=M_{10} emission rate (g PM_{10}/m^2-sec)
A=contaminated surface area (m^2)
1=conversion factor (1000 ug contaminant/mg contaminant)*(kg PM_{10}/1000 g PM_{10})

The values for f were estimated by assuming that the mass fraction of the contaminant in the inhalable particles emitted (PM_{10}) is equal to the mass fraction of the contaminant in the soil. The surface area available for wind erosion was assumed to be the area of the site (see Assumption column from Step 2). The value of Q_{10} calculated for each scenario can be found in Step 3 of the table.

STEP 3. AIRBORNE CONTAMINANT CONCENTRATION. Air dispersion modeling is used to predict offsite contaminant air concentrations based on the PM_{10} emission rate. Many different forms of dispersion models exist for a variety of applications. For this situation, the box model was selected because it is most appropriate to use when receptors are less than 100 meters from the edge of an area source. The model overpredicts concentrations by a factor of approximately four to six when compared with the Gaussian dispersion model, ISCST, for the downwind distances to exposure points of interest in this assessment (McCarthy and Burbank, 1990). The box model is a good screening model for a public health risk assessment because the concentrations estimated with the box model are protective of public health. If no risk is indicated using box model concentrations, the potential for adverse impacts to public health are considered negligible.

The box model is a basic analytical and physical model representing diffusion and convection from an area source. The box encloses the area source and is bounded by the ground as its base and the mixing height (H) of the mean vertical displacement of emissions, which is a function of atmospheric stability and downwind distance to the point of exposure. Within the box, mixing is assumed to be complete. The box has a width (W) equal to the width of the area source and the box is aligned so that its length lies in the direction of the wind, which passes through its end with a constant velocity (U). The ventilation rate, defined as the volume of air passing through the box, is equal to U x H x W. The downwind mixing height (H) of the box is determined from the following equation presented by Pasquill (1975) for neutral stability:

$$X = 6.25 \times z_0 \left[\left(\frac{H}{z_0}\right) \ln\left(\frac{H}{z_0}\right) - 1.58 \left(\frac{H}{z_0}\right) + 1.58 \right]$$

where:
X=downwind distance from the leading edge of the area source to the receptor (m)
H=downwind mixing height (m)
z0=roughness height (m)

The roughness height, z_0, was selected to be 0.02 meters, based on the roughness height of grassland provided by Cowherd et al. (1985). This roughness height provides a more conservative estimate of emissions than assuming nonvegetated conditions. The downwind distance to the receptor is measured to the closest exposure points for potentially exposed populations. For the purposes of this evaluation, a distance of 1 meter was assumed (the receptor is at the source). The ambient 24-hour contaminant concentration (C_{10}) was estimated by the following box model equation:

$$C_{10} = \frac{Q_{10} \times a}{U \times H \times W}$$

where:
C_{10}=concentration of contaminant at distance X ($\mu g/m^3$)
Q_{10} =particle-phase emission rate from wind erosion ($\mu g/sec$)
a=fraction of 24 hours during which emissions occur
U=average wind speed (m/sec)
H=downwind mixing height (m)
W=width of area perpendicular to wind (m)

The input values for this equation are shown in Step 3 in Table 1. This results in a conservative estimate of the 24-hour average concentration of contaminants to which an individual may be exposed to at the contaminant source on days in which wind erosion occurs. This concentration, the downwind contaminant concentration resulting from wind erosion, per unit of contaminant soil concentration (C_{10}) is multiplied by the concentration of each human health contaminant of potential concern (HHCPC) to obtain downwind contaminant concentrations. The estimated airborne contaminant concentrations resulting from wind erosion for the HHCPCs in the exposure scenario are presented in tabular form in Step 3 of Table 1.

The particulate emission factor (PEF) relates the contaminant concentration in soil with the concentration of respirable particles (PM_{10}) in the air due to fugitive dust emissions from surface contamination. The PEF is site-specific and independent of the type of contaminants present at the site. The PEF is calculated by dividing the soil contaminant concentration ($\mu g/kg$) by the concentration in the air ($\mu g/m^3$) to give the PEF (m^3/kg). This PEF is applied to chemical-specific soil concentrations to estimate dust-related chemical concentrations in air for the risk calculation spreadsheets.

This PEF is associated with a PM_{10} concentration of roughly 17 $\mu g/m^3$.

REFERENCES

Cowherd, C., G.E. Muleski, P.J. Englehart, and D.A. Gillette (1985). "Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites," prepared for USEPA Office of Health and Environmental Assessment, Washington, D.C.; EPA/600/8-85/002.

Gillette, D.A. (1981). "Production of Dust that May Be Carried Great Distances in Desert Dust: Origin Characteristics, and Effect on Man; edited by T. Pewe; Geological Society of America Special Paper 186.

McCarthy, S.M., and B. Burbank (1990). "Assessment of Fenceline Air Concentrations Associated with Construction Activities at Sites with Contaminated Soils," presented at American Waste Management Association - New England Section Conference, Wakefield, MA, February, 1990.

Pasquill, F. (1975). "The Dispersion of Materials in the Atmospheric Boundary Layer - The Basis for Generalization," in Lectures on Air Pollution and Environmental Impact Analysis, American Meteorological Society, Boston.

USEPA (1988). "Supplement B to Compilation of Air Pollutant Emissions Factors, Volume I: Stationary Point and Area Sources," USEPA Office of Air Quality Planning and Standards, AP-42, September, 1988.

TABLE J-6.1

appndj61	15-Mar-96

PARTICULATE CONCENTRATIONS FROM WIND EROSION – CALCULATION OF PARTICULATE EMISSIONS FACTOR
NTC ORLANDO
ORLANDO, FLORIDA

PURPOSE:

TO CALCULATE THE CONCENTRATIONS OF PM 10 EMISSIONS FOR CHEMICALS WHEN EMISSIONS ARE FROM UNLIMITED WIND EROSION USING THE BOX MODEL FOR AIR DISPERSION

STEPS LISTED IN THIS LOTUS SPREADSHEET

(1) CALCULATE PM10 EMISSION RATE FROM WIND EROSION (COWHERD, 1985)

(2) CALCULATE CONTAMINANT EMISSION RATE

(3) CALCULATE AIRBORNE CONTAMINANT CONCENTRATIONS

SOURCES:

Cowherd, 1985. Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites.

Pasquill, 1975. The Dispersion of Materials in the Atmospheric Boundary Layer – The Basis for Generalization.

USEPA, 1988. Supplement B to Compilation of Air Pollutant Emissions Factors, Volume I: Stationary Point and Area Sources.

TABLE J-6.1, continued

STEP 1: CALCULATE PM 10 EMISSIONS FROM WIND EROSION

UNLIMITED EROSION POTENTIAL

$E10 = 1.0E-5\ (1-V)\ ([u]/ut)^3\ F(x)$ — Cowherd, Eqn 4-4

where:

E10 = PM10 emission factor (g/m^2-s)
1.0E-5 = empirical constant
V = fraction of the contaminated surface area with continuous vegetative cover
[u] = mean annual wind speed (m/s) (Cowherd, Table 4-1)
ut = threshold value of wind speed at 7 m (m/s)
F(x) = function plotted in Cowherd, Fig. 4-3
x = dimentionless ratio = 0.886 ut/[u]

$ut = (1/0.4)\ ln(z/zo)\ u^*$ — Cowherd Eqn. 4-3

where:

z = height above surface (m)
zo = roughness height (m)
u* = friction velocity (m/s)

for x > 2:

$F(x) = 18\ (8x^3 + 12x)\ exp\ (-x^2)$ — Cowherd, Appendix B

VARIABLE	VALUE	UNITS	SOURCE
z	7.00	m	Cowherd
zo	0.02	m	Cowherd, Figure 3-6
u*	0.63	m/s	assumption
ut	9.14	m/s	calculated here
[u]	3.8	m/s	Cowherd, Table 4-1, Jacksonville, FloridaBoston, MA
x	2.13		calculated here
F(x)	0.20		calculated here or Cowherd, Figure 4-3
V	0.6	fraction	assumption based on site visit
E10	5.68E-08	g/m^2-s	calculated here

STEP 2: CALCULATE CONTAMINANT EMISSION RATE

Q10 = f x E10 x A Cowherd Eqn.

where:

Q10 = contaminant emission rate (μg contaminant/s)

f = fraction of PM 10 with contaminant (mg contaminant/kg PM10)
(assumed to equal soil concentration in mg contaminant/kg soil)

E10 = PM 10 emission rate (g PM 10 /m²–s)

A = area (m²)

1 = conversion (1000 μg contaminant/ mg contaminant) * (kg PM 10 / 1000 g PM 10)

At f = 1 mg contaminant / kg PM10:

Area = 33600.00 m^2

ACTIVITY	E10 (g/m²–s)	Q10 (μg/s)	ASSUMPTION
Wind Erosion	5.68E–08	1.91E–03	

STEP 3: CALCULATE AIRBORNE CONTAMINANT CONCENTRATION

BOX MODEL

$$C10 = \frac{Q10 \times a}{Ventilation\ Rate}$$

$$= \frac{Q10 \times a}{U \times H \times W}$$

where:

C10 = airborne contaminant concentration ($\mu g/m^3$)
Q10 = contaminant emission rate ($\mu g/s$)
U = wind speed (same as [u] from Step 2) (m/s)
W = width of area perpendicular to wind (m)
H = downwind mixing height (m)
a = fraction of 24 hours during which activity occurs

H is calculated in an iterative fashion based on the desired value of X from the following equation:

$$X = 6.25\ (zo)\ [(H/zo)\ \ln(H/zo) - 1.58\ (H/zo) + 1.58]$$

Pasquill, 1975

where:

X = downwind distance from leading edge of area source to receptor (m)
H = downwind mixing height (m)
zo = roughness height (same as in Step 2) (m)

z0 (m)	H (m)	X (m)
0.02	0.276	1.00

At f = 1 mg contaminant / kg PM10:

ACTIVITY	Q10 ($\mu g/s$)	a	U (m/sec)	H (m)	W (m)	C10 ($\mu g/m^3$ per mg/kg)
Wind Erosion	1.91E-03	1.00	2.45	0.276	140	2.02E-05

TABLE J-6.1, continued

appndj61	15-Mar-96

CHEMICAL	SOIL CONCENTRATION (mg/kg)	C10 WIND EROSION (µg/m³)	PEF m ^ 3/kg
	5	1.01E-04	4.96E+07
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	
		0.00E+00	

APPENDIX J-7

SOIL DERMAL ABSORPTION EQUATIONS

SUMMARY OF 1992 DERMAL GUIDANCE

REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT
OPERABLE UNIT 1
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

APPENDIX J-7
SUMMARY OF 1992 DERMAL GUIDANCE

DEVELOPMENT OF DOSE RESPONSE VALUES FOR USE IN DERMAL RISK CALCULATIONS. As required by USEPA Region IV guidance, risks associated with calculated absorbed doses (most commonly for soil and water dermal contact) should be evaluated using Reference Doses (RfDs) and Cancer Slope Factors (CSFs) that are specific to absorbed doses. Most oral RfDs and CSFs are based on administered dose rather than the absorbed dose (trichloroethylene's CSF is a notable exception). It is therefore necessary to adjust toxicity values that are based on administered dose so that they can be used for evaluation of absorbed doses. For dermal exposures, the toxicity values are adjusted as follows:

$$RfD_{adjusted} = RfD_{oral} \text{ X } ABSEFF_{oral}$$

$$CSF_{adjusted} = CSF_{oral} \ / \ ABSEFF_{oral}$$

where: $ABSEFF_{oral}$ is the absorption efficiency in the study that is the basis of the oral toxicity value.

If there is no information available on oral absorption efficiency, the conservative default values of 80 percent for volatile organics, 50 percent for semivolatile organics, and 20 percent for inorganics (USEPA, 1995) can be used.

ABSORBED DOSE CALCULATION - DERMAL EXPOSURE TO WATER. The absorbed dose is calculated per the USEPA *Dermal Exposure Assessment: Principles and Applications*, Interim Report, January 1992. The permeability constant approach is used for dermal exposures to contaminants in water.

The **steady-state approach for inorganics** is used here. The dose absorbed per unit area per event is:

$$DA_{event} = K_{pw} \ C_w \ t_{event} \ CF_1 \ CF_2$$

where:

DA_{event}	=	Dose absorbed per unit area per event (mg/cm^2-event)
K_{pw}	=	Permeability constant from water (cm/hr)
C_w	=	Concentration of chemical in water (μg/liter)
t_{event}	=	Duration of a single event (hr/event)
CF_1	=	Units conversion factor (liter/10^3 cm^3)
CF_2	=	Units conversion factor (mg/$10^3 \mu g$)

The **"unsteady-state approach for organics"** is used here. The dose absorbed per unit area per event is:

$$DA_{event} = 2 \ K_p \ C_w \ CF_3 \ CF_4 \ (6 \ \tau \ t_{event} \ / \ \pi)^{0.5}$$

Where $t < t^*$

and

$$DA_{event} = K_p C_w CF_5 CF_6 ((t_{event}/(1 + B)) + 2 \tau ((1 + 3 B) / (1 + B))$$
Where $t > t^*$

where:

K_p	=	Permeability constant from water (cm/hr)
C_w	=	Concentration of chemical in water (μg/liter)
τ	=	$l_{sc}^2 / 6 D_{sc}$ (hr)
l_{sc}	=	Thickness of stratum corneum (10 um)
D_{sc}	=	Stratum corneum diffusion coefficient (cm^2/hr)
t_{event}	=	Duration of a single event (hr/event)
π	=	Pi (dimensionless)
t^*	=	Time to reach steady state (hr)
B	=	Octanol water partition coefficient divided by 10^4 (dimensionless)
CF_3	=	Units conversion factor (mg/10^3 μg)
CF_4	=	Units conversion factor (liter/10^3 cm^3)
CF_5	=	Units conversion factor (mg/10^3 μg)
CF_6	=	Units conversion factor (liter/10^3 cm^3)

For a given compound, the values for B, K_p τ, and t^* can be found in Table 5-8 of the dermal guidance document (USEPA, 1992).

Once the dose-per-event (DA_{event}) is calculated, the dermally absorbed dose (DAD) for use in risk calculations can be derived as follows:

Dermally absorbed dose for use in risk calculations is derived generally (for adults who are no longer growing) as follows:

$$DAD_{adult} = DA_{event} EV EF ED SA / BW AT$$

For children, to account for changing surface areas and bodyweights, the dermally absorbed dose is calculated as follows:

$$DAD_{child} = (DA_{event} EV EF / AT) \sum^{n}_{i=m} (SA_i ED_i / BW_i)$$

where:

EV	=	Event frequency (events/day)
EF	=	Exposure frequency (days/year)
AT	=	Averaging time (days). For noncarcinogenic effects,
AT	=	ED, and for carcinogenic effects AT = 70 years or 25,550 days.
SA_i	=	Surface area exposed at age i (cm^2)
ED_i	=	Exposure duration at age i (years)
BW_i	=	Bodyweight at age i (kg)

All of the calculations contained in this appendix are based on the data presented in Tables J-7-1 through J-7-3.

For bathing and swimming, USEPA recommends that whole body surface area be used to represent skin surface area available for contact with water. For adults, using 50th and 95th percentile whole body SA values, the default SA values are 20,000 cm^2 and 23,000 cm^2. For children, the default values for each age group

Table J-7-1 – Exposure parameters for dermal contact with water

SURFACE AREA AVAILABLE FOR WATER CONTACT

	BATHING AND SWIMMING		WADING						SWIMMER	SWIMMER	WADER	WADER
AGE	50%ILE WHOLE BODY SA (1)	95%ILE WHOLE BODY SA (1)	25% x 50%ILE BODY SA	25% x 95%ILE BODY SA	50%ILE (2) BODYWEIGHT	50%ILE (2) BODYWEIGHT	EST 50%ILE BODYWEIGHT AVG OF M/F	95%ILE BODYWEIGHT	(EDi X SAi)/BWi AVG CASE WATER AVG	(EDi X SAi)/BWi RME WATER RME	(EDi X SAi)/BWi AVG CASE WATER AVG	(EDi X SAi)/BWi RME WATER RME
	CM SQ AVG	CM SQ RME	CM SQ AVG	CM SQ RME	KG MALE	KG FEMALE	KG	KG	CM SQ -YR/KG	CM SQ -YR/KG	CM SQ -YR/KG	CM SQ -YR/KG
1 < 2 (3)	5398	6104	1350	1526	11.5	10.5	11		490.7	554.9	122.7	138.7
2 < 3	6030	6820	1508	1705	13.4	12.6	13		463.8	524.6	116.0	131.2
3 < 4	6640	7640	1660	1910	15.3	14.6	14.95		444.1	511.0	111.0	127.8
4 < 5	7310	8450	1828	2113	17.4	16.4	16.9		432.5	500.0	108.1	125.0
5 < 6	7930	9180	1983	2295	19.3	18.8	19.05		416.3	481.9	104.1	120.5
6 < 7	8660	10600	2165	2650	21.9	21	21.45		403.7	494.2	100.9	123.5
7 < 8	9360	11100	2340	2775	24.4	23.5	23.95		390.8	463.5	97.7	115.9
8 < 9	10000	12400	2500	3100	27.3	27.3	27.3		366.3	454.2	91.6	113.6
9 < 10	10700	12900	2675	3225	29.7	29.6	29.65		360.9	435.1	90.2	108.8
10 < 11	11800	14800	2950	3700	34.5	34.3	34.4		343.0	430.2	85.8	107.6
11 < 12	12300	16000	3075	4000	36.4	40	38.2		322.0	418.8	80.5	104.7
12 < 13	13400	17600	3350	4400	42.1	45.2	43.65		307.0	403.2	76.7	100.8
13 < 14	14700	18100	3675	4525	47.7	48.6	48.15		305.3	375.9	76.3	94.0
14 < 15	16100	19100	4025	4775	55.5	52.8	54.15		297.3	352.7	74.3	88.2
15 < 16	17000	20200	4250	5050	60.2	53.9	57.05		298.0	354.1	74.5	88.5
16 < 17	17600	21600	4400	5400	63.6	55.3	59.45		296.0	363.3	74.0	90.8
17 < 18	18000	20900	4500	5225	65.7	58.3	62		290.3	337.1	72.6	84.3
18 < 75	20000	23000	5000	5750	75.9	61.5	70		285.7	328.6	71.4	82.1
CHILD							6 YRS	AGE 1 < 7 SUM	2651.3	3066.6	662.8	766.7
CHILD							6 YRS	AGE 2 < 8 SUM	2551.4	2975.2	637.8	743.8
OLDER CHILD							11 YRS	AGE 6 < 17 SUM	3690.4	4545.3	922.6	1136.3
CHILD/ADULT							30 yrs	age 1 < 31	9508.4	10952.3	2377.1	2738.1
ADULT							24 yrs	AGE 18 < 42 SU	6857.1	7885.7	1714.3	1971.4

(1)Table 4B-3 of Exposure Factors Handbook, USEPA, 1989, EPA/600/8-89/043
(2)Table 5A-3 Of Exposure Factors Handbook, USEPA 1989, EPA/600/8-89/043
(3) SAs based on equation SA = K X BW ^ 2/3. K calculated from age 2<3 data.
Equation from Appendix 4A of Exposure Factors Handbook, USEPA 1989, EPA/600/8-89/043

Table J-7-2 – Surface area exposed to surface water for waders

	Mean % of whole body SA			95 %ile Whole body SA (3)
Age	(1) Hands	(2) Lower Legs	(1) Feet	sq cm
1<2	5.68	12.8	6.27	6104
2<3	5.3	12.8	7.07	6820
3<4	6.07	12.8	7.21	7640
4<5	5.7	12.8	7.29	8450
5<6	5.7	12.8	7.29	9180
6<7	4.71	12.8	6.9	10600
Mean (age 1 thru 6)	5.5	12.8	7.0	8132

	Hands	Lower Legs	Feet	
Estimated average SA Ages 1 thru 6 (sq cm)	449.4	1040.9	569.7	
Estimated SA for lower legs, hands, feet ages 1 thru 6 (sq cm)	2060			

NOTE: area of lower legs, feet, hands is approximately 25% of whole body surface area (2060 sq cm/8132 sq cm)

(1) Table 4-3 of Exposure factors Handbook, USEPA 1989, EPA/600/8-89/043
(2) Table 4-2 of Exposure Factors Handbook, USEPA 1989, EPA/600/8-89/043
The percent of whole body surface area for the lower legs is taken from Table 4-2(adults) because no value for children is reported in Table 4-3.
(3) Table 4B-3 of Exposure Factors Handbook, USEPA 1989, EPA/600/8-89/043

Table J-7-3 – Exposure parameters for dermal contact with soil

AGE	50%ILE WHOLE BODY SA (1)	95%ILE WHOLE BODY SA (1)	AVAILABLE FOR SOIL CONTACT 25% x 50%ILE BODY SA	25% x 95%ILE BODY SA	50%ILE (2) BODYWEIGHT	50%ILE (2) BODYWEIGHT	EST 50%ILE BODYWEIGHT AVG OF M/F	95%ILE BODYWEIGHT	(EDi X SAi)/BWi AVG CASE SOIL AVG	(EDi X SAi)/BWi RME SOIL RME
	CM SQ AVG	CM SQ RME	CM SQ AVG	CM SQ RME	KG MALE	KG FEMALE	KG	KG	CM SQ-YR/KG	CM SQ-YR/KG
1 < 2 (3)	5398	6104	1350	1526	11.5	10.5	11		122.7	138.7
2 < 3	6030	6820	1508	1705	13.4	12.6	13		116.0	131.2
3 < 4	6640	7640	1660	1910	15.3	14.6	14.95		111.0	127.8
4 < 5	7310	8450	1828	2113	17.4	16.4	16.9		108.1	125.0
5 < 6	7930	9180	1983	2295	19.3	18.8	19.05		104.1	120.5
6 < 7	8660	10600	2165	2650	21.9	21	21.45		100.9	123.5
7 < 8	9360	11100	2340	2775	24.4	23.5	23.95		97.7	115.9
8 < 9	10000	12400	2500	3100	27.3	27.3	27.3		91.6	113.6
9 < 10	10700	12900	2675	3225	29.7	29.6	29.65		90.2	108.8
10 < 11	11800	14800	2950	3700	34.5	34.3	34.4		85.8	107.6
11 < 12	12300	16000	3075	4000	36.4	40	38.2		80.5	104.7
12 < 13	13400	17600	3350	4400	42.1	45.2	43.65		76.7	100.8
13 < 14	14700	18100	3675	4525	47.7	48.6	48.15		76.3	94.0
14 < 15	16100	19100	4025	4775	55.5	52.8	54.15		74.3	88.2
15 < 16	17000	20200	4250	5050	60.2	53.9	57.05		74.5	88.5
16 < 17	17600	21600	4400	5400	63.6	55.3	59.45		74.0	90.8
17 < 18	18000	20900	4500	5225	65.7	58.3	62		72.6	84.3
18 < 75	20000	23000	5000	5750	75.9	61.5	70		71.4	82.1
						CHIILD	6 YRS	AGE 1 < 7 SUM	662.8	766.7
						CHILD	6 YRS	AGE 2 < 8 SUM	637.8	743.8
						OLDER CHILD	11 YRS	AGE 6 < 17 SUM	922.6	1136.3
						CHILD/ADULT	30 yrs	age 1 < 31	2377.1	2738.1
						ADULT	24 yrs	AGE 18 < 42 SUM	1714.3	1971.4

(1)Table 4B-3 of Exposure factors Handbook, USEPA 1989, EPA/600/8-89/043
(2)Table 5A-3 of exposure factors Handbook, USEPA 1989, EPA/600/8-89/043
(3) SAs based on equation SA = K X BW^2/3. K calculated from age 2<3 data.
Equation from Appendix 4A of Exposure Factors Handbook, USEPA 1989, EPA/600/8-89/043

would be equal to the 50th percentile and 95th percentile whole body SA values. Estimated bodyweights are the average of the 50th percentile female and male weights. These values are shown below.

Values of

$$\sum_{i=m}^{n} (SA_i \; ED_i \; / \; BW_i)$$

for commonly used age ranges as calculated in Table J-7-1 are presented in Table J-7-4.

For wading, it is assumed that the entire surface area of the feet, lower legs, and hands is exposed to the surface water during the entire exposure event. This assumption is for shallow water situations. The percent of total body surface area represented by the feet, lower legs and hands has been approximated as shown in Table J-7-2. Averaging surface areas over the 6 childhood years yields the following: hands represent 5.5 percent of total body surface area, lower leg represents 12.8 percent of total body surface area, and the feet represent 7 percent of total body surface area. Therefore, the feet, lower legs and hands represent approximately 25 percent of total body surface area for children ages 1 through 6. This value is the same value that USEPA identifies as the percent of total body surface area which is available for soil contact (USEPA, 1992). This value, 25 percent of total body surface area is used here to represent surface area available for waders of all ages (Table J-7-5).

<u>ABSORBED DOSE CALCULATION - DERMAL EXPOSURE TO SOIL</u>. The absorbed dose is calculated per the USEPA *Dermal Exposure Assessment: Principles and Applications*, Interim Report, January 1992. The calculation of the estimated dermally absorbed dose per unit area per event is:

$$DA_{event} = C_{soil} \; AF \; ABS \; CF$$

where:

DA_{event}	=	Dose absorbed per unit area per event (mg/cm^2-event)
C_{soil}	=	Contaminant concentration in soil (mg/kg)
AF	=	Adherence factor of soil to skin (mg/cm^2-event)
ABS	=	Absorption fraction (dimensionless)
CF	=	Units conversion factor (10^{-6} kg/mg)

Dermally absorbed dose for use in risk calculations is derived generally (for adults who are no longer growing) as follows:

$$DAD_{adult} = DA_{event} \; EF \; ED \; SA \; / \; BW \; AT$$

For children, to account for changing surface areas and bodyweights, the dermally absorbed dose is calculated as follows:

$$DAD_{child} = (DA_{event} \; EF \; / \; AT) \sum_{i=m}^{n} (SA_i \; ED_i \; / \; BW_i)$$

Table J-7-4
Summary of Age-adjusted, Bodyweight-Normalized Surface Areas Exposed - Bathing or Swimming

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Age Range	Duration of Exposure to Water Bathing or Swimming	Sum of (area X duration/body-weight) terms Average Case cm^2-yr/kg	Sum of (area X duration/bodyweight) terms RME cm^2-yr/kg
1 thru 6	6 yrs	2651.3	3066.6
2 thru 8	6 yrs	2551.4	2975.2
6 thru 16	11 yrs	3690.4	4545.3
1 thru 30	30 yrs	9508.4	10952.3
18 thru 41	24 yrs	6857.1	7885.7

Notes: yrs = years.
cm^2/yr/kg = square centimeters per year per kilogram.
RME = reasonable maximum exposure.

Table J-7-5
Summary of Age-Adjusted, Bodyweight-Normalized Surface Areas Exposed - Wading

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Age Range	Duration of Exposure to Water Wading	Sum of (area X duration/bodyweight) terms Average Case cm^2-yr/kg	Sum of (area X duration/bodyweight) terms RME cm^2-yr/kg
1 thru 6	6 yrs	662.8	766.7
2 thru 8	6 yrs	637.8	743.8
6 thru 16	11 yrs	922.6	1136.3
1 thru 30	30 yrs	2377.1	2738.1
18 thru 41	24 yrs	1714.3	1971.4

Notes: yrs = years.
cm^2/yr/kg = square centimeters per year per kilogram.
RME = reasonable maximum exposure.

where:

EF	=	Exposure frequency (events/year)
AT	=	Averaging time (days). For noncarcinogenic effects, AT = ED, and for carcinogenic effects AT = 70 years or 25,550 days.
SA_i	=	Surface area exposed at age i (cm^2)
ED_i	=	Exposure duration at age i (years)
BW_i	=	Bodyweight at age i (kg)

For the typical case, USEPA recommends SA for head and hands only and for the "reasonable worst case," the SA of the head, hands, forearms, and lower legs as the SA available for contact with soil. USEPA simplifies these assumptions by saying that 25 percent of the total body surface area would be available for soil contact. For adults, using 50th and 95th percentile whole body SA values, the default SA values are 5,000 cm^2 and 5,800 cm^2. For children, the default values for each age group would be equal to 25 percent of the 50th percentile and 95th percentile whole body SA values. Estimated bodyweights are the average of the 50th percentile female and male weights. These values are shown in Table J-7-3.

Values of

$$\sum_{i=m}^{n} (SA_i \; ED_i \; / \; BW_i)$$

for commonly used age ranges, as calculated in Table J-7-3, are presented in Table J-7-6.

Table J-7-6
Summary of Age-Adjusted, Bodyweight-Normalized Surface Areas Exposed - Soil

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Age Range	Duration of Exposure to Soil	Sum of (area X duration/bodyweight) terms Average Case cm^2-yr/kg	Sum of (area X duration/bodyweight) terms RME cm^2-yr/kg
1 thru 6	6 yrs	662.8	766.7
2 thru 8	6 yrs	637.8	743.8
6 thru 16	11 yrs	922.6	1136.3
1 thru 30	30 yrs	2377.1	2738.1
18 thru 41	24 yrs	1714.3	1971.4

Notes: yrs = years.
cm^2/yr/kg = square centimeters per year per kilogram.
RME = reasonable maximum exposure.

REFERENCES

USEPA, 1989. Exposure Factors Handbook, Final Report, EPA/600/8-89/043.

USEPA, 1992. Dermal exposure Assessment: Principles and Applications, Interim Report, EPA/600/8-91/011B, January 1992.

USEPA, 1995, Supplemental Guidance to RAGS: Region IV Bulletins. Toxicity Assessment. Human Health Risk Assessment Bulletin No. 2. USEPA Region IV Waste Management Division, Atlanta. November, 1995.

APPENDIX J-8

DOSE-RESPONSE VALUES

HUMAN HEALTH TOXICITY PROFILES

HUMAN HEALTH BASELINE RISK ASSESSMENT
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Table J-8-1
Oral Dose-Response Data
for Carcinogenic Effects

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Chemical	Weight of Evidence	Oral Slope Factor (mg/kg/day)(-1)	Source	Test Species	Exposure Route	Tumor Type	Study Source
Semivolatile Organic Compounds							
Benzo(a)anthracene	B2	7.3e+00	(1)				
Benzo(a)pyrene	B2	7.3e+00	IRIS	Mouse	Oral-diet	Forestomach	IRIS
Benzo(b)fluoranthene	B2	7.3e+00	(1)				
Benzo(k)fluoranthene	B2	7.3e+00	(1)				
Chrysene	B2	7.3e+00	(1)				
Dibenz(a,h)anthracene	B2	7.3e+00	(1)				
Indeno(1,2,3-cd)pyrene	B2	7.3e+00	(1)				
Pesticides and PCBs							
Aroclor-1260	B2	7.7e+00	IRIS	Rat	Oral-diet	Liver	IRIS
Dieldrin	B2	1.6e+01	IRIS	Mouse	Oral-diet	Liver	IRIS
gamma-BHC (Lindane)	C/B2	1.3e+00	HEAST	Mouse	Oral-diet	Liver	IRIS
Inorganic Analytes							
Arsenic	A	1.5e+00	IRIS	Human	Oral-drinking water	Skin	IRIS

Integrated Risk Information System (IRIS) on-line database search, current as of February 1996.
Health Effects Assessment Summary Tables (HEAST), current as of November 1995.
(1) Value for benzo(a)pyrene was used as a surrogate for all polynuclear aromatic hydrocarbons classified as A or B carcinogens.

Notes: mg/kg/day = milligrams per kilogram per day.

Weight of Evidence (route-specific):
- A = Human carcinogen
- B = Probable human carcinogen (B1 = limited human evidence; B2 = sufficient human evidence)
- C = Possible human carcinogen
- D = Not classifiable as to human carcinogenicity

Table J-8-2
Inhalation Dose-Response Data for Carcinogenic Effects

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Chemical	Weight of Evidence	Inhalation Slope Factor (mg/kg/day)(-1)	Source	Inhalation Unit Risk ($\mu g/m^3$)(-1)	Source	Test Species	Exposure Route	Tumor Type	Study Source
Semivolatile Organic Compounds									
Benzo(a)anthracene	B2	3.1e+00	(1)	8.8e-01	(1)				
Benzo(a)pyrene	B2	3.1e+00	(1)	8.8e-01	(1)				
Benzo(b)fluoranthene	B2	3.1e+00	(1)	8.8e-01	(1)				
Benzo(k)fluoranthene	B2	3.1e+00	(1)	8.8e-01	(1)				
Chrysene	B2	3.1e+00	(1)	8.8e-01	(1)				
Dibenz(a,h)anthracene	B2	3.1e+00	(1)	8.8e-01	(1)				
Indeno(1,2,3-cd)pyrene	B2	3.1e+00	(1)	8.8e-01	(1)				
Pesticides and PCBs									
Aroclor-1260	B2	NE		NE					
Dieldrin	B2	1.6e+01	HEAST	4.6e-03	IRIS	Mouse	Oral-diet	Liver	IRIS
gamma-BHC (Lindane)	D	NE		NE					
Inorganic Analytes									
Arsenic	A	5.0e+01	HEAST	4.3e-03	IRIS	Human	Inhalation	Lung	IRIS

Integrated Risk Information System (IRIS) on-line database search, current as of February 1996.
Health Effects Assessment Summary Tables (HEAST), current as of November 1995.
(1) Supplement Guidance to RAGS, Region IV Bulletins, "Toxicity Assessment". Human Health Risk Assessment Bulletin, Nov 12, 1995.

Notes: mg/kg/day = milligrams per kilogram per day.
$\mu g/m^3$ = micrograms per cubic meter.
NE = not evaluated.

Weight of Evidence (route-specific):
A = Human carcinogen
B = Probable human carcinogen (B1 = limited human evidence; B2 = sufficient human evidence)
C = Possible human carcinogen
D = Not classifiable as to human carcinogenicity

Table J-8-4
Oral Dose-Response Data for Noncarcinogenic Effects

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Chemical	Chronic		Subchronic		Study Type	Confidence Level	Critical Effect	Test Animal	Uncertainty Factor	Study Source
	Oral RfD (mg/kg-day)	Source	Oral RfD (mg/kg- day)	Source						
Semivolatile Organic Compounds										
Benzo(a)anthracene	ND		ND							
Benzo(a)pyrene	ND		ND							
Benzo(b)fluoranthene	ND		ND							
Benzo(k)fluoranthene	ND		ND							
Chrysene	ND		ND							
Dibenz(a,h)anthracene	ND		ND							
Indeno(1,2,3-cd)pyrene	ND		ND							
Pesticides and PCBs										
Aroclor-1260	2.0e-05	(6)	5.0e-05	(6)						
Dieldrin	5.0e-05	IRIS	5.0e-05	HEAST	Oral-diet	Medium	Liver lesi-ons	Rat	100 H,A	IRIS
gamma-BHC (Lindane)	3.0e-04	IRIS	3.0e-03	HEAST	Oral-diet	Medium	Liver, kid-ney toxicity	Rat	1000 H,A,S	IRIS
Inorganic Analytes										
Arsenic	3.0e-04	IRIS	3.0e-04	HEAST	Oral-drinking water	Medium	Hyperpigm-entation, keratosis	Human	3 D	IRIS

Integrated Risk Information System (IRIS) on-line database search, current as of February 1996.
Health Effects Assessment Summary Tables (HEAST), current as of November 1995.
Environmental Criteria and Assessment Office (ECAO) of the U.S. Environmental Protection Agency in response to a specific request.
(6) The chronic and subchronic ingestion RfD for Aroclor-1254 has been used as a surrogate for all Aroclors lacking chemical specific RfDs.
Uncertainty factors:

Notes: RfD = reference dose.
mg/kg = milligrams per kilogram.
PCBs = polychlorinated biphenyls.
ND = No Data.
H = Variation in human sensitivity.
S = Extrapolation from subchronic to chronic observed adverse effects level
D = Inadequate data
A = Animal to human extrapolation.
L = Extrapolation from lowest observed adverse effects level to NOAEL.
M = Modifying factor.

Table J-8-4
Inhalation Dose-Response Data for Noncarcinogenic Effects

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Chemical	Chronic		Subchronic		Study Type	Confidence Level	Critical Effect	Test Animal	Uncertainty Factor	Study Source
	RfC ($\mu g/m^3$)	Source	RfC ($\mu g/m^3$)	Source						
Semivolatile Organic Compounds										
Benzo(a)anthracene	ND		ND							
Benzo(a)pyrene	ND		ND							
Benzo(b)fluoranthene	ND		ND							
Benzo(k)fluoranthene	ND		ND							
Chrysene	ND		ND							
Dibenz(a,h)anthracene	ND		ND							
Indeno(1,2,3-cd)pyrene	ND		ND							
Pesticides and PCBs										
Aroclor-1260	ND		ND							
Dieldrin	ND		ND							
gamma-BHC (Lindane)	ND		ND							
Inorganic Analytes										
Arsenic	ND		ND							

Integrated Risk Information System (IRIS) on-line database search, current as of February 1996.
Health Effects Assessment Summary Tables (HEAST), current as November 1995.

Notes: ND = no data.
Uncertainty factors:
- A = Animal to human extrapolation
- H = Variation in human sensitivity
- S = Extrapolation from subchronic to chronic NOAEL
- L = Extrapolation from LOAEL to NOAEL
- D = Inadequate data
- M = Modifying factor

Table J-8-5
Dermal Dose-Response Data for Carcinogenic Effects

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Compound	Weight of Evidence	Oral Slope Factor (mg/kg-day)-1	Oral Absorption Efficiency	Reference	Dermal Slope Factor (mg/kg-day)-1
Semivolatile Organic Compounds					
Benzo(a)anthracene	B2	7.3e+00	91%	(1)	8.0e-01
Benzo(a)pyrene	B2	7.3e+00	91%	Hecht et al., 1979	8.0e-01
Benzo(b)fluoranthene	B2	7.3e+00	91%	(1)	8.0e-01
Benzo(k)fluoranthene	B2	7.3e+00	91%	(1)	8.0e-01
Chrysene	B2	7.3e+00	91%	(1)	8.0e-01
Dibenz(a,h)anthracene	B2	7.3e+00	91%	(1)	8.0e-01
Indeno(1,2,3-cd)pyrene	B2	7.3e+00	91%	(1)	8.0e-01
Pesticides and PCBs					
Aroclor-1260	B2	7.7e+00	90%	Albro & Fishbein, 1972	8.6e+00
Dieldrin	B2	1.6e+01	80%	(2)	2.0e+01
gamma-BHC (Lindane)	C/B2	1.3e+00	50%	(3)	2.6e+00
Inorganic Analytes					
Arsenic	A	1.5e+00	98%	Vahter, 1983	1.5e+00

(1) The oral absorption efficiency of all PAHs is assumed to be identical to that of benzo(a)pyrene, based on structural analogy.
(2) The oral absorption efficiency of alpha-chlordane is assumed to be identical to that of Dieldrin, based on structural analogy.
(3) Supplement Guidance to RAGS, Region IV Bulletins, "Toxicity Assessment", Human Health Risk Assessment Bulletin Nov. 12, 1995.

Notes: NE = Not Evaluated.
For documentation concerning oral slope factors, refer to Table 1.

Weight of Evidence (route-specific):
A = Human carcinogen.
B = Probable human carcinogen (B1 = limited human evidence; B2 = sufficient human evidence).
C = Possible human carcinogen.
D = Not classifiable as to human carcinogenicity.

Table J-8-6
Dermal Dose-Response Data for Noncarcinogenic Effects

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

	Chronic Oral RfD (mg/kg-day)	Subchronic Oral RfD (mg/kg-day)	Oral Absorption Efficiency	Reference	Dermal Chronic RfD (mg/kg-day)	Dermal Subchronic RfD (mg/kg-day)
Semivolatile Organic Compounds						
Benzo(a)anthracene	ND	ND	91%	(1)	ND	ND
Benzo(a)pyrene	ND	ND	91%	Hecht et al., 1979	ND	ND
Benzo(b)fluoranthene	ND	ND	91%	(1)	ND	ND
Benzo(k)fluoranthene	ND	ND	91%	(1)	ND	ND
Chrysene	ND	ND	91%	(1)	ND	ND
Dibenz(a,h)anthracene	ND	ND	91%	(1)	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	91%	(1)	ND	ND
Pesticides and PCBs						
Aroclor-1260	2.0e-05	5.0e-05	90%	Albro & Fishbein, 1972	1.8e-05	4.5e-05
Dieldrin	5.0e-05	5.0e-05	80%	(3)	4.0e-05	4.0e-05
gamma-BHC (Lindane)	3.0e-04	3.0e-03	50%	(2)	1.5e-04	1.5e-04
Inorganic Analytes						
Arsenic	3.0e-04	3.0e-04	98%	Vahter, 1983	2.9e-04	2.9e-04

(1) The oral absorption efficiency of all PAHs is assumed to be identical to that of benzo(a)pyrene, based on structural analogy.
(2) The oral absorption efficiency of alpha-chlordane is assumed to be identical to that of Dieldrin, based on structural analogy.
(3)Supplemental Guidance to RAGS Region IV Bulletins, "Toxicity Assessment", Human Health Risk Assessment Bulletins. Nov. 12, 1995.

Notes: ND = No Data
For documentation concerning chronic and subchronic oral RfDs, refer to Table 3.

APPENDIX J-9

TOXICITY PROFILES

HUMAN HEALTH TOXICITY PROFILES

HUMAN HEALTH BASELINE RISK ASSESSMENT
NTC, ORLANDO
ORLANDO, FLORIDA

APPENDIX J-9
HUMAN HEALTH TOXICITY PROFILES

1,1-DICHLOROETHENE. 1,1-Dichloroethene is a man-made chlorinated solvent that is used to make polyvinylidene chloride copolymers, which are used as flexible films for packaging all types of materials, including food.

Data of 1,1-dichloroethene exposure in humans is limited. However, available evidence suggest that 1,1-dichloroethene causes central nervous system depression and liver toxicity in humans. Toxicity data on laboratory animals confirm this evidence, and also indicate that 1,1-dichloroethene may produce adverse effects on the kidney, heart, and lung. Pharmacokinetic data from laboratory animals suggest that 1,1-dichloroethene is metabolized to toxic metabolites, and that these metabolites are responsible for the adverse effects. Therefore, organs with high biotransformation enzyme activity, such as the liver, kidney, and lungs, are likely to be adversely impacted. Limited evidence in animals suggests that 1,1-dichloroethene may be carcinogenic. Therefore, the USEPA has place 1,1-dichloroethene in weight-of-evidence group C, possible human carcinogen.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for 1,1-Dichloroethene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1992.

1,2-DICHLOROETHANE. 1,2-dichloroethane is primarily used in the production of industrial solvents including vinyl chloride, vinylidene chloride, 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene, and ethylene diamines. Acute exposure to 1,2-dichloroethane can cause CNS depression, nausea, vomiting, headache, lightheadedness, and disequilibrium. Long-term exposure to workers has been associated with loss of appetite, nausea, epigastric pain, neurologic changes, and liver and kidney damage. Liver effects have also been noted in animal studies. 1,2-Dichloroethane is carcinogenic to mice and rats causing hemangiosarcomas and stomach, mammary, spleen, and lung cancers. It has been classified as a Group B2, probable human carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for 1,2-Dichloroethane"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1992.

1,2-DICHLOROETHENE. 1,2-Dichloroethene is a volatile organic compound which exists as cis- and trans-isomers. The commercially used material is usually a mixture of the two isomers. In the past, it was used as a general inhalation anesthetic. It is currently used as an extraction solvent or as a component of

dyes, perfume oils, waxes, resins, and plastics. It is also used as an intermediate in the synthesis of polymers.

1,2-Dichloroethene is absorbed by all routes of administration. Distribution is rapid and, due to its lipophilic nature, occurs to all organ systems. It is extensively metabolized to dichloroacetaldehyde and chloroacetic acids which are excreted primarily through urine.

Dermal contact to 1,2-dichloroethene may result in defatting of the skin and dermatitis. Exposure to airborne 1,2-dichloroethene causes irritation to eyes, mucous membranes and the upper respiratory tract. Systemically, the trans-isomer is believed to be more toxic than the cis-isomer. However, both have been reported to produce central nervous system depression and toxicity to liver and lungs. No data on the reproductive toxicity of 1,2-dichloroethene exists. Both isomers have tested negative for mutagenicity in vitro tests. Cancer effects have not been studied in humans or animals.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1990. "Toxicological Profile for 1,2-Dichloroethene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1990.

Mycroft, F.J., Jones, J.R., and Olson, K.R. 1990. Environmental and Occupational Toxicology. In: Poisoning and Drug Overdose. Ed. K.R. Olson. Appleton & Lange, CT. p. 397.

ACENAPHTHENE. Acenaphthene is a member of the polycyclic aromatic hydrocarbons (PAH) class of organic compounds. Unlike a number of PAHs, which have no known use, acenaphthene has a use in the manufacture of plastics and as an insecticide and fungicide. Toxicological data are extremely limited for acenaphthene. However, as a two ring PAH, acenaphthene is a closer structural analog to naphthalene than it is to multi-ring PAHs such as benzo(a)pyrene, chrysene, or phenanthrene. Therefore, toxicities induced by acenaphthene may be similar to those induced by naphthalene. PAHs as a class of compounds are absorbed by inhalation, oral, and dermal routes, and have been associated with atherosclerosis, cancer, and reproductive effects in humans and animals. However, mutagenicity and cancer tests for acenaphthene were negative.

REFERENCES:

ATSDR, 1989. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1989.

International Agency for Research on Cancer, 1983. *Monograph on the evaluation of carcinogenic risk of chemicals to man: polynuclear aromatic hydrocarbons*. 32:33-43.

USEPA, 1981. An exposure and risk assessment for acenaphthene. U.S.EPA Contract No. 68-01-6017. Office of Water Regulations and Standards, Washington, D.C.

ALUMINUM. Aluminum occurs naturally in the soil and makes up approximately 8 percent of the earths crust. Higher soil concentrations are associated with industries which burn coal and aluminum mining and smelting. Human exposures to aluminum may occur through ingestion of foods grown in soil that contains aluminum and use of antacids, antiperspirants, and other drug store items. Aluminum in antiperspirants can cause skin rashes in some people. Factory workers who inhale large amounts of aluminum dust may develop lung problems. Aluminum has caused lower birth weights in some animals. Studies have shown that aluminum accumulates in the brains of people with Alzheimer's disease. However, any causal link between aluminum exposure and this disease is yet to be demonstrated. Both human epidemiological studies and animal experiments strongly suggests that aluminum is not a carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1989. "Toxicological Profile for Aluminum"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1989.

ANTIMONY. Antimony enters the environment during the mining and processing of its ores and other related compounds. Small amounts of antimony are also released into the environment by incinerators and coal burning power plants. Antimony will strongly adhere to soil which contains iron, manganese, or aluminum. Antimony was used for medicinal purposes to treat people infected with parasites. However, chronic exposure can cause eye, skin, and lung irritation, as well as heart problems, vomiting and diarrhea. The oral RfD, based on an oral drinking water study in rats, showed changes in glucose and cholesterol metabolism. Antimony has not been evaluated by the USEPA for evidence of human carcinogenic potential.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Antimony"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

AROCLORS. Aroclors (polychlorinated biphenyls [PCBs]) are organic compounds composed of two chlorinated aromatic rings. The amount of chlorination of the rings determines the specific structure, or congener, of the aroclor and, subsequently, the specific chemical, physical, and toxicological properties. The excellent dielectric properties, thermal stability, and nonflamability of aroclors has made them ideal for use in electrical transformers and capacitors. Therefore, they have been used in these applications extensively in the past. Humans may be exposed to aroclors when an aroclor-containing electrical component burns or is dismantled. Although the production of aroclors in the U.S. was banned in 1977, aroclors do not readily breakdown, and they may still be present in older electrical equipment, and environmental media.

Following dermal exposure, aroclors have caused a skin rash called chloracne. Aroclors have also produced developmental defects in humans, which have mainly consisted of behavioral abnormalities. These effects have also been observed in animals. Epidemiological studies on occupationally-exposed humans do not conclusively link exposure to aroclors with an increased incidence of cancer. However, chronic oral exposure to aroclors has produced liver cancer in laboratory animals. The potency of the carcinogenic action of aroclors appears to increase as the chlorination of the aroclors increases. Although cancer in laboratory animals has only been conclusively demonstrated for aroclors with the highest percent chlorination (aroclors-1260 and 1254), the USEPA has classified all aroclor congeners as B2, probable human carcinogens.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

ARSENIC. Arsenic has been used in pesticide formulations and has industrial uses in tanneries, as well as the glass and wine making industries. Toxicity depends on its chemical form. Arsenic is an irritant of the skin, mucous membranes, and gastrointestinal tract. Symptoms of acute toxicity include vomiting, diarrhea, convulsions, and a severe drop in blood pressure. Subchronic effects include hyperpigmentation, sensory-motor polyneuropathy, persistent headache, and lethargy. Chronic oral exposure has caused skin lesions, peripheral vascular disease, and peripheral neuropathy. The USEPA has classified arsenic in Group A, human carcinogen, based on increased incidence of lung cancer in occupational studies.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for Arsenic"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1992.

BARIUM. Barium is used in paints, soap, paper, rubber, and in the manufacture of glass. Some compounds of barium have been used as insecticides. Acute exposure to barium through ingestion can cause gastroenteritis, muscular paralysis, as well as cardiovascular effects. Chronic inhalation of barium containing dust can cause a reversible, benign pneumoconiosis. There is no evidence for carcinogenicity for barium.

REFERENCES:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

BENZENE. Benzene is an organic solvent that is both naturally occurring and produced from petroleum. Benzene is used in the synthesis of many industrial chemicals and pharmaceuticals, for the extraction of fats and oils, in the

manufacture of explosives, in is a major component of petroleum based fuels such as gasoline.

Benzene is readily absorbed orally, moderately absorbed by inhalation, and poorly absorbed dermally. Its toxic actions are primarily a result of its metabolites, which are largely produced in the liver, and to some extent, in the bone marrow. Acute exposure to benzene has produced central nervous system depression in humans and animals. Chronic exposures have produced adverse liver effects and hematological toxicity, including aplastic anemia and leukemia. Available evidence does not suggest that benzene is teratogenic in humans or animals. There is sufficient evidence of benzene-induced carcinogenicity in humans via inhalation exposure, placing it in USEPA weight-of-evidence group A, human carcinogen.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

BENZO(A)ANTHRACENE. Benzo(a)anthracene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Benzo(a)anthracene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. It is also product of pyrolysis in tobacco smoke.

Benzo(a)anthracene has produced skin tumors in laboratory animals after dermal 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. As such, benzo(a)anthracene has been classified by USEPA as a B2, probable human carcinogen.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

BENZO(A)PYRENE. Benzo(a)pyrene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. They are ubiquitous in nature and are also man made. It occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. Human data demonstrating a causal relationship linking benzo(a)pyrene to carcinogenicity are lacking. However, multiple animal studies in many species demonstrate benzo(a)pyrene to be carcinogenic following administration by a variety of routes. The mechanism through which benzo(a)pyrene elicits its carcinogenic potential is well understood. Benzo(a)pyrene has produced positive results in numerous genotoxicity assays. Benzo(a)pyrene has been classified by the EPA as a B2, probable human carcinogen.

REFERENCES:

ATSDR, 1989. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1989.

Clayton, George D. and Florence E. Clayton, editors, 1981. Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition; John Wiley & Sons; New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

BENZO(B)FLUORANTHENE. Benzo(b)fluoranthene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Benzo(b)fluoranthene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material.

Although there are no human data that specifically link exposure to benzo(b)-fluoranthene to human cancers, benzo(b)fluoranthene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Benzo(b)fluoranthene produced tumors in mice after lung implantation, intraperitoneal, or subcutaneous injection, and skin painting. Benzo(b)fluoranthene has produced positive results in several genotoxicity assays. It has been classified as a B2, probable human carcinogen, by the USEPA.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

BENZO(K)FLUORANTHENE. Benzo(k)fluoranthene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Benzo(k)fluoranthene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material.

Although there are no human data that specifically link exposure to benzo(k)-fluoranthene to human cancers, benzo(k)fluoranthene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Benzo(k)fluoranthene produced tumors after lung implantation in mice and when administered with a promoting agent in skin-painting studies. Benzo(k)fluoranthene is mutagenic in bacteria. Benzo(k)fluoranthene has been classified by USEPA as a B2, probable human carcinogen.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

BERYLLIUM. Beryllium is a trace element that is obtained by extraction from mineral ores. Most beryllium is contributed to the environment by the burning of fossil fuels which contain beryllium ore. Beryllium is generally incorporated into alloy metals that are used in jet engine parts and electrical components. Pure beryllium metal is used in parts for aircraft brakes, nuclear weapons, nuclear reactors, and precision instruments.

Available data on beryllium suggest that it is most toxic to the lung. Acute inhalation exposures to high concentrations of beryllium in the air can cause chemical pneumonitis, the symptoms of which include cough, shortness of breath, and fatigue. These symptoms can persist and even worsen after exposure to beryllium has been discontinued. Chronic inhalation exposures to low concentrations of beryllium can produce chronic beryllium disease, which results in inhibited breathing efficiency. Inhalation of beryllium has been shown to produce lung cancer in animals, and an increased incidence of lung cancer has been demonstrated in workers who are exposed to beryllium in the air. Therefore beryllium has been classified by the USEPA as a B2, probable human carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Beryllium"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

BIS(2-ETHYLHEXYL)PHTHALATE (DEHP). DEHP is used industrially as a plasticizer for resins and is found in many plastic materials as it makes them more flexible. It is also used in manufacturing organic pump fluids in electrical capacitors. Acute exposure to DEHP has produced eye and mucous membrane irritation, nausea, and diarrhea. Chronic exposure of laboratory animals to DEHP indicate that the target organs are the liver, causing morphological and biochemical changes, as well as the testes, producing damage to the seminiferous tubules. DEHP has produced developmental and reproductive effects in laboratory animals including spina bifida and reduced fertility. DEHP has been shown to cause a dose-related increase in liver tumors in mice and rats. Thus, the USEPA has designated DEHP as a B2, probable human carcinogen.

REFERENCES:

ATSDR, 1991. Toxicological Profile for Di(2-ethylhexyl)phthalate. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1991.

CADMIUM. Cadmium is commonly used in electroplating and galvanizing due to its non-corrosive properties. It is a local respiratory tract irritant following

exposure to cadmium dust or fumes. Acute exposure to cadmium dust/fumes may produce an acute chemical pneumonitis. Acute, oral exposure to cadmium results in nausea, vomiting, salivation, abdominal pain, cramps, and diarrhea. Chronic exposure to cadmium results in osteomalacia and osteoporosis (Itai-Itai disease) secondary to renal damage. The USEPA has classified cadmium as a B1 carcinogen via inhalation based on epidemiological data from Japan and China.

REFERENCES:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

CARBON DISULFIDE. Carbon disulfide is used as a commercial fumigant and in the manufacture of soil disinfectants. It is also used as a polymerization inhibitor for vinyl chloride, and as a solvent for cleaning in the metal plating industry.

Epidemiological studies in occupationally-exposed workers suggest that carbon disulfide may produce minor neurological disfunction that does not appear to result in behavioral changes. Carbon disulfide administered orally and by inhalation produced reproductive toxicity, including increased fetal resorption rate and minor malformations, in laboratory animals. No data regarding the carcinogenicity of this chemical is available.

REFERENCES:

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

CARBAZOLE. Carbazole is a dibenzopyrrole compound which is formed from the incomplete combustion of nitrogen-containing organic matter, such as tobacco in cigarettes. Carbazole is also contained in crude oil and coal tars. Carbazole is used for making dyes, photographic plates, and in reagents.

Data on the adverse effects of carbazole exposure are limited. No data was available concerning human exposures. In animals, the oral LD_{50} has been reported as ranging from 500 to 5000 mg/kg, depending on the animal species tested. However, subcutaneous injections of 10 mg carbazole for one year did not produce any adverse effects in mice. In a carcinogenicity bioassay with mice, chronic oral administration of carbazole in the diet produced both hepatocellular carcinomas and forestomach papillomas in males and females. Limited *in vitro* genotoxicity data indicate that carbazole is not mutagenic, suggesting that a reactive metabolite is responsible for the carcinogenic effects. Based on the these data, carbazole has been ranked a group B2, probable human carcinogen.

REFERENCES:

International Agency for Research on Cancer (1983) IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Polynuclear

Aromatic Compounds, Part 1, Chemical, Environmental and Experimental Data. Volume 32 World Health Organization, France.

CHLOROBENZENE. Chlorobenzene is used industrially as a solvent and in the manufacture of other chemicals. It is an intermediate in the manufacture of dyestuffs and pesticides. Acute exposures have caused irritation of the eyes, nose, and skin, as well as CNS depression accompanied by drowsiness, numbness, nausea, and vomiting. Evidence from animal studies indicate that exposure via ingestion or inhalation can produce severe kidney and liver effects. The USEPA has classified chlorobenzene in Group D, inadequate evidence of carcinogenicity.

REFERENCES:

Clayton, George D. and Florence E. Clayton, editors, 1981. Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition; John Wiley & Sons; New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

ALPHA- AND GAMMA-CHLORDANE. A mixture of the alpha and gamma isomers of chlordane constitute the technical-grade chemical, a chlorinated pesticide, which was extensively used in agriculture to control insects, and as a termite proofing agent, until its registry cancellation in 1988. Chlordane may persist in soils for up to 20 years, and readily bioaccumulates in the food chain. Humans may be exposed to chlordane through contact with soil, where it was intentionally applied for pest control reasons, and through consumption of contaminated agricultural products.

Chlordane is absorbed well through all routes, and is stored in body fat, where it may persist for long periods of time. Toxic effects from chlordane exposure result from its metabolites, which can bind to cellular macromolecules causing cellular disfunction, rather than the parent compound. Chlordane induces its own metabolism to toxic metabolites and, therefore, organs containing high metabolizing enzyme activities such as the liver, are at risk. Chlordane produces hepatotoxicity in animals and humans. Additionally, chlordane produces nervous system toxicity, which may include dizziness, nausea, muscle tremors, and the induction of grand mal seizures. Additionally, chlordane is a developmental and reproductive toxicant in animals. Exposure to chlordane has not been positively associated with cancer in humans, and animal evidence is equivocal. However, animal data suggest that chlordane may act as a tumor promotor. For this reason, the USEPA has place chlordane in weight-of-evidence group B2, probable human carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for Chlordane"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1992.

CHROMIUM. Chromium has been used in plating for corrosion resistance and decorative purposes, in the manufacture of alloys, and in printing, dying, and photography. The toxicity of chromium depends upon its valence state. Hexavalent chromium is more toxic via inhalation than trivalent chromium. The effects of inhalation exposure to hexavalent chromium include ulcers of the upper respiratory tract, nasal inflammation, perforation of the nasal septa and lung cancer. Most trivalent chromium compounds are inactive in short-term genotoxicity assays. Trivalent chromium compounds have not been found to be carcinogenic by any route of exposure. There is epidemiological evidence of an association between chromium and lung cancer. The USEPA has classified hexavalent chromium as an A, human carcinogen, by the inhalation route.

REFERENCES:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

CHRYSENE. Chrysene is one of the polycyclic aromatic hydrocarbons (PAH) compounds which are formed during the combustion of organic material. Although there are no human data that specifically link exposure to chrysene to human cancers, chrysene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Chrysene produced chromosomal abnormalities in hamsters and mouse germ cells after gavage exposure, positive responses in bacterial gene mutation assays and transformed mammalian cells exposed in culture. Due to its similarities with benzo(a)pyrene and other carcinogenic PAHs, chrysene has been classified as a B2, probable human carcinogen.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

COBALT. Cobalt is an essential metal as a component of Vitamin B_{12}. It is a relatively rare metal produced primarily as a by-product of other metals, chiefly copper. Cobalt has been used in the manufacture of cobalt salts, permanent magnets, tools, cars, electrical components, and aircraft; in alloys as dental materials; in cutting materials, water-resistant materials, lacquers, varnishes, and paint driers; and in the production of inks, enamels, glazes, glass decolorizer, and catalysts.

Toxicity following excess therapeutic administration has been reported to include vomiting, diarrhea, increased blood pressure, slowed respirations, and tinnitus progressing to deafness. An epidemiological association between high endemic soil and water cobalt levels and goiter has been reported. Cardiomyopathy has been caused by excessive intake of cobalt in beer. Occupational exposure to airborne cobalt has produced irritation to the eyes and skin. Chronic exposure

has resulted in human lung fibrosis in some cases. There is no evidence of carcinogenicity in humans or animals from any naturally occurring route of exposure.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Cobalt"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

Friberg, L., Nordberg, G.F., Kessler, E. and Vouk, V.B. (eds), 1986. Handbook of the Toxicology of Metals. 2nd ed. Vol I, II.: Amsterdam: Elsevier Science Publishers B.V., p. V2 221.

Goyer, R.A., 1991. Toxic Effects of Metals. In: Casarett and Doull's Toxicology: The Basic Science of Poisons, 3rd edition. Eds. C.D. Klaassen, M.O. Amdur and J. Doull. Macmillan Publishing Co. N.Y.

DDD, DDE, DDT. DDT was one of the most highly used insecticides, and is now ubiquitous in the environment. It was used extensively in World War II to control lice (applied directly to human skin), and later used as an agricultural insecticide and as a public health tool to control insects which spread typhus and malaria. DDD and DDE were contained as impurities in DDT, and are also primary metabolites of DDT, and share similar toxicological properties. DDT, DDD, and DDE are highly persistent in the environment, and thus tend to bioconcentrate in the food chain. This, combined with its toxicological properties, has been attributed to the decline in population of several predatory bird species.

DDT is absorbed to a minor extent via inhalation and dermal routes, and to a large extent by the oral route. Exposure to humans is likely greatest through ingestion of mucous that was contaminated with DDT that had been inhaled. DDT is absorbed into the lymphatic system and distributed to fats throughout the body. In both humans and animals, DDT acts as a CNS stimulant by interfering with the movement of ions within neurons. DDT acts as an estrogenic compound in animals, and this has been attributed to numerous adverse reproductive effects observed in animals exposed to DDT. DDT also causes liver hypertrophy, hepatocyte degeneration, and induces the enzyme cytochrome P450, which can effect the metabolism of other xenobiotics. There is no conclusive evidence of DDT-induced carcinogenicity in humans. However, DDT has produced liver tumors in laboratory animals. DDD, DDE, and DDT have, therefore, been placed in USEPA's weight of evidence group B2, probable human carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for DDD, DDE, and DDT"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1992.

DIBENZO(A,H)ANTHRACENE. Dibenzo(a,h)anthracene is one of the polycyclic aromatic hydrocarbons (PAH) compounds which are formed during the combustion of organic material. This compound is found in tobacco smoke, food, and industrial emissions. Although there are no human data that specifically link exposure to dibenzo(a,h)anthracene to human cancers, dibenzo(a,h)anthracene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Dibenzo(a,h)anthracene is metabolized similarly to benzo(a)pyrene, and has produced skin tumors in laboratory animals following dermal exposure. Dibenzo(a,h)anthracene has also been shown to be mutagenic, producing DNA damage in human cell cultures. Due to its similarities with benzo(a)pyrene and other carcinogenic PAHs, dibenzo(a,h)-anthracene has been classified as a B2, probable human carcinogen.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

DIBENZOFURAN. Dibenzofuran is an unsubstituted organic compound that contains two benzene rings fused to a central furan ring. Dibenzofuran is a manmade chemical which may be introduced into the environment as a contaminant of commonly used pesticides (e.g., 2,4,5-T). Extensive toxicological information exists on the chlorinated species of dibenzofuran (chlorodibenzofurans), but minimal information is available concerning the unsubstituted parent molecule. Dibenzofuran, with no chlorine substitutes, is believed to have minimal toxicity compared to the chlorinated forms due to its lack of solubility and biological activity. A toxicity equivalency factor for dibenzofuran has been set by USEPA equal to zero, relative to the chlorinated isomers. Dibenzofuran is not mutagenic, with or without metabolic activation, in several in vitro mutagenicity tests. There are no data on the possible carcinogenicity of dibenzofuran alone in animals or humans.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1993. "Toxicological Profile for Chlorodibenzofurans"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1993.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

DIOXINS/FURANS. Chlorinated dioxins and furans are organic chemicals that comprise a group of approximately 210 mono- and polychlorinated congeners. Dioxins are produced as a byproduct in the manufacture of certain chlorinated herbicides, such as 2,4,5-trichlorophenoxy acids, and by the incineration of municipal wastes. Of the dioxin congeners known to exist, 2,3,7,8-tetrachloro-dibenzo-p-dioxin (2,3,7,8-TCDD) is generally believed to be the most toxic dioxin congener. Most research on dioxin compounds has focussed on this congener; little data concerning the potential adverse effects of other dioxin compounds are available. As a result, risk assessments for all dioxin congeners are based

on toxicological data for 2,3,7,8-TCDD. To compensate for the differences in toxicity, risk estimates for "non-2,3,7,8" congeners are adjusted with toxicity equivalency factors (TEFs).

2,3,7,8-TCDD has been positively correlated with only one effect, chloracne, in humans. Chloracne is a treatable skin disorder that can also result from exposure to other chemicals and chemical mixtures. Experiments with laboratory animals indicate that 2,3,7,8-TCDD is associated primarily with four types of effects: chloracne, hepatotoxicity, immunotoxicity, and the wasting syndrome, in which animals exposed to 2,3,7,8-TCDD spontaneously loose weight. Reproductive toxicity has been observed in monkeys exposed to low levels of 2,3,7,8-TCDD. The dose-response relationships of these effects varies substantially among laboratory animal species. Although many of these effects have either not been observed in humans or have not been positively correlated with dioxin exposure, the available animal evidence suggests that adverse effects in addition to chloracne could occur in humans. Available human epidemiology data are not conclusive enough to prove or disprove the association of exposures to dioxins with carcinogenicity. 2,3,7,8-TCDD has been shown to be carcinogenic to some laboratory animal species. Based on this evidence, 2,3,7,8-TCDD has been classified as a B2, possible human carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1987. "Toxicological Profile for 2,3,7,8-Tetrachlorodibenzo-p-dioxin"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, December, 1987.

ETHYLBENZENE. Ethylbenzene is a naturally occurring and synthetically produced volatile hydrocarbon which is used in the manufacture of styrene and other plastics, and in gasoline, which contains approximately 2% ethylbenzene.

Ethylbenzene is readily absorbed through inhalation, oral, and dermal routes, and is distributed throughout the body. Exposures to ethylbenzene have been associated with central nervous system depression in humans, and liver, kidney, and hematopoietic system toxicity in laboratory animals. No evidence of carcinogenicity has been reported in human epidemiological studies, and animal evidence is equivocal.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

HEPTACHLOR AND HEPTACHLOR EPOXIDE. Heptachlor is an insecticide that was used extensively between 1953 and 1974 as a soil and seed treatment to control ants, worms and other agricultural pests, and as a residential termite-proofing agent. Heptachlor is highly persistent in the environment and can biomagnify through the food chain. Therefore, humans may be exposed to heptachlor by ingesting agricultural products that were exposed to soil that was once treated with

heptachlor, or by drinking water or ingesting fish that are contaminated with heptachlor that leached from soil.

In humans and animals, heptachlor is rapidly metabolized to heptachlor epoxide, which is a more toxic and more persistent compound. Exposure to heptachlor has been associated with nervous system excitation, including irritability, salivation, muscle tremors, and convulsions in humans and animals. Heptachlor produces moderate to severe liver toxicity and liver cancer in laboratory animals. Available evidence suggests that heptachlor is a tumor promotor. However, epidemiological studies on humans are insufficient to determine if heptachlor is a human carcinogen. Therefore, the USEPA has placed heptachlor into weight-of-evidence group B2 probable human carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Heptachlor/Heptachlor epoxide"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1991.

INDENO(1,2,3-CD)PYRENE. Indeno(1,2,3-c,d)pyrene is one of the polycyclic aromatic hydrocarbons (PAH) compounds which are formed during the combustion of organic material and is a component of cigarette smoke and smoke stack emissions. No carcinogenicity data specifically for indeno(1,2,3-c,d)pyrene are available in humans, however, toxic effects are attributable to mixtures of PAHs. Animal studies indicate that indeno(1,2,3-c,d)pyrene can induce skin tumors in mice, and may have some immunosuppressive effects. In mammalian cell cultures, indeno-(1,2,3-c,d)pyrene was found to be genotoxic. It has been classified by the USEPA as a B2 carcinogen.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

IRON. Iron is a metal which is required for a variety of physiological functions such as heme biosynthesis, oxidative phosphorylation and mixed-function oxidase-mediated metabolic reactions. Only divalent forms of iron are absorbed. As absorption occurs, divalent iron is biochemically converted to trivalent iron, the biologically active form. Under normal conditions, absorbed dietary iron is complexed to hemoglobin and transported to the liver for storage until needed for physiological reactions. The balance of iron is regulated only by the amount of dietary intake and the degree of intestinal absorption. Intestinal absorption tends to be low (2 - 15%) except during periods of increased iron need when absorption efficiency increases dramatically.
Acute iron toxicity has been well characterized following the accidental ingestion of iron-containing preparations by children. Shortly after ingestion, the corrosive effects of iron cause vomiting and diarrhea, often bloody. Later signs include shock, metabolic acidosis, seizures, liver and/or kidney failure, coma, and death. Chronic iron overload manifests as disturbances in liver function, diabetes mellitus, and endocrine and cardiovascular effects.

Inhalation of iron containing dust or fumes in occupational settings may result in deposition of iron particles in the lungs leading to interstitial fibrosis. Autopsies of hematite miners noted an increase in lung cancer. However, the etiology of the lung cancer may be related to factors other than iron exposure such as cigarette, silica or PAH exposures.

REFERENCES:

Aisen, P., Cohen, G. and Kang, J.O., 1990. Iron Toxicosis. Int. Rev. Exp. Pathol. 31:1-46.

Goyer, R.A., 1991. Toxic Effects of Metals. In: Casarett and Doull's Toxicology: The Basic Science of Poisons, 3rd edition. Eds. C.D. Klaassen, M.O. Amdur and J. Doull. Macmillan Publishing Co. N.Y.

LEAD. Lead is used as a component in storage batteries and was widely used in gasoline and paints. It is the most ubiquitous toxic metal in the environment. The most serious effects of chronic exposure are encephalopathy, renal damage, and changes in the hematopoietic system which is the most sensitive indicator of lead exposure. Peripheral nerve dysfunction is observed in adults at blood lead levels of 30 to 50 μg/dL-blood. The nervous systems' of children are reported to be affected at levels of 15 μg/dL-blood (Benignus and others, 1981). Chronic lead exposure by workers through inhalation has resulted in statistically significant increases in tumors. Oral exposures of lead salts in animals has been shown to increase tumor formation.

REFERENCES:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

Benignus, V.A., Otto, D.A., Muller, K.E., Seiple, K.J., 1981. "Effects of Age and Body Lead Burden on CNS Function in Young Children. II:EEG Spectra." Electroencephalograph. Clin. Neurophysiol. 52:240-248.

MANGANESE. Manganese is a naturally occurring substance found in many types of rock. It does not generally occur in the environment as the pure metal, rather, it is found combined with other chemicals such as sulfur, oxygen, and chlorine. Manganese is mixed with iron to make various types of steel. Manganese is a component of some ceramics, pesticides, fertilizers, and in nutritional supplements. In small doses manganese is beneficial to human health. Manganese miners and steel workers exposed to elevated concentrations of manganese have evidenced mental and emotional disturbances, and slow and clumsy body movements. Target organs of manganese are the lung and CNS. When inhaled, manganese dust can also cause lung irritation. EPA has classified manganese as a D, not classifiable as to human carcinogenicity.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Manganese"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

MERCURY. Mercury has been used in the past for medicinal purposes, however, occupational exposure to mercury can occur during mining, smelting, chloralkali production, and in the manufacturing of mercury containing products. There are three forms in which mercury can exist: elemental, inorganic, and organic. Its chemical form determines its toxicity. Metallic mercury causes behavioral effects and other nervous system damage. Inorganic mercury salts will produce kidney damage. Organic mercury compounds target the CNS. Most organic mercury compounds that contaminate the environment produce a toxic neuroencephalopathy (paresthesias, ataxia, spasticity, tremor, mental status changes, learning defects and neurasthenic symptoms). Some organic mercury compounds readily break down in the body to inorganic compounds and thus produce toxicity similar to that produced by organic mercury compounds. Some studies have indicated that mercury is genotoxic. It has not been classified as to carcinogenicity by the USEPA.

REFERENCES:

Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

METHYLENE CHLORIDE. Methylene chloride, (also known as dichloromethane) is used as a solvent, paint stripper, and is component of pesticides and other aerosol products. Acute exposure to methylene chloride can cause nose, eyes, and throat irritation via inhalation. Chronic exposure to methylene chloride can cause CNS effects include irritability, nausea, and headaches. The primary targets of this chemical are the liver and the CNS. A USEPA assessment of one study concluded that methylene chloride ingested in drinking water by mice was associated with significant increases in liver carcinoma. It has classified it as a B2, probable human carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1989. "Toxicological Profile for Methylene Chloride"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, 1989.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

2-METHYLNAPHTHALENE. 2-Methylnaphthalene is a member of the polycyclic aromatic hydrocarbons (PAH) class of organic compounds, and is used in the synthesis of chemicals such as insecticides. Toxicological data on 2-methylnaphthalene is extremely limited. However, based on its structural similarity to naphthalene, it is likely to be metabolized through a similar process, and therefore is expected to exert effects similar to those induced by naphthalene. Humans can absorb naphthalene via the inhalation, oral, and dermal routes. Evidence from human and animal studies suggests that naphthalene is metabolized by the P450

mixed function oxidase system to form metabolites that exert toxic effects. The primary target organ for naphthalene metabolites in humans is the red blood cell. Various types and severities of anemias resulting from erythrocyte hemolysis have been documented in humans and animals exposed to naphthalene. Some evidence also suggests that naphthalene metabolites can induce cataracts in humans and animals. No studies were located investigating genotoxicity or cancer in humans.

REFERENCES:

ATSDR, 1989. Toxicological Profile for Naphthalene and 2-Methylnaphthalene. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1989.

2- AND 4-METHYLPHENOL. 2- Methylphenol and 4-methylphenol, also called o-cresol and p-cresol, are both naturally occurring and synthetically produced organic chemicals containing a single aromatic ring. M-cresol is another isomer of 2- and 4-methylphenol. 2- and 4-Methylphenol are often found together in mixtures, such as in disinfectants. Specific uses of 2-methylphenol include resins and pharmaceuticals. 4-Methylphenol is used in industry in the manufacture of antioxidants and in the manufacture of perfumes and dyes. 4-Methylphenol is also used in synthetic food flavors.

2- and 4-Methylphenol exhibit similar toxicities. They are highly irritating to the skin when contacted dermally, the lungs when inhaled, and the gastrointestinal tract when ingested, and can be readily absorbed by all three exposure routes. Neurological effects, including lethargy, incoordination, tremors, convulsions, and coma have been observed in humans that have been exposed to high concentrations of cresols. These effects have also been observed in laboratory animals, and can also result from long-term low-level exposure to cresols. There is no evidence of reproductive, developmental, or carcinogenic effects in humans or animals following exposure to cresols.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1990. "Toxicological Profile for Cresols"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service. October, 1990.

NAPHTHALENE. Naphthalene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Naphthalene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. It is also product of pyrolysis in tobacco smoke. Naphthalene is used for the production of phthalic anhydride, which is used for the production of plasticizers. Naphthalene is also used in moth balls, for the production of the insecticide carbaryl, and in numerous resins, dyes, pharmaceuticals, and other organic materials.

Naphthalene is absorbed through the inhalation, oral, and dermal routes, and appears to be more toxic to humans than laboratory animals. The principal toxic

effect of naphthalene in humans and animals is hemolysis of red blood cells, which can lead to anemia, decreased oxygen carrying capacity, and jaundice. Humans pre-disposed to anemia, such as those with G6DP enzyme deficiency, may be particularly sensitive to naphthalene toxicity. Exposure to naphthalene has also been correlated with increased risk of cataract formation. Animal studies were negative for naphthalene reproductive toxicity. Although no human epidemiological data are available for assessing naphthalene carcinogenicity, animal data investigating naphthalene toxicity are equivocal. The USEPA has placed naphthalene in weight-of-evidence Group D, not classifiable as to human carcinogenicity.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1990. "Toxicological Profile for Naphthalene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service. October, 1990.

NICKEL. Nickel is a natural element of the earth's crust. Toxic effects of nickel occur mainly through the inhalation route. Nickel is emitted into the air through fossil fuel combustion, incinerators, metallurgy, chemical manufacturing, cement manufacturing, and nickel recovery. Nickel exposure can cause dermatitis and eczema-like lesions at high exposure levels likely to occur only in the work place. The major adverse effects seen in man are dermatitis, chemical pneumonitis, and lung and nasal cancers. Rats fed nickel in their diets showed on adverse effects in three generations infertility, gestation, viability, or lactation. Occupational studies indicate that nickel is a carcinogen via inhalation but there is no evidence that it is a carcinogen in mammals through ingestion or dermal exposure (USEPA, 1985).

REFERENCES:

United States Environmental Protection Agency (USEPA), 1985. "Health Effect Assessment Document for Nickel." Office of Research and Development. Office of Emergency and Remedial Response.

PHENANTHRENE. Phenanthrene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also man made. Phenanthrene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material.

Phenanthrene has been shown to be a skin photosensitizer in humans. Intraperitoneally injection in rats produced liver effects. Although limited evidence exists that phenanthrene is a mutagen, the majority of tests have proved negative. Equivocal evidence exists for cancer after dermal application of phenanthrene in rats. Ingestion of 200 mg of phenanthrene produced no tumors in rats after two months.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

PHENOL. Phenol is a man-made aromatic chemical that is used extensively in the production of numerous products, including a wide variety of aromatic compounds, explosives, fertilizers, paints, rubber, plastic, and textiles.
Phenol is readily absorbed through ingestion, dermal, and inhalation exposures, and is rapidly distributed to tissues. Exposure to phenol can produce adverse effects on the central nervous system, including loss of consciousness and acute respiratory failure. Phenol can also cause severe burning of the mouth and throat if swallowed. Current genotoxicity and cancer studies on phenol are inadequate or inconclusive to allow a determination of the potential carcinogenicity of this chemical at this time.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

SODIUM. Sodium is an ubiquitous constituent of natural waters. Human activities also contribute sodium ions to natural waters. Sodium has been used in the manufacture of other sodium compounds, tetraethyl lead, in organic synthesis, in alloys, and as a chemical intermediate. Sodium is a naturally occurring element and an essential nutrient to humans.

Sodium is toxic only at very high concentrations. Chronic ingestion of elevated sodium levels may result in or aggravate hypertension in humans. Hypertension has also been demonstrated in animals chronically exposed to sodium in their diets. Sodium can be an eye irritant. There is no evidence for carcinogenicity by sodium.

REFERENCES:

National Academy of Sciences, 1977. "Drinking Water and Health"; Safe Drinking Water Committee, Washington, D.C.

RADIONUCLIDES. Radionuclides are substances which release radiation energy. Radioactive atoms from radionuclides undergo spontaneous nuclear transformations and release excess energy in the form of ionizing radiation. Radiation emitted by radioactive substances can transfer sufficient localized energy to atoms to remove electrons from the electric field of their nucleus (ionization). In living tissue, this energy transfer can destroy cellular constituents and produce electrically charged molecules (i.e., free radicals). Extensive biological damage can lead to adverse health effects. The type of ionizing radiation emitted by a particular radionuclide depends upon the exact nature of the nuclear transformation, and may include emission of alpha particles, electrons (beta

particles or positions), and neutrons; each of these transformations may be accompanied by emission of photons (gamma radiation or x-rays). Each type of radiation differs in its physical characteristics, and in its ability to inflict damage to biological tissue.

REFERENCES:

USEPA, 1989. Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A); EPA/540/1-89/002; December 1989.

ALPHA PARTICLES. Alpha particles are doubly charged cations, composed of two protons and two neutrons, which are ejected monoenergetically from the nucleus of an atom when the neutron to proton ration is too low. Because of their relatively large mass and charge, alpha particles tend to ionize nearby atoms quite readily, expending their energy in short distances. Alpha particles will usually not penetrate an ordinary sheet of paper or the outer layer of skin. Consequently, alpha particles represent a significant hazard only when taken into the body, where their energy is completely absorbed by small volumes of tissues in contact with the alpha-emitting radionuclide.

REFERENCES:

USEPA, 1989. Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A); EPA/540/1-89/002; December 1989.

BETA PARTICLES. Beta particles are electrons ejected at high speeds from the nucleus of an unstable atom when a neutron spontaneously converts to a proton and an electron. Unlike alpha particles, beta particles are not emitted with discrete energies but are ejected from the nucleus over a continuous energy spectrum. Beta particles are smaller than alpha particles, carry a single negative charge, and possess a lower specific ionization potential. Unshielded beta sources can constitute external hazards if the beta radiation is within a few centimeters of exposed skin surfaces and if the beta energy is greater than 70 keV. Beta sources shielded with certain metallic materials may produce bremstrahlung (low energy x-ray) radiation which may also contribute to the external radiation exposure. Internally, beta particles have a much greater range than alpha particles in tissue. However, because they cause fewer ionizations per unit path length, beta particles deposit much less energy to small volumes of tissue and, consequently, inflict much less damage than alpha particles.

REFERENCES:

USEPA, 1989. Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A); EPA/540/1-89/002; December 1989.

POSITRONS. Positrons are identical to beta particles except that they have a positive charge. A positron is emitted from the nucleus of a neutron-deficient atom when a proton spontaneously transforms into a neutron. Alternatively, in cases where positron emission is not energetically possible, the neutron deficiency may be overcome by electron capture, whereby one of the orbital

electrons is captured by the nucleus and united with a proton to form a neutron, or by annihilation radiation, whereby the combined mass of a positron and electron is converted into photon energy. The damage inflicted by positrons to small volumes of tissue is similar to that of beta particles.

REFERENCES:

USEPA, 1989. Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A); EPA/540/1-89/002; December 1989.

GAMMA RADIATIONS. Gamma radiations are photons emitted from the nucleus of a radioactive atom. X-rays, which are extra-nuclear in origin, are identical in form to gamma rays, but have slightly lower energy ranges. There are three main ways in which x- and gamma rays interact with matter: the photoelectric effect, the Compton effect, and pair production. All three processes yield electrons which then ionize or excite other atoms of the substance. Because of their high penetration ability, x- and gamma radiations are of most concern as external hazards

REFERENCES:

USEPA, 1989. Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A); EPA/540/1-89/002; December 1989.

NEUTRONS. Neutrons are emitted during nuclear fission reactions, along with two smaller nuclei, called fission fragments, and beta and gamma radiation. For radionuclides likely to be encountered at Superfund sites, the rate of spontaneous fission is minute and no significant neutron radiation is expected.

The adverse biological reactions associated with ionizing radiation, and hence with radioactive materials, are carcinogenicity, mutagenicity, and teratogenicity. The degree of biological damage caused by various types of radiation varies according to how close together the ionizations occur. Some ionizing radiations (e.g. , alpha particles) produce intense regions of ionization. For this reason, they are called high-LET (linear energy transfer) particles. Other types of radiation (such as high energy photons--x-rays) that release electrons that cause ionization and beta particles are called low-LET radiations because of the sparse pattern of ionization that they produce. In equal doses, the carcinogenicity and mutagenicity of high-LET radiations are generally an order of magnitude or more for low-LET radiations.

REFERENCES:

USEPA, 1989. Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A); EPA/540/1-89/002; December 1989.

ACTINIUM. Little data are available for actinium. However, since actinium is in the same radionuclide group as uranium and thorium (actinides), it likely behaves in similar ways.

REFERENCES:

Whicker, F. Ward, Ph.D. and Schultz, Vincent, Ph.D., Radioecology Nuclear Energy and the Environment, Volume I and II, 1982, CRC Press Inc., Boca Raton, Florida

BISMUTH. Radioactive bismuth is found as a short-lived decay product in the decay chains of several principle radionuclide decay chains. As a result, bismuth isotopes decay with relatively high alpha and gamma emissions.

REFERENCES:

Shleien, Bernard, The Health Physics and Radiological Health Handbook, 1992, Scinta, Inc. Sliver Spring, Maryland

CESIUM. Cesium-137 is a primary component of fission products and, therefore, is found in nuclear fuel wastes and radioactive emissions from nuclear weapons detonations. Cesium radioisotopes are ubiquitous in the environment, and constitute a large portion of the natural background radiation level that humans are exposed to. Cesium behaves like potassium in the body. The uptake and distribution of cesium in the body appears to be controlled by potassium regulation. As a result, cesium possesses the tendency to bioaccumulate in the food chain.

REFERENCES:

Whicker, F. Ward, Ph.D. and Schultz, Vincent, Ph.D., Radioecology Nuclear Energy and the Environment, Volume I and II, 1982, CRC Press Inc., Boca Raton, Florida

LEAD. Lead isotopes are naturally occurring decay products of other radionuclides. Several lead isotopes are ultimate decay products. The most substantial decay of lead isotopes is by alpha and beta emissions, although some gamma radiation is also emitted. In general, the alpha radiation is of most biological concern. Like the other members of the uranium decay series, lead can replace calcium in the biological systems and can accumulate in bone.

REFERENCES:

National Council on Radiation Protection and Measurements, Exposure from the Uranium Series with Emphasis on Radon and its Daughters, NCRP Report No. 77, 1984, Bethesda, Maryland

POTASSIUM. Potassium-40 is a naturally occurring radionuclide that does not have any industrial applications. Potassium radioisotopes behave very similarly to stable potassium in the body. As a result, radioactive potassium is widely distributed in the body. The principal mode of potassium decay is by alpha and beta emission.

REFERENCES:

Whicker, F. Ward, Ph.D. and Schultz, Vincent, Ph.D., Radioecology Nuclear Energy and the Environment, Volume I and II, 1982, CRC Press Inc., Boca Raton, Florida

RADIUM. Radium was used in radioluminescent paints, products and is used in medical administration, and fertilizer. The majority of the exposure was due to dial painting and medical administration. Radium is naturally occurring. Ra-226 and its daughter products are responsible for a major fraction of the radiation dose received by humans from the naturally occurring internal emitters. Radon-222 causes the most exposure to radiation. Radium is present in soil, rocks, and water.

Each isotope of radium gives rise to a series of radioactive daughter products that leads to a stable isotope of lead. In addition to the primary radiation (alpha, beta, or both) most isotopes emit other radiation such as x-rays, gamma rays, internal conversion electrons, and Auger electrons. In the analysis of radiation-effects data, the alpha particles emitted are considered to be the root cause of damage.

Following entry into the circulatory system from the gut or lungs, radium "is quickly distributed to body tissues and a rapid decrease in its content in blood occurs. It is eliminated from the body in urine and feces while tissue retention decreases. The loss is more rapid from soft than hard tissues, so there is a gradual shift in the distribution of body radium toward hard tissues, and ultimately, bone becomes the principal repository for radium in the body. Radium deposited in bone irradiates the cells of that tissue, eventually causing sarcomas in a large fraction of subjects exposed to high doses. Cancer of the paranasal sinuses and mastoid air cells has been associated with Ra-226,228 exposure since the late 1930s.

REFERENCES:

Committee on the Biological Effects of Ionizing Radiation, Board on Radiation Effects Research Commission on Life Sciences, and National Research Council, Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V, 1990, National Academy Press, Washington, D.C.

THALLIUM. Radioactive thallium is found as a short-lived decay product in the thorium decay series. Because it exists for only short periods (e.g., less than one hour) little data are available on the potential adverse effects of thallium exposure. However, as a result of its rapid decay, radioactive thallium emits high levels of alpha and gamma radiation.

REFERENCES:

Shleien, Bernard, The Health Physics and Radiological Health Handbook, 1992, Scinta, Inc. Sliver Spring, Maryland

THORIUM. Thorium is or was used in building materials, fertilizer, ceramics, glass, gas mantles, thoriated tungsten and welding rods. Thorium is naturally occurring. The most abundant thorium isotope is Th-232, which is the parent of the thorium series. Th-232 has a long half-life, but its decay products have short half-lives. Mobility of thorium in biological systems is extremely low.

Little data are available concerning the potential effects of thorium exposure. Like uranium, Thorium isotopes are alpha emitters and tend to be taken up by bone.

REFERENCES:

National Council on Radiation Protection and Measurements, Exposure from the Uranium Series with Emphasis on Radon and its Daughters, NCRP Report No. 77, 1984, Bethesda, Maryland

URANIUM. Uranium is used in the production and reprocessing of nuclear fuels, power reactors, nuclear weapons production, building materials, fertilizer, and in ceramics and glass. Uranium is naturally occurring in the earth's crust. Natural uranium by weight is made up of the following radioisotopes and their percentages: U-238, 99.28%; U-235, 0.72%; U-234, 0.0058%, and U-230 which has a short half-life. Uranium-238 is the parent of the uranium series. U-234 is a daughter product of U-238 and the two are usually in equilibrium with one another. U-235 is the parent isotope of the actinium series. The principal mode of decay for uranium isotopes is by alpha emitters.

The dietary uptake of uranium from food is the principal source of natural uranium in the general population. In the industrial environment, the respiratory tract is the most important route of entry. Soluble salts of uranium can be absorbed through the skin, but there are no data on the rate of such absorption in humans. Soluble uranium that is ingested is regarded as a chemical toxin affecting the kidney.

Uranium, like radium, behaves chemically like calcium due to its relatively long half-life, making the skeletal system the likely target organ for enriched uranium. Natural uranium targets the kidney. Uranium can induce bone sarcomas, but the likelihood is very small because of the low specific activity of natural uranium.

Uranium presents two separate potential risks due to its nephrotoxic action and as a result of alpha radiation. At present there is little convincing epidemiological evidence that serious renal disease or increased rates of malignant tumors has occurred in the human population as a result of chronic low-level exposure. However, this does not constitute reliable evidence of the absence of important health effects in occupationally exposed groups since the available epidemiological studies had limited power to detect increased rates of disease if these were present. It is for this reason that much weight has been given to inferences drawn from the results of animal studies and from tumor rates in human populations exposed to other alpha-emitting elements.

REFERENCES:

National Council on Radiation Protection and Measurements, Radiological Assessment: Predicting the Transport, Bioaccumulation, and Uptake by Man of Radionuclides Released to the Environment, NCRP Report No. 76, 1984, Bethesda, Maryland

National Council on Radiation Protection and Measurements, Exposure from the Uranium Series with Emphasis on Radon and its Daughters, NCRP Report No. 77, 1984, Bethesda, Maryland

Committee on the Biological Effects of Ionizing Radiation, Board on Radiation Effects Research Commission on Life Sciences, and National Research Council, Health Effects of Exposure to Low Levels of Ionizing Radiation, BEIR V, 1990, National Academy Press, Washington, D.C.

THALLIUM. Thallium is a naturally occurring soft metal that is a minor constituent in a variety of ores and is obtained as a by-product of the refining of iron, cadmium, and zinc. It is used as a catalyst, in certain alloys, jewelry, thermometers, semiconductors, dyes and pigments, and optical lenses. It has been used medically as a depilatory agent. Additionally, it is used as a rodenticide and insecticide.

Thallium is efficiently absorbed from the gastrointestinal tract. Excretion occurs primarily through urine and feces. Following absorption, distribution occurs to kidney tissue to a large extent, with lesser distribution to thyroid, intestines, testes, pancreas, skin, bone, and spleen.

Thallium is one of the more toxic metals. Acute toxicity results in gastrointestinal irritation, shock, ascending paralysis, seizures, and psychic disturbances. Signs of subacute or chronic thallium poisoning include hair loss, nail dystrophy, cataracts, peripheral muscular weakness and atrophy, chorea, peripheral neuropathy, and kidney damage. Loss of vision have been related to industrial thallium exposures. No information is available which addresses the carcinogenic potential of thallium.

REFERENCES:

Goyer, R.A., 1991. Toxic Effects of Metals. In: Casarett and Doull's Toxicology: The Basic Science of Poisons, 3rd edition. Eds. C.D. Klaassen, M.O. Amdur and J. Doull. Macmillan Publishing Co. N.Y.

Tweig, M., 1990. Thallium. In: Poisoning and Drug Overdose. Ed. K.R. Olson. Appleton & Lange, CT. pps. 276-7.

TETRACHLOROETHENE (PERCHLORETHENE). Tetrachloroethene is a man-made volatile chlorinated solvent that is used extensively in the textile and dry cleaning industries as a cleanser and degreaser. Tetrachloroethene is also used as a degreaser in the electronics and metal industry. Since tetrachloroethene effectively cleans and decreases without adversely affecting what is being

cleansed, tetrachloroethene is used extensively in a multitude of commercially available cleansers.

Tetrachloroethene is nearly completely absorbed via the inhalation and oral routes; dermal exposure represents a minor pathway. Oral and inhalation exposure to tetrachloroethene in humans and animals indicates that the liver, kidney, and nervous system are target organs. Long-term exposures to tetrachloroethene produced proliferative changes in the mouse livers, renal nephropathy in animals and occupationally exposed workers, and irreversible nervous system damage in laboratory animals. Additionally, an increased incidence of menstrual disorders and spontaneous abortions have been observed in women occupationally exposed to tetrachloroethene in the dry cleaning business. Epidemiological data in humans is insufficient to make conclusions regarding the potential carcinogenicity of tetrachloroethene. However, tetrachloroethene has produced hepatic cancer in laboratory animals exposed orally and by inhalation. Therefore, the USEPA has placed tetrachloroethene in weight-of-evidence group B2, probable human carcinogen.

REFERENCES:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Tetrachloroethene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service. October, 1991.

TRICHLOROETHENE. Trichloroethene is a man-made chlorinated solvent that is used extensively in industry as a metal decreasing agent. Trichloroethene is also used in dry cleaning and as a solvent in paints and adhesives.

Several human deaths and acute neurotoxic effects have been attributed to oral and inhalation exposure to trichloroethene. In animals, oral and inhalation exposure to trichloroethene have produce neurotoxic effects, including behavioral changes, and renal toxicity. Additionally, inhalation and oral exposures to trichloroethene in animals have produced lung, liver, and testicular cancers. Epidemiological data in humans is insufficient to conclude whether trichloroethene is a human carcinogen. However, studies on trichloroethene metabolism suggest that it is metabolized similarly in humans and laboratory animals. Therefore, the USEPA has place trichloroethene in weight-of-evidence group B2, probable human carcinogen.

REFERENCES:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

VANADIUM. Vanadium is widely, but sparsely, distributed in the earth's crust and in the environment. It is invaluable as an alloying agent with steel; ferrovanadium alloys are used in high-stress applications such as bearings, jet engines, and cutting tools. Human and animal studies indicate that vanadium is readily absorbed from the lungs and poorly absorbed from the gastrointestinal tract. It distributes primarily to the bone and kidney. Vanadium is a

respiratory irritant. Inhalation of vanadium dusts in both animals and occupationally-exposed workers induces mild to moderate respiratory irritation. The effects are reversible and subside when exposure is discontinued. No studies were located regarding cancer in humans or animals following inhalation, oral, or dermal exposures. However, vanadium has been found to induce DNA damage in human cell cultures, suggesting that vanadium may have the potential to be genotoxic to humans.

REFERENCES:

ATSDR, 1990. Toxicological Profile for Vanadium. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1990.

VINYL CHLORIDE. Most of the vinyl chloride produced in the United States is used in the manufacture of polyvinyl chloride and other vinyl polymers. Because vinyl chloride is a gas the only significant route of exposure is inhalation. It is highly flammable. Acute exposure to vinyl chloride causes CNS depression. Several epidemiologic studies have found associations between occupational exposure and impaired liver function to vinyl chloride. Symptoms of liver disease associated with occupational exposure include pain, hepatomegaly, portal hypertension, and thrombocytopenia. Carcinogenicity studies by inhalation and oral routes in rats, mice, and hamsters resulted in liver angiosarcomas in all animals tested. Vinyl chloride workers are at increased risk for developing liver angiosarcomas, brain, skin, and lung tumors, and tumors of the lymph and blood-forming systems. Vinyl chloride is classified in group A, a human carcinogen.

REFERENCES:

Clayton, George D. and Florence E. Clayton, editors, 1981. Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition; John Wiley & Sons; New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency,

APPENDIX K

ECOLOGICAL BENCHMARK SCREENING VALUES

BENCHMARK SCREENING VALUES USED FOR THE ECOLOGICAL RISK ASSESSMENT

Screening benchmarks were developed to quantify risk to ecological receptors that may potentially inhabit OU 1 at NTC, Orlando. Benchmarks were developed for the following groups of ecological receptors: terrestrial plants, soil invertebrates, and small vertebrate receptors. The text below discusses the derivation of the various benchmarks for each receptor group.

K.1 TERRESTRIAL PLANT BENCHMARKS. Terrestrial plant benchmarks were derived to be protective of the survival and reproductive fitness of plant species potentially occurring at NTC, Orlando OU 1. The selected RTVs for plant receptors are presented in Table K-1.

In general, terrestrial phytotoxicity data are generally very limited. Hulzebos et al. (1993) conducted soil and nutrient solution toxicity studies on lettuce (*Lactuca sativa*) for 76 organic priority pollutants and found that volatile and easily degradable organic compounds were not toxic to lettuce (i.e., had effects concentrations greater than 1,000 mg/kg). For those analytes that were toxic to lettuce, quantitative structure-activity relationships (QSARs) were used to relate effects concentrations (EC_{50} values) to an analyte's log K_{ow} in order to quantify a concentration that is toxic to lettuce. Generally, the toxicity of a compound increases respective to its lipophilicity.

Other studies containing useful phytotoxicity data include Eno and Everett (1958) and Will and Suter (1995). Eno and Everett (1958) found a 35 percent reduction in root weight and an 11 percent reduction in top weight of black valentine beans when grown in soil containing 12.5 mg/kg 4,4'-DDT. No phytotoxicity information was available for any other pesticides, therefore, the 4,4'-DDT RTV was used for all pesticides. The Oak Ridge National Laboratory (ORNL) developed plant toxicity screening values (benchmarks) for ecological risk assessments for toluene, 2,4-dinitrophenol, di-n-butylphthalate, PCBs, and metals (Will and Suter, 1994). The methodology used to derive these benchmarks is described as follows.

The Oak Ridge National Laboratory (ORNL) Environmental Restoration Program, under contract to the U.S. Department of Energy, conducted a record search of plant toxicity data for the derivation of Lowest Observed Effects Concentration (LOEC) benchmarks (i.e., the lowest concentrations that represent hazardous contaminant soil concentrations to terrestrial plants). These benchmarks were developed for the sole purpose of screening compounds from being considered as contaminants of potential concern in ecological risk assessments.

The three rooting media considered for the toxicity tests included natural soil, nutrient solutions (lysimeter samples, whole plants rooted in aqueous solutions, or shallow groundwater samples), and all other media (silica sand or vermiculite). Total metals concentrations were extracted from the soils with either hydrochloric acid or other mineral acids, and total organics soil concentrations were obtained from rigorous solvent extractions. In most cases, groundwater samples were acidified for the recovery of total concentrations (Will and Suter, 1994).

TABLE K–1
SUMMARY OF TOXICITY DATA FOR PLANT RECEPTORS

BASELINE RISK ASSESSMENT
OPERABLE UNIT 1
NTC ORLANDO, ORLANDO, FLORIDA

Chemical	Reference	RTV (mg/kg)
VOLATILE ORGANICS		
Acetone		200 [a]
SEMI–VOLATILE ORGANICS		
Acenaphthene	Hulzebos et al., 1993	25 [d]
Anthracene		25 [g]
Benzo(a)anthracene		25 [g]
Benzo(a)pyrene		25 [g]
Benzo(b)fluoranthene		25 [g]
Benzo(g,h,i)perylene		25 [g]
Benzo(k)fluoranthene		25 [g]
Bis(2–ethylhexyl)phthalate	Hulzebos et al., 1993	>1,000 [d]
Carbazole		NA
Chrysene		25 [g]
Dibenz(a,h)anthracene		25 [g]
Fluoranthene		25 [g]
Indeno(1,2,3–cd)pyrene		25 [g]
Phenanthrene		25 [g]
Pyrene		25 [g]
PESTICIDES/PCBs		
4,4'–DDD		12.5 [h]
4,4'–DDE		12.5 [h]
4,4'–DDT	Eno & Everett, 1958	12.5
Aroclors	Will and Suter, 1994	40
alpha–BHC		>1,000 [i]
alpha–Chlordane		12.5 [h]
gamma–Chlordane		12.5 [h]
Dieldrin		12.5 [h]
Heptachlor epoxide		12.5 [h]
INORGANICS		
Aluminum	Will and Suter, 1994	50
Arsenic	Will and Suter, 1994	10
Barium	Will and Suter, 1994	500
Cadmium	Will and Suter, 1994	3
Chromium	Will and Suter, 1994	1
Copper	Will and Suter, 1994	100
Lead	Will and Suter, 1994	50
Manganese	Will and Suter, 1994	500
Mercury	Will and Suter, 1994	0.3
Silver	Will and Suter, 1994	2
Thallium	Will and Suter, 1994	1
Vanadium	Will and Suter, 1994	2
Zinc	Will and Suter, 1994	50

Notes:
[a] Value for toluene used as a surrogate
[d] Value from Hulzebos et al., 1993. Values represent 14–day growth EC_{50}s for *Lactuca sativa* in soil.
[g] Value for acenaphthylene used as a surrogate.
[h] Value for 4,4'–DDT used as a surrogate.
[i] Value for beta–BHC used as a surrogate.
NA = Not Available

Chemical toxicity to plants may vary depending on pH, Eh, cation exchange capacity, moisture content, elemental interactions, and clay or organic content of the soil. These study area-specific characteristics must be considered when assessing chemical toxicity to plants, however, there is no known method of examining these cumulative effects on plant toxicity (Will and Suter, 1994).

Sources of chemical toxicity data for benchmark derivation included data base searches (BIOSIS, POL TOX I, and PHYTOTOX), review articles, and conventional literature searches. The effects primarily considered were measures of plant growth or yield as these response parameters are most common in phytotoxicity studies. In addition, plant growth and yield are ecologically significant endpoints for measuring effects on plant populations and their suitability as sustenance for higher trophic levels. If data considering these effects were not available, then other measures were used (i.e., metabolic activity, tissue chemical concentration, transpiration rate, CO_2 uptake, and chlorophyll content of needles). Test species were all vascular plants representing three different growth stages: seed germination and early growth, seedling, or seedling to maturity. Exposure durations ranged from 2 to 279 days; generally, plants with short lifespans were exposed for short periods and trees were exposed for longer periods (Will and Suter, 1994).

Two measurement endpoints were obtained from the results of these studies. The No Observed Effect Concentration (NOEC) represented the highest applied concentration, which resulted in a 20 percent or less reduction in a measured response, and the Lowest Observed Effects Concentration (LOEC) represented the lowest applied concentration, which resulted in greater than a 20 percent reduction in a measured response (Will and Suter, 1994).

The ORNL derived benchmarks by the same methodology used by the National Oceanographic and Atmospheric Administration's for deriving the Effects Range Low (ER-L) (Long and Morgan, 1990) sediment screening values. The ER-L is the tenth percentile of the distribution of toxic effects thresholds for organisms in sediments. This approach is based on the assumption that the toxicity of a chemical in soil at a particular study area is a random variable. The LOECs were rank ordered and the value that approximated the tenth percentile was chosen as the benchmark (when necessary, values were interpolated). No statistical fitting was performed on the data as there were seldom sufficient data and because the values were derived for nonregulatory purposes of screening compounds from inclusion in ecological risk assessments. The lowest LOEC was selected as the benchmark when there were fewer than 10 values for a particular chemical (Will and Suter, 1994).

When benchmark values are not available for contaminants of potential concern, benchmarks derived by ORNL (or any other sources) for structurally similar compounds were used as surrogate benchmarks.

Significant biases and sources of uncertainty inherent in the approach include: the use of soluble salts of metals in the toxicity tests, the use of domestic plant species, the use of agricultural soils, and laboratory test conditions. All these biases could result in overly conservative or unconventional benchmarks as they do not represent actual field conditions (Will and Suter, 1994).

K.2 SOIL INVERTEBRATE BENCHMARKS. Soil invertebrate benchmarks were derived to be protective of the survival and reproductive fitness of invertebrate species potentially occurring at NTC, Orlando OU 1. Chemical effects data for earthworms have been assessed for a variety of organic and inorganic compounds; the available toxicological data for earthworms and derived RTVs are provided in Table K-2.

Data on earthworm toxicity from organic chemicals are limited. Neuhauser et al. (1985) conducted 14-day soil tests on one to two chemicals from each of several organic chemical classes (i.e., phenols, amines, aromatic VOCs, halogenated aliphatic VOCs, PAHs, and phthalates). A single representative RTV was generated for each of the class of compounds. All compounds within a chemical class used the same representative RTV as a benchmark value. For instance, the lowest PAH soil test LC_{50} result in the Neuhauser et al. (1985) study was used as a surrogate to represent the toxicity of all PAHs. As described above, one-fifth of the LC_{50} value was used for the RTV.

Available earthworm data for pesticides and inorganics consists of acute LC_{50} data, subchronic mortality data, and subchronic reproductive toxicity data. Reproductive effects are generally more sensitive toxicity endpoints than are lethality effects. Therefore, reproductive effects were generally chosen as RTVs when available. When reproductive data were unavailable, appropriate mortality endpoints were chosen as RTVs. Because LC_{50} data do not represent protective soil chemical concentrations (e.g., they represent chemical concentrations lethal to 50 percent of the tested population), one-fifth of the LC_{50} value was used. The resultant chemical concentration (selected as the RTV) is expected to be protective of 99.9 percent of the exposed population from lethal effects (USEPA, 1986). When appropriate, RTVs for a particular compound were used as a surrogate for similarly structured compounds that lack toxicity information.

K.3 SMALL VERTEBRATE BENCHMARKS. No State or Federal standards or guidelines are available to evaluate surface soil exposures to terrestrial vertebrate receptors. Therefore, this medium has been evaluated through comparison of surface soil analytical data to terrestrial vertebrate protective contaminant levels (PCLs). PCLs are chemical concentrations that correspond to fixed levels of risk (i.e., a hazard quotient of 1), associated with chronic contaminant exposures that are estimated by a computer-generated food-chain model that incorporates conservative default exposure and toxicity information.

The methodology used to develop PCLs is described below. In summary, PCL derivation involves three steps: 1) identification of terrestrial vertebrate indicator species; 2) calculation of contaminant intakes to the indicator species; and 3) calculation of PCLs. This methodology has been submitted by the Navy to the State of Florida as part of other risk evaluations (i.e., Cecil Field) and is consistent with USEPA Region IV ecological risk evaluation guidance (USEPA, 1995 Eco Bulletin No. 1)

Selection of Indicator Species. Indicator species are terrestrial vertebrate species that are representative of the various taxonomic groups and trophic levels of terrestrial vertebrate receptors that may potentially occur within a given habitat. For the NTC, Orlando OU 1 ERA, the following indicator species typically found in urban environments were selected based on the habitats

TABLE K-2
SUMMARY OF TOXICITY DATA FOR TERRESTRIAL INVERTEBRATE RECEPTORS

BASELINE RISK ASSESSMENT
OPERABLE UNIT 1
NTC ORLANDO, ORLANDO, FLORIDA

Chemical	Test Type	Test Duration	Test Species	Chemical Concentration (mg/kg)	Effect	RTV (mg/kg)	Reference
VOLATILE ORGANIC COMPOUNDS							
Acetone	NA	NA	NA	NA	NA	NA	NA
SEMI-VOLATILE ORGANIC COMPOUNDS							
Acenaphthene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Anthracene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(a)anthracene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(a)pyrene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(b and k)fluoranthene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(g,h,i)perylene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Bis(2-ethylhexyl)phthalate	Soil Test	14 day	4 test species	2,390	LC_{50}	478 [h]	Neuhauser et al., 1986.
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Dibenz(a,h)anthracene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Fluoranthene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Indeno(1,2,3-c,d)pyrene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Phenanthrene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Pyrene	Soil Test	14 day	E. fetida	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
PESTICIDES							
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	Soil Test		P. posthuma		LC_{50}	8 [c]	Hans et al., 1990
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA
Dieldrin	Soil Test	89 day	E. fetida	10	6 % decrease in number of cocoons hatched		Reinecke and Venter, 1985
Dieldrin	Soil Test	89 day	E. fetida	30	26 % decrease in number of coc	30	Reinecke and Venter, 1985
Dieldrin	Soil Test	89 day	E. fetida	100	36 % decrease in number of cocoons hatched;		Reinecke and Venter, 1985
Dieldrin	Soil Test	89 day	E. fetida	100	50 % decrease in number of cocoons produced		Reinecke and Venter, 1985
4,4'-DDD	Soil Test	NS	NS	60	58% mortality	12 [b]	U.S. EPA, 1985
4,4'-DDE	Soil Test	NS	NS	60	58% mortality	12 [b]	U.S. EPA, 1985
4,4'-DDT	Soil Test	NS	NS	60	58% mortality	12 [b]	U.S. EPA, 1985
Heptachlor epoxide	Soil Test		P. posthuma		LC_{50}	6.4 [e]	Hans et al., 1990
INORGANICS							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Arsenic	Soil Test	14 day	E. fetida	100	0 % mortality	100	Bouche et al., 1987
Arsenic	Soil Test	14 day	E. fetida	200	100 % mortality		Bouche et al., 1987
Barium	NA	NA	NA	NA	NA	NA	NA
Cadmium	Soil Test	14 day	E. fetida	900	0 % mortality		Bouche et al., 1987
Cadmium	Soil Test	14 day	E. fetida	2,700	100 % mortality		Bouche et al., 1987
Cadmium	Soil Test	14 day	E. fetida	1,000 [f]	LC_{50}		van Gestel and van Dis, 1988
Cadmium	Soil Test	20 week	E. fetida	50 [g]	Decrease in cocoon production	50 [b]	Malecki et al., 1982
Cadmium	Soil Test	2 week	E. fetida	1,843	LC_{50}		Neuhauser et al., 1985
Chromium (III)	Soil Test	8 week	E. fetida	250	Reproduction 50% inhibited	50	Molnar et al., 1989

TABLE K-2
SUMMARY OF TOXICITY DATA FOR TERRESTRIAL INVERTEBRATE RECEPTORS

BASELINE RISK ASSESSMENT
OPERABLE UNIT 1
NTC ORLANDO, ORLANDO, FLORIDA

Chemical	Test Type	Test Duration	Test Species	Chemical Concentration (mg/kg)	Effect	RTV (mg/kg)	Reference
Copper	Soil Test	14 day	E. fetida	10	0 % mortality		Bouche et al., 1987
Copper	Soil Test	14 day	E. fetida	30	20 % mortality	30	Bouche et al., 1987
Copper	Soil Test	20 week	E. fetida	2,000 [g]	Decrease in cocoon production		Malecki et al., 1982
Copper	Soil Test	2 week	E. fetida	643	LC_{50}		Neuhauser et al., 1985
Lead	Soil Test	20 week	E. fetida	5,000 [g]	Decrease in cocoon production		Malecki et al., 1982
Lead	Soil Test	2 week	E. fetida	5,941	LC_{50}	1,190 [b]	Neuhauser et al., 1985
Manganese	NA	NA	NA	NA	NA	NA	NA
Mercury	Soil Test	14 day	E. fetida	36	0 % mortality	36	Bouche et al., 1987
Mercury	Soil Test	14 day	E. fetida	216	60 % mortality		Bouche et al., 1987
Silver	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	Soil Test	20 week	E. fetida	5,000 [g]	Decrease in cocoon production		Malecki et al., 1982
Zinc	Soil Test	2 week	E. fetida	662	LC_{50}	130 [b]	Neuhauser et al., 1985

NOTES:
[a] Equal to the lowest LC_{50} in each chemical class, multiplied by a safety factor of 0.2, as described in text. Value for fluorene used for PAHs.
[b] Conservative factor of 0.2 applied to endpoint; resultant value should be protective of 99.9% of the exposued population from acute effects (USEPA, 1986).
[c] Value for gamma-BHC used as a surrogate
[e] Value for heptachlor used as a surrogate
[f] LC_{50} value for soil at pH = 7.0; LC_{50} = 320 ug/g - 560 ug/g for soil pH = 4.1
[g] Acetate salt
[h] Mean of LC_{50}s for four test species (*A. teberculata, E. fetida, E. eugeniae*, and *P. excavatus*) from artificial soil tests; values used for a whole chemical class are multiplied by a factor of 0.2 (Neuhauser et al., 1986). Value for dimethylphthalate used for phthalates.
NA = Not Available
NS = not stated.

identified during biological field investigations: short-tailed shrew (*Blarina brevicauda*), cotton mouse (*Perymyscus gossypinus*), and American robin (*Turdus migratorius*). As indicated above, it was assumed that each of these species is representative of other species within a given trophic level (i.e., a trophic guilding approach was employed).

Food-chain Model. The terrestrial food-chain model was developed to estimate potential contaminant dietary exposure levels for each of the above-listed indicator species via ingestion of food and surface soil. The dietary exposure levels calculated in the food-chain model were used to develop PCLs for each of the indicator species.

In order to estimate contaminant tissue levels in various primary prey items (e.g., invertebrates and plants) consumed by each indicator species, specific bioaccumulation factors (BAFs) were used to estimate contaminant tissue residues in each prey species, as shown in the following equation:

$$PreyTissueConcentration(mg/kg) = SoilConcentration(mg/kg) \times BioaccumulationFactor(BAF)$$

Due to the limited habitat at OU 1, no bioaccumulation of contaminants in secondary prey items (i.e., such as small birds and rodents) was assumed to occur. The BAF data base is presented in Table K-3. For BAF derivation, when possible, chemical- and taxon-specific bioaccumulation data for plants and invertebrates were obtained from the literature. When these data were unavailable, BAFs were calculated using structure-activity relationships (SAR) or were obtained from empirical data or extrapolations, as described below.

- For plants, when literature values were unavailable, plant BAFs for semi-volatile organic chemicals and pesticides were calculated using a regression equation from Travis and Arms (1988) that is based on the uptake of organic contaminants into plant tissue. Log K_{ow}s ≥ 5 for PAHs were averaged to provide one BAF for that compound class. Based on evidence provided by Suter (1993) which suggests that compounds with log K_{ow}s less than 5 do not bioaccumulate in plants, BAFs for compounds or classes of compounds with log K_{ow}s less than 5 were conservatively assumed to be 0.02. Plant BAFs for inorganic chemicals were obtained from Baes et al. (1984). BAFs for volatile organic compounds were assumed to be zero.

- For terrestrial invertebrates, literature values for pesticides and inorganics were generally available. For SVOCs, a single BAF for PAHs was calculated using data presented in Beyer (1990); dry weight was converted to wet weight assuming earthworms are 80 percent water. This value was used as a surrogate for all semivolatile compounds.

The potential dietary exposure (PDE) level, for each modeled indicator species, was calculated by multiplying each calculated prey species tissue concentration by the proportion of that prey type in the diet, summing these values, adding soil exposure, and multiplying by the Site Foraging Frequency (SFF) of the given receptor species, as shown in the following equation:

Table K-3
Bioaccumulation Data

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Analyte	log K_{ow} [b]		Bioaccumulation Factor [a]			
			Invertebrate [c]	Plant [d]	Mammal [e]	Bird [f]
SEMIVOLATILES						
Acenaphthene	3.9	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Anthracene	4.5	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Benzo(a)anthracene	5.7	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Benzo(a)pyrene	6	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Benzo(b)fluoranthene	6.1	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Benzo(g,h,i)perylene	6.6	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Benzo(k)fluoranthene	6.1	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Carbazole	3.76 [j]	3.76	5.0E-02	5.2E-02	1.5E-01	1.5E-01
Chrysene	5.7	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Dibenz(a,h)anthracene	6.5	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
bis(2-Ethylhexyl)phthalate	5.1	6.1	5.0E-02	2.3E-03	1.9E+00	1.9E+00
Fluoranthene	4.95 [k]	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Indeno(1,2,3-c,d)pyrene	6.6	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Phenanthrene	4.5	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
Pyrene	5.3	5.6	5.0E-02	4.5E-03	6.0E-01	6.0E-01
PESTICIDES/PCBs						
Aroclor-1260	7.1 [o]		5.8E+00 [p]	1.2E-01 [q]	3.8E+00 [r]	3.2E-01 [s]
alpha-BHC	3.8		2.6E+00 [u]	4.9E-02	1.5E-06	2.1E-01 [n]
alpha-Chlordane	5.5		1.6E+00 [v]	5.1E-03	5.5E-01 [w]	1.8E+00 [x]
gamma-Chlordane	5.5		1.6E+00 [y]	5.1E-03	5.5E-01 [w]	1.8E+00 [x]
4,4'-DDD	6		3.3E+00 [z]	1.0E-02 [aa]	1.2E+00 [ab]	2.9E+00 [ac]
4,4'-DDE	5.7		1.7E+00 [z]	1.0E-02 [aa]	1.2E+00 [ab]	2.9E+00 [ac]
4,4'-DDT	6.4		5.7E-01 [z]	1.0E-02 [aa]	1.2E+00 [ab]	2.9E+00 [ac]
Dieldrin	4.6		5.5E+00 [m]	1.7E-02	1.5E+00 [af]	4.4E-01 [ag]
Heptachlor epoxide	5.4		1.0E+00 [y]	5.9E-03	3.5E-01 [n]	1.4E+00 [n]
INORGANICS						
Aluminum	NA		7.5E-02 [ai]	8.0E-04 [aj]	7.5E-02 [ak]	7.5E-02
Arsenic	NA		6.6E-03 [al]	3.0E-01 [am]	1.0E-01 [ak]	1.0E-01
Barium	NA		7.5E-03 [ai]	3.0E-02 [aj]	7.5E-03 [ak]	7.5E-03
Cadmium	NA		1.4E+00 [ao]	3.3E+01 [ap]	2.1E+00 [ak]	3.8E-01 [aq]
Chromium	NA		1.6E-01 [p]	1.5E-03 [aj]	2.8E-01 [ak]	2.8E-01
Copper	NA		1.6E-01 [p]	7.8E-01 [ar]	6.0E-01 [ai]	6.0E-01
Lead	NA		7.8E-02 [au]	NA [an]	1.5E-02 [ak]	1.5E-02
Manganese	NA		2.0E-02 [ai]	5.0E-02 [aj]	2.0E-02 [ak]	2.0E-02
Mercury	NA		6.8E-02 [av]	1.8E-01 [aj]	1.0E-02 [aw]	2.3E+00 [aw]
Silver	NA		1.5E-01 [ai]	8.0E-02 [aj]	1.5E-01 [ak]	1.5E-01
Thallium	NA		2.0E+00 [ai]	8.0E-04 [aj]	2.0E+00 [ak]	2.0E+00
Vanadium	NA		1.3E-01 [ai]	1.1E-03 [aj]	1.3E-01 [ak]	1.3E-01
Zinc	NA		1.8E+00 [p]	6.1E-01 [ar]	2.1E+00 [ak]	2.1E+00

NOTES:

[a] Units for bioaccumulation factors (BAFs) are mg/kg fresh wt tissue over mg/kg dry wt soil for invertebrates and plants, and mg/kg fresh wt tissue over mg/kg fresh wt. food for small mammals and small birds. No BAFs were calculated for VOAs since available evidence suggests that these analytes do not bioaccumulate. Units for bioconcentration factors (BCFs) are μg/kg fresh wt. tissue over μg/L water.

[b] From Superfund Chemical Data Matrix (USEPA, 1993) unless otherwise noted. Log K_{ow}s for PAHs were averaged to estimate a PAH-specific BAF. The average PAH log K_{ow} is 5.6.

[c] Average of earthworm BAFs (Beyer, 1990) converted from dry weight to wet weight assuming earthworm is 80% water, unless otherwise noted.

[d] Plant BAF calclulated using the following equation presented by Travis and Arms (1988) unless otherwise noted: log (Plant Uptake Factor)=1.588-0.578 (log Kow). Converted from dry weight to wet weight plant concentration assuming 80% water content of earthworms.

[e] Calculated using the following equation in Travis and Arms (1988) for semivolatile organic analytes with log K_{ow}s >5: log BTF (biotransfer factor) = log K_{ow} - 7.6; result multiplied by average ingestion rates for non-lactating and lactating test animals to convert from BTFs to BAFs, and divided by a factor of 0.2 to convert from dry feed to fresh feed. There is an uncertainty involved in using this equation for PAHs because this study did not use any PAHs in the regression analysis. When no literature values were available, BAFs were calculated for pesticides and PCBs, regardless of the log K_{ow}, due to the tendancy of these lipophylic compounds to bioaccumulate. With the exception

Table K-3
Bioaccumulation Data

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Analyte	log K_{ow} [b]	Bioaccumulation Factor [a]			
		Invertebrate [c]	Plant [d]	Mammal [e]	Bird [f]

of pesticides and PCBs, BAFs for analytes with log K_{ow}s < 5 are assumed to be 0.15 because they are unlikely to bioaccumulate in animal tissue (Maughan, 1992).

[f] Small mammal BAF used unless otherwise noted.

[g] Used to represent bioaccumulation from sediment to fish and aquatic invertebrates, however, unless otherwise noted mammalian BAFs are used for aquatic BAFs.

[h] From Barnthouse et al. (1988) unless otherwise noted. The value for naphthalene was used as a surrogate for 2-methylnaphthalene.

[i] Fish BCFs calculated from Veith et al. (1985) using the following regression equation: log (BCF) = 0.79 log K_{ow} - 0.40

[j] Hansch and Leo (1979)

[k] USEPA (1992), Dermal Exposure Guidance.

[l] ATSDR, 1993 (Toxicological Profile for Naphthalene).

[m] Geometric mean of reported BAFs for earthworms (Edwards & Thompson, 1973). Values provided by Gish (1970) were converted from dry weight to wet weight by multiplying by a conversion factor of 0.2 assuming 80% water composition of earthworms.

[n] BAFs from Garten & Trabalka (1983) were converted from (mg/kg of fat)/(mg/kg of diet) to (mg/kg fresh wt.)/(mg/kg diet) by multiplying the value by an assumed fat content of 10%. Poultry and small bird values were used for bird BAFs, and rodent, dog, swine, and cow values were used for mammal BAFs. Dog values were used for endrin and it's derivatives. Rodent values were used for endosulfan (and it's derivatives) and gamma-BHC. Swine values were used for methoxychlor, aldrin, and heptachlor. Cow values were used for heptachlor epoxide. Small bird values were used for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. Poultry values were used for endrin, alpha-BHC, beta-BHC, gamma-BHC, aldrin, endrin, heptachlor, and heptachlor epoxide. Fish in flowing water values were used for aldrin, Aroclor-1248, Aroclor-1254, alpha BHC, gamma BHC, alpha chlordane, gamma chlordane, 4,4'-DDE, dieldrin, heptachlor, and heptachlor epoxide.

[o] USEPA (1990) - Basics of Pump-and-Treat Ground-Water Remediation Technology

[p] BCF for earthworms from Diercxsens et al. (1985).

[q] Arithmetic mean BAF for corn, leaves, carrots, beets, surgarbeets, radishes, and soybeans (tops, roots, and whole plants) from USEPA (1985) and Webber (1983).

[r] BAF calculated from discussion in Eisler (1986) stating that Aroclor 1254 residues in subcutaneous fat of adult minks were up to 38 times dietary levels. Converted to whole body concentrations assuming 10% lipid content.

[s] BAF calculated from data presented in Eisler, 1986. Kestrels fed 33 mg PCB/kg diet for 62-69 days accumulated 107 mg PCB/kg lipid weight in muscle. Assuming muscle is 10% lipid content, the muscle concentration is about 10.7 mg/kg.

[t] Amphipod to sediment mean biomagnification factor for total PCBs in Lake Michigan and Lake Ontario (Evans et al., 1991).

[u] Value for gamma-BHC used as a surrogate

[v] Value for gamma-chlordane used as a surrogate

[w] BAF calculated from data presented in Eisler, 1990. Rats fed 20 mg/kg diet technical chlordane (equivalent to 3.6 mg/kg diet cis- and trans-chlordane) for 350 days accumulated 20 mg/kg in lipids. Assuming 10% lipid content, the whole body concentration is about 2 mg/kg.

[x] BAF calculated from data presented in Eisler, 1990. Red-winged blackbirds fed 10 mg/kg diet technical chlordane (equivalent to 1.8 mg/kg diet cis- and trans- chlordane) for 84 days accumulated 1.8 mg/kg wet weight whole body residue.

[y] Geometric mean of reported BAFs for earthworms (Gish, 1970) converted from dry weight to wet weight assuming 80% water composition of earthworms.

[z] Geometric means of 4,4'-DDT [Davis (1968), Davis & Harrison (1966), Wheatley & Hardman (1968), Bailey et al. (1970), Cramp & Olney (1967), and Beyer & Gish (1980)], 4,4'-DDE [Davis (1968), Davis & Harrison (1966), Cramp & Olney (1967), Collett & Harrison (1968), Hunt & Sacho (1969), and Gish (1970)], and 4,4-DDD [Barker (1958), Davis (1968), Davis & Harrison (1966), Cramp & Olney (1967), Collett & Harrison (1968), Wheatley & Hardman (1968), Hunt & Sacho (1969), Bailey et al. (1970), Dimond et al. (1970), Gish (1970), and Beyer & Gish (1980)] reported for earthworms. Dry soil concentrations calculated assuming 10% moisture content in sandy-loam soils (Donahue et al., 1977).

[aa] Geometric mean of 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE BAFs (fresh wt/dry wt) reported for roots (carrot, potato, sugar beet), grains (corn, oats), and legumes (alfalfa) derived from USEPA (1985) converted from dry weight to wet-weight per values provided by Suter (1993).

[ab] BAF for shrews and voles calculated using measured concentrations of DDT_R in stomach content and in whole body (Forsyth & Petrle, 1984).

[ac] Whole-body pheasant BAF for 4,4'-DDT presented in USEPA (1985); derived from Kenaga (1973).

[ad] Amphipod to sediment mean biomagnification factor for total DDT in Lake Michigan and Lake Ontario (Evans et al., 1991).

[ae] Geometric mean of BCFs obtained from AQUIRE (1994) and AWQC documents (calculated in Appendix __, Table ___).

[af] BAF calculated from data presented by Potter et al (1974). Based on an average dieldrin concentration in cow muscle and fat of 0.17 mg/kg (dry weight) and a dieldrin concentration of 0.11 mg/kg in the diet (dry weight).

[ag] Jeffries and Davis (1968).

[ah] Value for heptachlor epoxide used as a surrogate.

[ai] Prey-specific value not available; value shown is small mammal BAF for this chemical.

[aj] Value from Baes et al. (1984) for leafy portions of plants multiplied by 0.2 to represent 80% water composition of plants.

[ak] Value derived from biotransfer factors (BTFs), presented in Baes et al. (1984) for uptake into cattle. BTF converted to BAF by

Table K–3
Bioaccumulation Data

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Analyte	log K_{oc} [b]	Bioaccumulation Factor [a]			
		Invertebrate [c]	Plant [d]	Mammal [e]	Bird [f]

multiplying by food ingestion rate of 50 kg/day wet weight.

[al] Average of values for industrial soils from Beyer and Cromartie (1987) multiplied by 0.2 to represent 80% water composition in earthworms.

[am] Average of BAF values reported from Wang et al. (1984), Sheppard et al. (1985), and Merry et al. (1986).

[an] Mean of values reported for *Sorex araneus* in MacFadyen (1980).

[ao] Mean of values reported for soil invertebrates in MacFadyen (1980) converted from dry weight to wet weight.

[ap] Mammal value for copper and plant value for cadmium from Levine et al., 1989. Lead does not accumulate in plant tissue, therefore, a BAF of zero was assigned.

[aq] Based on accumulation of cadmium in kidneys of European quail in Pimentel et al. (1984).

[ar] Median of values reported from Levine et al. (1989).

[as] Cyanide has not been shown to bioaccumulate in any organisms.

[at] Cyanide is naturally occurring in some plants; the extent to which it is taken up from soil is unknown and therefore a BAF of 1 is conservatively assumed.

[au] Geometric mean of BAF values (fresh wt./dry wts) for worms and woodlice (USEPA, 1985__). Fresh weight tissue concentrations calculated assuming 80% body water content.

[av] Uptake value (fresh wt./dry wt.) for earthworms from USEPA (1985__) sludge document. Fresh weight tissue concentrations calculated assuming 80% body water content.

[aw] USEPA, 1985.

NA = Not Available

$$PDE = [P_{plant} \times T_{plant} + P_{invertebrate} \times T_{invertebrate} + soil\ exposure] \times SFF$$

Where:

PDE	=	Potential dietary exposure (mg/kg)
P_n	=	Percent of diet composed of prey item n
T_n	=	Tissue concentration in prey item n (mg/kg)
Soil Exposure	=	(0.05)(Soil concentration in mg/kg)
SFF	=	Site Foraging Frequency; Area of Contaminated Soil (acres)/Home range (acres) (cannot exceed 1)

Detailed information for each of the indicator species regarding diet, home-range, and other biological exposure parameters used in the food-chain model, were obtained from the *Wildlife Exposure Factors Handbook* (USEPA, 1993) and other literature sources, and are provided in Table K-4. Incidental soil ingestion associated with foraging, preening, and cleaning activities, was conservatively assumed to represent five percent of total dietary intake. In calculating the SFF, a site area of 15 acres was used in the PCL calculation to conservatively estimate wildlife receptor exposures to contaminated soil; in reality, the actual exposure area would be much smaller due to the presence of pavement, buildings, and sidewalks at the site, and because of the potential that this area will be covered by a landfill cap under the presumptive remedy. This area (15 acres) is larger than the home range of all three selected receptors, resulting in a calculated SFF of 1 and thereby "maximizing" the exposure estimate.

The potential dietary exposure level for each receptor species was multiplied by the receptor-specific ingestion rate and divided by the estimated body weight to calculate a Total Body Dose (TBD):

$$TBD = \frac{PDE \times IR}{BW}$$

Where:

TBD	=	Total Body Dose (mg/kgBW-day)
PDE	=	Potential dietary exposure (mg/kg)
IR	=	Ingestion rate (kg/day)
BW	=	Body weight (kg)

Because the TBD estimates are normalized to the ingestion and body weight of the particular receptor being evaluated, they are directly comparable to estimated Reference Toxicity Values (RTVs) derived from the literature. The comparison of the TBD estimate with the appropriate RTV results in an index (the Hazard Index) of potential risk associated with exposure to that particular chemical.

The toxicity data used for developing receptor RTVs consisted of chronic studies, which were preferentially chosen in the following order: 1) feeding studies, 2) gavage studies, 3) drinking water studies. Based on these data, RTVs were developed to represent a threshold dosage for effects to terrestrial organisms. RTVs are expressed in mg/kg BW (body weight)/day (dose normalized to body weight). From the toxicological data base (Table K-5), chemical-specific

Table K-4
Exposure Parameters for Representative Wildlife Species

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Representative Wildlife Species	Body Weight (kg)	Reported Diet	Soil/Sediment Ingestion (% of diet)	Assumed Diet for Exposure Assessment (% of diet)	Food Ingestion Rate (kg/day)	Water Intake Rate (ℓ/day)	Home Range (acres)
Cotton Mouse [a] (*Peromyscus gossypinus*)	0.021 [b]	Seeds and some insects [c]	2% soil [d]	88% Plants 10% Invertebrates	0.0029 [e]	0.0031 [f]	0.147 [g]
Short-Tailed Shrew (*Blarina brevicauda*)	0.017 [h]	Earthworms, slugs & snails, fungi, insects, and vegetation [c]	10% soil [d]	78% Invertebrates 12% Plants	0.0024 [e]	0.0039 [f]	0.96 ± 0.09 [c]
American Robin (Turdus migratorius)	0.0745 [i]	Fruit, earthworms, insects; diet is approximately 60% plants [j]	5% soil	40% Invertebrates 55% Plants	0.011 [k]	0.01 [l]	0.48 [m]

References:
[a] Values for the deer mouse were used for the cotton mouse (USEPA, 1993).
[b] Average of adult male and female deer mice in North America (USEPA, 1993).
[c] Wildlife Exposure Factors Handbook (USEPA, 1993).
[d] Deer mouse value used for cotton mouse. Surrogates were chosen based on similarities in diet. Other values were based on diet composition. USEPA (1993).
[e] Calculated using the mammal equation based on body weight (Wt.) in kg. Food ingestion (kg/day) = $0.0687 \times Wt^{0.822}$ (kg) (USEPA, 1993).
[f] Calculated using the mammal equation based on body weight (Wt.) in kg. Water ingestion (l/day) = $0.099 \times Wt^{0.90}$ (kg) (USEPA, 1993).
[g] Average for male and female deer mice, Virginia/mixed deciduous forest (USEPA, 1993).
[h] Mean of means reported for male and female shrews in summer and fall (USEPA, 1993).
[i] Terres (1991).
[j] DeGraaf & Rudis (1986).
[k] Calculated using the bird equation based on body weight (Wt.) in kg. Food ingestion (kg/day) = $0.0582 \times Wt^{0.651}$ (kg) (USEPA, 1993).
[l] Calculated using the bird equation based on body weight (Wt.) in kg. Water ingestion (ℓ/day) = $0.059 \times Wt^{0.67}$ (kg) (USEPA, 1993).
[m] Average of mean home range values provided for robins feeding nestlings and fledglings (USEPA, 1993).

Notes: g = grams
kg = kilograms
% = percent
NA = not available
kg/day = kilograms per day
ℓ/day = liters per day
N/acre = number per acre

Table K–5
Ingestion Toxicity Information for Wildlife

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mgk gBW–day Oral LOAEL	Sublethal RTV mgk gBW–day LONOAEL	Reference
VOLATILE ORGANIC COMPOUNDS							
Acetone	Rat	Oral	NR	Reproductive effects		273,000	RTECS, 1993
	Rat	Oral LD_{50}	NR	Mortality	5,800		RTECS, 1993
	Rat	Oral LD_{50}		Mortality	9,750		Sax, 1984
	Mouse	Oral LD_{50}	NR	Mortality	3,000		RTECS, 1993
	Rabbit	Oral LD_{50}	NR	Mortality	5,340		RTECS, 1993
SEMIVOLATILE ORGANIC COMPOUNDS							
Acenaphthene	Mouse	Oral (chronic)	90 days	Liver weight increase		175	IRIS, 1990
	Rat	Oral (chronic)	32 days	Physiological changes		2,000	USEPA, 1984d
Anthracene	Mouse	Oral LD_{50}	NR	Mortality	17,000		RTECS, 1993
	Rodents	Oral (chronic)	NS	Carcinogenicity		3,300	Eisler, 1987a
	Mouse	Oral (chronic)	90 days	Clinical and pathological effects		1,000	IRIS, 1990
Benzo(a)anthracene	Rodents	Oral (chronic)	NS	Carcinogenicity		2	Eisler, 1987a
Benzo(a)pyrene (surrogate for	Rat	Oral (chronic)	Pregnancy	Sterility in offspring		40	USEPA, 1984e
Dibenz(a,h)anthracene)	Rat	Oral (chronic)	3.5 months	Reproductive		50	USEPA, 1984e
	Mouse	Oral	Multi–generational	Decreased fertility of F1 progeny; decreased F2 litter size.		10 [a]	MacKenzie and Angevine, 1981
	Mouse	Oral (subchronic)	6 months	Mortality	120		ATSDR, 1993b
Benzo(b)fluoranthene and Benzo(k)fluoranthene	Rodents	Oral (chronic)	NS	Carcinogenicity		40	Eisler, 1987a
Benzo(g,h,i)perylene	Rodents	Oral (chronic)	NS	Carcinogenicity		99	Eisler, 1987a
Carbazole	Rat	Oral LD_{50}		Mortality	500		USEPA, 1986
Chrysene	Rodents	Oral (chronic)	NS	Carcinogenicity		99	Eisler, 1987a
bis(2–Ethylhexyl)phthalate	Rat	Oral LD_{50}	NR	Mortality	30,600		RTECS, 1993
	Rat	Oral	NR	Reproductive effects		7,140	RTECS, 1993
	Rat	Oral	NR	Reproductive effects		35	RTECS, 1993
	Rat	Oral	NR	Reproductive effects		6,000	RTECS, 1993
	Rat	Oral	NR	Reproductive effects		17,200	RTECS, 1993
	Rat	Oral	NR	Reproductive effects		10,000	RTECS, 1993
	Rat	Oral	NR	Reproductive effects		9,766	RTECS, 1993
	Mouse	Oral LD_{50}	NR	Mortality	30,000		RTECS, 1993
	Mouse	Oral	NR	Reproductive effects		78,880	RTECS, 1993
	Mouse	Oral	NR	Reproductive effects		4,200	RTECS, 1993
	Mouse	Oral	NR	Reproductive effects		50	RTECS, 1993
	Mouse	Oral	NR	Reproductive effects		1,000	RTECS, 1993
	Mouse	Oral	NR	Reproductive effects		2,040	RTECS, 1993
	Rabbit	Oral LD_{50}	NR	Mortality	34,000		RTECS, 1993
	Guinea pig	Oral LD_{50}	NR	Mortality	26,000		RTECS, 1993
	Guinea pig	Oral	NR	Reproductive effects		20,000	RTECS, 1993
	Mammal	Oral	NR	Reproductive effects		20,000	RTECS, 1993
	Mammal	Oral	NR	Reproductive effects		509,000	RTECS, 1993
	Mouse	Oral LD_{50}		Mortality	800		RTECS, 1993 and NIOSH, 1985
	Mouse	Oral (subchronic)	13 weeks	Renal effects		125	RTECS, 1993
Fluoranthene	Rat	Oral LD_{50}	NR	Mortality	2,000		RTECS, 1994
	Mouse	Oral (subchronic)	90 days	Nephropathy; clinical and pathological effects		250	125 IRIS, 1990
Indeno(1,2,3–cd)pyrene	Rodents	Oral (chronic)	NS	Carcinogenicity		72	Eisler, 1987a
Phenanthrene	Mouse	Oral LD_{50}	NR	Mortality	700		RTECS, 1994
	Mouse	Oral (subchronic)	6 months	Increased liver weight		120	ATSDR, 1989c
Pyrene	Rat	Oral LD_{50}	NR	Mortality	2,700		RTECS, 1993 and NIOSH, 1985
	Mouse	Oral LD_{50}	NR	Mortality	800		RTECS, 1993 and NIOSH, 1985
	Mouse	Oral (chronic)	13 weeks	Renal effects		125	75 IRIS, 1990

Table K–5
Ingestion Toxicity Information for Wildlife

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kg BW–day Oral LOAEL	Sublethal RTV mg/kg BW–day LONOAEL		Reference
PESTICIDES/PCBs								
Aroclor 1254 (surrogate for Aroclor 1248 and 1260)	Mouse	Oral	NR	Reproductive		1.53		USEPA, 1993a
	Chicken	Oral (chronic)	NR	Embryonic mortality		0.9		USEPA, 1976
	Rock dove	Oral (chronic)	NR	Parental incubation behavior		0.9		Peakall and Peakall, 1973
	American kestrel	Oral (chronic)	69 days	Reduced sperm concentration		9		Eisler, 1986
	Mink	Oral dose	160 days	Reproductive		0.096		USEPA, 1993a
	Mink	Oral	NR	Kit growth		0.15		USEPA, 1993a
	Mink	Oral	12.5 days	Reproductive		0.375		USEPA, 1993a
	Chicken	Oral	39 weeks	Egg production and fertility		2.44		USEPA, 1993a
	Chicken	Oral	NR	Egg production and hatchability		9.8		USEPA, 1993a
	Chicken	Maternal diet	NR	Chick growth		0.98		USEPA, 1993a
	Pheasant	Oral	16 weeks	Egg hatchability		1.8		USEPA, 1993a
Aroclor 1260 (surrogate for Aroclor 1248 and 1254)	Rat	Oral LD_{50}	NR	Mortality	1,315			RTECS, 1993
	Rat	Oral LD_{50}	NR	Mortality	500			Eisler, 1986
	Rat	Oral LD_{50}	NR	Mortality	1,300			Eisler, 1986
	Rat	Oral	NR	Reproductive effects		1,674		RTECS, 1993
	Rat	Oral (chronic)	2 generations	Reduced litter size		7.6		USEPA, 1985b
	Rat	Oral (subchronic)	9 weeks	Fetal mortality; maternal toxicity		6.4		ATSDR, 1987a
	Mouse	Oral	NR	Reproductive effects		74		RTECS, 1993
	Mink	Oral LD_{50}		Mortality	4,000			Eisler, 1986
	Mink	Oral LD_{50}		Mortality	3,000			Eisler, 1986
	Mink	Oral LD_{50}		Mortality	750			Eisler, 1986
	Mink	Oral (subchronic)	4 months	Impaired reproduction		0.0075		Newell et al., 1987
	Dog (beagle)	Oral (chronic)	2 years	LOAEL		0.37		USEPA, 1976
	Bobwhite	Oral LD_{50}	8 days	Mortality	80 [b]			Eisler, 1986
	Mallard	Oral LD_{50}	8 days	Mortality	111			Eisler, 1986
alpha–BHC	Rat	Single oral dose	NR	Mortality	177			Sax, 1984
	Rat	Oral (chronic)	56 weeks	NOAEL for reproductive effects			5.0 [c]	ATSDR, 1988a
	Bobwhite	Oral (acute)	5 days	Mortality	78			Hill et al., 1975
	Mallard	Oral (acute)	5 days	Mortality	360			Hill et al., 1975
Chlordane (alpha and gamma)	Rat	Oral LD_{50}	NR	Mortality	283			RTECS, 1993
	Rat	Oral LD_{50}		Mortality	430			Allen et al., 1979
	Rat	Oral LD_{50}		Mortality	335			Allen et al., 1979
	Rabbit	Oral LD_{50}		Mortality	300			Allen et al., 1979
	Rabbit	Oral LD_{50}		Mortality	100			Allen et al., 1979
	Dog	Oral LD_{50}		Mortality	200			Allen et al., 1979
	Goat	Oral LD_{50}		Mortality	180			Allen et al., 1979
	Rat	Oral (subchronic)	Multi–generational	Decreased fertility		16		ATSDR, 1992c
	Japanese quail	Oral LD_{50}	5 days	Mortality	35			Hill et al., 1975
	Bobwhite	Oral LD_{50}	5 days	Mortality	29			Hill et al., 1975
	Mallard	Oral LD_{50}	5 days	Mortality	62			Hill et al., 1975
	Pheasant	Oral LD_{50}		Mortality	24			USFWS, 1984
	Mouse	Oral (chronic)	2 years	Hepatocelluar hypertrophy and necrosis		0.47		ATSDR, 1992c
	Mouse	Oral (chronic)	30 months	Regional liver hypertrophy (females)		0.273	0.055	ATSDR, 1992c
	Dog	Oral (chronic)	2 years	Histologic changes		0.375		USEPA, 1988a
	Young chicken	Chronic	4 week	NOAEL for egg hatchability and growth			0.031 [b]	Eisler, 1990
4,4'–DDE	Rat	Oral LD_{50}	NR	Mortality	800			RTECS, 1993
	Mouse	Oral LD_{50}	NR	Mortality	700			RTECS, 1993
	Hamster	Oral LD_{50}	NR	Mortality	>5,000			RTECS, 1993
	Mallard	Oral	NR	Eggshell thinning		2.91		USEPA, 1993b
	Mallard	Oral	2 years	Reproductive: embryo mortality, cracked eggs		0.58		USEPA, 1993b
	Kestrel	Oral	NR	Eggshell thinning		0.39		USEPA, 1993b

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Ingestion Toxicity Information for Wildlife

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

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4,4'–DDT (surrogate for 4,4'–DDD and 4,4'–DDE)	Rat	Oral LD_{50}	NR	Mortality	87		RTECS, 1993
	Rat	Oral LD_{50}		Mortality	100		USEPA, 1985a
	Rat	Oral	NR	Reproductive		112	RTECS, 1993
	Rat	Oral	NR	Reproductive		100	RTECS, 1993
	Rat	Oral	NR	Reproductive		430	RTECS, 1993
	Rat	Oral	NR	Reproductive		1,890	RTECS, 1993
	Rat	Oral	NR	Reproductive		250	RTECS, 1993
	Rat	Oral	NR	Reproductive		50	RTECS, 1993
	Rat	Oral (chronic)	3 generations	Reproductive		0.2	IRIS, 1991
	Rat	Oral	2 years	Reproductive		2.5	USEPA, 1993b
	Mouse	Oral LD_{50}	NR	Mortality	135		RTECS, 1993
	Mouse	Oral LD_{50}		Mortality	200		USEPA, 1985a
	Mouse	Oral	NR	Reproductive		504	RTECS, 1993
	Mouse	Oral	NR	Reproductive		81	RTECS, 1993
	Mouse	Oral	NR	Reproductive		124	RTECS, 1993
	Mouse	Oral	NR	Reproductive		148	RTECS, 1993
	Rabbit	Oral LD_{50}	NR	Mortality	250		RTECS, 1993
	Rabbit	Oral	NR	Reproductive		150	RTECS, 1993
	Guinea pig	Oral LD_{50}	NR	Mortality	150		RTECS, 1993
	Hamster	Oral LD_{50}	NR	Mortality	>5,000		RTECS, 1993
	Dog	Oral LD_{50}	NR	Mortality	150		RTECS, 1993
	Dog	Oral LD_{50}		Mortality	60		USEPA, 1985a
	Dog	Oral	NR	Reproductive		3,540	RTECS, 1993
	Monkey	Oral LD_{50}	NR	Mortality	200		RTECS, 1993
	Chicken	Oral (subchronic)	10 weeks	Decreased reproductive success; toxic symptoms		91.4 [b]	USEPA, 1985a
	Rock dove	Oral LD_{50}		Mortality	4,000		USFWS, 1984
	Black duck	Oral (chronic)	2 years	Reduced eggshell thickness		0.14 [b]	Longcore and Stendell, 1977
	Mallard	Oral LD_{50}		Mortality	2,240		USFWS, 1984
	Mallard	Oral (subchronic)	96 days	Reduced eggshell thickness		2.8	Longcore and Stendell, 1977
	Mallard	Oral	NR	Eggshell thinning		1.16	USEPA, 1993b
	Mallard	Oral	NR	Eggshell thinning		2.91	USEPA, 1993b
	Mallard	Oral	2 years	Reproductive		1.45	USEPA, 1993b
	California quail	Oral LD_{50}		Mortality	595		USFWS, 1984
	Japanese quail	Oral LD_{50}		Mortality	841		USFWS, 1984
	Pheasant	Oral LD_{50}		Mortality	1,334		USFWS, 1984
	Sandhill crane	Oral LD_{50}		Mortality	1,200		USFWS, 1984
	Kestrel	Oral (chronic)	7 wk – 1 yr	Reduced eggshell thickness		0.56a	USEPA, 1985a
	Kestrel	Oral (chronic)	1 year	Reduced eggshell thickness		0.16a	Wiemeyer, et al., 1986
	Barn owl	Oral (chronic)	2 years	Reduced eggshell thickness		0.14 [b]	Longcore and Stendell, 1977
Dieldrin (used as a surrogate for Aldrin)	Mouse	Oral LD_{50}	NR	Mortality	38		Allen et al., 1979
	Mouse	Oral (chronic)	80 weeks	Body tremors		0.33	NCI, 1978
	Mouse	Oral (chronic)	2 year	Liver enlargement w/ histopathology		0.1	IRIS, 1991
	Mouse	Oral (chronic)	2 year	Hepatic cancer		1.3	ATSDR, 1991e
	Rat	Oral (chronic)	2 year	Histologic changes		2	ATSDR, 1987b
	Rat	Oral (chronic)	2 year	Liver lesions		0.05	0.005 IRIS, 1991
	Dog	Oral (chronic)	2 year	Increased liver weight; liver/body weight		0.05	0.005 IRIS, 1991
	Dog	Oral (chronic)	25 months	Hepatocyte degeneration		0.5	ATSDR, 1987b
	Monkey	Oral (chronic)	120 days	Tremors and Convusions		0.1	Smith et al., 1976
	Mouse	Oral (subchronic)	4 wks	Decreased pup survival		0.65	Virgo & Bellward, 1975
	Rat	Oral (subchronic)	120 days	Operant behavior		0.025	Smith et al., 1976
	Rat	Oral LD_{50}	NR	Mortality	46		Allen et al., 1979
	Guinea pig	Oral LD_{50}	NR	Mortality	25		Allen et al., 1979
	Rabbit	Oral LD_{50}	NR	Mortality	45		Allen et al., 1979
	House sparrow	Oral LD_{50}	NR	Mortality	48		USFWS, 1984
	Chicken	Oral LD_{50}	NR	Mortality	20		Allen et al., 1979
	Rock dove	Oral LD_{50}	NR	Mortality	27		USFWS, 1984
	Gray partridge	Oral LD_{50}	NR	Mortality	9		USFWS, 1984
	Chukar	Oral LD_{50}	NR	Mortality	25		USFWS, 1984
	Japanese quail	Oral LD_{50}	5 days	Mortality	6 [b]		Hill et al., 1975
	Japanese quail	Oral LD_{50}	NR	Mortality	70		USFWS, 1984

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Ingestion Toxicity Information for Wildlife

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kg BW–day Oral	LOAEL	Sublethal RTV mg/kg BW–day	LONOAEL	Reference
Dieldrin (cont.)	California quail	Oral LD_{50}	NR	Mortality	9				USFWS, 1984
	Bobwhite	Oral LD_{50}	5 days	Mortality	3 [b]				Hill et al., 1975
	Pheasant	Oral LD_{50}	NR	Mortality	79				USFWS, 1984
	Mallard	Oral LD_{50}	5 days	Mortality	12 [b]				Hill et al., 1975
	Mallard	Oral LD_{50}	5 days	Mortality	11 [b]				Hill et al., 1975
	Mallard	Oral LD_{50}	NR	Mortality	381				USFWS, 1984
	Whistling duck	Oral LD_{50}	NR	Mortality	100				USFWS, 1984
	Canada goose	Oral LD_{50}	NR	Mortality	141				USFWS, 1984
	Goat	Oral LD_{50}	NR	Mortality	100				Allen et al., 1979
	Sheep	Oral LD_{50}	NR	Mortality	50				Allen et al., 1979
	Cattle	Oral LD_{50}	NR	Mortality	60				Allen et al., 1979
	Mule deer	Oral LD_{50}	NR	Mortality	75				Allen et al., 1979
	Cat	Oral LD_{50}	NR	Mortality	300				Allen et al., 1979
	Dog	Oral LD_{50}	NR	Mortality	65				Allen et al., 1979
Heptachlor (used as a surrogate for Heptachlor epoxide)	Dog	Oral (chronic)	60 weeks	Increased liver to bodyweight ratio			0.013		IRIS, 1993
	Rat	Oral (chronic)	2 years	Increased liver to bodyweight ratio			0.25		IRIS, 1991
	Rat	Oral (chronic)	1 generation	Increased pup death			0.35		IRIS, 1991
	Cat	Oral (chronic)	2 years	Increased liver weight			0.15		USEPA, 1987b
	Rat	Single oral dose	NR	Mortality	40				Sax, 1984
	Chicken	Single oral dose	NR	Mortality	62				Sax, 1984
INORGANIC ANALYTES									
Aluminum	Mouse	Oral (chronic)	2–3 genrtns	Reduced body weight gain of newborns			425		NIOSH, 1985
	Rat	Oral (subchronic)	15 days	Reduced growth			100		Bernuzzi, et al., 1989
	Rat	Oral LD_{50}	NR	Mortality	3,700				Sax, 1984
Arsenic	Rat	Oral	NR	Reproductive effects			0.61		RTECS, 1993
	Rat	Oral	NR	Reproductive effects			0.58		RTECS, 1993
	Rat	Oral LD_{50}	NR	Mortality	763				RTECS, 1993
	Mouse	Oral LD_{50}	NR	Mortality	145				RTECS, 1993
	Mallard	Oral LD_{50}	NR	Mortality	323				Eisler, 1988a
	Cowbird	Oral LD_{50}	11 days	Mortality	18.1 [b]				Eisler, 1988a
	Young chicken	Oral	56 days	NOAEL for egg production				1 [b]	Hermeyer, 1977
Barium	Mouse	Oral (chronic)	lifetime	NOEL				0.825	IRIS, 1990
	Rat	Oral (chronic)	16 months	NOEL				5.1	IRIS, 1990
	Rat	Oral (chronic)	lifetime	NOEL				0.25	IRIS, 1990
	Rat	Oral (chronic)	13 weeks	NOEL				31.5	IRIS, 1990
	Rat	Oral (chronic)	68 weeks	Renal ultrastructure changes			142		IRIS, 1993
	Rat	Oral (subchronic)	13 weeks	LOAEL for renal effects			91		Dietz et al., 1992
	Rat	Oral (acute)	10 days	Decreased ovarian weight			198		ATSDR, 1990d
	Rat	Oral (subchronic)	13 weeks	20% population mortality		430			Dietz et al., 1992
Cadmium	Rat	Oral	NR	Reproductive effects			155		RTECS, 1993
	Rat	Oral	NR	Reproductive effects			220		RTECS, 1993
	Rat	Oral	NR	Reproductive effects			21.5		RTECS, 1993
	Rat	Oral	NR	Reproductive effects			23		RTECS, 1993
	Rat	Oral LD_{50}		Mortality	250				Eisler, 1985b
	Rat	Oral LD_{50}	NR	Mortality	225				RTECS, 1993
	Mouse	Oral LD_{50}	NR	Mortality	890				RTECS, 1993
	Mouse	Oral	NR	Reproductive effects			448		RTECS, 1993
	Mouse	Oral	NR	Reproductive effects			1,700		RTECS, 1993
	Guinea pig	Oral LD_{50}	NR	Mortality	150				Eisler, 1985b
	Mallard	Oral (subchronic)	90 days	Egg production suppressed			10		Eisler, 1985b
Chromium	Japanese quail	Oral LD_{50}	5 days	Mortality	126				Hill and Camardese, 1986
	Rat	Oral (subchronic)	90 days	NOAEL for histopathologic and reproductive effects			1,400		Ivankovic and Preussman, 1975
	Black Duck	Oral (subchronic)	5 months	NOAEL for reporductive effects			200		Outridge and Scheuhammer, 1993
	Rat	Oral LD_{50}		Mortality	200				ATSDR, 1991g
Copper	Rat	Single oral dose		Reproductive effects			152		NIOSH, 1985 and RTECS, 1993
	Rat	Oral LD_{50}	NR	Mortality	940				Sax, 1984
	Mouse	Oral (chronic)	30 days	Decr litter sizes with teratogenic effects			100		Lecyk, 1980

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Ingestion Toxicity Information for Wildlife

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kg BW–day Oral	Lethal RTV mg/kg BW–day LOAEL	Sublethal RTV mg/kg BW–day	Sublethal RTV mg/kg BW–day LONOAEL	Reference
Lead	Rat	Oral	NR	Reproductive effects			790		RTECS, 1993
	Rat	Oral	NR	Reproductive effects			1,140		RTECS, 1993
	Rat	Oral	NR	Reproductive effects			520		RTECS, 1993
	Rat	Oral	NR	Reproductive effects			1,100		RTECS, 1993
	Calf	Oral LD_{50}	NR	Mortality	220				Eisler, 1988b
	Rat	Oral (subchronic)	12–14 days	Decreased fetal bodyweight			2.5		McClain and Becker, 1972
	Mouse	Oral	NR	Reproductive effects			1,120		RTECS, 1993
	Mouse	Oral	NR	Reproductive effects			6,300		RTECS, 1993
	Mouse	Oral	NR	Reproductive effects			300		RTECS, 1993
	Mouse	Oral	NR	Reproductive effects			4,800		RTECS, 1993
	Domestic animal	Oral	NR	Reproductive effects			662		RTECS, 1993
	Mammal	Oral	NR	Reproductive effects			2,118		RTECS, 1993
	Kestrel	Diet	NR	Decreased egg laying fertility; decreased egg shell thickness				50	Eisler, 1988b
	Nestlings	Oral	NR	Reduced growth and brain weight; abnormal development			125		Eisler, 1988b
	Japanese quail	Oral LD_{50}	5 days	Mortality	24,752				Hill and Camardese, 1986
	Rat	Oral (chronic)	2 generations	NOAEL for developmental effects				7	Kimmel et al., 1980 and Grant et al., 1980
	Guinea pig	Oral LD_{50}		Mortality	300				Sax, 1984
	Rock dove	Oral (chronic)	NS	Kidney pathology; learning deficiences			6.25		Anders et al., 1982 and Dietz et al., 1979
	Rock dove	Oral LD_{50}		Mortality	375				Kendall and Scanlon, 1985
Manganese	Mouse	Oral (subchronic)	90 days	Delayed growth of testes			140		ATSDR, 1990e
	Mouse	Oral (chronic)	103 weeks	Mortality			4,050		ATSDR, 1990e
	Rat	Oral LD_{50}	NR	Mortality	410				ATSDR, 1990e
	Rat	Oral LD_{50}	20 days	Mortality	225				ATSDR, 1990e
	Rat	Oral (subchronic)	20 days	Decreased litter weight during gestation				620	ATSDR, 1990e
	Rat	Oral (chronic)	103 weeks	Mortality			930		ATSDR, 1990e
	Guinea pig	Oral LD_{50}	NR	Mortality	400				USEPA, 1984f
	Monkey	Oral (chronic)	18 months	Weakness, rigidity			25		ATSDR, 1990e
	Rodents/livestock	Oral (subchronic)	10 days – 2 months	Decreased growth rate			100		Cunningham et al., 1966
	Mouse	Oral (subchronic)	180 days	NOAEL for mortality		2,300			Gianutsos and Murray, 1982
Mercury	Mouse	Oral LD_{50}		Mortality	22				NIOSH, 1985
	Mouse	Oral (subchronic)	Day 6–17 (gest)	Stillbirths and neonatal death			4		Suzuki, 1979
	Rat	Oral (subchronic)	Day 6–14 (gest)	Retarded fetus growth			4		Suzuki, 1979
organomercury	Rat	Oral (chronic)	NR	Reduced fertility			0.5		Eisler, 1987b
	Rat	Oral LD_{50}		Mortality	18				NIOSH, 1985
organomercury	Pig	Oral (subchronic)	Pregnancy	High incidence of stillbirths			0.5		Eisler, 1987b
organomercury	Mule deer	Oral LD_{50}		Mortality	17.9				Eisler, 1987b
organomercury	River otter	Oral LD_{50}		Mortality	2				Eisler, 1987b
organomercury	Mink	Oral LD_{50}		Mortality	1				Eisler, 1987b
organomercury	Dog	Oral (subchronic)	Pregnancy	High incidence of stillbirths			0.1		Eisler, 1987b
methylmercury	House sparrow	Oral LD_{50}		Mortality	12.6				Eisler, 1987b
ethylmercury	Rock dove	Oral LD_{50}		Mortality	22.8				Eisler, 1987b
	Chicken	Oral LD_{50}		Mortality	20				Fimreite, 1979
	Bantam chicken	Oral LD_{50}		Mortality	190				Fimreite, 1979
ethylmercury	Prairie chicken	Oral LD_{50}		Mortality	11.5				Eisler, 1987b
ethylmercury	Chukar	Oral LD_{50}		Mortality	26.9				Eisler, 1987b
methylmercury	Coturnix	Oral LD_{50}		Mortality	1				Eisler, 1987b
	Mallard	Oral	NR	Reproduction, behavior			0.064		USEPA, 1993b
methylmercury	Black duck	Oral (subchronic)	28 weeks	Reproduction inhibited			0.22 [b]		Eisler, 1987b
methylmercury	Fulvous whistling duck	Oral LD_{50}		Mortality	37.8				Eisler, 1987b
methylmercury	Northern bobwhite	Oral LD_{50}		Mortality	23.8				Eisler, 1987b
methylmercury	Bobwhite quail	Oral LD_{50}	5 days	Mortality	523				Hill et al., 1975
	Japanese quail	Oral LD_{50}		Mortality	14.4				Eisler, 1987b
ethylmercury	Gray partridge	Oral LD_{50}		Mortality	17.6				Eisler, 1987b
organomercury	Gray pheasant	Oral (subchronic)	30 days	Reduced reproductive ability			0.64		Eisler, 1987b
methylmercury	Ring-necked pheasant	Oral LD_{50}		Mortality	11.5				Eisler, 1987b
	Mouse	Oral (subchronic)	50 days	Embryotoxicity and teratogenicity			0.9		Suzuki, 1979

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NTC Orlando, Orlando, Florida

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Silver	Mouse	Intraperitoneal (acute)		Mortality	34			NIOSH, 1985
	Rat	Oral (chronic)	37 week	Weight gain			222.2	ATSDR, 1990f
	Mouse	Oral (chronic)	125 days	Hypoactivity			18.1	ATSDR, 1990f
Thallium	Rat	Oral LD_{50}	NR	Mortality	35			Sax, 1984
	Rat	Oral (subchronic)	30 to 60 days	adverse testicular effects			0.7	IRIS, 1993
	Ring–necked pheasant	Oral LD_{50}	NR	Mortality	23.7			USFWS, 1984
	Golden eagle	Oral LD_{50}	NR	Mortality	90			USFWS, 1984
Vanadium	Japanese quail	Oral LD_{50}	5 days	Mortality	96			Hill and Camaardese, 1986
	Rat	Oral (subchronic)	2 months	Hypertension			15	Susic and Kentera, 1986
	Rat	Oral (subchronic)	35 days	NOAEL for development effects			8.4	Domingo, et al., 1986
	Chicken	Oral (subchronic)	6 weeks	Decrease in egg–laying			11 [c]	Berg et al., 1963
Zinc	Rat	Oral LD_{50}		Mortality	2,510			RTECS, 1993
	Rat	Oral	Gestation	Fetal resorptions in 4 to 20% of population			200	Shlicker and Cox, 1968
	Ferret	Oral	3–13 days	Mortality and gastrointestinal effects		390		Straube et al., 1980
	Rat	Oral (subchronic)	NR	Kidney toxicity			160	Llobet, et al., 1988

Notes:
LD_{50} = Dose resulting in 50% mortality in test population
LOAEL = Lowest Observed Adverse Effect Level
BW = Body weight
NR = Not reported
[a] Value for benzo(a)pyrene chosen as a surrogate for all PAHs. Chemical–specific toxicity studies for ecologically significant endpoints are lacking for other PAHs.
[b] Converted to dose per kilogram bodyweight by multiplying by ingestion and dividing by body weight. Body weights for birds obtained from Dunning, 1984.
Ingestion rates were calculated using the following regression equation (for all birds) from Nagy et al., 1987: Food Ingestion (kg/day) = 0.00582 * Body Weight $^{0.651}$ (kg). Ingestion rates for the chicken from NRC, 1984 (pg. 13).
[c] Converted from 30 ppm to 11 mg/kg gBW–day using standard default parameters (USEPA, 1988b).
[d] Doses converted from pg/gBW/day to mg/kg gBW/day

toxicity values for analytes detected in surface soil at OU 1 were selected as the RTVs (Table K-6) for each type of receptor (indicator species) evaluated. The RTV selection procedure included the general guidelines below:

- When taxon-specific data were unavailable, available toxicological data were used as surrogate toxicological benchmarks for various indicator species (e.g., a value from a sublethal avian study was used for an avian receptor RTV, regardless of avian species tested in the study).

- RTVs are conservatively selected from available literature to represent the lowest available reported adverse effect threshold for reproduction, growth or survival (see Table K-5). The RTVs are incorporated into the food-web model described below. When an LD_{50} value is selected as the basis for the RTV, a factor of 0.2 was applied to the acute mortality endpoint (e.g., the LD_{50}), and a factor of 0.1 was then applied to that value to approximately a chronic effects threshold (the acute-chronic ratio for many chemicals is approximately 10 [Newell et al., 1987]). When no RTV value is available for birds, the most conservative value for mammals is used. These methods may underestimate or overestimate risk.

- When acceptable study results were unavailable, the CPC was assigned an appropriate surrogate chemical for which adequate toxicological data exists (e.g., 4,4'-DDT was used as a surrogate for 4,4'-DDD and 4,4'-DDE).

- Efforts were made to avoid deriving RTVs based on carcinogenicity as an endpoint. For some PAHs, however, no other data were available. Therefore, all PAHs were assigned the RTV for benzo(a)pyrene, which is based on a reproductive endpoint, as a surrogate.

Development of Protective Contaminant Levels (PCLs). The utilization of PCLs assumes that an acceptable level of risk associated with exposure to each contaminant is equal to 1 (Hazard Quotient [HQ] = 1). In keeping with a risk level of 1, a particular contaminant-specific RTV, expressed as mg/kgBW-day, is equal to a receptor's target intake dose. In calculating PCLs, the RTV is divided by the TBD to estimate a safe or protective concentration of a particular contaminant, as shown by the following equation:

$$PCL = \frac{RTV}{TBD}$$

Where:

PCL = Protective Contaminant Level (mg/kg)
RTV = Reference Toxicity Value (i.e., target dose) (mg/kgBW-day)
TBD = Total Body Dose (mg/kgBW-day)

PCLs were developed for all analytes, for each of the terrestrial receptor organisms evaluated in the OU 1 ERA; these PCLs are presented in Table K-7. For each analyte, the lowest PCL among the indicator species selected for evaluation of surface soil at OU 1 was selected as the PCL value to be compared to the analytical data. For the majority of the contaminants evaluated, the short-

Table K-6
RTVs Selected for Ecological Risk Assessment
Units (mg/kgBW/day)

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Compound	Small Mammal [a]			Small Bird [b]			Predatory Mammal [c]			Predatory Bird [d]		
	Lethal (1/5 LD_{50})	Sublethal (LOAEL)	Selected RTV	Lethal (1/5 LD_{50})	Sublethal (LOAEL)	Selected RTV	Lethal (1/5 LD_{50})	Sublethal (LOAEL)	Selected RTV	Lethal (1/5 LD_{50})	Sublethal (LOAEL)	Selected RTV
Volatile Organic Compounds												
Acetone	600	273,000	600 [e]	600	273,000	600 [e]	600	273,000	600 [e]	600	273,000	600 [e]
Semivolatile Organic Compounds												
Acenaphthene	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10
Anthracene	3,400	10 [h]	10	3,400	10 [h]	10	3,400	10 [h]	10	3,400	10 [h]	10
Benzo(a)anthracene	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10
Benzo(a)pyrene	24	10	10	24	10	10	24	10	10	24	10	10
Benzo(b)fluoranthene	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10
Benzo(g,h,i)perylene	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10
Benzo(k)fluoranthene	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10
Carbazole	100	NA	100 [e]	100	NA	100 [e]	100	NA	100 [e]	100	NA	100 [e]
Chrysene	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10
Dibenz(ah)anthracene	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10
bis(2-Ethylhexyl)phthalate	160	35	35	160	35	35	160	35	35	160	35	35
Fluoranthene	40	10 [h]	10	40	10 [h]	10	40	10 [h]	10	40	10 [h]	10
Indeno(1,2,3-cd)pyrene	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10	24 [h]	10 [h]	10
Phenanthrene	140	10 [h]	10	140	10 [h]	10	140	10 [h]	10	140	10 [h]	10
Pyrene	160	10 [h]	10	160	10 [h]	10	160	10 [h]	10	160	10 [h]	10
Pesticides and PCBs												
Aroclor-1260	100	6.4	6.4	16	0.9	0.9	100	0.0075	0.0075	16	9	9
alpha-BHC	35	5	5	16	5	5	35	5	5	16	5	5
alpha-Chlordane	20	16	16	4.8	0.031 [f]	0.031	40	16	16	4.8	0.031 [f]	0.031
gamma-Chlordane	20	16	16	4.8	0.031 [f]	0.031	40	16	16	4.8	0.031 [f]	0.031
4,4'-DDD	17.4 [j]	0.2 [j]	0.2	119 [k]	0.14 [k]	0.14	17.4 [j]	3,540 [l]	17.4 [e]	119 [k]	0.14 [k]	0.14
4,4'-DDE	140	0.2 [j]	0.2	119 [k]	0.58	0.58	140 [j]	3,540 [l]	140 [e]	119 [k]	0.58 [k]	0.58
4,4'-DDT	17.4	0.2	0.2	119	0.14	0.14	17.4	3,540	17.4 [e]	119	0.14	0.14
Dieldrin	7.6	0.65	0.65	0.6	0.65 [m]	0.6 [e]	13	0.65 [m]	0.65	0.6	0.65 [m]	0.6 [e]
Heptachlor epoxide	8 [n]	0.35 [n]	0.35	12.4 [n]	0.35 [n]	0.35	8 [n]	0.35 [n]	0.35	12.4 [n]	0.35 [n]	0.35
Inorganic Compounds												
Aluminum	740	425	425	740	425	425	740	425	425	740	425	425
Arsenic	29	0.58	0.58	3.6	1	1	2,929	0.58	0.58	3.6	1	1
Barium	430 [g]	198	198	430 [g]	198	198	430 [g]	198	198	430 [g]	198	198
Cadmium	30	21.5	21.5	30	10	10	30	21.5	21.5	30	10	10
Chromium	25.2	1,400	25.2 [e]	25.2	200	25.2 [e]	25.2	1,400	25.2 [e]	25.2	200	25.2 [e]
Copper	188	100	100	188	100	100	188	100	100	188	100	100
Lead	60	2.5	2.5	75	6.25	6.25	60	2.5	2.5	75	50 [f]	50
Manganese	2,300 [g]	140	140	2,300 [g]	140	140	2,300 [g]	140	140	2,300 [g]	140	140
Mercury	3.6	0.5	0.5	2.2	0.064	0.064	0.2	0.1	0.1	2.2	0.064	0.064
Silver	6.8	18.1	6.8 [e]	6.8	18.1	6.8 [e]	6.8	18.1	6.8 [e]	6.8	18.1	6.8 [e]

Table K-6
RTVs Selected for Ecological Risk Assessment
Units (mg/kgBW/day)

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Compound	Small Mammal [a]			Small Bird [b]			Predatory Mammal [c]			Predatory Bird [d]		
	Lethal (1/5 LD_{50})	Sublethal (LOAEL)	Selected RTV	Lethal (1/5 LD_{50})	Sublethal (LOAEL)	Selected RTV	Lethal (1/5 LD_{50})	Sublethal (LOAEL)	Selected RTV	Lethal (1/5 LD_{50})	Sublethal (LOAEL)	Selected RTV
Thallium	7	0.7	0.7	4.74	0.7	0.7	7	0.7	0.7	18	0.7	0.7
Vanadium	19.2	8.4	8.4	19.2	11	11	19.2	8.4	8.4	19.2	11	11
Zinc	390 [g]	200	200	390 [g]	200	200	390 [g]	200	200	390 [g]	200	200

Notes:
NOAEL = No Observed Adverse Effect Level. Value corresponds to the boxed value in Appendix __, Table __-5.
LOAEL = Lowest Observed Adverst Effect Level. Value corresponds to the boxed value in Appendix __, Table __-5.
LD_{50} = Median lethal dose. Value corresponds to one-fifth of the boxed value from Appendix __, Table __.
NA = Not available.
[a] These RTVs represent safe chemical concentrations for the cotton mouse and the short tailed shrew.
[b] These RTVs represent safe chemical concentrations for the American woodcock, meadowlark, and the spotted sandpiper. When no data were available, the small mammal value was used as a surrogate.
[c] These RTVs represent safe chemical concentrations for the red fox and the raccoon. When no data were available, the small mammal values were used as a surrogate.
[d] These RTVs represent safe chemical concentrations for the great horned owl, the osprey, and the great blue heron. When no data were avaialable, the small bird or small mammal values were used as a surrogate.
[e] The lethal RTV was selected for modeling sublethal effects because receptors exposed to the compound are likely to exhibit lethal effects prior to any sublethal effects; this represents the most conservative scenario for evaluating total risks to receptors.
[f] Value is an NOAEL rather than a chronic LOAEL.
[g] Value is an acute LOAEL rather than an LD_{50}.
[h] The small mammal value for benzo(a)pyrene was used as a surrogate.
[i] All values for dieldrin were used as surrogates.
[j] The small mammal value for 4,4'-DDT/4,4'-DDE was used as a surrogate.
[k] The small bird value for 4,4'-DDT/4,4'-DDE was used as a surrogate.
[l] The predatory mammal value for 4,4'-DDT/4,4'-DDE was used as a surrogate.
[m] The small mammal value for dieldrin was used as a surrogate.
[n] All values for heptachlor were used as surrogates.

TABLE K-7
Ecological Protective Contaminant Levels (PCLs)

Baseline Risk Assessment
Operable Unit 1
NTC Orlando, Orlando, Florida

Analyte	Shrew	Mouse	Robin	PCL Selected for ERA
Volatile Organic Compounds (mg/kg)				
Acetone	1.4E+07	7.9E+07	1.5E+07	1.4E+07
Semivolatile Organic Compounds (mg/kg)				
acenaphthene	5.1E+02	2.5E+03	5.4E+02	5.1E+02
anthracene	5.1E+02	2.5E+03	5.4E+02	5.1E+02
benzo(a)anthra	5.1E+02	2.5E+03	5.4E+02	5.1E+02
benzo(a)pyren	5.1E+02	2.5E+03	5.4E+02	5.1E+02
benzo(b)fluora	5.1E+02	2.5E+03	5.4E+02	5.1E+02
benzo(g,h,i)pe	5.1E+02	2.5E+03	5.4E+02	5.1E+02
benzo(k)fluora	5.1E+02	2.5E+03	5.4E+02	5.1E+02
bis(2-ethylhex	1.8E+03	9.4E+03	1.9E+03	1.8E+03
carbazole	4.9E+02	1.0E+03	5.3E+02	4.9E+02
chrysene	5.1E+02	2.5E+03	5.4E+02	5.1E+02
dibenz(ah)anth	5.1E+02	2.5E+03	5.4E+02	5.1E+02
fluoranthene	5.1E+02	2.9E+03	5.4E+02	5.1E+02
indeno(1,2,3-c	5.1E+02	2.5E+03	5.4E+02	5.1E+02
phenanthrene	5.1E+02	2.5E+03	5.4E+02	5.1E+02
pyrene	5.1E+02	2.5E+03	5.4E+02	5.1E+02
Pesticides/PCBs (mg/kg)				
4,4'-DDD	5.3E-01	4.0E+00	3.8E-01	3.8E-01
4,4'-DDE	9.9E-01	7.3E+00	7.1E-01	7.1E-01
4,4'-DDT	2.6E+00	1.7E+01	1.9E+00	1.9E+00
Aroclor-1260	9.8E+00	6.6E+01	1.4E+01	9.8E+00
BHC-alpha	1.7E+01	1.1E+02	1.7E+01	1.7E+01
chlordane-alph	8.4E+01	6.3E+02	1.7E-01	1.7E-01
chlordane-gam	8.4E+01	6.3E+02	1.7E-01	1.7E-01
Dieldrin	1.0E+00	8.0E+00	8.3E+00	1.0E+00
Heptachlor ep	2.8E+00	2.0E+01	2.9E+00	2.8E+00
Inorganic Analytes (mg/kg)				
aluminum	1.9E+04	1.1E+05	2.0E+04	1.9E+04
arsenic	2.9E+01	1.5E+01	6.1E+01	1.5E+01
barium	1.3E+04	3.0E+04	1.4E+04	1.3E+04
cadmium	3.0E+01	5.3E+00	2.2E+01	5.3E+00
chromium	4.4E+04	2.7E+05	6.6E+03	6.6E+03
copper	2.2E+03	1.0E+03	7.8E+02	7.8E+02
lead	1.5E+02	7.9E+02	3.9E+02	1.5E+02
manganese	3.2E+03	1.1E+04	3.4E+03	3.2E+03
mercury	4.1E+00	3.9E+00	2.9E+01	3.9E+00
silver	5.7E+02	1.2E+03	6.1E+02	5.7E+02
thallium	3.0E+00	2.3E+01	3.1E+00	3.0E+00
vanadium	3.0E+02	1.8E+03	4.1E+02	3.0E+02
zinc	9.0E+02	2.0E+03	9.4E+02	9.0E+02

Notes: mg/kg = milligrams per kilogram.

Table K-8
Potential Sources of Uncertainty in Ecological Risk Assessment

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Potential source	Direction of Effect	Justification
Uncertainties Associated with Problem Formulation		
Exposure pathways evaluated	Underestimate	Due to the urban nature of OU 1, no evaluation of risk to predatory mammals and birds was conducted. This may represent an underestimate of risk to certain ecological receptors that may possibly use the limited ecological habitat to prey on smaller mammalian and avian species.
Uncertainties Associated with CPC Selection Process		
Degradation of chemicals not considered	Overestimate	Risk estimates are based on recent chemical concentrations. Concentrations will tend to decrease over time from degradation and the formation of daughter products.
No evaluation of TIC data	Underestimate	Risk was not calculated for potential exposure to these compounds.
Uncertainties Associated with Exposure Assessment		
Food chain not assumed to occur at site	Unknown	Occurrence of the food chain at OU 1 is unknown.
Uncertain occurrence of receptors at sites	Unknown	Actual occurrence at the sites by receptors considered in the OU 1 ERA is uncertain.
Extrapolation of literature values from test species to representative wildlife species	Unknown	Species differ with respect to absorption, metabolism, distribution, and excretion of chemicals. The magnitude and direction of the difference will vary with each chemical.
No evaluation of dermal or inhalation exposure pathways	Underestimate	The dermal and inhalation exposure pathways are generally considered insignificant due to protective fur, feathers, chitinous exoskeletons, and the low concentration of contaminants under natural atmospheric conditions. However, under certain conditions, these exposure pathways may occur.
Maximum exposure scenarios	Overestimate	It is unlikely any receptor would be exposed concurrently to maximum concentrations of all CPCs.
BAF estimation	Unknown	As many literature values were not available for some species and analytes, alternate BAFs were derived using other assumptions or regressions. There is additional uncertainty related to the averaging the log K_{ow} values for PAHs prior to calculating BAFs using the Travis and Arms (1988) regression equations, resulting in an overestimate of risk to some compounds and an underestimate of risk to other compounds.
Continuous uptake and bioaccumulation of CPCs by soil biota	Unknown	Tissue and organ responses to CPC uptake were represented by a linear function, that is an oversimplification of a more complex system (i.e., trophic states and lipid concentrations may affect bioaccumulation).
Bioaccumulation of CPCs in leafy portions of plants	Overestimate	Ryan and others (1988) states that compounds with log K_{ow}s > 5 are unavailable to plants due to soil sorption. Compounds with log K_{ow}s > 5 will be taken into the roots of plants, but are not easily transported into the leafy parts of plants (Briggs and others, 1982; 1983). The PCL calculation model overestimates CPC exposure via plant ingestion to those receptors that only eat the leafy portions of plants.

See notes at end of table.

Table K-8 (Continued)
Potential Sources of Uncertainty in Ecological Risk Assessment

Remedial Investigation Report, Operable Unit 1
North Grinder Landfill
Naval Training Center
Orlando, Florida

Potential source	Direction of Effect	Justification
Relative uptake of inorganics by different plant species	Unknown	Estimated plant BAFs for certain inorganics were based on BAF data for leafy produce grown in sewage sludge. Variability in type of plant and substrate may make the chosen BAF values an overestimate or underestimate of actual uptake.
Uncertainties Associated with Effects		
Lack of toxicity information for reptile species	Unknown	Information is not available on the toxicity of contaminants to reptilian species resulting from dietary or oral exposures. It is assumed that if mammals and birds are protected then reptiles should be protected also; therefore, reptiles were not evaluated in the risk assessment. However, reptiles may not be protected if they are more sensitive than mammals or birds.
Use of measurement endpoints	Overestimate	Although an attempt was made to have measurement endpoints reflect assessment endpoints, limited available ecotoxicological literature resulted in the selection of certain measurement endpoints that may overestimate assessment endpoints.
Lack of toxicity information for mammals or birds	Unknown	Reference toxicity values for certain compounds and receptor groups were not available, therefore, surrogate values were used to calculate PCLs.
Lack of site-specific toxicity and bioaccumulation data	Unknown	Effects characterization is based solely on literature values. No site-specific biological data has been collected at OU 1.
Uncertainties Associated with Risk Characterization		
Risk evaluated for individual terrestrial receptors only	Overestimate	Effects on individual terrestrial organisms may occur with little population- or community-level effects. However, as the number of affected individuals increases, the likelihood of population-level effects increases.
Multiple conservative assumptions	Overestimate	Cumulative impact of multiple conservative assumptions yields high risk to ecological receptors, and may result in risk at background concentrations or the prediction of risks when there is no potential for adverse effects.

Notes: CPC = contaminant of potential concern.
TIC = tentatively identified compounds.
CRQLs = contract required quantitation limits.
CLP = contract laboratory program.
BAF = bioaccumulation factor.
OU = operable unit.
ERA = ecological risk assessment.
PCLs = protective contaminant levels.
K_{ow}s>5 = octanol-water partition coefficient

tailed shrew (due to its small home range, voracious appetite, and insectivorous diet) was found to be the ecological receptor species with the lowest PCL. The PCL values used in the OU 1 ERA represent the concentration of each analyte in surface soil that, if not exceeded, is expected to be protective of all terrestrial organisms.

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