N00174.AR.000514
NSWC INDIAN HEAD
5090.3a

Feasibility Study Report

Site 57 - Building 292 TCE Contamination

Naval Support Facility, Indian Head

Indian Head, Maryland

VOLUME II - APPENDICES

Naval Facilities Engineering Command
Washington

Contract Number N62472-03-D-0057

Contract Task Order 007

July 2006

APPENDIX A

FIELD FORMS

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A.1 BORING LOGS

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT
BORING NUMBER: S57SB016
DATE: 8/23/01
GEOLOGIST: BOB BALKOVEC
DRILLER: AARON E

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	1					BRN REDDISH	SILTY SAND W/		0-5' @ 1403	0.0			
	2						ASPHALT + CINDERS			0.0			
	3												
	4												
	5	2 / 6				YELLOW	SILTY CLAY W/	CL	4-5' @ 1413	0.0			
3" S-1 1410	6	4 / 2	2"			LT GRAY	T-SAND + GRAVEL		S57SBDUP04	0.0			
	7												
	8												
	9	2 / 4			SOFT	OL	SILTY CLAY	CL		0.0			
S-2 1417	10	2 / 3	6" / 2"		MOIST	GREEN	T-GRAVEL		8-10' @ 1420	0.0			
	11												
	12												
	13												
	14												
	15												
	16												
	17												
	18												
	19	30 / 46			V. DENSE	GRAY	MED SAND			0.0			
3" S-3 1437	20	50/1	13" / 13"		WET				18-20' @ 1440	0.0			
				TD. 20'			SEE SOIL BORINGS S57SB018 + S57SB021 FOR COMPLETE LITHOLOGIC DETAILS						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: HSA TO 18' W/ 2-3" SPOONS + 1-2"

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57SB017
DATE: 8/23/01
GEOLOGIST: BOB BALKOVIC
DRILLER: AARON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1								0-5' @ 1245				
	2								S57SDUP02				
	3												
	4												
	5	1 / 2			LOOSE	LT-GRAY	CLAY W/SAND	CL	4-5' @ 1251	0.0			
S-1 1256	6	1 / 2	1.5' / 2'		WET	YELLOW OR	T-GRAVEL	CL		0.0			
	7												
	8												
	9	8 / 9			V. STIFF	LT	SILTY CLAY W/	CL		0.0			
S-2 1300	10	12 / 10	2' / 2'		MOIST	GRAY	T-GRAVEL		8-10 @ 1304	0.0			
	11												
	12												
	13												
	14												
	15	40 / 40			LOOSE	YELL OR	MED-COARSE SAND	GW		0.0			
S-3 1310	16	50 / 3	15" / 15"		WET	LT GRAY	W/ SOME CLAY	↓	14-16 @ 1312	0.0			
	17												
	18												
	19	12 / 15			DENSE	YELL OR	CLAYEY, MED SAND	SC		0.0			
S-4 1323	20	17 / 21	22" / 2'		WET	LT GRAY		SP	18-20 @ 1325	0.0			
							SEE S57 BORING						
							S57SB018 FOR						
							COMPLETE LITHOLOGY						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: HSA TO 18' W/ 4 SPOONS

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57SB018
DATE: 8/23/01
GEOLOGIST: BOB BALKOVEC
DRILLER: AARON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1	12 / 14			DENSE +	BROWN	SZLY SAND W/ GRAVEL	GM	0-5 @ 0930	0.0			
S-1 0930	2	21 / 24	1.5' / 2'			↓	T. ORGANICS	GW	S57SS04A01	0.0			
	3	6 / 8			STIFF	YELL	SZLY CLAY W/ GRAVEL	GC		0.0			
S-2 0940	4	6 / 3	1' / 2'		↓	BR	↓	↓		0.0			
	5	3 / 2			STIFF	YELL BR	SZLY CLAY W/	CL	4-5 @ 0950	0.0			
3" S-3 0946	6	6 / 7	1.5' / 2'		MOIST	GRAY	T. SAND + GRAVEL	↓		0.0			
	7	2 / 2			SOFT +		SZLY CLAY	CL		0.0			
S-4 0956	8	2 / 3	1' / 2'		MOIST	↓	T. SAND	↓		0.0			
	9	3 / 5				LT GRAY	SZLY / CLAYEY SAND	SC		0.0			
S-5 1000	10	9 / 8	1' / 2'			↓	W/ T. GRAVEL	SM	8-10 @ 1001	0.0			
	11	2 / 8				LT GRAY	SZLY SAND W/	SM		0.0			
S-6 1004	12	9 / 12	1' / 2'			YELL BR	T. GRAVEL	↓		0.0			
	13	6 / 9			DENSE		SAND + GRAVEL	SC		0.0			
S-7 1013	14	40 / 50/3	1.5' / 21"				W/ SZLY + CLAY	GM		0.0			
	15	50/.		?			O RECOVERY		UNABLE TO SAMPLE	0.0			
3" S-8 1018	16	0	0'		↓				16-18'	0.0			
	17	12 / 21			DENSE	GRAY +	MED SAND W/	SP	HARD DRILLING @15'	0.0			
3" S-9 1027	18	25 / 50/3	21" / 21"			YELL BR	T. SZLY + CLAY	SM	16-18 @ 1030	0.0			
	19	9 / 18			MED DENSE	↓	↓	↓		0.0			
S-10 1037	20	16 / 17	20" / 2'			↓	↓	↓	18-20 @ 1055	0.0			
				T.D. 20'									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: HSA TO 18' W/ 10 SPOONS 7-7" 3-3"

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEO SYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57SB019
DATE: 8/23/01
GEOLOGIST: BOB BALLOUZ
DRILLER: APPROVE

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	PID/FID Reading (ppm): Remarks	Sample	Sampler BZ	Borehole**	Driller BZ**
	1	2 / 4				BROWN	SZLT + SANDY W/ GRAVEL	SM	0-.5' @ 1114	00			
S-1 1112	2	5 / 5	1' / 2'			BLK.		OW		00			
	3												
	4												
	5	2 / 2			SOFT	YELL BR			4-5' @ 1120	00			
S-2 1119	6	1 / 3	1.5' / 2'		↓	LT. GRAY	SZLTY CLAY	CL		00			
	7												
	8												
	9	3 / 5			V. DENSE	GRAY	CLAYEY SZLT W/	ML		00			
S-3 1123	10	5 / 3	6" / 9"		↓	V	T. GRAVEL		8-10' @ 1125	00			
	11												
	12												
	13												
	14												
	15	6 / 21			HARD +	YELL BR	GRAVEL W/ SOME	GC		00			
S-4 1139	16	21 / 40	4" / 2'		WET	LT. GRAY	CLAY + SAND	↓	14-16' @ 1142	00			
	17												
	18												
	19	8 / 16			DENSE -	LT GRAY	MED SAND W/	SP		00			
S-5 1152	20	21 / 25	20" / 2'		WET	YELL BR	T. CLAY + SZLT	↓	18-20' @ 1155	00			
							SEE S57SB018 FOR						
							COMPLETE LITHOLOGY						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: DPT ATV RIG

BORING NUMBER: SS7SB20
DATE: 8/15/01
GEOLOGIST: BOB BALKOVEC
DRILLER: AARON E

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1					[illegible]	[illegible]	[illegible]	0-.5' @ 0826	0.0	0.0		
	2				[illegible]	[illegible]	[illegible]	[illegible]		0.0			
	3					[illegible]	[illegible]	[illegible]		[illegible]			
S-1 0824	4		3.5' / 4'			[illegible]	T- [illegible]	[illegible]		4.7		0.0	0.0
	5								4.5' @ 0824	[illegible]			
	6				[illegible]					[illegible]			
	7								[illegible]	[illegible]			
S-2 0829	8		3.5' / 4'							[illegible]		0.0	0.0
				7.0 8'									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: DP7 ATV R67

BORING NUMBER: S57SB24
DATE: 8/14/01
GEOLOGIST: BOB BALKOVEC
DRILLER: BUD SAZLER + BRIAN VANDORO

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	1					DUK	TOP 3" CINDERS + ASPHALT	GW	0.5' @ 1642	0.0	0.0		
	2			6.0		LT BR	33" SILTY CLAY + GRAVEL	CL					
	3							GC					
S-1 1640	4		3' / 4'									0.0	0.0
	5					LT BR	TOP 6" SILTY CLAY +		4.5 @ 1648	36.1			
	6					BR	GRAVEL			27.2			
	7					LT. BR	BOTT 3" SILTY CLAY	CL		19.4			
S-2 1646	8		3.5' / 4'			GRAY				10.2			
	9						2" SILTY CLAY			81.3			
	10								R-W @ 1700	47.3			
	11								F-M DUP	26.1			
S-3 1655	12		3.5' / 4'			GRAY-BROWN	SAND + GRAVEL	GW	REFUSAL @ 13' w/DPT	30.2		0.0	0.0
	13	7 / 50								0.0			
8/15/01 S-4 1458	14	4	4" / 4"						UNABLE TO SAMPLE	0.0			
	15	8 / 10				GRAY	MED-COARSE SAND	SW	12-14'	0.0			
S-5 1510	16	18 / 24	19" / 2'			YELL BR	T- GRAVEL		14'-16' @ 1515	0.0			
	17	19 / 18					F-MED SAND	SP		0.0			
S-6 1530	18	18 / 15	1' / 2'				T-SILT			0.0			
	19	14 / 12								0.0			
S-7 1528	20	11 / 10	1.5' / 2'	T.D. 20'					18'-20' 1530	0.0			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: DPT ATV R67 + HSA

BORING NUMBER: S5 75B22
DATE: 8/14/01
GEOLOGIST: BOB PALLOVICE
DRILLER: BUD SAZUR / BRIAN VAN DORN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1					BLK	TOP 3" BLACK CINDERS + ASPHALT	GW		20.6	0.0		
	2					LT	BOTT 2'9" SILTY CLAY	CL	0-.5' @ 1349	44			
	3					BR	W/ T. COARSE SAND			0.0			
S4 1347	4		4'						4.5' @ 1400	0.0		1.4	0.0
	5						TOP 6"			0.0			
	6				SOFT-WET		BOTT 21" SILTY CLAY		MOIST @ 6'	0.0			
	7									0.0			
S-2 1350	8		27" / 4'						8-10 @ 1410	0.0		0.0	0.0
	9				WET	LT	SAND + GRAVEL	GW		0.0			
	10					BR	T. CLAY			0.0			
	11					WHITE				0.0			
1355	12		23" / 4'							0.0			
	13						TOP 4" SAND + GRAVEL			0.0			
	14					BR +			12-14 @ 1420	0.0			
	15					LT	M. SAND	SP		0.0			
S-4 1415	16		3" / 4'			GRAY			REFUSAL @ 17' w/ DPT	0.0			
	17	12 / 9				LT. GRAY	TOP 6" SAND + GRAVEL	GW	S5 COLLECTED w/	0.0			
S5/a HSA S-5 1408	18	16 / 24	2' / 2'			BROWN +	BOTT 1.5' MED SAND	SP	SPLIT SPOON	0.0			
	19	12 / 17				LT GRAY	TOP 7"	SP		0.0			
S6 1415	20	19 / 21	20" / 2'			GRAY	SANDY SILT T. CLAY	ML	18-20 @ 1420	0.0			
				T.D. 20'			DPT TO 16' (REFUSAL @ 17')						
							HSA TO 18' SPOONED TO 20'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: DPT TO 17' HAD REFUSAL
HSA FROM 16'-18' SPOONED 16-20'

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: GEO PROBE RG7

BORING NUMBER: S5TSB23
DATE: 8/14/01
GEOLOGIST: BOB BALMOUR
DRILLER: BUD SAZIER

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	1					BLK	CLAY, SOME SAND &	CL	0-3.5' @ 1600	0.0	0.0		0.0
	2					GRAY	GRAVEL						
	3												
S1 1557	4		40" / 4'										
	5					LT.	SILTY CLAY W/	CL	REDDISH.	0.0		0.0	0.0
	6					BR	T. COARSE SAND & GRAVEL		4-5' @ 1605				
	7												
S2 1603	8		2' / 4'										
	9				SOFT.	GRAY	CLAY W/ SOME SILT	CL		0.0			
	10								8-10' @ 1612				
	11					GRAY	COARSE SAND & GRAVEL	GW					
S3 1610	12		33" / 4'			WHITE							
	13						TOP 1' COARSE SAND & GRAVEL T. CLAY			0.0		0.0	0.0
S4 1620	14		1.5' / 2'			GRAY BROWN	BOTT 6" MED SAND	SP	12-14' @ 1625				
				T.D. 14'									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: D.P.T ATV R67

BORING NUMBER: S57SB024
DATE: 8/15/01
GEOLOGIST: BOB BALKOVICH
DRILLER: ARRON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1					LT.	TOP 18" SAND + GRAVEL	GW	0-.5' @ 0910	11.2			
	2					BR	T- SILT + CLAY	↓		10.1			
	3					LT.	BOTT 8" SILTY CLAY W/	CL		7.0			
S-1 0905	4		39" / 4"			BR	T- GRAVEL	↓		4.1			
	5						SILTY CLAY W/ GRAVEL	GC	4-5' @ 0920	0.0			
	6						↓			↓			
	7												
S-2 0915	8		.5' / 4"			↓	↓	↓		↓			
	9					LT.	SAND + GRAVEL	GW		0.0			
	10					BR	T- CLAY		8-10' @ 0930				
	11												
S-3 0925	12		2'4" / 4"					↓	S-40' RECOVERY W/	↓			
	13	3 / 3				LT.	SAND + GRAVEL	GW	DPT TOK SPOON SAMP				
S-4 1613	14	2 / 1	1" / 2"			BR	T- CLAY		UNABLE TO SAMPLE				
		2 / 2							12-14'				
S-5 1620	16	1 / 1	1" / 2"						OR 14-16'				
				TD 16'									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: DPT TO 16' 0 RECOVERY 12-16'
HSA TO 12 SPOON 12-14 1" RECOVERY
HSA TO 14 SPOON 14-16' 1" RECOVERY

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: D.P.T. ATV R67

BORING NUMBER: S57SB025
DATE: 8/15/01
GEOLOGIST: BOB BALKOVEC
DRILLER: AARON E

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1					BLK	TOP 4" ASPHALT	GW	0.5' @ 0945	71.2	0.0		
	2					Lt	BOTT [illegible] SILTY SAND	GM		0.0			
	3					BROWN	GRAVEL			0.0			
S-1 0942	4		3' / 4"							0.0		0.0	0.0
	5						F SAND W/ SOME CLAY	SP	4.5' @ 0955	0.0			
	6												
	7												
S-2 [illegible]	8		16" / 4"										
	9					GRAY	SILTY CLAY W/	CL		0.0			
	10						SAND + GRAVEL		8-10' @ 1000				
	11												
S-3 0956	12		15" / 4"									0.0	0.0
	13				VERY		SILTY CLAY W/ F SAND		V. WET	0.0			
S-4 1005	14		2' / 2'		SOFT		+ T- GRAVEL		12-14' @ 1007				
				TD 14'									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: D.P.T. ATV R67

BORING NUMBER: SS7SB026
DATE: 8/15/01
GEOLOGIST: BOB PALKOVEC
DRILLER: AARON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1					REDDISH	CLAYEY SAND + GRAVEL	GC		0.0	0.0		
	2					BROWN							
	3												
S4 1120	4		18" / 4"									0.0	0.0
	5									0.0			
	6												
	7								RED BRICK FRAG.				
S-2 1124	8		1" / 4"				PULL OF GRAVEL TO TOP OF SAMPLE		POOR RECOVERY				
S-3 1133	9		1" / 4"			GREY	CLAY W/ SAND + GRAVEL		8-9' @ 1135	0.0	0.0		
				T.D. 9'									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57SB027
DATE: 8/2/01
GEOLOGIST: BOB BAUKNECT
DRILLER: AARON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	1	2 / 6				BR	SANDY SILT W/ T-CLAY	SM/ML	0-5 @ 1112	0.0			
S-1 1110	2	8 / 7	1' / 2'			↓	- GRAVEL						
	3	2 / 9											
S-2 1112	4	4 / 4	144 / 2'										
	5	1 / 2			V. SOFT	GRAY	SILTY CLAY W/		4-5 @ 1125	0.0			
S-3 1122	6	1 / 2	20" / 2'		+ WET	↓	T- GRAVEL			0.0			
	7	6 / 9			V. STIFF	GRAY	SILTY CLAY	CL		0.0			
S-4 1129	8	15 / 11	22" / 2'		+ SL. MOIST	↓				0.0			
	9	6 / 6			V. STIFF	LT GRAY + YELLOW	SILTY CLAY			0.0			
S-5 1134	10	10 / 13	22" / 2'		+ SL. MOIST		MOTTLED		8-10' @ 1136	0.0			
	11	4 / -			V. STIFF	LT GRAY	TOP 17" SILTY CLAY			0.0			
S-6 1145	12	15 / 18	22" / 2'		↓	- YELLOW	BOTT 5" SANDY SILT	ML		0.0			
	13	5 / 13			DENSE + SL. DRY		V.F. SAND, SILTY			0.0			
S-7 1152	14	19 / 23	22" / 2'						12-14 @ 1155	0.0			
	15	8 / 13					V.F. SAND SILTY	ML		0.0			
S-8 1200	16	19 / 23	21" / 2'					SP		0.0			
	17	10 / 13			DENSE		CLAYEY F. SAND / SILT	SC/ML		0.0			
S-9 1213	18	14 / 31	2' / 2'						16-18 @ 1215	0.0			
	19	2 / 6			DENSE	LT GRAY	MED. SAND	SP	V. WET	0.0			
S-10 1300	20	19 / 20	2' / 2'		+ WET					0.0			
	21	16 / 26			V. DENSE	LT GRAY	MED SAND			0.0			
S-11 1318	22	18 / 35	20" / 2'			YELLOW				0.0			
	23	5 / 4			DENSE +					0.0			
S-12 1327	24	12 / 28	22" / 2'		WET					0.0			
	25	13 / 20					MED SAND						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: HSA TO 30 FEET 15

Converted to Well: Yes X No

Well I.D. #: S57TW015

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57SB027
DATE: 8/21/01
GEOLOGIST: BOB BALLOUX
DRILLER: AARON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-13 1345	26	24 / 41	15" / 2"			LT GRAY	MED SAND TO SILTY F. SAND	SM		0.0			
	27	10 / 9				LT GRAY	TOP 1' SILTY F. SAND	↓		0.0			
S-14 1400	28	8 / 17	22" / 2"			[illegible]	BOTT F. SANDY SILT	ML		0.0			
	29	7 / 12				[illegible]	TOP 4" F SANDY SILT	↓		0.0			
S-15 1405	30	21 / 17	22" / 2"			GREEN GRAY	BOTT 18" SANDY SILT & CLAY	CL		0.0			
				T.D. 30'									
							INSTALLED S57TW015 8/21/01						
							@ 30' T.D.						
							SCREENED FROM 25-30						
							SAND TO 17'						
							BENT TO SURFACE						
							1" WELL 8" BOREHOLE						
							INSTALLED S57TW014 8/22/01						
							@ 9'						
							SCREENED FROM 4-9'						
							SAND TO						
							BENT TO						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: S57TW015

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57SB028
DATE: 8/16/01
GEOLOGIST: BOB BALKOVIC
DRILLER: BRIAN VAN DORN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1	3/3			M. STIFF	WHITE BR	SILTY CLAY	CL	0-.5' @ 1047	0.0	0.0		
S-1 1045	2	5/9	1'/2'		↓	GRAY	↓	↓		0.0			
	3	7/6			M. DENSE	WHITE BR	F. SAND T-SILT	SP		0.0			
S-2 1050	4	8/7	1.5'/2'		↓	BR				0.0			
	5	6/8			M. DENSE	GRAY			4.5' @ 1057	0.0			
S-3 1056	6	9/10	20"/2'		M. DENSE	↓	↓	↓	S57SB04P02	0.0			
	7	15/11			M. DENSE		F. SAND T-SILT	SP		0.0			
S-4 1104	8	10/14	21"/2'		WET	↓		↓		0.0			
	9	7/12				BR	MED. SAND	SP		0.0			
S-5 1110	10	17/20	20"/2'			GRAY		↓		0.0			
	11	17/17			DENSE	BROWN	FINE - MED. SAND	SP		0.0			
S-6 1120	12	16/21	22"/2'		↓	MED BR	↓	↓	10-12 @ 1121	0.0			
	13	3/18			DENSE	GRAY	MED - SAND	SP	2 MS/MSD	0.0			
S-7 1125	14	23/24	2'/2'		↓	↓	↓	↓	12-14 @ 1127	0.0			
	15	12/20			DENSE					0.0			
S-8 1130	16	20/20	60"/2'		↓	↓	↓	↓		0.0			
	17	13/16			DENSE		MED - SAND	SP		0.0			
S-9 1140	18	25/35	23"/2'		V. DENSE	↓	↓	↓		0.0			
	19	10/19			DENSE	GRAY LBR	TOP 5" MED SAND	SP	WET	0.0			
S-10 1148	20	17/16	60"/2'		↓	↓	BOTTOM 15" F SAND T-SILT	ML	18-20 @ 1150	0.0			
	21	7/7			V. STIFF	WHITE	F SANDY SILT	ML	S57SB04P03	0.0			
S-11 1160	22	11/14	15"/2'		↓	BR	↓	↓	MOIST	0.0			
	23	7/7			V. STIFF	BR	F SANDY CLAY		DRY SPOON	0.0			
S-12 1160	24	9/10	23"/2'		↓	BR	↓			0.0			
	25	6/12			V. STIFF	BROWNISH BR	F. SANDY CLAY			0.0			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No

Well I.D. #: S57TW017

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE BIOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57SB028
DATE: 8/16/01
GEOLOGIST: BOB BALMORE
DRILLER: BRIAN VAN DORN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-13 1214	26	14 14	22" 2'		V. STIFF	DK. BROWN	F-SANDY CLAY	CL		00	00		
				TD: 26'									
							INSTALLED TW @ 23'		8/16/01				
							SCREENED FROM 13'-23'						
							1" WELL, SAND TO 12'						
							BENTONITE TO SURFACE						
							8" BOREHOLE						
							OFFSET AND INSTALLED		8/17/01				
							A TW @ 10'						
							SCREENED FROM 5'-10'						
							1" WELL, SAND TO						
							BENTONITE TO SURFACE						
							8" BOREHOLE						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 00

Remarks: TW @ 23'
TW @ 10'

Converted to Well: Yes X No ____ Well I.D. #: S57TW017

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: Chesapeake Geosystems
DRILLING RIG: HSA

BORING NUMBER: S57SB029
DATE: 8/17/01
GEOLOGIST: Jennifer Wellman
DRILLER: Brian Van Dorn

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1	5/15					top 4" asphalt						
S-1	2	15/	17"/2'		Loose Sand	Lt. brown	silty-sand w/gravel	GM		0	0		
	3	11/13			medium dense sand	yellow orange	clay-silt w/gravel	CC					
S-2	4	12/13	16"/2'							0	0		
	5	8/9			loose sand	light brown	fine sand-silt trace clay w/gravel	GM					
	6	10/8	16"/2							0	0		
	7	5/10			Loose / Med Sand	reddish brown	silty clay w/ gravel and sand	GC		0	0		
	8	15/9	11'/2"										
	9	5/8											
	10	20/15	15"/2"		dense sand	reddish brown	silty clay w/gravel sand	GC		0	0		
	11	1/1			very loose sand	olive gray	~~very loose sand~~						
	12	1/1	10"/2"				Clayey-silt w/ trace sand	ML					
	13	28/15			med. dense sand	olive gray	silty-sand w/gravel		very loose gravel sand-	0	0		
	14	10/8	0/2"					GM					
	15	6/16			very dense sand		medium-fine sand-			0	0		
	16	20/31	18"/2"					SP					
	17	2/8			Dense sand	lt. brown	medium-coarse sand w/ traces clay			0	0		
	18	12/26	23"/2"					SP					
	19	12/20			very dense sand	lt gray	silty-medium to fine sand			0	0		
	20	30/25	19"/2"					SP					
	21	7/7			Dense sand	yellow-orange	silty sand						
	22	12/20	17'/2'					SM					
	23	5/8			Medium Dense sand	~~olive~~ green gray	top 14 inches clayey sand						
	24	12/15	23"/2'				grading into a sandy-clay	SC/					
	~~25~~							ML					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No Well I.D. #: S57TW019

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: Chesapeake Geosystems
DRILLING RIG:

BORING NUMBER: S57SB029
DATE: 8/17/01
GEOLOGIST:
DRILLER: Brian VanDorn

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	25	7 / 13			Dense	greenish-brown mottle	Sandy-clay						
	26	20 / 22	24" / 2'		sand			CL					
	27												
	28		2'										
	29												
	30		3'										

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes X No

Well I.D. #: S57TW019

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE
DRILLING RIG: MOBILE RIG B-61

BORING NUMBER: S57SB30
DATE: 8-24-01
GEOLOGIST: FRED W RAMSER
DRILLER: ARRON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 955		6/12			STIFF		YEL BRN CLAY + SILT TR	ML	DRY TR ROOT MATL.	9.0			
	2	5/4	1.5/2.0				F-g SAND MOTTLED		TR GRAVEL				
S-2 1000		8/16			MED DENSE		SILT + f-g SAND TR CLAY	SC	MOIST	12			
	4	9/12	2.0/2.0				MOTTLED YEL BRN						
S-3 1005		7/7					AS ABOVE	SC	MOIST	10	0	0	0
	6	9/12	2.0/2.0				TR m-g SAND		S57SB300103 4-6'				
S-4 1010		1/5			MED STIFF		PALE YEL BRN	CL	MOIST	10	0	0	0
	8	6/10	2.0/2.0				SANDY CLAY TR SILT		TR GRA WELL ROUNDED				
S-5 1015		4/9			MED DENSE		f-g SAND + SILT TR CLAY	SM	3" SPOON 8-10 COLLECTED	3	0	0	0
	10	12/24	[illegible]/2.0						S57SB300203 8-10				
S-6 1022		10/15		▽	MED DENSE		YEL-ORG BRN MOTTLE	SP	WET	0	0	0	0
	12	13/19	2.0/2.0				SAND TR GRA + SILT						
S-7 1025		10/24					SAND		ROOM WET				
	14	24/37	0.0/2.0						LOOSE SAND				
S-8 1045		8/9			MED DENSE		GREY SAND f-g	SP	COLLECTED S57SB300303 14-16	0			
	16	12/21	2.0/2.0				TR f-g						
S-9 1054		12/12					AS ABOVE						
	18	12/24	2.0/2.0										
1100 S-10		10/10					AS ABOVE						
	20	24/31	2.0/2.0										
1111 S-11		4/4			MED STIFF		OLIVE GREY CLAY + SILT	CL	MOTTLED ORG	0			
	22	7/8	2.0/2.0						PLASTIC CONFINING LAYER				
S-12 1145		12/13			STIFF		OLIVE GREY CLAY		3" SPLIT SPOON COLLECTED				
	24	15/20	2.0/2.0						S57SB300403 22-24				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ____

Remarks: 2" SPLIT SPOONS x 10
3" SPLIT SPOONS x 2

Converted to Well: Yes ____ No X Well I.D. #: S57SB30

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEO SYSTEMS
DRILLING RIG:

BORING NUMBER: 557SB31
DATE: 8-24-01
GEOLOGIST: FREDWRAMSER
DRILLER: ARRON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Drifter BZ**
S-1 800		9/6					NO RECOVERY						
	2	9/9	0.0/2.0										
S-2 805		3/3			LOOSE	YEL BRN	MED TO COARSE SAND TR GRA. TR SILT	SP		0	0	0	0
	4	3/2	1.0/2.0										
S-3 807		1/1			VERY SOFT/		DARK YEL BRN MED SAND	SP	SATURATED				
	6	1/1	2.0/2.0		LOOSE		W/TRACE SILT + CLAY ~5'		COLLECTED 557SB0310103				
S-4 812		WOH			?		NO RECOVER						
	8	1/1	0.0/2.0		↓		NO RECOVERY						
S-5 818		3/6			MED DENSE		PALE YEL BROWN SILTY F-g SAND	SP	3" SPOON COLLECTED				
	10	8/12	2.0/2.0		↓		TR GRA		557SB0310203				
S-6 824		14/16					NO RECOVERY						
	12	20/47	2.0/2.0				YEL BROWN SILTY		[illegible]				
S-7 831		11/9			MED DENSE		YEL BROWN SAND	SP					
	14	9/9	0.8/2.0										
S-8 840		11/21			MED DENSE		LT YEL BROWN SAND MOTTLED ;" SILT @ 15'	SP	COLLECTED 557SB0310303				
	16	24/28	2.0/2.0				↓						
S-9 855		6/9			LOOSE		YEL BRN SAND						
	18	18/19	2.0/2.0		MED STIFF		MOTTLED BRN GRY YEL BRN SILT + CLAY TR F SAND	ML	MED PLASTIC				
S-10 900		1/10					LT BRN-YEL BRN CLAY TR SILT GRADED DOWN TO SILTY		3" SPOON, GOOD CONF LAYER				
	20	10/12	1.5/2.0				f.g. SAND @ 19.5'		COLLECTED 557SB0310403				
									FOR CHEM + GEO TECH				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ____

Remarks: 2 x 3" DIA SPLIT SPOONS
8 x 2" DIA SPLIT SPOONS

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE
DRILLING RIG: MOBILE RIG B-61

BORING NUMBER: S57SB32
DATE: 8-24-01
GEOLOGIST: FREDWRAMSER
DRILLER: ARRON E

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
							DK BRN SAND + GRAVEL		ROOT MAT'L				
	2						TAN BROWN SAND + GRAVEL		↓				
				▽	LOOSE		GREY SAND		WET	2	0	0	0
	4						↓		AUGERED TO 4'				
S-1 1300		2/2			?		NO RECOVERY		SATURATED SPOON	5	0	0	0
	6	2/2	0.5/2.5		?								
1305 S-2		1/2			SOFT		MOTTLED YEL BRN + GREY SILT + CLAY	ML	S57SB0320103 6-8	4	0	0	0
	8	4/7	1.5/2.0										
1315 S-3		5/5			STIFF		MOTTLED YEL BRN	CL	3" SPOON	0	0	0	0
	10	7/8	2.0/2.0				GRAY CLAY TR SILT	↓	S57SB0320203 8-10				
S-4 1326		2/2			MED STIFF		AS ABOVE	↓		0	0	0	0
	12	4/2	0.0/2.0					↓					
S-5 1335		4/7			STIFF		MOTTLED CLAY W/ SILT YEL BRN	CL		0	0	0	0
	14	5/7	0.5/2.0					↓					
S-6 1335		2/2			SOFT		AS ABOVE	↓	COLLECTED S57SB0320303	0	0	0	0
	16	2/2	1.5/2.0				TR F-G SAND	↓					
S-7 1342		2/3			STIFF			↓		0	0	0	0
	18	7/8	0.5/2.0					↓					
S-8 1345		2/4			STIFF		AS ABOVE	↓	COLLECTED	0	0	0	0
	20	6/12	1.0/2.0				TR F-G SAND + GRAVEL	↓	S57SB0320403				
									3" SPLIT SPOON				
	22												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ____

Remarks: 2 x 3" SPLIT SPOONS
6 x 2" SPLIT SPOONS

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57MW020
DATE: 8/22/01
GEOLOGIST: BOB BALKOVE
DRILLER: AARONE

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1	50/2					2" TOP SOIL + ROCK			0.0			
S-1 1120	2	0 / 0	2" / 2							0.0			
	3	2					0 RECOVERY						
S-2 1124	4	1 / 1	0 / 2"							0.0			
	5	1 / 1			V. SOFT +	OLIVE	CLAYEY SILT W/	ML		0.0			
S-3 1127	6	1 / 1	15" / 0		WET	GRAY	SOME ROOTS			0.0			
	7	1 / 1					CLAYEY SILT W/			0.0			
S-4 1130	8	2 / 0	18" / 0				T. FINE SAND			0.0			
	9	1 / 1			V. SOFT + WET	OLIVE GRAY	TOP 3" CLAYEY SILT	ML	VERY WET @ 9'	0.0			
S-5 1133	10	1 / 4	8" / 2"		L. LOOSE	LIGHT GRAY	BOTT 5" MED SAND	SP		0.0			
	11	27 / 26			V. DENSE		4' MED - FINE SAND	SP		0.0			
S-6 1139	12	25 / 36	4" / 2"		+ WET					0.0			
	13	8 / 10			M. DENSE + WET	LIGHT YELLOW	TOP 1' MED SAND	SP		0.0			
S-7 1149	14	12 / 8	18" / 0		V. STIFF MOIST	ORANGE	SILTY CLAY (CONFINING LAYER)	CL	HIGH PLASTICITY	0.0			
				T.D. 14'									
							INSTALLED WELL						
							T.D. 14'						
							SCREENED FROM 4-14'						
							SAND TO 3'						
							BENT TO 1'						
							2" WELL						
							9" BOREHOLE						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): [ ]

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: S57MW020

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57TW021
DATE: 8/20/01
GEOLOGIST: BOB BARROVE
DRILLER: AARON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1	2 / 5			M. DENSE	BLK	TOP 7" TOP SOIL			0.0	0.0		
S1 1539	2	6 / 14	14" / 2'		+ DRY	YELL BR	BOTT 7" F-SAND + GRAVEL	SW		0.0			
	3	18 / 21			V DENSE	↓	↓	↓		0.0			
S2 1543	4	25 / 32	15" / 23"		+ DRY	↓	↓	↓		0.0			
	5	15 / 22			↓	↓	↓	↓		0.0			
S3 1553	6	43 / 25	13" / 2'		↓	↓	↓	↓		0.0			
	7	18 / [illegible]			DENSE +	YELL BR	F-M SAND W/ SOME SILT	SM	WET @ 7'	0.0			
S4 1605	8	[illegible] / 60	14" / 2'		WET	LT. BROWN	+ T. GRAVEL	↓		0.0			
	9	13 / 8			M. DENSE	↓	MED. SAND W/ T-SILT	SP		0.0			
S5 1610	10	11 / 14	16" / 2'		+ WET	↓	+ T. GRAVEL	↓		0.0		0.0	0.0
	11	8 / 19			V. DENSE	YELL BR	MED SAND	SP		0.0			
S6 1615	12	23 / 29	17" / 2'		+ WET	LT. GRAY + RED	W/ CLAYBALL	↓		0.0			
	13	1 / 6			M. DENSE	LT GRAY	TOP 8" MED SAND	SP		0.0			
S7 1625	14	[illegible] / 14	20" / 2'		M DENSE	YELL BR.	BOTT 1' CLAYEY SAND	SC		0.0			
	15	7 / 12			M. DENSE	YELL BR	TOP 16" CLAYEY SAND	↓		0.0			
S8 1637	16	15 / 15	2' / 2'		HARD	DARK GRAY	BOTT 2" CLAY T-SAND	CL	CONTINUING LAYER?	0.0			
	17	1 / 1			HARD	↓	TOP 4" ↓ (NO SAND)	CL	CLAY LENSE	0.0			
S9 1648	18	14 / 20	2' / 2'		DENSE	LT GRAY	BOTT 20" MED SAND	SP	VERY WET.	0.0			
	19	2 / 10			DENSE +	↓	TOP 16" MED SAND	↓		0.0			
S10 1656	20	12 / 24	2' / 2'		V-WET	↓	BOTT 8" FINE SAND	↓	DECREASE IN GRAIN SIZE	0.0		0.0	0.0
	21	14 / 16			DENSE +	LT	FINE SAND	SP		0.0			
S11 1707	22	19 / 30	20" / 2'		WET	GRAY	↓	↓		0.0			
	23	6 / 6			V-DENSE	↓	TOP 20" F. SAND	SP		0.0			
S12 1722	24	31 / 50	2' / 2'		↓	YELL BR	BOTT 4" MED SAND	↓	COARSER GRAINS	0.0	↓		
	25			TD 25'			& SPLIT SPOON STUCK IN	AUGERS					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No

Well I.D. #: S57TW021

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57TW021
DATE: 8/20/01
GEOLOGIST: BOB BALKOVIC
DRILLER: AARON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S13 1758	26		0 / 2'				0 RECOVERY V. TIGHT FORMATION						
	27												
S-14	28		2'										

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks: HSA TO 25' SPOONED TO 26'

Converted to Well: Yes X No

Well I.D. #: S57TW021

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57MW022
DATE: 8/22/01
GEOLOGIST: BOB BALKOVEC
DRILLER: AARON E.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1	1 / 2				BLACK	TOP SOIL W/ ORGANICS	OL		0.0			
S-1 0918	2	1 / 0	6" / 2"					L		0.0			
	3	2 / 7			MEDIUM		ALSO CONTAINS GRAVEL	SW		0.0			
S-2 0920	4	1 / 4	1" / 2"		FIRM					0.0			
	5	1 / 1			V. LOOSE					0.0			
S-3 0922	6	1 / 1	14" / 2"		FIRM				[illegible]	0.0			
	7	1 / 2			V. SOFT	DK.	CLAY W/ TR. GRAVEL	CL		0.0			
S-4 0924	8	1 / 2	1" / 2"		[illegible]					0.0			
	9	1 / 1			V. SOFT	DK.	CLAY W/ [illegible]	CL		0.0			
S-5 0940	10	2 / 3	2" / 2"		FIRM	GRAY				0.0			
	11	1 / 1			V. SOFT		CLAY ±ORGANICS	OH		0.0			
S-6 0954	12	1 / 1	2" / 2"		WET					0.0			
	13	1 / 1			V. SOFT	DK GRAY	TOP 15" CLAY ±ORG	OH		0.0			
S-7 1002	14	2 / 4	2" / 2"			DK GRAY	BOTT 9" F. SAND W/ WOOD FRAGS + CLAY	SP / SC		0.0			
				14' TD.									
							ABANDONED WELL						
							TD 14'						
							SAND TO 3'						
							BENT TO 1'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: S57MW022

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE GEOSYSTEMS
DRILLING RIG: HSA TRUCK MOUNT

BORING NUMBER: S57SB033/MW023
DATE: 8/22/01
GEOLOGIST: BOB BAKOVEE
DRILLER: AARON E

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1	5 / 10			V. DENSE	YELL OR	SAND + GRAVEL	GM		0.0	0.0		
S-1 1425	2	18 / 20	6" / 2'		↓	↓	↓	↓		0.0			
	3	20 / 47			V. DENSE	YELL OR	TOP 15" SAND + GRAVEL	GW		0.0			
S-2 1430	4	25 / 16	17" / 2'		HARD	YELLOW BROWN	BOT 2" CLAY (MOTTLED)	CL		0.0			
	5	10 / 12			V. STIFF	YELL OR	TOP 6" SILTY CLAY	CL		0.0			
S-3 1434	6	13 / 16	20" / 2'		↓		BOT 14" CLAYEY SILT	ML		0.0		0.0	0.0
	7	2 / 4			SOFT	LT GRAY	SILTY CLAY	CL	SOFT @ 7'	0.0			
S-4 1439	8	10 / 8	18" / 2'		V. STIFF	↓	[illegible]	CL	MOIST	0.0			
	9	3 / 5			V. STIFF ↓	LT GRAY	SILTY CLAY	CL		0.0			
S-5 1445	10	9 / 11	2' / 2'		MOIST	YELLOW	↓	↓		0.0			
	11	8 / 15			DENSE ↓	↓	F. MED. SAND	SP		0.0			
S-6 1450	12	14 / 20	20" / 2'		MOIST	↓		↓	10-12 @ 1457	0.0			
	13	8 / 16			DENSE ↓	GRAY	MED. SAND	SP		0.0			
S-7 1456	14	15 / 20	22" / 2'		WET	↓	↓	↓		0.0			
	15	10 / 15			DENSE ↓	YELL OR ↓	SILTY MED. SAND	SM		0.0			
S-8 1502	16	21 / 25	22" / 2'		WET	LT GRAY	↓	↓		0.0		0.0	0.0
	17	10 / 21			DENSE	↓	↓	↓		0.0			
S-9 1511	18	22 / 25	18" / 2'		↓	GRAY	↓	↓		0.0			
	19	5 / 15			↓	↓	MED SAND	SP		0.0			
S-10 1520	20	17 / 20	20" / 2'		↓	↓	↓	↓		0.0	✓		
				TD 20'			INSTALLED WELL 20' TD						
							SCREENED FROM 10-20						
							SAND TO 7.5'						
							BENT TO 4.5'						
							2" WELL 9" BOREHOLE						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks:

Converted to Well: Yes X No ____ Well I.D. #: S57MW023

Tetra Tech NUS, Inc.

BORING LOG

Page ___ of ___

PROJECT NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 245
DRILLING COMPANY: CHESAPEAKE
DRILLING RIG: B-57

BORING NUMBER: CPT01 PILOT HOLE
DATE: 8/30/01
GEOLOGIST: FRED W RAMSER
DRILLER: ARRON E

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth /Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							YEL BRN TO						
							ORG BRN SAND						
	5						+ GRAVEL TO						
							~15', ~~15-22'~~						
							GRAVEL 15-22'						
							SANDY CLAY						
	10						TR GRAVEL						
							22'-25'						
							TD@ 25'						
	15												
	20												
	25												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): ____

Remarks: 3 1/4 HSA, NO SPOONS, PILOT HOLE FOR CPT RIG. CPT RIG ENCOUNTERED REFUSAL @ 16'

Converted to Well: Yes ____ No X Well I.D. #: CPT 01 PILOT

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head ~~SITE 00~~ SITE 57, CTO ~~0005~~ 0007
PROJECT NUMBER: ~~2144~~ 2194
DRILLING COMPANY: ~~Talon Drilling~~ Unitech
DRILLING RIG: Geoprobe 66DT

BORING No.: S57SB033
DATE: 10/4/05
GEOLOGIST: C. Doolan
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							For description						
							above confining unit		(0-25')				
							See S57MW003						
	25						boring log						
S-1 1315			0.0/4.0										
							No Recovery						
	28												
S-2 1335			1.5/4.0					SC					
					med dense	olive brown	lt. olive green and yellow brown mottled			0			
	32				to dense		fine clayey sand						
S-3 1400			1.0/4.0										
					med dense		lt. olive green and yellow brown mottled			0			
	36				to dense		fine clayey sand						
S-4 1455			4.0/4.0		dense		lt. olive green f. clayey sand		"bottom of CU"	0			
							olive green and brown m. sand and clay	SW/SC					
					dense	yellow brown	coarse to med. sand w/ some clay and silt			0		0	
	40				v dense		brown grey clay	ML	waxy feel very dense friable				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: DPT 4' x 2" Macro Core
Drive 3" casing into Confining unit

Converted to Well: Yes ____ No ✓ Well I.D. #: ——

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head
PROJECT NUMBER: N2194
DRILLING COMPANY: Unitech
DRILLING RIG: DPT geoprobe

BORING No.: S57SB035
DATE: 10-3-05
GEOLOGIST: C. Doolan
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
S-1 1405			3.5/4.0		loose	brown	Sand silt and gravel	GW	damp				
							fill		fill material	6.8			
						brown	clay, gravel, sand pebbles, coal frag at 4'						
	4									7.8			
S-2 1408			2.5/4.0			brown red. brn	fill sand, gravel clay		damp	34.2			
					soft to med.	brown	brown to grey gravelly and sandy clay	GW/SC	moist				
					dense				fill?				
	8									2.1			
S-3 1412			2.5/4.0		soft		brown to grey brown clayey sand and gravel		wet.				
					med dense		some large pebbles			3.1			
					dense		grey brown pebbles, gravel and sand, some silt,	GW	saturated				
	12						trace clay		chemical odor	604			
S-4 1430			3.5/4.0		dense	grey to yellow orange	coarse sand and gravel with large rock fragments		odor				
										162			
					dense		orange to orange brown coarse to v. coarse	SW					
	16						sand, trace gravel, trace clay			12.6			
S-5 1450			4.0/4.0		dense	grey, tan	med to coarse sand, trace silt and clay						
					v dense	tan and orange	v coarse sand and clay, trace gravel	SC		0			
	20				dense	orange grey	med. to coarse sand and silt trace clay						
S-6 1502			4.0/4.0		v dense		lt. olive grey clayey, silty f. sand	SC/SM	confining unit				
							mottled brown			0			
							increased brown w/ depth						
	24				v dense		increased density w/ depth			0			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: DPT 4' x 2" Macro Core sampling
TEMP WELL POINT INSTALLED

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head, CTO 0007
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: DPT

BORING No.: SS7SB036
DATE: 9/29/05
GEOLOGIST: COLIN DOOLAN
DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
S-1 @1125						yellow brown	sand and gravel		TOPSOIL				
	4		4.0										
S-2 @1130						yellow brown	silty sand						
					soft	olive green	silty fine sand		saturated				
	8		4.0 / 4.0										
S-3 @1135						grey	clayey silty fine sand	SM/SC					
					MED DENSE	grey	medium sand	SW					
						orange	11.5 medium sand						
	12		4.0 / 4.0			dark grey	2" of red sand w/ sand gravel	GM					
S-4 @1145							14-15 clayey sand	SC					
						orange	medium sand	SW					
	16		4.0 / 4.0										
							TD @ 16'						
							LOST SAMPLE						
							16'-20' IN HOLE						
							W/LEAD ROD + CUTTING						
							SHOE						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4' x 2" MACRO CORE SAMPLER W/PLUNGER
RAIN PREVENT THE USE OF PID

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No X Well I.D. #: —

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head ~~SITE 36~~, CTO ~~0005~~ Site57 0007
PROJECT NUMBER: ~~2144~~ 2194
DRILLING COMPANY: ~~Talon Drilling~~ Unitech
DRILLING RIG: DPT geoprobe

BORING No.: S57SB036
DATE: 10/4/05
GEOLOGIST: C. Doolan
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	16												
S-5 1620			4.0/4.0										
							med to fine sand and silt some clay						
	20				v dense	orange brown	orange brown and green gray and brown mottled and banded			0			
S-6 1630			4.0/4.0										
	24				V dense	olive	olive grey and yellow brown mottled f. clay/sand		confining unit	0			
S-7 1730	25		1.0/4.0						Set casing				
	28				Soft		lt. olive grey silty clay			0			
S-8 1750			1.0/4.0										
					Soft to		greenish brown to olive grey mottled						
	32				medium dense		clayey silty fine to medium sand			0			
S-9 1810			0.5/4.0										
					med dense		brown to green brown silty fine						
					to soft		to med sand			0			
	36												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT w/ 4' x 2" Macro Core sampling
drove 3" casing into confining unit

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No ✓ Well I.D. #: ——

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 G.W. INVESTIGATION
PROJECT NUMBER: 2174
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57SB037
DATE: 9-21-05
GEOLOGIST: FRED WRAMSER
DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
							YEL BRN		ASPHALT ~6" SURFACE			5	0
	2						SAND + GRAVEL		~3" CONCRETE			6	0
						LT GREY	SAND	GW					
	4											0	
							YEL BRN SAND		WET @ 5'				
	6						AND GRAVEL					0	
							SILTY SAND +	GM					
	8					YEL	GRAVEL					0	
						BRN							
	10											0	
S-1 0835		2/3					NO RECOVERY						
	12	8/5	0/2.0				(GRAY SAND IN SHOE)						
S-2 0837		4/8			DENSE		YEL BRN SAND	GW	VARIEGATED	0		0	
	14	8/7	1.5/2.0				AND GRAVEL		GRAY, BRN				
S-3 843		7/7				LT GRAY	SAND TR GRAVEL	SP					
	16	6/9	1.5/2.0				(Med to coarse SAND)						
S-4 850		7/5					AS ABOVE			0		0	
	18	10/16	1.1/2.0				BOT 3" SILT SAND						
S-5 905		7/11				LT GRAY	SAND (med grain)	SP	SLIGHTL				
	20	10/9	1.5/2.0						YEL BRN MOTTLED				
S-6 909		6/5					SAND (med to f.g)			0		0	
	22	4/3	1.5/2.0										
S-7 920		3/6					DK YEL ORG f.g						
	24	4/7	1.4/2.0		MED DENSE		SAND + SILT TR CLAY	SM	(NON PLASTIC) BOT 1" CLAYEY	0		0	
S-8		3/4				LT OLIVE	f.g SAND + SILT, LT OLIVE BRN TR CLAY	SP/SM	WET VARIEGATED				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): [ ]

Remarks: 4 1/4 HSA, 2" x 2' SPLIT SPOONS
AUGERED TO 10' BGS, BEGAN COLLECTING SS

Converted to Well: Yes ____ No ✓ Well I.D. #: S57SB037

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 G.W. INVESTIGATION
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85
BORING No.: S57SB037
DATE: 9-21-05
GEOLOGIST: FRED W. RAMISER
DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	26	7/9	2.0										
S9 100		6/7			MED DENSE	LT GRAY	SANDY SILT TR CLAY	SM	SANDIER THEN CU	0		0	
	28	10/12	1.5/2.0				f-g MOTTLED		FOUND DOWN GRADIENT @MW37				
S-10 1005		4/7			STIFF	MOD YEL BRN	f-g SANDY SILT GRAY CLAY STRINGER @291	SC	POOR CU? PLASTIC				
	30	8/9	2.0/2.0		MED			SM		0		0	
S-11 1010		4/8			DENSE		MOD YEL BRN	SM	WET				
	32	8/9	2.0/2.0				f-g SANDY SILT						
S-12 1018		7/8				MOD TO	AS ABOVE	SM/SP	WET	0		0	
	34	9/10	2.0/2.0			DK YEL	SLIGHTLY MORE SAND		(10YR 4/2 10YR 5/4)				
S-13 1025		4/6				BRN							
	36	7/9	2.0/2.0										
									CLAY IS ABSENT IN THIS AREA				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4 HSA 2"x2' SPLIT SPOONS

Drilling Area Background (ppm):

Converted to Well: Yes ____ No ✓ Well I.D. #: S57 SB037

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head
PROJECT NUMBER: N2194
DRILLING COMPANY: Unitech
DRILLING RIG: DPT geoprobe

BORING No.: SS75B041
DATE: 10-5-05
GEOLOGIST: C. Doolan
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
S-1 0840			4.0/4.0		loose	tan	silt and sand		dry				
							fill			5.3			
							aburdant gravel	GW					
	4				stiff	brown green gray	@ 3.5 brown and green grey clay, trace silt	CL	moist	4.1			
S-2 0846			4.0/4.0										
					stiff		some red mottling		moist	4.8			
	8				dense		red mottling increases silt content increases		moist	3.7			
S-3 0854			4.0/4.0		dense		brow silty clay		moist organic odor trace bituminous mat.				
					v. dense		orange and greenish gray clay w/ some silt		moist	4.2			
					med. dense	orange lt. green	orange, yellow, lt. green grey mottled silty	SM	v. moist				
	12						fine sand			5.6			
S-4 0910			4.0/4.0		dense	orange grey	light grey green and light to dark orange		v. moist				
						tan	fine sand and silt		slightly wet	2.5			
					dense	dark orange	med sand and silt						
	16					grey				2.6		3.7	
S-5 0930			4.0/4.0		med. dense	grey	grey to tan fine to med. sand w/ silt		wet				
							orange band	SP	saturated	0			
					dense	grey	dk grey band						
	20					grey	med. to coarse sand coarsening downward		saturated	0			
S-6 0950			4.0/4.0		dense	grey	coarse to very coarse sand trace silt and clay						
										0			
	24				dense	orange	coarse to v. coarse sand w/ some clay, trace silt		increasing clay content	2.2			
S-7 1020			4.0/4.0		dense v dense		very coarse sand 24.5'-25' grey clay w/ coarse sand		some gravel				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT w/ 4' x 2" Macro Core sampling

Drilling Area Background (ppm): 0.0

Converted to Well: Yes _____ No ✓ Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head
PROJECT NUMBER: N2194
DRILLING COMPANY: Unitech
DRILLING RIG: DPT geoprobe

BORING No.: S57SB041
DATE: 10-5-05
GEOLOGIST: C. Dodon
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	25												
					dense	orange and gray mottled	fine sand and silt, trace clay	SM		0			
								↓					
	28				med. dense			↓		0			
S-8 1040			4.0/4.0		v. dense		lt. olive grey clay w/ trace silt, brown mottling	OL	confining unit				
								↓		0			
								ML					
	32				v dense		extremely dense blue grey and brown mottled clay	↓	damp, waxy feel	0			
									friable				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT w/ 4' x 2" Macro Cores

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head
PROJECT NUMBER: N2194
DRILLING COMPANY: Unitech
DRILLING RIG: DPT geoprobe

BORING No.: S57SB042
DATE: 10-5-05
GEOLOGIST: C. Doolon
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
S-1 1305			4.0/4.0		loose	tan to	silt and sand w/ some gravel	SW	damp				
						orange brown	fill			0			
					v dense		gray and orange brown clay, trace silt	ML	damp				
	4									0			
S-2 1310			4.0/4.0										
							orange and brown mottled			0			
	8									0			
S-3 1315			4.0/4.0										
										0			
	12				v dense	light tan	fine sand and silts	SM	moist clean, mature sand	0			
S-4 1325			4.0/4.0		dense								
					v dense	orange bands	increasing clay content	SC		0			
	16				dense	grey to tan	trace to some clay, some M. sand		slightly wet	0			
S-5 1335			4.0/4.0		v dense	tan	medium to fine sand	SW	wet				
						to	grey with rare orange bands		saturated	0			
					v dense	gray							
	20									0			
S-6 1415			4.0/4.0		dense	light	med to coarse sand with some silt						
					med dense	gray	some clay at ±21' to 21.5'			0			
						with some							
	24				v. dense	orange patches				0			
S-7 1430			4.0/4.0										

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT 4' x 2" Macro Core Sampling

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head
PROJECT NUMBER: N2194
DRILLING COMPANY: Unitech
DRILLING RIG: DPT geoprobe

BORING No.: SS7SB042
DATE: 10-5-05
GEOLOGIST: C. Doolan
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	25												
	28				dense	tan to orange	very coarse sand and coarse sand. Some clay	SW		0			
S-8 1540			4.0										
										0			
								ML					
	32				v dense		extremely dense blue gray/and brown mottled clay		damp waxy feel	0			
									friable				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT 4' x 2" Macro Cores

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No ✓ Well I.D. #: —

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head
PROJECT NUMBER: N2194
DRILLING COMPANY: Unitech
DRILLING RIG: DPT geoprobe

BORING No.: S57SB043
DATE: 10-5-05
GEOLOGIST: C. Doolan
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
S-1 1625			3.0/4.0		loose	brown	silt sand, trace gravel	SW	damp				
							fill			0			
					loose		2.5' clayey silt brown to green brn.		damp				
	4						↓	OL		0			
S-2 1630			4.0/4.0		stiff	brown	increased density	↓	damp				
					dense		7.5' yellow brown and orange fine sand	SM		0			
							and silt		moist				
	8						↓ ↓	↓		0			
S-3 1635			4.0/4.0		dense	orange brown	med. to fine sand and silt	SW/SM	moist				
							↓ ↓ increasing clay			0			
					v dense	blue grey	11' to 11.5' med to	SC					
	12				med dense	brown	fine clayey sand med sand		v. moist	0			
S-4 1640			4.0/4.0			brown	fine to medium sand trace silt	SW	saturated				
					medium					0			
					dense to	light grey	medium to coarse sand trace silt		↓				
	16				dense	brown	medium to coarse			0			
S-5 1655			2.5/4.0		dense		sand						
							↓ ↓ coarsening		Saturated	0			
					med dense	orange brown	↓ ↓						
	20				dense	tan to brn.	coarse to v. coarse sand some fine sand			0			
S-6 1715			4.0/4.0		very dense		20' - 21' some clay						
					soft		↓ ↓		saturated.	0			
					dense		23.5' orange to dark brown						
	24				v. dense		23.5' very coarse sand to gravel and clay	↓		0			
S-7 1730			4.0/4.0		loose	tan orange	med. to coarse sand and silt	SW/SW					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT 4' x 2" Macro Core sampling

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No ✓ Well I.D. #: ——

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head
PROJECT NUMBER: N2194
DRILLING COMPANY: Unitech
DRILLING RIG: DPT geoprobe

BORING No.: SS7SB043
DATE: 10-5-05
GEOLOGIST: C. Doolan
DRILLER: Mike Shepherd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	25												
					loose	tan brown	med. to coarse sand w/ fine snd. and silt	SW/SM	saturated.	0			
					dense		26' dark olive grey coarse sand		confining unit				
	28				v dense	dk olive grey	27' coarse to med. sand grading to clay	SC		0			
S-8 1825			4.0/4.0		v dense		fine clayey sand and silt						
							olive grey			0			
					very dense								
	32				v dense		extremely dense blue and green gray clay with	mc	damp	0			
							brown mottling trace silt		waxy, friable				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: DPT 4' x 2" Macro Samplers

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ____ No ✓ Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 52 G.W. INVESTIGATION
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: GEOPROBE 66DT
BORING No.: S52SB45
DATE: 9-27-05
GEOLOGIST: FRED WILLIAMSON
DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 0735						MED BRN	SAND + SILT						
	2					YEL BRN	GRAVEL AND SAND	GW					
						YEL BRN	SILTY f-g SAND	SM		0			
	4		3.5/4.0				↓		WET @ 4'				
S-2 0740							AS ABOVE			0			
	6						TR GRAVEL		MOTTLED				
							TR CLAY		DK BRN	0			
	8		3.5/4.0				↓	↓					
S-3 0745					LOOSE		SAND AND	SW	SATURATED				
	10						GRAVEL			0			
							TR SILT						
	12		3.0/4.0					↓					
S-4 805					MED DENSE	LT GRAY	SAND	SP	SLIGHT	0			
	14						TR SILT		MOTTLED BRN				
							TR						
	16		4.0/4.0				↓	↓		0			
S-5 0815					DENSE	LT GRAY	AS ABOVE	SP					
	18						TR F. GRAVEL						
										0			
	20		4.0/4.0				↓						
S-6 0830							TOP 6" CLAYEY SAND	↓	SC	0			
					DENSE	GRAY	SAND f-g TO C-g	SW	MOTTLED				
							W/SOME FINE		DK BRN ORG	0			
	24		4.0/4.0				GRAVEL ↓	↓					
S-7 0859	25						LT OLIVE GRAY CLAYEY f-g SAND		NON PLASTIC				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm):

Remarks: DPT 4' x 2" MACRO CORE

Converted to Well: Yes ____ No X Well I.D. #: ____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 G.W. INVESTIGATION
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: GEOPROB 66 DT

BORING No.: S57SB045
DATE: 9-27-05
GEOLOGIST: FRED W RAMSER
DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	26						LT. OLIVE GRAY		THIS IS				
							CLAYEY f-g SAND		SIMILIAR				
	28		4.0				PALE YEL BRN f-g SAND + SILT + CLAY		TO THE CU				
				cont.			3" CASING						
				below			HIT REFUSAL						
							@ 23'						
	28												
S-8 0945			4.0/4.0		v. dense		Lt. olive gray, mottled brown clayey fine sand			0			
							Lt. olive gray w/ dark gray bands fine clayey sand						
							pale yellow brn fine clayey sand		some clay stringers of same color, waxy feel	0			
	32				v dense		Lt. olive gray clayey med. sand		bottom of CU				
S-9 1020			4.0/4.0		dense		yellow brown mottled Lt. olive gray med. sand w clay			0			
					dense		yellow brown med.						
							sand some clay and sand			0			
	36				v dense	lt. olive gray, brown	med to coarse sand, some clay/silt		coarsening w/ depth				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.0

Remarks: DRIVE 3" CASING W/ DPT
Had to auger w 3 1/4" to sample below 28'

Converted to Well: Yes _____ No X Well I.D. #: _____

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57, INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW027/026
DATE: 9-16-05
GEOLOGIST: FRED W RAMSER
DRILLER: MIKE SHEPARD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
							DK BRN SAND						
							AND GRAVEL						
							↓						
				▽									
							↓						
							LT GRAY SAND						
							W/SOME GRAVEL						
	10												
S-1 1005		3/6 4/5				YEL ORG	+ YEL BRN SAND+GRAVEL	GW		0		0	
	12	11/12	1.5/2.0					↓					
S-2 1011		8/4					AS ABOVE	↓		0		0	
	14	7/1	1.0/2.0				↓	↓					
S-3 1018		11/3			MED DENSE	LT GRAY	SAND	SW		0		0	
	16	5/8	1.0/2.0		↓	↓	↓	↓					
S-4 1022		6/11					AS ABOVE						
	18	12/12	2.0/2.0		↓	↓	↓	↓					
S-5 1030		3/2			LOOSE	LT BRN YEL ORG	SAND	SP	MOTTLED				
	20	2/2	2.0/2.0				TR SILT TR CLAY	SC					
S-6 1035		2/5					NO RECOVERY		SILTY CLAY IN				
	22	7/11	1.8/2.0						SHOE				
S-7 1040		2/5			MED DENS		TOP 18" CLAYEY, SILTY f-g SAND	SC	BASED ON DRILLER CU @ 20'				
	24	7/8	1.8/2.0		VERY STIFF		BOT 6" SILT + CLAY (LEAN CLAY)	↓	MOTTLED BRN				
9-21-05 S-1 1430			3/8				TOP 12" SILT + CLAY TR f-g SAND	↓					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0.2

Remarks: 4 1/4 HSA, 2" x 2' SPLIT SPOONS
S57MW027 (SHALLOW) S57MW026 (DEEP WELL)
→ WELL 10-20', SAND 8-20 BENT 6-8

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW027/MW026

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW027 / 026
DATE: 9-21-05
GEOLOGIST: FRED WRAMSER
DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
9/21 S-1 1430	26	11 / 10	2.6 / 2.0				CLAYEY f.g SAND TR SILT / MORE CLAY	SC	9-21-05				
S-2 1445		7 / 8					f.g SAND + SILT @ 26.5	SM	DK GRAYISH	0			
	28	9 / 10	7.6 / 2.0				TR CLAY	↓	GREEN INTERLAYERED				
S-3 1507		5 / 6				M. YEL BRN	CLAY + SILT - f.g SAND	SC	MOD YEL BRN AND DK YEL BRN	0			
	30	7 / 7	2.0 / 2.0			GRAYISH GREEN	SILTY SAND, SANDIER THAN ABOVE	SP/SM	CLAYEY SILT TR f.g SAND				
S-4 1535		4 / 5				↓	AS ABOVE	SP/SM		0			
	32	5 / 4	2.0 / 2.0			↓	↓	↓					
S-5 1545		5 / 6					TOP 18" GRAY GREEN SILTY SAND	↓	f.g SAND	0			
	34	8 / 8	2.0 / 2.0				BOT 6" MOD. YEL BRN SILTY SAND TR CLAY	SM/SP	COHESIVE NON PLASTIC				
S-6 1620		6 / 10					TOP 12" AS ABOVE.	SP	WET TO MOIST	0			
	36	9 / 7	2.0 / 2.0				BOT 12" GRAY GREEN SILTY SAND	SP/SM		0			
S-8 1635		3 / 7											
	38	11 /	2.0		VERY STIFF	BRNISH GRAY	5YR 4/1, SILT + CLAY	ML	MOTTLED RED	0			
S-9 1650		9 / 7				↓	SILT + CLAY	↓	WAXY APPEARANCE FRIABLE DRY				
	40	11 / 11	/ 2.0		HARD	↓	CLAY	↓	DRY				
							DEEP WELL						
							SAND 38-24						
							SCREEN 27-37						
							S57MW026						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): [ ]

Remarks: S57MW027 (SHALLOW) S57MW026 (DEEP)
SIX INCH ESD CASING INSTALLED 9-20-05 (1630AM)
MUD ROTARY W/ 2" SS 5 3/4 WIDE BIT

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW027 / 026

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW29/MW28
DATE: 9-16-05
GEOLOGIST: FRED WRANOSE
DRILLER: MIKE SHEPERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
						BRN	SILT AND SAND	SM/SM					
	2												
S-1 0735		2/3					SILT + SAND DK GREY CLAY AND						
	4	1/1	0.2/2.0			BLK	CHARCOAL (FLY ASH)		WET @ 4'				
S-2 0737		WOH		?			NO RECOVERY						
	6		0/2.0				GRAY SILT + CLAY IN SHOE						
S-3 0739		H			VERY LOOSE	LT	SILTY SAND (f-g)	SM/SC	SATURATED	0		0	
	8	2/1	2.0/2.0			GRAY	TR CLAY						
S-4 0740		WOH					AS ABOVE		SATURATED	0		0	
	10	3	1.0/2.0										
S-5 0745		2/3					TOP 15": SILTY SAND +	SM					
	12	4/4	1.5/2.0				BOT 3": SAND + GRAVEL		YEL BRN	0		0	
S-6 0750		4/5			LOOSE	YEL BRN	SAND + GRAVEL	GW	MOTTLED GRAY				
	14	4/4	1.5/2.0										
S-7 0755		5/5			STIFF	5GY	GREENISH GRAY	OL	MED TO LOW	0		0	
	16	6/8	2.0			5/1	CLAY + SILT TR f-g SAND		PLASTIC MOTTLED BRN				
									CU 14' TO 19'				
							CONTINUE LOG ON PAGE 2 OF 2						
							INSTALL WELL S57MW29 4-14 SAND 3-14 SEAL 2-3						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4 HSA, 2"X2' SPLIT SPOONS

Drilling Area Background (ppm): 0.8

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW029

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: S57 GW INVESTIGATION
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85
BORING No.: S57MW28 (DEEP)
DATE: 9-22-05
GEOLOGIST: FRED WRANISKI
DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1340		2 / 3			MED	GRN	SILT + CLAY	OL	(SEE PG 1 FOR				
	18	4 / 4	1.5 / 2.0		STIFF	BRN	TR f-g SAND		LITHOLOGY 0-16')	0		0	
S-2 1345		7 / 8			STIFF		SANDY CLAY W/SILT	OL	MOTTLED BRN				
	20	9 / 10	1.5 / 2.0				↓ (f-g)	OL/SM	COARSENING DOWNWARD	0		0	
S-3 1400		1 / 3					SILT + CLAY	OL	INTERLAYER SANDY CLAY				
	22	7 / 8	1.5 / 2.0				TR f-g SAND	SM	CLAYEY SAND (f-g)				
S-4 1405		9 / 10				GRN	SILT + CLAY	SM/SC		0		0	
	24	10 / 10	1.5 / 2.0			GRAY	+ f-g SAND						
S-5 1415		3 / 7			STIFF		AS ABOVE						
	26	7 / 9	1.5 / 2.0										
S-6 1425		3 / 5					AS ABOVE		BRN	0		0	
	28	7 / 5	1.5 / 2.0				[@ 27' CLAYEYER]	SC	MOTTLED				
S-7 1443		8 / 10					SANDY CLAY	SM					
	30	11 / 14	1.8 / 2.0		VERY SOFT	GRN GRAY	SILT + CLAY	OL	BRN				
S-8 1507		7 / 5			MED		SILTY SAND	SM	SLIGHTLY COARSER	0		0	
	32	4 / 8	2.0 / 2.0		DENSE		TR CLAY	SP	SAND THAN ABOVE				
S-9 1520		6 / 8					SILTY SAND	SM	SAND CONTENT INC.				
	34	9 / 11	2.0 / 2.0				TR CLAY	SP					
S-10 1530		9 / 10			VERY	BRN GRAY	SILT + CLAY	ML	MOTTLED RED	0		0	
	36	12 / 13	/ 2.0		STIFF		5YR4/1 DRY		WAXY FRIABLE				
							S57MW28						
							SCREEN						
							24-34						
							SAND 22-34						
							SEAL 20-22						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: MUD ROTARY DRILLING BEYOND 6" STEEL ISOLATION CASING INSTALLED TO 16' BGS

Drilling Area Background (ppm):

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW028

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: S57 GROUNDWATER INVES. BORING No.: S57MW030
PROJECT NUMBER: 2194 DATE: 9-23-05
DRILLING COMPANY: UNITECH GEOLOGIST: FREDW RAMSER
DRILLING RIG: CME 85 DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	16												
S-1 740		3/4			MED STIFF		GREENISH GRAY SILT + CLAY TR F-g SAND	OL	SEE BORING	0			
	18	4/5	2.0/2.0						S57MW020				
S-2 746		9/7					AS ABOVE		0-14'	0		0	
	20	14/12	1.0/2.0				HI BLOW COUNTS DUE TO OVER DRIVE		(CASING IN				
S-3 801		4/9					AS ABOVE	OL	STILL FOR 7.0	0		0	
	22	11/8	1.5/2.0				SLIGHTY MORE SAND BRN MOTTLED @21'		16' BEGIN				
S-4 807		8/7			MED STIFF	GRN GRAY	SILT + CLAY TR F-g SAND	OL	SAMPLING	0		0	
	24	6/7	1.0/2.0				SLIGHTY MOR CLAY @ 23'		@ 16')				
S-5 825		4/6					AS ABOVE		(STRONGLY	0			
	26	9/5	1.0/2.0						MOTTLED BRN)				
S-6 830		6/5			MED DENSE		SILTY f-g SAND	SM/SP	LESS MOTTLED	0			
	28	6/6	1.0/2.0				TR CLAY						
S-7 854		7/10					AS ABOVE		SLIGHTLY MORE				
	30	10/11	1.5/2.0				SLIGHTLY MORE SAND		BRN MOTTLED				
S-8 0913		5/5					f-g SAND	SM/SP	COARSER THAN 28-30'				
	32	5/5	1/2.0				SILT TR CLAY		SAND CONT. INC DOWNWARD				
S-9 0917		9/8					AS ABOVE		(LESS SILT				
	34	9/7	1.0/2.0						THAN 30-28)				
S-10 0933		5/9			VERY STIFF	BRN GRAY	SILT + CLAY	ML	MOTTLED RED				
	36	13/15	/2.0				5YR 4/1		WAXY DRY FRIABLE				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 0

Remarks: MUD ROTARY DRILLING USING 5 3/4 LING BIT THROUGH SIX INCH ID. CASING

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW030

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW031
DATE: 9-15-05
GEOLOGIST: FRED W RAMSEY
DRILLER: MIKE SHEPARD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	2												
S-1 1645		1 / 1/12			LOOSE	BRN	SILT SAND + GRA.	GM	SLAG FRAG.	0		0	
	4	1	1.8 / 2.0				TR CLAY @ 3.8'		WET @ 4'				
S-2 1648		6 / 8			MED DENSE		GRAVEL + SAND	GM	DRY?	0			
	6	8 / 6	1.8 / 2.0				TR SILT + CLA						
S-3 1650		4 / 6		?			NO RECOVERY			0		0	
	8	7 / 9	0 / 2.0										
S-4 1655		6 / 7				LT GRAY	SAND TR SILT	SW	SATURATED MOTTLED	0		0	
	10	8 / 14	1.8 / 2.0				CLAYEY @ 9' (1" THICK)		YEL ORG YEL BRN				
S-5 1658		3 / 6				LT GRAY	SAND W/SOME SILT	SW	YEL ORG	0		0	
	12	9 / 9	1.6 / 2.0				CLAYEY SAND LAYER (2" @ 11.5' BGS)		YEL BRN LAYERING				
S-6 1700		5 / 7				LT GRAY	AS ABOVE	SW	SLIGHT	0		0	
	14	8 / 7	1.8 / 2.0				SILTY SAND IN SHOE		MOTTLED YEL BRN				
S-7 1702		4 / 6			STIFF	LT GRAY	TOP 6": CLAY + SILT BOTTOM 18" SAND	CL / SP	(LT OLIVE GRY 5Y 5/2)	0		0	
	16	5 / 6	2 / 2.0		MED DENSE								
S-8 1705		7 / 9				LT GRAY	SAND	SP		0		0	
	18	10 / 8	2 / 2.0										
S-9 1710		7 / 9											
	20	9 / 9	2 / 2.0							0		0	
S-10 1740		3 / 4			MED STIFF	MED GREENISH GRAY	CLAY AND SILT	OL	THIS IS THE				
	22	4 / 4	2.0				(5GY 5/1)		CU				
							INSTALLED						
							SCREEN 10-20						
							SAND 8-20, SEAL 6-8'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): [ ]

Remarks: 4 1/4 HSA, 2" x 2' SPLIT SPOONS

Converted to Well: Yes ✓ No ____ Well I.D. #: S57MW031

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW032
DATE: 9-15-05
GEOLOGIST: FRED W RAMSEYER
DRILLER: MIKE SHEPHERD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							SAND + SILT TOPSOIL	GW					
	2						GRAVEL						
S-1 735		1/1			SOFT	GRAY	SILT + CLAY	CL	MOIST	0		0	
	4	1/1	1.5/2.0				BLK STRINGERS						
S-2 740		1/1					TR GRAVEL		WOOD FRAG	0		0	
	6	1/1	1.5		LOOSE	GRAY	SAND + GRAVEL	GW	WET				
S-3 742		1/1					AS ABOVE			0		0	
	8	1/1	1.8/2.0										
S-4 750		1/0				GRAY	AS ABOVE	GW		0		0	
	10	1/1	1.5/2.0										
S-5 755		1/1			LOOSE		GRAY CLAYEY SAND		WET				
	12	1/1	1.0/2.0				SAND + GRAVEL			0		0	
S-6 800		5/7			MED DENSE	DK	SAND + GRAVE	GW					
	14	11/12	1.0/2.0			YEL BRN	TO YEL ORG						
S-7 0805		3/3					DK GRAY CLAY LAYER		CLAY STRINGER	0		0	
	16	8/8	[illegible]/2.0		MED DENSE	YEL GRAY	SAND	SP	@ 14.8' W/ YEL BRN LAYERS				
S-8 0815		8/10					AS ABOVE		YEL ORG				
	18	14/17	[illegible]/2.0					SP	MOTTLED YEL GRAY	0		0	
							SCREEN 5-15						
							SAND 3-16						
							BENT. 2-3						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 18.7

Remarks: 4 1/4 HSA, 2" SPLIT SPOONS USING MECH. HAMMER

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW032

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW033
DATE: 9-15-05
GEOLOGIST: FRED WRAMSER
DRILLER: MIKE SHEPARD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
						VEL BRN	SAND + GRAVEL	GW		0			
	2												
S-1 1140		1 / 1								0			
	4	1 / 2	1.5 / 2.0		SOFT		CLAYEY SAND + GRAVEL	GC		0			
S-2 1142		1				LT GRAY	SILT + CLAY	OH					
	6	1	.8 / 2.0										
S-4 1145		1					NO RECOVERY		CUTTINGS				
	8	1	0 / 2.0						ARE DK GRAY				
S-5 1148		1					NO RECOVERY		MUD TO BLK				
	10	1	0 / 2.0						SAND + CLAY				
S-6 1150		1 / WOH				OLIVE GREY	SILT + CLAY	OH		0			
	12		1.8 / 2.0			DK	SAND STRINGER @ 12'						
S-7 1310		WOH				GRAY	CLAYEY SAND	SC	MAYBE				
	14	1	1.5 / 2.0				AND SILT (f.g)		CONFINING UNIT	0			
S-8 1320		WOH					AS ABOVE						
	16	6	2.0 / 2.0				SAND CONTENT INC DOWNWARD	SC	(f.g SAND)	0			
							SCREEN 6-16						
							SAND 4-16						
							SEAL 3-4						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4 HSA, 2" x 2' SPLIT SPOON SPL.

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW033

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW034
DATE: 9-15-05
GEOLOGIST: FRED W RAMSER
DRILLER: MIKE SHEPARD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
						BLK	SAND + SILT	SW					
	2					↓		↓					
S-1 1015		1/1				BLK	SAND & SILT	↓	CHARCOAL	0			0
	4	1/1	1.8/2.0			YEL BRN	CLAYEY SILT		@ 3' (FILL)	0			0
S-2 1018		↓ WOH				YEL BRN MOTTLED	CLAYEY SILT	ML	WET				
	6	2/2	1.0/2.0			GREY	TR F-g SAND			0			0
S-3 1020		4/4				↓	INCREASE SAND CONTENT DOWNWARD		SATURATED				
	8	4/5	2.0/2.0			↓	↓	ML/CL		0			0
S-4 1022		3/3				YEL BRN	SAND TR GRAVEL		MOTTLED GRAY				
	10	3/2	1.5/2.0			↓	↓			0			0
S-5 1025		2/3					SAND + GRAVEL	GW					
	12	4/3	1.0/2.0			↓		↓	↓	0			0
S-6 1030		1/4				↓	AS ABOVE	↓	↓				
	14	7/8	1.0/2.0			↓	CLAY + SILT	CL	YEL BRN + GRAY	0			0
S-7 1035		1/WOH			SOFT	OLIVE	CLAY TR SILT	CL	MED PLASTIC				
	16	↓	1.8/2.0			GRAY	↓	↓	CU? NOT THE SAME AS MW037	0			0
							SCREEN 4-14						
							SAND 3-14						
							BENT. 2-3						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4 HSA, 2" x 2' SPLIT SPOONS

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW034

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Site 57 Indian Head
PROJECT NUMBER: 2194
DRILLING COMPANY: Unitech
DRILLING RIG: CME 85

BORING No.: S57MW035
DATE: 2/19/05
GEOLOGIST: C. Doolan
DRILLER: Mike Sheperd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0						fine sand and silt dry		Augered to 10' before sampling				
	5												
	10												
S-1 1404		6/8	1.5/2.0		loose	orange yellow	fine sandy silt trace gravel, damp	SM		0		0	
	12	10/9											
S-2 1407		6/15	1.0/2.0		loose	light brown	fine sand and gravel trace wood fragments	GW		0		0	
	14	8/7				tan	clay at 14' moist	OL	clay lens				
S-3 1413		4/6	1.5/2.0		med. dense	lt. grey yellow	medium sand, mottled wet	SP		0		0	
	16	7/6				brown							
S-4 1416		5/10	2.0/2.0		med. dense	"	medium sand, trace clay at 16', wet	SP		0		0	
	18	9/10											
S-5 1422		5/6	1.5/2.0		med. dense	lt. grey orange	coarse sand, mottled saturated	SP		0		0	
	20	7/8											
S-6 1427		1/1	1.5/2.0		med. dense loose	lt. grey	coarse sand, saturated trace fine sand	SP		0		0	
	22	1/3			med dense	orange							
S-7 1432		1/5	2.0/2.0		dense	grey orange	very coarse sand saturated	SP		0		0	
	24	8/10			v. dense dense	grey	coarse sand very coarse sand						
S-8 1435		5/6	2.0/2.0		dense	orange and grey	coarse to v. coarse sand mottled, saturated	SP		0		0	

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): [ ]

Remarks: 4 1/4 HSA, 2" x 2' Split Spoons

Well 22' - 32', sand 20' - 32', bent. 18' - 20'

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW035

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: Indian Head SITE ~~50~~ 57, CTO ~~0005~~ 0007
PROJECT NUMBER: ~~2144~~ 2194
DRILLING COMPANY: ~~Talon Drilling~~ Unitech
DRILLING RIG: CME 85

BORING No.: S57MW035
DATE: 9/19/05
GEOLOGIST: C. Doolan
DRILLER: Mike Sheperd

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
							cont.						
	26	6 / 10			v dense dense		trace silt and fine sand	SP					
S-9 1439		10 / 11	2.0 / 2.0		dense	grey	v. coarse sand, trace silt	SP		0		0	
	28	16 / 20			v. dense		← very dark brown lens	SP					
S-10 1447		2 / 4	2.0 / 2.0		v. dense	tan	v coarse sand saturated	SP		0		0	
	30	14 / 17			stiff	med tan	gray clay at 29'. med. sand, wet	OT	clay lens				
S-11 1452		4 / 8	1.5 / 2.0		dense	orange	v coarse sand, trace silt	SP		0		0	
	32	9 / 4			dense stiff	blue grey	v. coarse sand, trace silt and clay, clay at 32', some silt	SP OT	confining unit				
							← SGYS1						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4¼ HSA, 2" x 2' Split Spoons

Drilling Area Background (ppm):

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW035

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW036
DATE: 9-15-05
GEOLOGIST: FRED W RAMSKA
DRILLER: MIKE SHEPARD

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
							SAND + GRAVEL	GW					
	2												
S-1 1500		4/6			MED DENSE	YEL ORG	SAND + GRAVEL			0			
	4	8/6	0.5/2.0										
S-2 1510		8/8				YEL BRN	CLAY	CL		0			
	6	7/6	2.0/2.0			LT. GRAY	SAND	SP					
S-3 1515		5/6			MED DENSE				WET @ 6'	0			
	8	8/8	2.0/2.0										
S-4 1520		5/6					SAND			0			
	10	6/7	2.0/2.0		STIFF	LT GRAY	SILT W TR CLAY	CL	DRY				
S-5 1530		6/7			STIFF				DRY	0			
	12	8/8	2.0/2.0				(OLIVE GRAY)						
							PLACE SCREEN						
							5'-10'						
							SAND 4-10						
							BENT 3-4						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4 HSA, 2" x 2' SPLIT SPOONS

Drilling Area Background (ppm):

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW036

Tetra Tech NUS, Inc.

BORING LOG

PROJECT NAME: SITE 57 INDIAN HEAD
PROJECT NUMBER: 2194
DRILLING COMPANY: UNITECH
DRILLING RIG: CME 85

BORING No.: S57MW037
DATE: 9-14-05
GEOLOGIST: FRED W RAMSER
DRILLER: ~~MICHAEL~~ MIKE S.

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
							SAND + SILT	SC					
	2				SOFT	GRAY	SILTY SAND	SC					
S-1 1455									HIT H_2O				
	4	WOH	1.5/2.0		SOFT	GRAY	SILT + CLAY		@ 2' BGS			•	
S-2					LOOSE	OLIVE BRN	CLAYEY SAND f.g)	SC					
	6	1 WOH	2.0/2.0				TR SILT			0		0	
S-3 1505													
	8	WOH	1.5/2.0				PEAT @ 7.5' SILT + CLAY						
S-4 1510		WOH/18					NO REC TR f.g SAND			0		0	
	10	1 WOH	0.3/2.0		SOFT/ LOOSE		(SAND IN SHOE?)						
S-5 1515		3/4				OLIVE BRN	SAND (m.g)	GW					
	12	3/4	/2.0				AND GRAVEL			0		0	
S-6 1520		3/5			LOOSE		AS ABOVE						
	14	5/4	/2.0										
S-7 1530		5/6			LOOSE					0		0	
	16	7/6	2.0/2.0		MED STIFF		CLAY + SILT TR LOW PLASTIC	OL	(DK GREENISH GRAY 5GY 4/1)				
							f.g SAND		THIS IS THE CONFINING				
	18								UNIT.				
							SCREEN 10-15						
							SAND: 8'-15'						
							BENT: 6-8						

* When rock coring: enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Remarks: 4 1/4 HSA, 2" x 2' SPLIT SPOONS

Drilling Area Background (ppm): 0.0

Converted to Well: Yes ✓ No _____ Well I.D. #: S57MW037

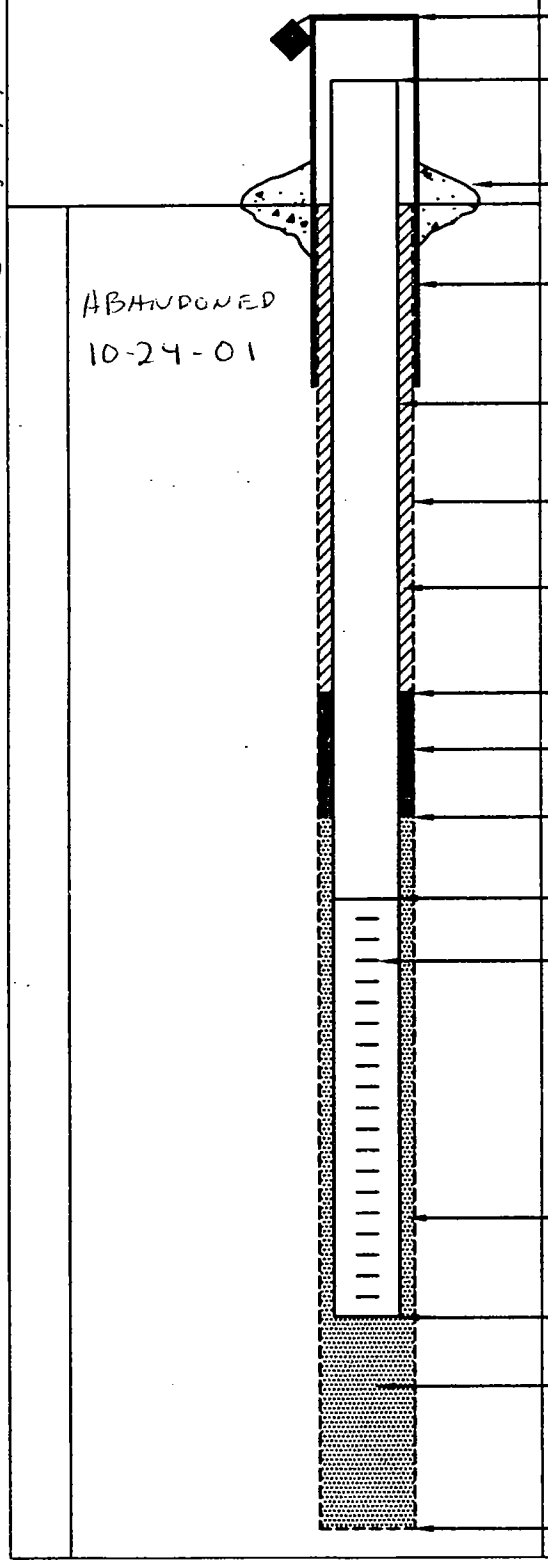
A.2 WELL CONSTRUCTION SHEETS

WELL NO.: S57TW014

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT: NSWC Indian Head	LOCATION: Site 57	DRILLER: Aaron E.
PROJECT NO.: N7129	BORING: S57SB027	DRILLING METHOD: HSA
DATE BEGUN: 8/22/01	DATE COMPLETED: 8/22/01	DEVELOPMENT METHOD: Pump
FIELD GEOLOGIST: Bob Balkovec		
GROUND ELEVATION: 42.51	DATUM: NGVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /

TYPE OF SURFACE SEAL: Bentonite

I.D. OF SURFACE CASING: NA
TYPE OF SURFACE CASING: NA

RISER PIPE I.D.: 1"
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: /0

TYPE OF SEAL: Bentonite

DEPTH TOP OF SAND PACK: 3'

ELEVATION/DEPTH TOP OF SCREEN: /4'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 5'

I.D. OF SCREEN: 1"

TYPE OF SAND PACK: Silica Sand
20-40 Sieve Size

ELEVATION/DEPTH BOTTOM OF SCREEN: /9'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /10'

BACKFILL MATERIAL BELOW SAND: Silica Sand

ELEVATION/DEPTH OF HOLE: /10'

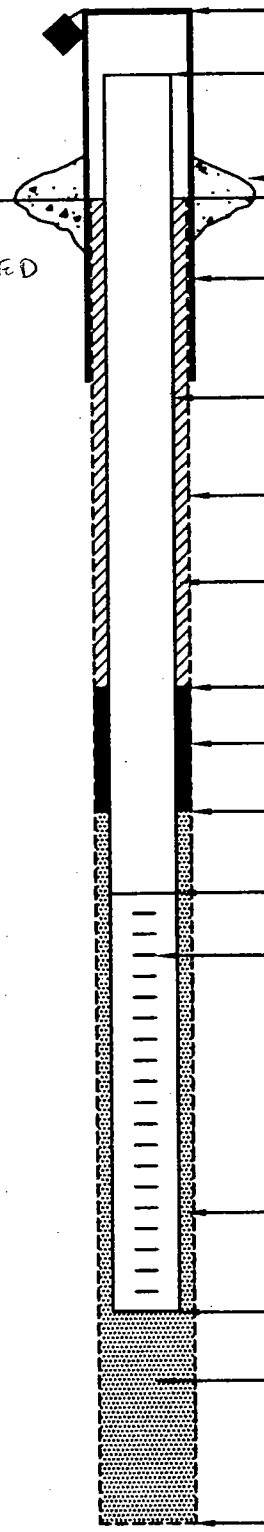
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57TW015

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NSWC INDIAN HEAD	LOCATION SITE 57	DRILLER AARON E.
PROJECT NO. 107124	BORING S57SB027	DRILLING METHOD HSA
DATE BEGUN 8/21/01	DATE COMPLETED 8/21/01	
FIELD GEOLOGIST BOB BALKOVEC		DEVELOPMENT METHOD PUMP
GROUND ELEVATION 42.71	DATUM NGVD 29	



ABANDONED 10-24-01

ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /

TYPE OF SURFACE SEAL: BENTONITE

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASING: NA

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: /0

TYPE OF SEAL: BENTONITE

DEPTH TOP OF SAND PACK: 17'

ELEVATION/DEPTH TOP OF SCREEN: /25'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 5'

I.D. OF SCREEN: 1"

TYPE OF SAND PACK: SILICA SAND 20-40 SIEVE SIZE

ELEVATION/DEPTH BOTTOM OF SCREEN: /30'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /30'

BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: /30'

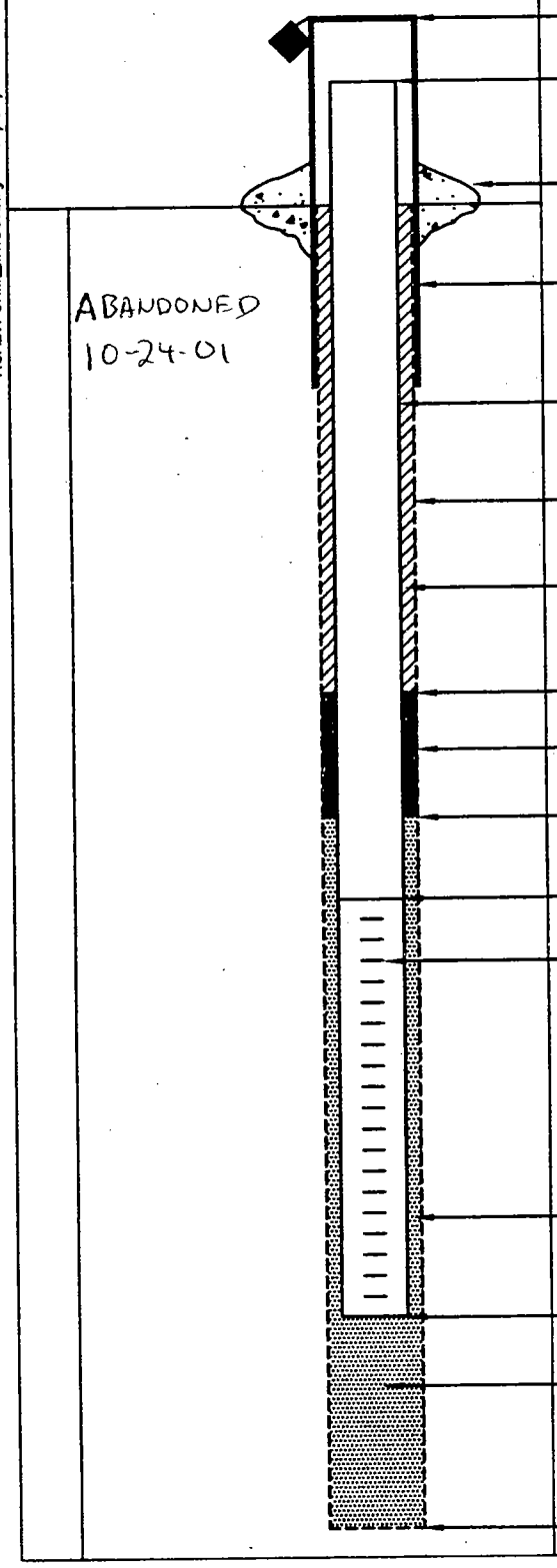
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57TW016

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NSWC INDIAN HEAD	LOCATION SITE 57	DRILLER BRIAN VAN DORN
PROJECT NO. 107129	BORING S57SB078	DRILLING METHOD HSA
DATE BEGUN 8/17/01	DATE COMPLETED 8/17/01	DEVELOPMENT METHOD PUMP
FIELD GEOLOGIST BOB BALKOVEC		
GROUND ELEVATION 37.83	DATUM NGVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1.5'

TYPE OF SURFACE SEAL: BENTONITE

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASING: NA

RISER PIPE I.D.: 1"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: 10'

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: 4'

ELEVATION/DEPTH TOP OF SCREEN: 15'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 5'

I.D. OF SCREEN: 1"

TYPE OF SAND PACK: SILICA SAND 20-40 SIEVE SIZE

ELEVATION/DEPTH BOTTOM OF SCREEN: 10'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 10'

BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: 10'

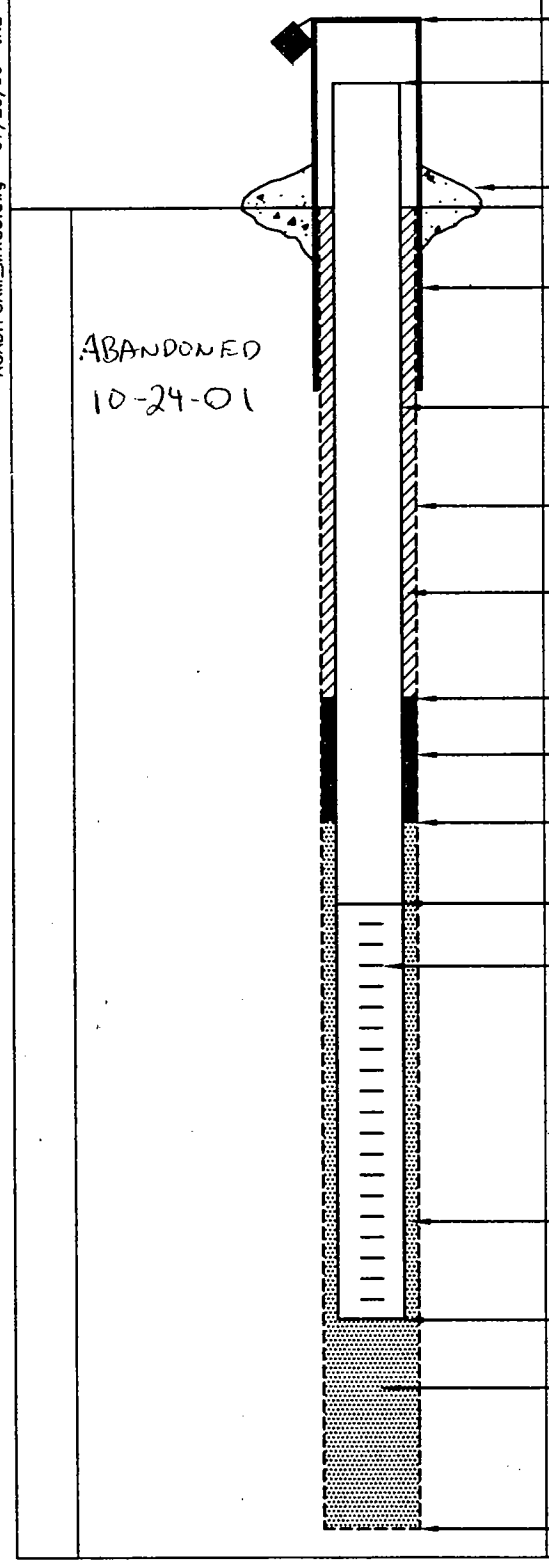
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57TW017

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NSWC INDIAN HEAD	LOCATION SITE 57	DRILLER BRIAN VAN DORN
PROJECT NO. 107129	BORING S57SB028	DRILLING METHOD HSA
DATE BEGUN 8/16/01	DATE COMPLETED 8/16/01	
FIELD GEOLOGIST BOB BALKOVEC		DEVELOPMENT METHOD PUMP
GROUND ELEVATION 34.78	DATUM NGVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /2'

TYPE OF SURFACE SEAL: BENTONITE

I.D. OF SURFACE CASING: NA
TYPE OF SURFACE CASING: NA

RISER PIPE I.D.: 1"
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: /0'

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: 11'

ELEVATION/DEPTH TOP OF SCREEN: /13'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 10'

I.D. OF SCREEN: 1"

TYPE OF SAND PACK: SILICA SAND
20-40 SIEVE

ELEVATION/DEPTH BOTTOM OF SCREEN: /23'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /24'
BACKFILL MATERIAL BELOW SAND:
SAND 20-40 SIEVE

ELEVATION/DEPTH OF HOLE: /24'

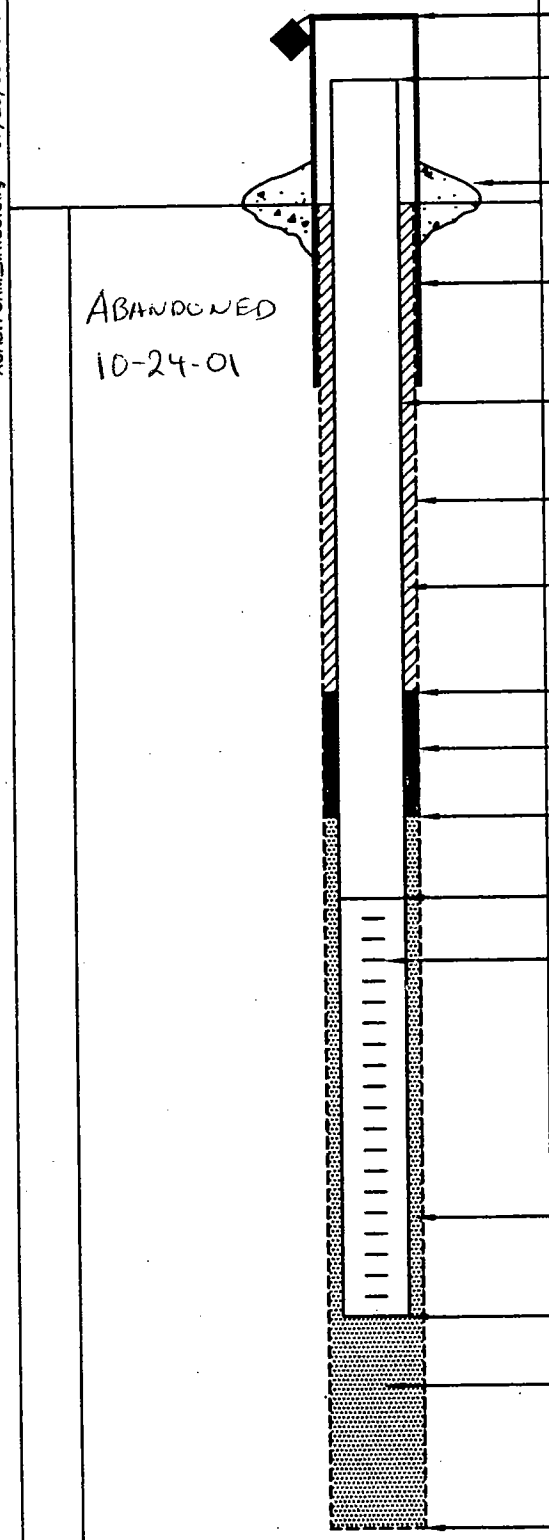
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57TW018

OVERBURDEN MONITORING WELL SHEET STICK-UP

Tetra Tech NUS, Inc.

PROJECT NSWC INDIAN HEAD	LOCATION SITE 57	DRILLER AARON E.
PROJECT NO. N7124	BORING S57SB024	DRILLING METHOD HSA
DATE BEGUN 8/20/01	DATE COMPLETED 8/20/01	
FIELD GEOLOGIST BOB BALKOVEC		DEVELOPMENT METHOD PUMP
GROUND ELEVATION 30.71	DATUM NGVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1.5'

TYPE OF SURFACE SEAL: BENTONITE

I.D. OF SURFACE CASING: NA
TYPE OF SURFACE CASING: NA

RISER PIPE I.D.: 1"
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: 10'

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: 7'

ELEVATION/DEPTH TOP OF SCREEN: 19.5'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 5'

I.D. OF SCREEN: 1"

TYPE OF SAND PACK: SILICA SAND
20-40 SIEVE SIZE

ELEVATION/DEPTH BOTTOM OF SCREEN: 14.5'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 15' ~~14.5~~
BACKFILL MATERIAL BELOW SAND:
SAND

ELEVATION/DEPTH OF HOLE: 15

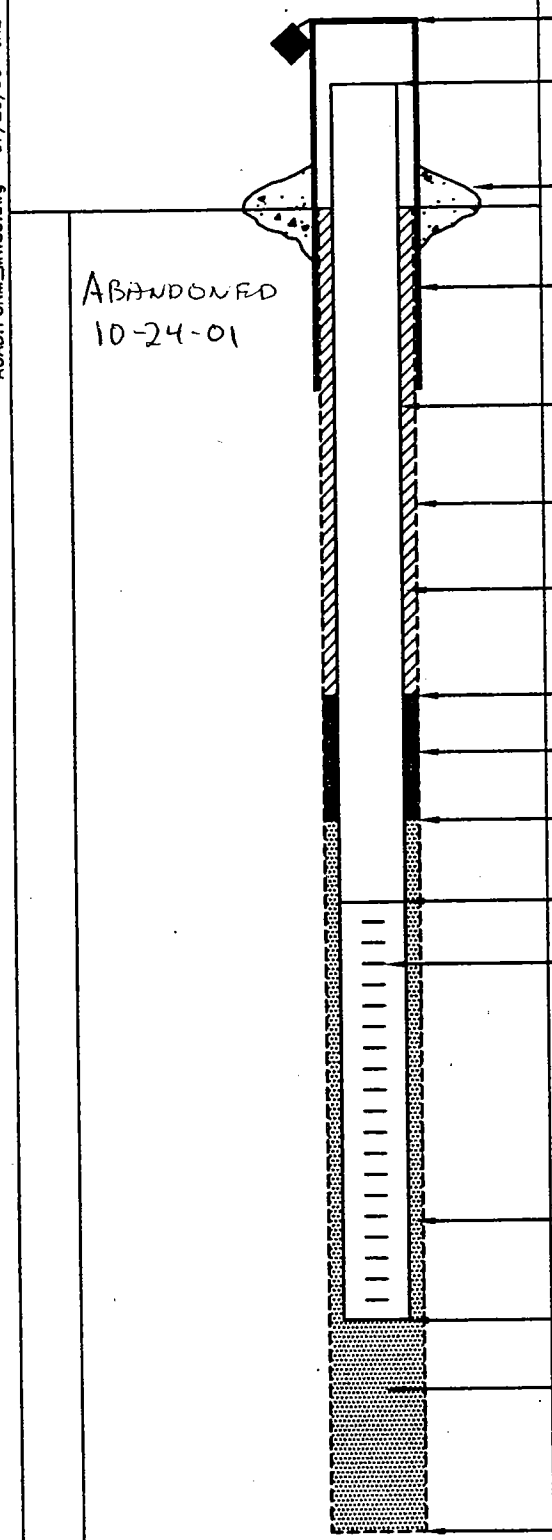
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57TW019

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NUSWC INDIAN HEAD	LOCATION SITE 57	DRILLER BRIAN VAN DORN	
PROJECT NO. N71129	BORING S57SB029	DRILLING METHOD HSA	
DATE BEGUN 8/17/01	DATE COMPLETED 8/17/01		
FIELD GEOLOGIST BOB BALKOVEC		DEVELOPMENT METHOD PUMP	
GROUND ELEVATION 30.64	DATUM NGVD 29		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /1'

TYPE OF SURFACE SEAL: BENTONITE

I.D. OF SURFACE CASING: NA
TYPE OF SURFACE CASING: NA

RISER PIPE I.D.: 1"
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: /0'

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: 14.5'
(NATURAL COLLAPSE FROM 17.5'-14.5')

ELEVATION/DEPTH TOP OF SCREEN: /19'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 5'

I.D. OF SCREEN: 1"

TYPE OF SAND PACK: SILICA SAND
20-40 SIEVE

ELEVATION/DEPTH BOTTOM OF SCREEN: /24'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /24'
BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: /24'

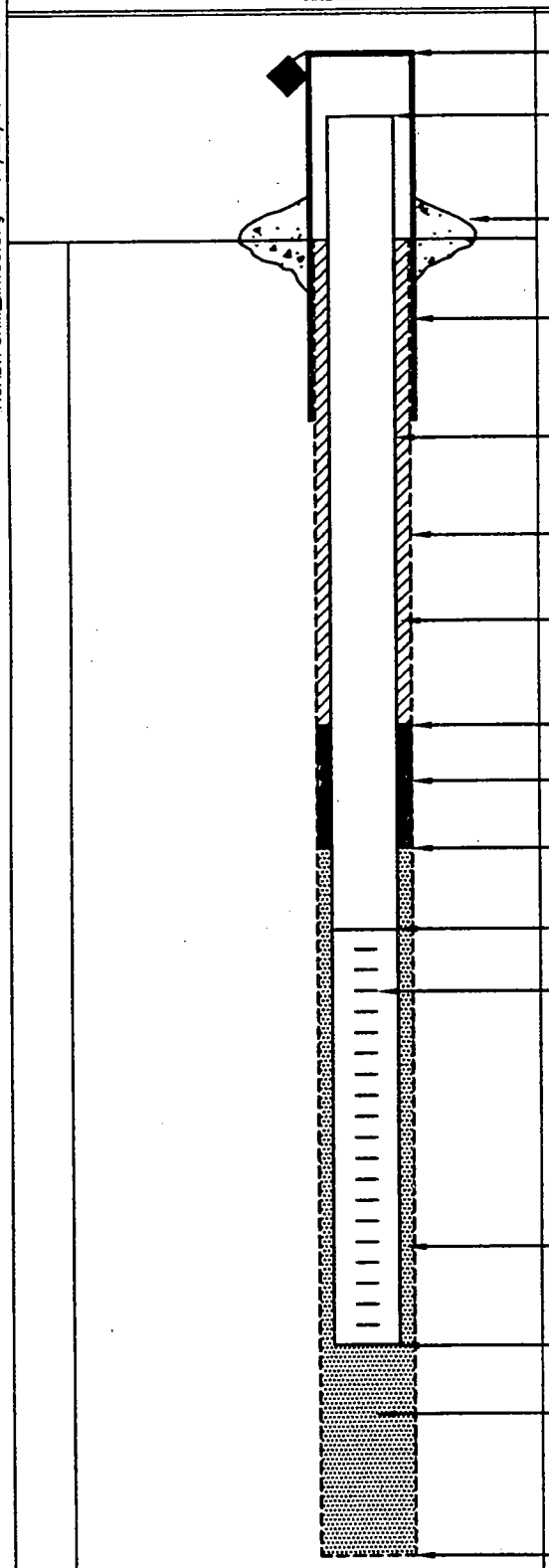
ACAD:FORM_MWSU.dwg 07/28/99 INL

WELL NO.: S57MW020

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NUSWC INDIAN HEAD	LOCATION SITE 57	DRILLER AARON E	
PROJECT NO. N7179	BORING S57MW020	DRILLING METHOD HSA	
DATE BEGUN 8/22/01	DATE COMPLETED 8/22/01		
FIELD GEOLOGIST BOB BALKOVICH		DEVELOPMENT METHOD PUMP	
GROUND ELEVATION 10.39	DATUM NGVD 29		



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 13.75/3.36

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 13.31/2.92

TYPE OF SURFACE SEAL: CEMENT W/ POSTS

I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLK STEEL

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 9"

TYPE OF BACKFILL: CEMENT

ELEVATION/DEPTH TOP OF SEAL: 9.39/1'

TYPE OF SEAL: BENTONITE PELLETS

DEPTH TOP OF SAND PACK: 3'

ELEVATION/DEPTH TOP OF SCREEN: 6.39/4'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND 20-40 SIEVE SIZE

ELEVATION/DEPTH BOTTOM OF SCREEN: -3.61/14'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -3.61/14'
BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: -3.61/14'

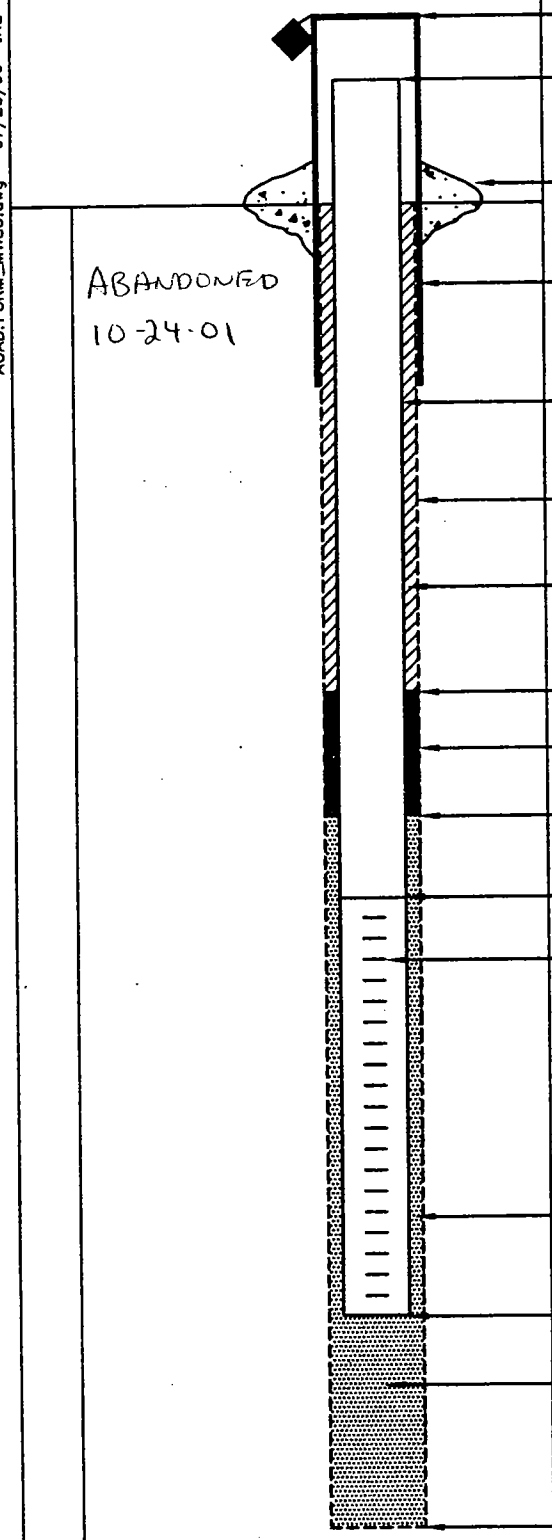
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: SS7TW021

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NSWC INDIAN HEAD	LOCATION SITE 57	DRILLER AMRUNE
PROJECT NO. N7129	BORING SS7TW021	DRILLING METHOD HSA
DATE BEGUN 8/20/01	DATE COMPLETED 8/21/01	
FIELD GEOLOGIST BOB BALKOVEC		DEVELOPMENT METHOD PUMP
GROUND ELEVATION 9.84	DATUM NGVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 1.1'

TYPE OF SURFACE SEAL: BENTONITE

I.D. OF SURFACE CASING: NA
TYPE OF SURFACE CASING: NA

RISER PIPE I.D.: 1"
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: 10

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: 4'

ELEVATION/DEPTH TOP OF SCREEN: 9'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 5'

I.D. OF SCREEN: 1"

TYPE OF SAND PACK: SILICA SAND
20-40 SIEVE SIZE

ELEVATION/DEPTH BOTTOM OF SCREEN: 14'

ELEVATION/DEPTH BOTTOM OF SAND PACK: 15'

BACKFILL MATERIAL BELOW SAND:
NATURAL MATERIAL TO 17'
BENTONITE TO 15'

ELEVATION/DEPTH OF HOLE: 25'

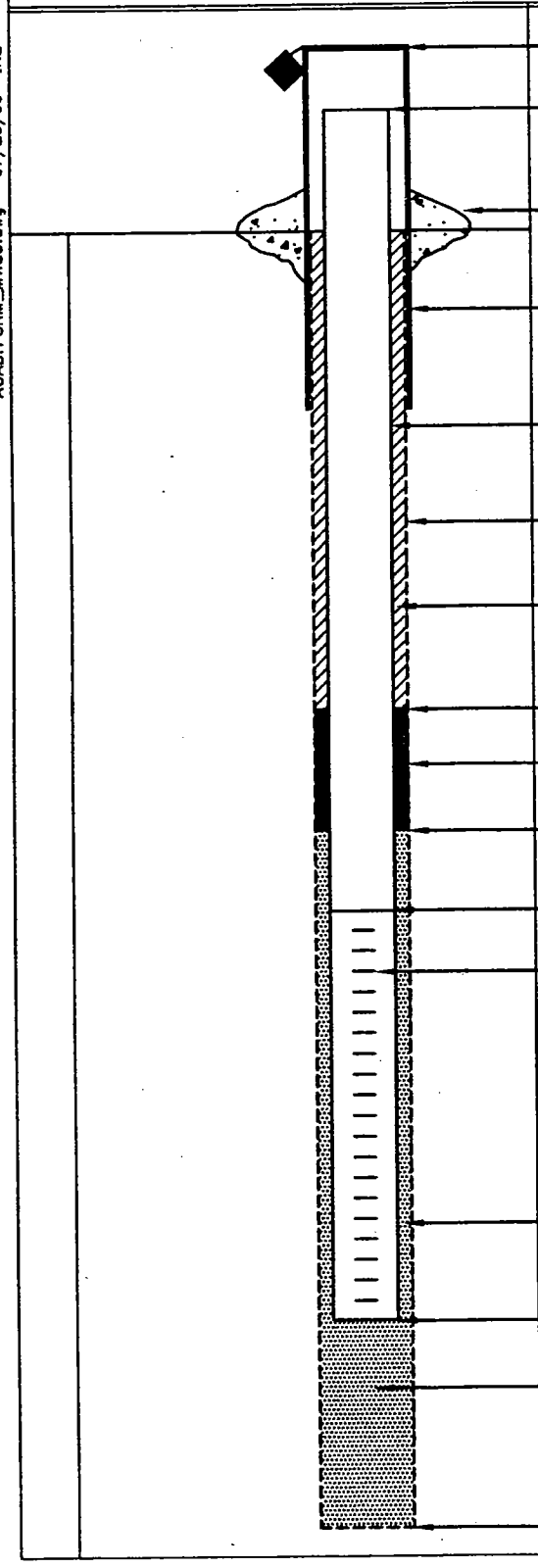
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW022

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT NUSWC INDIAN HEAD	LOCATION SITE 57	DRILLER AARON E
PROJECT NO. N7129	BORING ~~SITE~~ S57MW022	DRILLING METHOD HSA
DATE BEGUN 8/22/01	DATE COMPLETED 8/22/01	
FIELD GEOLOGIST BOB BALKOVEC		DEVELOPMENT METHOD PUMP
GROUND ELEVATION 8.11	DATUM NGVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 10.60/2.49

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 10.09/1.98

TYPE OF SURFACE SEAL: CEMENT W/ POSTS.

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 9"

TYPE OF BACKFILL: CEMENT

ELEVATION/DEPTH TOP OF SEAL: 7.11/1'

TYPE OF SEAL: BENTONITE PELLETS

DEPTH TOP OF SAND PACK: 3'

ELEVATION/DEPTH TOP OF SCREEN: 4.11/4'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND 20-40 SIEVE SIZE

ELEVATION/DEPTH BOTTOM OF SCREEN: -5.89/14'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -5.89/14'

BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: -5.89/14'

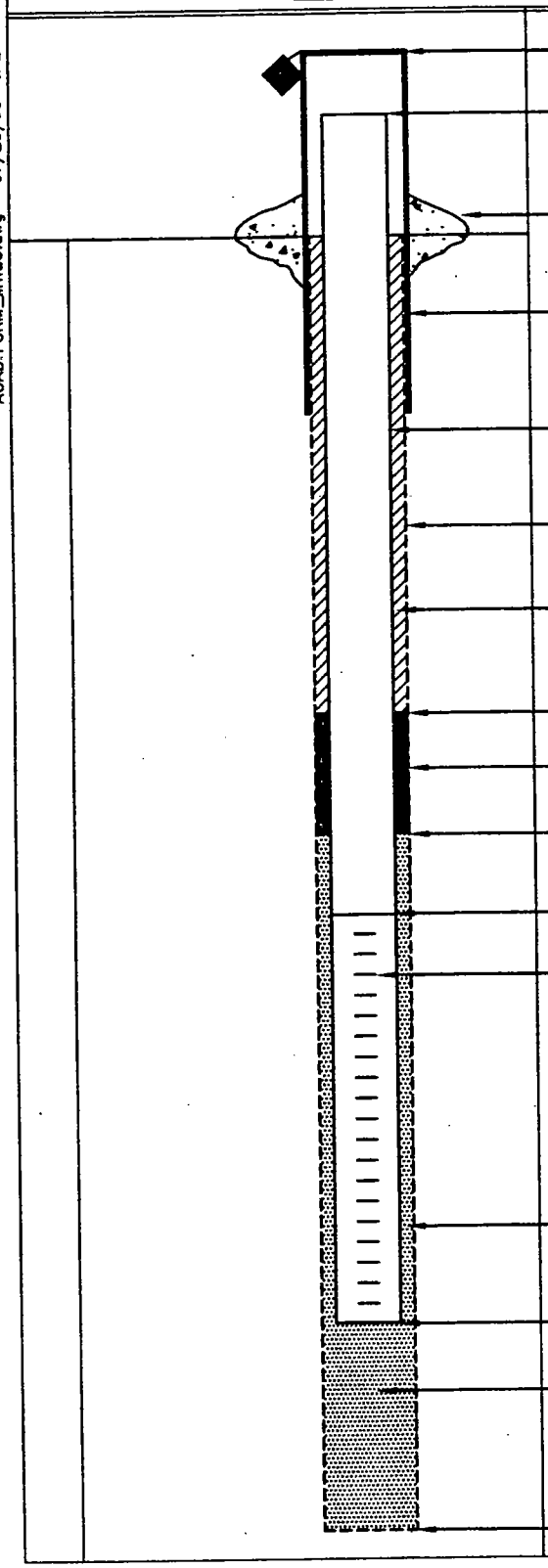
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW023

OVERBURDEN MONITORING WELL SHEET STICK-UP

Tetra Tech NUS, Inc.

PROJECT Naval Indian Head	LOCATION S-Site 57	DRILLER Aaron E.
PROJECT NO. 07129	BORING S57SB033	DRILLING METHOD HSA
DATE BEGUN 8/22/01	DATE COMPLETED 8/22/01	DEVELOPMENT METHOD
FIELD GEOLOGIST Bob Barkovec		
GROUND ELEVATION 37.44	DATUM NGVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 41.03/3.59

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 40.54/3.1

TYPE OF SURFACE SEAL: CEMENT w/ POSTS

I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLK STEEL

RISER PIPE I.D.: 2"
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: 9"

TYPE OF BACKFILL: CEMENT

ELEVATION/DEPTH TOP OF SEAL: 32.94/4.5'

TYPE OF SEAL: BENTONITE PELLETS

DEPTH TOP OF SAND PACK: 7.5'

ELEVATION/DEPTH TOP OF SCREEN: 27.44/10'

TYPE OF SCREEN: PVC

SLOT SIZE x LENGTH: 0.10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND 20-40 SIEVE SIZE

ELEVATION/DEPTH BOTTOM OF SCREEN: 17.44/20

ELEVATION/DEPTH BOTTOM OF SAND PACK: 17.44/20
BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: 17.44/20'

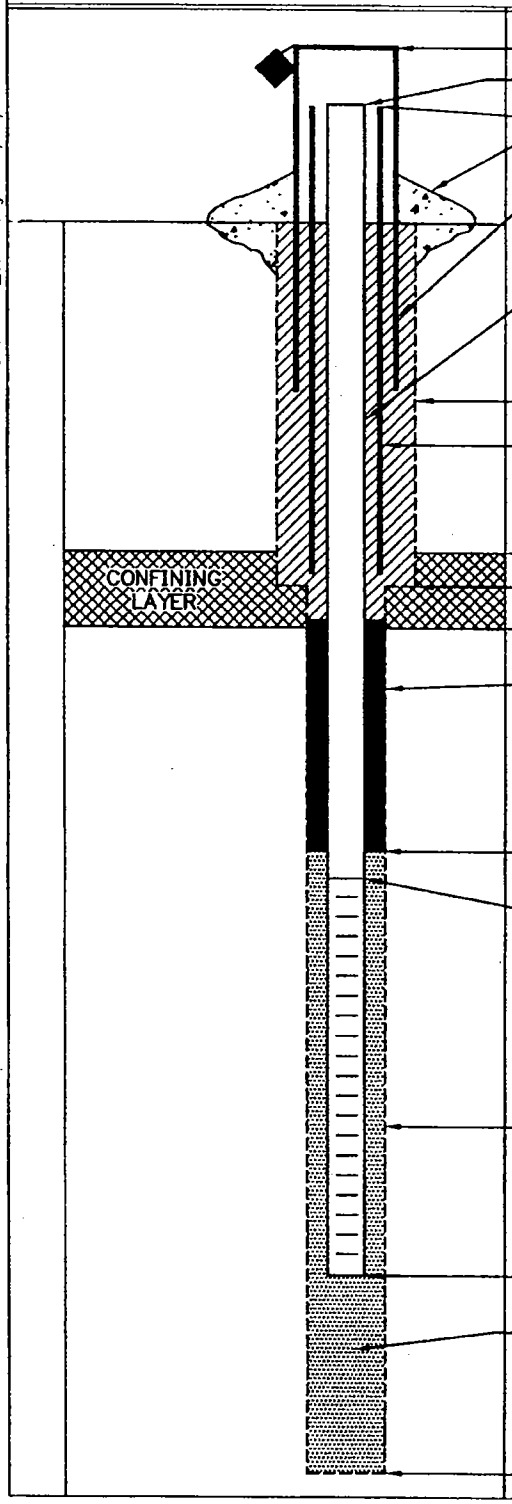
ACAD:FORM_MWSU.dwg 07/28/99 INL

WELL NO.: S57MW026

Tetra Tech NUS, Inc.

CONFINING LAYER
MONITORING WELL SHEET

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW026	DRILLING METHOD HSA AND MUD ROTARY
DATE BEGUN 9-20-05	DATE COMPLETED 9-21	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
GROUND ELEVATION 14.87	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: -1~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 17.05/~2.5'

ELEVATION/HEIGHT OF TOP OF PERM. CASING: -1~0.5'

TYPE OF SURFACE SEAL: 3' x 3' x 0.5' CONCRETE PAD

I.D. OF SURFACE CASING: ~4"

TYPE OF SURFACE CASING: STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 12"

PERM. CASING I.D.: 6"

TYPE OF CASING AND BACKFILL: STEEL, CEMENT/BENTONITE

ELEVATION/DEPTH TOP CONFINING LAYER: -5.13/20'

ELEVATION/DEPTH BOTTOM OF CASING: -7.13/22'

ELEVATION/DEPTH BOTTOM CONFINING LAYER: -12.13/27

ELEVATION/DEPTH TOP OF SEAL: -3.13/18

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 24'

ELEVATION/DEPTH TOP OF SCREEN: -12.13/27'

TYPE OF SCREEN: PVC, 10 SLOT 2" ID

TYPE OF SAND PACK: SILICA SAND "FILPRO" W/ #1

BOREHOLE DIA. BELOW CASING: ~6"

ELEVATION/DEPTH BOTTOM OF SCREEN: -22.13/37'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -23.13/38'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -23.13/38'

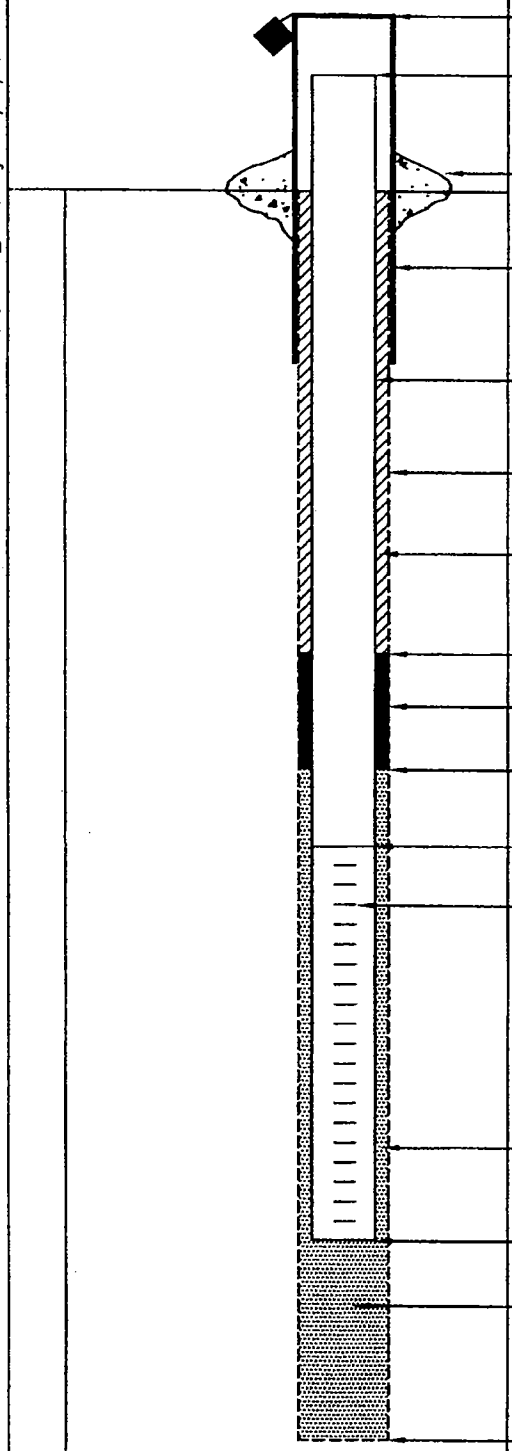
ACAD:FORM_CLMW.dwg 07/20/99 INL

WELL NO.: S57MW027

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW027	DRILLING METHOD HSA
DATE BEGUN 9-16-05	DATE COMPLETED 9-16-05	DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
FIELD GEOLOGIST FRED W RAMSER		
GROUND ELEVATION 14.80	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: -1~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 17.28/~25'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE.

ELEVATION/DEPTH TOP OF SEAL: 8.8 / 6'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 8'

ELEVATION/DEPTH TOP OF SCREEN: 4.8 / 10'

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WG#1

ELEVATION/DEPTH BOTTOM OF SCREEN: -5.2 / 20'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -5.2 / 20'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -5.2 / 20'

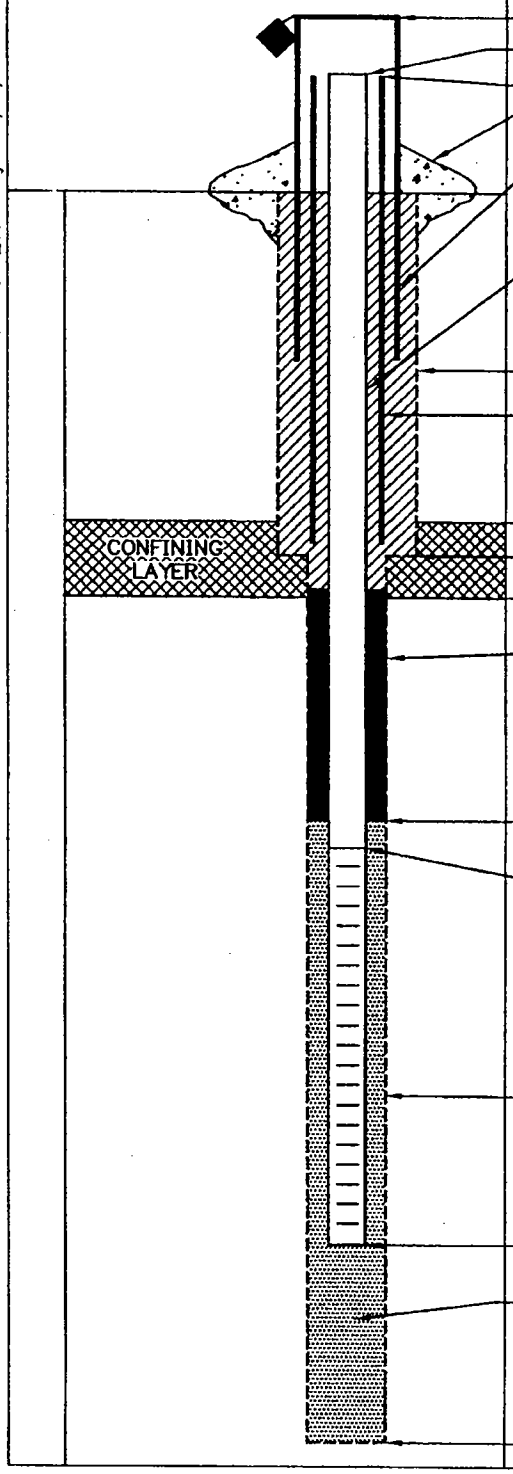
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW028

CONFINING LAYER
MONITORING WELL SHEET

Tetra Tech NUS, Inc.

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW028	DRILLING METHOD HSA AND MUD ROTARY
DATE BEGUN 9-20-05	DATE COMPLETED 9-22-05	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
GROUND ELEVATION 11.96	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: -1/~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 14.11/~2.5'

ELEVATION/HEIGHT OF TOP OF PERM. CASING: -1/~0.5'

TYPE OF SURFACE SEAL: 3' x 3' x 0.5' CONCRETE PAD

I.D. OF SURFACE CASING: ~4"

TYPE OF SURFACE CASING: STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 12"

PERM. CASING I.D.: 6"

TYPE OF CASING AND BACKFILL: STEEL, CEMENT/BENTONITE

ELEVATION/DEPTH TOP CONFINING LAYER: -2.04/14'

ELEVATION/DEPTH BOTTOM OF CASING: -4.04/16'

ELEVATION/DEPTH BOTTOM CONFINING LAYER: -7.04/19'

ELEVATION/DEPTH TOP OF SEAL: -8.04/20'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 22'

ELEVATION/DEPTH TOP OF SCREEN: -12.04/24'

TYPE OF SCREEN: PVC, 10 SLOT 2" ID

TYPE OF SAND PACK: SILICA SAND "FILPRO" W/ #1

BOREHOLE DIA. BELOW CASING: ~6"

ELEVATION/DEPTH BOTTOM OF SCREEN: -22.04/34'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -22.04/34'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -22.04/34'

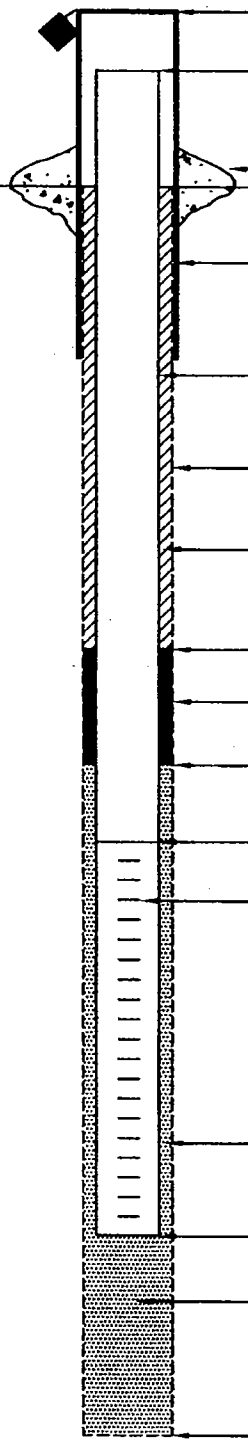
ACAD:FORM_CLMW.dwg 07/20/99 INL

WELL NO.: S57MW029

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW029	DRILLING METHOD HSA
DATE BEGUN 9-16-05	DATE COMPLETED 9-16-05	DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
FIELD GEOLOGIST FRED W RAMSER		
GROUND ELEVATION 12.09	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: - 1~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 14.39/~25'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE

ELEVATION/DEPTH TOP OF SEAL: 10.09/2'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 3'

ELEVATION/DEPTH TOP OF SCREEN: 8.09/4'

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WGF1

ELEVATION/DEPTH BOTTOM OF SCREEN: -1.91/14'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -1.91/14'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -1.91/14'

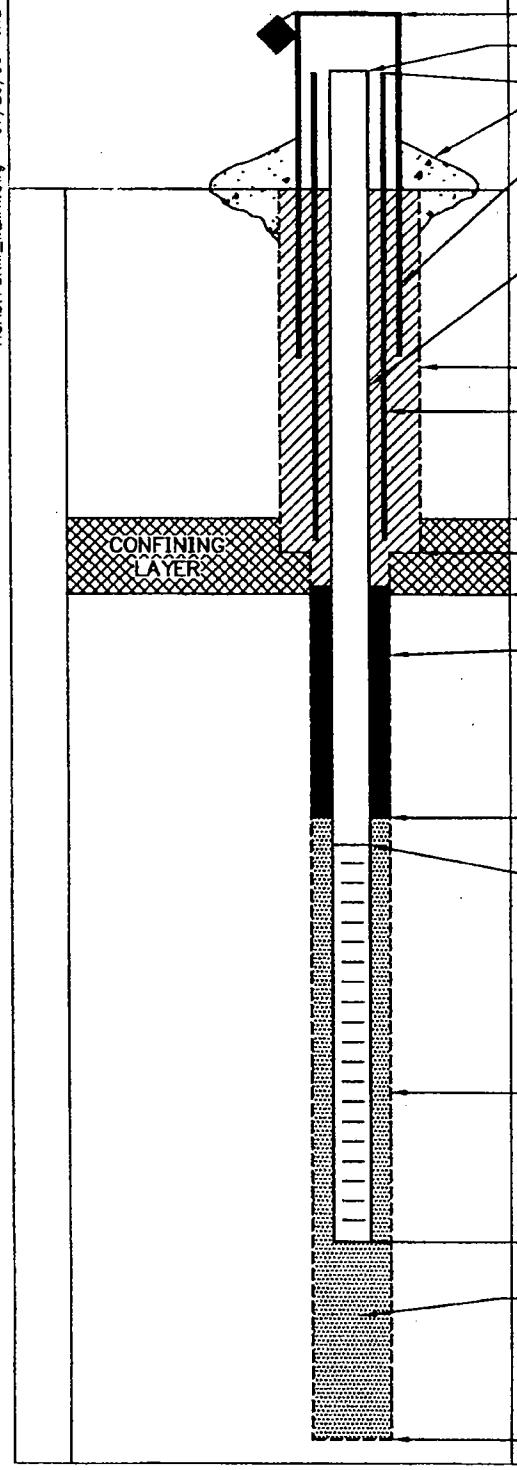
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW030

Tetra Tech NUS, Inc.

CONFINING LAYER
MONITORING WELL SHEET

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW030	DRILLING METHOD HSA AND MUD ROTARY
DATE BEGUN 9-20-05	DATE COMPLETED 9-23-05	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
GROUND ELEVATION 10.36	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: -1/~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 12.74/~2.5'

ELEVATION/HEIGHT OF TOP OF PERM. CASING: -1/~0.5'

TYPE OF SURFACE SEAL: 3' x 3' x 0.5" CONCRETE PAD

I.D. OF SURFACE CASING: ~4"

TYPE OF SURFACE CASING: STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 12"

PERM. CASING I.D.: 6"

TYPE OF CASING AND BACKFILL: STEEL, CEMENT/BENTONITE

ELEVATION/DEPTH TOP CONFINING LAYER: -3.64/14'

ELEVATION/DEPTH BOTTOM OF CASING: -5.64/16'

ELEVATION/DEPTH BOTTOM CONFINING LAYER: -15.64/26'

ELEVATION/DEPTH TOP OF SEAL: -9.64/20'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 22

ELEVATION/DEPTH TOP OF SCREEN: -13.64/24

TYPE OF SCREEN: PVC, 10 SLOT 2" ID

TYPE OF SAND PACK: SILICA SAND "FILPRO" W/ #1

BOREHOLE DIA. BELOW CASING: ~6"

ELEVATION/DEPTH BOTTOM OF SCREEN: -23.64/34

ELEVATION/DEPTH BOTTOM OF SAND PACK: -23.64/34

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -23.64/34

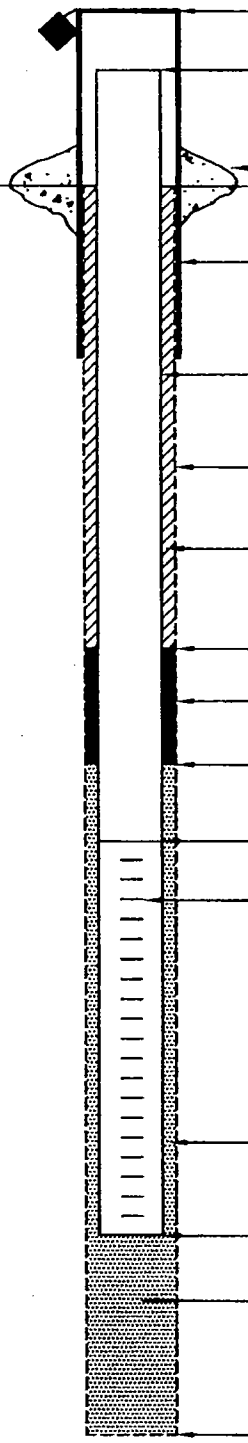
ACAD: FORM_CLMW.dwg 07/28/99 INL

WELL NO.: 557MW031

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW031	DRILLING METHOD HSA
DATE BEGUN 9-15-05	DATE COMPLETED 9-15-05	DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
FIELD GEOLOGIST FRED W RAMSER		
GROUND ELEVATION 12.46	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 14.61 / ~25'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE

ELEVATION/DEPTH TOP OF SEAL: 6.46 / 6'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 8'

ELEVATION/DEPTH TOP OF SCREEN: 2.46 / 10'

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WGF1

ELEVATION/DEPTH BOTTOM OF SCREEN: -7.54 / 20'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -7.54 / 20'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -7.54 / 20'

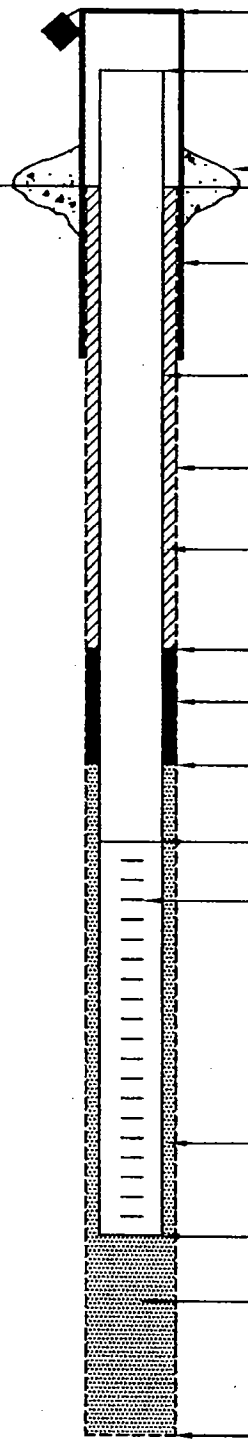
ACAD: FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW032

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW032	DRILLING METHOD HSA
DATE BEGUN 9-15-05	DATE COMPLETED 9-15-05	DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
FIELD GEOLOGIST FRED W RAMSER		
GROUND ELEVATION 7.71	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: - 1~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 10.05/~2.5'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE

ELEVATION/DEPTH TOP OF SEAL: 5.71 / 2'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 3'

ELEVATION/DEPTH TOP OF SCREEN: 2.71 / 5'

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WGFI

ELEVATION/DEPTH BOTTOM OF SCREEN: -7.29 / 15'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -8.29 / 16'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -8.29 / 16'

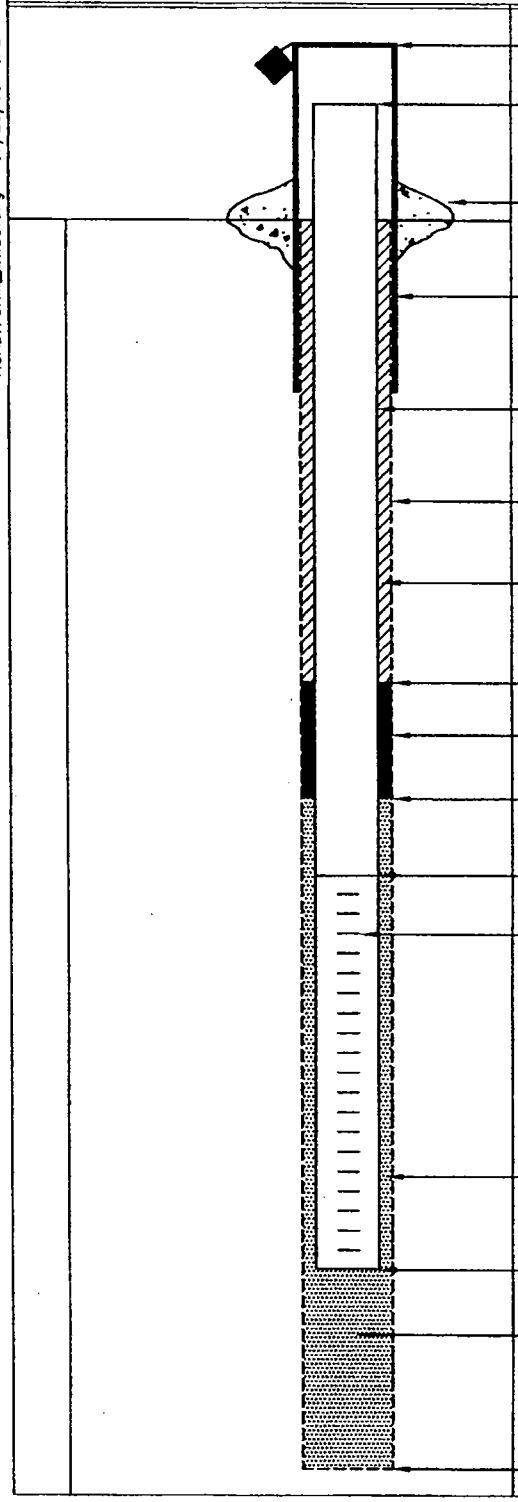
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW033

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW033	DRILLING METHOD HSA
DATE BEGUN 9-15-05	DATE COMPLETED 9-15-05	
FIELD GEOLOGIST FRED W RAMSER		DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
GROUND ELEVATION 8.41	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: - / ~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 10.96 / ~25'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE

ELEVATION/DEPTH TOP OF SEAL: 5.41 / 3

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 4

ELEVATION/DEPTH TOP OF SCREEN: 2.41 / 6

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WG#1

ELEVATION/DEPTH BOTTOM OF SCREEN: -7.59 / 16

ELEVATION/DEPTH BOTTOM OF SAND PACK: -7.59 / 16

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -7.59 / 16

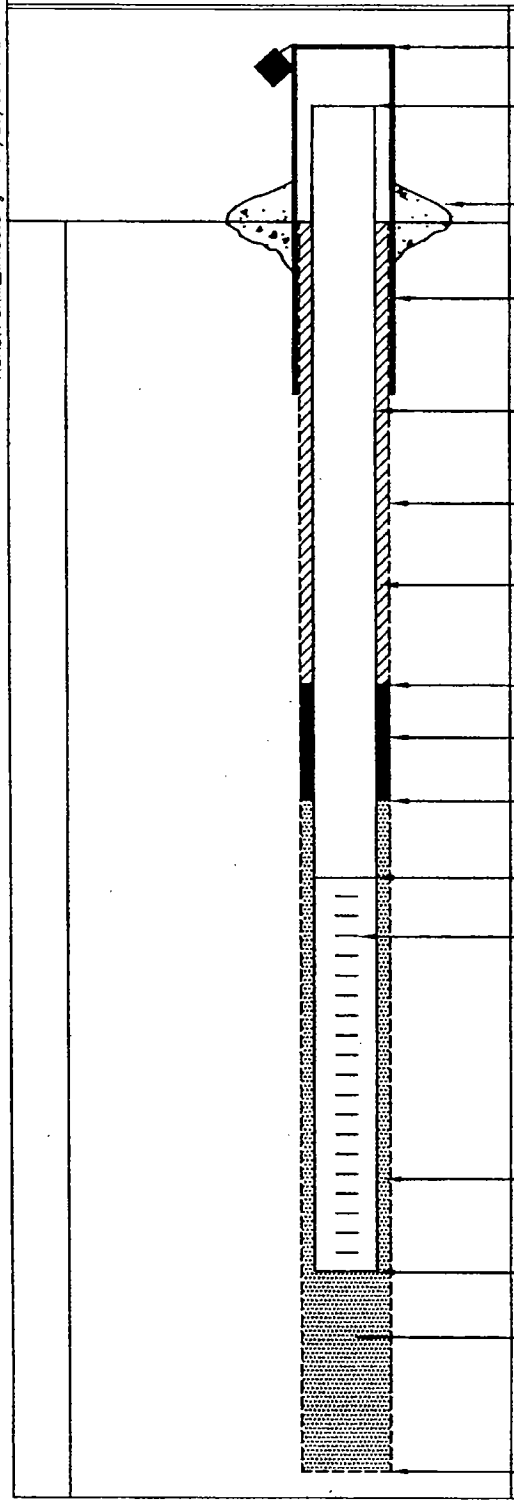
ACAD: FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW034

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW034	DRILLING METHOD HSA
DATE BEGUN 9-15-05	DATE COMPLETED 9-15-05	DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
FIELD GEOLOGIST FRED W RAMSER		
GROUND ELEVATION 8.21	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: -1/~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 10.76/~2.5'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE

ELEVATION/DEPTH TOP OF SEAL: 6.21/2'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 3'

ELEVATION/DEPTH TOP OF SCREEN: 4.21/4'

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WGF1

ELEVATION/DEPTH BOTTOM OF SCREEN: -5.79/14'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -5.79/14'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -5.79/14'

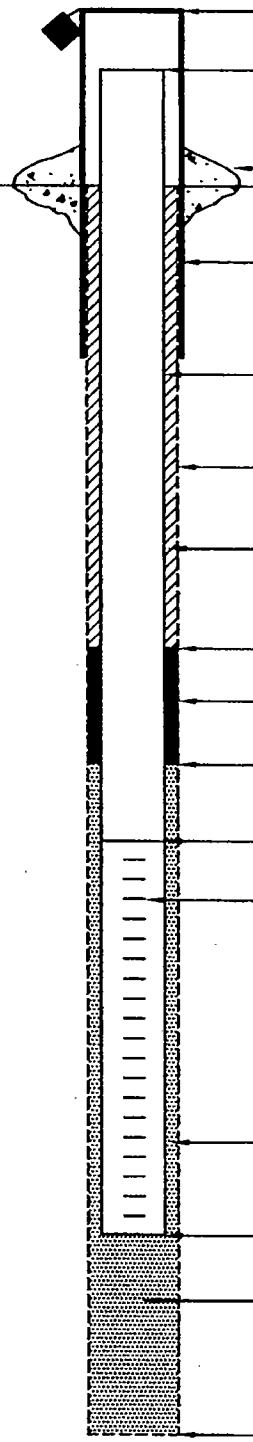
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW035

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW035	DRILLING METHOD HSA
DATE BEGUN 9-19-05	DATE COMPLETED 9-19-05	DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
FIELD GEOLOGIST FRED W RAMSER		
GROUND ELEVATION 29.05	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: - 1~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 31.55 / ~2.5'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE.

ELEVATION/DEPTH TOP OF SEAL: 11.05 / 18'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 20'

ELEVATION/DEPTH TOP OF SCREEN: 7.05 / 22'

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WG#1

ELEVATION/DEPTH BOTTOM OF SCREEN: -2.95 / 32'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -2.95 / 32'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -2.95 / 32'

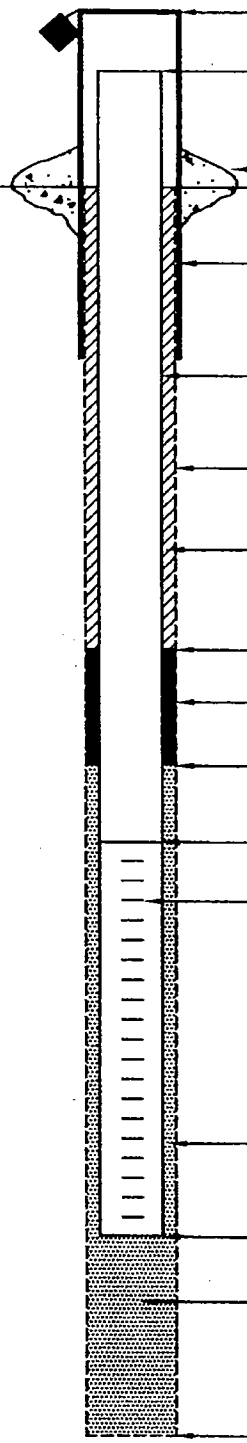
ACAD:FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW036

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW036	DRILLING METHOD HSA
DATE BEGUN 9-15-05	DATE COMPLETED 9-15-05	DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
FIELD GEOLOGIST FRED W RAMSER		
GROUND ELEVATION 7.91	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: 1~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 10.58 / ~2.5'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE

ELEVATION/DEPTH TOP OF SEAL: 4.91 / 3'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 4'

ELEVATION/DEPTH TOP OF SCREEN: 2.91 / 5'

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 5'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WGF1

ELEVATION/DEPTH BOTTOM OF SCREEN: -2.09 / 10'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -2.09 / 10'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -2.09 / 10'

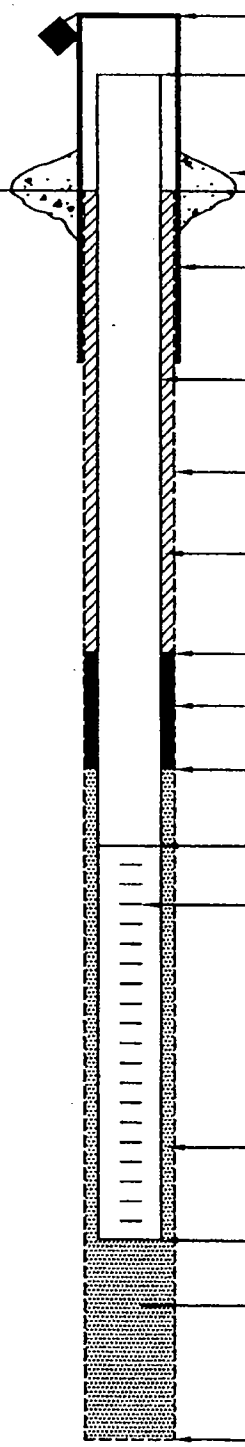
ACAD: FORM_MWSU.dwg 07/20/99 INL

WELL NO.: S57MW037

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57MW037	DRILLING METHOD HSA
DATE BEGUN 9-14-05	DATE COMPLETED 9-14-05	DEVELOPMENT METHOD BAILER SURGE AND SUB. PUMP
FIELD GEOLOGIST FRED W RAMSER		
GROUND ELEVATION 8.92	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: -1/~3'

ELEVATION/HEIGHT OF TOP OF RISER PIPE: 11.57/~2.5'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"

TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D.: 2"

TYPE OF RISER PIPE: SCH. 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT AND BENTONITE

ELEVATION/DEPTH TOP OF SEAL: 2.92/6'

TYPE OF SEAL: BENTONITE "HOLE PLUG" BAROID 3/8" CHIPS

DEPTH TOP OF SAND PACK: 8'

ELEVATION/DEPTH TOP OF SCREEN: -1.08/10'

TYPE OF SCREEN: P.V.C

SLOT SIZE x LENGTH: 10 x 5'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: SILICA SAND "FILPRO" WG#1

ELEVATION/DEPTH BOTTOM OF SCREEN: -6.08/15'

ELEVATION/DEPTH BOTTOM OF SAND PACK: -6.08/15'

BACKFILL MATERIAL BELOW SAND:

ELEVATION/DEPTH OF HOLE: -6.08/15'

ACAD:FORM_MWSU.dwg 07/20/99 INL

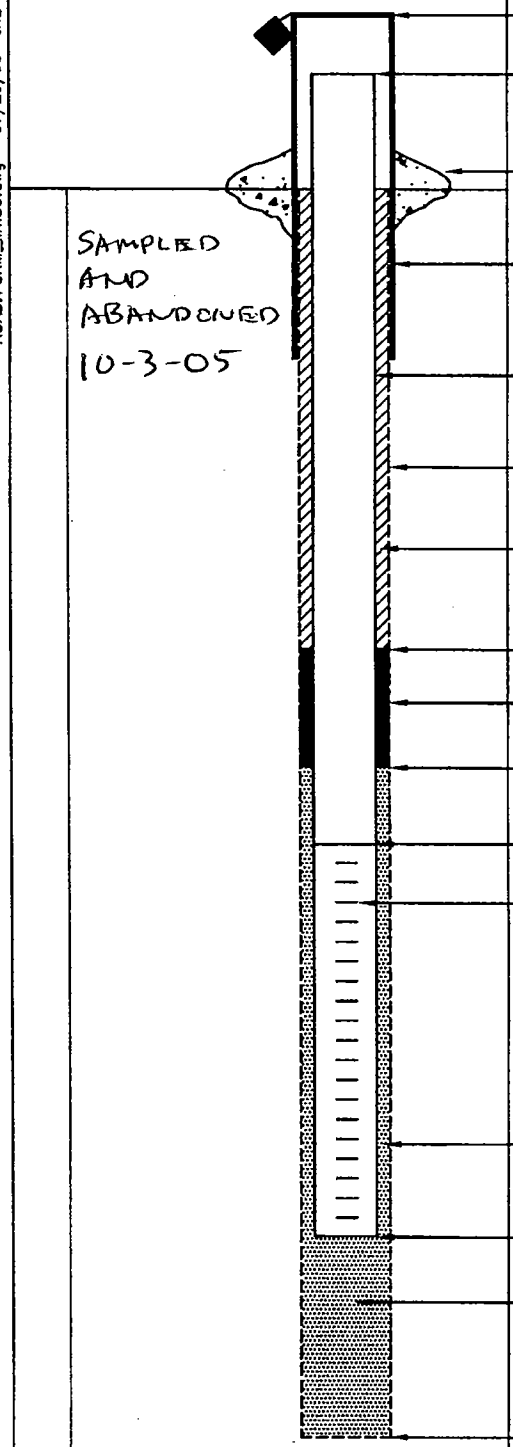
TEMPORARY WELL

WELL NO.: S57SB033

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT: SITE 57	LOCATION: INDIAN HEAD	DRILLER: MIKE SHEPHERD
PROJECT NO.: 2194	BORING: S57SB033	DRILLING METHOD: DPT
DATE BEGUN: 9-30-05	DATE COMPLETED: 10-3-05	DEVELOPMENT METHOD: NA
FIELD GEOLOGIST: FRED W. RAMSER		
GROUND ELEVATION: 33.03	DATUM: NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /~1'

TYPE OF SURFACE SEAL: NA

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASING:

RISER PIPE I.D.: ~1.25"

TYPE OF RISER PIPE: STEEL

BOREHOLE DIAMETER: ~1.5

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: /

TYPE OF SEAL: NA

DEPTH TOP OF SAND PACK:

ELEVATION/DEPTH TOP OF SCREEN: /21'

TYPE OF SCREEN: STAINLESS STEEL

SLOT SIZE x LENGTH: 0.006 x 4"

I.D. OF SCREEN: ~0.5"

TYPE OF SAND PACK: NA

ELEVATION/DEPTH BOTTOM OF SCREEN: /25'

ELEVATION/DEPTH BOTTOM OF SAND PACK: /

BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: /

ACAD:FORM_MWSU.dwg 07/28/99 INL

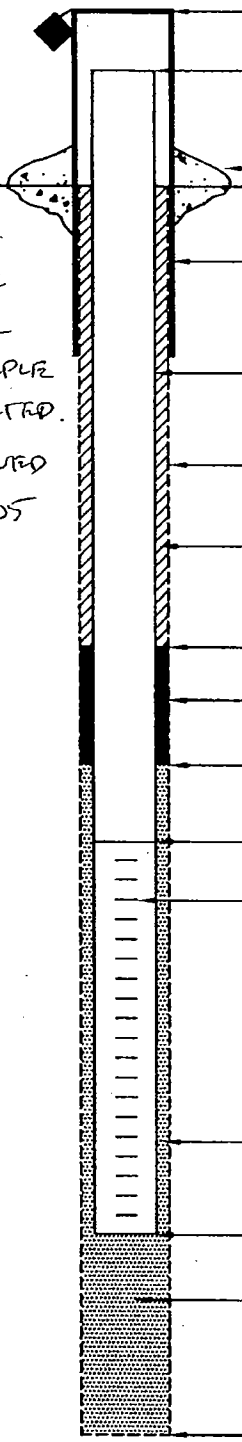
TEMPORARY WELL

WELL NO.: S57SB034

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING	DRILLING METHOD DPT
DATE BEGUN 9-29-05	DATE COMPLETED 9-30-05	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD NA
GROUND ELEVATION 32.11	DATUM NAVD 29	



DID NOT PRODUCE WATER NO SAMPLE COLLECTED. ABANDONED 9-30-05

ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /

TYPE OF SURFACE SEAL: NA

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASING:

RISER PIPE I.D.: ~1.25"

TYPE OF RISER PIPE: STEEL

BOREHOLE DIAMETER: ~1.5

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: /

TYPE OF SEAL: NA

DEPTH TOP OF SAND PACK:

ELEVATION/DEPTH TOP OF SCREEN: /18

TYPE OF SCREEN: STAINLESS STEEL

SLOT SIZE x LENGTH: 0.006 x 4"

I.D. OF SCREEN: ~0.5"

TYPE OF SAND PACK: NA

ELEVATION/DEPTH BOTTOM OF SCREEN: /22

ELEVATION/DEPTH BOTTOM OF SAND PACK: /

BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: /

ACAD:FORM_MWSU.dwg 07/20/99 INL

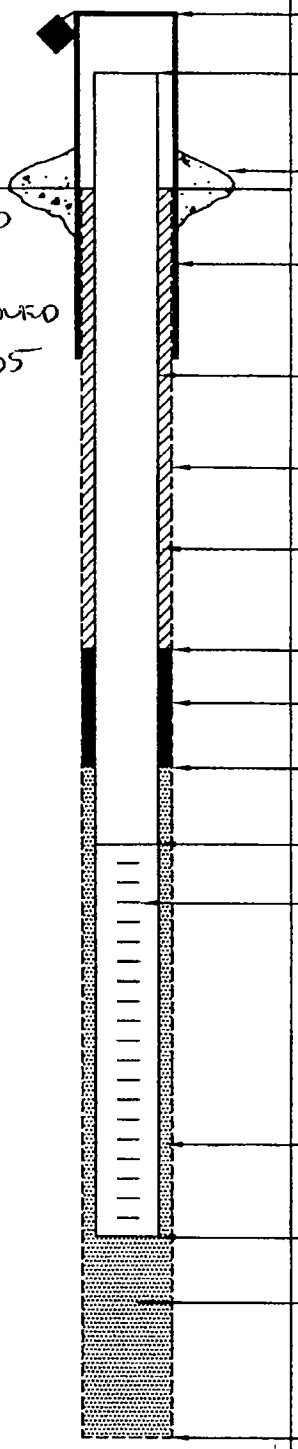
TEMPORARY WELL

WELL NO.: S57SB035

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57SB035	DRILLING METHOD DPT
DATE BEGUN 10-5-05	DATE COMPLETED 10-6-05	
FIELD GEOLOGIST FRED W. RAMSER		DEVELOPMENT METHOD NA
GROUND ELEVATION 33.90	DATUM NAVD 29	



SAMPLED AND ABANDONED 10-6-05

ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /

TYPE OF SURFACE SEAL: NA

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASING:

RISER PIPE I.D.: ~1.25"

TYPE OF RISER PIPE: STEEL

BOREHOLE DIAMETER: ~1.5

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: /

TYPE OF SEAL: NA

DEPTH TOP OF SAND PACK:

ELEVATION/DEPTH TOP OF SCREEN: /10

TYPE OF SCREEN: STAINLESS STEEL

SLOT SIZE x LENGTH: 0.006 x 4"

I.D. OF SCREEN: ~0.5"

TYPE OF SAND PACK: NA

ELEVATION/DEPTH BOTTOM OF SCREEN: /14

ELEVATION/DEPTH BOTTOM OF SAND PACK: /

BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: /

ACAD:FORM_MWSU.dwg 07/28/99 INL

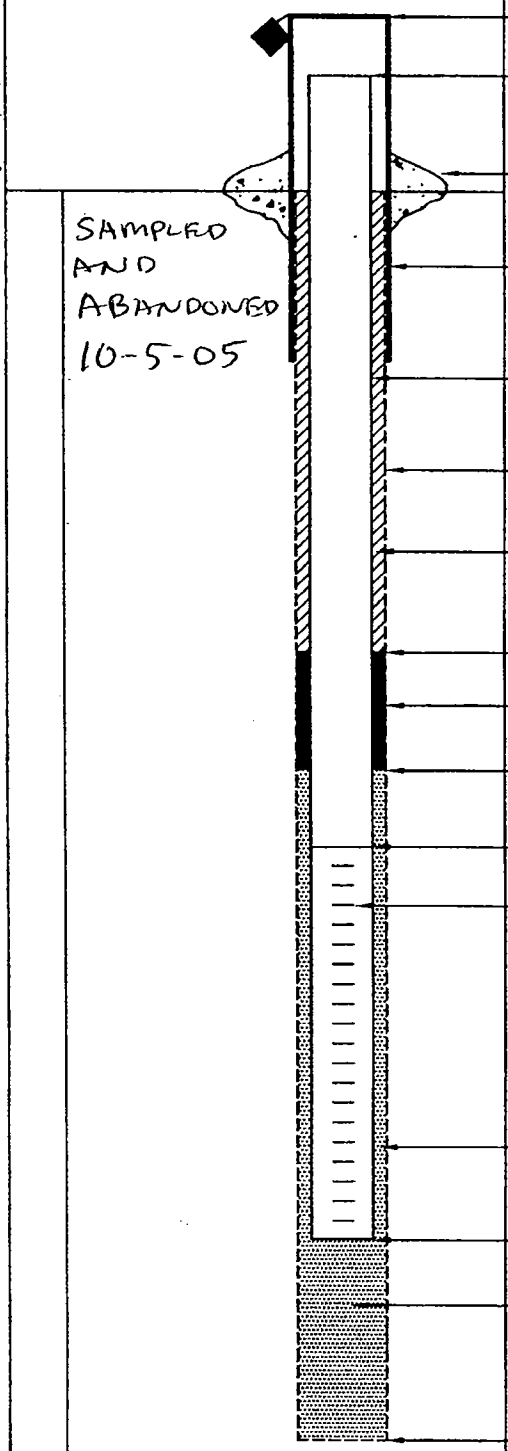
TEMPORARY WELL

WELL NO.: S57SB035

Tetra Tech NUS, Inc.

OVERBURDEN MONITORING WELL SHEET STICK-UP

PROJECT SITE 57	LOCATION INDIAN HEAD	DRILLER MIKE SHEPHERD
PROJECT NO. 2194	BORING S57SB035	DRILLING METHOD DPT
DATE BEGUN 10-4-05	DATE COMPLETED 10-5-05	DEVELOPMENT METHOD NA
FIELD GEOLOGIST FRED W. RAMSER		
GROUND ELEVATION 33.90	DATUM NAVD 29	



ELEVATION/HEIGHT OF TOP OF SURFACE CASING: /

ELEVATION/HEIGHT OF TOP OF RISER PIPE: /

TYPE OF SURFACE SEAL: NA

I.D. OF SURFACE CASING: NA

TYPE OF SURFACE CASING:

RISER PIPE I.D.: ~1.25"

TYPE OF RISER PIPE: STEEL

BOREHOLE DIAMETER: ~1.5

TYPE OF BACKFILL: NA

ELEVATION/DEPTH TOP OF SEAL: /

TYPE OF SEAL: NA

DEPTH TOP OF SAND PACK:

ELEVATION/DEPTH TOP OF SCREEN: 116

TYPE OF SCREEN: STAINLESS STEEL

SLOT SIZE x LENGTH: 0.006 x 4"

I.D. OF SCREEN: ~0.5"

TYPE OF SAND PACK: NA

ELEVATION/DEPTH BOTTOM OF SCREEN: 120

ELEVATION/DEPTH BOTTOM OF SAND PACK: /

BACKFILL MATERIAL BELOW SAND: NA

ELEVATION/DEPTH OF HOLE: /

ACAD:FORM_MWSU.dwg 07/20/99 TNI

A.3 WELL COMPLETION REPORTS

B 2484 (MDE USE ONLY)

STATE OF MARYLAND
PERMIT TO DRILL WELL
please print or type

CH – 94 – 4176
fill in this form completely

Date Received (APA) _____ (MM DD YY)

OWNER INFORMATION

Naval Surface Warfare Center
Last Name / Owner / First Name

Indian Head Division
Street or RFD

Indian Head, Maryland 20640
Town / State / Zip

DRILLER INFORMATION

Michael W. Huber — M W D 336
Driller's Name / License No.

CHESAPEAKE GEOSYSTEMS, INC.
Firm Name

6720 Ft. Smallwood Rd Balto., MD 21226
Address

Signature / Date

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.) NA

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY) NA

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- D DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- I INDUSTRIAL, COMMERICIAL, DEWATERING
- P PUBLIC WATER SUPPLY WELL
- T TEST, OBSERVATION, MONITORING Geoprobe
- G GEO-THERMAL

APPROXIMATE DEPTH OF WELL 20 FEET

APPROXIMATE DIAMETER OF WELL 2 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) / JETTED / Jetted & DRIVEN
AIR-ROTary / AIR-PERcussion / ROTARY (Hydraulic Rotary)
CABLE / REVerse-ROTary / DRive-POINT
other

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)

- N THIS WELL WILL NOT REPLACE AN EXISTING WELL
- Y THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- D THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) _____

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER _____G_____

PERMIT No. CH – 94 – 4176

B 3 LOCATION OF WELL

Charles
COUNTY

SUBDIVISION

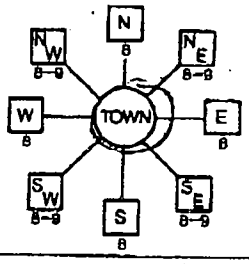
SECTION ____ LOT ____

Indian Head
NEAREST TOWN

MILES FROM TOWN (enter 0 if in town) 0 MI

B 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



Hersey Road
NEAR WHAT ROAD

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)

DISTANCE FROM ROAD

ENTER FT OR MI

TAX MAP: 20 BLK: 8 PARCEL

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

Charles — 01-14187-W(M)
COUNTY NAME / COUNTY NO.

STATE SIGNATURE _____ INSERT S →

DATE ISSUED 8-24-01 — 8-24-02
CO SIGNATURE / EXP. DATE

NORTH GRID 274 000 — EAST GRID 751 000

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X

SOURCES OF DRILLING WATER
1.
2.
3.

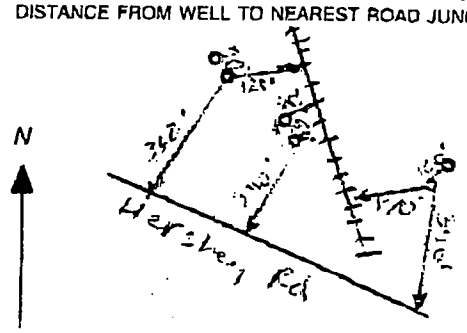
WRITE THE BOX NUMBER FROM THE MAP HERE

E 751,000

N 274,000

X
000
000

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION

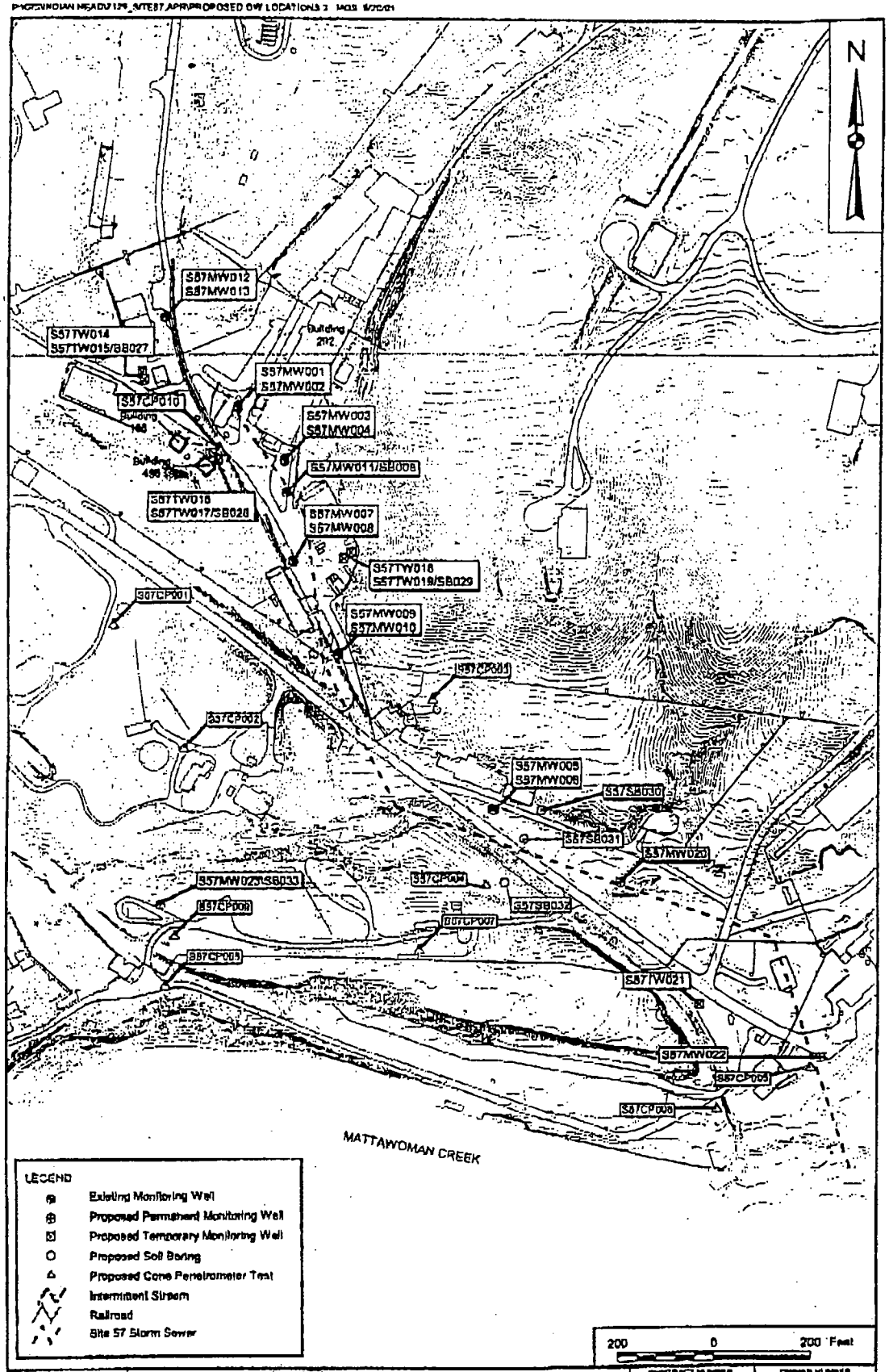


SPECIAL CONDITIONS
NOTE - APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED

DENV-Permit 97

④ DRILLER

NOV-16-2001 15:56 PANASONIC 4107895029 P.02/22



Tetra Tech NUS, Inc.

PROPOSED SOIL AND GROUNDWATER SAMPLING AND
CONE PENETROMETER TEST LOCATIONS
SITE 57 - FORMER DRUM LOADING AREA
NSWC INDIAN HEAD
INDIAN HEAD, MARYLAND

CONTRACT NUMBER 7179
OWNER NUMBER
APPROVED BY G.A.
DATE 5/21/01
APPROVED BY
DATE
DRAWING NO. FIGURE 2
REV 0
SCALE AS NOTED

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER: 01-14187-W(M)

ST/CO USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED: MM 08 DD 21 YY 01

Depth of Well: 30 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": CH - 94 - 4176

OWNER: Naval Surface Warfare Center (7th)

STREET OR RFD: Indian Head Division

TOWN: Indian Head, MD 2640

SUBDIVISION: SECTION: LOT:

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
rip rap, sand and gravel	0	6	
grey/lite olive brown silt and sand	6	3	
grey sand some gravel	8	14	
pale yellow sand trace silt	14	16	
black/yellow and brownish grey sand	16	23	
greenish grey sand, trace silt and clay	23	30	
water @ 6'			

NUMBER OF UNSUCCESSFUL WELLS: none

WELL HYDROFRACTURED: YES [Y] NO [N]

CIRCLE APPROPRIATE LETTER

- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M 3 3 6

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION): Michael W. Burke

LIC. NO.: M D

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): YES [X] NO [N]

TYPE OF GROUTING MATERIAL (Circle one): CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS: 12 NO. OF POUNDS: 1,128

GALLONS OF WATER: 72

DEPTH OF GROUT SEAL (to nearest foot): from 0 ft. (TOP) to 23 ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	1	25

OTHER CASING (if used) — EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2

DEPTH (nearest ft.) — EACH SCREEN

1 PL	25	30
2		
3		

SLOT SIZE 1 010 2 3

DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 23 to 30

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING: LOG INDICATOR: OTHER DATA

C 3 NA

PUMPING TEST

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) Temporar Monitor [J] jet [S] submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO): YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

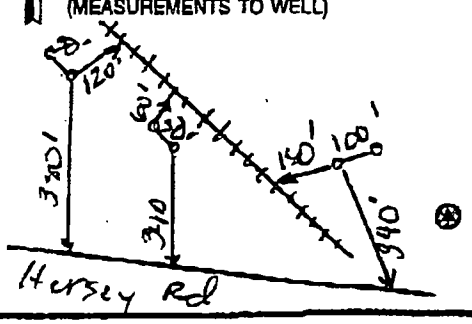
PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height): [+] above [−] below LAND SURFACE 00 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



NOV-16-2001 15:57 PANASONIC 4107895029 P.04/22

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

WATER WELL ABANDONMENT-SEALING REPORT FORM

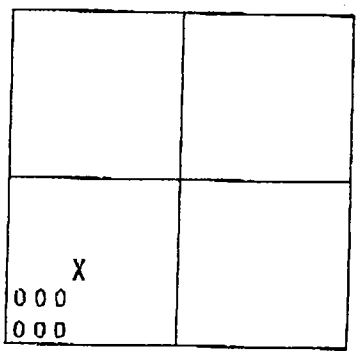
SUBMIT COPIES OF COMPLETED FORM TO:
- COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- WELL OWNER
- MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 08/29/2001 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any): CH — 94 — 4176
* PERMIT NUMBER OF REPLACEMENT WELL: — —
* PERSON ABANDONING WELL: Aaron Eichelberger
* WELL DRILLERS LICENSE NUMBER: AWD 709
* OWNER'S NAME: Naval Surface Warfare Center
CIRCLE: MWD/MSD/MG

* WELL LOCATION:
COUNTY: Charles
NEAREST TOWN: Indian Head
TAX MAP 20 BLOCK 8 PARCEL
SUBDIVISION:
SECTION: LOT:
NEAREST ROAD: Hersey Road

MARYLAND GRID COORDINATES
BOX NUMBER
E 751,000
N 274,000



SHOW WELL LOCATION BY X WITHIN BOX

Tmp 014

* TYPE OF WELL BEING ABANDONED:
  - ___ DRILLED
  - ___ JETTED
  - X BORED/AUGUERED
  - ___ HAND DUG
  - ___ OTHER (specify)

* USE CODE:
  - ___ DOMESTIC
  - ___ MUNICIPAL/PUBLIC
  - ___ IRRIGATION
  - ___ INDUSTRIAL
  - X TEST/OBSERVATION

* TYPE OF CASING:
  - ___ STEEL
  - X PLASTIC
  - ___ CONCRETE
  - ___ OTHER (specify)

* SIZE OF CASING: 1 INCHES IN DIAMETER
* DEPTH OF WELL: ~~15~~ 10 FEET DEEP
* WAS ANY CASING REMOVED? X YES ___ NO
  if yes, length removed, in feet: 2
* WAS CASING RIPPED OR PERFORATED? ___ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite-Cement Slurry	0	~~15~~ 10

SIGNATURE MASTER WELL DRILLER OR SUPERVISOR: Michael W. Kuhn 336 MWD/MSD/MGD

NOV-16-2001 15:58 PANASONIC 4107895029 P.05/22

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

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DATE WELL ABANDONED: 08/29/2001 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 4176
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Aron Eichelberger
* WELL DRILLERS LICENSE NUMBER: AWD 709
CIRCLE: MWD/MSD/MG
* OWNER'S NAME: Naval Surface Warfare Center
* WELL LOCATION:
COUNTY: Charles
NEAREST TOWN: Indian Head
TAX MAP 20 BLOCK 8 PARCEL
SUBDIVISION:
SECTION: LOT:
NEAREST ROAD: Hersey Road

MARYLAND GRID COORDINATES
BOX NUMBER
E 751,000
N 274,000

000
000

SHOW WELL LOCATION BY X WITHIN BOX

TMP 05

* TYPE OF WELL BEING ABANDONED:

___ DRILLED ___ JETTED
X BORED/AUGUERED ___ HAND DUG
___ OTHER (specify)

* USE CODE:

___ DOMESTIC ___ MUNICIPAL/PUBLIC
___ IRRIGATION ___ INDUSTRIAL
X TEST/OBSERVATION

* TYPE OF CASING:

___ STEEL X PLASTIC
___ CONCRETE ___ OTHER (specify)

* SIZE OF CASING: 1 INCHES IN DIAMETER
* DEPTH OF WELL: 30 FEET DEEP
* WAS ANY CASING REMOVED? X YES ___ NO
if yes, length removed, in feet: 2
* WAS CASING RIPPED OR PERFORATED? ___ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite-Cement Slurry	0	30

Michael W. Kuhn 336 MWD/MSD/MGD

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN LICENSE # CIRCLE ONE DATE

NOV-16-2001 15:58 PANASONIC 4107895029 P.06/22

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

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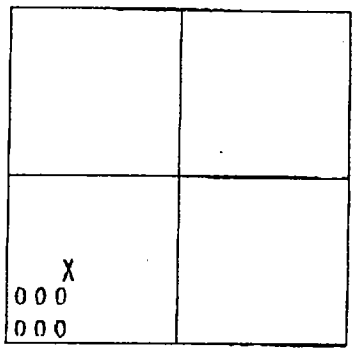
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 08/29/2001 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 4176
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Aaron Eichelberger
* WELL DRILLERS LICENSE NUMBER: AWD 709
  CIRCLE: MWD/MSD/MG
* OWNER'S NAME: Naval Surface Warfare Center
* WELL LOCATION:
  COUNTY: Charles
  NEAREST TOWN: Indian Head
  TAX MAP 20 BLOCK 8 PARCEL
  SUBDIVISION:
  SECTION: LOT:
  NEAREST ROAD: Hersey road

MARYLAND GRID COORDINATES
BOX NUMBER
E 751,000
N 274,000



SHOW WELL LOCATION BY X WITHIN BOX

TMP016

* TYPE OF WELL BEING ABANDONED:
  - DRILLED
  - X BORED/AUGUERED
  - JETTED
  - HAND DUG
  - OTHER (specify)
* USE CODE:
  - DOMESTIC
  - IRRIGATION
  - X TEST/OBSERVATION
  - MUNICIPAL/PUBLIC
  - INDUSTRIAL
* TYPE OF CASING:
  - STEEL
  - CONCRETE
  - X PLASTIC
  - OTHER (specify)
* SIZE OF CASING: 1 INCHES IN DIAMETER
* DEPTH OF WELL: 10 FEET DEEP
* WAS ANY CASING REMOVED? X YES NO
  if yes, length removed, in feet: 2
* WAS CASING RIPPED OR PERFORATED? YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite-Cement Slurry	0	10

SIGNATURE, MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # 336 — CIRCLE ONE: MWD/MSD/MGD — DATE

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

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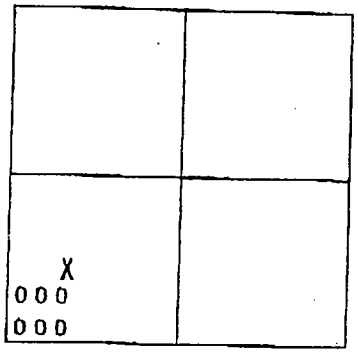
- WELL OWNER
- MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 08/29/2001 (month/day/year)

- PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 4176
- PERMIT NUMBER OF REPLACEMENT WELL — —
- PERSON ABANDONING WELL: Aaron Eichelberger
- WELL DRILLERS LICENSE NUMBER: AWD 709
- CIRCLE: MWD/MSD/MG
- OWNER'S NAME: Naval Surface Warfare Center
- WELL LOCATION:
  COUNTY: Charles
  NEAREST TOWN: Indian Head
  TAX MAP 20 BLOCK 8 PARCEL
  SUBDIVISION:
  SECTION: LOT:
  NEAREST ROAD: Hersey Road

MARYLAND GRID COORDINATES
BOX NUMBER
E 751,000
N 274,000



SHOW WELL LOCATION BY X WITHIN BOX

TMP017

- TYPE OF WELL BEING ABANDONED:
  - DRILLED
  - X BORED/AUGUERED
  - JETTED
  - HAND DUG
  - OTHER (specify)
- USE CODE:
  - DOMESTIC
  - IRRIGATION
  - X TEST/OBSERVATION
  - MUNICIPAL/PUBLIC
  - INDUSTRIAL
- TYPE OF CASING:
  - STEEL
  - CONCRETE
  - X PLASTIC
  - OTHER (specify)
- SIZE OF CASING: 1 INCHES IN DIAMETER
- DEPTH OF WELL: 26 FEET DEEP
- WAS ANY CASING REMOVED? X YES NO
  if yes, length removed, in feet: 2
- WAS CASING RIPPED OR PERFORATED? YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
Bentonite-Cement Slurry	0	26

Michael W. Kuhn 336 MWD/MSD/MGD

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN LICENSE # CIRCLE ONE DATE

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

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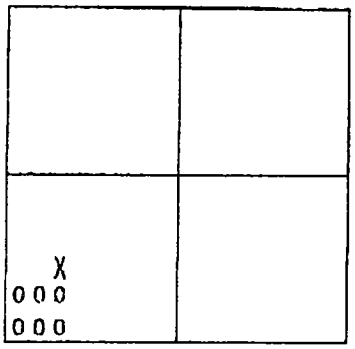
* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 08/29/2001 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 4176
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Aaron Eichelberger
* WELL DRILLERS LICENSE NUMBER: AWD 709
* CIRCLE: MWD/MSD/MC
* OWNER'S NAME: Naval Surface Warfare Center
* WELL LOCATION:
  COUNTY: Charles
  NEAREST TOWN: Indian Head
  TAX MAP 20 BLOCK 8 PARCEL
  SUBDIVISION:
  SECTION: LOT:
  NEAREST ROAD: Hersey road

MARYLAND GRID COORDINATES
BOX NUMBER
E 751,000
N 274,000



SHOW WELL LOCATION BY X WITHIN BOX

FMP 018

* TYPE OF WELL BEING ABANDONED:
  - DRILLED
  - X BORED/AUGUERED
  - JETTED
  - HAND DUG
  - OTHER (specify)
* USE CODE:
  - DOMESTIC
  - IRRIGATION
  - X TEST/OBSERVATION
  - MUNICIPAL/PUBLIC
  - INDUSTRIAL
* TYPE OF CASING:
  - STEEL
  - CONCRETE
  - X PLASTIC
  - OTHER (specify)
* SIZE OF CASING: 1 INCHES IN DIAMETER
* DEPTH OF WELL: 26 FEET DEEP
* WAS ANY CASING REMOVED? X YES NO
  if yes, length removed, in feet: 2
* WAS CASING RIPPED OR PERFORATED? YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite-~~XXXXX~~ Cement Slurry	0	26

Michael W. Kabe

336 MWD/MSD/MGD

DATE CIRCLE ONE LICENSE # SIGNATURE

NOV-16-2001 15:59 PANASONIC 4107895029 P.09/22

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

WATER WELL ABANDONMENT-SEALING REPORT FORM

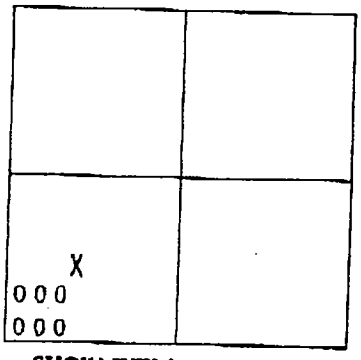
SUBMIT COPIES OF COMPLETED FORM TO:

- COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- WELL OWNER
- MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 08/29/2001 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 4176
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Aaron Eichelberger
* WELL DRILLERS LICENSE NUMBER: AWD 709
* OWNER'S NAME: Naval Surface Warfare Center
* CIRCLE: MWD/MSD/MG
* WELL LOCATION:
  COUNTY: Charles
  NEAREST TOWN: Indian Head
  TAX MAP 20 BLOCK 8 PARCEL
  SUBDIVISION:
  SECTION: LOT:
  NEAREST ROAD: Hersey Road

MARYLAND GRID COORDINATES
BOX NUMBER
E 751,000
N 274,000



SHOW WELL LOCATION BY X WITHIN BOX

TMP 019

* TYPE OF WELL BEING ABANDONED:
  - DRILLED
  - X BORED/AUGUERED
  - JETTED
  - HAND DUG
  - OTHER (specify)
* USE CODE:
  - DOMESTIC
  - IRRIGATION
  - X TEST/OBSERVATION
  - MUNICIPAL/PUBLIC
  - INDUSTRIAL
* TYPE OF CASING:
  - STEEL
  - CONCRETE
  - X PLASTIC
  - OTHER (specify)
* SIZE OF CASING: 1 INCHES IN DIAMETER
* DEPTH OF WELL: 15 FEET DEEP
* WAS ANY CASING REMOVED? X YES NO
  if yes, length removed, in feet: 2
* WAS CASING RIPPED OR PERFORATED? YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite-Cement Slurry	0	15

Michael W. Kuhn 336 MWD/MSD/MGD

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN LICENSE # CIRCLE ONE DATE

NOV-16-2001 15:59 PANASONIC 4107895029 P.10/22

B 1 2482 (MDE USE ONLY)

STATE OF MARYLAND
PERMIT TO DRILL WELL
please print or type

CH – 94 – 4178
fill in this form completely

Date Received (APA) _____ (8 MM DD YY 13)

OWNER INFORMATION

Naval Surface Warfare Center (15 Last Name Owner First Name 34)

Indian Head Division (35 Street or RFD 55)

Indian Head, MD 20640 (57 Town 70 State 72 Zip 76)

DRILLER INFORMATION

Michael W. Huber (Driller's Name 76) M W D 336 (License No. 81)

CHESAPEAKE GEOSYSTEMS, INC. (Firm Name)

6720 Ft. Smallwood Rd Balto., MD 21226 (Address)

Signature _____ Date _____

B 2 **WELL INFORMATION**

APPROX. PUMPING RATE (GAL. PER MIN.) NA (8 12)

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY) NA (14 20)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- D DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- 22 I INDUSTRIAL, COMMERICIAL, DEWATERING
- P PUBLIC WATER SUPPLY WELL
- T TEST, OBSERVATION, MONITORING
- G GEO-THERMAL

APPROXIMATE DEPTH OF WELL 20 (24 28) FEET

APPROXIMATE DIAMETER OF WELL 2 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) JETTED Jetted & DRIVEN

30 AIR-ROTary AIR-PERcussion ROTARY (Hydraulic Rotary)

37 CABLE REVerse-ROTary DRive-POINT

other _____

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX)

- N THIS WELL WILL NOT REPLACE AN EXISTING WELL
- Y THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- 39 S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- D THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) 41 _ _ - _ - _ _ _ _ 52

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER _ _ _ _ _ _G_ _ _

PERMIT No. CH 94 4178 (70 71 72 73 74 75 76 77 78 79)

B 3 **LOCATION OF WELL**

Charles (8 COUNTY 21)

_____ (23 SUBDIVISION 42)

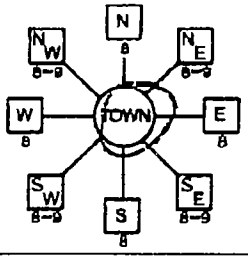
SECTION _____ (44 46) LOT _____ (48 50)

Indian Head (52 NEAREST TOWN 71)

MILES FROM TOWN (enter 0 if in town) 0 (73 76 77 78)

B 4 (1 2)

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



Hersey Road (11 NEAR WHAT ROAD 30)

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)

NORTH N, WEST W, SE, EAST E, S SOUTH

34 140 37 DISTANCE FROM ROAD

ENTER FT OR MI FT (38 39)

TAX MAP: 20 BLK: 8 PARCEL _____

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

~~Charles~~ COUNTY NAME ~~01-16189-W(M)~~ COUNTY NO.

STATE SIGNATURE _____ INSERT S → 41

DATE ISSUED 8-24-01 (43 MM DD YY 48) CO SIGNATURE _____ EXP. DATE 8-24-02

NORTH GRID 274 000 (50 55) EAST GRID 751 000 (57 63)

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X →

SOURCES OF DRILLING WATER
1.
2.
3.

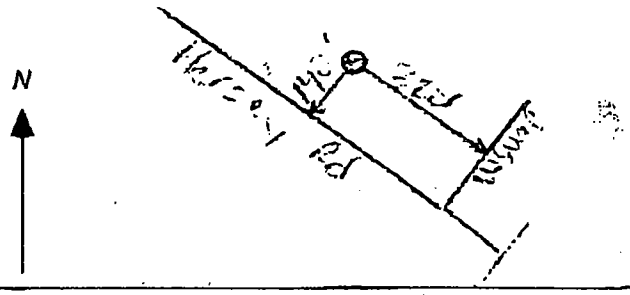
WRITE THE BOX NUMBER FROM THE MAP HERE

E 751,000

N 274,000

X 000 000

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



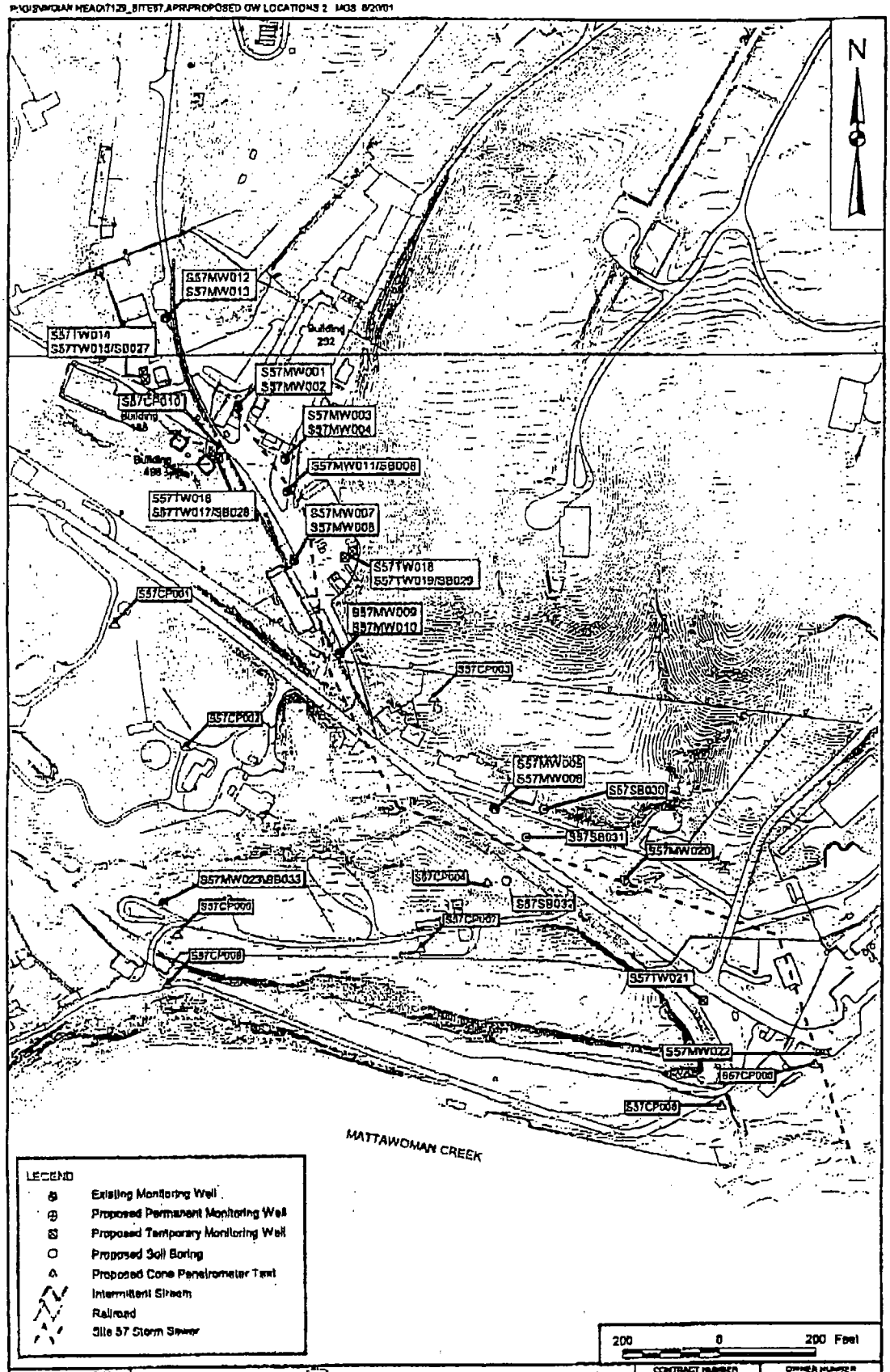
SPECIAL CONDITIONS
NOTE - APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED.

DENV-Permit 97

④ DRILLER

NOV-16-2001 16:00 PANASONIC 4107895029 P.11/22

P:\GIS\INDIAN HEAD\7129_SITE57.APR\PROPOSED GW LOCATIONS 2 IAGS 8/20/01



DRAWN BY / DATE	Tetra Tech NUS, Inc.	CONTRACT NUMBER 7129 / ORDER NUMBER
CHECKED BY / DATE	PROPOSED SOIL AND GROUNDWATER SAMPLING AND CONE PENETROMETER TEST LOCATIONS SITE 57 - FORMER DRUM LOADING AREA NSWC INDIAN HEAD INDIAN HEAD, MARYLAND	APPROVED BY G.L. / DATE 9/21/01
COST/SCHEDULE-AREA		APPROVED BY / DATE
SCALE AS NOTED		DRAWING NO. FIGURE 2 / REV 0

NOV-16-2001 16:00 PANASONIC 4107895029 P.12/22

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-8 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER 01-14189-W(M)

ST/CO USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED MM 08 DD 22 YY 01

Depth of Well 14 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH 96 4178

OWNER Naval Surface Warfare Center (7th)

STREET OR RFD Indian Head Division TOWN Indain Head, MD 20640

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow gravel with some sand silt	0	2	
Dark sand and ~~XXXXX~~ gravel	2	8	
yellow/brown clayey sand	8	10	
yellow/brown sand and gravel	10	~~XX~~ 14	
water @ 12'			

NUMBER OF UNSUCCESSFUL WELLS: none

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M W 3 3 6

DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M D

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permitted)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [X] no [N]

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS 6 NO. OF POUNDS 364

GALLONS OF WATER X 42

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. TOP to 2 ft. BOTTOM

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	2	4

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[S T] STEEL [B R] BRASS BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	4	14 ~~XX~~
2			
3			

SLOT SIZE 1 010 2 3

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 88

from	to
2	14

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3 NA

PUMPING TEST

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible Monitori

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

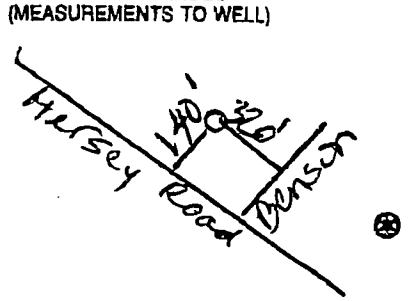
PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height) [+] above [−] below LAND SURFACE 00 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR97 ORIGINAL-STATE

MW-2D

NOV-16-2001 16:01 PANASONIC 4107895029 P.13/22

B 1 2485 SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
PERMIT TO DRILL WELL
please print or type

STATE PERMIT NUMBER: CH – 94 – 4175

fill in this form completely

Date Received (APA) _____ (MM DD YY)

OWNER INFORMATION

Naval Surface Warfare Center — Last Name / First Name

Indian Head Division — Street or RFD

Indian Head, Maryland 20640 — Town / State / Zip

DRILLER INFORMATION

MichaEL W. Huber — Driller's Name — M W D 336 License No.

~~EMEX~~ Chesapeake Geosystems, Inc. — Firm Name

6720 Ft. Smallwood Ropad Balto., MD 21226 — Address

Signature _____ Date

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.): NA

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): NA

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- D DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- 22 I INDUSTRIAL, COMMERICIAL, DEWATERING
- P PUBLIC WATER SUPPLY WELL
- T TEST, OBSERVATION, MONITORING Piezometer
- G GEO-THERMAL

APPROXIMATE DEPTH OF WELL 20 FEET

APPROXIMATE DIAMETER OF WELL 2 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) — JETTED — Jetted & DRIVEN

30 AIR-ROTary — AIR-PERcussion — ROTARY (Hydraulic Rotary)

37 CABLE — REVerse-ROTary — DRive-POINT

other _____

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)

- N THIS WELL WILL NOT REPLACE AN EXISTING WELL
- Y THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- 39 S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- D THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) 41 _____ 52

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER _____G_____

PERMIT No. CH_ 94_ 4175 (70 71 72 73 74 75 76 77 78 79)

B 3 LOCATION OF WELL

Charles — COUNTY

SUBDIVISION

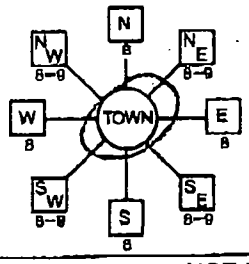
SECTION _____ LOT _____

Indian Head — NEAREST TOWN

MILES FROM TOWN (enter 0 if in town) 0 M

B 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



Hersey road — NEAR WHAT ROAD

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)

DISTANCE FROM ROAD _____ ENTER FT OR MI

TAX MAP: 20 BLK: 8 PARCEL _____

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

Charles — COUNTY NAME

01-14136-W(M) — COUNTY NO.

STATE SIGNATURE _____ INSERT S

DATE ISSUED 08-24-01 (43 MM DD YY 48)

CO SIGNATURE _____ EXP. DATE 08-24-02

NORTH GRID 274 000 (50 55) EAST GRID 751 000 (57 63)

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X

SOURCES OF DRILLING WATER
1.
2.
3.

WRITE THE BOX NUMBER FROM THE MAP HERE

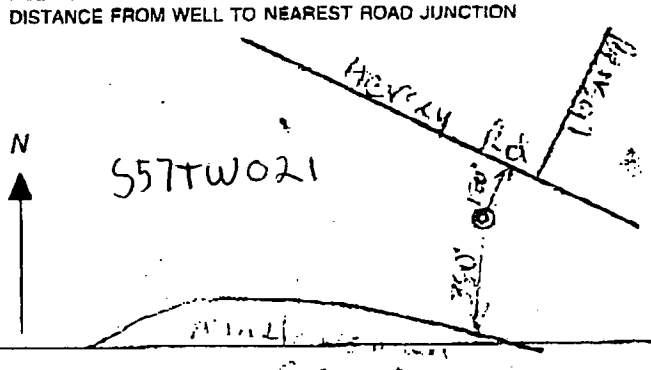
E 751,000

N 274,000

X

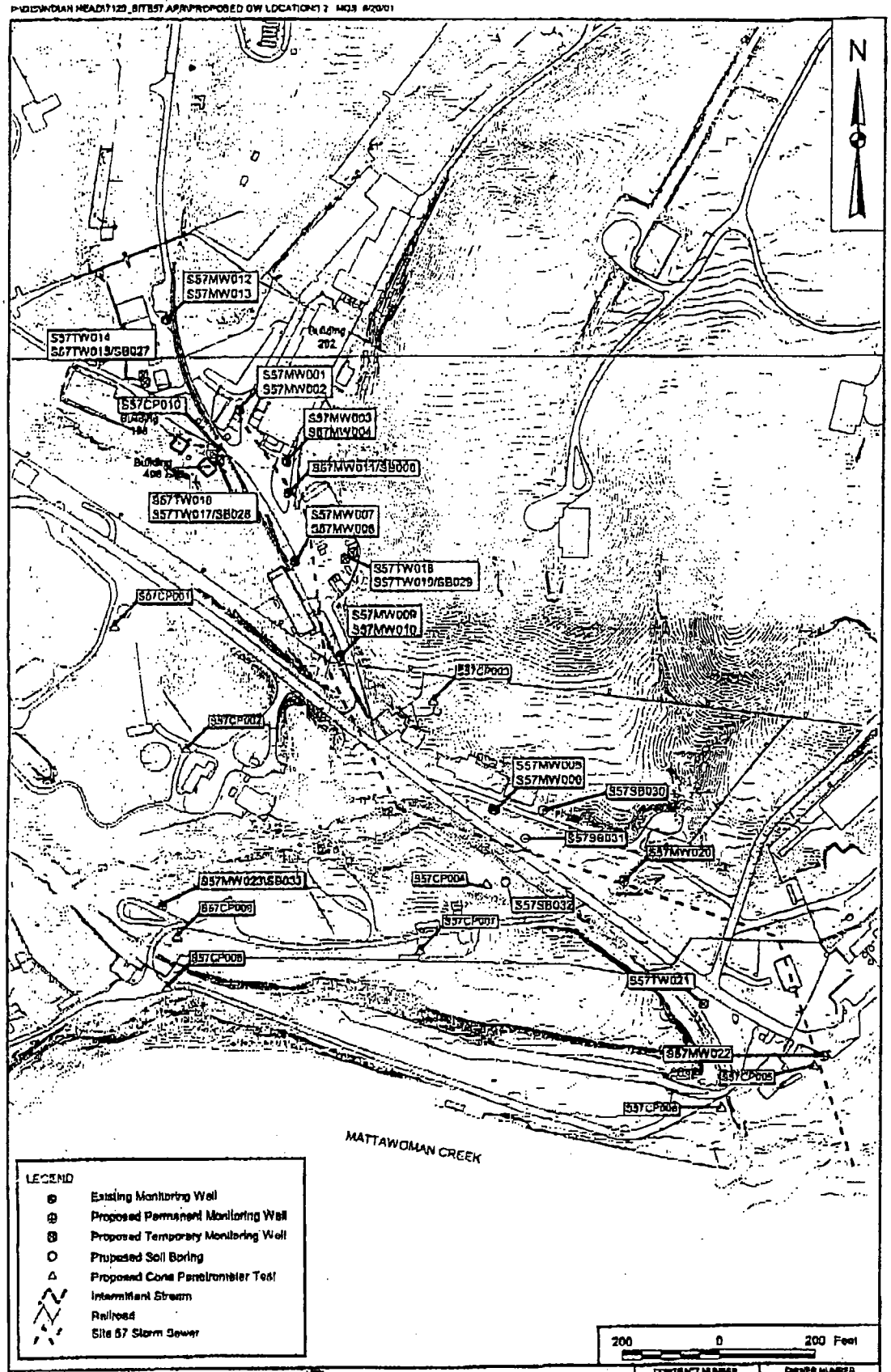
000
000

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



SPECIAL CONDITIONS
NOTE: APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED

P:\DIS\INDIAN HEAD\7129_SITE57 APR\PROPOSED GW LOCATIONS 2 MGS 8/20/01



Tetra Tech NUS, Inc.	CONTRACT NUMBER 7129	DRAWER NUMBER
PROPOSED SOIL AND GROUNDWATER SAMPLING AND CONE PENETROMETER TEST LOCATIONS SITE 57 - FORMER DRUM LOADING AREA NSWC INDIAN HEAD INDIAN HEAD, MARYLAND	APPROVED BY G.L. / DATE 8/21/01 APPROVED BY / DATE	
SCALE AS NOTED	DRAWING NO. FIGURE 2	REV 0

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER 01-14186-W(M)

ST/CO USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED MM 08 DD 20 YY 01

Depth of Well 14 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 4175

OWNER Naval Surface Warfare Center (7th)
STREET OR RFD Indian Head Division TOWN Indian Head, MD 20640
SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow gravel with some sand and ~~xxxxx~~ silt	0	2	
dark sand and gravel	2	8	
yellow/brown clayey sand	8	10	
yellow/brown sand and gravel	10	14	
water @ 12'			

NUMBER OF UNSUCCESSFUL WELLS: none

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M W D 2 3 6

Michael W. Kuhn
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: M __ D __ __ __

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [X] no [N]

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT (CM) BENTONITE CLAY (BC)

NO. OF BAGS 6 NO. OF POUNDS 364
GALLONS OF WATER 36
DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. to 7 ft.
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	1	9

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

DEPTH (nearest ft.)

EACH SCREEN			
1	PL	9	14
2			
3			

SLOT SIZE 1 010 2 ___ 3 ___

DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
7	14

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q

TELESCOPE CASING ___ LOG INDICATOR ___ OTHER DATA ___

C 3 NA

PUMPING TEST

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below) Temporary Monitorin, J jet, S submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

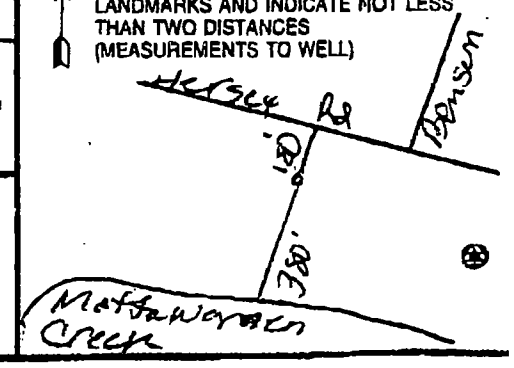
CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)
+ above, − below LAND SURFACE 00 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR97 ORIGINAL-STATE Temp021

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

WATER WELL ABANDONMENT-SEALING REPORT FORM

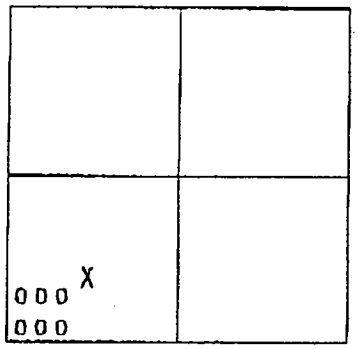
SUBMIT COPIES OF COMPLETED FORM TO:

- COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- WELL OWNER
- MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 08/29/2001 (month/day/year)

- PERMIT NUMBER OF ABANDONED WELL (if any): CH — 94 — 4175
- PERMIT NUMBER OF REPLACEMENT WELL: — —
- PERSON ABANDONING WELL: Aaron Eichelberger
- WELL DRILLERS LICENSE NUMBER: AWD 709
  CIRCLE: MWD/MSD/MGI
- OWNER'S NAME: Naval Surface Warfare Center
- WELL LOCATION:
  COUNTY: Charles
  NEAREST TOWN: Indian Head
  TAX MAP 20 BLOCK 8 PARCEL
  SUBDIVISION:
  SECTION: LOT:
  NEAREST ROAD: Hersey Road

MARYLAND GRID COORDINATES
BOX NUMBER E 751,000 N 274,000



SHOW WELL LOCATION BY X WITHIN BOX

Tmp 021

- TYPE OF WELL BEING ABANDONED:
  - DRILLED
  - JETTED
  - X BORED/AUGUERED
  - HAND DUG
  - OTHER (specify)
- USE CODE:
  - DOMESTIC
  - MUNICIPAL/PUBLIC
  - IRRIGATION
  - INDUSTRIAL
  - X TEST/OBSERVATION
- TYPE OF CASING:
  - STEEL
  - X PLASTIC
  - CONCRETE
  - OTHER (specify)
- SIZE OF CASING: 1 INCHES IN DIAMETER
- DEPTH OF WELL: 14 FEET DEEP
- WAS ANY CASING REMOVED? X YES NO
  if yes, length removed, in feet: 2
- WAS CASING RIPPED OR PERFORATED? YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite-Cement Slurry	0	14

Michael W. Kehoe MWD/MSD/MGD 336

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN LICENSE # CIRCLE ONE DATE

B 1 2483 — SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
PERMIT TO DRILL WELL
please print or type

STATE PERMIT NUMBER: CH - 94 - 4177

fill in this form completely

Date Received (APA) ____ 8 MM DD YY 13

OWNER INFORMATION

Naval Surface Warfare Center — 15 Last Name Owner First Name 34

Indian Head Division — 38 Street or RFD 55

Indian Head, ~~XXXXXX~~ MD 20640 — 57 Town 70 State 72 Zip 76

DRILLER INFORMATION

Michael W. Huber — M W D 336 — Driller's Name 76 License No. 81

CHESAPEAKE GEOSYSTEMS, INC. — Firm Name

6720 Ft. Smallwood Rd Balto., MD 21226 — Address

Signature ____ Date

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.): NA (8–12)

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): NA (14–20)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- [D] DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- [F] FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- 22 [I] INDUSTRIAL, COMMERICIAL, DEWATERING
- [P] PUBLIC WATER SUPPLY WELL
- [T] TEST, OBSERVATION, MONITORING
- [G] GEO-THERMAL

APPROXIMATE DEPTH OF WELL: 20 FEET (24–28)

APPROXIMATE DIAMETER OF WELL: 2 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) — JETTED — Jetted & DRIVEN

30 AIR-ROTary — AIR-PERcussion — ROTARY (Hydraulic Rotary)

37 CABLE — REVerse-ROTary — DRive-POINT

other ____

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)

- [N] THIS WELL WILL NOT REPLACE AN EXISTING WELL
- [Y] THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- 39 [S] THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- [D] THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) 41 __ __ - __ - __ __ __ __ 52

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER _ _ _ _ _ _G_ _ _

PERMIT No. CH - 94 - 4177 (70 71 72 73 74 75 76 77 78 79)

B 3 LOCATION OF WELL

Charles — 8 COUNTY 21

23 SUBDIVISION 42

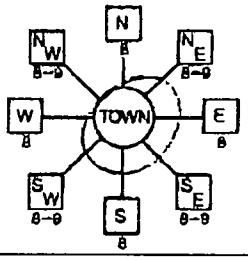
SECTION (44–46) LOT (48–50)

Indian Head — 52 NEAREST TOWN 71

MILES FROM TOWN (enter 0 if in town): 0 M (73–76 77 78)

B 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



Hersey Road — 11 NEAR WHAT ROAD 30

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)

34 60 37 DISTANCE FROM ROAD — ENTER FT OR MI: FT (38 39)

TAX MAP: 20 BLK: 8 PARCEL ____

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

Charles — COUNTY NAME

01-14188-4(M) — COUNTY NO.

STATE SIGNATURE ____ INSERT S → 41

DATE ISSUED 8-24-01 (43 MM DD YY 48) — CO SIGNATURE — EXP. DATE 8-24-02

NORTH GRID 274 000 (50–55) EAST GRID 751 000 (57–63)

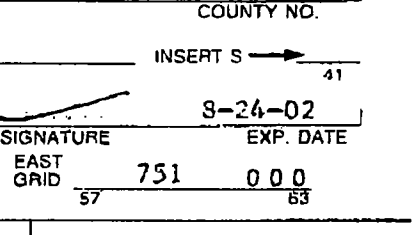
SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X →

SOURCES OF DRILLING WATER
1.
2.
3.

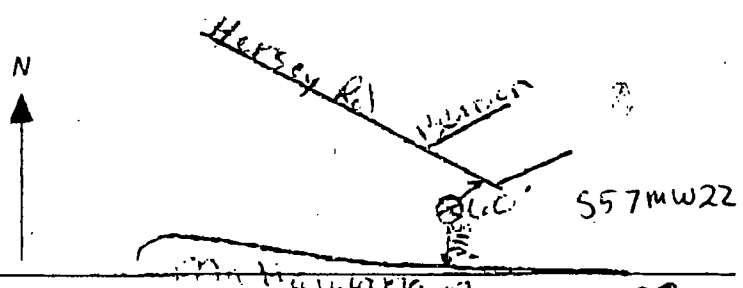
WRITE THE BOX NUMBER FROM THE MAP HERE

E 751,000

N 274,000



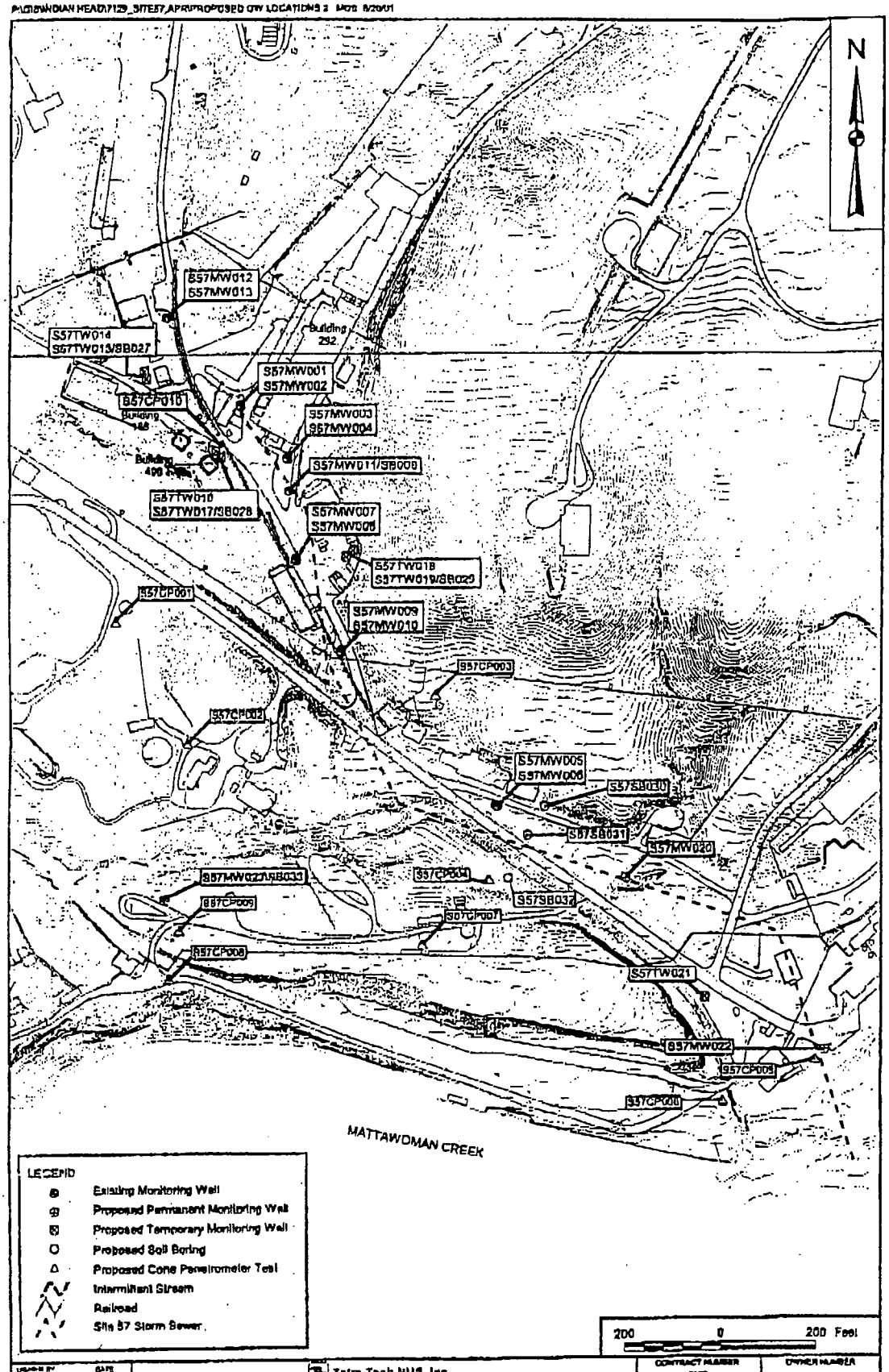
DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



SPECIAL CONDITIONS

NOTE - APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED -

P:\CIS\INDIAN HEAD\7129_SITE57_APR\PROPOSED GW LOCATIONS 2 MOD 8/20/01



LEGEND

- Existing Monitoring Well
- Proposed Permanent Monitoring Well
- Proposed Temporary Monitoring Well
- Proposed Soil Boring
- Proposed Cone Penetrometer Test
- Intermittent Stream
- Railroad
- Site 57 Storm Sewer

200 0 200 Feet

DRAWN BY / REVIEW BY	DATE	Tetra Tech NUS, Inc.
CHECKED BY	DATE	PROPOSED SOIL AND GROUNDWATER SAMPLING AND CONE PENETROMETER TEST LOCATIONS SITE 57 - FORMER DRUM LOADING AREA NSWC INDIAN HEAD INDIAN HEAD, MARYLAND
COORDINATE SYSTEM		
SCALE: AS NOTED		

CONTRACT NUMBER 7129	OWNER NUMBER
APPROVED BY GJL	DATE 8/20/01
APPROVED BY	DATE
DRAWING NO. FIGURE 2	REV 0

C 1 5735

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 01-14188-W(M)

ST/CO USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED MM 08 DD 22 YY 01

Depth of Well 14 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 4177

OWNER Naval Surface Warefare Center (7th)

STREET OR RFD Indian Head Division TOWN Indian Head, MD 20640

SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow gravel with some sand silt	0	2	
dark sand and gravel	2	8	
yellow/brown clayey sand	8	10	
yellow/brown sand and gravel	10	14	
water @ 12'			

RECEIVED NOV 26 2001 CHARLES CO HEALTH DEPT ENVIRONMENTAL HEALTH

NUMBER OF UNSUCCESSFUL WELLS: none

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLER'S LIC. NO.: M 1 0 3 6

DRILLER'S SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: M __ D __ __ __

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permitee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT (C M) BENTONITE CLAY (B C)

NO. OF BAGS 6 NO. OF POUNDS 564

GALLONS OF WATER 42

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. TOP to 2 ft. BOTTOM

(enter 0 if from surface)

CASING RECORD

casing types: insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	2	4

OTHER CASING (if used)

	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole: insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

		DEPTH (nearest ft.)	
1	PL	4	14
2			
3			

SLOT SIZE 1 010 2 ____ 3 ____

DIAMETER OF SCREEN 2 (NEAREST INCH)

	from	to
GRAVEL PACK	2	14

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 ____ 72 ____ 74 76 78

TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3 NA

PUMPING TEST

HOURS PUMPED (nearest hour) ____

PUMPING RATE (gal. per min.) ____

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ ft.

WHEN PUMPING ____ ft.

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

Monitorin

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ____

CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____

PUMP HORSE POWER ____

PUMP COLUMN LENGTH (nearest ft.) ____

CASING HEIGHT (circle appropriate box and enter casing height)

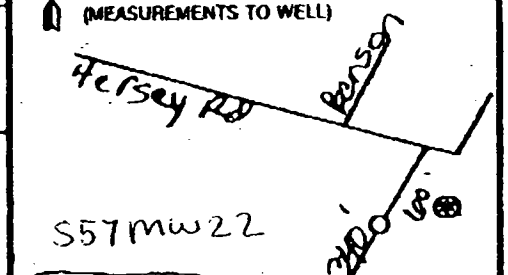
+ above LAND SURFACE

− below

00 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



B 1 | 2481 — SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
PERMIT TO DRILL WELL
please print or type

STATE PERMIT NUMBER: CH – 94 – 4174

fill in this form completely

Date Received (APA) 0 MM DD YY 13

OWNER INFORMATION

Naval Surface Warfare Center (15 Last Name — Owner — First Name 34)

Indian Head Division (36 Street or RFD 55)

Indian Head, Maryland 20640 (57 Town 70 State 72 Zip 76)

DRILLER INFORMATION

Michael W. Huber — M W D 336 (Driller's Name 76 License No. 81)

CHESAPEAKE GEOSYSTEMS, INC. (Firm Name)

6720 Ft. Smallwood Rd Balto., MD 21226 (Address)

Signature — Date

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.): NA (8 – 12)

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): NA (14 – 20)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- [D] DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- [F] FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- 22 [I] INDUSTRIAL, COMMERICIAL, DEWATERING
- [P] PUBLIC WATER SUPPLY WELL
- [T] TEST, OBSERVATION, MONITORING
- [G] GEO-THERMAL

APPROXIMATE DEPTH OF WELL: 20 FEET (24 – 28)

APPROXIMATE DIAMETER OF WELL: 2 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) — JETTED — Jetted & DRIVEN

30 AIR-ROTary — AIR-PERcussion — ROTARY (Hydraulic Rotary)

37 CABLE — REVerse-ROTary — DRive-POINT

other

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)

- [N] THIS WELL WILL NOT REPLACE AN EXISTING WELL
- [Y] THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- 39 [S] THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- [D] THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) 41 — — — — – — — — — 52

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER — — — — — — G — — —

PERMIT No. CH – 94 – 4174 (70 71 72 73 74 75 76 77 78 79)

B 3 LOCATION OF WELL

Charles (8 COUNTY 21)

(23 SUBDIVISION 42)

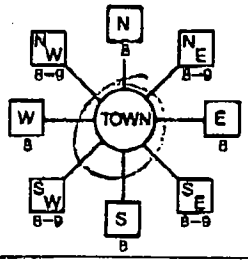
SECTION (44 – 46) LOT (48 – 50)

Indian Head (52 NEAREST TOWN 71)

MILES FROM TOWN (enter 0 if in town): 0 (73 – 76 M 77 78)

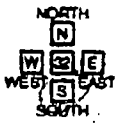
B 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



Hersey Rd Road (11 NEAR WHAT ROAD 30)

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)



34 560 37 DISTANCE FROM ROAD FT (ENTER FT OR MI 38 39)

TAX MAP: 20 BLK: 8 PARCEL

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

Charles — 01-14185-V(M) (COUNTY NAME — COUNTY NO.)

STATE SIGNATURE — INSERT $ (41)

DATE ISSUED 8-24-01 — CO SIGNATURE — 8-24-02 EXP. DATE (43 MM DD YY 48)

NORTH GRID 275 000 (50 – 55) EAST GRID 751 000 (57 – 63)

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X

SOURCES OF DRILLING WATER
1.
2.
3.

WRITE THE BOX NUMBER FROM THE MAP HERE

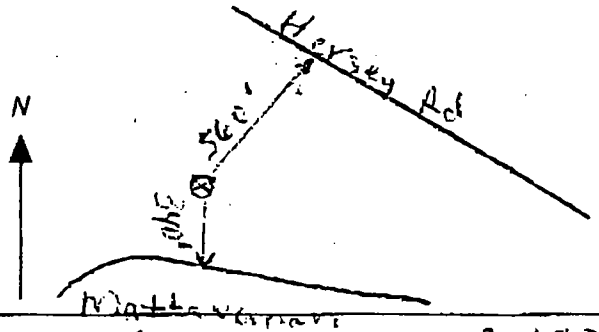
E 751,000

N 274,000

X

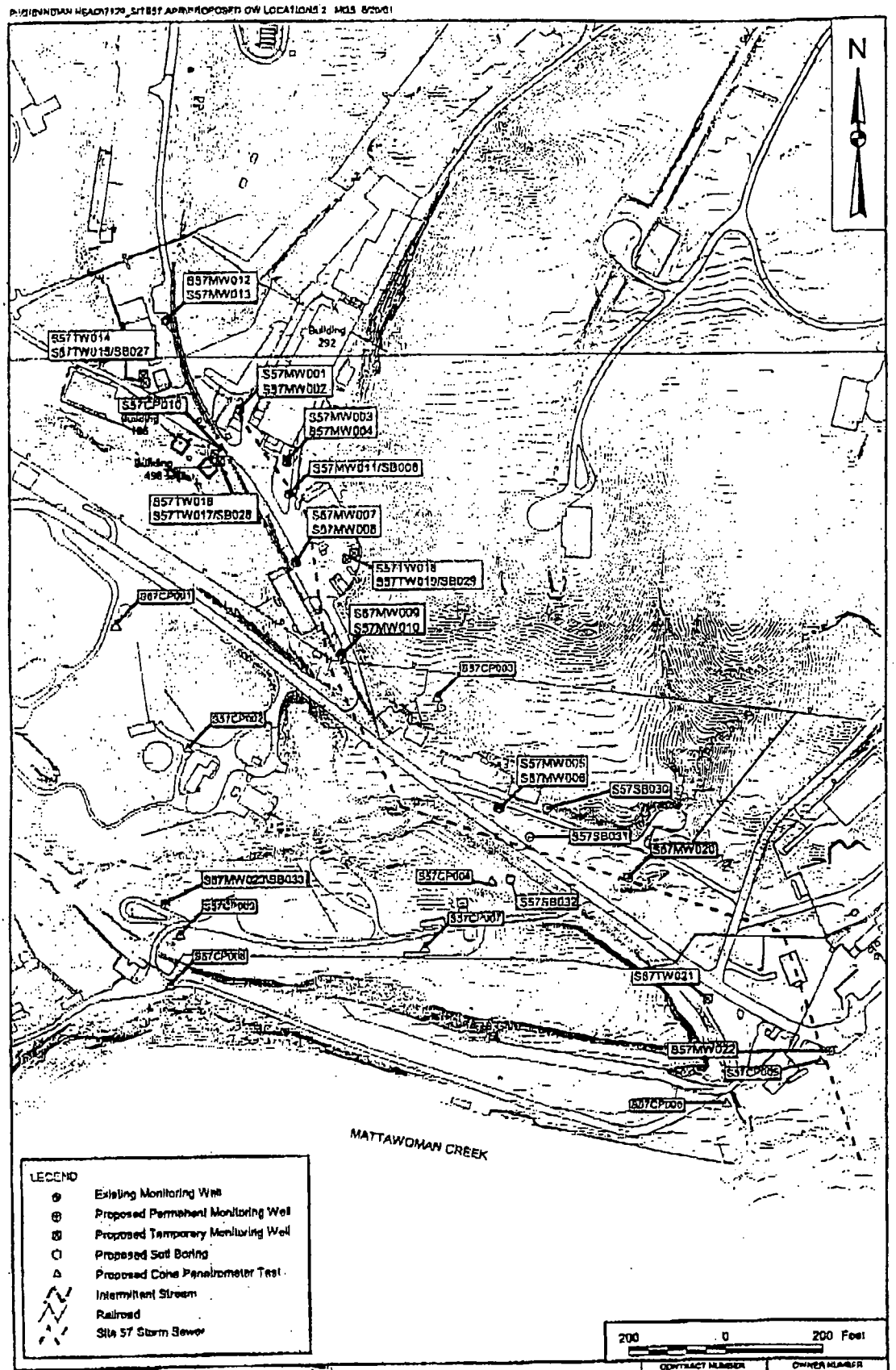
000
000

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



SPECIAL CONDITIONS
NOTE: APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED.

MW23



Tetra Tech NUS, Inc.

PROPOSED SOIL AND GROUNDWATER SAMPLING AND CONE PENETROMETER TEST LOCATIONS
SITE 57 - FORMER DRUM LOADING AREA
NSWC INDIAN HEAD
INDIAN HEAD, MARYLAND

AS NOTED

CONTRACT NUMBER 7129
OWNER NUMBER
APPROVED BY CLR
DATE 8/21/01
APPROVED BY
DATE
DRAWING NO. FIGURE 2
REV 0

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY PLEASE TYPE

COUNTY NUMBER 01-14185-W(M)

ST/GO USE ONLY DATE Received MM DD YY

DATE WELL COMPLETED MM 08 DD 22 YY 01

Depth of Well 20 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 4174

OWNER Navel Surface Warefare Center

STREET OR RFD ~~Indian Head Division~~ TOWN ~~Indian Head, MD 20640~~

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Yellow/brown gravel, sand, silt and clay	0	12'	
lite gray sand and gravel	12	14	
lite grey sand trace silt and clay	14	20	
water @ 12'			

NUMBER OF UNSUCCESSFUL WELLS: none

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04 04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M D

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M D

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes X no N

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 6 NO. OF POUNDS 564

GALLONS OF WATER 42

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. to 8 ft.

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
Ø PL	2	10

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

DEPTH (nearest ft.)

EACH SCREEN			
1	PL	10	20
2			
3			

SLOT SIZE 1 010 2 3

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 from 8 to 20

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3 NA

PUMPING TEST

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

Monitorin

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

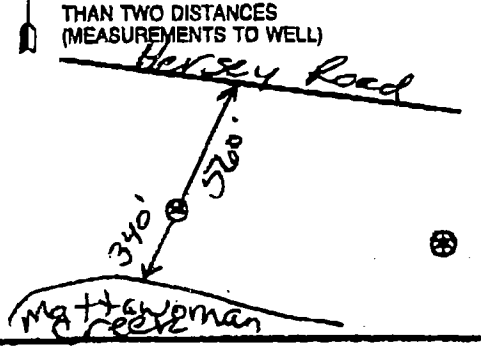
PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

+ above – below LAND SURFACE 00 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



MW-23

DENV-CR97 ORIGINAL-STATE

NOV-16-2001 16:10 PANASONIC 4107895029 P.01/01

C 1 | 18/2 SEQUENCE NO. (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received DD YY
8 13

DATE WELL COMPLETED MM 9 DD 20 YY 07
15 20

Depth of Well 22 38 26 (TO NEAREST FOOT)

MW0216

PERMIT NO FROM "PERMIT TO DRILL WELL" CH - 94 - 6680
28 29 30 31 32 33 34 35 36 37

OWNER Naval District Washington (last name first name)
STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
F sand & silt	0	10	
brown F sand	10	18	
orang gray C Sand	18	38	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M D
Michael Shepherd
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. JWD 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] 44 no [N] 44

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [CM] 45 46 BENTONITE CLAY [BC] 45 46

NO. OF BAGS 5 NO. OF POUNDS 470
GALLONS OF WATER 30
DEPTH OF GROUT SEAL (to nearest foot)
from 0 (48 TOP 52) ft. to 24 (54 BOTTOM 58) ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL (60 61)	2 (63 64)	27 (66 70)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to
ST	6	+1	22

SCREEN RECORD
screen type or open hole insert appropriate code below

[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2 (1 2)

EACH SCREEN		DEPTH (nearest ft.)	
1	PL (8 9)	27 (11 15)	37 (17 21)
2	(23 24)	(26 30)	(32 36)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1 .010 2 3

DIAMETER OF SCREEN 2" (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
24	38

68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W O
70 72 74 75 76
TELESCOPING CASING OG INDICATOR OTHER DATA

OWNER

C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) (8 9)

PUMPING RATE (gal. per min.) (11 15)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING (17 20) ft.

WHEN PUMPING (22 25) ft.

TYPE OF PUMP USED (for test)
[A] air (27) [P] piston (27) [T] turbine (27)
[C] centrifugal (27) [R] rotary (27) [O] other (describe below) (27)
[J] jet (27) [S] submersible (27)

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. (29)

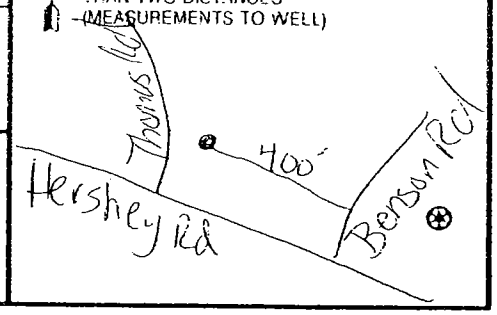
CAPACITY: GALLONS PER MINUTE (to nearest gallon) (31 35)

PUMP HORSE POWER (37 41)

PUMP COLUMN LENGTH (nearest ft.) (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)
[+] above (49) LAND SURFACE
[–] below (49) (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



2 3 6
HIS NUMBER IS TO BE PUNCHED
I COLS. 3-6 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER 34667

T/CO USE ONLY
ATE Received
MM DD YY
13

DATE WELL COMPLETED
MM DD YY
9 16 05
15 20

Depth of Well
22 20 26
(TO NEAREST FOOT)

MW027

PERMIT NO.
FROM "PERMIT TO DRILL WELL"
CH - 94 - 6680
28 29 30 31 32 33 34 35 36 37

OWNER Naval District Washington (last name) (first name)
STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640
SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow orange sand & gravel	0	18	
gray green sand	18	20	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M D
Michael Shepherd
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. JW D 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 44

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM 45 46 BENTONITE CLAY BC 45 46

NO. OF BAGS 1 1/2 NO. OF POUNDS 170
GALLONS OF WATER 10
DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. to 8 ft.
48 TOP 52 54 BOTTOM 58
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL CO CONCRETE
PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	2	10'
60 61	63 64	66 70

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE
PL PLASTIC OT OTHER

C 2 1 2

DEPTH (nearest ft.)

EACH SCREEN			
1	PL	10'	20'
	8 9	11 15	17 21
2			
	23 24	26 30	32 36
3			
	38 39	41 45	47 51

SLOT SIZE 1 .010 2 3

DIAMETER OF SCREEN 2 (NEAREST INCH)
56 60

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
8	20

68

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 72 74 75 76
TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3 1 2

PUMPING TEST

HOURS PUMPED (nearest hour) 8 9

PUMPING RATE (gal. per min.) 11 15

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING 17 20 ft.

WHEN PUMPING 22 25 ft.

TYPE OF PUMP USED (for test)

A air 27 P piston 27 T turbine 27
C centrifugal 27 R rotary 27 O other (describe below) 27
J jet 27 S submersible 27

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. 29

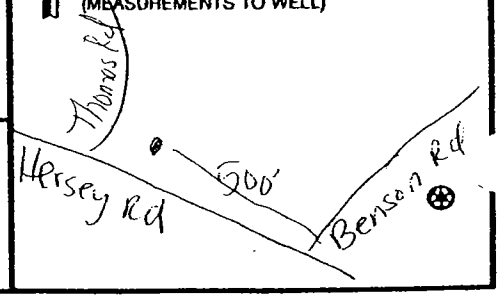
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 31 35

PUMP HORSE POWER 37 41

PUMP COLUMN LENGTH (nearest ft.) 43 47

CASING HEIGHT (circle appropriate box and enter casing height)
+ above 49
– below 49
LAND SURFACE
50 51 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



OWNER

1 2 3 6
THIS NUMBER IS TO BE PUNCHED IN COLS. 3 & 6 ON ALL CARDS

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER 34667

ST CO USE ONLY
DATE Received MM DD YY
8 13

DATE WELL COMPLETED
MM DD YY
9 22 05
15 20

Depth of Well 22 34 26
(TO NEAREST FOOT)

S57MW028

PERMIT NO. FROM "PERMIT TO DRILL WELL"
CH - 94 - 6680
28 29 30 31 32 33 34 35 36 37

OWNER Naval District Washington
STREET OR RTE. 101 Strauss Avenue
SUBDIVISION
TOWN Indian Head, MD 20640
SECTION
LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
M green silt & sand	0	28	
brown gray silt & clay	28	34	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO.: M D
Michael Lust
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO.: III D 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 46 no N 44

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM 45 46 BENTONITE CLAY BC 45 46

NO. OF BAGS 4/4 NO. OF POUNDS 225
GALLONS OF WATER 28
DEPTH OF GROUT SEAL (to nearest foot)
from 0 48 TOP 52 ft. to 22 54 BOTTOM 58 ft.
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL 60 61	2" 63 64	34 66 70

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to
ST	6	+1	16'

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL 8 9	24 11 15	34' 17 21
2	23 24	26 30	32 36
3	36 39	41 45	47 51

SLOT SIZE 1 .010 2 3

DIAMETER OF SCREEN 2" 56 60 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from 22 to 34 68

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 72
TELESCOPE CASING — LOG INDICATOR — 74 75 76 OTHER DATA

C 3

PUMPING TEST N/A

HOURS PUMPED (nearest hour) 8 6

PUMPING RATE (gal. per min.) 11 15

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING 17 20 ft.

WHEN PUMPING 22 25 ft.

TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible (27)

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. 29

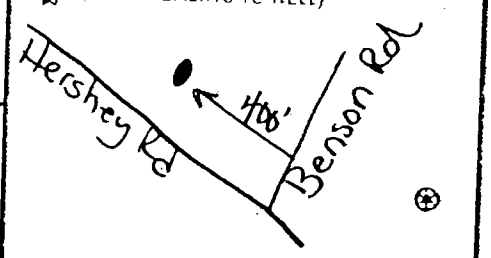
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 31 35

PUMP HORSE POWER 37 41

PUMP COLUMN LENGTH (nearest ft.) 43 47

CASING HEIGHT (circle appropriate box and enter casing height)
+ above, − below 49
LAND SURFACE 3 (nearest foot) 50 51

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENY-CR00

OWNER

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

(THIS NUMBER IS TO BE PUNCHED IN COLS 3-6 ON ALL CARDS)

NO DATA AFTER WELL IS COMPLETED

COUNTY NUMBER: 34667

STATE USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED: MM 9 DD 16 YY 0[illegible]

Depth of Well: 14 (TO NEAREST FOOT)

mw029

PERMIT NO FROM "PERMIT TO DRILL WELL": CH - 94 - 6680

OWNER: ~~Naval District Washington~~

STREET OR RFD: ~~101 Strauss Avenue~~ TOWN: Indian Head, MD 20640

SUBDIVISION: SECTION: LOT:

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
gray sand trace clay	0	14	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED: yes [Y] no [N]

CIRCLE APPROPRIATE LETTER

- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M D

Michael Stepter
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: JW D 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one): CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS: 3/4 NO. OF POUNDS: 60

GALLONS OF WATER: 5

DEPTH OF GROUT SEAL (to nearest foot): from 0 ft. (TOP) to 3 ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	2	4'

OTHER CASING (if used) — EACH CASING

	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole — insert appropriate code below

[S T] STEEL [B R] BRASS [H O] OPEN HOLE [P L] PLASTIC BRONZE [O T] OTHER

[C 2]

DEPTH (nearest ft.) — EACH SCREEN

1	PL	4	14
2			
3			

SLOT SIZE 1 .010 2 ____ 3 ____

DIAMETER OF SCREEN 2" (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 3 to 14

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W O

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

[C 3]

PUMPING TEST

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

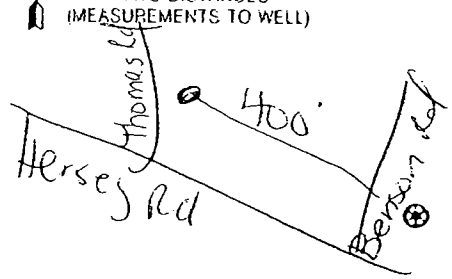
PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

[+] above [–] below LAND SURFACE (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

1 2 3 4
THIS NUMBER IS TO BE PUNCHED IN COLS. 3 & 4 ON ALL CARDS.

WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER 34667

STATE USE ONLY
DATE Received MM DD YY
8 13

DATE WELL COMPLETED MM DD YY: 9 23 05 (15 20)

Depth of Well 22 34 (TO NEAREST FOOT) 26

well#S57SB040/ mw 030

PERMIT NO FROM "PERMIT TO DRILL WELL": CH 94 6680 (28 29 30 31 32 33 34 35 36 37)

C R ~~Naval District Washington~~ (Inst. name)

STREET OR RFD ~~101 Strauss Avenue~~ TOWN Indian Head, MD 20640

SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
greengrey silt & clay	0	32	
browngray silt & clay	32	34	

NUMBER OF UNSUCCESSFUL WELLS: _____

WELL HYDROFRACTURED yes Y / no N (circled)

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO.: M D

Michael Shepherd
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: J W D 3 4 7

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (circled) / no N

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT C M (circled) BENTONITE CLAY B C (circled)

NO. OF BAGS 4 1/2 NO. OF POUNDS 425

GALLONS OF WATER 28

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. TOP to 22 ft. BOTTOM

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

S T STEEL; C O CONCRETE; P L (circled) PLASTIC; O T OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	2"	24

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to
ST	6"	0	16

SCREEN RECORD

screen type or open hole insert appropriate code below

S T STEEL; B R BRASS BRONZE; H O OPEN HOLE; P L PLASTIC; O T OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	24	34
2			
3			

SLOT SIZE 1 .010 2 _____ 3 _____

DIAMETER OF SCREEN 2" (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 22 to 34

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 TELESCOPE CASING; 72 LOG INDICATOR; 74 75 76 OTHER DATA

C 3

PUMPING TEST

N/A

HOURS PUMPED (nearest hour) _____

PUMPING RATE (gal. per min.) _____

METHOD USED TO MEASURE PUMPING RATE _____

WATER LEVEL (distance from land surface)

BEFORE PUMPING _____ ft.

WHEN PUMPING _____ ft.

TYPE OF PUMP USED (for test)

A air; P piston; T turbine; C centrifugal; R rotary; O other (describe below); J jet; S submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES / NO (circled)

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. _____

CAPACITY: GALLONS PER MINUTE (to nearest gallon) _____

PUMP HORSE POWER _____

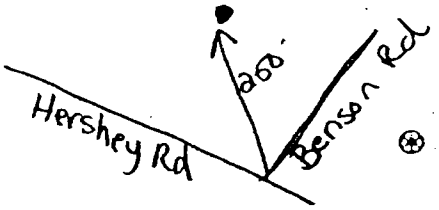
PUMP COLUMN LENGTH (nearest ft.) _____

CASING HEIGHT (circle appropriate box and enter casing height)

+ above / – below (circled) LAND SURFACE 3 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

(THIS NUMBER IS TO BE PUNCHED IN COLS. 5-8 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

WELL NUMBER 34667

STATE USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED MM 9 DD 15 YY 05

Depth of Well 20' (TO NEAREST FOOT)

MW031

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 6683

OWNER Naval District Washington (last name first name)

STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
brown silt & sand	0	8	
lt gray Sand	0	20	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO. M D

Michael Stephens
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. JW D367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) [Y] [N]

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS 1 3/4 NO. OF POUNDS 160

GALLONS OF WATER 10

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. to 8 ft.
TOP BOTTOM
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	2"	10'

OTHER CASING (if used)

EACH CASING	diameter (inch)	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[S T] STEEL [B R] BRASS BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	10	20
2			
3			

SLOT SIZE 1 .010 2 3

DIAMETER OF SCREEN 2" (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
8	20

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W O

TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3

N/A

PUMPING TEST

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

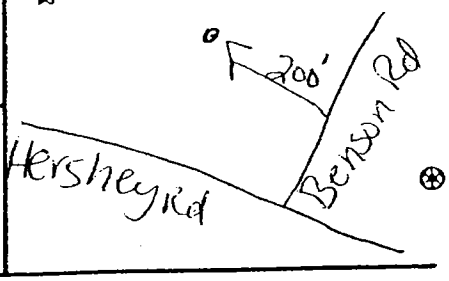
PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

[+] above [–] below LAND SURFACE 3 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

(THIS NUMBER IS TO BE PUNCHED IN COLS. 2 & 3 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER 34667

STATE USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED MM 9 DD 15 YY 05

Depth of Well 16 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH 94 6683

MW032

C R Naval District Washington (line name)

S. ET OR RFD 101 Strauss Avenue (line name) TOWN Indian Head, MD 20640

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
black sand clay, H	0	4	
yellow brown sand and gravel	4	14	
olive gray clay trace silt	14	16	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLER'S LIC. NO. M D

Michael Shepherd

DRILLER'S SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. W D 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate box) YES Y 44 NO N 44

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT C M 45 46 BENTONITE CLAY B C 45 46

NO OF BAGS 3/4 NO OF POUNDS 60

GALLONS OF WATER 4

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. to 3 ft.
48 TOP 52 54 BOTTOM 58

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

S T STEEL C O CONCRETE P L PLASTIC O T OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	2	5
60 61	63 64	66 70

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

S T STEEL B R BRASS BRONZE H O OPEN HOLE P L PLASTIC O T OTHER

C 2 1 2

DEPTH (nearest ft.)

EACH SCREEN			
1	PL	5	15
	8 9	11 15	17 21
2			
	23 24	26 30	32 36
3			
	38 39	41 45	47 51

SLOT SIZE 1 .010 2 3

DIAMETER OF SCREEN 2" (NEAREST INCH) 56 63

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 66

from	to
3	16

66

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 TELESCOPE CASING 72 LOG INDICATOR 74 75 76 OTHER DATA

C 3 1 2

N/A

PUMPING TEST

HOURS PUMPED (nearest hour) 8 9

PUMPING RATE (gal. per min.) 11 15

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING 17 20 ft.

WHEN PUMPING 22 25 ft.

TYPE OF PUMP USED (for test)

A air 27 P piston 27 T turbine 27

C centrifugal 27 R rotary 27 O other (describe below) 27

J jet 27 S submersible 27

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. 29

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 31 35

PUMP HORSE POWER 37 41

PUMP COLUMN LENGTH (nearest ft.) 43 47

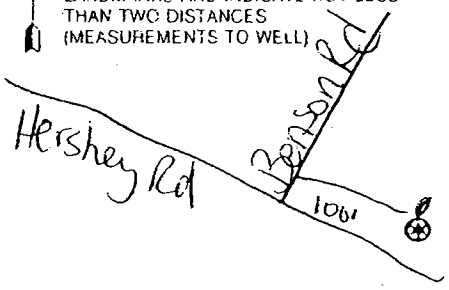
CASING HEIGHT (circle appropriate box and enter casing height)

+ above 49 – below 49 LAND SURFACE 50 51 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



DENV-CR00

OWNER

THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS

FILL IN THIS FORM COMPLETELY PLEASE TYPE

COUNTY NUMBER 34667

ST/CO USE ONLY DATE Received MM DD YY

DATE WELL COMPLETED 9 15 05

Depth of Well 12 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" MW033 CH - 94 - 6683

OWNER Naval District Washington

STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Gray Silt and Clay	0	12	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO. M D

Michael Shepherd

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. IWD 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) Y N

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 1 NO. OF POUNDS 90

GALLONS OF WATER 6

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. to 4 ft.

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	2	6

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	6	16
2			
3			

SLOT SIZE 1 .010 2 3

DIAMETER OF SCREEN 2" (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
4	16

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3

PUMPING TEST N/A

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

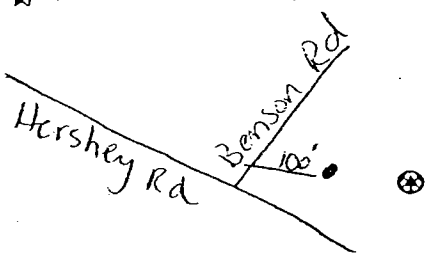
PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height) + above – below

LAND SURFACE 3 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

1 2 3 4
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER 34667

STATE USE ONLY
DATE Received MM DD YY
8 13

DATE WELL COMPLETED
MM DD YY
9 15 05
15 20

Depth of Well
22 14 26
(TO NEAREST FOOT)

MW34

PERMIT NO. FROM "PERMIT TO DRILL WELL"
CH - 94 - 6683
26 29 30 31 32 33 34 35 36 37

OWNER Naval District Washington
last name first name
STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640
SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED: THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Blacksand & silt	0	8	
yellowbrown sand + gravel	8	14	

NUMBER OF UNSUCCESSFUL WELLS: _____

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO.: M D
Michael Stephen
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO.: IWD367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) YES [Y] 44 NO [N] 44

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [CM] 45 46 BENTONITE CLAY [BC] 45 46

NO. OF BAGS 3/4 NO. OF POUNDS 60
GALLONS OF WATER 4
DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. to 3 ft.
48 TOP 52 54 BOTTOM 58
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	2"	4
60 61	63 64	66 70

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2 1 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	4'	14'
	8 9	11 15	17 21
2			
	23 24	26 30	32 36
3			
	38 39	41 45	47 51

SLOT SIZE 1 .010 2 _____ 3 _____

DIAMETER OF SCREEN 2 1/2" (NEAREST INCH)
56 60

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
3	14

68

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 72 74 75 76
TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3 1 2

PUMPING TEST

N/A

HOURS PUMPED (nearest hour) _____ 8 9

PUMPING RATE (gal. per min.) _____ 11 15

METHOD USED TO MEASURE PUMPING RATE _____

WATER LEVEL (distance from land surface)

BEFORE PUMPING _____ ft. 17 20

WHEN PUMPING _____ ft. 22 25

TYPE OF PUMP USED (for test)

[A] air 27 [P] piston 27 [T] turbine 27
[C] centrifugal 27 [R] rotary 27 [O] other (describe below) 27
[J] jet 27 [S] submersible 27

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. _____ 29

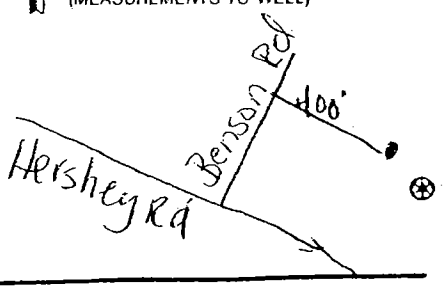
CAPACITY: GALLONS PER MINUTE (to nearest gallon) _____ 31 35

PUMP HORSE POWER _____ 37 41

PUMP COLUMN LENGTH (nearest ft.) _____ 43 47

CASING HEIGHT (circle appropriate box and enter casing height)
[+] above 49 [–] below 49 LAND SURFACE _____ (nearest foot) 50 51

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER: CH-94-6681

ST/CO USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED: MM 9 DD 19 YY 85

Depth of Well: 32 (TO NEAREST FOOT) — MW 0303

PERMIT NO. FROM "PERMIT TO DRILL WELL"

OWNER: Naval District Washington

STREET OR RFD: 101 Strauss Avenue — TOWN: Indian Head, MD 20640

SUBDIVISION: ____ SECTION: ____ LOT: ____

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
F sand & silt	0	10	
brown F sand silt trace gravel	10	18	
orange gray C sand	18	30	
orange V coarse sand trace clay	30	32	

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED: yes [Y] no [N]

CIRCLE APPROPRIATE LETTER

- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M ____ D ____

Michael Stephens
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. JW D367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one): CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS: 3 NO. OF POUNDS: 15

GALLONS OF WATER: 20

DEPTH OF GROUT SEAL (to nearest foot): from 0 ft. (TOP) to 22 ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below: [S T] STEEL, [C O] CONCRETE, [P L] PLASTIC, [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	2"	22

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole — insert appropriate code below: [S T] STEEL, [B R] BRASS BRONZE, [H O] OPEN HOLE, [P L] PLASTIC, [O T] OTHER

EACH SCREEN	TYPE	DEPTH (nearest ft.)	
1	PL	32	
2			
3			

SLOT SIZE 1 .010 2 ____ 3 ____

DIAMETER OF SCREEN: 2" (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 66: from 20 to 32

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T ____ (E.R.O.S.) ____ W Q ____

TELESCOPE CASING ____ LOG INDICATOR ____ OTHER DATA ____

PUMPING TEST

C 3 — N/A

HOURS PUMPED (nearest hour): ____

PUMPING RATE (gal. per min.): ____

METHOD USED TO MEASURE PUMPING RATE: ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING: ____ ft.

WHEN PUMPING: ____ ft.

TYPE OF PUMP USED (for test)

- [A] air
- [P] piston
- [T] turbine
- [C] centrifugal
- [R] rotary
- [O] other (describe below)
- [J] jet
- [S] submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO): YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

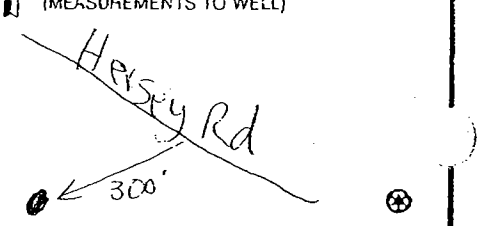
PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height): [+] above / [−] below LAND SURFACE: +3 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

WELL COMPLETION REPORT

FILE IN THIS FORM COMPLETELY (PLEASE TYPE)

COUNTY NUMBER 34467

CH-94-6681

ST/CO USE ONLY
DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM 9 DD 15 YY 05 15 20

Depth of Well 100 (TO NEAREST FOOT) 21 26

MW0036

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH-94-6681 28 29 30 31 32 33 34 35 36 37

O R Naval District Washington (last name)

STREET OR RFD 101 Strauss Avenue (first name) TOWN Indian Head, MD 20640

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
gray sand	0	10	

NUMBER OF UNSUCCESSFUL WELLS

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M D

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. J W D 3[illegible]

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 44

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM 45 46 BENTONITE CLAY BC 45 46

NO. OF BAGS 1 NO. OF POUNDS 50

GALLONS OF WATER 5

DEPTH OF GROUT SEAL (to nearest foot) from 0 ft. to 4 ft.
48 TOP 52 54 BOTTOM 58
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	3	5
60 61	63 64	66 70

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2 1 2 DEPTH (nearest ft.)

EACH SCREEN	TYPE	DEPTH
1	PL	10
2		
3		

8 9 11 15 17 21 23 24 26 30 32 36 38 39 41 45 47 51

SLOT SIZE 1 .010 2 3

DIAMETER OF SCREEN 3" (NEAREST INCH) 56 60

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 from 1 to 10

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER) (E.R.O.S.) W O

70 TELESCOPING CASING LOG INDICATOR 74 75 76 OTHER DATA

C 3 1 2

PUMPING TEST

N/A

HOURS PUMPED (nearest hour) 8 9

PUMPING RATE (gal. per min.) 11 15

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING 17 20 ft.

WHEN PUMPING 22 25 ft.

TYPE OF PUMP USED (for test)

A air 27 P piston 27 T turbine 27

C centrifugal 27 R rotary 27 O other (describe below) 27

J jet 27 S submersible 27

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29 29

CAPACITY GALLONS PER MINUTE (to nearest gallon) 31 35

PUMP HORSE POWER 37 41

PUMP COLUMN LENGTH (nearest ft.) 43 47

CASING HEIGHT (circle appropriate box and enter casing height)

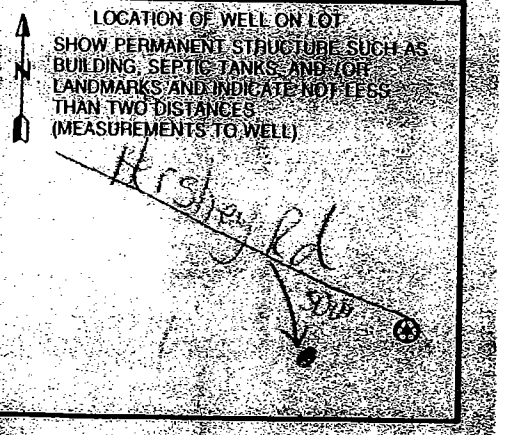
+ 49 above

− 49 below

LAND SURFACE 3 (nearest foot) 50 51

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENY CROG

OWNER

1 1973 (MDE USE ONLY)

2 3 8
THIS NUMBER IS TO BE PUNCHED
IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received MM DD YY 13

DATE WELL COMPLETED MM DD YY 9 14 95 (15–20)

Depth of Well 22 15 26 (TO NEAREST FOOT) MW37

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH 94 6683 (28–36)

OWNER Naval District Washington (last name / first name)

STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
gray silt and clay	0	15	

NUMBER OF UNSUCCESSFUL WELLS

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M D 70

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. I WD 3to 1

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 44

TYPE OF GROUTING MATERIAL (Circle one) CEMENT CM 45 46 BENTONITE CLAY BC 45 46

NO. OF BAGS 1½ NO. OF POUNDS 158

GALLONS OF WATER 10

DEPTH OF GROUT SEAL (to nearest foot) from 0 ft. (48 TOP 52) to 8 ft. (54 BOTTOM 58)
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL (60 61)	2 (63 64)	10 (66 70)

OTHER CASING (if used) — EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type of open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2 (1 2)

TYPE	DEPTH (nearest ft.)	
PL (8 9)	10 (11 15)	15 (17 21)
(23 24)	(26 30)	(32 36)
(38 39)	(41 45)	(47 51)

SLOT SIZE 1 .010 2 3

DIAMETER OF SCREEN 2 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from 8 to 15' (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER) T HOST W-O 70

TELESCOPE CASING TOP INDICATOR 74 75 76 OTHER DATA

OWNER

C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) 8 9

PUMPING RATE (gal. per min.) 11 15

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING 17 20 ft.

WHEN PUMPING 22 25 ft.

TYPE OF PUMP USED (for test)
A air (27), P piston (27), T turbine (27), C centrifugal (27), R rotary (27), O other (describe below) (27), J jet (27), S submersible (27)

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29 28

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 31 35

PUMP HORSE POWER 37 41

PUMP COLUMN LENGTH (nearest ft.) 43 47

CASING HEIGHT (circle appropriate box and enter casing height)
+ above (49) / – below (49) LAND SURFACE (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N

Hershey Rd

MDE/WRA/ENV-CR00

1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS 3 6 ON ALL CARDS)

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM DD YY 9 30 05 (15 20)

Depth of Well 22 26 (TO NEAREST FOOT)

SB033

PERMIT NO FROM "PERMIT TO DRILL WELL" CH - 94 - 6679 (26 29 30 31 32 33 34 35 36 37)

OWNER (last name) Naval District Washington

STREET OR RFD (last name) 101 Strauss Avenue

SUBDIVISION _____ SECTION _____ TOWN Indian Head, MD 20640 LOT _____

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
gray silt and clay	0	25	

NUMBER OF UNSUCCESSFUL WELLS: _____

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE APPROVED PERMIT AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO. M D _____

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION) Michael Shepherd

LIC. NO. J W D 3 6 7

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] (44) no [N] (44)

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT [CM] (45 46) BENTONITE CLAY [BC] (45 46)

NO. OF BAGS 3/4 NO. OF POUNDS 78

GALLONS OF WATER 5

DEPTH OF GROUT SEAL (to nearest foot)

from 0 (46 TOP 52) ft. to 25 (54 BOTTOM 58) ft.

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
60 61	63 64	66 70

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2 (1 2)

DEPTH (nearest ft.)

EACH SCREEN 1 (8 9 11 15 17 21) 2 (23 24 26 30 32 36) 3 (38 39 41 45 47 51)

SLOT SIZE 1 _____ 2 _____ 3 _____

DIAMETER OF SCREEN _____ (NEAREST INCH) (56 60)

from _____ to _____

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 _____ (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 TELESCOPE CASING ____ 72 LOG INDICATOR ____ 74 75 76 OTHER DATA ____

C 3 (1 2)

PUMPING TEST

HOURS PUMPED (nearest hour) _____ (8 9)

PUMPING RATE (gal. per min.) _____ (11 15)

METHOD USED TO MEASURE PUMPING RATE _____

WATER LEVEL (distance from land surface)

BEFORE PUMPING _____ (17 20) ft.

WHEN PUMPING _____ (22 25) ft.

TYPE OF PUMP USED (for test)

[A] air (27) [P] piston (27) [T] turbine (27)

[C] centrifugal (27) [R] rotary (27) [O] other (describe below) (27)

[J] jet (27) [S] submersible (27)

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. _____ (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) _____ (31 35)

PUMP HORSE POWER _____ (37 41)

PUMP COLUMN LENGTH (nearest ft.) _____ (43 47)

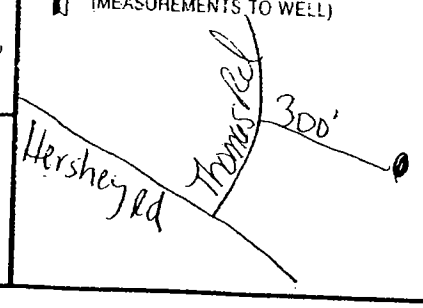
CASING HEIGHT (circle appropriate box and enter casing height)

[+] (49) above LAND SURFACE

[–] (49) below _____ (50 51) (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



ENV-CR00

OWNER

THIS NUMBER IS TO BE PUNCHED IN COLS. 5 & 6 ON ALL CARDS

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED MM DD YY: 9 29 05

Depth of Well: N/A (TO NEAREST FOOT)

SB034

PERMIT NO. FROM "PERMIT TO DRILL WELL": CH 94 6679

OWNER: Naval District Washington (tax name)

STREET OR RFD: 101 Strauss Avenue (tax name) TOWN: Indian Head, MD 20640

SUBDIVISION: SECTION: LOT:

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS, AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellowbrown sand + gravel	0	22	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED: yes [Y] no [N]

CIRCLE APPROPRIATE LETTER

A) WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M D

Michael Shepherd
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. MD 361

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS 3/4 NO. OF POUNDS 65

GALLONS OF WATER 5

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. (TOP) to 22 ft. (BOTTOM)

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole — insert appropriate code below

[S T] STEEL [B R] BRASS BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

C 2

DEPTH (nearest ft.)

EACH SCREEN	from	to
1		
2		
3		

SLOT SIZE 1 ____ 2 ____ 3 ____

DIAMETER OF SCREEN ____ (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING | LOG INDICATOR | OTHER DATA

C 3

PUMPING TEST

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ ft.

WHEN PUMPING ____ ft.

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

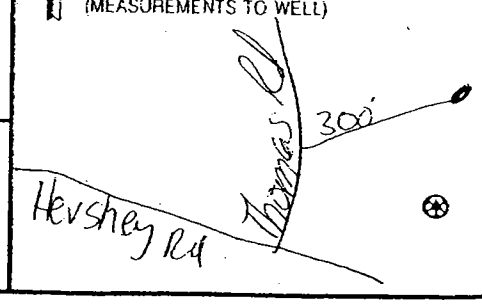
PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

[+] above [–] below LAND SURFACE (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

COUNTY NUMBER 34667

STATE USE ONLY
DATE Received MM DD YY (8–13)

DATE WELL COMPLETED MM 10 DD 6 YY 05 (15–20)

Depth of Well 14 (22–26) (TO NEAREST FOOT)

$ 5575B035

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH 94 6679 (28–37)

OWNER Naval District Washington (usr. name)

STREET OR RFD 101 Strauss Avenue (frm name) TOWN Indian Head, MD 20640

SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Yellow brown sand	0	4	
dlive green sand	4	12	
orange M sand	12	14	

NUMBER OF UNSUCCESSFUL WELLS: 0

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER

A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M ___ D ___

Michael Stephed
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: JW D 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] (44) no [N] (44)

TYPE OF GROUTING MATERIAL (Circle One)

CEMENT [C M] (45 46) BENTONITE CLAY [B C] (45 46)

NO. OF BAGS 1/2 NO. OF POUNDS 45

GALLONS OF WATER 3

DEPTH OF GROUT SEAL (to nearest foot)

from 0 (46–52) TOP ft. to 14 (54–58) BOTTOM ft.

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
(60–61)	(63–64)	(66–70)

EACH CASING — OTHER CASING (if used)

	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[S T] STEEL [B R] BRASS BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

[C 2] (1–2) DEPTH (nearest ft.)

EACH SCREEN

1	(8–9)	(11–15) (17–21)
2	(23–24)	(26–30) (32–36)
3	(38–39)	(41–45) (47–51)

SLOT SIZE 1 ___ 2 ___ 3 ___

DIAMETER OF SCREEN ___ (56–66) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from ___ to ___ (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (70) (E.R.O.S.) (72) W Q (74–76)

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

[C 3] (1–2) N/A

PUMPING TEST

HOURS PUMPED (nearest hour) ___ (6–9)

PUMPING RATE (gal. per min.) ___ (11–15)

METHOD USED TO MEASURE PUMPING RATE ___

WATER LEVEL (distance from land surface)

BEFORE PUMPING ___ (17–20) ft.

WHEN PUMPING ___ (22–25) ft.

TYPE OF PUMP USED (for test)

[A] air (27) [P] piston (27) [T] turbine (27)

[C] centrifugal (27) [R] rotary (27) [O] other (describe below) (27)

[J] jet (27) [S] submersible (27)

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ___ (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) ___ (31–35)

PUMP HORSE POWER ___ (37–41)

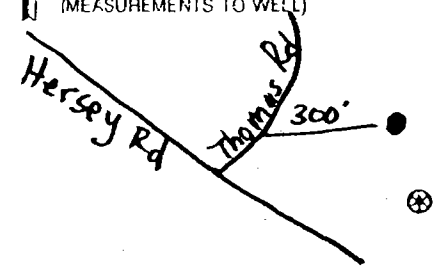
PUMP COLUMN LENGTH (nearest ft.) ___ (43–47)

CASING HEIGHT (circle appropriate box and enter casing height)

[+] above (45) / [–] below (49) LAND SURFACE ___ (50–51) (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

CH 1071 (MDE USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received MM DD YY

DATE WELL COMPLETED MM 10 DD 5 YY 05

Depth of Well 20 (TO NEAREST FOOT)

S57SB036

PERMIT NO FROM "PERMIT TO DRILL WELL" CH - 94 - 6679

OWNER Naval District Washington (last name first name)

STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640

SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
gray M sand	0	20	

NUMBER OF UNSUCCESSFUL WELLS: _____

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
- A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO.: M D

Michael Stephens
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: JWD 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS 3/4 NO. OF POUNDS 70

GALLONS OF WATER 5

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. to 20 ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below

[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2

DEPTH (nearest ft.)

EACH SCREEN 1 _____ 2 _____ 3 _____

SLOT SIZE 1 _____ 2 _____ 3 _____

DIAMETER OF SCREEN _____ (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 from _____ to _____

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3

PUMPING TEST
N/A

HOURS PUMPED (nearest hour) _____

PUMPING RATE (gal. per min.) _____

METHOD USED TO MEASURE PUMPING RATE _____

WATER LEVEL (distance from land surface)

BEFORE PUMPING _____ ft.

WHEN PUMPING _____ ft.

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. _____

CAPACITY: GALLONS PER MINUTE (to nearest gallon) _____

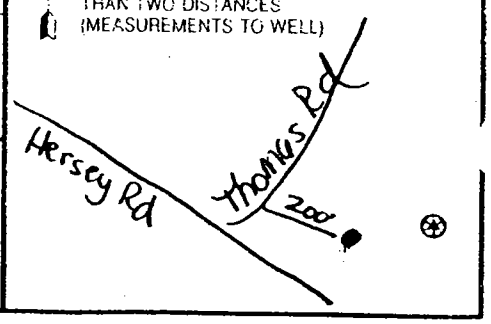
PUMP HORSE POWER _____

PUMP COLUMN LENGTH (nearest ft.) _____

CASING HEIGHT (circle appropriate box and enter casing height)

[+] above [–] below LAND SURFACE _____ (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00

OWNER

(MDE USE ONLY)

1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM 9 DD 21 YY 05 (15 20)

Depth of Well 22 N/A 26 (TO NEAREST FOOT)

PERMIT NO FROM "PERMIT TO DRILL WELL" SB037

CH 94 6682 (28 29 30 31 32 33 34 35 36 37)

OWNER (last name) Naval District Washington (first name)

STREET OR RFD 101 Strauss Avenue

SUBDIVISION ____ SECTION ____ TOWN Indian Head, MD 20640 LOT ____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Light gray Silt and sand	0	22	
Light gray msand	22	30	
yellow sandy silt	30	36	

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M D ____

DRILLERS SIGNATURE Michael Slepian
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. JWD367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] (44) no [N] (44)

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [CM] (45 46) BENTONITE CLAY [BC] (45 46)

NO. OF BAGS 4½ NO. OF POUNDS 425

GALLONS OF WATER 28

DEPTH OF GROUT SEAL (to nearest foot)
from 0 (48 TOP 52) ft. to 36 (54 BOTTOM 58) ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: N/A
[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
(60 61)	(63 64)	(66 70)

OTHER CASING (if used) — EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below: N/A
[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2 (1 2)

DEPTH (nearest ft.) — EACH SCREEN

1 (8 9 11 15 17 21)
2 (23 24 26 30 32 36)
3 (38 39 41 45 47 51)

SLOT SIZE 1 ____ 2 ____ 3 ____

DIAMETER OF SCREEN ____ (56 60) (NEAREST INCH)

	from	to
GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68		(68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (70) (E.R.O.S.) (72) W Q
TELESCOPE CASING — LOG INDICATOR — (74 75 76) OTHER DATA

C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) ____ (8 9)

PUMPING RATE (gal. per min.) ____ (11 15)

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ (17 20) ft.

WHEN PUMPING ____ (22 25) ft.

TYPE OF PUMP USED (for test) (27)
[A] air [P] piston [T] turbine
[C] centrifugal [R] rotary [O] other (describe below)
[J] jet [S] submersible

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ____ (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____ (31 35)

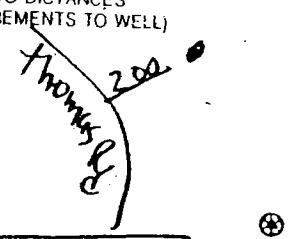
PUMP HORSE POWER ____ (37 41)

PUMP COLUMN LENGTH (nearest ft.) ____ (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)
[+] (49) above LAND SURFACE
[−] (49) below
____ (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



Hersey Rd

ENV-CR00

OWNER

(MDE USE ONLY)

1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS 3 6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received MM DD YY
8 13

DATE WELL COMPLETED MM 10 DD 5 YY 05
15 20

Depth of Well 22 N/A 26
(TO NEAREST FOOT)

SB041

PERMIT NO FROM "PERMIT TO DRILL WELL"
CH 94 6682
26 29 30 31 32 33 34 35 36

OWNER Naval District Washington (last name first name)
STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells.

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
tan silt and sand	0	8	
gray to tan F-M sand	8	20	
gray M C sand	20	25	
orang F sand trace clay	25	32	

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26 04 04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC NO. M D
Michael Stephens
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. IWD 367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] 44 no [N] 44

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [C M] 45 46 BENTONITE CLAY [B C]

NO. OF BAGS 4 NO. OF POUNDS 45 46 395
GALLONS OF WATER 25

DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. to 32 ft.
48 TOP 52 54 BOTTOM 58
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE
[P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
60 61	63 64	66 70

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below

[S T] STEEL [B R] BRASS BRONZE [H O] OPEN HOLE
[P L] PLASTIC [O T] OTHER

C 2
1 2

DEPTH (nearest ft.)

EACH SCREEN
1 ____ 8 9 ____ 11 15 ____ 17 21
2 ____ 23 24 ____ 26 30 ____ 32 36
3 ____ 38 39 ____ 41 45 ____ 47 51

SLOT SIZE 1 ____ 2 ____ 3 ____

DIAMETER OF SCREEN ____ (NEAREST INCH)
56 60

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68
from ____ to ____
68

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 ____ 72 ____
TELESCOPE CASING LOG INDICATOR 74 75 76 OTHER DATA

C 3
1 2

PUMPING TEST
HOURS PUMPED (nearest hour) ____ 8 9

PUMPING RATE (gal per min.) ____ 11 15

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ 17 20 ft.

WHEN PUMPING ____ 22 25 ft.

TYPE OF PUMP USED (for test)
[A] air 27 [P] piston 27 [T] turbine 27
[C] centrifugal 27 [R] rotary 27 [O] other (describe below) 27
[J] jet 27 [S] submersible 27

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ____ 29

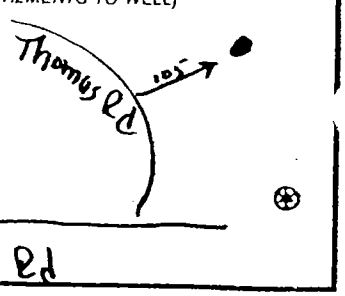
CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____ 31 35

PUMP HORSE POWER ____ 37 41

PUMP COLUMN LENGTH (nearest ft.) ____ 43 47

CASING HEIGHT (circle appropriate box and enter casing height)
[+] above 49
[–] below 49
LAND SURFACE ____ 50 51 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR00 OWNER

1 2 3 6
THIS NUMBER IS TO BE PUNCHED IN COLS 3-6 ON ALL CARDS

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received MM DD YY (8–13)

DATE WELL COMPLETED MM 10 DD 3 YY 05 (15–20)

Depth of Well (TO NEAREST FOOT) (22–26)

SB042

PERMIT NO FROM "PERMIT TO DRILL WELL" CH 94 6682 (26, 29–37)

OWNER Naval District Washington (last name)
STREET OR RFD 101 Strauss Avenue (first name)
SUBDIVISION _____ TOWN Indian Head, MD 20640
SECTION _____ LOT _____

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
tan and orange silt and sand w/ gravel	0	12	
tan F sand and silt	12	20	
Light gray M-C sand some silt	20	28	
tan to orange v coarse sand, some clay	28	32	

NUMBER OF UNSUCCESSFUL WELLS: _____

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
D TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE MENTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M __ D ____ :
Michael Slesh
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: J W D 367 :

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] no [N] (44)

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [C M] (45–46) BENTONITE CLAY [B C] (45–46)

NO. OF BAGS 4 NO. OF POUNDS 395
GALLONS OF WATER 25
DEPTH OF GROUT SEAL (to nearest foot)
from 0 (46–52) TOP ft. to 32 (54–58) BOTTOM ft.
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

[S T] STEEL [C O] CONCRETE
[P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
(60–61)	(63–64)	(66–70)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

[S T] STEEL [B R] BRASS BRONZE [H O] OPEN HOLE
[P L] PLASTIC [O T] OTHER

C 2 (1–2)

DEPTH (nearest ft.)

EACH SCREEN			
1	(8–9)	(11–15)	(17–21)
2	(23–24)	(26–30)	(32–36)
3	(38–39)	(41–45)	(47–51)

SLOT SIZE: 1 _____ 2 _____ 3 _____

DIAMETER OF SCREEN _____ (56–60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 _____ from _____ to _____ (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 ____ TELESCOPE CASING
72 ____ LOG INDICATOR
74 75 76 OTHER DATA

C 3 (1–2)

PUMPING TEST

HOURS PUMPED (nearest hour) _____ (8–9)

PUMPING RATE (gal. per min.) _____ (11–15)

METHOD USED TO MEASURE PUMPING RATE _____

WATER LEVEL (distance from land surface)

BEFORE PUMPING _____ (17–20) ft.

WHEN PUMPING _____ (22–25) ft.

TYPE OF PUMP USED (for test)
[A] air (27) [P] piston (27) [T] turbine (27)
[C] centrifugal (27) [R] rotary (27) [O] other (describe below) (27)
[J] jet (27) [S] submersible (27)

PUMP INSTALLED

DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. _____ (29)

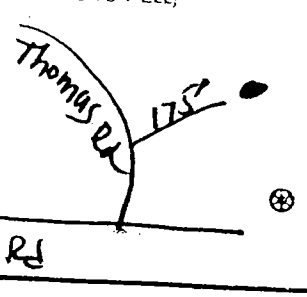
CAPACITY: GALLONS PER MINUTE (to nearest gallon) _____ (31–35)

PUMP HORSE POWER _____ (37–41)

PUMP COLUMN LENGTH (nearest ft.) _____ (43–47)

CASING HEIGHT (circle appropriate box and enter casing height)
[+] above (49) LAND SURFACE
[–] below (49) _____ (50–51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



NV-CR00

OWNER

C 1 | 1074 (MDE USE ONLY)

1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 34667

ST/CO USE ONLY
DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM DD YY 10 5 02 (15 20)

Depth of Well 22 N/A 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH 94 6682 (28 29 30 31 32 33 34 35 36)

S6043

OWNER (last name) Naval District Washington (first name)
STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
brown silt, sand trace gravel	0	8	
brown/gray m-c sand, trace silt	8	20	
tan, brown, gray c sand, some gravel & clay	20	28	
gray olive fine sand	28	32	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS LIC. NO.: M B
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO.: IWD 367

SITE SUPERVISOR (sign of driller or journeyman responsible for site work if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 44

TYPE OF GROUTING MATERIAL (Circle one) CEMENT CM 45 46 BENTONITE CLAY BC 45 46

NO. OF BAGS 4 NO. OF POUNDS 325

GALLONS OF WATER 25

DEPTH OF GROUT SEAL (to nearest foot)
from ft. to ft.
48 TOP 52 54 BOTTOM 58
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE | Nominal diameter top (main) casing (nearest inch) | Total depth of main casing (nearest foot)
60 61 63 64 66 70

EACH CASING — OTHER CASING (if used) diameter inch depth (feet) from to

SCREEN RECORD
Screen type or open hole — insert appropriate code below
ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2 DEPTH (nearest ft.)
1 2
EACH SCREEN
1 8 9 11 15 17 21
2 23 24 26 30 32 36
3 38 39 41 45 47 51

SLOT SIZE 1 2 3

DIAMETER OF SCREEN (NEAREST INCH)
56 60

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from to

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER) (E.R.O.S.) T W Q
70 72
TELESCOPE CASING LOG INDICATOR 74 75 76 OTHER DATA

C 3
1 2

PUMPING TEST
HOURS PUMPED (nearest hour) 8 9

PUMPING RATE (gal. per min.) 11 15

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)
BEFORE PUMPING 17 20 ft.
WHEN PUMPING 22 25 ft.

TYPE OF PUMP USED (for test)
A air 27 P piston 27 T turbine 27
C centrifugal 27 R rotary 27 O other (describe below) 27
J jet 27 S submersible 27

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29 29

CAPACITY GALLONS PER MINUTE (to nearest gallon) 31 35

PUMP HORSE POWER 37 41

PUMP COLUMN LENGTH (nearest ft.) 43 47

CASING HEIGHT (circle appropriate box and enter casing height)
+ above 49 / − below 49 LAND SURFACE (nearest foot) 50 51

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N

Thomas Rd

Hersey Rd

DENV-C200 OWNER

C 1 1871 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS) — SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 34667

ST/CO USE ONLY — DATE Received DD YY

DATE WELL COMPLETED MM DD YY: 9 29 05

Depth of Well: N/A (TO NEAREST FOOT)

PERMIT NO FROM "PERMIT TO DRILL WELL": CH - 94 - 6679

SB45

OWNER (last name) Naval District Washington (first name)

STREET OR RFD 101 Strauss Avenue TOWN Indian Head, MD 20640

SUBDIVISION ____ SECTION ____ LOT ____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow brown sand & gravel	0	12	
gray sand & gravel	12	28	
olive M sand	28	36	

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M ____ D ____

Michael Stepter
(AS SIGNATURE MATCH SIGNATURE ON APPLICATION)

LIC. NO.: WD367

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (44) no N (44)

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM (45 46) BENTONITE CLAY BC (45 46)

NO. OF BAGS 1 NO. OF POUNDS 94

GALLONS OF WATER 6

DEPTH OF GROUT SEAL (to nearest foot) from 0 (48) TOP (52) ft. to 36 (54) BOTTOM (58) ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL — CO CONCRETE — PL PLASTIC — OT OTHER

MAIN CASING TYPE (60 61) — Nominal diameter top (main) casing (nearest inch) (63 64) — Total depth of main casing (nearest foot) (66 70)

OTHER CASING (if used) — EACH CASING — diameter inch — depth (feet) from — to

SCREEN RECORD
screen type or open hole insert appropriate code below

ST STEEL — BR BRASS BRONZE — HO OPEN HOLE — PL PLASTIC — OT OTHER

C 2 (1 2) DEPTH (nearest ft.)

EACH SCREEN
1 (8 9) (11) (15) (17) (21)
2 (23 24) (26) (30) (32) (36)
3 (38 39) (41) (45) (47) (51)

SLOT SIZE 1 ____ 2 ____ 3 ____

DIAMETER OF SCREEN ____ (56 60) (NEAREST INCH)

GRAVEL PACK — from ____ to ____

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 ____ 72 ____ 74 75 76

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

OWNER

C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) ____ (8 9)

PUMPING RATE (gal. per min.) ____ (11 15)

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ (17 20) ft.

WHEN PUMPING ____ (22 25) ft.

TYPE OF PUMP USED (for test)

A air (27) — P piston (27) — T turbine (27) — C centrifugal (27) — R rotary (27) — O other (describe below) (27) — J jet (27) — S submersible (27)

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____ (31 35)

PUMP HORSE POWER ____ (37 41)

PUMP COLUMN LENGTH (nearest ft.) ____ (43 47)

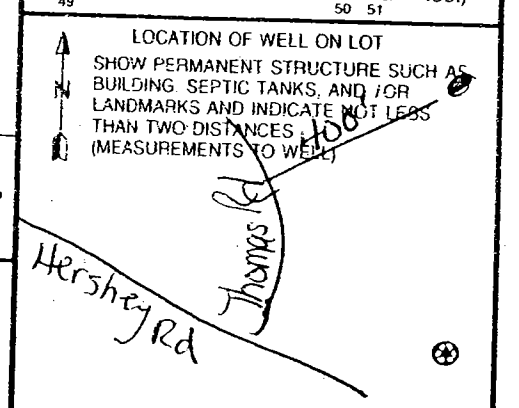
CASING HEIGHT (circle appropriate box and enter casing height)

+ above (49) — LAND SURFACE — (nearest foot) (50 51)

– below (49)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



A.4 WELL DEVELOPMENT SHEETS

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57TW015
Site: S57
Date Installed: 8/22/01
Date Developed: 8/22/01
Dev. Method: Pump
Pump Type: Peristaltic

Depth to Bottom (ft.): 32.90
Static Water Level Before (ft.): 8.97
Static Water Level After (ft.): 19.56
Screen Length (ft.): 5ft
Specific Capacity: N/A
Casing ID (in.): 1" PVC

Responsible Personnel: Jennifer Wellman
Drilling Co.: Chesapeake Geosystems
Project Name: Indian Head
Project Number: 7129

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1006	2in	~~3.5~~	8.97					thick - brown
1016		~~3.5~~	11.94					" "
1026		7.0	17.20					" "
1036		10.5	19.01					" "
1046		14.0	19.55					" "
1056		17.5	19.56					" "
1106		21.0	19.56					thinner - brown
1116		24.5	19.57	20.95	5.46	0.125	>2000	" "
1126		28.0	19.57	20.82	5.40	0.122	>2000	" "
1136	0	31.5	19.57	20.85	5.42	0.121	>2000	" "

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57TW016
Site: S57
Date Installed: 8/17/01
Date Developed: 8/20/01
Dev. Method: Pump
Pump Type: Peristaltic

Depth to Bottom (ft.): 11.92
Static Water Level Before (ft.): 7.92
Static Water Level After (ft.): 8.33
Screen Length (ft.): 5 ft
Specific Capacity: NA
Casing ID (in.): 1" PVC

Responsible Personnel: Jennifer Wellman
Drilling Co.: Chesapeak GeoSystems
Project Name: Indian Head Site 57
Project Number: 7129

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume ~~(Gal.)~~ L	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1700	—	~~250mL~~ 500	07.91	start	purge	—	—	brown 250mL/min
1710	2.1N	2.5L	08.20	22.19	6.54	0.097	170	murky
1720	↓	5.0L	08.22	21.32	6.57	0.096	50	clear
1730	↓	7.5L	08.26	21.22	6.51	0.099	160	cloudy
1740	↓	10.0L	08.29	21.26	6.46	0.101	170	cloudy
1750	0.1N	12.5L	08.33	21.15	6.47	0.102	33	clear

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Page ___ of ___

Well: S57TW017
Site: Site 57
Date Installed: 8/16/01
Date Developed: 8/20/01
Dev. Method: Pump
Pump Type: Peristaltic

Depth to Bottom (ft.): 24.95
Static Water Level Before (ft.): 8.12
Static Water Level After (ft.): 8.44
Screen Length (ft.): 10.0ft
Specific Capacity: NA
Casing ID (in.): 1 inch

Responsible Personnel: Jennifer Wellman
Drilling Co.: Chesapeak GeoSystems
Project Name: Indian Head Site 57
Project Number: 7129

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (~~Gal.~~) L	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units S/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1428			8.12					Start development
1438	2 in	3.0L	8.39	18.17	5.60	0.241	+2000	dark brown
1448		6.0L	8.41	17.65	5.41	0.139	+2000	light brown/yellow
1458		9.0L	8.44	17.62	5.37	0.133	+2000	light brown
1508		12.0L	8.44	17.81	5.36	0.126	160	cloudy
1518		15.0L	8.44	17.55	5.37	0.126	100	cloudy
1528	0 in	18.0L	8.44	17.50	5.39	0.127	37	clear

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Page ___ of ___

Well: S57TW18
Site: SITE 57
Date Installed: 8-20-01
Date Developed: 8-21-01
Dev. Method: PERISTALTIC PUMP
Pump Type: " "

Depth to Bottom (ft.): 15'
Static Water Level Before (ft.): 10.49
Static Water Level After (ft.): 10.52
Screen Length (ft.): 5'
Specific Capacity: N/A
Casing ID (in.): 1"

Responsible Personnel: FRED W. RAMSER
Drilling Co.: CHESAPEAKE GEOSYSTEMS
Project Name: SITE 57 FS EHDIV
Project Number: 7129

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (~~Gal.~~) ℓ	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1100	—	—	10.49	—	—	—	—	
1110	—	2 ℓ	11.52	19.95	4.60	0.352	>999	
1120	—	4 ℓ	11.82	19.85	4.65	0.338	500	
1130	—	6 ℓ	11.95	19.82	4.67	0.335	10	NO ODOR

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 557TW019~~0103~~ PUR
Site: Site 57
Date Installed: 8/17/01
Date Developed: 8/21/01
Dev. Method: Pump
Pump Type: Peristaltic

Depth to Bottom (ft.): 25.0 ft
Static Water Level Before (ft.): 10.56
Static Water Level After (ft.): 11.79
Screen Length (ft.): 5 ft
Specific Capacity: NA
Casing ID (in.): 1" PVC

Responsible Personnel: Jennifer Wellman
Drilling Co.: Chesapeak GeoSystems
Project Name: ~~7129~~ Indian Head Site 57
Project Number: 7129

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (~~Gal.~~) L	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1016	—	—	10.56	—	—	—	—	start purge
1026	—	2.0L	11.73	—	—	—	—	
1036	—	4.0L	11.79	—	—	—	—	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 57MW20
Site: 57
Date Installed: 8-22-01
Date Developed: 8/28/01
Dev. Method: Pump
Pump Type: Whale

Depth to Bottom (ft.): 17.65
Static Water Level Before (ft.): 10.26
Static Water Level After (ft.): 15.72
Screen Length (ft.): 10ft
Specific Capacity: NA
Casing ID (in.): 2" PVC

Responsible Personnel: Jennifer Wellman
Drilling Co.: Chesapeake Geosystems
Project Name: Indian head
Project Number: 57

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1130	—	15gal		22.2	6.19	0.15	999	- Depth to water can not
1200	—	25gal	10.46	22.3	6.19	0.13	999	be measured - 2nd
1205	2in	30gal	11.94	22.0	5.9	0.11	996	whale pump - blocking
1210		35gal	13.35	22.0	5.9	0.10	990	well
1215		38gal	14.46	21.0	5.7	0.11	316	
1220		40gal	15.27	21.0	5.5	0.12	286	
1225		43	15.54	22.0	5.5	0.12	286	
1230		47	15.53	22.0	5.5	0.12	176	
1240		50	15.55	21.0	5.4	0.10	283	
1245	0in	55	15.72	21.0	5.5	0.12	296	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: SS7 MW 22
Site: Site 57
Date Installed: 8-22-01
Date Developed: 8/28/01
Dev. Method: Bail/Pump
Pump Type: whale

Depth to Bottom (ft.): 18.0
Static Water Level Before (ft.): 9.03
Static Water Level After (ft.): 8.24
Screen Length (ft.): 10ft
Specific Capacity: NA
Casing ID (in.): 2" PVC

Responsible Personnel: Jennifer Wellman
Drilling Co.: Chesapeake Geosystems
Project Name: Indian head
Project Number: 7129

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0855	—	7gal	*	19.2	5.41	1.95	+2000	* Water level can
0905								not be measured
1040	- well has poor water production - have							second pump in
	bailed approximately 8 gallons - with no more							the way
	sand coming up on baler - Have purged for							
	2¾ hours. Water has cleared up. - Well is							
	considered develop. -							
	- Was able to hand bail the well dry. - Had to							
	wait at least 30 minutes - for any kind of							
	recovery		~~0.~~	~~20.3~~	~~6.13~~	~~1.90~~	~~761~~	
1045		25gal	0	23.3	6.13	1.90	761	

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 57MW23
Site: Site 57
Date Installed: 8-22-01
Date Developed: 8/28/01
Dev. Method: Bail/Pump
Pump Type: Whale

Depth to Bottom (ft.): 23.5
Static Water Level Before (ft.): 14.95
Static Water Level After (ft.): 14.60
Screen Length (ft.): 10'
Specific Capacity: NA
Casing ID (in.): 2" PVC

Responsible Personnel: Jennifer Wellman
Drilling Co.: Chesapeake Geosystems
Project Name: Indian head
Project Number: 7129

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)
1355	—	7 ~~5~~		19.0	5.6	0.55	168	clear
1400	0	10		19.0	5.1	0.56	176	clear
1405		13		18.0	4.8	0.57	46	
1410		15	15.55 *	17.0	4.8	0.55	14	
1415		17	15.57 *	17.0	4.7	0.56	11	
1420		20	15.58 *	18.0	4.6	0.57	11	
1425		23	15.59 *	17.0	4.5	0.57	10	
1430		26	15.59*	17.0	4.6	0.55	10	
1435	0	30	16.00*	17.0	4.5	0.56	10	
* ~~water level~~		Drill cut PVC-casing - app 6 inches shorter during						
		development reading needs to have 6 inches added						
		to make water level comparible to initial						

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW026
Site: 57
Date Installed: 9/22/05
Date Developed: 9/26/05
Dev. Method: bail and purge
Pump Type: whale

Depth to Bottom (ft.): 39.51
Static Water Level Before (ft.): 7.07
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Unitech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1505	0.01	3.5	7.07	—	—	—	—	start bailing, brown
								bailed for 20 min
1535			22.23	—	—	—	—	start development, brown
								~ 1 gpm, went dry in 10 min
1545	0.01	13.5	—	20.04	7.22	0.703	>1000	v. cloudy
			allowed to recover					
1625	<0.01	18.5	33.35	18.24	7.08	0.686	>1000	v cloudy, went dry in 5 min
			recovery					
1705	<0.01	20.0	37.40	18.23	7.17	0.702	>1000	v cloudy, went dry in 1 min
								end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: 557MW027
Site: 57
Date Installed: 9/14/05
Date Developed: 9/22/05
Dev. Method: bail and purge
Pump Type: Whale

Depth to Bottom (ft.): 22.71
Static Water Level Before (ft.): 7.83
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Uritech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units uS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1300	0.02	3	7.83	—	—	—	—	start bailing, orange brown
								bailed for 15 minutes
1325	<0.01	3	8.25	—	—	—	—	start development, orange brown
1335	<0.01	8	16.60	21.49	4.75	0.123	>1000	v cloudy, ~.5 gpm
1345	~0	13	17.09	19.79	4.65	0.109	800	v cloudy
1355	0	18	16.63	20.01	4.82	0.108	15	clear
1400	0	20.5	16.52	19.64	4.77	0.107	13	clear
1405	0	23	16.47	19.53	4.80	0.103	32	clear, end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW028
Site: 57
Date Installed: 9/22/05
Date Developed: 9/27/05
Dev. Method: bail and purge
Pump Type: whale

Depth to Bottom (ft.): 36.56
Static Water Level Before (ft.): 5.75
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Oosian
Drilling Co.: Unitech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0800	0.02	3.5	5.75	—	—	—	—	start bailing, dark brown
								bailed for 20 min
0840	0.01	3.5	20.79	—	—	—	—	start development, grey brown
0850	<0.01	8.5	29.50	19.06	7.17	0.673	>1000	grey brown, ~ .5 gpm
0900	<0.01	13.5	33.51	18.56	7.32	0.585	>1000	grey brown
0910	<0.01	18.5	—	18.38	7.20	0.600	>1000	grey brown, went dry
			recovery					
0945	~ 0	22.25	32.00	17.16	7.29	0.525	>1000	grey brown, ~ 1.5 gpm
								went dry in 2.5 min
			recovery					
1025	0	25.00	31.72	18.06	7.20	0.384	>1000	very cloudy, went dry in 2.5 min
				~~18.0~~				end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57 MW029
Site: 57
Date Installed: 9/14/05
Date Developed: 9/21/05
Dev. Method: bail and purge
Pump Type: whale

Depth to Bottom (ft.): 15.25
Static Water Level Before (ft.): 7.34
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Unitech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1525	0.5	3	7.34	—	—	—	—	start bailing, brown grey
								balled for 15 min until dry
1620	0.01	3	8.31	—	—	—	—	start development, brown grey
~~15~~ CD		~~6~~ CD						went dry in 3 min
								at ~ 1 gpm
1624	0.01	6	~ 0	21.79	6.14	0.253	>1000	< initial readings
1700	<.01	9	8.41	21.06	6.17	0.213	>1000	brown, went dry in 3 min
1740	~ 0	12	8.49	20.45	6.25	0.193	>1000	brown, went dry in 3 min
								end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW030
Site: 57
Date Installed: 9-23-05
Date Developed: 9-27-05
Dev. Method: BAILER/SURGE/
Pump Type: PUMP 12VDC SUB.

Depth to Bottom (ft.): 36.57
Static Water Level Before (ft.): 4.79
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: NA
Casing ID (in.): 2

Responsible Personnel: C. DOOLAN
Drilling Co.: UNITECH
Project Name: SITE 57, INDIAN HEAD
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1120	0.3	3.5	4.79	—	—	—		START BAILING, BROWN
								BAILED FOR 20 MIN
1155	0.02	3.5	6.45	—	—	—		START DEV. ~0.5GPM
1205	<0.01	8.5	27.63	19.38	7.12	0.430	>1000	CLOUDY
1215	0	13.5	29.36	18.87	6.80	0.336	900	"
1225	0	18.5	30.30	19.01	6.78	0.333	650	"
1235	0	23.5	31.99	19.01	6.83	0.347	≥1000	"
1245	0	28.5	33.13	19.06	6.92	0.366	>1000	CLOUDY, INC FLOW
								TO 1.5GPM
								WENT DRY @ 1252
			ALLOW TO		RECOVER			
1320	0	33.5	24.10	18.20	6.98	0.264	29	CLEAR FLOW ~0.5GPM
1330	0	38.5	29.55	18.31	6.88	0.263	85	SLIGHTLY CLOUDY INC
								FLOW TO 1.5GPM
								WENT DRY @ 1336
								END DEVELOPMENT

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW031
Site: 57
Date Installed: 9/15/05
Date Developed: 9/21/05
Dev. Method: bail and purge
Pump Type: whale

Depth to Bottom (ft.): 20.33
Static Water Level Before (ft.): 6.98
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Unitech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1025	.03	3	6.98	—	—	—	—	start bailing, brown, thick
—								bailed for 15 minutes
1050	.01	3	7.15	—	—	—	—	start development, brown
1100	.01	13	14.70	21.62	5.49	0.726	150	cloudy, ~1 gpm
1110	0	23	14.97	21.44	5.35	0.721	25	clear
1120	0	33	15.73	21.37	5.36	0.731	32	clear
1130	0	43	12.60	21.91	5.35	0.760	100	slightly cloudy
1140	0	53	12.55	21.79	5.39	0.773	11	clear, end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW032
Site: 57
Date Installed: 9/15/05
Date Developed: 9/21/05
Dev. Method: bail and purge
Pump Type: whale

Depth to Bottom (ft.): 17.91
Static Water Level Before (ft.): 8.95
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Unitech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0855	~.02	3	8.95	—	—	—	—	start bailing, brown,
—								bailed for 15 minutes
0915	<.01	3	9.60	—	—	—	—	start development
0925	<.01	18	8.64	22.60	6.26	1.46	>1000	cloudy brown, 1.5 gpm
0935	0	33	9.29	22.23	6.31	1.54	500	cloudy
0945	0	43	8.92	22.28	6.38	1.51	15	clear, 1 gpm
0950	0	50.5	8.98	22.27	6.41	1.51	5.8	clear, end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW033
Site: 57
Date Installed: 9/15/05
Date Developed: 9/20/05
Dev. Method: bail & surge
Pump Type: whale

Depth to Bottom (ft.): ~~10.98~~ 18.70
Static Water Level Before (ft.): 6.98
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Unitech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1320	.02	3	—	—	—	—	—	begin bailing, drk. brown grey
~~1355~~								bailed for 15 minutes
1350	<.01	7.5	—	25.63	6.29	0.637	>1000	start development
								went dry in 3 min
1410	<.01	14.0	7.01	25.26	6.28	0.523	>1000	reduced flow by 1/4
								starting flow, went dry
							~~>1000~~	in 4.5 min.
1430	0	26.5	12.44	24.83	6.54	0.473	650	1435 reduced flow to 3/5
								starting flow ~ 1.25 gpm
1440	0	39.0	12.81	24.42	6.57	0.479	130	cloudy
1450	0	51.5	9.90	24.36	6.64	0.468	60	slightly cloudy
1500	0	61.5	9.38	24.50	6.68	0.467	14	clear
1505	0	66.5	9.39	24.49	6.63	0.457	10	clear; end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW034
Site: 57
Date Installed: 9/15/05
Date Developed: 9/22/05
Dev. Method: bail and purge
Pump Type: whale

Depth to Bottom (ft.): 17.36
Static Water Level Before (ft.): 5.50
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Unitech
Project Name: Indian Head
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1515	0.2	3	5.50	—	—	—	—	start bailing, brown
								bailed for 15 min
1535	0.01	3	5.91	—	—	—	—	start development, pale brown
1545	<0.01	8	7.63	24.76	4.60	0.418	1000	cloudy, ~.5 gpm
1555	<0.01	13	7.81	24.45	4.68	0.396	>1000	very cloudy, grey brown
1605	~0	18	8.24	24.00	4.75	0.395	600	cloudy
1615	0	23	8.02	23.99	4.77	0.388	39	clear
1625	0	28	8.07	23.85	4.87	0.387	8.9	clear, end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW035
Site: 57
Date Installed: 9/19/05
Date Developed: 9/21/05
Dev. Method: bail and purge
Pump Type: whale

Depth to Bottom (ft.): 35.06
Static Water Level Before (ft.): 20.91
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Unitech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
1320	~.01	3.5	20.91	—	—	—	—	start bailing, brown
								bailed for 20 minutes
1350	<.01	3.5	21.37	—	—	—	—	start development, brown
1400	<.01	13.5	24.23	17.03	5.16	0.898	650	cloudy, ~1 gpm
1410	0	23.5	24.43	16.67	4.95	0.861	140	slightly cloudy
1420	0	33.5	24.52	16.53	4.83	0.853	26	clear
1430	0	43.5	24.57	16.37	4.80	0.845	14	clear
1435	0	48.5	24.59	15.97	4.73	0.833	11	clear, end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW036
Site: 57
Date Installed: 9/15/05
Date Developed: 9/20/05
Dev. Method: bail & surge
Pump Type: whale

Depth to Bottom (ft.): 12.71
Static Water Level Before (ft.): 7.54
Static Water Level After (ft.): —
Screen Length (ft.): 5
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Uni-tech
Project Name: Indian Head, CTO 0007
Project Number: 2194

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0910	—	4	—	—	—	—	—	start bailing, orange
								bailed + surged for 20 min
0945	<.1	5.5	—	24.32	4.57	0.668	>1000	start development, went
					~~4.~~		~~>1000~~	dry in 1.5 min
1022	<.1	7.5	—	24.28	4.60	0.610	>1000	went dry in 1.5 min
1042	0	9.5	—	~~29.04~~	~~4.80~~	~~0.000~~	900	went dry in 1 min
				29.24	4.60	0.002		pale yellow
1102	0	11.5	7.54	24.99	4.54	0.682	360	went dry in 1 min
1122	0	13.5	7.54	26.56	4.52	0.688	180	went dry in 1 min
1137	0	15.5	7.56	25.88	4.48	0.672	140	went dry in 1 min
1152	0	17.5	7.56	26.20	4.47	0.669	120	went dry in 1 min
1207	0	19.5	7.55	24.59	4.43	0.673	85	went dry in 1 min
1222	0	21.5	7.56	26.83	4.42	0.648	75	went dry in 1 min
								end development

Tetra Tech NUS, Inc.

MONITORING WELL DEVELOPMENT RECORD

Well: S57MW037
Site: 57
Date Installed: 9/14/05
Date Developed: 9/22/05
Dev. Method: bail and purge
Pump Type: whale

Depth to Bottom (ft.): 15.10
Static Water Level Before (ft.): 2.11
Static Water Level After (ft.): —
Screen Length (ft.): 5
Specific Capacity: —
Casing ID (in.): 2"

Responsible Personnel: C. Doolan
Drilling Co.: Unitech
Project Name: Indian Head, CTO 0007
Project Number: 2194

stick up = ~ .2 ft.

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.)
0900	0.01	3.5	2.11	—	—	—	—	start bailing, light brown grey
								bailed for 15 min.
0930	<.01	3.5	3.15	—	—	—	—	start development, grey
								~ .5 gpm
0940	<.01	8.5	5.49	21.49	6.31	0.180	>1000	brown grey, organic odor
0950	<.01	13.5	5.89	20.90	6.37	0.163	>1000	brown grey
1000	~0	18.5	5.90	21.45	6.34	0.153	>1000	light brown grey
1010	0	23.5	6.00	21.62	6.39	0.152	>1000	tan, v cloudy
1020	0	28.5	6.13	21.91	6.36	0.157	750	pale yellow, v cloudy
1030	0	33.5	6.25	22.23	6.33	0.155	450	cloudy
1040	0	38.5	6.34	22.01	6.34	0.156	320	cloudy
1050	0	43.5	6.44	21.70	6.33	0.156	230	cloudy
1100	0	48.5	6.53	22.10	6.28	0.159	180	slightly cloudy
1110	0	53.5	6.49	21.97	6.28	0.157	120	slightly cloudy
1120	0	58.5	6.49	21.90	6.30	0.159	110	slightly cloudy, end development

A.5 SOIL SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

Sample ID No.: S57SS016 0003
Sample Location: S57SB016
Sampled By: B BALKOVEC
C.O.C. No.: 41518

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

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1403 Method: DISPOSABLE TROWEL Monitor Reading (ppm): 0.0	0-.5'	BROWN + REDDISH	SILTY SAND W/ ASPHALT + CINDERS

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0160103
Sample Location: S57SB016
Sampled By: B. BALKOVEC
C.O.C. No.: 41518

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1413 Method: SPLIT SPOON Monitor Reading (ppm): 0-0	4-5'	YELLOW ORANGE LIGHT GRAY	SILTY CLAY W/ T. SAND + GRAVEL

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓ - 2	
Arsenic	(1) 4 oz. Jar	–	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓ - 2	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	–	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓ (1)	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S57SB04P04

Signature(s): Robert Belkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB016 0303
Sample Location: S57SB016
Sampled By: B. BALKOVEC
C.O.C. No.: 41519

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1420 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	8'-10'	OLIVE GREEN	SILTY CLAY W/ T. GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0160303
Sample Location: S57SB016
Sampled By: B BALLOUE
C.O.C. No.: 41919

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1440 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	18'-20'	GRAY	MED. SAND

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Ballouee

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

Sample ID No.: S57SS01703
Sample Location: S57S8017
Sampled By: B BALKOVEC
C.O.C. No.: 15736

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

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1245 Method: DISPOSABLE TROWEL Monitor Reading (ppm):	0-.5'	BROWN + RED	SILT + SANDY GRAVEL

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓ -2	
Arsenic	(1) 4 oz. Jar	-2	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	–	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	–	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: S57SSDUP02

Signature(s): Robert Belkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS75B017D103
Sample Location: SS75B017
Sampled By: B. BALKOVEC
C.O.C. No.: 15736

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01	4-5'	YELLOW ORANGE LIGHT GRAY	CLAY W/ SAND & GRAVEL
Time: 1251			
Method: SPLIT SPOON			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB01708D3
Sample Location: SS7SB017
Sampled By: B. BALKOVEC
C.O.C. No.: 15736

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01	8-10	LIGHT GRAY	SILTY CLAY W/ T GRAVEL
Time: 1304			
Method: SPLIT SPOON			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S5TSB017-0303
Sample Location: S5TSB017
Sampled By: B. BALKOVEC
C.O.C. No.: 15736

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1312 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	14-16'	YELLOW ORANGE LIGHT GRAY	MED-GRAVELLY SAND W/ SOME CLAY

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB0170403
Sample Location: SS7SD017
Sampled By: B. BALKOVEC
C.O.C. No.: 41518

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1325 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	18-20'	YELLOW ORANGE + LIGHT GRAY	CLAYEY, MED. SAND

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	–	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	–	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	–	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
–	–

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SS0T80103
Sample Location: S57SB018
Sampled By: B. BALKOVEC
C.O.C. No.: 15740

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 0930 Method: DISPOSABLE TROWEL Monitor Reading (ppm): 0.0	0-.5'	BROWN	SILT + SAND W/ GRAVEL T-ORGANICS

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓-2	
Arsenic	(1) 4 oz. Jar	✓-2	
Arsenic, CEC, & pH	(1) 4 oz. Jar	-	
CEC & pH	(1) 4 oz. Jar	-	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	-	
TOC, CEC, & pH	(1) 4 oz. Jar	-	
TOC & pH	(1) 4 oz. Jar	-	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	-	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: S57SSDUP01

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB018 0403
Sample Location: S57SB018
Sampled By: B. BALKOVEC
C.O.C. No.: 15740

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/23/01 Time: 0450 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	4-5'	YELLOW ORANGE + LT. GRAY	SILTY CLAY W/ F-SAND + GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0180703
Sample Location: S57SB018
Sampled By: B. BALLOVER
C.O.C. No.: 15740

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1001 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	8'-10'	LIGHT GRAY	SILTY/CLAYEY SAND W/ T- GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Robert Ballover

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB01R03B
Sample Location: S57SB018
Sampled By: B BALKOVEC
C.O.C. No.: 15740

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1030 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	16-18'	LIGHT GRAY + YELLOW OR.	MED. SAND w/ T-SILT + CLAY

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB018 0403
Sample Location: S57SB018
Sampled By: B BALKOVEC
C.O.C. No.: 15740

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1055 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	18-20	YELLOW ORANGE LIGHT GRAY	MED. SAND W/ TR SILT + CLAY

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag		

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Robert P. Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57S60140103
Sample Location: S57SB019
Sampled By: B. BALKOVEC
C.O.C. No.: 15740

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1114 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	0-5	BROWN & RED	SILT & SAND W/ GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0190103
Sample Location: S57SB019
Sampled By: B BALLOVER
C.O.C. No.: 15740

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1120 Method: SPIZZ SPOON Monitor Reading (ppm): 0-2	4-5'	YELLOW OR-ange LIGHT GRAY	SILTY CLAY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Ballover

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB01W0703
Sample Location: SS7SB01W
Sampled By: B. Balkovec
C.O.C. No.: 15740

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1125 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	8-10'	GRAY	CLAYEY SILT W/ T-GRAVEL (VERY DENSE)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0190303
Sample Location: S57SB29
Sampled By: B BALKOVEC
C.O.C. No.: 15736

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1142 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	14-16'	YELLOW ORANGE + LIGHT GRAY	GRAVEL W/ SOME CLAY + SAND

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB019 0403
Sample Location: S57SB019
Sampled By: B. BALKOVEC
C.O.C. No.: 15736

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/23/01 Time: 1155 Method: SPLITSPOON Monitor Reading (ppm): 0.0	18'-20'	YELLOW ORANGE & LIGHT GRAY	MED SAND W/ T-CLAY + SILT

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag		

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SS0200103
Sample Location: S57SB0200
Sampled By: B. BALKOVIC
C.O.C. No.: 15758

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01 Time: 0826 Method: DPT Monitor Reading (ppm): 0.0	0-5'	Black + Brownish Red	SILTY CLAY W/ CINDERS + GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	–	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	–	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	–	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovic

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB020103
Sample Location: SS7SB020
Sampled By: B BALKOVEC
C.O.C. No.: 15758

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01	4-5'	GRAY + BROWN	SILTY CLAY W/ T- GRAVEL
Time: 0834			
Method: DPT			
Monitor Reading (ppm): BKG 21.7			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	–	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	–	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	–	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
–	

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SS0210103
Sample Location: S57SB021
Sampled By: B. BALLOVET
C.O.C. No.: 15754

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01			
Time: 1643	0-.5'		
Method: DPT			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Belkerose

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS75B0210103
Sample Location: SS75B021
Sampled By: B. Balkovec
C.O.C. No.: 15754

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01	4-5'		
Time: 1648			
Method: DPT			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB021 0203
Sample Location: S57SB021
Sampled By: B. BALKOVEC
C.O.C. No.: 15757

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01			
Time: 1200			
Method: DPT	8-10		
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	2	
Arsenic	(1) 4 oz. Jar	1	
Arsenic, CEC, & pH	(1) 4 oz. Jar	1	
CEC & pH	(1) 4 oz. Jar	1	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	1	
TOC, CEC, & pH	(1) 4 oz. Jar	1	
TOC & pH	(1) 4 oz. Jar	1	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	1	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: 0010003
S57FD0~~0814~~0114 BVC

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB021 0303
Sample Location: SS7SB021
Sampled By: B. BALKOVEC
C.O.C. No.: 15761

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01	14-16'	GRAY + YELLOW RANGE	MED-COARSE SAND W/ T-SILT
Time: 1515			
Method: SPLIT SPOON			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB0021040 3
Sample Location: SS7SB021
Sampled By: B. BALLARD
C.O.C. No.: 15761

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/17/01			
Time: 1530	18-20		
Method: Spoon Sampler			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SS220103
Sample Location: SS7SB22
Sampled By: B. BALKOVOC
C.O.C. No.: 15755

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01 Time: 1349 Method: DPT Monitor Reading (ppm): 20.6	0 - .5'	BLK. + LT. BROWN (REDDISH)	SILTY CLAY W/ T- COARSE SAND & CINDERS

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovoc

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB220103
Sample Location: S57SB22
Sampled By: B. BALKOVEC
C.O.C. No.: 15755

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01	4-5'	LT. BROWN (REDDISH)	SILTY CLAY W/ T COARSE SAND
Time: 1400			
Method: DPT			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB220203
Sample Location: S57SB22
Sampled By: B. Balkovec
C.O.C. No.: 15755

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01 Time: 1410 Method: DPT Monitor Reading (ppm): 0.0	8-10	LT. BROWN (REDDISH)	SAND + GRAVEL, SOME SILTY CLAY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB220303
Sample Location: S57SB22
Sampled By: B. BALLOVER
C.O.C. No.: 15755

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01	12-14'	BROWN + LT. GRAY	F. SAND w/ GRAVEL
Time: 1420			
Method: DPT			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Ballover

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB022040 3
Sample Location: S57SB028
Sampled By: B. Balkovec
C.O.C. No.: 15761

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01 Time: 1420 Method: A Split Spoon Monitor Reading (ppm): 0.0	18-20	Gray	Med Sand w/ Some Silt & Clay

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SS023OW3
Sample Location: S57SB023
Sampled By: B. Balkovec
C.O.C. No.: 15755

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01 Time: 1600 Method: DP7 Monitor Reading (ppm): 0.0	0-.5'	Black + Gray	Clay, Some Sand + Gravel

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0230103
Sample Location: S57SB023
Sampled By: R BALKOVEC
C.O.C. No.: 15755

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01 Time: 1609 Method: DPT Monitor Reading (ppm): 0.0	4-5'	LIGHT BROWN	SILTY CLAY W/ T- COARSE SAND + GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB0730703
Sample Location: SS7SB073
Sampled By: B. Balcore
C.O.C. No.: 15755

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 7/14/01	8-10'	Gray	Clay w/ Some Silt
Time: 1612			
Method: DPT			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balcore

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB0230303
Sample Location: SS7SB023
Sampled By: B. Balkovec
C.O.C. No.: 15754

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/14/01 Time: 1625 Method: DPT Monitor Reading (ppm): 0.0	12'-14'	GRAY, LT. BROWN + WHITE	COARSE SAND + GRAVEL T- CLAY

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SS0240103
Sample Location: S57S6024
Sampled By: B. BALLOVET
C.O.C. No.: 15758

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01	0-.5'	BLACK & LT. BROWN	SAND & GRAVEL T-STRAT. CLAY.
Time: 0910			
Method: DPT			
Monitor Reading (ppm): 11.3			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Ballovet

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0240103
Sample Location: S57SB024
Sampled By: B. BALKOVEC
C.O.C. No.: 15758

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01	4-5'	LIGHT BROWN	SILTY CLAY W/ GRAVEL
Time: 0920			
Method: DPT			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS75B0240203
Sample Location: SS75B024
Sampled By: B. BALKOVEC
C.O.C. No.: 15758

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01 Time: 0930 Method: OPT Monitor Reading (ppm): 0.0	8-10	LIGHT BROWN	SAND + GRAVEL, T. CLAY

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

Sample ID No.: S57SS025 0103
Sample Location: S57SB025
Sampled By: B. BALKOVEC
C.O.C. No.: 15758

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

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01 Time: 0945 Method: DPT Monitor Reading (ppm): 71.7	0-.5'	BLACK + REDDISH BROWN	ASPHALT + SILTY SAND + GRAVEL

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	–	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	–	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	–	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB025U03
Sample Location: S57SB025
Sampled By: B. Balkovec
C.O.C. No.: 15761

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01 Time: 0955 Method: DPT Monitor Reading (ppm): 0.0	4-5'	REDDISH BROWN	F-SAND W/ SOME CLAY

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0250203
Sample Location: S57SB025
Sampled By: B. BALKOVEC
C.O.C. No.: 15761

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01 Time: 1000 Method: DPT Monitor Reading (ppm): 0.0	8-10'	GRAY	SILTY CLAY W/SAND + GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB02S0303
Sample Location: S57SB025
Sampled By: B. BALKOVEC
C.O.C. No.: 15761

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01 Time: 1007 Method: DPT Monitor Reading (ppm): 0.0	12-14'	GRAY + REDDISH BROWN	SILTY CLAY W/ F-SAND + T-GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag		

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0260103
Sample Location: S57SB026
Sampled By: B BALKOVEC
C.O.C. No.: 15761

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01	8-9'	REDDISH BROWN + GRAY	CLAY W/ SAND + GRAVEL
Time: 1135			
Method: DPT			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC ~~pH~~ (60)	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

Sample ID No.: 5575S0270103
Sample Location: 5575B027
Sampled By: B BALKOWEC
C.O.C. No.: 41515

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

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/21/01 Time: 1112 Method: SPLIT SPOON Monitor Reading (ppm): 0-0	0-5	BROWN	SANDY SILT W/ TRACE GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkowec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB027 0103
Sample Location: S57SB027
Sampled By: B BALLOVER
C.O.C. No.: 41515

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/21/01 Time: 1125 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	4-5	GRAY	SILTY CLAY W/ GRAVEL VERY SOFT

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Ballover

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB027 0203
Sample Location: SS7SB027
Sampled By: B. BALKOVEC
C.O.C. No.: 41515

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/21/01 Time: 1136 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	8-10	LT. GRAY + YELLOW ORANGE	SILTY CLAY V. STIFF MOTTLED

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB027 0303
Sample Location: S57SB027
Sampled By: B. BALKOVITZ
C.O.C. No.: 41515

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/21/01 Time: 1155 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	12-14	LIGHT BROWN YELLOW ORANGE	SANDY SILT

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovitz

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0270403
Sample Location: S57SB027
Sampled By: B. Balkovitz
C.O.C. No.: 41515

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/21/01 Time: 1215 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	16-18	LIGHT GRAY + YELLOW ORANGE	CLAYEY F SANDY SILT

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovitz

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of ___

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

Sample ID No.: SS7SS0280103
Sample Location: SS7SB038
Sampled By: B. BALLQUO
C.O.C. No.: 15759

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

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/01 Time: 1047 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	0-.5	YELLOW ORANGE + LT. GRAY	SILTY CLAY

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs + e.e.	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Ballquo

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB038 0103
Sample Location: SS7SB038
Sampled By: B. BALKOVE
C.O.C. No.: 15759

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/15/01 Time: 1057 Method: SPLIT SPOON Monitor Reading (ppm): 0-0	4-5'	LIGHT BROWN YELLOW ORANGE	FINE SAND W/ TRACE SILT

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	SS7SB04P02

Signature(s): Robert Balkove

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB028U203
Sample Location: S57SB028
Sampled By: B. DALMORE
C.O.C. No.: 15759

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/01			
Time: 1121	10-12'	GRAY + YELLOW OR.	F-M SAND.
Method: SPLIT SPOON			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs* e.e	(1) 4 oz. Jar	5	
Arsenic	(1) 4 oz. Jar	–	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	–	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	–	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkaz

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB0780303
Sample Location: SS7SB078
Sampled By: B. BALKOVEC
C.O.C. No.: 15759

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/01	12-14'	GRAY + YELLOW ORANGE	MED SAND
Time: 1127			
Method: SPLIT SPOON			
Monitor Reading (ppm): 0-0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB028040 3
Sample Location: S57SB028
Sampled By: B. BALKOVE
C.O.C. No.: 15759

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/16/01 Time: 1150 Method: SPLIT SPOON Monitor Reading (ppm): 10.7	18'-20'	GRAY + LIGHT BROWN (YELLOW OR)	FINE SANDY SILT (MOTTLED)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	2	
Arsenic	(1) 4 oz. Jar	1	
Arsenic, CEC, & pH	(1) 4 oz. Jar	1	
CEC & pH	(1) 4 oz. Jar	1	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	1	
TOC, CEC, & pH	(1) 4 oz. Jar	1	
TOC & pH	(1) 4 oz. Jar	1	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	1	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S57SBDUP03

Signature(s): Robert Balkove

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SS0240W3
Sample Location: SS7SB079
Sampled By: B. Balcover
C.O.C. No.: 15756

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/17/01 Time: 1100 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	0-.5'	LIGHT BROWN + BLACK	SILTY SAND W/ GRAVEL + ASPHALT

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Robert Balcover

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB079 0103
Sample Location: S57SB079
Sampled By: B BALLOUET
C.O.C. No.:

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/17/01	4-5'	LIGHT BROWN	SANDY SILT W/ GRAVEL, TR CLAY
Time: 1110			
Method: SPLIT SPOON			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Ballouet

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: 5575B0240203
Sample Location: 5575B079
Sampled By: B. BALKOVEC
C.O.C. No.:

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/17/01 Time: 1132 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	10-12	OLIVE GRAY	CLAYEY SILT W/ TRACE SAND

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB02Q0303
Sample Location: S57SB029
Sampled By: B. BALKOVEC
C.O.C. No.:

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/17/01 Time: 1210 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	20-22	YELLOW ORANGE	SILTY SAND

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB029 0403
Sample Location: S57SB029
Sampled By: B. BALKOVEC
C.O.C. No.:

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/17/01 Time: 1220 Method: SOLID SPOON Monitor Reading (ppm): 0.0	24-26'	GREENISH BROWN	F. SANDY CLAY, VERY STIFF

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB0300103
Sample Location: SS7SB030
Sampled By: B BALKOVE
C.O.C. No.: 15762

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01 Time: 1005 Method: SPLIT SPOON Monitor Reading (ppm): 10.0	4-6	LT. BROWN & LT. GRAY	SILTY SAND T-CLAY (MOTTLED)

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Robert Balkove

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB030203
Sample Location: S57SB030
Sampled By: B BALLOVER
C.O.C. No.: 15762

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01 Time: 1015 Method: SPLIT SPOON Monitor Reading (ppm): 8.0	8-10	YELLOW BROWN LT. GRAY	SAND & SILT

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	~~4~~ 2	
Arsenic	(1) 4 oz. Jar	1	
Arsenic, CEC, & pH	(1) 4 oz. Jar	1	
CEC & pH	(1) 4 oz. Jar	1	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	1	
TOC, CEC, & pH	(1) 4 oz. Jar	1	
TOC & pH	(1) 4 oz. Jar	2	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	1	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	FD-S57SBDUP06

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB030303
Sample Location: S57SB030
Sampled By: B BALKOVEC
C.O.C. No.: 15762

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01 Time: 1045 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	14-16	LIGHT GRAY	MED. SAND

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S37SB030040 3
Sample Location: S37SB030
Sampled By: B BALKOVEC
C.O.C. No.: 15763

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01			
Time: 1145			
Method: SPLIT SPOON	22-24'		
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	3 COLLECTED ONLY	
Arsenic	(1) 4 oz. Jar	1 SAMPLE	
Arsenic, CEC, & pH	(1) 4 oz. Jar	1	
CEC & pH	(1) 4 oz. Jar	1	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	1	
TOC, CEC, & pH	(1) 4 oz. Jar	1	
TOC & pH	(1) 4 oz. Jar	3	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	1	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB031U103
Sample Location: S57SB031
Sampled By: B BALKOVEC
C.O.C. No.: 15762

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01 Time: 807 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	4-6	DK YEL BRN	SAND TR SILT

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	3	
Arsenic	(1) 4 oz. Jar	–	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	–	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	.	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS75B031 0203
Sample Location: SS75B031
Sampled By: B BALKOVIC
C.O.C. No.: 15762

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 5/24/01	8-10	YELLOW BROWN	SILTY, FINE SAND
Time: 0878			
Method: SPLIT SPOON			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓ 2	
Arsenic	(1) 4 oz. Jar	–	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	✓ 2	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓ (1)	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.: SS75B04D05
—	

Signature(s): Robert Balkovic

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB031D303
Sample Location: S57SB031
Sampled By: B BALKOVEC
C.O.C. No.: 15762

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01	14-16	YELLOW BR.	SAND.
Time: 0840			
Method: SPLIT SPOON			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	—	
Arsenic, CEC, & pH	(1) 4 oz. Jar	—	
CEC & pH	(1) 4 oz. Jar	—	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC, CEC, & pH	(1) 4 oz. Jar	—	
TOC & pH	(1) 4 oz. Jar	—	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB031 0403
Sample Location: S57SB031
Sampled By: B BALKOVEC
C.O.C. No.: 15762

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01 Time: 0100 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	18-20'	LIGHT YELLOW BROWN - LT GRAY	CLAY + SILT

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	3 (MS/MSD)	
Arsenic	(1) 4 oz. Jar	–	
Arsenic, CEC, & pH	(1) 4 oz. Jar	–	
CEC & pH	(1) 4 oz. Jar	–	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC, CEC, & pH	(1) 4 oz. Jar	–	
TOC & pH	(1) 4 oz. Jar	1	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	1	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD
VOCs

Duplicate ID No.:

Signature(s):

Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB032003
Sample Location: S57SB032
Sampled By: B BALKOVIC
C.O.C. No.: 15763

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/03	6-8'	YELLOW BROWN & LIGHT GRAY	SILT-CLAY (MOTTLED)
Time: 1305			
Method: SPLIT SPOON			
Monitor Reading (ppm): 0.0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

* UNABLE TO SAMPLE 4-6' 0 RECOVERY

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkovic

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB0320203
Sample Location: SS7SB032
Sampled By: B. BALKOVEC
C.O.C. No.: 15763

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01	8-10'	YELLOW ORANGE LT. GRAY	CLAY W/ T-SZET
Time: 1315			
Method: SPLIT SPOON			
Monitor Reading (ppm): 0-0			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkovec

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: S57SB0320203
Sample Location: S57SB032
Sampled By: B. BALKOVOC
C.O.C. No.: 15763

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01 Time: 1335 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	14-16'	YEL BRN GREY	CLAY W TR f-g SAND

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Robert Balkovoc

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB032040 3
Sample Location: SS7SB032
Sampled By: B. BALKOVE
C.O.C. No.: 15763

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/24/01 Time: 1345 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	18-20	LT BROWN & LIGHT GRAY	SILTY, CLAY W/ SOME GRAVEL

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(1) 4 oz. Jar	✓	
Arsenic	(1) 4 oz. Jar	✓	
Arsenic, CEC, & pH	(1) 4 oz. Jar	✓	
CEC & pH	(1) 4 oz. Jar	✓	
Arsenic, TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC, CEC, & pH	(1) 4 oz. Jar	✓	
TOC & pH	(1) 4 oz. Jar	✓	
Moisture content, Grain size, Specific gravity, Bulk density	Gallon Ziplock Bag	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Robert Balkove

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129

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

Sample ID No.: SS7SB033 0103
Sample Location: SS7SB033 MW033
Sampled By: B. BALKOVEC
C.O.C. No.: 15737

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 8/22/01 Time: 1457 Method: SPLIT SPOON Monitor Reading (ppm): 0.0	10-12'	YELLOW ORANGE	FINE MED SAND

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC'S + ETHYL ETHER	(1) 4oz JAR	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Robert Balkovec

A.6 GROUNDWATER SAMPLE LOG SHEETS

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0010103
Sample Location: S57MW001
Sampled By: J. Wellman
C.O.C. No.: 15760
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/15/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: ~~0916~~ 1121	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump	Clear	5.78	0.089	21.8	0.27	3.20	155	0.06

PURGE DATA:

Date: 8/15/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 26.25				See Low Flow Purge Data Sheet				
Static Water Level (WL): 7.44								
One Casing Volume(gal/L): ~~3~~ 6.321								
Start Purge (hrs): 0916								
End Purge (hrs): 1121								
Total Purge Time (min): 125								
Total Vol. Purged (gal/L): 12.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	—
Carbon Dioxide	4°C	1-500mL Poly	1
Total Dissolved Iron	4°C HNO_3	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57MW001
DATE: 8/15/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (mL) (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0916	7.44	—	100mL	start purge →							
0921	7.64	500	100mL	6.53	0.175	178	4.80	21.7	-20	0.10	
0926	7.85	1000	100mL	6.56	0.159	80.7	3.55	21.6	-20	0.10	
0931	7.88	1500	100mL	6.54	0.161	48.6	3.57	21.6	-18	0.11	
0936	7.90	2000	100mL	6.57	0.155	27.2	3.52	21.5	-18	0.10	
0941	7.90	2500	100mL	6.59	0.151	18.5	3.37	21.6	-15	0.10	
0946	7.95	3000	100mL	6.63	0.148	10.47	3.35	21.2	-12	0.10	
0951	7.97	3500	100mL	6.63	0.144	8.73	3.31	21.1	-11	0.09	
0956	8.00	4000	100mL	6.64	0.140	7.07	3.30	20.9	-3	0.09	
1001	8.04	4500	100mL	6.59	0.133	6.77	3.31	20.7	8	0.09	
1006	8.05	5000	100mL	6.33	0.121	6.02	3.30	20.8	45	0.09	
1012	8.05	5500	100mL	6.27	0.120	3.05	3.31	20.9	53	0.08	
1016	8.04	6000	100mL	6.14	0.109	2.37	3.25	20.8	80	0.07	
1021	8.04	6500	100	6.11	0.111	2.25	3.29	21.1	84	0.07	
1026	8.03	7000	100	6.05	0.109	2.11	3.26	21.2	91	0.07	
1031	8.03	7500	100	6.00	0.107	1.32	3.28	21.3	106	0.07	
1036	8.02	8000	100	5.95	0.100	0.81	3.24	21.3	116	0.07	
1041	8.01	8500	100	5.92	0.105	1.07	3.27	21.6	114	0.07	
1046	8.02	9000	100	5.93	0.098	0.66	3.29	21.7	118	0.06	
1051	8.02	9500	100	5.83	0.091	0.29	3.29	21.6	140	0.06	
1056	8.02	10000	100	5.82	0.091	0.05	3.27	21.4	140	0.06	
1101	8.02	10500	100	5.79	0.089	0.56	3.22	21.5	148	0.06	
1106	8.03	11000	100	5.79	0.088	1.41	3.22	21.3	151	0.06	
1111	8.03	11500	100	5.78	0.088	0.72	3.22	21.4	153	0.06	
1116	8.03	12000	100	5.77	0.089	0.15	3.23	21.7	155	0.06	
1121	8.03	12500	100	5.78	0.089	0.27	3.20	21.8	155	0.06	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW002010
Sample Location: S57MW002~~0103~~ PAR
Sampled By: JCW
C.O.C. No.: 15760
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/15/01								
Time: 1515								
Method: Peristaltic Pump	Clear	6.56	0.172	24.4	1.92	3.26	53	0.11

PURGE DATA:

Date: 8/15/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 14.32				See Low Flow Purge Data Sheet				
Static Water Level (WL): 7.97								
One Casing Volume(gal/L): 4.0								
Start Purge (hrs): 1355								
End Purge (hrs): 1515								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 8.0L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, ~~and Iron~~	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	
Carbon Dioxide	4°C	(1) 500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Iron (Total) HNO_3/4°C (1)-500mL Poly 1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57MW002
DATE: 8/15/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume mL ~~(gal.)~~	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1355	7.97		100ml	-start		purge					
1405	8.12	1000mL	100mL	6.42	0.203	26.5	5.41	25.4	51	0.13	
1415	8.55	2000mL	100	6.44	0.201	21.3	5.28	24.8	53	0.13	
1425	8.62	3000	100	6.49	0.198	~~4.73~~ 15.53	4.73	24.6	41	0.13	
1435	8.62	4000	100	6.53	0.187	9.35	3.94	25.0	35	0.12	
1445	8.63	5000	100	6.53	0.180	6.84	3.55	24.6	36	0.12	
1455	8.65	6000	100	6.55	0.177	4.36	3.35	24.4	40	0.12	
1505	8.65	7000	100	6.56	0.175	2.62	3.29	24.5	47	0.11	
1515	8.65	8000	100	6.56	0.172	1.92	3.26	24.4	53	0.11	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 557MW0030103
Sample Location: 557MW003
Sampled By: Jennifer Wellman
C.O.C. No.: 157164
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8-16-01								
Time: 1030								
Method: Peristaltic Pump	clear	5.29	0.004	20.7	0.04	3.43	258	0.04

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8-16-01								
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 24.35				See Low Flow Purge Data Sheet				
Static Water Level (WL): 8.82								
One Casing Volume(gal/L): 6.3								
Start Purge (hrs): 0820								
End Purge (hrs): 1030								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 13								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	4
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	2
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	2
Chromium (Hexavalent)	4° C	(1) 500mL POLY	2
Dissolved Gases	4° C	(3) 40 mL Vial	6
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	2
Ferrous Iron	4° C	(1) 1L Poly	2
Misc. Anions	4° C	(1) 1L Poly	2
Sulfide	NaOH / 4° C	(1) 500mL POLY	2
Alkalinity & TSS	4° C	(1) 1L Poly	2
~~Alkalinity~~, BOD, DOC ~~& TSS~~	4° C	(1) 1L Poly	2
CO_2	4°C	1 - 500mL Poly	2

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Fe(dissolved) HNO_3/4°C 1- 500 mL Poly 2

Circle if Applicable:

MS/MSD: /

Duplicate ID No.: 557MWDUP01

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: 557MW003
DATE: 8/16/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume mL (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0820	8.82	—	100	START PURGE							
0830	8.99	1000	100	5.25	0.075	6.83	5.15	20.8	247	0.05	
0840	8.99	2000	100	5.29	0.062	3.61	3.69	20.6	252	0.04	
0850	8.99	3000	100	5.29	0.066	5.24	3.63	20.6	255	0.04	
0900	8.99	4000	100	5.30	0.064	9.11	3.53	20.5	258	0.04	
0910	9.00	5000	100	5.29	0.064	6.52	3.50	20.5	260	0.04	
0920	9.01	6000	100	5.29	0.063	6.37	3.52	20.5	261	0.04	
0930	9.02	7000	100	5.28	0.063	4.87	3.51	20.5	262	0.04	
0940	9.02	8000	100	5.28	0.062	4.17	3.53	20.5	261	0.04	
0950	9.02	9000	100	5.28	0.065	3.44	3.52	20.5	262	0.04	
1000	9.02	10000	100	5.27	0.061	3.06	3.52	20.6	261	0.04	
1010	9.02	11000	100	5.28	0.064	2.54	3.50	20.6	261	0.04	
1020	9.02	12000	100	5.29	0.064	3.11	3.52	20.7	259	0.04	
1030	9.02	13000	100	5.29	0.064	4.25	3.43	20.7	258	0.04	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SS7MW0040103
Sample Location: SS7MW004
Sampled By: J Wellman
C.O.C. No.: 15764
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/16/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 1605	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump	Clear	6.49	0.140	22.5	0.78	3.26	168	0.09

PURGE DATA:

Date: 8/16/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 16.15				See Low Flow Purge Data Sheet				
Static Water Level (WL): 8.80								
One Casing Volume(gal/L): 4.9								
Start Purge (hrs): ~~0825~~ 1425								
End Purge (hrs): 1605								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 10L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	6
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	3
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	3
Chromium (Hexavalent)	4° C	(1) 500mL POLY	3
Dissolved Gases	4° C	(3) 40 mL Vial	9
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	3
Ferrous Iron	4° C	(1) 1L Poly	3
Misc. Anions	4° C	(1) 1L Poly	3
Sulfide	NaOH / 4° C	(1) 500mL POLY	3
Alkalinity & TSS	4° C	(1) 1L Poly	3
~~Alkalinity~~, BOD, DOC ~~& TSS~~	4° C	(1) 1L Poly	3
CO_2	4°C	1-500mL Poly	3

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Iron HNO3/4°C 1-500mL Poly 3

Circle if Applicable:

MS/MSD Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57MW004
DATE: 8/16/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1425	8.80	—	100mL	—	start	purge	—	—	—	—	
1435	8.91	1000	100	6.60	0.165	9.72	6.31	23.0	190	0.11	
1445	8.96	2000	100	6.57	0.164	8.15	4.54	23.0	163	0.11	
1455	9.01	3000	100	6.55	0.164	3.60	4.14	23.0	163	0.11	
1505	9.03	4000	100	6.54	0.161	3.21	3.72	23.4	163	0.10	
1515	9.05	5000	100	6.54	0.158	2.48	3.70	23.0	164	0.10	
1525	9.07	6000	100	6.54	0.154	1.52	3.68	23.1	168	0.10	
1535	9.07	7000	100	6.52	0.151	1.43	3.45	23.0	166	0.10	
1545	9.08	8000	100	6.51	0.148	1.23	3.32	22.7	166	0.10	
1555	9.08	9000	100	6.50	0.144	0.95	3.26	22.6	167	0.09	
1605	9.08	10000	100	6.49	0.140	0.78	3.26	22.5	168	0.09	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0050103
Sample Location: S57MW005
Sampled By: Jennifer Wellman
C.O.C. No.: 41519
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/23/01 Time: 1504	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Method: Peristaltic Pump	Clear	4.24	0.113	20.5	1.2	4.30	315	0.07

PURGE DATA:

Date: 8/23/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 19.8				See Low Flow Purge Data Sheet				
Static Water Level (WL): 5.85								
One Casing Volume(gal/L): 3.0L								
Start Purge (hrs): 1404								
End Purge (hrs): 1504								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 6.0L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity, BOD, DOC & TSS~~ CO_2	4° C	(1) ~~1L Poly~~ 500mL	1
Dissolved Iron	HNO_3	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: 557MW005
DATE: 8/28/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1404	5.85	—	100	—	start	purge	—	—	—	—	
1414	5.90	1.0L	100	4.81	0.117	23	6.78	21.1	262	0.08	
1424	5.91	2.0L	100	4.71	0.115	8.9	5.46	20.7	276	0.07	
1434	5.91	3.0L	100	4.60	0.115	7.1	4.90	20.9	287	0.07	
1444	5.91	4.0L	100	4.31	0.114	5.4	4.36	20.7	308	0.07	
1454	5.91	5.0L	100	4.26	0.114	2.3	4.32	20.6	312	0.07	
1504	5.91	6.0L	100	4.24	0.113	1.2	4.30	20.5	315	0.07	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SS7MW0060103
Sample Location: SS7MW006
Sampled By: J. Wellman
C.O.C. No.: 41521
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/24/01 Time: 0858 Method: Peristaltic Pump	clear	4.88	0.066	20.59	0.1	4.34	288	0.09

PURGE DATA:

Date: 8/24/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 14.2				See Low Flow Purge Data Sheet				
Static Water Level (WL): 5.92								
One Casing Volume(gal/L): 4.3L								
Start Purge (hrs): 0738								
End Purge (hrs): 0858								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 8.5L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, ~~and Iron~~	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity, BOD, DOC & TSS~~ Carbon Dioxide	4° C	(1) ~~1L Poly~~ 500mL Poly	1
Dissolved Fe	HNO_3 / 4°C	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57 MW006
DATE: 8/24/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0738	5.92	—	150	start	purge	—	—	—	—	—	
0748	6.00	1.5L	100	4.81	0.086	3.3	4.70	20.75	286	0.06	
0758	6.02	2.5L	100	4.85	0.076	0.7	4.48	20.65	290	0.05	
0808	6.02	3.5L	100	4.87	0.071	0.3	4.43	20.53	289	0.05	
0818	6.02	4.5L	100	4.87	0.068	0.1	4.39	20.47	293	0.04	
0828	6.02	5.5L	100	4.87	0.068	0.1	4.34	20.44	291	0.04	
0838	6.02	6.5L	100	4.87	0.067	0.0	4.34	20.51	288	0.04	
0848	6.02	7.5L	100	4.88	0.066	0.0	4.33	20.56	289	0.04	
0858		8.5L	100	4.88	0.066	0.1	4.34	20.59	288	0.04	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0070103
Sample Location: S57MW007
Sampled By: Jennifer Wellman
C.O.C. No.: 41519
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Date: 8/23/01	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Time: 0915								
Method: Peristaltic Pump	Clear	5.28	0.365	19.4	0.7	4.06	22	0.24

PURGE DATA:

Date: 8/23/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 28.2				See Low Flow Purge Data Sheet				
Static Water Level (WL): 9.27								
One Casing Volume(gal/L): 6 OL								
Start Purge (hrs): 0815								
End Purge (hrs): 0915								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 12.0L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	4
Cadmium, Chromium, ~~and Iron~~	HNO_3 / 4° C	(1) 500mL Poly	2
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	2
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	6
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	2
Ferrous Iron	4° C	(1) 1L Poly	2
Misc. Anions	4° C	(1) 1L Poly	2
Sulfide	NaOH / 4° C	(1) 500mL POLY	2
Alkalinity & TSS	4° C	(1) 1L Poly	2
~~Alkalinity~~, BOD, DOC & ~~TSS~~	4° C	(1) 1L Poly	1
Carbon Dioxide	4°C	1-500mL Poly	2

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time - collected at 1550

Dissolved Fe HNO3 1-500mL Poly 2

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	557MWDUP03

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57MW007
DATE: 8/23/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0815	9.27	—	200	start	purge						
0825	10.27	2.0	200	5.42	0.393	4	6.78	19.2	-9	0.26	
0835	10.46	4.0	200	5.28	0.390	3.2	5.81	19.2	-29	0.25	
0845	10.56	6.0	200	~~4.01~~ 5.25	0.384	3.1	4.11	19.2	-25	0.25	
0855	10.67	8.0	200	5.24	0.369	2.7	4.09	19.4	-6	0.24	
0905	10.68	10.0	200	5.28	0.3666	1.4	4.08	19.4	19	0.24	
0915	10.71	12.0	200	5.28	0.365	0.7	4.06	19.4	22	0.24	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 557MW0080103
Sample Location: 557MW008
Sampled By: Jennifer Wellman
C.O.C. No.: 41516
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/22/01								
Time: 1515								
Method: Peristaltic Pump	clear	6.45	0.365	26.48	4.4	2.48	46	0.24

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8/22/01								
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 16.81				See Low Flow Purge Data Sheet				
Static Water Level (WL): 8.49								
One Casing Volume(gal/L): 4 L								
Start Purge (hrs): 1425								
End Purge (hrs): 1515								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 10 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity~~, BOD, DOC ~~& TSS~~	4° C	(1) 1L Poly	1
CO_2	4°C	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Iron HNO_3 1-500mL Poly 1

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: SS7MW008
DATE: 8/22/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1425	8.49	—	200	Start	purge	—					
1435	8.80	2.0L	200	6.85	0.528	+2000	3.29	25.55	9	0.33	
1445	8.88	4.0L	200	6.86	0.470	100	2.64	26.63	8	0.29	
1455	8.89	6.0L	200	6.67	0.414	75	2.50	26.63	27	0.27	
1505	8.89	8.0L	200	6.55	0.375	11.0	2.46	26.59	37	0.24	
1515	9.01	10.0L	200	6.45	0.365	4.4	2.48	26.48	46	0.24	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0090103
Sample Location: S57MW009~~010~~ PW
Sampled By: PWR
C.O.C. No.: 41519
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/23/01								
Time: 1130								
Method: Peristaltic Pump	CLEAR	5.00	0.057	22.30	0	3.14	261	0.04

PURGE DATA:

Date: 8/23/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 21.90				See Low Flow Purge Data Sheet				
Static Water Level (WL): 8.87								
One ~~Casing~~ Purge Volume(gal/L): ~~1.72~~ ~~6.0~~ ≈ 3.0 l								
Start Purge (hrs): 1017								
End Purge (hrs): 1130								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS MS/MSD	✓(6)
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly MS/MSD	✓(3)
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	✓(1)
Chromium (Hexavalent)	4° C	(1200HRS) (1) 500mL POLY MS/MSD	✓(3)
Dissolved Gases	4° C	(3) 40 mL Vial MS/MSD	✓(9)
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	✓(1)
Ferrous Iron	4° C	(1) 1L Poly MS/MSD	✓(3)
Misc. Anions	4° C	(1) 1L Poly	✓(1)
Sulfide	NaOH / 4° C	(1) 500mL POLY	✓(1)
Alkalinity & TSS	4° C	(1) 1L Poly	✓(1)
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	—
CO_2			✓(1)

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Fe (DISS) FILTERED MS/MSD ✓(3)

NOTE SCREEN LENGTH = 5.0' ∴ ONE PURGE VOL = 3.0 l
MIN PURGE VOL TO COLLECT = 6.0 l

Circle if Applicable:

MS/MSD	Duplicate ID No.:
✓	—

Signature(s): Fred W Ramsey

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: INDIAN HEAD MCO SITE 57
PROJECT NUMBER: 7129
START 1017 STATIC H_2O = 8.87

WELL ID.: 857MW1009
DATE: 8-23-01

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS g/l	Comments VOL
1030	9.25	~100ml/m	5.07	0.061	10	5.82	22.08	227	0.04	
1040	9.25	100ml/m	5.02	0.059	5	3.38	22.07	241	0.04	
1050	9.30	100	5.01	0.059	5	3.25	21.85	254	0.04	
1100	9.32	100	5.00	0.059	0	3.14	22.70	255	0.04	4.5 l
1110	9.37	100	5.00	0.058	0	3.19	22.31	261	0.04	5.5 l
1120	9.42	100	5.03	0.057	0	3.15	22.24	260	0.04	6.5 l
1130	9.47	100	5.00	0.057	0	3.14	22.30	261	0.04	7.5 l
					(PURGE COMPLETED)					

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0100103
Sample Location: S57MW010
Sampled By: Jennifer Wellman
C.O.C. No.: 41519
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/23/01 Time: 1214	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Method: Peristaltic Pump	clear	5.55	0.313	23.1	1.1	3.97	57	0.20

PURGE DATA:

Date: 8/23/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 19.03				See Low Flow Purge Data Sheet				
Static Water Level (WL): 16.00								
One Casing Volume(gal/L): 4.2								
Start Purge (hrs): 1054								
End Purge (hrs): 1214								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 8.5L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	—
Carbon Dioxide	4°C	1-500mL	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Iron HNO_3 1-500mL 1

Circle if Applicable:

MS/MSD ✓ Duplicate ID No.:

Signature(s): Jennifer S. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: 557MW01C
DATE: 8/23/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1059	9.03	—	100	start	purge	—	—	—	—	—	—
1104	9.49	1.5L	100	5.19	0.242	19	5.81	22.4	135	0.16	
1114	9.61	2.5L	100	5.30	0.301	11	5.29	22.9	98	0.20	
1124	9.72	3.5L	100	5.51	0.349	6.0	4.75	23.0	77	0.23	
1134	9.83	4.5L	100	5.57	0.352	5.1	4.42	23.0	72	0.23	
1144	9.87	5.5L	100	5.66	0.364	4.2	4.14	22.9	57	0.24	
1154	9.98	6.5L	100	5.64	0.342	4.9	3.99	23.1	62	0.22	
1204	10.00	7.5L	100	5.65	0.326	1.0	3.98	22.9	60	0.21	
1214	10.00	8.5L	100	5.55	0.313	1.1	3.97	23.1	57	0.20	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SS7MW0110103
Sample Location: SS7MW011
Sampled By: Jennifer Wellman
C.O.C. No.: 15765
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/17/01								
Time: 1100 HRS / 1200 HRS								
Method: Peristaltic Pump	CLEAR	5.79	0.104	21.34	0.75	3.30	135	0.07

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8/17/01								
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: PVC 2"								
Total Well Depth (TD): 19.69				See Low Flow Purge Data Sheet				
Static Water Level (WL): 9.59								
One Casing Volume(gal/L): 6 L								
Start Purge (hrs): ~~0850~~ 0855								
End Purge (hrs): 1055								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 12000 ml								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	✓
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	✓
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	✓
Chromium (Hexavalent)	4° C	(1) 500mL POLY	✓
Dissolved Gases	4° C	(3) 40 mL Vial	✓
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	✓
Ferrous Iron	4° C	(1) 1L Poly	✓
Misc. Anions	4° C	(1) 1L Poly	✓
Sulfide	NaOH / 4° C	(1) 500mL POLY	✓
Alkalinity & TSS	4° C	(1) 1L Poly	✓
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	
CO_2	4°C	1-500mL Poly	✓

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Fe 4°C/HNO_3 1-500mL Poly ✓

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Fred Williamson FOR JW

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57MW011
DATE: 8/17/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0855	9.59	—	100	start purge							
0905	10.04	1000	100	5.43	0.081	45.7	4.45	22.16	231	0.05	
0915	10.22	2000	100	5.56	0.085	33.3	3.72	22.0	218	0.06	
0925	10.26	3000	100	5.64	0.089	22.0	3.58	21.9	204	0.06	
0935	10.40	4000	100	5.75	0.094	11.7	3.53	21.6	182	0.06	
0945	10.48	5000	100	5.81	0.099	5.34	3.54	21.6	167	0.06	
0955	10.55	6000	100	5.81	0.096	3.72	3.55	21.4	160	0.06	
1005	10.60	7000	100	5.81	0.098	2.98	3.48	21.4	152	0.06	
1015	10.63	8000	100	5.80	0.100	2.18	3.34	21.4	146	0.07	
1025	10.67	9000	100	5.79	0.101	1.52	3.31	21.4	144	0.07	
1035	10.71	10000	100	5.80	0.101	2.1	3.32	21.3	141	0.07	
1045	10.66	11000	100	5.83	0.105	0.80	3.25	21.37	136	0.07	
1055	10.64	12000	100	5.79	0.104	0.75	3.30	21.34	135	0.07	
						PURGE COMPLETED BEGIN TO FILL CONTAINERS					

SIGNATURE(S): _____

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Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0120103
Sample Location: S57MW012
Sampled By: Jennifer Wellman
C.O.C. No.: 41516
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/22/01 Time: 0915 Method: Peristaltic Pump	clear	5.59	0.111	18.04	6.0	3.92	167	0.07

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8/22/01								
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 44.3 ft				See Low Flow Purge Data Sheet				
Static Water Level (WL): 6.02 ft								
One Casing Volume(gal/L): 6 l								
Start Purge (hrs): 0805								
End Purge (hrs): 0915								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 14 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	3
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY (1100 HR)	1
Dissolved Gases	4° C	(3) 40 mL Vial	2
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity, BOD, DOC & TSS~~	~~4° C~~	~~(1) 1L Poly~~	—
CO_2	4°C	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Iron HNO_3 1-500mL Poly 1

Circle if Applicable:

MS/MSD Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57MW012
DATE: 8/22/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0805	6.02	—	200	Start	purge	—					
0815	6.11	2.0L	200	5.67	0.138	140	4.55	18.00	136	0.09	
0825	6.12	4.0L	200	5.67	0.121	40	4.0	18.19	158	0.08	
0835	6.13	6.0L	200	5.66	0.114	37	3.92	17.89	150	0.07	
0845	6.13	8.0L	200	5.66	0.113	40	3.88	17.86	140	0.07	
0855	6.13	10.0L	200	5.65	0.112	36	3.88	17.92	137	0.07	
0905	6.13	12.0L	200	5.61	0.111	12	3.88	17.94	149	0.07	
0915	6.13	14.0L	200	5.59	0.111	6.0	3.92	18.04	167	0.07	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57mw0130103 Fur
Sample Location: S57mw013~~0103~~
Sampled By: FWR
C.O.C. No.: 41516
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/22/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 1100	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump	CLEAR	4.25	0.164	19.2	0	—	306	0.119/l

PURGE DATA:

Date:	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type:								
Total Well Depth (TD): 17.95				See Low Flow Purge Data Sheet				
Static Water Level (WL): 5.87								
One Casing Volume(gal/L): 6.6 l								
Start Purge (hrs): 0955								
End Purge (hrs): 1035								
Total Purge Time (min):								
Total Vol. Purged (gal/L): 12 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	✓
Cadmium, Chromium, ~~and Iron~~	HNO_3 / 4° C	(1) 500mL Poly	✓
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	✓
Chromium (Hexavalent)	4° C	(1) 500mL POLY	✓
Dissolved Gases	4° C	(3) 40 mL Vial	✓
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	✓
Ferrous Iron	4° C	(1) 1L Poly	✓
Misc. Anions	4° C	(1) 1L Poly	✓
Sulfide	NaOH / 4° C	(1) 500mL POLY	✓
Alkalinity & TSS	4° C	(1) 1L Poly	✓
~~Alkalinity, BOD, DOC & TSS~~	4° C	(1) 1L Poly	
CO_2	4°C	1 500ml PE	✓

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

TOTAL DISSOLVED IRON (FILTERED) 4°C/HNO_3 1 500ml PE ✓

Ferrous 4°C UNPRESERVED ✓

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Rauser

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57MW013
DATE: 10-22-01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU) (1*)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS (g/l)	Notes:
0955	6.00	2000ml	~200ml	4.86	0.171	41	*	19.8	259	0.11	
1005	6.07	4000ml		4.62	0.168	5	*	19.9	281	0.11	*DEFECTIVE
1015	6.07	8000ml		4.42	0.168	0	*	20.1	291	0.11	DO PROBE
1025	6.13	10000ml		4.30	0.168	0	*	19.6	300	0.11	1* USING
1035	6.17	12000ml	200ml/m	4.25	0.169	0	*	19.2	306	0.11	HORIBA
											FOR TURBIDITY
							COMPLETED	PURGING	@ 1035		

SIGNATURE(S): _____

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Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: TEMP WELL
[] QA Sample Type:

Sample ID No.: S57TW0140103
Sample Location: S57TW014
Sampled By: PLR
C.O.C. No.: 41517
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8-23-01								
Time: 1625								
Method: Peristaltic Pump	CLEAR	5.25	0.368	26.06	0	2.29	117	0.24

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8-23-01								
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material Type: 1" ID PVC								
Total Well Depth (TD): 11.70				See Low Flow Purge Data Sheet				
Static Water Level (WL): 7.37								
One ~~Casing~~ Volume(gal/L): .75 l								
Start Purge (hrs): 1550								
End Purge (hrs): 1625								
Total Purge Time (min):								
Total Vol. Purged (gal/L): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	✓
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	✓
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	✓
Chromium (Hexavalent)	4° C	(1) 500mL POLY	✓
Dissolved Gases	4° C	(3) 40 mL Vial	✓
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	✓
Ferrous Iron	4° C	(1) 1L Poly	✓
Misc. Anions	4° C	(1) 1L Poly	✓
Sulfide	NaOH / 4° C	(1) 500mL POLY	✓
Alkalinity & TSS	4° C	(1) 1L Poly	✓
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	
CO_2		1 500ml PE	✓

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time SULFIDE NAOH 1 500ml PE ✓

5 ft screen

.15 l/ft

2' STICK UP, ALL MEASUREMENTS W/R TO TPVC

11.70
7.37
4.33

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred Williamson

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57TW0140103
DATE: 8/23/01

ST. WL = 7.37

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS (g/l)	Notes:
1550											
1600	7.59	1 l	100 ml/m	5.10	0.428	30.5	5.63	26.44	112	0.28	
1605	7.72	1.5 l	100 ml/m	5.13	0.414	10.0	2.54	26.19	118	0.27	
1610	7.80	2 l	100	5.15	0.403	8.0	2.45	26.18	119	0.26	
1615	7.88	2.5 l	100	5.19	0.389	2.0	2.33	26.09	118	0.25	
1620	7.93	3.0 l	100	5.24	0.373	0.0	2.30	26.04	117	0.24	
1625	7.97	3.5	100	5.25	0.368	0	2.29	26.06	114	0.24	
							PURGE COMPLETED				

SIGNATURE(S): Fred Wanner

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temp Well
[] QA Sample Type:

Sample ID No.: S57TW01S0103
Sample Location: S57TW015
Sampled By: J. Wellman
C.O.C. No.: 415016
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/22/01								
Time: 1239								
Method: Peristaltic Pump	yellow-br	5.46	0.113	18.06	500	4.53	-21	0.07

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8/22/01								
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 32.90				See Low Flow Purge Data Sheet				
Static Water Level (WL): 8.97								
One Casing Volume(gal/L): .75L								
Start Purge (hrs): 11:39								
End Purge (hrs): 12:39								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 9.0L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	3
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	2
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity, BOD, DOC & TSS~~	~~4° C~~	~~(1) 1L Poly~~	
CO_2	4°C	1-500 ml Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Iron 4°C HNO_3 1-500mL Poly 1

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: 557 TW ~~017~~ 015 FUR
DATE: 8/22/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1139	8.97	—	100	start	purge	—	—	—	—	—	
1144	10.51	0.5 L	100	5.42	0.121	+2000	7.54	20.90	1	0.08	
1149	10.97	1.0 L	100	5.40	0.121	+2000	5.98	21.10	1	0.08	
1154	10.98	1.5 L	100	5.48	0.120	+2000	4.48	22.30	-7	0.08	
1159	10.98	2.0 L	100	5.46	0.122	+2000	4.58	20.76	-12	0.08	
1204	10.98	2.5 L	100	5.49	0.118	+2000	4.37	20.46	-18	0.08	
1209	10.98	3.0 L	100	5.50	0.118	+2000	4.38	20.56	-20	0.08	
1219	12.39	5.0 L	200	5.49	0.115	+2000	4.54	18.11	-28	0.07	
1229	15.47	7.0 L	200	5.46	0.113	850	4.52	18.02	-23	0.07	
1239	15.49	9.0 L	200	5.46	0.113	500	4.53	18.06	-21	0.07	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: SS7TW0160103
Sample Location: SS7TW016
Sampled By: Jennifer Wellman
C.O.C. No.: 15734
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/21/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 0850	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump	clear	6.53	0.107	20.83	0.00	7.91	145	0.07

PURGE DATA:

Date: 8/21/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 11.92				See Low Flow Purge Data Sheet				
Static Water Level (WL): 7.91								
One Casing Volume(gal/L): .75L								
Start Purge (hrs): 0820								
End Purge (hrs): 0850								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): 3.0L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, ~~and Iron~~	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity, BOD, DOC &~~ TSS	4° C	(1) 1L Poly	~~1~~
CO_2	4°C	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Fe (Dissolved) 4°C / HNO_3 1-500mL Poly 1

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57 TW016
DATE: 8/21/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0820	7.91	—	100	start	purge						
0825	7.94	~~1.0L~~ 0.5L	100	6.39	0.128	80	9.40	21.35	175	0.08	
0830	7.98	1.0L	100	6.50	0.117	32	8.59	21.14	165	0.08	
0835	7.99	1.5L	100	6.53	0.117	19	8.24	20.91	160	0.08	
0840	8.00	2.0L	100	6.54	0.111	9.1	8.06	20.79	152	0.07	
0845	8.01	2.5L	100	6.54	0.108	2.0	7.95	20.82	146	0.07	
0850	8.01	3.0L	100	6.53	0.107	0.00	7.91	20.83	145	0.07	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57TW0170103
Sample Location: S57TW017
Sampled By: J Wellman
C.O.C. No.: 15735
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/20/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 1601	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump	Clear	5.35	0.124	18.4	4.4	4.05	177	0.08

PURGE DATA:

Date: 8/20/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 25.00				See Low Flow Purge Data Sheet				
Static Water Level (WL): 8.12								
One Casing Volume(~~gal~~/L): 1.5L								
Start Purge (hrs): 1531								
End Purge (hrs): 1601								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): 6 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	
Carbon Dioxide	4°C	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Iron HNO_3/4°C 1-500mL Poly 1

Circle if Applicable:

MS/MSD —

Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: SSTWD17
DATE: 8/20/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
15.31	8.20	—	200	—	start	purge	—	—	—	—	
15.36	8.31	1000	200	5.44	0.129	45	4.37	18.4	165	0.08	
1541	8.30	2000	200	5.37	0.124	50	4.16	18.4	168	0.08	
1546	8.30	3000	200	5.34	0.125	17	4.09	18.4	173	0.08	
1551	8.30	4000	200	5.34	0.124	7.7	4.07	18.5	174	0.08	
1556	8.30	5000	200	5.33	0.124	5.2	4.05	18.5	176	0.08	
1601	8.30	6000	200	5.35	0.124	4.4	4.05	18.4	177	0.08	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Temp. Well
[] QA Sample Type:

Sample ID No.: S57TW0180103
Sample Location: S57TW018
Sampled By: Jennifer Wellman
C.O.C. No.: 15734
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/21/01								
Time: 1345								
Method: Peristaltic Pump	clear	4.87	0.189	19.47	5.7	4.35	185	0.12

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8/21/01								
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 15 ft				See Low Flow Purge Data Sheet				
Static Water Level (WL): 10.55								
One Casing Volume(gal/L): .75L								
Start Purge (hrs): 1315								
End Purge (hrs): 1345								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): 3.0L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	2
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	2
Chromium (Hexavalent)	4° C	(1) 500mL POLY	2
Dissolved Gases	4° C	(3) 40 mL Vial	
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	2
Ferrous Iron	4° C	(1) 1L Poly	2
Misc. Anions	4° C	(1) 1L Poly	2
Sulfide	NaOH / 4° C	(1) 500mL POLY	2
Alkalinity & TSS	4° C	(1) 1L Poly	2
~~Alkalinity, BOD, DOC & TSS~~	~~4° C~~	~~(1) 1L Poly~~	
Carbon Dioxide	4°C	1-500mL Poly	2

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Dissolved Fe 4°C/HNO_3 1-500mL Poly 2

Circle if Applicable:

MS/MSD

Duplicate ID No.: S57MW DUP 02

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57TW018
DATE: 8/21/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1315	10.55	—	100	start	Purge	—					
1320	10.67	.5 L	100	4.76	0.259	120	7.16	19.82	184	0.17	
1325	10.69	1.0	100	4.16	0.256	110	5.59	19.74	185	0.17	
1330	10.72	1.5	100	4.74	0.237	50	4.81	19.52	190	0.15	
1335	10.74	2.0	100	4.75	0.216	22	4.60	19.68	191	0.14	
1340	10.74	2.5	100	4.81	0.201	9.8	4.42	19.62	188	0.14	
1345	10.75	3.0	100	4.87	0.189	5.7	4.35	19.47	185	0.12	

SIGNATURE(S): Jennifer C Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57TW0190103
Sample Location: S57TW019
Sampled By: Jennifer Wellman
C.O.C. No.: 15734
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/21/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 1115	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump	clear	6.01	0.114	17.40	4.9	4.62	64	0.07

PURGE DATA:

Date: 8/21/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 1" PVC								
Total Well Depth (TD): 25.0ft				See Low Flow Purge Data Sheet				
Static Water Level (WL): 10.56								
One Casing Volume(gal/L): .75								
Start Purge (hrs): 1045								
End Purge (hrs): 1115								
Total Purge Time (min): 30								
Total Vol. Purged (gal/L): 3.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, ~~and Iron~~	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity, BOD, DOC & TSS~~	4° C	(1) 1L Poly	—
Dissolved Iron	HNO_3 / 4°C	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Carbon Dioxide 4°C 1-500mL Poly 1

Circle if Applicable:

MS/MSD	Duplicate ID No.: [redacted] gw

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: SS7TW019
DATE: 8/21/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1045	10.66	—	100	Start	purge	—	—	—	—	—	
1050	11.29	.5L	100	6.12	0.123	10	6.50	17.15	77	0.08	
1055	11.30	1.0L	100	6.09	0.120	21	5.12	17.45	72	0.08	
1100	11.32	1.5L	100	6.05	0.117	12	4.74	17.47	69	0.08	
1105	11.33	2.0L	100	6.02	0.115	6.7	4.64	17.22	65	0.07	
1110	11.35	2.5L	100	6.02	0.116	6.5	4.63	17.23	64	0.08	
1115	11.36	3.0L	100	6.01	0.114	4.9	4.62	17.40	64	0.07	

SIGNATURE(S): Jennifer C. Wellman

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0200103
Sample Location: S57MW020
Sampled By: Jennifer Wellman
C.O.C. No.: 41525
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/29/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 1008	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump	Clear	5.62	0.089	21.02	3.9	2.84	104	0.06

PURGE DATA:

Date: 8/29/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 6.58				See Low Flow Purge Data Sheet				
Static Water Level (WL): 6.50								
One Casing Volume(gal/L): 6 L								
Start Purge (hrs): 0908								
End Purge (hrs): 1008								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 12.0L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, ~~and Iron~~	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1040
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity, BOD, DOC & TSS~~ CO_2	4° C	(1) ~~1L~~ Poly 500mL	1
Dissolved Iron	4°C/HNO_3	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: 57MW020
DATE: 8/29/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0908	6.50	—	200	start	purge						
0913	6.69	1.0L	200	5.60	0.090	121.0	6.04	20.48	125	0.06	
0918	6.71	2.0L	200	5.64	0.091	90.0	3.52	20.55	116	0.06	
0923	6.73	3.0	200	5.64	0.090	77.4	2.99	20.62	110	0.06	
0928	6.75	4.0	200	5.64	0.090	54.7	2.92	20.60	110	0.06	
0933	6.77	5.0	200	5.64	0.089	48.4	3.01	20.65	108	0.06	
0938	6.77	6.0	200	5.64	0.089	23.1	3.10	20.72	108	0.06	
0943	6.77	7.0	200	5.64	0.089	20.4	2.86	20.64	106	0.06	
0948	6.77	8.0	200	5.64	0.089	9.9	2.81	20.67	106	0.06	
0953	6.77	9.0	200	5.65	0.089	4.1	2.79	20.96	104	0.06	
0958	6.77	10.0	200	5.62	0.089	3.7	2.87	21.04	105	0.06	
1003	6.77	11.0	200	5.63	0.089	4.8	2.87	21.08	104	0.06	
1008	6.77	12.0	200	5.62	0.089	3.9	2.84	21.02	104	0.06	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: TEMP WELL
[] QA Sample Type:

Sample ID No.: S57TW0210103
Sample Location: S57TW21
Sampled By: FWR
C.O.C. No.: 41516
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 1530 8/22/01								
Time: 1530								
Method: Peristaltic Pump	CLEAR	4.83	1.78	20.7	35	7.09	-256	1.1

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8-22-01								
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material Type: 1" PVC								
Total Well Depth (TD):				See Low Flow Purge Data Sheet				
Static Water Level (WL): 6.80								
One Casing Volume(gal/L): .18 gal								
Start Purge (hrs): 1435								
End Purge (hrs): 1510								
Total Purge Time (min): 35								
Total Vol. Purged (gal/L): 4.3 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	MS/MSD	✓
Cadmium, Chromium, ~~and Iron~~	HNO_3 / 4° C	(1) 500mL Poly	MS/MSD	✓
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	—	✓
Chromium (Hexavalent)	4° C	(1) 500mL POLY	MS/MSD	✓
Dissolved Gases	4° C	(3) 40 mL Vial	MS/MSD	✓
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	—	✓
Ferrous Iron	4° C	(1) 1L Poly	~~MS/MSD~~	✓
Misc. Anions	4° C	(1) 1L Poly	—	✓
Sulfide	NaOH / 4° C	(1) 500mL POLY	—	✓
Alkalinity & TSS	4° C	(1) 1L Poly	—	✓
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	—	—
CO2			—	✓

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Fe(dissolved) MS/MSD ✓

ALL LEVELS MADE W/R TO TPVC

STICKUP = 7/10'

Circle if Applicable:

MS/MSD ~~MS~~

Duplicate ID No.: —

Signature(s): Fred M Ramsey

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: S57TW21
DATE: 8-21-01

STATIC H_2O = 6.80 TPVC

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS (g/L)	Notes:
1435	6.80										
1440	8.32	1.2 l	~200ml	5.03	1.61	>999	9.65	20.7	-63	1.0	LOW FLOW
1445	8.53	1.7 l	~110ml	4.91	1.65	>999	8.31	20.9	-168	1.1	PUMPING RATE
1450	8.45	2.3 l	~100ml	4.87	1.69	930	7.45	21.1	-193	1.1	LOW FLOW RATE
1500	8.50	3.3 l	100ml/min	4.83	1.76	78	8.16	20.7	-256	1.1	TO ~100ml
1505	8.57	3.8 l	100ml/min	4.83	1.77	35	7.27	20.7	-257	1.1	CLEANED
1510	8.35	4.3 l	100ml/min	4.83	1.78	35	7.09	20.7	-256	1.1	FLOW THRU
											CELL
							PURGE COMPLETED @ 1510				

SIGNATURE(S): Fred M Rauser

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0220103
Sample Location: S57MW022
Sampled By: J Wellman
C.O.C. No.: 41525
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/29/01								
Time: 1326								
Method: Peristaltic Pump	Clear	6.82	2.09	18.52	6.2	4.45	-11	1.3

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8/29/01								
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 17.45				See Low Flow Purge Data Sheet				
Static Water Level (WL): 8.21								
One Casing Volume(gal/L): 5.5								
Start Purge (hrs): 1136								
End Purge (hrs): 1326								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L) 11.0L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	1
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	1
Chromium (Hexavalent)	4° C	(1) 500mL POLY	1
Dissolved Gases	4° C	(3) 40 mL Vial	3
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	1
Ferrous Iron	4° C	(1) 1L Poly	1
Misc. Anions	4° C	(1) 1L Poly	1
Sulfide	NaOH / 4° C	(1) 500mL POLY	1
Alkalinity & TSS	4° C	(1) 1L Poly	1
~~Alkalinity, BOD, DOC & TSS~~ CO_2	4° C	(1) 1L Poly 500	1
Dissolved Iron	4°C / HNO_3	1-500mL Poly	1

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: SS7MW022
DATE: 8/29/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
1136	8.21	—	100	Start	Purge						
1146	8.58	1.0 L	100	6.02	2.96	24.4	3.98	18.42	23	1.9	
1156	8.69	2.0 L	100	6.09	2.88	21.6	3.35	18.73	14	1.8	
1206	8.79	3.0 L	100	6.41	2.58	16.4	3.64	18.79	-8	1.7	
1216	8.88	4.0 L	100	6.70	2.31	20.9	4.30	18.32	-13	1.5	
1226	8.94	5.0 L	100	6.74	2.17	19.4	4.35	18.59	-10	1.4	
1236	8.97	6.0 L	100	6.72	2.20	17.6	4.44	18.40	-7	1.4	
1246	9.04	7.0 L	100	6.73	2.18	16.4	4.45	18.50	-7	1.4	
1256	9.10	8.0 L	100	6.77	2.14	10.5	4.43	18.40	-6	1.4	
1306	9.14	9.0 L	100	6.79	2.12	9.4	4.43	18.48	-9	1.4	
1316	9.18	10.0 L	100	6.81	2.10	8.2	4.43	18.55	-10	1.3	
1326	9.22	11.0 L	100	6.82	2.09	6.2	4.45	18.52	-11	1.3	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0230103
Sample Location: S57MW023
Sampled By: Jennifer Wellman
C.O.C. No.: 41525
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/29/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 0840	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump	Clear	4.35	0.492	16.28	0.4	3.26	355	0.32

PURGE DATA:

Date: 8/29/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 23.1				See Low Flow Purge Data Sheet				
Static Water Level (WL): 14.61								
One Casing Volume(gal/L): 23.6L								
Start Purge (hrs): 0740								
End Purge (hrs): 0840								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 11.8L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	2
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	
Chromium (Hexavalent)	4° C	(1) 500mL POLY	
Dissolved Gases	4° C	(3) 40 mL Vial	
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	
Ferrous Iron	4° C	(1) 1L Poly	
Misc. Anions	4° C	(1) 1L Poly	
Sulfide	NaOH / 4° C	(1) 500mL POLY	
Alkalinity & TSS	4° C	(1) 1L Poly	
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Jennifer C. Wellman

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSWC INDIAN HEAD
PROJECT NUMBER: N7129 CTO 0245

WELL ID.: 557MW023 0103
DATE: 8/29/01

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (gal/L)	Flowrate (mL/min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	TDS ( )	Notes:
0740	14.61	—	150	start	purge						
0745	14.64	0.750	200	4.40	0.500	39.3	4.69	17.02	346	0.32	
0750	14.64	1.75	200	4.37	0.495	10.8	3.71	16.84	354	0.32	
0755	14.64	2.75	200	4.36	0.498	5.5	3.43	16.44	355	0.32	
0800	14.65	3.75	200	4.35	0.497	5.1	3.50	16.32	355	0.32	
0805	14.65	4.75	200	4.36	0.496	4.8	3.41	16.31	355	0.32	
0810	14.66	5.75	200	4.35	0.497	3.2	3.35	16.23	354	0.32	
0815	14.66	6.75	200	4.34	0.497	2.4	3.37	16.06	353	0.32	
0820	14.66	7.75	200	4.36	0.496	1.7	3.34	16.17	352	0.32	
0825	14.66	8.75	200	4.35	0.497	0.8	3.32	16.18	353	0.32	
0830	14.66	9.75	200	4.35	0.499	0.6	3.28	16.18	354	0.32	
0835	14.66	10.75	200	4.35	0.498	0.5	3.27	16.12	356	0.32	
0840	14.66	11.75	200	4.35	0.492	0.4	3.26	16.28	355	0.32	

SIGNATURE(S): Jennifer C. Wellman

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: CPT WELL POINT
[] QA Sample Type:

Sample ID No.: S57CP0040103
Sample Location: S57CP004
Sampled By: PMR
C.O.C. No.: 41526
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/28/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 1800	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	—
Method: Peristaltic Pump	—	—	—	NA	—	—	—	—

PURGE DATA:

Date: 8/18/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: ~~Peristaltic Pump~~ BAILER								
Monitor Reading (ppm): NA								
Well Casing Diameter & Material								
Type: 1" PVC x 2'								
Total Well Depth (TD):				See Low Flow Purge Data Sheet				
Static Water Level (WL): NA								
One Casing Volume(gal/L): NA								
Start Purge (hrs): NA								
End Purge (hrs): NA								
Total Purge Time (min): NA								
Total Vol. Purged (gal/L): NA								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	✓
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	
Chromium (Hexavalent)	4° C	(1) 500mL POLY	
Dissolved Gases	4° C	(3) 40 mL Vial	
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	
Ferrous Iron	4° C	(1) 1L Poly	
Misc. Anions	4° C	(1) 1L Poly	
Sulfide	NaOH / 4° C	(1) 500mL POLY	
Alkalinity & TSS	4° C	(1) 1L Poly	
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred Wanson

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: CPT WELL PT
[] QA Sample Type:

Sample ID No.: S57CP0050103
Sample Location: S57CP005
Sampled By: FYR
C.O.C. No.: 41526
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Date: 8/29/01								
Time:								
Method: Peristaltic Pump				NA				

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Date: 8/29/01								
Method: ~~Peristaltic Pump~~ Bailer								
Monitor Reading (ppm): NA								
Well Casing Diameter & Material Type: 1" PVC X 2'								
Total Well Depth (TD): 19'				See Low Flow Purge Data Sheet				
Static Water Level (WL): NA								
One Casing Volume(gal/L): NA								
Start Purge (hrs): NA								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	✓
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	—
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	—
Chromium (Hexavalent)	4° C	(1) 500mL POLY	—
Dissolved Gases	4° C	(3) 40 mL Vial	—
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	—
Ferrous Iron	4° C	(1) 1L Poly	—
Misc. Anions	4° C	(1) 1L Poly	—
Sulfide	NaOH / 4° C	(1) 500mL POLY	—
Alkalinity & TSS	4° C	(1) 1L Poly	—
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	—
			—

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

COLLECTED SPL @ 17'-19' BGS

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
—	S57CPDUP01	[signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: CPT WELL POINT
[] QA Sample Type:

Sample ID No.: S57CP0100103
Sample Location: S57CP010
Sampled By: PWR
C.O.C. No.: 41526
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/28/01	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	TDS
Time: 1430	Visual	Standard	mS/cm	°C	NTU	mg/l	(m/V)	
Method: Peristaltic Pump				NA				

PURGE DATA:

Date: 8/28/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: Peristaltic Pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 1" x 2' PVC								
Total Well Depth (TD):				See Low Flow Purge Data Sheet				
Static Water Level (WL): NA								
One Casing Volume(gal/L): N/A								
Start Purge (hrs): N/A								
End Purge (hrs): N/A								
Total Purge Time (min): N/A								
Total Vol. Purged (gal/L): N/A								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	✓
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	
Chromium (Hexavalent)	4° C	(1) 500mL POLY	
Dissolved Gases	4° C	(3) 40 mL Vial	
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	
Ferrous Iron	4° C	(1) 1L Poly	
Misc. Anions	4° C	(1) 1L Poly	
Sulfide	NaOH / 4° C	(1) 500mL POLY	
Alkalinity & TSS	4° C	(1) 1L Poly	
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred M Conner

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: NSWC INDIAN HEAD
Project No.: N7129 CTO 245

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57CP080103
Sample Location: S57CP08
Sampled By: FWR
C.O.C. No.: 44526-PWR
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 8/28/01	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP (m/V)	TDS
Time:								
Method: ~~Peristaltic Pump~~ Bailer				N/A				

PURGE DATA:

Date: 8/28/01	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Flow Rate
Method: ~~Peristaltic Pump~~ Bailer								
Monitor Reading (ppm): NA								
Well Casing Diameter & Material								
Type: 1" x 3'								
Total Well Depth (TD):				See Low Flow Purge Data Sheet				
Static Water Level (WL):								
One Casing Volume(gal/L):								
Start Purge (hrs):								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatiles	HCl / 4°C	(2) 40 ML VIALS	
Cadmium, Chromium, and Iron	HNO_3 / 4° C	(1) 500mL Poly	
COD and TOC	H_2SO_4 / 4° C	(1) 120 mL Poly	
Chromium (Hexavalent)	4° C	(1) 500mL POLY	
Dissolved Gases	4° C	(3) 40 mL Vial	
Hardness	HNO_3 / 4° C	(1) 500 mL Poly	
Ferrous Iron	4° C	(1) 1L Poly	
Misc. Anions	4° C	(1) 1L Poly	
Sulfide	NaOH / 4° C	(1) 500mL POLY	
Alkalinity & TSS	4° C	(1) 1L Poly	
Alkalinity, BOD, DOC & TSS	4° C	(1) 1L Poly	

OBSERVATIONS / NOTES:

* Chromium (Hexavalent) has 24 hr Hold Time

NO SAMPLE COLLECTED

27-29-DRY WELL

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred Ulkanson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020 0509

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: MANHOLE NEAR MW20
[] QA Sample Type:

Sample ID No.: IW80
Sample Location: IW80
Sampled By: SJC
C.O.C. No.:

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

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA (ORP)
Date: 4/1/04								
Time: 1045								
Depth: 7.5'±								
Method: PERISTALTIC	LT BRN	6.62	340	12.52	50	8.22	—	101

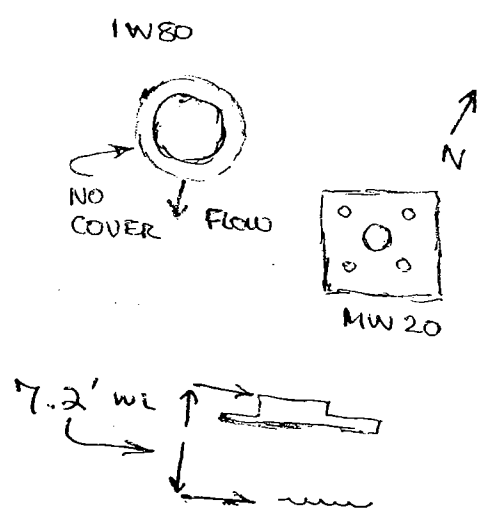
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	HCL	3 X 40-ml vial	✓
Total TAL Metals	HNO_3	500-ml HDPE plastic container	✓
Dissolved TAL Metals	HNO_3	500-ml HDPE plastic container	✓
Total Cyanide	NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	none	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

RAIN TODAY
GOOD FLOW THRU MANHOLE SYSTEM.

MAP:



Circle if Applicable:

MS/MSD: —
Duplicate ID No.: —

Signature(s): S. Conti

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0010109
Sample Location: S57MW001
Sampled By: RWR
C.O.C. No.: K-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3-30-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1125	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLR	5.20	107	12.78	2.5	0.67	240.4	—

PURGE DATA:

Date: 3-30-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 26.25								
Static Water Level (WL): 7.47			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): *6.2L								
Start Purge (hrs): 0935								
End Purge (hrs): 1125								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 12.75								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^{0}C & HCL	3 X 40-ml vial	✓
TDS and TSS	4^{0}C	500-ml HDPE plastic container	✓
Total TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓

OBSERVATIONS / NOTES:

* 10' SATURATED SCREEN LENGTH ∴ 6.2 L x 2 = 12.4.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Brad Ramsey

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW001
DATE: 3-30-09

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0945	8.59	175 ml	6.02	122	4.0	6.70	12.65	214.8	LOWERED FLOW RATE
0955	8.37	110	5.48	115	2.5	3.63	12.17	204.4	@ 947 TO 110 ml
1005	8.35	110	5.32	110	2.8	3.01	12.33	213.3	
1015	8.35	110	5.29	109	3.0	1.35	12.45	218.1	
1025	8.35	110	5.27	109	3.0	0.87	12.51	220.9	
1035	8.35	110	5.27	108	3.0	0.79	12.70	225.7	
1045	8.37	110	5.27	108	3.0	0.74	12.71	228.1	
1055	8.37	110	5.23	107	3.0	0.67	12.65	234.8	
1105	8.37	110	5.24	107	2.5	0.66	12.80	234.0	
1115	8.38	110	5.21	106	2.5	0.66	12.80	240.0	
1125	8.38	110	5.20	107	2.5	0.67	12.78	240.4	COMPLETED PURGING

SIGNATURE(S): Fred W Ramser

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Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0020109
Sample Location: S57MW002
Sampled By: FWR
C.O.C. No.: K-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 3-30-04	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Time: 1305								
Method: Peristaltic pump	CLR	5.73	164	12.03	4.2	1.33	197.3	—

PURGE DATA:

Date: 3-30-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 14.32								
Static Water Level (WL): 8.39			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 3.7								
Start Purge (hrs): 1145								
End Purge (hrs): 1305								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 9 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^{0}C & HCL	3 X 40-ml vial	✓
TDS and TSS	4^{0}C	500-ml HDPE plastic container	✓
Total TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓

OBSERVATIONS / NOTES:

14.32
-8.39
5.93

3.7 l × 2 = 7.4 l

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Fred W Ramer

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW002
DATE: 3-30-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1155	9.0	175.	5.72	184	12.1	5.77	11.68	208.4	
1205	9.3	110	5.73	184	9.2	3.97	11.65	201.5	
1215	9.55	110	5.74	180	7.5	3.14	11.76	191.8	
1225	9.61	110	5.74	178	6.8	2.43	11.55	192.4	LOWERED FLOW RATE TO
1235	9.63	100	5.74	173	5.7	2.26	11.66	193.2	100 ml/min
1245	9.64	100	5.74	169	5.0	1.81	11.84	193.6	
1255	9.64	100	5.74	167	4.4	1.56	11.97	195.2	
1305	9.64	100	5.73	164	4.2	1.33	12.03	197.3	COMPLETED PURGE

SIGNATURE(S): Fred W Ramser

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0030109
Sample Location: S57MW003
Sampled By: FWR
C.O.C. No.: K-1, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. u S/cm	Temp. °C	Turbidity NTU	DO mg/l	ORP mv	Other NA
Date: 3-30-04								
Time: 1525								
Method: Peristaltic pump	CLR	4.90	83	14.12	5.5	0.79	325.2	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Date: 3-30-04								
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 24.3'								
Static Water Level (WL): 8.78			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 3.1 *								
Start Purge (hrs): 1415								
End Purge (hrs): 1525								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 6.3 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4°C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4°C & HCL	2 X 40-ml vial	✓
TDS and TSS	4°C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4°C	500-ml HDPE plastic container	✓
Total TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4°C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4°C & NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	4°C	2 X 40-ml vial	✓
TOC	4°C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4°C	2 X 40-ml vial	✓
Sulfide	4°C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4°C/H_2SO_4	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

*5' SCREEN ⇒ 3.1 l x 2 = 6.2 l

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ramsey

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW003
DATE: 3-30-09

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1425	8.98	90	4.95	82	9.5	1.78	13.89	282.1	
1435	8.99	90	4.91	80	6.9	1.35	13.94	297.2	
1445	8.99	90	4.90	82	5.5	1.21	14.00	305.6	
1455	8.99	90	4.92	80	5.5	0.92	14.11	311.8	
1505	8.99	90	4.90	83	5.5	0.85	14.09	318.6	
1515	9.00	90	4.89	81	5.5	0.78	14.06	323.0	
1525	9.00	90	4.90	83	5.5	0.79	14.12	325.2	COMPLETED PURGING

SIGNATURE(S): Fred W Ramser

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Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name: IHDIV Site 57 Rd 9 gw sampling
Sample ID No.: S57MW0030109
Project No.: 4020-0509
Sample Location: S57MW003
Sampled By: FWR
Duplicate: ☐
Field Analyst: FWR
Blank: ☐
Field Form Checked as per QA/QC Checklist (initials): JWR

SAMPLING DATA:

Date: 3-30-04	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1525	(Visual)	(S.U.)	(u S/cm)	(^{0}C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Low Flow Per. Pump	CLR	4.90	83	14.12	5.5	0.79	—	325.2

Equipment Used: YSI MODEL 556 MPS 02H1304
LAMOTTE MOD. 2020 S/N 2283-0501

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.8 ppm

Range Used:	Range	Method	Concentration ppm
☒	0 to 1 ppm	K-7510	0.8
☐	1 to 12 ppm	K-7512	

Analysis Time: 1612

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01 =	mg/L
_____	x 0.02 =	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L
Program/Module: 500nm 33

Concentration: <0.2 ppm

Analysis Time: 1620

Equipment: IR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Concentration: <0.1 ppm

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: 1615

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☒
Correct measurement units are cited in the SAMPLING DATA block: ☒
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☒
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☒
Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☒

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0040109
Sample Location: S57MW004
Sampled By: SJC
C.O.C. No.: K-1, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 3/30/04	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Time: 1525								
Method: Peristaltic pump	CLEAR	5.49	94	13.85	0	.32	314	—

PURGE DATA:

Date: 3/30/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 16.15'								
Static Water Level (WL): 8.78			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L) ≈ 4.9								
Start Purge (hrs): 1350								
End Purge (hrs): 1520								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 11.1 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^{0}C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4^{0}C & HCL	2 X 40-ml vial	✓
TDS and TSS	4^{0}C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4^{0}C	500-ml HDPE plastic container	✓
Total TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	4^{0}C	2 X 40-ml vial	✓
TOC	4^{0}C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4^{0}C	2 X 40-ml vial	✓
Sulfide	4^{0}C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4^{0}C	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

7.37' H_2O = 4.9
SAY = 10 L = 2 VOL.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S57GWDUP0109

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW004
DATE: 3/30/04

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
	1350	8.78								
	1400	9.41	150	5.38	86	3	.56	13.70	—	CLEAR - NON TURBID
	1410	9.52	120	5.45	90	1	.49	13.69	319	" " "
	1420	9.54	120	5.39	90	0	.35	13.79	322	" " "
	1430	9.58	120	5.50	92	0	.61	13.73	318	" " "
	1440	9.59	120	5.43	92	0	.36	13.71	321	" " "
60m	1450	9.61	120	5.45	93	0	.33	13.87	318	" " "
70m	1500	9.63	120	5.46	94	0	.31	13.83	316	" " "
80m	1510	9.64	120	5.48	94	0	.34	13.83	315	" " "
90m	1520	9.65	120	5.49	94	0	.32	13.85	314	" " "
		Sampled @ 1525								

SIGNATURE(S): SJ Conti

PAGE 1 OF 1

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0040109
Project No.:	4020-0509	Sample Location:	S57MW004
Sampled By:	SJC	Duplicate:	☐
Field Analyst:	SJC	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	FWR		

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Date: 3/30/04								
Time: 1525	(Visual)	(S.U.)	(uS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: PERISTALTIC	CLEAR	5.49	94	13.85	0	0.32	—	314

Equipment Used: YSI MODEL 556 MPS 03C0005
LAMOTTE MOD. 2020 S/N 3678-4002

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.9 ppm

Range Used:	Range	Method	Concentration ppm
☒	0 to 1 ppm	K-7510	0.9
☐	1 to 12 ppm	K-7512	

Analysis Time: 5 min (1530 HRS)

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier		Concentration
_____	x 0.01	=	mg/L
_____	x 0.02	=	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: < 0.2 ppm

Analysis Time: 8 min (1538 HRS)

Equipment: ✓ IR-18C Color Wheel Range: 0 - 10 mg/L ✓

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C ✓ Other: _____

Concentration: < 0.05 ppm

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: 5 min (1543 HRS)

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☒

Correct measurement units are cited in the SAMPLING DATA block: ☒

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☒

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☐

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☒

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0050109
Sample Location: S57MW005
Sampled By: FWR
C.O.C. No.: K-3
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4-1-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 0945	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLR	4.68	111	11.95	4.9	1.46	367.0	—

PURGE DATA:

Date: 4-1-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 19.8								
Static Water Level (WL): 5.20			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 3.1 l								
Start Purge (hrs): 840								
End Purge (hrs): 0945								
Total Purge Time (min): 65 min								
Total Vol. Purged (gal/L): 6.6 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^0C & HCL	3 X 40-ml vial	✓
TDS and TSS	4^0C	500-ml HDPE plastic container	✓
Total TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓

OBSERVATIONS / NOTES:

5' SCREEN LENGTH → 3.1 l x 2 PURGE VOL. = 6.2 l

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred Wanner

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW005
DATE: 4-1-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0845	5.25	125	4.71	111	29	5.39	11.47	310.4	LOWERED FLOW RATE
0855	5.25	100	4.72	111	20	1.71	11.75	330.5	TO 100 ml
0905	5.23	100	4.71	111	12	1.64	11.83	346.0	
0915	5.23	100	4.74	111	9.2	1.54	11.84	355.7	
0925	5.23	100	4.70	111	6.9	1.56	11.86	362.3	
0935	5.23	100	4.68	111	4.8	1.48	11.90	365.3	
0945	5.23	100	4.68	111	~~6.9~~ 4.9	1.46	11.95	367.0	COMPLETED PURGE

SIGNATURE(S): Fred M Rauser

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0060109
Sample Location: S57MW006
Sampled By: FWRamser
C.O.C. No.: K-3
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4-1-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1150	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLR	4.63	105	11.52	0.0	1.77	355.7	—

PURGE DATA:

Date: 4-1-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 14.2								
Static Water Level (WL): 5.35			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 5.6 l								
Start Purge (hrs): 1020								
End Purge (hrs): 1150								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 11.7 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^{0}C & HCL	3 X 40-ml vial	✓
TDS and TSS	4^{0}C	500-ml HDPE plastic container	✓
Total TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓

OBSERVATIONS / NOTES:

8.85' STANDING H_2O ⇒ 5.6 l × 2 = 11.2 l

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ramser

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW006
DATE: 4-1-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1030	5.48	130	7.72	106	5.0	10.15	12.01	346.8	
1030	5.45	110	4.66	105	3.0	6.44	11.54	348.4	
1040	5.45	110	4.64	105	2.5	1.93	11.53	360.4	
1050	5.45	110	4.63	106	0.0	1.73	11.58	363.7	
1100	5.45	110	4.64	106	0.0	1.73	11.67	363.2	
1110	5.45	120	4.64	106	0.0	1.73	11.64	362.0	INC. FLOW RATE
1120	5.45	120	4.65	106	0.0	1.75	11.68	359.1	
1130	5.45	120	4.64	106	0.0	1.80	11.61	358.5	
1140	5.46	120	4.64	106	0.0	1.75	11.57	356.1	
1150	5.46	120	4.63	105	0.0	1.77	11.52	355.7	COMPLETED PURGE

SIGNATURE(S): Fred U Ramsey

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0070109
Sample Location: S57MW007
Sampled By: SJC
C.O.C. No.: K-2, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 3/31/04	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Time: 1250								
Method: Peristaltic pump	CLEAR	5.40	374	13.31	0	1.85	268	—

PURGE DATA:

Date: 3/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 28.2'								
Static Water Level (WL): 8.44			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 6.2								
Start Purge (hrs): 1130								
End Purge (hrs): 1250								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 13								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^0C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4^0C & HCL	2 X 40-ml vial	✓
TDS and TSS	4^0C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4^0C	500-ml HDPE plastic container	✓
Total TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	4^0C	2 X 40-ml vial	✓
TOC	4^0C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4^0C	2 X 40-ml vial	✓
Sulfide	4^0C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4^0C	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

1 VOL = 6.2 L (10')
2 VOL = 12.4 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW007
DATE: 3/31/04

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
	1130	8.44	—	—	—	—	—	—	—	CLEAR - NON TURBID
	1140	9.90	200	5.76	412	0	4.38	13.31	260	" " "
	1150	9.94	150	5.70	406	0	3.27	13.63	261	" " "
	1200	9.96	200	5.64	397	0	3.30	13.60	260	" " "
	1210	9.97	150	5.56	393	0	2.36	14.12	261	" " "
	1220	9.99	150	5.51	384	0	2.22	13.51	262	" " "
60m	1230	10.01	150	5.47	382	0	2.19	13.78	264	" " "
	1240	10.02	150	5.42	378	0	1.93	13.48	267	" " "
80m	1250	10.03	150	5.40	374	0	1.85	13.60	268	" " "
		Sampled @	1250 HRS.							

SIGNATURE(S): SJ Conti

PAGE 1 OF 1

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name: IHDIV Site 57 Rd 9 gw sampling
Project No.: 4020-0509
Sampled By: SJC
Field Analyst: SJC
Field Form Checked as per QA/QC Checklist (initials): SJC

Sample ID No.: S57MW0070109
Sample Location: S57MW007
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (µS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (+/- mv)
Date: 3/31/04								
Time: 1250								
Method: PERISTALTIC	CLEAR	5.40	374	13.31	0	1.85	—	268

Equipment Used: YSI MODEL 556 MPS 03C0005
LAMBTTE MOD 2020 S/N 3678 - 4002 TURBIDITY METER

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	1.0 → 1.5
☑	1 to 12 ppm	K-7512	1.0

Concentration: 1 → 1.5 ppm

Analysis Time: 6 min (1256 Hrs)

Equipment: HACH Digital Titrator OX-DT

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Analysis Time: _____

Titration Count	Multiplier	Concentration
_____	x 0.01	= mg/L
_____	x 0.02	= mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L
Program/Module: 500nm 33

Concentration: 0.4 ppm

Analysis Time: ±6 min (1302 Hrs)

Equipment: ☑ IR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: LHS-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0 ppm

Analysis Time: 5 min (1307 Hrs)

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑
Correct measurement units are cited in the SAMPLING DATA block: ☑
Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑
Mulitplication is correct for each *Multiplier* table: ☐
Final calulated concentration is within the appropriate *Range Used* block: ☑
Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0080109
Sample Location: S57MW008
Sampled By: SJC
C.O.C. No.: K-2, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/31/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1050	Visual	Standard	u S/cm	°C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLEAR	6.09	670	12.19	5	2.80	229	✓

PURGE DATA:

Date: 3/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 16.8'								
Static Water Level (WL): 7.55			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 6								
Start Purge (hrs): 0910								
End Purge (hrs): 1050								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 12								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4°C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4°C & HCL	2 X 40-ml vial	✓
TDS and TSS	4°C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4°C	500-ml HDPE plastic container	✓
Total TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4°C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4°C & NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	4°C	2 X 40-ml vial	✓
TOC	4°C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4°C	2 X 40-ml vial	✓
Sulfide	4°C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4°C	2 X 40-ml vial	

OBSERVATIONS / NOTES:

9.25' H_2O = SAY 6L/VOL
2 VOL = 12 L ±

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509
WELL ID.: S57MW008
DATE: 3/31/04

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
	0910	7.55		—	—	—	—	—	—	Initial
	0920	8.01	130	6.42	1081	180	—	11.07	280	RED BRN - TURBID
	0930	8.27	110	6.34	1061	150	—	11.27	273	ORANGE BRN "
	0940	8.37	120	6.33	1014	120	—	11.29	267	" " "
	0950	8.45	120	6.30	969	75	—	11.53	255	" " "
	1000	8.53	120	6.20	869	40	5.36	11.69	251	CLEAR - SL TURBID
60	1010	8.58	120	6.17	826	30	5.07	11.69	248	" "
	1020	8.60	120	6.14	752	18	3.85	11.84	243	" "
80	1030	8.61	120	6.11	721	13	3.48	12.04	238	" "
	1040	8.63	120	6.10	683	9	2.87	12.25	231	" NONTURBID
100	1050	8.64	120	6.09	670	5	2.80	12.19	229	" NON TURBID
		Sampled @	1050 HRS							
										DO METER NOT WORKING
										INITIAL RDG WAS = 14.00 mg/L
										AND DISPLAY BLINKING.
										AT 0955 RDG WAS 6.23
										AND STEADY

SIGNATURE(S): SJ Conti

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page __ of __

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0080109
Project No.:	4020-0509	Sample Location:	S57MW008
Sampled By:	SJC	Duplicate:	☐
Field Analyst:	SJC	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	JWP		

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Date: 3/31/04								
Time: 1050	(Visual)	(S.U.)	(uS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: PERISTALTIC	CLEAR	6.09	670	12.19	5	2.80	—	229

Equipment Used: YSI MODEL 556 MPS 03C0005
LAMOTTE MOD. 2020 S/N 3678-4002 TURBIDITY METER

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 1.0 ppm

Range Used:	Range	Method	Concentration ppm
☐	0 to 1 ppm	K-7510	
☑	1 to 12 ppm	K-7512	1.0

Analysis Time: 5 MIN (1055 hrs)

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier		Concentration
_____	x 0.01	=	mg/L
_____	x 0.02	=	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0 TO 0.2 ppm

Analysis Time: ≈ 6 MIN (1101 Hrs)

Equipment: ✓ IR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Concentration: 0 ppm

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: ≈ 5 MIN (1106 Hrs)

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☑

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0090109
Sample Location: S57MW009
Sampled By: FWRamser
C.O.C. No.: K-2, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/31/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1010	Visual	Standard	u S/cm	°C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLR	4.78	86	13.05	1.0	0.91	358.3	

PURGE DATA:

Date: 3/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 21.90								
Static Water Level (WL): 8.10			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 3.1 l*								
Start Purge (hrs): 900								
End Purge (hrs): 1010								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 8 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4°C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4°C & HCL	2 X 40-ml vial	✓
TDS and TSS	4°C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4°C	500-ml HDPE plastic container	✓
Total TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4°C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4°C & NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	4°C	2 X 40-ml vial	✓
TOC	4°C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4°C	2 X 40-ml vial	✓
Sulfide	4°C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4°C	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

5' SCREEN LENGTH = 3.1 x 2 = 6.2 l (MIN PURGE VOL)

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Fred W Ramser

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW009
DATE: 3-31-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
910	8.64	140	4.94	85		~~*FULSOM~~	12.75	285.1	* DO GREATER THEN 100%
920	8.69	110	4.87	85	4.3	2.13	12.84	312.1	LOWERED FLOW RATE TO
930	8.70	110	4.83	85	4.0	1.32	12.94	328.5	
940	8.70	110	4.80	85	1.8	1.08	12.97	342.4	
950	8.70	110	4.79	85	1.2	1.02	12.96	348.5	
1000	8.71	110	4.79	86	1.0	0.95	12.99	351.8	
1010	8.71	110	4.78	86	1.0	0.91	13.05	358.3	COMPLETED PURGING

SIGNATURE(S): Fred Ramser

PAGE___OF___

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page __ of __

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0090109
Project No.:	4020-0509	Sample Location:	S57MW009
Sampled By:	SWR	Duplicate:	☐
Field Analyst:	SWR	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	SWR		

SAMPLING DATA:

Date: 3/31/04	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1010	(Visual)	(S.U.)	(µS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: Low Flow/Per. Pump	CLR	4.78	86	13.05	1.0	0.91	—	358.3

Equipment Used: YSI MODEL 556MPS 02H1304
LAMOTTE MOD. 2020 S/N 2283-0501 TURBIDITY METER

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.7 ppm

Range Used:	Range	Method	Concentration ppm
☒	0 to 1 ppm	K-7510	
☐	1 to 12 ppm	K-7512	

Analysis Time: 1040

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier		Concentration
_____	x 0.01	=	mg/L
_____	x 0.02	=	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: <0.2 ppm

Analysis Time: 1045

Equipment: IR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Concentration: <0.05 ppm

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: 1042

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☒

Correct measurement units are cited in the SAMPLING DATA block: ☒

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☑

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0100109
Sample Location: S57MW010
Sampled By: FUR
C.O.C. No.: K-2, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/31/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1220	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLR	5.63	260	12.95	4.3	0.42	1508	—

PURGE DATA:

Date: 3/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 16.0								
Static Water Level (WL): 8.34			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 4.9 l								
Start Purge (hrs): 1100								
End Purge (hrs): 1220								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 9.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^0C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4^0C & HCL	2 X 40-ml vial	✓
TDS and TSS	4^0C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4^0C	500-ml HDPE plastic container	✓
Total TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	4^0C	2 X 40-ml vial	✓
TOC	4^0C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4^0C	2 X 40-ml vial	✓
Sulfide	4^0C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4^0C	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

7.66 → 4.9 l × 2 = 9.8 l

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s):

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW010
DATE: 3/31/04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1110	8.80	150	5.76	336	128	12.98	12.59	177.3	
1120	8.97	120	5.83	354	65	1.93	12.54	160.0	LOWERED FLOW RATE TO
1130	8.99	110	5.76	346	17	0.69	12.50	148.6	110
1140	9.01	110	5.70	320	12.5	0.59	12.45	146.2	
1150	9.02	110	5.68	293	9.7	0.52	12.82	150.3	
1200	9.03	110	5.65	270	7.8	0.47	12.91	150.6	
1210	9.03	110	5.65	265	6.5	0.43	12.98	150.9	
1220	9.03	110	5.63	260	6.3	0.42	12.95	150.8	COMPLETED PURGING
1230									

SIGNATURE(S): Fred W Ramser

PAGE___OF___

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page __ of __

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0100109
Project No.:	4020-0509	Sample Location:	S57MW010
Sampled By:	FWR	Duplicate:	☐
Field Analyst:	FWR	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	FWR		

SAMPLING DATA:

Date: 3/31/04	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1220	(Visual)	(S.U.)	(µS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: LOW FLOW / PER.PUMP	CLR	5.63	260	12.95	4.3	0.42	—	150.8

Equipment Used: YSI MODEL 556 MPS 02H1304
LAMOTTE MOD 2020 S/N 2283-0501

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.6 ppm

Range Used:	Range	Method	Concentration ppm
☒	0 to 1 ppm	K-7510	0.6
☐	1 to 12 ppm	K-7512	

Analysis Time: 1254

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier		Concentration
_____	x 0.01	=	mg/L
_____	x 0.02	=	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 _ _ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 1.6 ppm

Analysis Time: 1247

Equipment: IR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Concentration: <0.1 ppm

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: 1245

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☑

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0110109
Sample Location: S57MW011
Sampled By: FWR
C.O.C. No.: K-2, MS-2
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 3/31/04	Visual	Standard	u S/cm	°C	NTU	mg/l	mv	NA
Time: 1620								
Method: Peristaltic pump	CLR	5.40	119	12.78	2.3	0.30	260.1	—

PURGE DATA:

Date: 3/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 19.69								
Static Water Level (WL): 9.40			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 6.2 l								
Start Purge (hrs): 1420								
End Purge (hrs): 1620								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 12.25 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^0C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4^0C & HCL	2 X 40-ml vial	✓
TDS and TSS	4^0C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4^0C	500-ml HDPE plastic container	✓
Total TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	4^0C	2 X 40-ml vial	✓
TOC	4^0C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4^0C	2 X 40-ml vial	✓
Sulfide	4^0C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4^0C	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

6.2 x 2 = 12.4 l TOTAL (2 vol)

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ramser

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Page __ of __

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0110109
Project No.:	4020-0509	Sample Location:	S57MW011
Sampled By:	FWR	Duplicate:	☐
Field Analyst:	FWR	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	FWR		

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (uS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (+/- mv)
Date: 3/31/04								
Time: 1620								
Method: LOW FLOW/PER. PUMP	CLR	5.40	119	12.78	2.3	0.30	—	260.1

Equipment Used: YSI MODEL 556 MPS 02H1304
LAMOTTE MOD. 2020 S/N 2283-0501

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.5 ppm

Analysis Time: 1652

Range Used:	Range	Method	Concentration ppm
☒	0 to 1 ppm	K-7510	
☐	1 to 12 ppm	K-7512	

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	= mg/L
_____	x 0.02	= mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 0.2 ppm

Analysis Time: 1649

Equipment: IR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Concentration: <0.1 ppm

Exceeded 5.0 mg/L range on color chart: ☐

Analysis Time: 1647

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☑

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509
WELL ID.: S57MW011
DATE: 3/31/04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1430	10.46	125	5.07	97	7.1	1.15	12.77	269.7	LOWERED FLOW RATE
1440	10.49	100	5.01	96	7.0	0.76	12.68	273.2	TU 100
1450	10.51	100	5.00	96	6.5	0.85	12.65	276.2	
1500	10.53	100	4.99	96	6.0	0.54	12.58	278.3	
1510	10.55	100	5.01	98	5.6	0.38	12.64	279.9	
1520	10.55	100	5.09	99	4.8	0.36	12.62	276.9	
1530	10.56	100	5.21	108	3.3	0.34	12.67	265.8	
1540	10.56	100	5.28	109	2.7	0.32	12.66	259.8	
1550	10.56	100	5.33	114	2.6	0.33	12.59	255.7	
1600	10.57	100	5.35	116	2.5	0.32	12.65	257.6	
1610	10.57	100	5.39	117	2.4	0.30	12.71	259.4	
1620	10.57	100	5.40	119	2.3	0.30	12.78	260.1	COMPLETED PURGING

SIGNATURE(S): Fred W Ramsey

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0120109
Sample Location: S57MW012
Sampled By: SJC
C.O.C. No.: K-2,
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/30/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1050	Visual	Standard	u S/cm	°C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLEAR	5.01	132	13.94	2	1.10	302	—

PURGE DATA:

Date: 3/30/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 44.3								
Static Water Level (WL): 5.07			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 6.2								
Start Purge (hrs): 0935								
End Purge (hrs): 1045								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 14								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4°C & HCL	3 X 40-ml vial	✓
TDS and TSS	4°C	500-ml HDPE plastic container	✓
Total TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4°C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4°C & NaOH	250-ml HDPE plastic container	✓

OBSERVATIONS / NOTES:

Purge 2 volumes 10' screen
1 vol = 6.2 L
2 vol = 12.4 L

~~6.2~~
~~70~~
~~4 40~~
SJC

70
200
14000 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJConti

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW012
DATE: 3/30/04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
0935	5.07	200	~~5.11~~	—	—	—	—	—	INITIAL START
0945	5.07	200	5.11	139	12	1.49	13.19	240	CLEAR SL TURBID
0955	5.16	200	5.07	136	9	1.37	13.56	258	" " "
1005	5.18	200	5.12	135	7	1.18	13.77	268	" NON "
1015	5.20	200	5.02	132	4	1.07	13.78	290	" " "
1025	5.20	200	5.03	132	3	1.12	13.84	294	" " "
1035	5.21	200	5.01	132	3	1.11	13.92	298	" " "
1045	5.22	200	5.01	132	2	1.10	13.94	302	" " "
	Sampled @	1050 @	MW012						

SIGNATURE(S): SJ Conti

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0130109
Sample Location: S57MW013
Sampled By: SJC
C.O.C. No.: K-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/30/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1215	Visual	Standard	u S/cm	°C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLEAR	4.96	137	12.15	4	1.38	354	—

PURGE DATA:

Date: 3/30/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 17.95								
Static Water Level (WL): 4.89			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 6.2								
Start Purge (hrs): 1100								
End Purge (hrs): 1210								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 14								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^0C & HCL	3 X 40-ml vial	✓
TDS and TSS	4^0C	500-ml HDPE plastic container	✓
Total TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓

OBSERVATIONS / NOTES:

Min: 2 VOL = 12.4 L

70 min
200 ml/min
14000 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJConti

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW013
DATE: 3/30/04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1100	4.89	—	—	—	—	—	—	—	
1110	5.20	200	4.85	134	29	1.57	11.96	335	CLEAR - SL TURBID
1120	5.21	200	4.82	133	33	1.81	12.01	342	" - NON "
1130	5.26	200	4.87	134	20	1.94	12.19	340	" " "
1140	5.29	200	4.90	134	10	1.81	12.13	347	" " "
1150	5.29	200	4.98	134	6	1.70	12.11	353	" " "
1200	5.30	200	4.98	135	5	1.50	12.18	354	" " "
1210	5.30	200	4.96	137	4	1.38	12.15	354	" " "
	Sampled @	1215 HRS							

SIGNATURE(S): SJ Conti

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0200109
Sample Location: S57MW020
Sampled By: SJC
C.O.C. No.: K-3, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4-1-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1010	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLEAR	4.90	154	11.89	4	1.39	351	-

PURGE DATA:

Date: 4-1-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 17.58								
Static Water Level (WL): 5.50			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 6.2								
Start Purge (hrs): 0850								
End Purge (hrs): 1010								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 12.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^0C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4^0C & HCL	2 X 40-ml vial	✓
TDS and TSS	4^0C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4^0C	500-ml HDPE plastic container	✓
Total TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
TOC	4^0C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4^0C	2 X 40-ml vial	✓
Sulfide	4^0C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4^0C	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

1 VOL = 6.2 L
2 VOL = 12.4 L

NOTE: NO METABOLIC ACIDS COLLECTED

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
—	—	SJConte

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

Tetra Tech NUS, Inc.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0200109
Project No.:	4020-0509	Sample Location:	S57MW020
Sampled By:	SJC	Duplicate:	☐
Field Analyst:	SJC	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	FWR		

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Date: 4-1-04	(Visual)	(S.U.)	(uS/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Time: 1010								
Method: PERISTALTIC	CLEAR	4.90	154	11.89	4	1.39	—	351

Equipment Used: YSI MODEL 556 MPS 03C0005
LAMOTTE MOD 2020 S/N 3678-4002 TURBIDITY METER

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: 0.8 → 1 ppm

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	.8 → 1.0
☐	1 to 12 ppm	K-7512	

Analysis Time: 6 min (1016)

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01 =	mg/L
_____	x 0.02 =	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 _ _ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: < 0.2 ppm

Analysis Time: ± 5 min (1021)

Equipment: ~~LH~~-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): Range: 0 - 5 mg/L

Equipment: ~~LH~~S-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: < 0.05 ppm

Analysis Time: ± 5 min (1026)

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☐

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW020
DATE: 4-1-04

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
	0850	5.50	—	—	—	—	—	—	—	START
	0900	5.89	150	5.12	165	23	3.56	11.64	324	CLEAR - NON TURBID
	0910	5.93	150	4.94	154	18	2.94	11.59	351	" "
	0920	5.99	200	4.93	154	13	1.58	11.65	355	" "
	0930	6.02	150	4.91	155	8	1.16	11.73	362	" "
	0940	6.05	150	4.92	154	7	1.96	11.86	360	" "
60	0950	6.06	150	4.90	154	5	1.61	11.81	355	" "
	1000	6.06	150	4.91	154	5	1.54	11.83	353	" "
80	1010	6.07	150	4.90	154	4	1.39	11.89	351	" "
		Sampled @	1010 HRS	4/1/04						

SIGNATURE(S): SJ Conti

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0220109
Sample Location: S57MW022
Sampled By: SJC
C.O.C. No.: K-3, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Date: 4/1/04	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Time: 1520								
Method: Peristaltic pump	CLEAR	6.00	2357	11.34	10	1.37	77	—

PURGE DATA:

Date: 4/1/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 17.45								
Static Water Level (WL): 7.75			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): ≈6								
Start Purge (hrs): 1340								
End Purge (hrs): 1520								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 12 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^0C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4^0C & HCL	2 X 40-ml vial	✓
TDS and TSS	4^0C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4^0C	500-ml HDPE plastic container	✓
Total TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^0C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^0C & NaOH	250-ml HDPE plastic container	✓
TOC	4^0C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4^0C	2 X 40-ml vial	✓
Sulfide	4^0C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4^0C	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

SAY 10' = 6.2 L/VOL

NOTE: NO METABOLIC ACID COLLECTED

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJ Conti

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0220109
Project No.:	4020-0509	Sample Location:	S57MW022
Sampled By:	SJC	Duplicate:	☐
Field Analyst:	SJC	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	SJR		

SAMPLING DATA:

Date: 4-1-04	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Time: 1520	(Visual)	(S.U.)	(u S/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: PERISTALTIC	CLEAR	6.00	2357	11.34	10	1.37	—	77

Equipment Used: YSI MODEL 556 MPS 03C0005
LAMOTTE MOD 2020 S/N 3678-4002 TURBIDITY

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

0.8 To 1.0

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	1.0
☐	1 to 12 ppm	K-7512	

Concentration: 1.0 ppm

Analysis Time: 5 min ± (1525)

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier		Concentration
_____	x 0.01	=	mg/L
_____	x 0.02	=	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 _ _ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 2.4 ppm

Analysis Time: 5 min ± (1530)

Equipment: ☑ HR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S): ☑ Range: 0 - 5 mg/L

Equipment: ☑ HS-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: < 0.1 ppm

Analysis Time: 5 min ± (1535)

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☑

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW022
DATE: 4-1-04

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
	1340	7.75	—	—	—	—	—	—	—	START
	1350	7.90	120	5.62	2653	95	3.53	12.32	176	CLEAR - SL TURBID
	1400	7.93	120	5.62	2635	85	1.63	12.04	168	" "
	1410	7.96	120	5.62	2620	85	1.71	11.87	164	" "
	1420	7.99	120	5.69	2592	60	2.06	11.85	153	" "
	1430	8.02	120	5.71	2569	50	1.76	11.73	146	" "
60 min	1440	8.02	120	5.75	2543	40	1.70	11.69	126	" "
	1450	8.05	120	5.80	2478	38	1.47	11.28	105	" "
80 min	1500	8.08	120	5.89	2451	20	1.24	11.42	91	" NON "
	1510	8.10	120	5.98	2398	13	1.32	11.46	78	" "
100 min	1520	8.11	120	6.00	2357	10	1.37	11.34	77	" "
		Sampled @	1520	HRS						

SIGNATURE(S): SJ Conti

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0230109
Sample Location: S57MW023
Sampled By: SJC
C.O.C. No.: K-3
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4-1-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1210	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLEAR	4.25	633	12.67	0	1.28	44.4	—

PURGE DATA:

Date: 4-1-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 23.1								
Static Water Level (WL): 12.96			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 6.2								
Start Purge (hrs): 1110								
End Purge (hrs): 1210								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 12.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^{0}C & HCL	3 X 40-ml vial	✓
Total TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓

OBSERVATIONS / NOTES:

1 VOL = 6.2L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): SJConti

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW023
DATE: 4-1-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1110	12.96	—	—	—	—	—	—	—	START
1120	13.00	200	4.39	625	12	3.14	12.70	407	CLEAR - SL TURBID
1130	13.01	200	4.28	632	3	2.04	12.71	435	" — NON TURBID
1140	13.01	220	4.25	633	0	1.34	12.69	442	" " "
1150	13.02	200	4.25	634	0	1.23	12.69	444	" " "
1200	13.02	200	4.25	634	0	1.32	12.68	443	" " "
1210	13.02	220	4.25	633	0	1.28	12.67	444	" " "
	Sampled @	1210 HRS							

SIGNATURE(S): SJ Conte

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0240109
Sample Location: S57MW024
Sampled By: SJC
C.O.C. No.: K-2, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 3/31/04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1530	Visual	Standard	u S/cm	°C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLR	6.22	324	13.40	4.0	0.50	-17	—

PURGE DATA:

Date: 3/31/04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 12.55								
Static Water Level (WL): 6.38			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 4								
Start Purge (hrs): 1430								
End Purge (hrs): 1530								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 9.3 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
TCL VOC with ethyl ether	4°C & HCL	3 X 40-ml vial	x 3	✓
Dissolved methane, ethane, ethene.	4°C & HCL	2 X 40-ml vial	x 3	✓
TDS and TSS	4°C	500-ml HDPE plastic container		✓
Anions/Alkalinity	4°C	500-ml HDPE plastic container	x 3	✓
Total TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	x 3	✓
Dissolved TAL Metals	4°C & HNO_3	250-ml HDPE plastic container	x 3	✓
Total Cyanide	4°C & NaOH	250-ml HDPE plastic container	x 3	✓
Dissolved Cyanide	4°C & NaOH	250-ml HDPE plastic container	x 3	✓
Metabolic Acids	4°C	2 X 40-ml vial	x 3	✓
TOC	4°C & H_2SO_4	2 X 40-ml vial	x 3	✓
Carbon Dioxide	4°C	2 X 40-ml vial	x 3	✓
Sulfide	4°C & ZnAc/NaOH	500-ml HDPE plastic container	x 3	✓
TIC	4°C	2 X 40-ml vial	x 3	✓

OBSERVATIONS / NOTES:

6.17' WATER 1 VOL = ≈ 4 L
2 VOL = 8 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
✓	—

Signature(s): SJ Conti

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0240109
Project No.:	4020-0509	Sample Location:	S57MW024
Sampled By:	SJC	Duplicate:	☐
Field Analyst:	SJC	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	SWR		

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (uS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP (+/- mv)
Date: 3-31-04								
Time: 1530								
Method: PERISTALTIC	CLR	6.22	324	13.40	4.0	0.50	—	-17

Equipment Used: YSI MODEL 556 MPS 03C0005
LAMOTTE MOD 2020 S/N 3678-4002 TURBIDITY METER

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Range Used:	Range	Method	Concentration ppm
☑	0 to 1 ppm	K-7510	0 to 0.05
☐	1 to 12 ppm	K-7512	

Concentration: .05 ppm

Analysis Time: 5 min (1535 HRS)

Equipment: HACH Digital Titrator OX-DT

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Analysis Time: _____

Titration Count	Multiplier		Concentration
_____	x 0.01	=	mg/L
_____	x 0.02	=	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 3.0 ppm

Analysis Time: 5 min (1540 HRS)

Equipment: ✓ IR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: ✓ HS-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: <0.1 ppm

Analysis Time: 5 min (1545 HRS)

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☐

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW024
DATE: 3-31-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1430	6.38	—	—	—	—	—	—	—	
1440	6.94	180	6.24	411	4.0	3.50	13.19	-12	CLEAR- NON TURBID
1450	7.25	150	6.25	401	5.0	.67	13.23	-8	" "
1500	7.45	150	6.23	362	5.0	.58	13.19	-41	" "
1510	7.52	150	6.22	351	5.0	.54	13.25	-37	" "
1520	7.54	150	6.23	334	5.0	.48	13.36	-30	" "
60 min 1530	7.55	150	6.22	324	4.0	.50	13.40	-17	" "
	Sampled @	1530	HRS.						

SIGNATURE(S): SJ Conte

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 57 RD 9 GW SAMPLING
Project No.: 4020-0509

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0250109
Sample Location: S57MW025
Sampled By: FWR
C.O.C. No.: K-3, MS-1
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 4-1-04	Color	pH	S.C.	Temp.	Turbidity	DO	ORP	Other
Time: 1520	Visual	Standard	u S/cm	^{0}C	NTU	mg/l	mv	NA
Method: Peristaltic pump	CLR	5.72	1109	12.72	0.0	0.23	-18.1	—

PURGE DATA:

Date: 4-1-04	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	ORP	Other
Method: Peristaltic pump								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" / PVC								
Total Well Depth (TD): 13.9								
Static Water Level (WL): 7.25			(SEE LOW FLOW PURGE DATA SHEET)					
One Well Volume (gal/L): 4.3l								
Start Purge (hrs): 1350								
End Purge (hrs): 1520								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 9.25l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC with ethyl ether	4^{0}C & HCL	3 X 40-ml vial	✓
Dissolved methane, ethane, ethene.	4^{0}C & HCL	2 X 40-ml vial	✓
TDS and TSS	4^{0}C	500-ml HDPE plastic container	✓
Anions/Alkalinity	4^{0}C	500-ml HDPE plastic container	✓
Total TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Dissolved TAL Metals	4^{0}C & HNO_3	250-ml HDPE plastic container	✓
Total Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓
Dissolved Cyanide	4^{0}C & NaOH	250-ml HDPE plastic container	✓
Metabolic Acids	4^{0}C	2 X 40-ml vial	✓
TOC	4^{0}C & H_2SO_4	2 X 40-ml vial	✓
Carbon Dioxide	4^{0}C	2 X 40-ml vial	✓
Sulfide	4^{0}C & ZnAc/NaOH	500-ml HDPE plastic container	✓
TIC	4^{0}C	2 X 40-ml vial	✓

OBSERVATIONS / NOTES:

STANDING H_2O - 0.65 → 4.3l x 2 = 8.6l two vols

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S57GWDUP0209

Signature(s): [illegible]

Note: Analyte, method, and/or equipment may be deleted from form if not being performed.

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page __ of __

Project Site Name:	IHDIV Site 57 Rd 9 gw sampling	Sample ID No.:	S57MW0250109
Project No.:	4020-0507	Sample Location:	S57MW025
Sampled By:	SWR	Duplicate:	☐
Field Analyst:	SWR	Blank:	☐
Field Form Checked as per QA/QC Checklist (initials):	SWR		

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	ORP
Date: 4-1-04								
Time: 1520	(Visual)	(S.U.)	(u S/cm)	(°C)	(NTU)	(mg/l)	(%)	(+/- mv)
Method: LOW FLOW/PER. PUMP	CLR	5.72	1109	12.72	0.0	0.23	—	-18.1

Equipment Used: YSI MODEL 556 MPS 02H1304
LAMOTTE MOD 2020 S/N 2283-0501

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: Chemetrics Test Kit

Concentration: <0.05 ppm

Range Used:	Range	Method	Concentration ppm
☒	0 to 1 ppm	K-7510	< 0.05
☐	1 to 12 ppm	K-7512	

Analysis Time: 1615

Equipment: HACH Digital Titrator OX-DT

Analysis Time: _____

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier		Concentration
_____	x 0.01	=	mg/L
_____	x 0.02	=	mg/L

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-850 DR-8 __ Range: 0 - 3.00 mg/L

Program/Module: 500nm 33

Concentration: 8 ppm

Analysis Time: 1618

Equipment: IR-18C Color Wheel Range: 0 - 10 mg/L

Notes:

Filtered: ☐

Hydrogen Sulfide (H_2S):

Range: 0 - 5 mg/L

Equipment: HS-C Other: _____

Exceeded 5.0 mg/L range on color chart: ☐

Concentration: 0.7 ppm

Analysis Time: 1628

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Values cited in the SAMPLING DATA block are consistent with the Groundwater Sample Log Sheet: ☑

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☑

Title block on each page of form is initialized by person who performed this QA/QC Checklist: ☑

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head Site 57 Round 9 GW Sampling
PROJECT NUMBER: 4020 0509

WELL ID.: S57MW025
DATE: 4-1-04

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (uS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	ORP (mV)	Comments
1400	~~Pump 2.5~~ 7.63	125	5.51	1877	2.1	1.02	13.47	24.1	
1410	7.65	100	5.53	1818	0.0	0.58	13.36	12.3	LOWERED FLOW RATE TO
1420	7.67	100	5.57	1703	0.0	0.28	13.25	11.3	
1430	7.67	100	5.58	1550	0.0	0.25	13.20	12.6	
1440	7.69	100	5.60	1431	0.0	0.25	13.10	9.4	
1450	7.70	100	5.65	1267	0.0	0.23	12.89	1.6	
1500	7.70	100	5.69	1197	0.0	0.24	12.70	-15.3	
1510	7.71	100	5.70	1138	0.0	0.25	12.67	-17.2	
1520	7.71	100	5.72	1109	0.0	0.23	12.72	-18.1	COMPLETED PURGING

SIGNATURE(S): _____

PAGE___OF___

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2494

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: ~~057~~ S41 MW0010109
Sample Location: ~~057~~ MW001
Sampled By: S41 C. Doolan
C.O.C. No.: 3771
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Date: 9/30/05								
Time: 1145								
Method: Peristaltic	clear	4.60	0.469	22.06	1.0	0.73	0.0	170

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 9/30/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 4" PVC								
Total Well Depth (TD): 20.10'								
Static Water Level (WL): 7.82'								
One Casing Volume(gal/L): 30.70								
Start Purge (hrs): 1015								
End Purge (hrs): 1140								
Total Purge Time (min): 85								
Total Vol. Purged (gal/L): 25.50								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

20.10
− 7.82
12.28 (2.5) = 30.70 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Colin Doolan

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # ~~N4020~~ 2194

WELL ID.: ~~S57~~ S41 MW001
DATE: 9/30/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1015	7.82	—	—	—	—	—	—	—	—	—	start purge, clear
1025	8.69	3.00	300	4.58	0.466	1.2	1.35	20.54	173	0.0	clear
1035	9.44	6.00	300	4.57	0.466	1.6	0.74	20.83	170	0.0	clear
1045	10.12	9.00	300	4.59	0.469	1.0	0.69	21.31	169	0.0	clear
1055	10.50	12.00	300	4.61	0.471	1.1	0.79	21.68	168	0.0	clear
1105	10.74	15.00	300	4.62	0.469	1.1	0.88	21.75	168	0.0	clear
1115	10.75	18.00	300	4.58	0.468	1.0	0.96	21.88	170	0.0	clear
1125	10.75	21.00	300	4.58	0.468	1.1	0.88	22.07	170	0.0	clear
1135	10.73	24.00	300	4.58	0.467	1.1	0.76	22.05	170	0.0	clear
1140	10.75	25.50	300	4.60	0.469	1.0	0.73	22.06	170	0.0	clear, end purge
1145	—	—	—	—	—	—	—	—	—	—	start sample

SIGNATURE(S): [signature]

PUMP INTAKE SET AT: 17.10 ' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N4~~1020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S41MW0020109**
Sample Location: S41MW002
Sampled By: FREDW. RAMSER
C.O.C. No.: 3768
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-6-05								
Time: 1100								
Method: Peristaltic	CLR	5.68	0.279	19.03	215	0.41	0.0	18

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-6-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 4" PVC								
Total Well Depth (TD): 20								
Static Water Level (WL): 6.05								
One Casing Volume(gal/L):								
Start Purge (hrs): 900								
End Purge (hrs): 1100								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 24 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	

OBSERVATIONS / NOTES:

10' SATURATED SCREEN LENGTH ≈ 24.7 l, PURGE VOL ~~12.3 l~~ 24 l

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W. Ramser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~305~~ 007 JOB # N~~#920~~ 2194

WELL ID.: S41MW002
DATE: 10-6-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0910	6.21	2.0	200	5.60	0.270	970	1.36	18.79	117	0.0	
0920	6.25	4.0	200	5.68	0.271	860	0.73	18.68	75	0.0	
0930	6.26	6.0	200	5.76	0.274	750	0.60	18.80	38	0.0	
0940	6.26	8.0	200	5.76	0.272	350	0.55	18.77	28	0.0	
0950	6.26	10.0	200	5.76	0.271	380	0.47	18.80	18	0.0	
1000	6.26	12.0	200	5.76	0.271	380	0.46	18.96	15	0.0	
1010	6.26	14.0	200	5.75	0.272	320	0.43	18.92	15	0.0	
1020	6.26	16.0	200	5.71	0.275	280	0.40	18.96	16	0.0	
1030	6.27	18.0	200	5.71	0.276	250	0.40	18.99	17	0.0	
1040	6.27	20.0	200	5.69	0.277	230	0.41	18.94	18	0.0	
1050	6.27	22.0	200	5.69	0.279	220	0.41	19.00	18	0.0	
1100	6.27	24.0	200	5.68	0.279	215	0.41	19.03	18	0.0	COMPLETED PURGING

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: MID-SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: ~~857~~ S41 MW0040109
Sample Location: ~~857~~ MW004
Sampled By: S41 C. Doolan
C.O.C. No.: 3771
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mv)
Date: 9/30/05								
Time: 0920 (CD) ~~0920 0810~~								
Method: Peristaltic	Clear	3.71	0.518	19.71	1.7	2.62	0.0	192

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 9/30/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 14.46'								
Static Water Level (WL): 5.19'								
One Casing Volume(gal/L): 5.15								
Start Purge (hrs): 0810								
End Purge (hrs): 0915								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 13.30								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

14.46
- 5.19
~~9.67~~ (0.6) = ~~5.93 L~~ (CD) 5.15 L
8.59

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Chris Doolan

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~005~~ 007 JOB # N~~4000~~ 2194

WELL ID.: ~~057~~ 541 MW004
DATE: 9/30/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
~~1645~~ 0810	~~15.50~~ 5.19										start purge, clear
0820	5.53	2.20	220	3.76	0.521	4.0	3.11	19.47	192	0.0	clear
0830	5.61	4.40	220	3.74	0.517	3.1	2.80	19.80	193	0.0	clear
0840	5.66	6.60	220	3.72	0.517	2.0	2.69	19.68	192	0.0	clear
0850	5.69	8.80	220	3.72	0.516	2.0	2.65	19.71	192	0.0	clear
0900	5.72	10.00	220	3.72	0.517	1.2	2.64	19.73	192	0.0	clear
0910	5.75	12.20	220	3.71	0.520	1.9	2.61	19.72	192	0.0	clear
0915	5.76	13.30	220	3.71	0.518	1.7	2.62	19.71	192	0.0	clear, end purge
0920											start sample

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 11.46' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~[illegible]~~ JOB # N~~[illegible]~~ 2194
007

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S~~4~~57MW0010109
Sample Location: S~~4~~57MW001
Sampled By: 57 FREDLUKAMSER
C.O.C. No.: 3757
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-4-05								
Time: 1320								
Method: Peristaltic	CLR	5.11	0.249	21.75	0	0.73	0.0	164

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/4/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm):								
Well Casing Diameter & Material Type: 2"								
Total Well Depth (TD): 26.25								
Static Water Level (WL): 7.42								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 1140								
End Purge (hrs): 1320								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 12.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

10 FT SCREEN ⇒ 2x SATURATED SCREEN LENGTH: 12.4 l

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s): Fred U Ramser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: ~~CTO 805~~ JOB # N~~4020~~ 2194 007

WELL ID.: S~~4~~57MW001
DATE: 10-4-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1150	8.15	2	200	5.68	0.164	5	0.99	22.31	140	0.0	LOWERED FLOW RATE
1200	8.20	3.15	115	5.56	0.168	5	0.81	22.19	150	0.0	TO
1210	8.24	4.30	115	5.27	0.230	3	0.74	22.17	158	0.0	
1220	8.27	5.45	115	5.16	0.213	2	0.75	22.14	160	0.0	
1230	8.27	6.60	115	5.11	0.216	2	0.77	22.03	162	0.0	
1240	8.29	7.75	115	5.11	0.205	2	0.77	21.83	162	0.0	
1250	8.30	8.80	115	5.09	0.265	1	0.76	21.73	164	0.0	
1300	8.30	9.95	115	5.11	0.253	1	0.76	21.59	163	0.0	
1310	8.30	11.10	115	5.11	0.250	0	0.74	21.75	164	0.0	
1320	8.30	12.25	115	5.11	0.249	0	0.73	21.75	164	0.0	COMPLETED PURGING COLLECT SAMPLE @ 1320

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: MID-SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~005~~ 007 JOB # ~~N4020~~ FUR 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0020109**
Sample Location: S57MW002
Sampled By: FUR
C.O.C. No.: 3757
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-4-05								
Time: 1120								
Method: Peristaltic	CLR	5.41	0.387	24.01	4	0.68	0.0	148

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-4-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 14.2								
Static Water Level (WL): 8.27								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 1015								
End Purge (hrs): 1120								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 7.85								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ JOB # N~~4020~~ 2194 007

WELL ID.: S57MW002
DATE: 10-4-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1030	9.16	2.1	140	5.39	0.129	15	0.72	24.01	157	0.0	LOWERED FLOW
1040	9.18	3.25	115	5.38	0.319	5	0.71	23.92	152	0.0	RATE TO 115
1050	9.25	4.4	115	5.38	0.393	4	0.70	23.93	151	0.0	
1100	9.31	5.55	115	5.40	0.540	4	0.69	24.10	149	0.0	
1110	9.41	6.7	115	5.41	0.386	4	0.68	24.09	148	0.0	
1120	9.50	7.85	115	5.41	0.387	4	0.68	24.01	148	0.0	COMPLETED PURGE @1120

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: MID-SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~305~~ 007 JOB # N ~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0030109**
Sample Location: S57MW003
Sampled By: FRED WRAMSER
C.O.C. No.: 3757
Type of Sample:
[] Low Concentration
[X] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Date: 10/5/05								
Time: 0915								
Method: Peristaltic	CLR	4.97	0.102	21.33	0	0.66	0.0	205

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-5-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 24.35								
Static Water Level (WL): 9.08								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 0825								
End Purge (hrs): 0915								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 6.25 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

SATURATED WELL SCREEN LENGTH = 5' ⇒ PURGE VOL. = 2 X 3.1 = 6.2 l

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S57MW DUP0109

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~895~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW003
DATE: 10-5-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0835	9.28	1.25	125	4.90	0.101	25	1.48	21.32	224	0.0	
0845	9.28	2.50	125	4.95	0.098	11	0.94	21.38	211	0.0	
0855	9.28	3.75	125	4.97	0.098	5	0.74	21.37	207	0.0	
0905	9.28	5.00	125	4.97	0.102	2	0.68	21.35	206	0.0	
0915	9.28	6.25	125	4.97	0.102	0	0.66	21.33	205	0.0	PURGE COMPLETE

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: MID - SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~305~~ 007 JOB # N~~4920~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: ~~S41~~ 557 MW0040109
Sample Location: ~~S41~~ 557 MW004
Sampled By: FREDW. RAMSER
C.O.C. No.: 3757
Type of Sample:
[] Low Concentration
[X] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10/5/05								
Time: 1100								
Method: Peristaltic	CLR	5.05	0.114	22.47	0	0.47	0.0	191

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-5-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 18.01								
Static Water Level (WL): 9.04								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 0930								
End Purge (hrs): 1100								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 11.25 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

5.6 l x 2 = 11.2 l PURGE VOL.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
–	–

Signature(s): Fred W. Ramser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~895~~ 007 JOB # N~~4920~~ 2194

WELL ID.: S~~4~~57MW004
DATE: 10/5/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0930	9.30	1.25	125	4.98	0.101	5	1.73	22.20	216	0.0	
0950	9.35	2.50	125	4.98	0.100	4	0.84	22.28	212	0.0	
1000	9.40	3.75	125	5.00	0.111	2	0.62	22.27	207	0.0	
1010	9.43	5.00	125	5.03	0.106	2	0.57	22.25	204	0.0	
1020	9.46	6.25	125	5.04	0.110	0	0.53	22.23	201	0.0	
1030	9.48	7.50	125	5.05	0.114	0	0.49	22.23	199	0.0	
1040	9.50	8.75	125	5.06	0.113	0	0.47	22.30	197	0.0	
1050	9.50	10.00	125	5.05	0.112	0	0.46	22.45	193	0.0	
1100	9.51	11.25	125	5.05	0.114	0	0.47	22.47	191	0.0	

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: MID - WATER COLUMN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N ~~4520~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0050109**
Sample Location: S57MW005
Sampled By: FRED W RAMSER
C.O.C. No.: 3774
Type of Sample:
[] Low Concentration
[X] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-5-05								
Time: 1530								
Method: Peristaltic	CLR	4.67	0.105	21.00	0	2.05	0.0	150

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-5-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 19.8								
Static Water Level (WL): 6.30								
One Casing Volume(gal/L): —								
Start Purge (hrs): 1430								
End Purge (hrs): 1530								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 7 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

5' SCREEN → PURGE VOL = 3.1 x 2 = 6.2 l

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Fred W Ramser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~305~~ 007 JOB # N4~~D20~~ 2194

WELL ID.: S57MW005
DATE: 10-5-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1440	6.40	1.25	125	4.45	0.110	5	2.35	21.19	129	0.0	FLOW RATE
1450	6.38	2.40	115	4.46	0.107	2	2.19	21.99	136	0.0	LOWER TO 115
1500	6.37	3.55	115	4.65	0.106	0	2.12	21.70	135	0.0	
1510	6.38	4.70	115	4.66	0.106	0	2.10	21.41	140	0.0	
1520	6.40	5.85	115	4.66	0.106	0	2.11	21.06	146	0.0	
1530	6.40	7.00	115	4.67	0.105	0	2.05	21.00	150	0.0	PURGE COMPLETED
~~1540~~ PM		~~8.15~~ PM	~~115~~ PM								

SIGNATURE(S): Fred M Ramos

PUMP INTAKE SET AT: MID-POINT SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~385~~ 007 JOB # N~~4020~~ 2149

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0060109**
Sample Location: S57MW006
Sampled By: FRED WRAMSER
C.O.C. No.: ~~3757~~ 3774
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-5-05								
Time: 1725								
Method: Peristaltic	CLR	4.66	0.099	21.62	0	2.16	0.0	188

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-5-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: PVC 2"								
Total Well Depth (TD): 14.12								
Static Water Level (WL): 6.40								
One Casing Volume(gal/L):								
Start Purge (hrs): 1555								
End Purge (hrs): 1725								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 10.35								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	

OBSERVATIONS / NOTES:

STANDING H_2O = 7.72 ⇒ 8' ⇒ 4.9 ℓ x 2 = 9.8 ℓ = PURGE VOL

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred Wramser

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LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~305~~ 007 JOB # N~~1020~~ 2149

WELL ID.: S57MW006
DATE: 10-5-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1605	6.50	1.15	115	4.61	0.102	4	2.53	21.73	178	0.0	
1615	6.51	2.30	115	4.60	0.100	0	2.22	21.60	181	0.0	
1625	6.51	3.45	115	4.63	0.100	0	2.26	21.62	180	0.0	
1635	6.51	4.60	115	4.64	0.099	0	2.20	21.65	182	0.0	
1645	6.51	5.75	115	4.65	0.099	0	2.13	21.65	183	0.0	
1655	6.51	6.90	115	4.60	0.099	0	2.26	21.65	185	0.0	
1705	6.52	8.05	115	4.63	0.099	0	2.16	21.69	185	0.0	
1715	6.52	9.20	115	4.65	0.099	0	2.13	21.63	186	0.0	
1725	6.52	10.35	115	4.66	0.099	0	2.16	21.62	188	0.0	COMPLETED PURGE

SIGNATURE(S): Fred Ullman

PUMP INTAKE SET AT: MID - SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~285~~ 007 JOB # N~~5220~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0070109**
Sample Location: S57MW007
Sampled By: C. Doolan
C.O.C. No.: 3771
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Date: 9/28/05								
Time: 1545								
Method: Peristaltic	clear	5.48	1.23	21.38	0.50	0.58	0.1	137

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 9/28/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 28.01'								
Static Water Level (WL): 9.00'								
One Casing Volume(gal/L): 11.41								
Start Purge (hrs): 1410								
End Purge (hrs): 1540								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 13.50								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

28.01
− 9.00
19.01 (0.6) = ~~10.81~~ (CD) 11.41 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Chris Doolan

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~[illegible]~~ JOB # N~~[illegible]~~ 2194 007

WELL ID.: S57MW007
DATE: 9/28/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1410	9.00										start purge, clear
1420	10.06	1.50	150	5.70	0.694	1.1	0.81	21.64	129	0.0	clear
1430	10.34	3.00	150	5.63	0.633	1.4	0.71	21.58	132	"	clear
1440	10.51	4.50	150	5.52	0.90	1.9	0.66	21.65	137	"	clear
1450	10.61	6.00	150	5.50	1.55	2.0	0.63	21.47	138	0.1	clear
1500	10.65	7.50	150	5.51	0.999	1.1	0.60	21.40	139	0.0	clear
1510	10.68	9.00	150	5.46	0.90	0.65	0.60	21.34	138	0.0	clear
1520	10.71	10.50	150	5.49	0.609	0.35	0.60	21.42	137	0.0	clear
1530	10.72	12.00	150	5.48	0.853	0.50	0.59	21.36	137	0.0	clear
1535	10.73	12.75	150	5.48	1.31	0.50	0.58	21.31	137	0.1	clear
1540	10.74	13.50	150	5.48	1.23	0.50	0.58	21.38	137	0.1	clear, end purge
1545											start sample

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 24.00' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~803~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0080109**
Sample Location: S57MW008
Sampled By: C Doolan
C.O.C. No.: 3771
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Date: 9/29/05								
Time: 0940								
Method: Peristaltic	clear	6.02	0.548	21.66	3.4	0.57	0.0	119

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 9/29/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 16.39'								
Static Water Level (WL): 8.20'								
One Casing Volume(gal/L): 4.91								
Start Purge (hrs): 0805								
End Purge (hrs): 0935								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 12.60								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

16.39
− 8.20
8.19 (0.6) = 4.91 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): C Doolan

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~006~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW008
DATE: 9/29/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0805	8.20										Start purge, clear w/ iron flakes
0815	8.88	1.40	140	6.21	0.661	50	1.82	22.04	127	0.0	clear
0825	9.32	2.80	140	6.27	0.664	70	1.09	22.32	127	0.0	cloudy orange
0835	9.59	4.20	140	6.27	0.681	85	0.92	22.36	125	"	slightly cloudy
0845	9.75	5.60	140	6.24	0.653	60	0.75	22.19	119	"	slightly cloudy
0855	9.86	7.00	140	6.18	0.629	35	0.68	22.04	116	"	clear
0905	9.93	8.40	140	6.12	0.581	16	0.65	21.88	115	"	clear
0915	9.99	9.80	140	6.08	0.571	7.6	0.61	21.82	116	"	clear
0925	10.03	11.20	140	6.04	0.555	4.3	0.59	21.75	118	"	clear
0935	10.05	12.60	140	6.02	0.548	3.4	0.57	21.66	119	"	clear, end purge
0940											Start sample

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 12.39 ' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~005~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0090109**
Sample Location: S57MW009
Sampled By: PROCURAVISER
C.O.C. No.: 3757
Type of Sample:
X Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP mV
Date: 10-4-05								
Time: 1550								
Method: Peristaltic	CLR	4.64	0.099	21.71	0	1.04	0.0	204

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-4-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 21.90								
Static Water Level (WL): 8.89								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 1500								
End Purge (hrs): 1550								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 6.6 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	

OBSERVATIONS / NOTES:

5 FT SCREEN ⇒ 6.2 l TARGETTED PURGE VOLUME

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ JOB # N~~4020~~ 2194 007

WELL ID.: S57MW009
DATE: 10-4-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1510	9.46	1.6	160	4.65	0.095	5	1.24	22.01	204	0.0	LOWER FLOW RATE
1520	9.51	2.85	125	4.64	0.095	3	1.18	21.96	202	0.0	TO 125
1530	9.55	4.10	125	4.61	0.097	1	1.10	21.78	204	0.0	
1540	9.58	5.35	125	4.61	0.106	1	1.09	21.73	205	0.0	
1550	9.60	6.60	125	4.64	0.099	0	1.04	21.71	204	0.0	COMPLETE PURGE

SIGNATURE(S): Fred Ramsey

PUMP INTAKE SET AT: MID-SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ JOB # N~~4020~~ 2194 007

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S57MW0100109
Sample Location: S57MW010
Sampled By: Fred W Ramsey
C.O.C. No.: 3757
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mv)
Date: 10-4-05								
Time: 1710								
Method: Peristaltic	CLR	5.74	0.442	22.00	33	0.59	0.0	120

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-4-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 15.91								
Static Water Level (WL): 9.12								
One Casing Volume(gal/L):								
Start Purge (hrs): 1605								
End Purge (hrs): 1710								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 10 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

SATURATED SCREEN LENGTH = ~7' ⇒ 4.3 l x 2 = 8.6 l TARGET PURGE VOL.

Circle if Applicable:

MS/MSD

Duplicate ID No.: —

Signature(s): Fred W Ramsey

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4080~~ 2194

WELL ID.: S57MW010
DATE: 10-4-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1610	9.51	1.0	200	5.79	0.247	116	0.84	22.44	128	0.0	
1620	9.62	2.5	150	5.90	0.293	70	0.75	22.52	103	0.0	LOWER FLOW RATE TO
1630	9.74	4.0	150	5.93	0.311	35	0.70	22.47	106	0.0	150
1640	9.88	5.5	150	5.87	0.292	35	0.65	22.22	105	0.0	
1650	9.92	7.0	150	5.80	0.438	35	0.63	22.14	113	0.0	
1700	9.98	8.5	150	5.75	0.440	34	0.60	22.05	121	0.0	
1710	10.01	10.0	150	5.74	0.442	33	0.59	22.00	120	0.0	COMPLETED PURGE
											SAMPLED @ 1710

SIGNATURE(S): Fred W Ranse

PUMP INTAKE SET AT: MID-WATER COLUMN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~006~~ 007 JOB # N~~0020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0110109**
Sample Location: S57MW011
Sampled By: C. Doolan
C.O.C. No.: 3771
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mv)
Date: 9/28/05								
Time: 1250								
Method: Peristaltic	clear	5.55	0.217	23.65	4.3	0.61	0.0	133

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 9/28/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 20.54'								
Static Water Level (WL): 9.03'								
One Casing Volume(gal/L): 6.91								
Start Purge (hrs): 1125								
End Purge (hrs): 1245								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 12.60								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

20.54
− 9.03
11.51 (0.6) = 6.91 L

Circle if Applicable:

MS/MSD: yes
Duplicate ID No.:

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ JOB # N~~4820~~ 2194 007

WELL ID.: S57MW011
DATE: 9/28/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1125	9.03	—	~~200~~ 150	—	—	—	—	—	—	—	start purge, clear
1135	10.72	2.00	200	5.06	0.142	26	0.97	23.94	165	0.0	clear
1145	11.01	3.60	160	5.17	0.169	24	0.84	23.91	159	0.0	clear
1155	11.02	5.10	150	5.22	0.221	16	0.74	24.03	154	"	clear
1205	11.11	6.60	150	5.32	0.267	11	0.67	23.88	147	"	clear
1215	11.10	8.10	150	5.35	0.273	8.5	0.70	23.93	144	"	clear
1225	11.12	9.60	150	5.45	0.244	6.4	0.65	23.83	140	"	clear
1235	11.14	11.10	150	5.52	0.216	5.9	0.63	23.75	135	"	clear
1245	11.16	12.60	"	5.55	0.217	4.3	0.61	23.65	133	"	clear, end purge
1250	—										start sample.

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 16.54' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0120109**
Sample Location: S57MW012
Sampled By: C. Doolan
C.O.C. No.: 3757
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Date: 10/3/05								
Time: 1800								
Method: Peristaltic	clear	4.90	0.167	16.63	1.4	1.56	0.0	169

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/3/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 44.15								
Static Water Level (WL): 5.70								
One Casing Volume(gal/L): 23.07								
Start Purge (hrs): 1715								
End Purge (hrs): 1755								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 16.00								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

44.15
-5.70
38.45 (0.6) = 23.07 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
yes	—

Signature(s): Chris Doolan

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW012
DATE: 10/3/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1715	5.70										start purge, clear
1725	5.85	4.00	400	4.78	0.205	6.3	1.44	17.33	175	0.0	clear
1735	5.89	8.00	400	4.79	0.180	1.7	1.22	16.89	175	0.0	clear
1745	5.91	12.00	400	4.86	0.170	1.3	1.43	16.74	171	0.0	clear
1750	5.91	14.00	400	4.88	0.168	1.3	1.50	16.65	170	0.0	clear
1755	5.91	16.00	400	4.90	0.167	1.4	1.56	16.63	169	0.0	clear, end purge
1800											start sample

SIGNATURE(S): Clin Fischer

PUMP INTAKE SET AT: 40.15' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~305~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0130109**
Sample Location: S57MW013
Sampled By: FRED W RAMSER
C.O.C. No.: 3757
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-4-05								
Time: 1005								
Method: Peristaltic	CLR	4.89	0.181	19.88	0	3.43	0.0	167

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-4-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 17.95								
Static Water Level (WL): 5.46								
One Casing Volume(gal/L): —								
Start Purge (hrs): 0845								
End Purge (hrs): 1005								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 12.6 L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ramser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~[illegible]~~ JOB # N~~[illegible]~~ 2194
007

WELL ID.: S57MW013
DATE: 10-4-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0855	5.71	2.1	210	4.71	0.199	1.5	4.00	19.60	166	0.0	
0905	5.71	3.6	150	4.79	0.185	1.0	3.69	19.95	169	0.0	LOWERED FLOW TO
0915	5.71	5.1	150	4.83	0.187	0.5	3.62	19.87	168	0.0	150
0925	5.72	6.6	150	4.86	0.183	0.5	3.50	19.76	167	0.0	
0935	5.72	8.1	150	4.86	0.182	0.0	3.55	19.78	168	0.0	
0945	5.72	9.6	150	4.87	0.181	0.0	3.49	19.83	168	0.0	
0955	5.73	11.1	150	4.88	0.181	0	3.46	19.89	168	0.0	
1005	5.73	12.6	150	4.89	0.181	0	3.43	19.88	167	0.0	COMPLETED PURGE

SIGNATURE(S): Fred M Moore

PUMP INTAKE SET AT: MID SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0200109**
Sample Location: S57MW020
Sampled By: C. Doolan
C.O.C. No.: 3756
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mv)
Date: 10/12/05								
Time: 1740								
Method: Peristaltic	clear	5.58	0.097	21.46	1.9	0.00	0.00	87

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/12/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 17.45'								
Static Water Level (WL): 5.46'								
One Casing Volume(gal/L): 7.19								
Start Purge (hrs): 1255								
End Purge (hrs): 1735								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 13.00								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

17.45
-5.46
11.99 (0.6) = 7.19 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): Chris Doolan

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW020
DATE: 10/12/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1255	5.46										start purge, clear
1305	5.95	2.00	200	5.14	0.101	24	0.00	21.84	144	0.00	clear, stopped pump
1640											resumed purge
1650	5.99	4.00	200	5.53	0.100	11	0.01	21.55	92	0.00	clear
1700	6.09	6.00	200	5.55	0.099	4.4	0.00	21.57	90	0.00	clear
1710	6.12	8.00	200	5.55	0.098	2.8	"	21.54	90	"	clear
1720	6.16	10.00	200	5.56	0.098	2.2	"	21.55	89	"	clear
1730	6.18	12.00	200	5.57	0.097	2.1	"	21.55	87	"	clear
1735	6.20	13.00	200	5.58	0.097	1.9	"	21.46	87	"	clear, end purge
1740											start sample

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 14.45' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~006~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0220109**
Sample Location: S57MW022
Sampled By: C. Doolan
C.O.C. No.: 3771
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 9/29/05	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Time: 1550								
Method: Peristaltic	clear	6.07	2.43	18.83	4.3	0.84	0.1	-3

PURGE DATA:

Date: 9/29/05	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 17.30'								
Static Water Level (WL): 8.08'								
One Casing Volume(gal/L): 5.53								
Start Purge (hrs): 1355								
End Purge (hrs): 1525								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 12.60								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

17.30
− 8.08
9.22 (0.6) = 5.53 L

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ JOB # N~~4020~~ 2194 007

WELL ID.: S57MW022
DATE: 9/29/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1355	8.08										start purge, clear
1405	8.58	1.40	140	5.59	2.66	12	0.94	18.47	91	0.1	clear
1415	8.78	2.80	140	5.61	2.66	18	1.15	18.53	95	0.1	clear
1425	8.93	4.20	140	5.64	2.64	16	1.19	18.60	94	0.1	clear
1435	9.06	5.60	140	5.71	2.64	11	1.05	18.61	89	0.1	clear
1445	9.16	7.00	140	5.80	2.61	7.6	0.95	18.62	80	0.1	clear
1455	9.24	8.40	140	5.89	2.56	5.9	0.88	18.67	66	0.1	clear
1505	9.32	9.80	140	5.89	2.50	4.1	0.85	18.71	40	0.1	clear
1515	9.32	11.20	140	6.01	2.47	4.6	0.86	18.80	17	0.1	clear
1520	9.34	11.90	140	6.04	2.46	5.8	0.84	18.81	6	0.1	clear
1525	9.35	12.60	140	6.07	2.43	4.3	0.84	18.83	-3	0.1	clear, end purge
1530											Start sample

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 13.30' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~205~~ 007 JOB # ~~N4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0230109**
Sample Location: S57MW023
Sampled By: FURAMSER
C.O.C. No.: 3768
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-6-05 Time: 1715 Method: Peristaltic	CLR	4.30	0.612	18.09	0	2.18	0.0	153

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-6-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 23.00								
Static Water Level (WL): 14.60								
One Casing Volume(gal/L): —								
Start Purge (hrs): 1545								
End Purge (hrs): 1715								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 11.25 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

SATURATED SCREEN LENGTH ~ 9' = 5.6 l x 2 = 11.2 l
PURGE VOL

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~305~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW023
DATE: 10-6-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1555	14.61	12.5 L	125 mL	4.18	0.604	5	1.14	18.27	159	0.0	
1605	14.61	2.5	125	4.13	0.602	3	0.79	18.12	163	0.0	
1615	14.61	3.75	125	4.27	0.603	0	1.24	18.05	156	0.0	
1625	14.61	5.00	125	4.28	0.601	0	1.50	18.13	155	0.0	
1635	14.61	6.25	125	4.30	0.603	0	1.85	18.05	154	0.0	
1645	14.61	7.50	125	4.31	0.610	0	2.10	18.13	153	0.0	
1655	14.61	8.75	125	4.30	0.604	0	2.15	18.16	154	0.0	
1705	14.61	10.00	125	4.30	0.610	0	2.16	18.15	154	0.0	
1715	14.61	11.25	125	4.30	0.612	0	2.18	18.09	153	0.0	COMPLETED PURGE

SIGNATURE(S): Fred Ullmann

PUMP INTAKE SET AT: SCREEN MID-POINT

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~005~~ JOB # N4~~1020~~ 2194 007

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0240109**
Sample Location: S57MW024
Sampled By: FRED W RAMSEUR
C.O.C. No.: 3757
Type of Sample:
[] Low Concentration
[X] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP (mV)
Date: 10-5-05								
Time: 1225								
Method: Peristaltic	CLR	6.32	0.208	23.25	0	0.55	0	-50

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-5-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 12.35								
Static Water Level (WL): 6.71								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 1115								
End Purge (hrs): 1225								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 8.05 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	

OBSERVATIONS / NOTES:

STANDING H_2O = 5.64' ⇒ 3.7 l × 2 = 7.4 l PURGE VOL.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ramseur

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW024
DATE: 10-5-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1125	6.90	1.15	115	5.96	0.162	5	0.93	23.46	87	0	
1135	7.00	2.53	115	6.04	0.173	0	0.57	23.41	83	0	
1145	7.00	3.45	115	6.22	0.202	0	0.56	23.40	60	0	
1155	7.00	4.60	115	6.26	0.215	0	0.54	23.27	52	0	
1205	7.00	5.75	115	6.29	0.207	0	0.57	23.26	37	0	
1215	7.00	6.90	115	6.32	0.210	0	0.55	23.26	-46	0	
1225	6.98	8.05	115	6.32	0.208	0	0.55	23.25	-50	0	

SIGNATURE(S): Fred W Rand

PUMP INTAKE SET AT: MID-WATER COLUMN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~895~~ 007 JOB # N4~~D20~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0250109**
Sample Location: S57MW025
Sampled By: FRED WRAMSER
C.O.C. No.: 3774
Type of Sample:
[] Low Concentration
[X] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-5-05								
Time: 1355								
Method: Peristaltic	CLR	5.95	6.03	23.30	0	2.05	0.0	-70

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-5-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 13.70								
Static Water Level (WL): 7.09								
One Casing Volume(gal/L): —								
Start Purge (hrs): 1245								
End Purge (hrs): 1355								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 8.15								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

STANDING H_2O @ 7' ⇒ PURGE VOL = 2 x 4.3 l = 8.6 l

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S57MWDUP0209

Signature(s): Fred Wramser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~305~~ 007 JOB # N~~4020~~ 2149

WELL ID.: S57MW025
DATE: 10-5-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1255	7.35	1.25	125	5.79	1.41	5	1.02	22.87	-31	0.1	
1305	7.40	2.4	115	5.84	1.30	2	4.38	23.29	-47	0.1	LOWERED FLOW RATE
1315	7.42	3.55	115	5.87	1.20	0	5.86	23.27	-56	0.1	TO 115
1325	7.43	4.70	115	5.89	1.08	0	3.82	23.37	-62	0.0	
1335	7.43	5.85	115	5.93	0.99	0	2.78	23.35	-65	0.0	
1345	7.43	7.00	115	5.94	1.01	0	2.09	23.32	-68	0.1	
1355	7.44	8.15	115	5.95	1.03	0	2.05	23.30	-70	0.0	COMPLETED PURGE BEGIN TO COLLECT

SIGNATURE(S): Fred M Ramser

PUMP INTAKE SET AT: MID-WATER COLUME

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0260109**
Sample Location: S57MW026
Sampled By: FRFOW,RAMSEY
C.O.C. No.: 3756
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-11-05								
Time: 1850								
Method: Peristaltic	CLOUDY WHT	9.69	0.468	16.79	150	2.37	0.0	166

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-11-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 39.52								
Static Water Level (WL): 6.13								
One Casing Volume(gal/L): —								
Start Purge (hrs): 1530								
End Purge (hrs): 1850								
Total Purge Time (min): 200								
Total Vol. Purged (gal/L): 35.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):
—	—	[signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW026
DATE: 10-11-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1540	7.34	1.25	125	9.95	0.635	78	2.42	18.13	146	0.0	LOWERED FLOW
1550	8.85	2.25	100	9.91	0.626	55	2.07	18.10	152	0.0	TO 100 mL
1600	10.00	3.25	100	9.87	0.624		1.96	18.01	156	0.0	
1610	11.26	4.25	100	9.91	0.622	45	1.93	17.88	155	0.0	
1620	12.10	5.25	100	9.92	0.625	45	1.91	17.78	155	0.0	
1630	13.00	6.25	100	9.96	0.618	42	1.88	17.77	154	0.0	
1640	14.03	7.25	100	9.97	0.617	40	1.85	17.75	153	0.0	
1650	14.95	8.25	100	9.99	0.614	40	1.83	17.64	154	0.0	
1700	18.30	12.50	425	9.95	0.596	58	2.00	16.17	156	0.0	DECIDED TO INC
1710	22.45	16.75	425	9.86	0.557	80	2.72	16.19	160	0.0	FLOW RATE TO 425
1720	23.15	17.75	100	9.86	0.550	56	2.91	16.90	159	0.0	DRAW LEVEL DOWN
1730	23.53	18.75	100	9.86	0.545	55	2.87	17.37	159	0.0	TO SCREEN/DRY
1740	23.91	19.75	100	9.85	0.542	55	2.84	17.48	159	0.0	LOWERED FLOW TO 100 mL
1750	24.23	20.75	100	9.88	0.543	54	2.88	17.36	160	0.0	@ 1710 HRS
1800	28.55	26.25	550	9.71	0.543	130	2.95	15.93	167	0.0	DECIDED TO INC
1810	29.89	31.25	500	9.71	0.507	100	2.63	15.98	165	0.0	FLOW TO 550 mL/m
1820	29.84	32.25	100	9.68	0.487	100	2.73	16.36	165	0.0	DRAW DOWN STABILIZE
1830	29.82	33.25	100	9.67	0.472	150	2.39	16.76	165	0.0	@ 29.89 @ 100 mL/m, DB
1840	29.78	34.25	100	9.66	0.469	150	2.38	16.79	166	0.0	
1850	29.78	35.25	100	9.69	0.468	150	2.37	16.79	166	0.0	END PURGE
											FILLED CONT.

SIGNATURE(S): Fred W Rawson

PUMP INTAKE SET AT: SCREEN MID-PT

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0270109**
Sample Location: S57MW027
Sampled By: SWC
C.O.C. No.: 3756
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-12-05								
Time: 0930								
Method: Peristaltic	CLR	4.96	0.098	18.32	0	1.17	0.0	187

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-12-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 22.73								
Static Water Level (WL): 6.64								
One Casing Volume(gal/L):								
Start Purge (hrs): 0745								
End Purge (hrs): 0930								
Total Purge Time (min): 105								
Total Vol. Purged (gal/L): 13.15								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

10' SATURATED WELL SCREEN ⇒ 2 x 6.2 l = 12.4 l PURGE VOL.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S57MW DUP0309

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 294

WELL ID.: S57MW027
DATE: 10-12-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0750	6.85	0.65	125	4.80	0.172	5	1.83	18.33	165	0.0	
0800	6.87	1.90	125	4.90	0.109	3	1.23	18.39	171	0.0	
0810	6.89	3.15	125	4.88	0.105	0	1.14	18.26	177	0.0	
0820	6.90	4.4	125	4.87	0.103	0	1.16	18.29	180	0.0	
0830	6.90	5.65	125	4.87	0.101	0	1.12	18.24	183	0.0	
0840	6.92	6.90	125	4.86	0.101	0	1.14	18.25	185	0.0	
0850	6.95	8.15	125	4.86	0.100	0	1.15	18.20	185	0.0	
0900	6.95	9.40	125	4.87	0.099	0	1.16	18.22	186	0.0	
0910	6.95	10.65	125	4.87	0.098	0	1.18	18.30	186	0.0	
0920	6.95	11.90	125	4.87	0.098	0	1.18	18.33	187	0.0	
0930	6.95	13.15	125	4.86	0.098	0	1.17	18.32	187	0.0	COMPLETED PURGE

SIGNATURE(S): Fred R Rowe

PUMP INTAKE SET AT: SCREEN MID. PT

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N4~~020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0280109**
Sample Location: S57MW028
Sampled By: C. Doolan
C.O.C. No.: 3756
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Date: 10/11/05								
Time: 1715								
Method: Peristaltic	clear	7.72	0.222	17.83	8.0	0.00	0.01	-49

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/11/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 36.66'								
Static Water Level (WL): 4.76'								
One Casing Volume(gal/L): 19.14								
Start Purge (hrs): 1535								
End Purge (hrs): 1710								
Total Purge Time (min): 95								
Total Vol. Purged (gal/L): 17.25								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

36.66
− 4.76
31.90 (0.6) = 19.14 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Colin Doolan

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW028
DATE: 10/11/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1535	4.76										Start purge, clear
1545	7.64	2.00	200	7.01	0.213	5.9	0.16	18.81	31	0.01	clear
1555	9.52	3.75	175	7.06	0.214	6.7	0.16	18.78	30	0.01	clear
1605	11.12	5.50	175	7.09	0.223	7.7	0.07	18.53	29	0.01	clear
1615	12.59	7.25	175	7.14	0.231	11	0.00	18.33	25	0.01	clear
1625	13.90	9.00	175	7.38	0.233	12	0.00	18.11	-5	0.01	clear
1635	15.11	10.75	175	7.69	0.229	10	0.07	17.98	-42	0.01	clear
1645	15.68	12.00	125	7.79	0.228	9.9	0.00	17.98	-51	0.01	clear
1650	15.80	12.75	125	7.77	0.227	11	0.00	17.91	-50	"	clear
1655	15.91	13.25	100	7.77	0.225	11	0.00	17.87	-51	"	clear
1700	15.96	13.75	100	7.75	0.225	9.1	0.00	17.81	-51	"	clear
1705	16.05	14.25	100	7.76	0.222	8.2	0.00	17.79	-50	"	clear
1710	16.00	14.75	100	7.72	0.222	8.0	0.00	17.83	-49	"	clear, end purge
1715											Start sample

SIGNATURE(S): Chris [illegible]

PUMP INTAKE SET AT: 32.66' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0290109**
Sample Location: S57MW029
Sampled By: C. Doolan
C.O.C. No.: 3756
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mv)
Date: 10/11/05								
Time: 1855								
Method: Peristaltic	clear	7.33	0.202	20.16	9.2	0.00	0.01	-73

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/11/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 17.14'								
Static Water Level (WL): 5.41'								
One Casing Volume(gal/L): 7.04								
Start Purge (hrs): 1745								
End Purge (hrs): 1850								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 13.00								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

17.14
- 5.41
11.73 (0.6) = 7.04 L

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW029
DATE: 10/11/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1745	5.41										start purge, clear
1759	6.14	2.00	200	7.25	0.206	37	0.00	19.88	-53	0.01	v slightly cloudy
1805	6.12	4.00	200	7.43	0.203	35	0.00	20.07	-72	0.01	v slightly cloudy
1815	6.04	6.00	200	7.43	0.204	28	0.00	20.10	-75	"	clear
1825	6.03	8.00	200	7.38	0.209	24	0.00	20.13	-74	"	clear
1835	6.11	10.00	200	7.33	0.206	14	0.00	20.20	-71	"	clear
1845	6.02	12.00	200	7.34	0.204	11	0.00	20.12	-73	"	clear
1850	6.01	13.00	200	7.33	0.202	9.2	0.00	20.16	-73	"	clear, end purge
1855											start sample

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 13.14' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0300109**
Sample Location: S57MW030
Sampled By: C. Doolan
C.O.C. No.: 3756
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Date: 10/12/05								
Time: 1055								
Method: Peristaltic	clear	7.61	0.185	18.53	1.1	0.00	0.01	-34

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/12/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 36.74'								
Static Water Level (WL): 5.08'								
One Casing Volume(gal/L): 19.00								
Start Purge (hrs): 0935								
End Purge (hrs): 1050								
Total Purge Time (min): 75								
Total Vol. Purged (gal/L): 13.10								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

36.74
- 5.08
31.66 (0.6) = 19.00 L

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Colin Doolan

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW030
DATE: 10/12/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0935	5.08										start purge, clear
0945	6.05	1.75	175	7.42	0.199	5.3	0.00	19.49	-19	0.01	clear
0955	6.27	3.50	175	7.71	0.196	3.8	0.00	19.14	-47	0.01	clear
1005	6.40	5.25	175	7.67	0.192	1.4	0.00	19.02	-42	0.01	clear
1015	6.58	7.00	175	7.61	0.188	4.2	0.00	18.97	-31	"	clear
1025	6.80	8.75	175	7.62	0.187	1.6	0.00	18.64	-36	"	clear
1035	6.76	10.50	175	7.63	0.186	0.90	0.00	18.66	-38	"	clear
1045	6.81	12.25	175	7.62	0.184	0.75	"	18.57	-37	"	clear
1050	6.83	13.10	175	7.61	0.185	1.1	"	18.53	-34	"	clear, end purge
1055											start sample

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 32.74' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0310109**
Sample Location: S57MW031
Sampled By: C. Doolan
C.O.C. No.: 3756
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Date: 10/12/05								
Time: 0910								
Method: Peristaltic	clear	5.62	0.556	20.78	1.4	0.00	0.02	96

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/12/05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 22.26'								
Static Water Level (WL): 6.03'								
One Casing Volume(gal/L): 9.74								
Start Purge (hrs): 0745								
End Purge (hrs): 0905								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 13.50								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

22.26
- 6.03
16.23 (0.6) = 9.74 L

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S57MWDUP0409

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW031
DATE: 10/12/05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
0745	6.03										start purge, clear
0755	6.49	2.00	200	5.23	0.591	16	0.00	20.44	132	0.02	clear
0805	6.65	4.50	250	5.47	0.568	11	0.00	20.66	113	0.02	clear
~~0815~~		~~7.50~~	~~300~~								~~clear~~ (CD)
0810											stopped pump to meet subcontractors
0840											resumed flow
0845	6.66	7.50	300	5.55	0.572	3.7	0.00	20.48	100	0.02	clear
0855	6.74	10.50	300	5.64	0.552	2.7	0.00	20.63	95	0.02	clear
0900	6.76	12.00	300	5.62	0.553	2.1	"	20.65	95	"	clear
0905	6.78	13.50	300	5.62	0.556	1.4	"	20.78	96	"	clear, end purge
0910											start sample

SIGNATURE(S): [signature]

PUMP INTAKE SET AT: 18.26' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0320109**
Sample Location: S57MW032
Sampled By: FRED W RAMSER
C.O.C. No.: 3768
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-7-05								
Time: 0940								
Method: Peristaltic	CLR	6.25	1.90	22.75	2	4.02	0.1	-110

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-7-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 17.95								
Static Water Level (WL): 5.43								
One Casing Volume(gal/L): —								
Start Purge (hrs): 750								
End Purge (hrs): 0940								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 13 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

10' SATURATED SCREEN LENGTH ≈ 6.2 l ⇒ 6.2 l x 2 ≈ 12.4 PURGE VOLUME

Circle if Applicable:

MS/MSD	Duplicate ID No.:
✓	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW032
DATE: 10-7-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
0800	5.73	1.50	150	6.20	1.87	120	0.74	22.61	23	0.1	LOWERED FLOW
0810	5.71	2.65	115	6.21	1.87	75	3.79	22.68	-90	0.1	TO 115 ml/min
0820	5.72	3.80	115	6.22	1.88	30	4.85	22.65	-99	0.1	
0830	5.72	4.95	115	6.22	1.90	7	5.02	22.67	-103	0.1	
0840	5.73	6.10	115	6.23	1.91	5	5.17	22.67	-106	0.1	
0850	5.73	7.25	115	6.23	1.91	5	5.06	22.75	-107	0.1	
0900	5.73	8.40	115	6.24	1.89	4	4.95	22.79	-107	0.1	
0910	5.73	9.55	115	6.24	1.92	4	4.35	22.84	-107	0.1	
0920	5.73	10.70	115	6.24	1.92	3	4.05	22.75	-109	0.1	
0930	5.73	11.85	115	6.25	1.91	3	4.03	22.76	-110	0.1	
0940	5.73	13.00	115	6.25	1.90	2	4.02	22.75	-110	0.1	

SIGNATURE(S): Fred Williamson

PUMP INTAKE SET AT: SCREEN MID-POINT

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~305~~ 007 JOB # N~~4920~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0330109**
Sample Location: S57MW033
Sampled By: FRED WRAMSER
C.O.C. No.: 3768
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-6-05								
Time: 1410								
Method: Peristaltic	CLR	6.39	0.635	22.60	0	1.66	0.0	-112

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-6-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): –								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 18.72								
Static Water Level (WL): 7.25								
One Casing Volume(gal/L): –								
Start Purge (hrs): 1245								
End Purge (hrs): 1410								
Total Purge Time (min): 85								
Total Vol. Purged (gal/L) 12.75L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

10' SCREEN ⇒ 6.2 l × 2 = 12.4 l PURGE VOL.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
–	–

Signature(s): Fred Wramser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW033
DATE: 10-6-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1250	7.26	0.75	150	6.29	0.633	120	1.03	21.77	-39	0.0	
1300	7.26	2.25	150	6.30	0.624	33	0.90	22.09	-87	0.0	
1310	7.26	3.75	150	6.35	0.622	11	1.16	22.13	-100	0.0	
1320	7.26	5.25	150	6.37	0.624	5	1.50	22.24	-107	0.0	
1330	7.26	6.75	150	6.38	0.629	0	1.69	22.38	-110	0.0	
1340	7.24	8.25	150	6.39	0.640	0	1.74	22.48	-112	0.0	
1350	7.26	9.75	150	6.38	0.638	0	1.71	22.50	-112	0.0	
1400	7.26	11.25	150	6.39	0.634	0	1.69	22.55	-112	0.0	
1410	7.26	12.75	150	6.39	0.635	0	1.66	22.60	-112	0.0	COMPLETED PURGE

SIGNATURE(S): Fred Ramm

PUMP INTAKE SET AT: SCREEN MID. PT.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0340109**
Sample Location: S57MW034
Sampled By: FREDWRAMSEYER
C.O.C. No.: 3756
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-12-05								
Time: 1250								
Method: Peristaltic	CLR	4.38	0.387	20.30	0	0.98	0.0	176

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-12-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: 2" PVC								
Total Well Depth (TD): 17.37								
Static Water Level (WL): 5.08								
One Casing Volume(gal/L): —								
Start Purge (hrs): 1130								
End Purge (hrs): 1250								
Total Purge Time (min): 80								
Total Vol. Purged (gal/L): 12.5 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	

OBSERVATIONS / NOTES:

10' SCREEN ⇒ 6.2 l × 2 = 12.4 l PURGE VOL.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ramseyer

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW034
DATE: 10-12-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1140	5.37	2.0	200	4.51	0.385		0.90	19.93	155	0.0	
1150	5.31	3.50	150	4.43	0.387	30	0.66	19.99	163	0.0	
1200	5.31	5.00	150	4.41	0.383	6	0.71	20.18	167	0.0	
1210	5.31	6.50	150	4.40	0.384	3	0.79	20.19	171	0.0	
1220	5.31	8.00	150	4.39	0.385	0	0.89	20.28	173	0.0	
1230	5.31	9.50	150	4.38	0.386	0	0.95	20.26	175	0.0	
1240	5.31	11.00	150	4.37	0.387	0	0.98	20.25	176	0.0	
1250	5.31	12.50	150	4.38	0.387	0	0.98	20.30	176	0.0	COMPLETED PURGE

SIGNATURE(S): Fred W Rowe

PUMP INTAKE SET AT: MID-PT SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0350109**
Sample Location: S57MW035
Sampled By: C. Doolan
C.O.C. No.: 3768
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	~~Other~~ ORP (mV)
Date: 10-7-05								
Time: 1120								
Method: Peristaltic	clear	5.00	0.726	17.50	2.6	0.00	0.03	123

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-7-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 35.16'								
Static Water Level (WL): 21.21'								
One Casing Volume(gal/L): 8.37								
Start Purge (hrs): 1005								
End Purge (hrs): 1115								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 12.60								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

35.16
-21.21
13.95 (0.6) = 8.37 L

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW035
DATE: 10-7-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity % or ppt	Comments
1005	21.21										Start purge, clear
1015	21.33	1.80	180	4.80	0.759	20	0.00	17.25	141	.03	clear
1025	21.35	3.60	180	4.89	0.758	14	0.00	17.27	135	.03	clear
1035	21.36	5.40	180	4.90	0.741	8.7	0.00	17.32	133	"	clear, DO suspect
1045	21.37	7.20	180	4.94	0.732	5.5	"	17.32	130	"	clear
1055	21.37	9.00	180	4.96	0.730	4.6	"	17.26	127	"	clear
1105	21.38	10.80	180	4.97	0.727	3.2	"	17.41	126	"	clear
1115		12.60	180	5.00	0.726	2.6	"	17.50	123	"	clear, end purge
1120											Start sample

SIGNATURE(S): [illegible]

PUMP INTAKE SET AT: 31.16' BTOR

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~895~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0360109**
Sample Location: S57MW036
Sampled By: FRED W RANSER
C.O.C. No.: 3768
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10/6/05 Time: 1230 Method: Peristaltic	CLR	4.39	0.729	22.61	0	2.26	0.0	147

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-6-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 12.71								
Static Water Level (WL): 7.50								
One Casing Volume(gal/L):								
Start Purge (hrs): 1130								
End Purge (hrs): 1230								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 7.50L								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	

OBSERVATIONS / NOTES:

5' SCREEN ⇒ 3.1 l x 2 = 6.2 l PURGE VOL

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ranser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW036
DATE: 10-6-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
1140	7.55	1.25 l	125	4.31	0.965	5	0.91	22.43	143	0.0	
1150	7.55	2.50	125	4.37	0.896	0	1.15	22.60	145	0.0	
1200	7.56	3.75	125	4.39	0.771	0	2.16	22.54	146	0.0	
1210	7.56	5.00	125	4.39	0.735	0	2.29	22.57	146	0.0	
1220	7.56	6.25	125	4.38	0.730	0	2.27	22.60	147	0.0	
1230	7.56	7.50	125	4.39	0.729	0	2.26	22.61	147	0.0	COMPLETED PURGE

SIGNATURE(S): Fred M Rau

PUMP INTAKE SET AT: MID POINT OF SCREEN

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N4~~020~~ 2194

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: **S57MW0370109**
Sample Location: S57MW037
Sampled By: FRED W RAMSER
C.O.C. No.: 3756
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other ORP(mV)
Date: 10-12-05								
Time: 1055								
Method: Peristaltic	CLR	6.27	0.198	18.36	8	0.52	0.0	75

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-12-05								
Method: Peristaltic		See Low Flow Purge Data Sheet						
Monitor Reading (ppm): —								
Well Casing Diameter & Material Type: 2" PVC								
Total Well Depth (TD): 15.10								
Static Water Level (WL): 4.38								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 1005								
End Purge (hrs): 1055								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 6.25 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

5' SCREEN ⇒ 2 × 3.1 l = 6.2 l PURGE VOL

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ramser

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Indian Head, Site 57
PROJECT NUMBER: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

WELL ID.: S57MW037
DATE: 10-12-05

Time (Hrs.)	Water Level (Ft. below TOC)	Volume (L)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	ORP mV	Salinity (%) or ppt	Comments
~~1000~~ 1015	4.58	1.25	125	6.26	0.203		0.93	18.48	81	0.0	1015 HRS
1025	4.60	2.50	125	6.25	0.200	16	0.67	18.43	76	0.0	
1035	4.60	3.75	125	6.27	0.199	13	0.57	18.38	76	0.0	
1045	4.61	5.00	125	6.27	0.198	13	0.53	18.36	75	0.0	
1055	4.61	6.25	125	6.27	0.198	8	0.52	18.36	75	0.0	END PURGE

SIGNATURE(S): Fred W Kamsa

PUMP INTAKE SET AT: SCREEN MID-PT

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N~~4020~~ 2194

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: temp well point
[] QA Sample Type:

Sample ID No.: **S57GB0330109**
Sample Location: S57SB033
Sampled By: C. Doolan
C.O.C. No.: ~~8774~~ 3757
Type of Sample:
[] Low Concentration
[X] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 10/3/05								
Time: 1315								
Method: Peristaltic								

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date:								
Method:								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type:								
Total Well Depth (TD):								
Static Water Level (WL):								
One Casing Volume(gal/L):								
Start Purge (hrs):								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

Mixed Red "O" dye into ~ 40ml aliquot
No Reaction (non-detect
screen interval: (21' to 25')

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): C. Doolan

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ JOB # N4020 2194
007

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: GEOPROBE WELL POINT
[] QA Sample Type:

Sample ID No.: S57GB0~~2~~35 0109
Sample Location: S57SB0~~3~~35
Sampled By: FRED WRAMSON
C.O.C. No.: 3768
Type of Sample:
[] Low Concentration
[X] High Concentration

SAMPLING DATA:

Date: 10-6-05	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Time: 0800								
Method: Peristaltic				NA				

PURGE DATA:

Date:	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Method:								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type:								
Total Well Depth (TD):								
Static Water Level (WL):								
One Casing Volume(gal/L):								
Start Purge (hrs):								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

ADDED RED "O" DYE TO ~50ml MIXED WELL
NO INDICATION "NON-DETECT"
[SCREEN 10'-14']

Circle if Applicable:

MS/MSD	Duplicate ID No.:
✓	S57GBDUP0109

Signature(s): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head, Site 57
Project No.: CTO ~~805~~ 007 JOB # N ~~4020~~ 2194

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: TEMP WELL POINT
[] QA Sample Type:

Sample ID No.: S57GB0~~350~~109 36
Sample Location: S57SB0~~38~~ 36
Sampled By: FRED WRANSEN
C.O.C. No.: 3757
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Date: 10/5/05								
Time: 0740								
Method: Peristaltic								

PURGE DATA:

	Volume	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: —								
Method: —								
Monitor Reading (ppm): —								
Well Casing Diameter & Material								
Type: —								
Total Well Depth (TD): —								
Static Water Level (WL): —								
One Casing Volume(gal/L): —								
Start Purge (hrs):								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	4°C/HCl	3 x 40 ml glass vial	✓

OBSERVATIONS / NOTES:

MIXED RED "O" DYE INTO ~ 40ml ALIQUOT NO REACTION (NON-DETECT) FWR

screen interval: 16' to 20'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred Wransen

A.7 CHAIN OF CUSTODY FORMS

CHEMTECH
CHAIN OF CUSTODY RECORD

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: Tetra Tech NUS

ADDRESS: 6601 Andersen Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latulliper

PHONE: 412 921-7091 FAX:

PROJECT INFORMATION

PROJECT NAME: Indian Head

PROJECT NO.: 7129

PROJECT MANAGER: George Latulliper

LOCATION: Pittsburgh

PHONE: 412 921-7091 FAX:

BILLING INFORMATION

BILL TO: SAME AS PO #:

ADDRESS: CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 Moisture content
2 Grain size
3 Specific gravity
4 Bulk density
5
6
7
8
9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS ← Specify Preservatives A – HCl B – HNO_3 C – H_2SO_4 D – NaOH E – ICE F – Other
1.	SS7SB0220103	SO	1	X	8/29/01	1400	1	X	X	X	X						
2.	SS7SB0320403	SO	1	X	8/29/01	1345	1	X	X	X	X						
3.	SS7SB0210303	SO	1	X	8/15/01	1515	1	X	X	X	X						
4.	SS7SB0180303	SO	1	X	8/28/01	1030	1	X	X	X	X						
5.	SS7SB0310403	SO	1	X	8/29/01	0900	1	X	X	X	X						
6.	SS7SB0310203	SO	1	X	8/29/01	0838	1	X	X	X	X						
7.	SS7SB0220303	SO	1	X	8/14/01	1400	1	X	X	X	X						
8.	SS7SB0240103	SO	1	X	8/15/01	0920	1	X	X	X	X						

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [illegible]	8/29/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
Fed Ex Airbill - 830341777222

Page 1 of 1

Shipment Complete: Yes _____ No _____

Ver. 6/2000

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41522

CHEMTECH
CHAIN OF CUSTODY RECORD

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: Tetra Tech NUS

ADDRESS: 661 Anderson Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Lutenlupe

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: Indian Head

PROJECT NO.: 7129

PROJECT MANAGER: George Lutenlupe

LOCATION: Pittsburgh

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: SAME AS PO #:

ADDRESS: CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 Moisture content
2 Grain size
3 Specific gravity
4 bulk density
5
6
7
8
9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	SS7SB0210103	SO		X	8/14/01	1648	1	X	X	X	X						
2.	SS7SB0320203	SO		X	8/24/01	1315	1	X	X	X	X						
3.	SS7SB0180103	SO		X	8/23/01	0950	1	X	X	X	X						
4.	SS7SB0300203	SO		X	8/24/01	1015	1	X	X	X	X						
5.	SS7SB0300403	SO		X	8/24/01	1145	1	X	X	X	X						
6.	SS7SB0160303	SO		X	8/23/01	1440	1	X	X	X	X						
7.	SS7SB0160103	SO		X	8/23/01	1413	1	X	X	X	X						
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [illegible]	8/29/01 1700	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
Fed Ex AB# 830334177222

Page 2 of 2

Shipment Complete: Yes _____ No _____

Ver. 6/2000

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41523

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TTNUS

ADDRESS: 661 ANDERSEN DR

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULIPPE

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LATULIPPE

LOCATION: INDIAN HEAD MD

PHONE: 412-921 7090 FAX: —

BILLING INFORMATION

BILL TO: SAME AS CLIENT INFO PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOA w/ tbl
2 ARSENIC
3 TOC, CEC + pH
4 5 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57TB001000 2 3	AQ		X	8/17/01	1200	2	2									
2.	S57SS0220103	SO		X	8/14/01	1349	2	1	1								
3.	S57SB0220103	SO		X	8/14/01	1400	2	1		1							
4.	S57SB0220203	SO		X	8/14/01	1410	1	1									
5.	S57SB0220303	SO		X	8/14/01	1420		1		1							
6.	S57SB0230103	SO		X	8/14/01	1605		1									
7.	S57SS0230103	SO		X	8/14/01	1600		1									
8.	S57SB0230203	SO		X	8/14/01	1612		1									

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
[signature]	8/14/01 1930	1. FED EX
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
FED EX AB# 830334177450

Page 1 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15755

155

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: SEE PAGE 1 OF 2

ADDRESS:

CITY: STATE: ZIP:

ATTENTION:

PHONE: FAX:

PROJECT INFORMATION

PROJECT NAME:

PROJECT NO.: SEE PAGE 1 OF 2

PROJECT MANAGER:

LOCATION:

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOA w/ ethanol 2 ARSENIC 3 TOC, CFC + pH 4 ARSENIC, TOC, CFC + pH 5 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57SB0230303	SO		X	8/14/01	1625	1	1									
2.	S57SS0210103	SO		X	8/14/01	1642	2	1	1								
3.	S57SB0210103	SO		X	8/14/01	1648	1	1									
4.	S57SB0210203	SO		X	8/14/01	1700	1	1									
5.	S57FD0010003	SO		X	8/14/01	0000	1	1									S57SB0210203
6.																	
7.																	
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [signature]	8/14/01 1930	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
FED EX AB# 830334177450

Page 2 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15754

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TtNUS

ADDRESS: 661 ANDERSEN DR

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULIPPE

PHONE: 412 921 7090 FAX:

PROJECT INFORMATION

PROJECT NAME: INDIANHEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE L.

LOCATION: PITTSBURGH

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: SAME AS CLIENT INFO PO #:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCLVOC w/ ethyl ether
2 ARSENIC
3 TOC, CEC + pH
4 ~~TOC, CEC + pH~~
5 TOC, CEC + pH
6
7
8
9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS (← Specify Preservatives A – HCl, B – HNO_3, C – H_2SO_4, D – NaOH, E – ICE, F – Other)
1.	S57TB0020003	AQ		X	8/15/01	0800	2	2									
2.	S57RB0010003	AQ		X	8/15/01	1630	4	2	1	X							CALLED LAB TO CANCEL 8/16
3.	S57SS0200103	SO ~~AQ~~		X		0826	1		1								
4.	S57SB0200103	~~AQ~~ SO		X		0834	1		1								
5.	S57SS0240103	SO		X		0910	1	1									
6.	S57SB0240103	SO		X		0920	2	1			1						
7.	S57SB0240203	SO		X		0930	1	1									
8.	S57SS0250103	SO		X	8/15/01	0945	1	1									

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [signature]	8/15/01 1930	1. FED Ex
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
FED Ex 830334177428

Page 1 of _____

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15758

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY:

ADDRESS: SEE pg 1 of 3

CITY: STATE: ZIP:

ATTENTION:

PHONE: FAX:

PROJECT INFORMATION

PROJECT NAME:

PROJECT NO.: SEE pg 1 of 3

PROJECT MANAGER:

LOCATION:

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE pg 1 of 3

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOCs + ethyl ether
2 Arsenic
3 TOC
4 TOC, CEC + pH
5
6
7
8
9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57SB025 0103	SO		X	8/15/01	0955	1	1									
2.	S57SB025 0203	SO		X		1000	1	1									
3.	S57SB025 0303	SO		X		1007	1	1									
4.	S57SB026 0103	SO		X		1135	1			1							
5.	S57SB022 0403	SO		X		1420	1	1									
6.	S57SB021 0303	SO		X		1515	1	1			1	X					
7.	S57SB021 0403	SO		X	8/15/01	1530	1	1									
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. Fred M Ramos	8/15/01 1930	1. FED Ex
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:

Page 2 of 3

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15761

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TtNUS

ADDRESS: 6161 Andersen Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latulippe

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: Indianhead Site 57

PROJECT NO.: 7129

PROJECT MANAGER: George Latulippe

LOCATION: Pittsburgh

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: Same as Client Info

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOA w/ethylene
2 Cd, Cr
3 Cod + TOC
4 Hex. Cr.
5 Dis. Gases
6 hardness
7 Ferrous Fe
8 Misc. Anions
9 Sulfide
Alkalinity & TSS
CO2
Dissolved Fe

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1 HCl	2 HNO3	3 H2SO4	4 /	5 /	6 HNO3	7 /	8 /	9 NaOH	COMMENTS (← Specify Preservatives A – HCl, C – H2SO4, E – ICE, HNO3, NaOH, Other)		
1.	S57MW0020103	AQ		X	8/15/01	1515	15	2	1	1	1	3	1	1	1	1	1	1	
2.	S57MW0010103	AQ		X	8/15/01	1121	15	2	1	1	1	3	1	1	1	1	1	1	
3.																			
4.																			
5.																			
6.																			
7.																			
8.																			

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1 Jennifer Wellman	8/15/01 1930	1. FED Ex
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
FEDEx 830334177428

Page 3 of 3

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15760

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
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www.chemtech.net

4SB

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TENUS

ADDRESS: 661 ANDERSEN DR

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULIPPE

PHONE: 412-921-7090 FAX: —

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LATULIPPE

LOCATION: INDIAN HEAD

PHONE: — FAX: —

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

- ☐ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE: _____
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT: _____
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1 TCL VOC + 8 ARSENIC 2 TOC 3 4 5 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS (← Specify Preservatives: A – HCl, B – HNO_3, C – H_2SO_4, D – NaOH, E – ICE, F – Other)
1.	S57TB0030003	AQ		X	8/16/01	0800	2										FROM LAB
2.	S57FB0010003	AQ		X	8/16/01	1330	~~4~~ 3	2	1	~~1~~ HPL							
3.	S57SS0280103	SO		X	8/16/01	1047	1	1									
4.	S57SB0280103	SO		X	8/16/01	1057	1	1									
5.	S57SBDUP02	SO		X	8/16/01	0000	1	1									S57SB0280103
6.	S57SB0280203	SO		X	8/16/01	1121	3	3									RUN MS/MSD
7.	S57SB0280303	SO		X	8/16/01	1127	1	1									
8.	S57SB0280403	SO		X	8/16/01	1150	1	1									

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [signature]	8/16/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:

FED EX AB# 830334177439

Page _____ of _____

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TtNUS

ADDRESS: 661 ANDERSON DR

CITY: PGH STATE: PA ZIP 15220

ATTENTION: GEORGE LATULIPPE

PHONE: 412-921-7090 FAX: —

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD NSWC

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LATULIPPE

LOCATION: INDIAN HEAD MD

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOC + C.C. 2 ARSENIC 3 TOC 4 5 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57SBDUP03	SO		X	8/16/01	~~1500~~ 0800	1	1									S57SB0280403
2.	S57FB0020003	AQ		X	8/16/01	1500	3	2	1								
3.	S57RB0020003	AQ		X	8/16/01	1600	3	2	1								
4.																	
5.																	
6.																	
7.																	
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [signature]	1900 8/16/01	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:

FED EX AB# 830334177439

Page _____ of _____

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15757

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TENUS

ADDRESS: 6161 Andersen Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latulippe

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: Indianhead Site 57

PROJECT NO.: 7129

PROJECT MANAGER: George Latulippe

LOCATION: Pittsburgh

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: SAME AS CLIENT INFO PO#

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOL + ethylether
2 Cad, Cr
3 COD, TOC
4 Hex. Cr
5 Dissolved Gases
6 hardness
7 Ferrous Iron
8 Misc. Anions
9 Alkalinity & TSS
BOD, DOC
CO2
Fe dissolved
Sulfide

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS			
1.	557MWDUP01	AQ		X	8/16/01	0000	16	2	1	1	1	3	1	1	1	1	1	1	1	1
2.	557MW003010 3	AQ		X	8/16/01	1030	16	2	1	1	1	3	1	1	1	1	1	1	1	1
3.	557MW004010 3 *	AQ		X	8/16/01	1605	48	6	3	3	3	9	3	3	3	3	3	3	3	3
4.																				
5.																				
6.																				
7.																				
8.																				

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [signature]	8/16/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments: * RUN MS/MSD ON THIS SAMPLE
FED Ex AB# 830334177439

Page _____ of _____

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15764

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TT NUS

ADDRESS: 661 ANDERSEN DR.

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: G. LATULZOPE

PHONE: 412-921-7090 FAX: 412-921-4040

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LATULZOPE

LOCATION: PITTSBURGH

PHONE: 412-921-7090 FAX: 412-921-4040

BILLING INFORMATION

BILL TO: SAME AS CLIENT INFO

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOCS + ETHYL ETHER 2 3 4 5 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57SS0290103	SOIL		✓	8/17/01	1100	1	1									
2.	S57SB0290103	↓		✓	↓	1110	1	1									
3.	S57SB0290203	↓		✓	↓	1132	1	1									
4.	S57SB0290303	↓		✓	↓	1210	1	1									
5.	S57SB0290403	↓		✓	↓	1220	1	1									
6.																	
7.																	
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. Robert Bellerose	8/17/01 1500	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:

Page _____ of _____

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15756

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TTNUS

ADDRESS: 661 ANDERSON DR.

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULZPPE

PHONE: 412-921-7090 FAX: 412-921-4040

PROJECT INFORMATION

PROJECT NAME: INDIANHEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LATULZPPE

LOCATION: PITTSBURGH

PHONE: 412-921-7090 FAX: 412-921-4040

BILLING INFORMATION

BILL TO: SAME AS CLIENT INFO

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOC + TENTATIVE
2 CAD CR
3 COD + TOC
4 PH + CR
5 DISSOLVED GAS
6 HARDNESS
7 FLOWS + PH
8 MISC ANIONS
9 AMMONIA + TSS
BOD COD
CR + DISSOLVED

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	557TB0011 0003	WATER		✓	8/17/01	0900	1	2									
2.	557MW011 0103	GW		✓	↓	1200	1	2	1	1	1	3	1	1	1	1	1
3.	557MW011 0103	↓		✓	↓	1100			1	1			1			1	1
4.																	
5.																	
6.																	
7.																	
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. Robert Balthaus	8/17/01 / 1800	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler ____
Comments:

Page_____ of_____

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15765

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TtNUS

ADDRESS: 661 ANDERSEN DR

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULIPPE

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE L.

LOCATION: INDIAN HEAD

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

- ☐ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE: _____
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT: _____
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1 TCL VOA + Ethylene Glycol
2 Cad, CF
3 COD + TOC
4 HEX CF
5 DISSOLVED GASES
6 HARDNESS
7 FERROUS IRON
8 MISC ANIONS
9 ALK + TSS
BOD + DOC
CO2
Fe (DISS)
SULFIDE

PRESERVATIVES

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – CE F – Other

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57TB0050003	AQ		X	8/29/01	1200	2	2									
2.	S57RB0030003	AQ		X	8/29/01	1600	7	2	1		1			1	1		X 1
3.	S57TW0170103	AQ		X	8/29/01	1601	15	2	1	1	1	3	1	1	1	1	1 1 1
4.																	
5.																	
6.																	
7.																	
8.																	

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. FRED [illegible]	8/29/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments: FEDEX AB# 830334177380

Page _____ of _____

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15735

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TtNUS

ADDRESS: 661 ANDERSEN DR

CITY: PGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATUILLIPE

PHONE: 412-921-7090 FAX: —

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE L.

LOCATION: INDIAN HEAD

PHONE: 412-921-7090 FAX: —

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SAME AS CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

- ☐ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE: _____
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT: _____
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1 TCL VOAs + 8 Cl
2 Cd + Cr
3 COD + TOC
4 HEX Cr
5 DISSOLVED GASES
6 HARDNESS
7 FERROUS IRON
8 MISCELLANEOUS
9 ALK, TSS, BOD + DOC, CO3, Fe (DISS), SULFIDE

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS (← Specify Preservatives A – HCl, B – HNO_3, C – H_2SO_4, D – NaOH, E – ICE, F – Other)			
1.	S57TB0060003	AQ		X	8/21/01	1000	2	2												
2.	S57RB0040003	AQ		X	8-21-01	1600	2	2												
3.	S57TW0180103	AQ		X	8/21/01	1345	15	2	1	1	1	3	1	1	1	1		1	1	1	
4.	S57MWDUP02	AQ		X	8/21/01	0000	15	2	1	1	1	3	1	1	1	1		1	1	1	S57TW0180103
5.	S57TW0190103	AQ		X	8/21/01	1115	15	2	1	1	1	3	1	1	1	1		1	1	1	
6.	S57TW0160103	AQ		X	8/21/01	0850	14	2	1	1	[illegible]	3	1	1	1	1		1	1	1	
7.	S57TW0160103	AQ		X	8/21/01	1100	1				1									
8.																				

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. S Wilamson	8/21/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments: FED EX AB# 830334224747

Page _____ of _____

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15734

CHEMTECH
CHAIN OF CUSTODY RECORD

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TTNUS

ADDRESS: 661 ANDERSEN DRIVE

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULZIPPE

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LATULZIPPE

LOCATION: INDIAN HEAD MD

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: SAME AS CLIENT INFO PO#:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOC + 10 CAS + TNTO 2 3 4 5 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1	2	3	4	5	6	7	8	9	COMMENTS
1.	SS7SS0270103	SOIL		✓	8/21/01	1112	1	1									
2.	SS7SB0270103	↓		✓	↓	1125	1	1									
3.	SS7SB0270203	↓		✓	↓	1136	1	1									
4.	SS7SB0270303	↓		✓	↓	1155	1	1									
5.	SS7SB0270403	↓		✓	↓	1215	1	1									
6.																	
7.																	
8.																	

PRESERVATIVES

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. J Williamson	8/21/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:
FED EX AB# 830334224747

Page_____ of_____ Shipment Complete: Yes _____ No _____

Ver. 6/2000 WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41515

CHEMTECH
CHAIN OF CUSTODY RECORD

284 SHEFFIELD
MONTVILLE NJ
07092

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TETRA TECH

ADDRESS: 661 ANDERSEN

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULIPPE

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD FS. SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LAT.

LOCATION: INDIAN HEAD MD

PHONE: 412 921 7090 FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOA + CF
2 Cd + CF
3 Cr + CF
4 HEX CF
5 DISS GAS
6 HARDNESS
7 FERROUS IRON
8 MISC ANIONS
9 ALK + TSS
BOD + DOC
CO2
Fe (DISS)
SULFIDE

PRESERVATIVES

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57TB0070003	AQ		X	8/22/01	0800	2	2									
2.	S57TW0150103	AQ		X	8/22/01	1239	15	2	1	1	1	3	1	1	1	1	
3.	S57MW0080103	AQ		X	8/22/01	1515	16	2	1	1	1	3	1	1	1	1	1
4.	S57MW0130103	AQ		X	8/22/01	1100	15	2	1	1	1	3	1	1	1	1	
5.	S57MW0120103	AQ		X	8/22/01	0115	15	2	1	1	X	3	1	1	1	1	
6.	S57TW0210103	AQ		X	8/22/01	1530	15	2	1	1	1	3	1	1	1	1	
7.	S57RB0050003	AQ		X	8/22/01	1650	2	2									
8.	S57MW0120103	AQ		X	8/22/01	1100					1						

COMMENTS: ← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [signature]	8/22/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:

FED EX AB# 830334177347

Page 1 of 2

Shipment Complete: Yes _____ No _____

Ver. 6/2000

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41516

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TT NUS

ADDRESS: 661 ANDERSEN DRIVE

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: G. LATULIPPE

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: BWC INDIAN HEAD

PROJECT NO.: N07129

PROJECT MANAGER: G. LATULIPPE

LOCATION: INDIAN HEAD, M.D.

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: AMEAS CLIENT IAFP PO#

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOCs + EDB 2 3 4 5 6 7 8 9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1 (4°C)	2	3	4	5	6	7	8	9	COMMENTS
1.	S57SB0330103	SOIL		✓	8/22/01	1457	1	1									
2.																	
3.																	
4.																	
5.																	
6.																	
7.																	
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. J. Ramsey	8/22/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
FED EX AB# 830334177347

Page 2 of 2

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15737

CHEMTECH
CHAIN OF CUSTODY RECORD

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: Tetra Tech NUS

ADDRESS: 661 Anderson Drive

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Lalullipe

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: Indian Head

PROJECT NO.: 7129

PROJECT MANAGER: George Lalullipe

LOCATION: Indian Head

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SAME AS CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOC + Xylenes
2 Cd Cr
3 Cd Tot
4 Hex Cr
5 Dissolved Gases
6 Hardness
7 Ferrous Iron
8 Mix. Anions
9 Sulfide
Alkalinity, TSS
DOC, BOC
CO2
Preserved

PRESERVATIVES

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1	2	3	4	5	6	7	8	9					
1.	S57MW0090103 *	AQ		X	8/23/01	1130	35	6	3	1	X	9	1	3	1	1	1		1	3	
2.	S57MW0100103	AQ		X	8/23/01	1214	15	2	1	1	1	3	1	1	1	1	1		1	1	
3.	S57MWDUP03	AQ		X	8/23/01	0000	15	2	1	1	1	3	1	1	1	1	1		1	1	MW07
4.	S57MW0070103	AQ		X	8/23/01	0915	15	2	1	1		3	1	1	1	1	1	1	1	1	
5.	S57MW0070103	AQ		X	8/23/01	1550	1				1										
6.	S57MW0050103	AQ		X	8/23/01	1504	15	2	1	1	1	3	1	1	1	1	1		1	1	
7.	S57MW0090103	AQ		X	8/23/01	1200	3				3*										
8.																					

COMMENTS

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. S. Klausner	8/23/01 1900hr	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments: * MS/MSD

FEDEX AB# 830334177370

Page 1 of 5

Shipment Complete: Yes _____ No _____

Ver. 6/2000

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41519

CHEMTECH
CHAIN OF CUSTODY RECORD

284 SHEFFIELD ST
MOUNTAINSIDE NJ
07092

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TENUS

ADDRESS: 661 ANDERSEN DR

CITY: PGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULIPPE

PHONE: 412-921-7090 FAX: —

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LATULIPPE

LOCATION: INDIAN HEAD MD.

PHONE: 412 921 7090 FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SAME AS ABOVE

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOA + ee
2 Cad, CT
3 COD - TOC
4 Hex CT
5 DISS GASES
6 HARDNESS
7 FERROUS IRON
8 MUNC AMONS
9 ALK 4755
BOD + DOC
CO2
Cl (Vol)

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	557TB0080003	AQ		X	8/22/01	0800	2	2									
2.	~~557TW0090103~~	~~AQ~~		~~X~~	~~8/22/01~~	~~1130~~		FUR									
3.	557TW0140103	AQ		X	8/22/01	1625	15	2	1	1	1	3	1	1	1	1	1 1 1
4.																	
5.																	
6.																	
7.																	
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1 S.M. Ramsey	8/23/01 1900HR	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
FED Ex AB# 830334177370

Page 2 of 5

Shipment Complete: Yes _____ No _____

Ver. 6/2000

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41517

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TTNUS

ADDRESS: 661 ANDERSEN DR

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: G. LATULIPPE

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: NSWC INDIAN HEAD

PROJECT NO.: N7129

PROJECT MANAGER: G. LATULIPPE

LOCATION: INDIAN HEAD, MD

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: SAME AS CLIENT INFO

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOC's w/ Ethanol
2 ARSENIC
3 ABSENCE, LEC + pH
4 ABSENCE, LEC + pH
5 6 7 8 9

PRESERVATIVES

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57SS0180103	SOIL		✓	8/23/01	0930	2	1	1								
2.	S57SB0180103			✓		0950	2	1		1							
3.	S57SB0180203			✓		1001	1	1									
4.	S57SB0180303			✓		1030	1	1			1						
5.	S57SB0180403			✓		1055	1	1									
6.	S57SS0190103			✓		1114	1	1									
7.	S57SB0190103			✓		1120	1	1									
8.	S57SB0190203			✓		1125	1										

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. J W Ramsey	8/23/01 1900HR	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments: FED EX AB# 830334177370

Page 3 of 5

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15740

CHEMTECH
CHAIN OF CUSTODY RECORD

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TTMS

ADDRESS: 661 ANDERSON DR.

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULIPPE

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: PUBLIC INDIAN HEAD

PROJECT NO.: 07129

PROJECT MANAGER: GEORGE LATULIPPE

LOCATION: INDIAN HEAD, MD

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOC + TICS
2 ARSENIC
3 ARSENIC (EC) + pH
4 CEC + pH
5
6
7
8
9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57SB0170403	SOIL		✓	8/23/01	1325	1	1									
2.	S57SB0160103			✓		1403	2	1	1								
3.	S57SB0160103			✓		1413	2	1		1							
4.	S57SB0160203			✓		1420	1	1									
5.	S57SB0160303			✓		1440	2	1			1						
6.	S57SB04P04			✓		0000	2	1		1							
7.	S57RB0060003	WATER		✓		1745	2	1	1								
8.																	

PRESERVATIVES

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. S.W. Ramos	8/23/01 1900 HR	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments: FED EX AB# 830334177370

Page 4 of 5

Shipment Complete: Yes _____ No _____

Ver. 6/2000

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41518

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TTNUS

ADDRESS: 661 ANDERSON DR

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LATULZIPPE

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: NSWC INDIAN HEAD

PROJECT NO.: N7129

PROJECT MANAGER: GEORGE LATULZIPPE

LOCATION: INDIAN HEAD, M.D.

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

- ☐ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE: _____
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT: _____
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1 TCL VOCS + TCMC EDBR
2 ARSENIC
3 ARSENIC (LEACHED)
4
5
6
7
8
9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57SB0190303	SOIL		✓	8/03/01	1142	1	1									
2.	S57SB0190403			✓		1155	1	1									
3.	S57SSDUP01			✓		0000	2	1	1								
4.	S57SSDUP02			✓		0000	2	1	1								
5.	S57SS0170103			✓		1245	2	1	1								
6.	S57SB0170103			✓		1251	2	1	1								
7.	S57SB0170203			✓		1304	1	1									
8.	S57SB0170303			✓		1312	1	1									

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. JWRamos	8/23/01 1900HR	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments: FED EX AB# 830334177370

Page 5 of 5

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15736

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TETRA TECH

ADDRESS: 661 ANDERSON DR

CITY: PGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LAVOLIPPE

PHONE: 412-921-7090 FAX: —

PROJECT INFORMATION

PROJECT NAME: INDIAN HEAD

PROJECT NO.: 7129

PROJECT MANAGER: GEORGE LAT.

LOCATION: INDIAN HEAD

PHONE: 412-921-7090 FAX: —

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

- ☐ RESULTS ONLY
- ☐ RESULTS PLUS QC
- ☐ REGULATORY FORMAT, STATE: _____
- ☐ NEW JERSEY REDUCED DELIVERABLES
- ☐ CLP
- ☐ EDD FORMAT: _____
- ☐ NY STATE CATEGORY A
- ☐ NY STATE CATEGORY B

ANALYSIS

1 TCL VOC's from Leader
2 TOC + pH
3
4
5
6
7
8
9

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57TB0090003	WATER		✓	8/24/01	0730	2	2									
2.	S57SB0310103	SOIL		✓		0807	3	3									RUN MS/MSD (VOC'S)
3.	S57SB0310203			✓		0828	2	1	1								
4.	S57SB0310303			✓		0840	1	1									
5.	S57SB0310403			✓		0900	4	3	1								RUN MS/MSD (VOC'S)
6.	S57SB0300103			✓		1005	1	1									
7.	S57SB0300203			✓		1015	2	2	1								
8.	S57SB0300303			✓		1045	1	1									

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. S. Lamson	8/24/01 1530	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments:

FED EX AB# 830334224758

Page 1 of 3

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

Ver. 7/2001

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

15762

CHEMTECH
CHAIN OF CUSTODY RECORD

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TtNUS

ADDRESS: 601 Andersen Dr

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latullipe

PHONE: 412-921-7090 FAX: ——

PROJECT INFORMATION

PROJECT NAME: Indian Head

PROJECT NO.: 7129

PROJECT MANAGER: George Latullipe

LOCATION: Indian head

PHONE: 412-921-7090 FAX: ——

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SAME AS CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOA + e2
2 Cd + Cr
3 COD + TDC
4 Hex Cr
5 Dissolved Gases
6 Hardness
7 Ferrous Iron
8 Mix Anions
9 Alk + TSS
Carbon Dioxide
Dissolved Fe
Sulfide

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1 (HCl)	2 (HNO_3)	3 (H_2SO_4)	4	5	6 (HNO_3)	7	8	9	COMMENTS ← Specify Preservatives A – HCl B – HNO_3 C – H_2SO_4 D – NaOH E – ICE F – Other			
1.	S57MW0060103	AQ		X	8/24/01	0858	14	2	1	1		3	1	1	1	1	1	1	1	
2.	S57MW0060103	AQ		X	8/24/01	1445	1				1									
3.																				
4.																				
5.																				
6.																				
7.																				
8.																				

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
T. Kramer	8/24/01 1530	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____

Comments: Fed Ex AB# 830334224758

Page 2 of 3

Shipment Complete: Yes _____ No _____

Ver. 6/2000

WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41521

CHEMTECH
CHAIN OF CUSTODY RECORD

284 Sheffield Street, Mountainside, NJ 07092
(908) 789-8900 Fax (908) 789-8922
www.chemtech.net

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TTNUS

ADDRESS: 661 ANDERSEN DR

CITY: PITTSBURGH STATE: PA ZIP: 15220

ATTENTION: G. LATULZPPE

PHONE: 412 921 7090 FAX:

PROJECT INFORMATION

PROJECT NAME: NSWC INDIAN HEAD

PROJECT NO.: 7129

PROJECT MANAGER: G. LATULZPPE

LOCATION: INDIAN HEAD, MD

PHONE: 412 921 7090 FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: SEE CLIENT INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ NY STATE CATEGORY A
☐ RESULTS PLUS QC ☐ NY STATE CATEGORY B
☐ REGULATORY FORMAT, STATE: _____
☐ NEW JERSEY REDUCED DELIVERABLES
☐ CLP
☐ EDD FORMAT: _____

ANALYSIS

	1	2	3	4	5	6	7	8	9
	TCLVOC'S	TOX	pH	TOC					

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	SS7SB0320403	SOIL		✓	8/24/01	1145	2	1	1								Run VOS/MD on VOC
2.	SS7SBDUP05			✓		0000	2	1	1								
3.	SS7SBDUP06			✓		0000	2	1	1								
4.	SS7SB0320103			✓		1305	1	1									
5.	SS7SB0320203			✓		1315	2	1	1								
6.	SS7SB0320303			✓		1335	1	1									
7.	SS7SB0320403			✓		1345	2	1	1								
8.	SS7RB0070003	WATER		✓	8/24/01	1445	3	2		1							

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [signature]	8/24/01 1530	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
FED Ex AB# 830334224758

Page 3 of 3

SHIPPED VIA: CLIENT: ☐ HAND DELIVERED ☐ OVERNIGHT
CHEMTECH: ☐ PICKED UP ☐ OVERNIGHT

Shipment Complete: ☐ YES ☐ NO

CHEMTECH
CHAIN OF CUSTODY RECORD

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TT NUS

ADDRESS: 661 Andersen Dr.

CITY: Pittsburgh STATE: PA ZIP: 15220

ATTENTION: George Latulippe

PHONE: 412-921-7090 FAX:

PROJECT INFORMATION

PROJECT NAME: Indian Head

PROJECT NO.: 7129

PROJECT MANAGER: G. Latulippe

LOCATION: Indian head

PHONE: 412-921-7090 FAX:

BILLING INFORMATION

BILL TO: SEE CLIENT INFO PO#:

ADDRESS:

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

1 TCL VOCs + TCC
2 Cd + Cr
3 COD + TOC
4 Hex Cr
5 Diss. Gases
6 Hardness
7 Ferrous Iron
8 Misc. Anions
9 Alk + TSS
Carbon Dioxide
Dissolved Fe
Sulfide

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS (← Specify Preservatives: A – HCl, B – HNO_3, C – H_2SO_4, D – NaOH, E – ICE, F – Other)
1.	SS7 TB011003	AQ		X	8/29/01	0700	2	2									
2.	SS7 MW020103	AQ		X	8/29/01	1008	14	2	1	1		3	1	1	1	1	1 1 1
3.	SS7 MW060103	AQ		X	8/29/01	1010	1				1						
4.	SS7 MW023010 3	AQ		X	8/29/01	0840	2	2									
5.	SS7 MW022010 3	AQ		X	8/29/01	1326	15	2	1	1	1	3	1	1	1	1	1 1 1
6.																	
7.																	
8.																	

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. Brooke C. Wellman	8/29/01 1900	1.
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments:
Fed Ex AB# 830334177325

Page 1 of _____ Shipment Complete: Yes _____ No _____

Ver. 6/2000 WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41525

CHEMTECH
CHAIN OF CUSTODY RECORD

☐ 110 Route 4
Englewood, NJ 07631
(201) 567-6868
Fax (201) 567-1333

☐ 205 Campus Plaza 1
Edison, NJ 08837
(732) 225-4111
Fax (732) 225-4110

CHEMTECH JOB NO.:

CHEMTECH QUOTE NO.:

CLIENT INFORMATION

REPORT TO BE SENT TO:

COMPANY: TENUS

ADDRESS: 661 ANDERSON DR

CITY: PGH STATE: PA ZIP: 15220

ATTENTION: GEORGE LAMPOLIPS

PHONE: 412 921-8684 FAX: 412 921-4040

PROJECT INFORMATION

PROJECT NAME: [illegible] HEAD SITE 57

PROJECT NO.: 7129

PROJECT MANAGER: [illegible]

LOCATION: [illegible]

PHONE: FAX:

BILLING INFORMATION

BILL TO: PO #:

ADDRESS: [illegible] INFO

CITY: STATE: ZIP:

ATTENTION: PHONE:

DATA TURNAROUND INFORMATION

FAX: _____ DAYS *
HARD COPY: _____ DAYS *
EDD: _____ DAYS *
* TO BE APPROVED BY CHEMTECH
** NORMAL TURNAROUND TIME - 14 DAYS

DATA DELIVERABLE INFORMATION

☐ RESULTS ONLY ☐ USEPA CLP
☐ RESULTS + QC ☐ NYS ASP "B"
☐ NJ REDUCED ☐ NYS ASP "A"
☐ NJ CLP ☐ EDD
☐ EDD FORMAT: _____

ANALYSIS

TCL VOCs

CHEMTECH SAMPLE ID	PROJECT SAMPLE IDENTIFICATION	SAMPLE MATRIX	SAMPLE TYPE COMP	SAMPLE TYPE GRAB	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	# OF BOTTLES	PRESERVATIVES 1	2	3	4	5	6	7	8	9	COMMENTS
1.	S57TB010203	AQ		X	8/30/01	1400	2	2									
2.	S57CP0040103	AQ		X	8/30/01	1800	2	2									
3.	S57CP0100103	AQ		X	8/30/01	1430	2	2									
4.	S57CP0050103	AQ		X	8/30/01	0130	2	2									
5.	S57CP0060103	AQ		X	8/30/01	1200	2	2									
6.	S57CPDUP01	AQ		X	8/30/01	0000	2	2									
7.																	
8.																	

← Specify Preservatives
A – HCl B – HNO_3
C – H_2SO_4 D – NaOH
E – ICE F – Other

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION INCLUDING COURIER DELIVERY

RELINQUISHED BY SAMPLER:	DATE/TIME:	RECEIVED BY:
1. [illegible]	8/30/01 1900	1. FED Ex
RELINQUISHED BY: 2.	DATE/TIME:	RECEIVED BY: 2.
RELINQUISHED BY: 3.	DATE/TIME:	RECEIVED FOR LAB BY: 3.

Conditions of bottles or coolers at receipt: ☐ Compliant ☐ Non-Compliant ☐ Temp. of Cooler _____
Comments: FEDEx AB# 830334177314

Page 1 of 1 Shipment Complete: Yes _____ No _____

Ver. 6/2000 WHITE – CHEMTECH COPY FOR RETURN TO CLIENT YELLOW – CHEMTECH COPY PINK – SAMPLER COPY

41526

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER K-1 | PAGE 1 OF 1

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
4020	INDIANHEAD	GEORGE LATULIPPE 412-921-8684	KATAHDIN ANALYTICAL COLBY
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
Fred W Ramser		FRED W RAMSER 412-921-8838	340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER	CITY, STATE
S J Conti		FED EX 8455 4237 8415	WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G P P P P P

PRESERVATIVE USED: HCL 4°C; 4°C; HNO3; HNO3; NaOH; NaOH; H2SO4 4°C; ZnAc/NaOH 4°C; H2SO4 4°C; 4°C

DATE YEAR 2004	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs + Ethylether	ALK + MISC ANIONS	TOTAL TAL METALS	DISSOLVED METALS	TOTAL CN	DISSOLVED CN	TOC	SULFIDE	TIC	TDS/TSS	COMMENTS
3/30	0800	S57TB0010009	AQ	FROM LAB	2	2										
3/30	10~~45~~ 50	S57MW0120109	AQ	G	8	3		1	1	1	1				1	(TIME 1050 HRS)
3/30	1125	S57MW0010109	AQ	G	8	3		1	1	1	1				1	
3/30	~~1210~~ 1215	S57MW0130109	AQ	G	8	3		1	1	1	1				1	
3/30	1305	S57MW0020109	AQ	G	8	3		1	1	1	1				1	
3/30	1525	S57MW0040109	AQ	G	14	3*	1	1	1	1	1	2	1	2	1	*HI LEVEL/ CONCENTRATION
3/30	0000	S57GWDUP0109	AQ	G	14	3*	1	1	1	1	1	2	1	2	1	
3/30	1525	S57MW0030109	AQ	G	14	3*	1	1	1	1	1	2	1	2	1	*HI CONCENTRATION
3/30	1740	S57RB0010009	AQ	G	12	3	1	1		1		2	1	2	1	

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Fred W Ramser	3/30/04	1900	FED EX		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS *PLEASE RUN TWO DILUTION LEVELS ON THESE SAMPLES IF NEEDED.

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TINUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER K-2 | PAGE 1 OF 1

PROJECT NO: 4020	SITE NAME: INDIAN HEAD	PROJECT MANAGER AND PHONE NUMBER: GEORGE LATILLIPPE 412-921-8684	LABORATORY NAME AND CONTACT: KATAHDIN ANALYTICAL ANDRIA COLBY
SAMPLERS (SIGNATURE): Fred W Ramser, S J Conta		FIELD OPERATIONS LEADER AND PHONE NUMBER: FRED W RAMSER 412-921-8838	ADDRESS: 340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER: FED EX 8455 4237 8470	CITY, STATE: WESTBROOK ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs + ee	ALK + MISC ANIONS	TOTAL TAL METAL	DISSOLVED TAL METALS	TOTAL CN	DISSOLVED CN	TOC	SULFIDE	TIC	TDS/TSS	COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						G	P	P	P	G	P	G	P			
PRESERVATIVE USED						HCL	4°	HNO3	NaOH	H2SO4	ZnAc NaOH	H2SO4	4°			
3/31	0900	S57TB0020009	AQ	FROM LAB	2	2										
3/31	1010	S57MW0090109	AQ	G	14	3	1	1	1	1	1	2	1	2	1	
3/31	1050	S57MW0080109	AQ	G	14	3	1	1	1	1	1	2	1	2	1	
3/31	1220	S57MW0100109	AQ	G	14	3	1	1	1	1	1	2	1	2	1	
3/31	1250	S57MW0070109	AQ	G	14	3	1	1	1	1	1	2	1	2	1	
3/31	1530	S57MW0240109	AQ	G	~~39~~ 29	9	3	3	3	3	3	6	3	6	1	RUN MS/MSD
3/31	1620	S57MW0110109	AQ	G	14	3	1	1	1	1	1	2	1	2	1	

1. RELINQUISHED BY: Fred W Ramser	DATE: 3/31/04	TIME: 1900	1. RECEIVED BY: FED EX	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TINUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER K-3 | PAGE 1 OF 1

PROJECT NO: 4020	SITE NAME: INDIAN HEAD	PROJECT MANAGER AND PHONE NUMBER: GEORGE LATULIPPE 412-921-8684	LABORATORY NAME AND CONTACT: KATAHDIN ANALYTICAL
SAMPLERS (SIGNATURE): Fred W Ramser, S J Conte		FIELD OPERATIONS LEADER AND PHONE NUMBER: FRED W RAMSER 412-921-8838	ADDRESS: 340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER: FED EX 8455 4237 8426	CITY, STATE: WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G)
PRESERVATIVE USED

DATE YEAR 2004	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	VOCs + ee (HCL)	Alk + misc Anions (None 4°)	Total Total Metals (HNO3)	Dissolved Metals	Total CN (NaOH 4°)	Dissolved CN	TOC (H2SO4 4°)	Sulfide (ZnAc/NaOH)	TIC (H2SO4 4°)	TDS/TSS (4°)	COMMENTS
4/1	0900	S57TB0030009	AQ	G	2	2										
4/1	0945	S57MW0050109	AQ	G	8	3		1	1	1	1				1	
4/1	1150	S57MW0060109	AQ	G	8	3		1	1	1	1				1	
4/1	~~1350~~ 1520	S57MW0250109	AQ	G	14	3	1	1	1	1	1	2	1	2	1	
4/1	1520	S57MW0220109	AQ	G	14	3	1	1	1	1	1	2	1	2	1	
4/1	1210	S57MW0230109	AQ	G	7	3		1	1	1	1					
4/1	1045	~~S57A~~ IW80	AQ	G	7	3		1	1	1	1					
4/1	0000	S57GWDUP0209	AQ	G	14	3	1	1	1	1	1	2	1	2	1	
4/1	1010	S57MW0200109	AQ	G	14	3	1	1	1	1	1	2	1	2	1	

1. RELINQUISHED BY: S J Conte	DATE: 4/1/04	TIME: 1900	1. RECEIVED BY: FED EX	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC.

CHAIN OF CUSTODY | NUMBER MS-1 | PAGE 1 OF 2

PROJECT NO:	SITE NAME:	PROJECT MANAGER AND PHONE NUMBER	LABORATORY NAME AND CONTACT:
4020	INDIAN HEAD	GEORGE LATULIPPE 412-921-8684	MICROSEEPS BECKY HAWS
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER AND PHONE NUMBER	ADDRESS
Fred W Ramser		FRED W RAMSER 412-921-8838	220 WILLIAM PITT WAY
		CARRIER/WAYBILL NUMBER	CITY, STATE
		FED Ex 8455 4237 8481	PITTSBURGH PA 15238

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: DISSOLVED GASES	TYPE OF ANALYSIS: METABOLIC ACIDS						COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						AMB G	G						
PRESERVATIVE USED						4°	4°						
3/30	1525	S57MW0040109	AQ	G	4	2	2						
3/30	0000	S57GWDUP0109	AQ	G	4	2	2						
3/30	1525	S57MW0030109	AQ	G	4	2	2						
3/31	1010	S57MW0090109	AQ	G	4	2	2						
3/31	1050	S57MW0080109	AQ	G	4	2	2						
3/31	1220	S57MW0100109	AQ	G	4	2	2						
3/31	1250	S57MW0070109	AQ	G	4	2	2						
4/1	~~1350~~ 1520	S57MW0250109	AQ	G	4	2	2						
4/1	0000	S57GWDUP0209	AQ	G	4	2	2						
4/1	1520	S57MW0220109	AQ	G	2	2							
4/1	1045	IW80	AQ	G	2		2						
4/1	1010	S57MW0200109	AQ	G	2	2							
3/31	1530	S57MW0240109	AQ	G	12	6	6						RUN MS/MSD

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Fred W Ramser	4/1/04	1900	FED EX		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER MS-2 | PAGE 2 OF 2

PROJECT NO: 4020	SITE NAME: INDIAN HEAD	PROJECT MANAGER AND PHONE NUMBER: GEORGE LAT. X 8684	LABORATORY NAME AND CONTACT: MICROSEEPS BECKY HANS
SAMPLERS (SIGNATURE): Fred W Ramsey, S J Conti		FIELD OPERATIONS LEADER AND PHONE NUMBER: FRED WRAMSEY 412-921-8838	ADDRESS: 220 WILLIAM PITT WAY
		CARRIER/WAYBILL NUMBER: FED EX 8455 4237 8481	CITY, STATE: PITTSBURGH PA 15238

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2004	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: DISSOLVED GASES	TYPE OF ANALYSIS: METABOLIC ACIDS							COMMENTS
CONTAINER TYPE PLASTIC (P) or GLASS (G)						GLASS	G							
PRESERVATIVE USED						4°	4°							
3/31	1620	S57MW0110109	AQ	G	4	2	2							

1. RELINQUISHED BY: Fred W Ramsey	DATE: 4/1/04	TIME: 1900	1. RECEIVED BY: FED EX	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99
FORM NO. TtNUS-001

0011 LAWSON BAILEY R

TETRA TECH NUS, INC. 517

CHAIN OF CUSTODY

NUMBER 3771

PAGE 1 OF 1

PROJECT NO: N2194	FACILITY: Indian Head	PROJECT MANAGER: George Latulippe	PHONE NUMBER: 412-921-7090	LABORATORY NAME AND CONTACT: Katahdin Analytical, A. Colby
SAMPLERS (SIGNATURE): [signature]		FIELD OPERATIONS LEADER: Fred Ramser	PHONE NUMBER: 412-921-7090	ADDRESS: 340 County Rd. #5
		CARRIER/WAYBILL NUMBER: Fed Ex 8412 2491 0170		CITY, STATE: Westbrook, ME 04092

STANDARD TAT ☑
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G

PRESERVATIVE USED: HCl

TYPE OF ANALYSIS: TCL VOC

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TCL VOC	COMMENTS
9/28	0900	S57TB0109	QA	—	—	QC	—	2	2	
9/28	1250	S57MW0110109	—	—	—	GW	G	9	9*	Medium analysis
9/28	1545	S57MW0070109	—	—	—	GW	G	3	3	Medium analysis
9/29	0940	S57MW0080109	—	—	—	GW	G	3	3	Medium analysis
9/29	1550	S57MW0220109	—	—	—	GW	G	3	3	Medium analysis
9/30	0920	~~S57~~ S41 MW0040109	—	—	—	GW	G	3	3	Medium analysis
9/30	1145	~~S57~~ S41 MW0010109	—	—	—	GW	G	3	3	Medium analysis
		CO 10/4/05								

1. RELINQUISHED BY [signature]	DATE 9/30/05	TIME 1300	1. RECEIVED BY Fed Ex	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS * Run MS/MSD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R

FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 3757 | PAGE 1 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N2194	Indian Head, MD	George Latulippe	412-921-7090	Katahdin Analytical, A. Colby
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
Fred Ramser		Fred Ramser	412-921-7090	340 County Rd. #5
		CARRIER/WAYBILL NUMBER		CITY, STATE
		Fed Ex 8492 7852 5220		Westbrook, ME 04092

STANDARD TAT ☑
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: HCl
TYPE OF ANALYSIS: TCL VOC

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TCL VOC	COMMENTS
10/3	1230	S57TB0209	QC	—	—	QC	—	2	2	
10/3	1315	S57GB0330109	—	—	—	GW	G	3	3	Medium Analysis
10/3	1800	S57MW0120109	—	—	—	GW	G	9	9*	Low Analysis
10/4	1005	S57MW0130109	—	—	—	GW	G	3	3	MED. ANAL.
10/4	1120	S57MW0020109	—	—	—	GW	G	3	3	MED. ANAL.
10/4	1320	S57MW0010109	—	—	—	GW	G	3	3	MED. ANAL.
10/4	1550	S57MW0090109	—	—	—	GW	G	3	3	MED. ANAL.
10/4	1710	S57MW0100109	—	—	—	GW	G	3	3	MED. ANAL.
10/5	0740	S57GB0360109	—	—	—	GW	G	3	3	" "
10/5	0915	S57MW0030109	—	—	—	GW	G	3	3	" "
10/5	0000	S57MW DUP0109	—	—	—	GW	G	3	3	COLLECTED @ S57MW003
10/5	1100	S57MW0040109	—	—	—	GW	G	3	3	" "
10/5	1225	S57MW0240109	—	—	—	GW	G	3	3	MED. ANAL.

1. RELINQUISHED BY	DATE	TIME	1. RECEIVED BY	DATE	TIME
Fred Ramser	10/5/05	1930	Fed Ex		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS * Run MS/MSD

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. CHAIN OF CUSTODY | NUMBER 3774 | PAGE 2 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N2194	INDIAN HEAD, MD	GEORGE LATULIPPE	412-921-7090	KATAHDIN ANALYTICAL A. COLBY
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
[signature]		FRED W RAMSER	412-921-8838	340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX AB# 8492 7852 5220		WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: HCL

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: TCL VOC								COMMENTS
10/5	1355	S57MW025010 9	—	—	—	GW	G	3	3								MED ANAL.
10/5	0000	S57MW DUP0209	—	—	—	GW	G	3	3								COLLECTED @ S57MW025
10/5	1530	S57MW005010 9	—	—	—	GW	G	3	3								" "
10/5	1725	S57MW006010 9	—	—	—	GW	G	3	3								" "

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	10/5/05	1930	1. RECEIVED BY FED EX		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3768 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
N2194	INDIAN HEAD, MD	GEORGE LATULIPPE	412-921-7090	KATAHDIN ANALYTICAL, A. COLBY
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
[signature]		FRED W. RAMSER	412-921-8838	340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER		CITY, STATE
		FED EX 8494 1921 6717		WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: HCL
TYPE OF ANALYSIS: VOC's

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	VOC's	COMMENTS
10/6	0745	S57TB0309	—	—	—	—	G	2	2	
10/6	0800	S57GB0350109	—	—	—	—	G	3	3	MED ANAL.
10/6	0000	S57GBDUP0109	—	—	—	—	G	3	3	MED ANAL
10/6	1100	~~S57MW~~ S41MW0020109	—	—	—	—	G	3	3	LOW "
10/6	1230	S57MW0360109	—	—	—	—	G	3	3	MED "
10/6	1410	S57MW0330109	—	—	—	—	G	3	3	MED "
10/6	1715	S57MW0230109	—	—	—	—	G	3	3	MED "
10/7	0940	S57MW0320109	—	—	—	—	G	3	3	MED "
10/7	1120	S57MW0350109	—	—	—	—	G	3	3	MED "

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY [signature]	10-7-05	1300	1. RECEIVED BY Fed Ex		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3756 | PAGE 1 OF 2

PROJECT NO: 2194	FACILITY: INDIAN HEAD	PROJECT MANAGER: GEORGE LATULIPPE	PHONE NUMBER: 412-921-8684	LABORATORY NAME AND CONTACT: KATAHDIN ANALYTICAL, A. COLBY
SAMPLERS (SIGNATURE): Fred W Ramser, Alin Colby		FIELD OPERATIONS LEADER: FRED W RAMSER	PHONE NUMBER: 412-921 8838	ADDRESS: 340 COUNTY RD #5
		CARRIER/WAYBILL NUMBER: FED EX 8494 1921 6706		CITY, STATE: WESTBROOK, ME 04092

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: HCL

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: TCL VOC								COMMENTS
10/11	1500	S57TB0409	—	—	—	QC	—	2	2								
10/11	1855	S57MW0290109	—	—	—	GW	G	3	3								Low analysis
10/11	1715	S57MW0280109	—	—	—	GW	G	3	3								Low analysis
10/11	1850	S57MW0260109	—	—	—	GW	G	3	3								
10/12	0930	S57MW0270109	—	—	—	GW	G	3	3								Medium analysis
10/12	0000	S57MWDUP0309	—	—	—	GW	G	3	3								COLLECTED @ MW027 Medium analysis
10/12	1055	S57MW0370109	—	—	—	GW	G	3	3								Medium analysis
10/12	1250	S57MW0340109	—	—	—	GW	G	3	3								Medium analysis
10/12	1600	S57RB0109	—	—	—	QC	G	3	3								
10/12	1610	S57FB0109	—	—	—	QC	G	3	3								
10/12	0910	S57MW0310109	—	—	—	GW	G	3	3								Medium analysis
10/12	1055	S57MW0300109	—	—	—	GW	G	3	3								Low analysis
10/12	1740	S57MW0200109	—	—	—	GW	G	3	3								Low analysis

1. RELINQUISHED BY: Alin Colby	DATE: 10/13/05	TIME: 1630	1. RECEIVED BY: Fed Ex	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 3769 | PAGE 2 OF 2

PROJECT NO: 2194	FACILITY: Indian Head, MD	PROJECT MANAGER: George Latulippe	PHONE NUMBER: 412-921-8684	LABORATORY NAME AND CONTACT: Katahdin Analytical, A. Colby
SAMPLERS (SIGNATURE): Colin Dooley		FIELD OPERATIONS LEADER: Fred W Ramser	PHONE NUMBER: 412-921-8838	ADDRESS: 340 County Rd. #5
		CARRIER/WAYBILL NUMBER: Fed Ex 8494 1921 6706		CITY, STATE: Westbrook, ME 04092

STANDARD TAT ☑
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): G
PRESERVATIVE USED: HCl

DATE YEAR 2005	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: TCL VOC								COMMENTS
10/13	0700	S57FB0209	—	—	—	QC	G	3	3								
10/12	0000	S57MWDUP0409	—	—	—	GW	G	3	3								Medium analysis S57MW0310109

1. RELINQUISHED BY: Colin Dooley	DATE: 10/13/05	TIME: 1630	1. RECEIVED BY: Fed Ex	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

A.8 GROUNDWATER LEVEL MEASUREMENTS

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: Indian Head
Project No.: 7129
Location: Site 57
Personnel: Jennifer Wellman
Weather Conditions: Overcast 80's
Measuring Device: water-level indicator
Tidally Influenced: Yes ___ No X
Remarks:

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
MW022	8/29/01	1618	10.09	17.45	8.24	—	1.85	
MW023	8/29/01	1614	40.54	23.10	14.60	—	25.94	
MW020	8/29/01	1622	13.31	17.58	6.52	—	6.79	
MW005	8/29/01	1628	18.54	19.80	5.96	—	12.58	
MW006	8/29/01	1630	18.57	14.20	6.03	—	12.54	
MW009	8/29/01	1633	25.75	21.90	8.93	—	16.82	
MW010	8/29/01	1635	25.82	16.00	8.93	—	16.89	
MW008	8/29/01	1640	30.26	16.80	8.55	—	21.71	
MW007	8/29/01	1639	30.58	28.20	9.27	—	21.31	
MW011	8/29/01	1642	33.49	19.69	9.31	—	24.18	
MW003	8/29/01	1644	35.82	24.35	8.97	—	26.85	
MW004	8/29/01	1646	35.72	16.15	9.18	—	26.54	
MW001	8/29/01	1649	37.09	26.25	7.52	—	29.57	
MW002	8/29/01	1650	37.58	14.32	8.17	—	29.41	
MW013	8/29/01	1654	43.98	17.95	5.88	—	38.10	
MW012	8/29/01	1656	43.82	44.30	6.03	—	37.79	
TW014	8/29/01	1659	44.54	11.70	7.38	—	37.16	
TW015	8/29/01	1701	45.92	32.90	8.99	—	36.93	
TW016	8/29/01	1705	35.68	11.92	7.92	—	27.76	
TW017	8/29/01	1707	35.48	25.00	8.13	—	27.35	
TW018	8/29/01	1709	31.16	15.00	10.55	—	20.61	
TW019	8/29/01	1713	31.64	25.00	10.57	—	21.07	
TW021	8/29/01	1720	10.49	14.65	6.81	—	3.68	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: INDIAN HEAD
Project No.: 4020
Location: SITE 57
Personnel: FRED W. RAMSER / STAN CONTI
Weather Conditions: SUNNY
Measuring Device: M-SCOPE
Tidally Influenced: Yes ___ No ✓
Remarks:

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
S57MW13	3/29/04	1345	43.98	17.95	4.90	–	39.08	
S57MW12		1348	43.82	44.30	5.10	–	38.72	
S57MW01		1354	37.09	26.25	7.42	–	29.67	
S57MW02		1356	37.58	14.32	8.30	–	29.28	
S57MW04		1408	35.72	16.15	8.79	–	26.93	
S57MW03		1410	35.82	24.30	8.69	–	27.13	
S57MW24		1419	32.50	12.55	6.43	–	26.07	
S57MW25		1422	32.43	13.90	7.33	–	25.10	
S57MW11		1425	33.49	19.69	9.34	–	24.15	
S57MW07		1430	30.58	28.20	8.36	–	22.22	
S57MW08		1432	30.26	16.80	7.57	–	22.69	
S57MW10		1433	25.82	16.00	8.10	–	17.72	
S57MW09		1435	25.75	21.90	8.09	–	17.66	
S57MW06		1448	18.57	14.20	5.59	–	12.98	
S57MW05		1450	18.54	19.80	5.38	–	13.16	
S57MW20		1453	13.31	17.58	5.62	–	7.69	
S57MW22		1459	10.09	17.45	7.98	–	2.11	
S57MW23		1505	40.54	23.10	13.39	–	27.15	
41MW01		1515	15.76	20.30	6.56	–	9.20	
41MW04		1518	8.20	14.97	3.81	–	4.39	
41MW02	3/29/04	1520	10.10	20.22	5.01	–	5.09	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: SITE 57
Location: INDIAN HEAD MD
Weather Conditions: RAINY
Tidally Influenced: Yes ___ No X

Project No.: 2194
Personnel: FRED W. RAMSEY / CD
Measuring Device: Solinst water level meter
Remarks: RAINY

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
S57MW013	10/11/05	1354	43.98	17.95	5.06	—	38.92	
S57MW012	10/11/05	1355	43.82	44.15	5.35	—	38.47	
S57MW001	"	1357	37.09	26.25	6.95	—	30.14	
S57MW002		1358	37.58	14.20	5.51	—	32.07	
S57MW004		1405	35.72	18.01	8.57	—	27.15	
S57MW003		1406	35.82	24.35	8.60	—	27.22	
S57MW024		1407	32.50	12.35	6.41	—	26.09	
S57MW025		1408	32.43	13.70	6.79	—	25.64	
S57MW011		1409	33.49	20.54	8.68	—	24.81	
S57MW008		1412	30.26	16.39	6.44	—	23.82	
S57MW007		1413	30.58	28.01	8.47	—	22.11	
S57MW010		1416	25.82	15.91	8.45	—	17.37	
S57MW009		1417	25.75	21.90	8.45	—	17.30	
S57MW006		1422	18.57	14.12	5.45	—	13.12	
S57MW005		1424	18.54	19.80	5.34	—	13.20	
S57MW026		1425	17.05	39.52	6.11	—	10.94	
S57MW027		1426	17.28	22.73	6.60	—	10.68	
S57MW029		1428	14.39	17.14	5.35	—	9.04	
S57MW028		1429	14.11	36.66	4.65	—	9.46	
S57MW020		1433	13.31	17.45	5.39	—	7.92	
S57MW030		1435	12.74	36.74	5.00	—	7.74	
S57MW031		1438	14.61	22.26	5.84	—	8.77	
S57MW032		1439	10.05	17.95	5.18	—	4.87	
S57MW033		1441	10.96	18.72	5.74	—	5.22	
S57MW034		1443	10.76	17.37	5.06	—	5.70	

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: Site 57
Location: Indian Head, MD
Weather Conditions: rainy
Tidally Influenced: Yes ___ No X

Project No.: 2194
Personnel: Fred Ramser / CO
Measuring Device: Solinst water level meter
Remarks: Rainy

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
S57MW022	10/11/05	1445	10.09	17.30	7.95	—	2.14	
S57MW036		1448	10.58	12.71	7.16	—	3.42	
S41MW02		1451	9.33	20.0	5.08	—	4.25	
S41MW04		1454	8.20	14.46	4.14	—	4.06	
S41MW01		1458	14.97	20.10	6.75	—	8.22	
S57MW023		1501	40.54	23.00	14.18	—	26.36	
S57MW035		1503	31.55	35.16	20.73	—	10.82	
S57MW037		1507	11.57	15.10	4.31	—	7.26	

* All measurements to the nearest 0.01 foot

A.9 SURVEY DATA

Indian Head, Md. Site 57

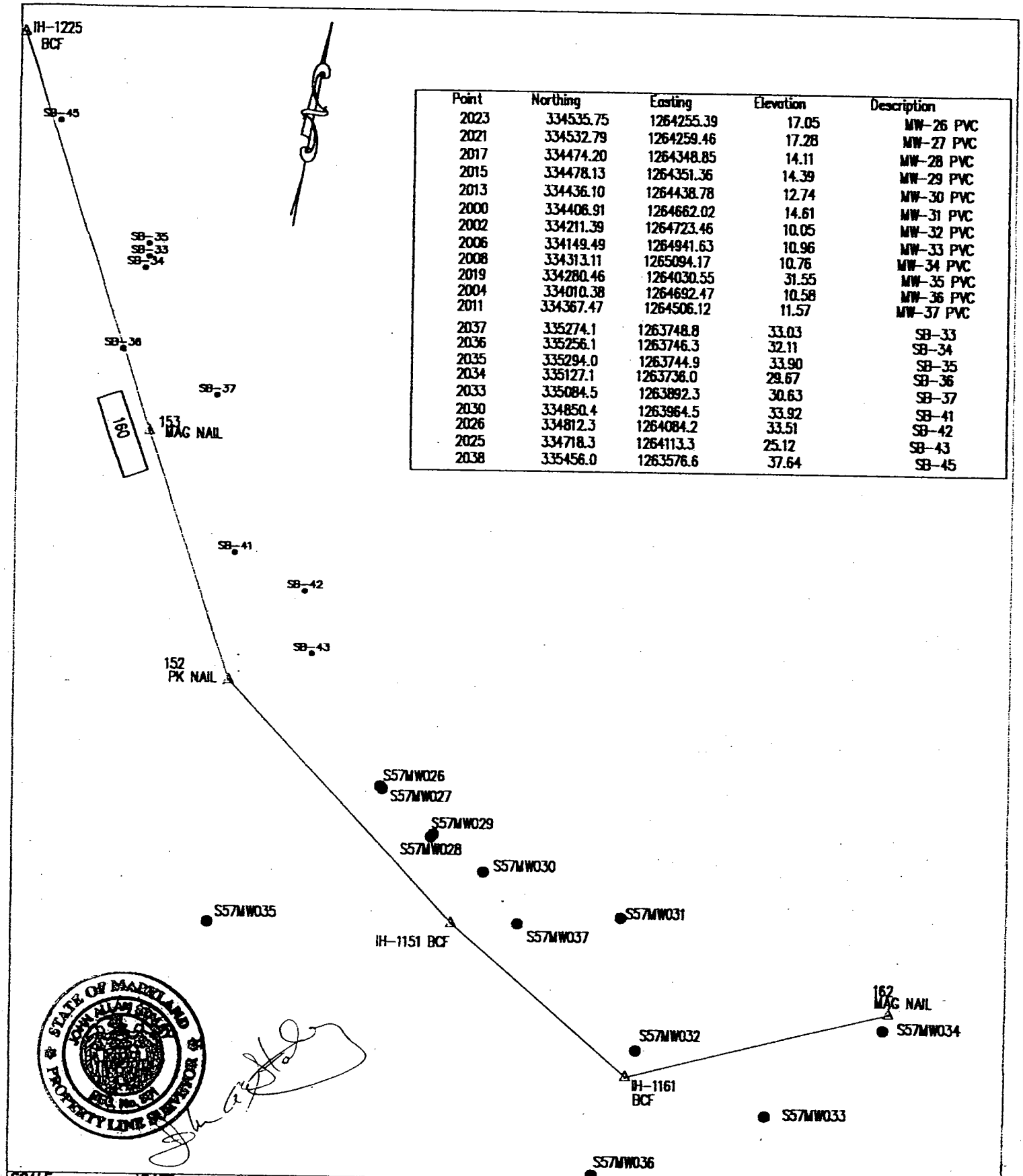
POINT	Northing	Easting	Elevaion	Description
1255	335,279.07	1,263,762.47	33.73	57-SB-016
1250	335,275.25	1,263,786.41	33.81	57-SB-017
1251	335,265.94	1,263,786.96	33.60	57-SB-018
1252	335,259.16	1,263,782.68	33.21	57-SB-019
1253	335,262.91	1,263,760.40	32.64	57-SB-020
1254	335,243.02	1,263,758.24	32.57	57-SB-021
1256	335,265.48	1,263,720.24	33.07	57-SB-022
1257	335,285.19	1,263,688.81	33.88	57-SB-023
1258	335,298.59	1,263,680.26	34.04	57-SB-024
1259	335,319.34	1,263,686.09	34.28	57-SB-025
1247	335,582.55	1,263,496.60	42.08	57-SB-026
1264	335,449.71	1,263,455.01	42.71	57-SB-027
1262	335,289.40	1,263,606.71	34.78	57-SB-028
1248	335,078.62	1,263,897.69	30.64	57-SB-029
1201	334,582.73	1,264,271.91	17.33	57-SB-030
1267	334532.34	1264264.58	14.25	57-SB-031
1242	334,372.21	1,264,235.26	14.53	57-SB-032
1232	334,392.01	1,263,440.68	38.86	57-SB-033
1243	335,041.75	1,263,378.61	75.96	57-CP-001
1266	334733.23	1263591.09	39.00	57-CP-002
1265	334820.26	1264059.09	34.42	57-CP-003
1241	334,365.84	1,264,190.00	20.41	57-CP-004
1222	334,071.68	1,264,896.71	8.25	57-CP-005
1230	333,968.89	1,264,640.78	6.78	57-CP-006
1237	334,278.06	1,264,026.24	29.14	57-CP-007
1236	334,208.41	1,263,509.08	28.52	57-CP-008
1231	334,378.55	1,263,452.66	38.35	57-CP-009
1260	335,292.06	1,263,606.29	34.98	57-CP-010
1263	335,445.15	1,263,459.21	42.51	57-TW-014
1264	335,449.71	1,263,455.01	42.71	57-TW-015
1261	335,291.18	1,263,603.59	34.83	57-TW-016
1262	335,289.40	1,263,606.71	34.78	57-TW-017
1249	335,080.92	1,263,895.89	30.71	57-TW-018
1248	335,078.62	1,263,897.69	30.64	57-TW-019
1220	334,173.08	1,264,593.47	9.84	57-TW-021

Indian Head, Md. Site 57

POINT	Northing	Easting	T.O.C.	T.O.R.	GROUND	Description
1200	334,440.46	1,264,429.15	13.75	13.31	10.39	57-MW-020
1221	334,065.57	1,264,908.66	10.60	10.09	8.11	57-MW-022
1232	334,392.01	1,263,440.68	41.03	40.54	37.44	57-MW-023

TETRA TECH NUS
INDIAN HEAD NSWC
SITE 57 SAMPLE LOCATIONS
SURVEYED BY KLS CONSULTANTS, INC.
October 12, 2005

Point	Northing	Easting	Elevation	Description
2023	334535.75	1264255.39	17.05 14.87	MW-26 PVC CONC
2021	334532.79	1264259.46	17.28 14.80	MW-27 PVC CONC
2017	334474.20	1264348.85	14.11 11.96	MW-28 PVC CONC
2015	334478.13	1264351.36	14.39 12.09	MW-29 PVC CONC
2013	334436.10	1264438.78	12.74 10.36	MW-30 PVC CONC
2000	334406.91	1264662.02	14.61 12.46	MW-31 PVC CONC
2002	334211.39	1264723.46	10.05 7.71	MW-32 PVC CONC
2006	334149.49	1264941.63	10.96 8.41	MW-33 PVC CONC
2008	334313.11	1265094.17	10.76 8.21	MW-34 PVC CONC
2019	334280.46	1264030.55	31.55 29.05	MW-35 PVC CONC
2004	334010.38	1264692.47	10.58 7.91	MW-36 PVC CONC
2011	334367.47	1264506.12	11.57 8.92	MW-37 PVC CONC
2037	335274.1	1263748.8	33.03	SB-33
2036	335256.1	1263746.3	32.11	SB-34
2035	335294.0	1263744.9	33.90	SB-35
2034	335127.1	1263736.0	29.67	SB-36
2033	335084.5	1263892.3	30.63	SB-37
2030	334850.4	1263964.5	33.92	SB-41
2026	334812.3	1264084.2	33.51	SB-42
2025	334718.3	1264113.3	25.12	SB-43
2038	335456.0	1263576.6	37.64	SB-45



Point	Northing	Easting	Elevation	Description
2023	334535.75	1264255.39	17.05	MW-26 PVC
2021	334532.79	1264259.46	17.28	MW-27 PVC
2017	334474.20	1264348.85	14.11	MW-28 PVC
2015	334478.13	1264351.36	14.39	MW-29 PVC
2013	334436.10	1264438.78	12.74	MW-30 PVC
2000	334406.91	1264662.02	14.61	MW-31 PVC
2002	334211.39	1264723.46	10.05	MW-32 PVC
2006	334149.49	1264941.63	10.96	MW-33 PVC
2008	334313.11	1265094.17	10.76	MW-34 PVC
2019	334280.46	1264030.55	31.55	MW-35 PVC
2004	334010.38	1264692.47	10.58	MW-36 PVC
2011	334367.47	1264506.12	11.57	MW-37 PVC
2037	335274.1	1263748.8	33.03	SB-33
2036	335256.1	1263746.3	32.11	SB-34
2035	335294.0	1263744.9	33.90	SB-35
2034	335127.1	1263736.0	29.67	SB-36
2033	335084.5	1263892.3	30.63	SB-37
2030	334850.4	1263964.5	33.92	SB-41
2026	334812.3	1264084.2	33.51	SB-42
2025	334718.3	1264113.3	25.12	SB-43
2038	335456.0	1263576.6	37.64	SB-45

STATE OF MARYLAND
JOHN ALAN SHULT
PROPERTY LINE SURVEYOR

SCALE:	DATE	SURVEYOR	SITE 57
1"=200'	10/19/05	K.L.S. CONSULTANTS, INC.	INDIAN HEAD NSWC
DR. BY: JAS	CHK'D BY:	4401 PHILADELPHIA ROAD BEL AIR, MARYLAND 21015 (410) 734-0445	
DWG. NO.: SITE-57	PROJ. NO.: IH-2005		

APPENDIX B

ANALYTICAL RESULTS

B.1 SOIL ANALYTICAL DATA

B.2 SOIL GEOTECHNICAL DATA

B.3 GROUNDWATER ANALYTICAL DATA

B.1 SOIL ANALYTICAL DATA

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB016 S57SS0160103 8/23/2001 0 - 0.5	QUAL	S57SB016 S57SB0160103 8/23/2001 4 - 5	QUAL	S57SB016 S57SB0160103-D 8/23/2001 4 - 5	QUAL	S57SB016 S57SB0160203 8/23/2001 8 - 10	QUAL	S57SB016 S57SB0160303 8/23/2001 18 - 20	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
1,1,2,2-TETRACHLOROETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
1,1,2-TRICHLOROETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
1,1,2-TRICHLOROTRIFLUOROETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
1,1-DICHLOROETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
1,1-DICHLOROETHENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
1,2-DICHLOROETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
1,2-DICHLOROPROPANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
2-BUTANONE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
2-HEXANONE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
4-METHYL-2-PENTANONE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
ACETONE	5.3	U	5	U	5.9	U	280	J	6.2	U
BENZENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
BROMODICHLOROMETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
BROMOFORM	5.3	U	5	U	5.9	U	6.1	U	6.2	U
BROMOMETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CARBON DISULFIDE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CARBON TETRACHLORIDE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CHLOROBENZENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CHLORODIBROMOMETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CHLOROETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CHLOROFORM	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CHLOROMETHANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CIS-1,2-DICHLOROETHENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CIS-1,3-DICHLOROPROPENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
CYCLOHEXANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
DIETHYL ETHER	5.3	U	5	U	5.9	U	6.1	U	8.3	
ETHYLBENZENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
ISOPROPYLBENZENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
M+P-XYLENES	5.3	U	5	U	5.9	U	6.1	U	6.2	U
METHYL ACETATE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
METHYL CYCLOHEXANE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
METHYL TERT-BUTYL ETHER	5.3	U	5	U	5.9	U	6.1	U	6.2	U
METHYLENE CHLORIDE	3.5	B	3.1	B	5.7	B	8	B	5.3	B
O-XYLENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
STYRENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB016 S57SS0160103 8/23/2001 0 - 0.5	QUAL	S57SB016 S57SB0160103 8/23/2001 4 - 5	QUAL	S57SB016 S57SB0160103-D 8/23/2001 4 - 5	QUAL	S57SB016 S57SB0160203 8/23/2001 8 - 10	QUAL	S57SB016 S57SB0160303 8/23/2001 18 - 20	QUAL
TETRACHLOROETHENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
TOLUENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
TRANS-1,2-DICHLOROETHENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
TRANS-1,3-DICHLOROPROPENE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
TRICHLOROETHENE	5.3	U	5	U	5.6	J	6.1	U	6.2	U
VINYL CHLORIDE	5.3	U	5	U	5.9	U	6.1	U	6.2	U
INORGANICS (MG/KG)										
ARSENIC	6.9		35.2	J	1.5	UJ				
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)			129.8						111.7	
NO. 10 SIEVE %			68.4						97.5	
NO. 100 SIEVE %			45						13.4	
NO. 20 SIEVE %			63						74.3	
NO. 200 SIEVE %			41						8.5	
NO. 4 SIEVE %			79.5						98.7	
NO. 40 SIEVE %			55.3						34.1	
POROSITY %			32.9						43.3	
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %			93.3							
SIEVE 3/4" %			100							
SIEVE 3/8" %			89.3						100	
SPECIFIC GRAVITY S.U.			2.65						2.63	
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1			160	J	550	J			70	J
PH MEQ/1			7.17		6.4				5.5	
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION			SM						SW-SM	
AASHTO CLASSIFICATION			A-4(0)						A-1-b	

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB017 S57SS0170103 8/23/2001 0 - 0.5	QUAL	S57SB017 S57SS0170103-D 8/23/2001 0 - 0.5	QUAL	S57SB017 S57SB0170103 8/23/2001 4 - 5	QUAL	S57SB017 S57SB0170203 8/23/2001 8 - 10	QUAL	S57SB017 S57SB0170303 8/23/2001 14 - 16	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
1,1,2,2-TETRACHLOROETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
1,1,2-TRICHLOROETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
1,1,2-TRICHLOROTRIFLUOROETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
1,1-DICHLOROETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
1,1-DICHLOROETHENE	5.8	U	6	U	6.6	U	6	U	5.9	U
1,2-DICHLOROETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
1,2-DICHLOROPROPANE	5.8	U	6	U	6.6	U	6	U	5.9	U
2-BUTANONE	5.8	U	6	U	6.6	U	6	U	5.9	U
2-HEXANONE	5.8	U	6	U	6.6	U	6	U	5.9	U
4-METHYL-2-PENTANONE	5.8	U	6	U	6.6	U	6	U	5.9	U
ACETONE	5.8	U	6	U	6.6	U	6	U	5.9	U
BENZENE	5.8	U	6	U	6.6	U	6	U	5.9	U
BROMODICHLOROMETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
BROMOFORM	5.8	U	6	U	6.6	U	6	U	5.9	U
BROMOMETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
CARBON DISULFIDE	5.8	U	6	U	6.6	U	6	U	5.9	U
CARBON TETRACHLORIDE	5.8	U	6	U	6.6	U	6	U	5.9	U
CHLOROBENZENE	5.8	U	6	U	6.6	U	6	U	5.9	U
CHLORODIBROMOMETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
CHLOROETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
CHLOROFORM	5.8	U	6	U	6.6	U	6	U	5.9	U
CHLOROMETHANE	5.8	U	6	U	6.6	U	6	U	5.9	U
CIS-1,2-DICHLOROETHENE	21		24		16		6	U	5.9	U
CIS-1,3-DICHLOROPROPENE	5.8	U	6	U	6.6	U	6	U	5.9	U
CYCLOHEXANE	5.8	U	6	U	6.6	U	6	U	5.9	U
DIETHYL ETHER	5.8	U	6	U	6.6	U	6	U	5.9	U
ETHYLBENZENE	5.8	U	6	U	6.6	U	6	U	5.9	U
ISOPROPYLBENZENE	5.8	U	6	U	6.6	U	6	U	5.9	U
M+P-XYLENES	5.8	U	6	U	6.6	U	6	U	5.9	U
METHYL ACETATE	5.8	U	6	U	6.6	U	6	U	5.9	U
METHYL CYCLOHEXANE	5.8	U	6	U	6.6	U	6	U	5.9	U
METHYL TERT-BUTYL ETHER	5.8	U	6	U	6.6	U	6	U	5.9	U
METHYLENE CHLORIDE	6.2	B	7.4	B	8.2	B	6.3	B	6.2	B
O-XYLENE	5.8	U	6	U	6.6	U	6	U	5.9	U
STYRENE	5.8	U	6	U	6.6	U	6	U	5.9	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB017 S57SS0170103 8/23/2001 0 - 0.5	QUAL	S57SB017 S57SS0170103-D 8/23/2001 0 - 0.5	QUAL	S57SB017 S57SB0170103 8/23/2001 4 - 5	QUAL	S57SB017 S57SB0170203 8/23/2001 8 - 10	QUAL	S57SB017 S57SB0170303 8/23/2001 14 - 16	QUAL
TETRACHLOROETHENE	5.8	U	6	U	6.6	U	6	U	5.9	U
TOLUENE	5.8	U	6	U	6.6	U	6	U	5.9	U
TRANS-1,2-DICHLOROETHENE	5.8	U	6	U	6.6	U	6	U	5.9	U
TRANS-1,3-DICHLOROPROPENE	5.8	U	6	U	6.6	U	6	U	5.9	U
TRICHLOROETHENE	220		210		5.5	J	6	U	5.9	U
VINYL CHLORIDE	5.8	U	6	U	6.6	U	6	U	5.9	U
INORGANICS (MG/KG)										
ARSENIC	21		21.8		2.6					
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)										
NO. 10 SIEVE %										
NO. 100 SIEVE %										
NO. 20 SIEVE %										
NO. 200 SIEVE %										
NO. 4 SIEVE %										
NO. 40 SIEVE %										
POROSITY %										
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %										
SPECIFIC GRAVITY S.U.										
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1										
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION										
AASHTO CLASSIFICATION										

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB017 S57SB0170403 8/23/2001 18 - 20	QUAL	S57SB018 S57SS0180103 8/23/2001 0 - 0.5	QUAL	S57SB018 S57SS0180103-D 8/23/2001 0 - 0.5	QUAL	S57SB018 S57SB0180103 8/23/2001 4 - 5	QUAL	S57SB018 S57SB0180203 8/23/2001 8 - 10	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
1,1,2,2-TETRACHLOROETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
1,1,2-TRICHLOROETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
1,1,2-TRICHLOROTRIFLUOROETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
1,1-DICHLOROETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
1,1-DICHLOROETHENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
1,2-DICHLOROETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
1,2-DICHLOROPROPANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
2-BUTANONE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
2-HEXANONE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
4-METHYL-2-PENTANONE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
ACETONE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
BENZENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
BROMODICHLOROMETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
BROMOFORM	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
BROMOMETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CARBON DISULFIDE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CARBON TETRACHLORIDE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CHLOROBENZENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CHLORODIBROMOMETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CHLOROETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CHLOROFORM	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CHLOROMETHANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CIS-1,2-DICHLOROETHENE	6.1	U	5.5	U	5.5	U	84		5.7	U
CIS-1,3-DICHLOROPROPENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
CYCLOHEXANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
DIETHYL ETHER	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
ETHYLBENZENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
ISOPROPYLBENZENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
M+P-XYLENES	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
METHYL ACETATE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
METHYL CYCLOHEXANE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
METHYL TERT-BUTYL ETHER	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
METHYLENE CHLORIDE	7.8	B	3.4	B	6.3	B	12	B	6.8	B
O-XYLENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
STYRENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB017 S57SB0170403 8/23/2001 18 - 20	QUAL	S57SB018 S57SS0180103 8/23/2001 0 - 0.5	QUAL	S57SB018 S57SS0180103-D 8/23/2001 0 - 0.5	QUAL	S57SB018 S57SB0180103 8/23/2001 4 - 5	QUAL	S57SB018 S57SB0180203 8/23/2001 8 - 10	QUAL
TETRACHLOROETHENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
TOLUENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
TRANS-1,2-DICHLOROETHENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
TRANS-1,3-DICHLOROPROPENE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
TRICHLOROETHENE	6.1	U	5.5	U	5.5	U	270		5.7	U
VINYL CHLORIDE	6.1	U	5.5	U	5.5	U	6.8	U	5.7	U
INORGANICS (MG/KG)										
ARSENIC			26.6		22.6		2.3			
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)							122.3			
NO. 10 SIEVE %							69.6			
NO. 100 SIEVE %							50.6			
NO. 20 SIEVE %							65			
NO. 200 SIEVE %							46.4			
NO. 4 SIEVE %							79.1			
NO. 40 SIEVE %							59.4			
POROSITY %							41.9			
SIEVE 1" %							100			
SIEVE 1-1/2" %										
SIEVE 1/2" %							95.7			
SIEVE 3/4" %							100			
SIEVE 3/8" %							92.2			
SPECIFIC GRAVITY S.U.							2.58			
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1							420	J		
PH MEQ/1							5.48			
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION							SM			
AASHTO CLASSIFICATION							A-4(0)			

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB018 S57SB0180303 8/23/2001 16 - 18	QUAL	S57SB018 S57SB0180403 8/23/2001 18 - 20	QUAL	S57SB019 S57SS0190103 8/23/2001 0 - 0.5	QUAL	S57SB019 S57SB0190103 8/23/2001 4 - 5	QUAL	S57SB019 S57SB0190203 8/23/2001 8 - 10	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
1,1,2,2-TETRACHLOROETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
1,1,2-TRICHLOROETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
1,1,2-TRICHLOROTRIFLUOROETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
1,1-DICHLOROETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
1,1-DICHLOROETHENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
1,2-DICHLOROETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
1,2-DICHLOROPROPANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
2-BUTANONE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
2-HEXANONE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
4-METHYL-2-PENTANONE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
ACETONE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
BENZENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
BROMODICHLOROMETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
BROMOFORM	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
BROMOMETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CARBON DISULFIDE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CARBON TETRACHLORIDE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CHLOROBENZENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CHLORODIBROMOMETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CHLOROETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CHLOROFORM	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CHLOROMETHANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CIS-1,2-DICHLOROETHENE	6.3	U	5.8	U	12		32		5.7	U
CIS-1,3-DICHLOROPROPENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
CYCLOHEXANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
DIETHYL ETHER	36		4.6	J	5.5	U	6.5	U	5.7	U
ETHYLBENZENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
ISOPROPYLBENZENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
M+P-XYLENES	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
METHYL ACETATE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
METHYL CYCLOHEXANE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
METHYL TERT-BUTYL ETHER	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
METHYLENE CHLORIDE	8.4	B	7.7	B	4.3	B	7.2	B	9.2	B
O-XYLENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
STYRENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB018 S57SB0180303 8/23/2001 16 - 18	QUAL	S57SB018 S57SB0180403 8/23/2001 18 - 20	QUAL	S57SB019 S57SS0190103 8/23/2001 0 - 0.5	QUAL	S57SB019 S57SB0190103 8/23/2001 4 - 5	QUAL	S57SB019 S57SB0190203 8/23/2001 8 - 10	QUAL
TETRACHLOROETHENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
TOLUENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
TRANS-1,2-DICHLOROETHENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
TRANS-1,3-DICHLOROPROPENE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
TRICHLOROETHENE	6.3	U	5.8	U	49		52		4.6	J
VINYL CHLORIDE	6.3	U	5.8	U	5.5	U	6.5	U	5.7	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)	111.7									
NO. 10 SIEVE %	98									
NO. 100 SIEVE %	25									
NO. 20 SIEVE %	76.7									
NO. 200 SIEVE %	22.2									
NO. 4 SIEVE %	99.5									
NO. 40 SIEVE %	41.6									
POROSITY %	37.2									
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %	100									
SPECIFIC GRAVITY S.U.	2.61									
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1	64	J								
PH MEQ/1	5.91									
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION	SM									
AASHTO CLASSIFICATION	A-1-b									

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB019 S57SB0190303 8/23/2001 14 - 16	QUAL	S57SB019 S57SB0190403 8/23/2001 18 - 20	QUAL	S57SB020 S57SS0200103 8/15/2001 0 - 0.5	QUAL	S57SB020 S57SB0200103 8/15/2001 4 - 5	QUAL	S57SB021 S57SS0210103 8/14/2001 0 - 0.5	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	5.9	U	5.8	U					5.4	U
1,1,2,2-TETRACHLOROETHANE	5.9	U	5.8	U					5.4	U
1,1,2-TRICHLOROETHANE	5.9	U	5.8	U					5.4	U
1,1,2-TRICHLOROTRIFLUOROETHANE	5.9	U	5.8	U						
1,1-DICHLOROETHANE	5.9	U	5.8	U					5.4	U
1,1-DICHLOROETHENE	5.9	U	5.8	U					5.4	U
1,2-DICHLOROETHANE	5.9	U	5.8	U					5.4	U
1,2-DICHLOROPROPANE	5.9	U	5.8	U					5.4	U
2-BUTANONE	5.9	U	5.8	U					5.4	U
2-HEXANONE	5.9	U	5.8	U					5.4	U
4-METHYL-2-PENTANONE	5.9	U	5.8	U					5.4	U
ACETONE	2400		5.8	U					16	B
BENZENE	5.9	U	5.8	U					5.4	U
BROMODICHLOROMETHANE	5.9	U	5.8	U					5.4	U
BROMOFORM	5.9	U	5.8	U					5.4	U
BROMOMETHANE	5.9	U	5.8	U					5.4	U
CARBON DISULFIDE	5.9	U	5.8	U					5.4	U
CARBON TETRACHLORIDE	5.9	U	5.8	U					5.4	U
CHLOROBENZENE	5.9	U	5.8	U					5.4	U
CHLORODIBROMOMETHANE	5.9	U	5.8	U					5.4	U
CHLOROETHANE	5.9	U	5.8	U					5.4	U
CHLOROFORM	5.9	U	5.8	U					5.4	U
CHLOROMETHANE	5.9	U	5.8	U					5.4	U
CIS-1,2-DICHLOROETHENE	22		5.8	U					16	
CIS-1,3-DICHLOROPROPENE	5.9	U	5.8	U					5.4	U
CYCLOHEXANE	5.9	U	5.8	U						
DIETHYL ETHER	10		5.8	U					5.4	U
ETHYLBENZENE	5.9	U	5.8	U					5.4	U
ISOPROPYLBENZENE	5.9	U	5.8	U						
M+P-XYLENES	5.9	U	5.8	U					5.4	U
METHYL ACETATE	5.9	U	5.8	U						
METHYL CYCLOHEXANE	5.9	U	5.8	U						
METHYL TERT-BUTYL ETHER	5.9	U	5.8	U						
METHYLENE CHLORIDE	7.1	B	5.4	B					9.9	B
O-XYLENE	5.9	U	5.8	U					5.4	U
STYRENE	5.9	U	5.8	U					5.4	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB019 S57SB0190303 8/23/2001 14 - 16	QUAL	S57SB019 S57SB0190403 8/23/2001 18 - 20	QUAL	S57SB020 S57SS0200103 8/15/2001 0 - 0.5	QUAL	S57SB020 S57SB0200103 8/15/2001 4 - 5	QUAL	S57SB021 S57SS0210103 8/14/2001 0 - 0.5	QUAL
TETRACHLOROETHENE	5.9	U	5.8	U					5.4	U
TOLUENE	5.9	U	5.8	U					5.4	U
TRANS-1,2-DICHLOROETHENE	5.9	U	5.8	U					5.4	U
TRANS-1,3-DICHLOROPROPENE	5.9	U	5.8	U					5.4	U
TRICHLOROETHENE	45		5.8	U					53	
VINYL CHLORIDE	5.9	U	5.8	U					5.4	U
INORGANICS (MG/KG)										
ARSENIC					33.6		3.3		79.9	
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)										
NO. 10 SIEVE %										
NO. 100 SIEVE %										
NO. 20 SIEVE %										
NO. 200 SIEVE %										
NO. 4 SIEVE %										
NO. 40 SIEVE %										
POROSITY %										
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %										
SPECIFIC GRAVITY S.U.										
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1										
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION										
AASHTO CLASSIFICATION										

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB021 S57SB0210103 8/14/2001 4 - 5	QUAL	S57SB021 S57SB0210203 8/14/2001 8 - 10	QUAL	S57SB021 S57SB0210203-D 8/14/2001 8 - 10	QUAL	S57SB021 S57SB0210303 8/15/2001 14 - 16	QUAL	S57SB021 S57SB0210403 8/15/2001 18 - 20	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
1,1,2,2-TETRACHLOROETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
1,1,2-TRICHLOROETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
1,1,2-TRICHLOROTRIFLUOROETHANE							6.5	U	6.1	U
1,1-DICHLOROETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
1,1-DICHLOROETHENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
1,2-DICHLOROETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
1,2-DICHLOROPROPANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
2-BUTANONE	25		6.9	U	6.6	U	6.5	U	6.1	U
2-HEXANONE	23		6.9	U	6.6	U	6.5	U	6.1	U
4-METHYL-2-PENTANONE	16		6.9	U	6.6	U	6.5	U	6.1	U
ACETONE	30	B	43	B	34	B	19	B	18	B
BENZENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
BROMODICHLOROMETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
BROMOFORM	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
BROMOMETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CARBON DISULFIDE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CARBON TETRACHLORIDE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CHLOROBENZENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CHLORODIBROMOMETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CHLOROETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CHLOROFORM	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CHLOROMETHANE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CIS-1,2-DICHLOROETHENE	16		690		240		6.5	U	6.1	U
CIS-1,3-DICHLOROPROPENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
CYCLOHEXANE							6.5	U	6.1	U
DIETHYL ETHER	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
ETHYLBENZENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
ISOPROPYLBENZENE							6.5	U	6.1	U
M+P-XYLENES	3.1	J	6.9	U	6.6	U	6.5	U	6.1	U
METHYL ACETATE							6.5	U	6.1	U
METHYL CYCLOHEXANE							6.5	U	6.1	U
METHYL TERT-BUTYL ETHER							6.5	U	6.1	U
METHYLENE CHLORIDE	17	B	22	B	18	B	13	B	16	B
O-XYLENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
STYRENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB021 S57SB0210103 8/14/2001 4 - 5	QUAL	S57SB021 S57SB0210203 8/14/2001 8 - 10	QUAL	S57SB021 S57SB0210203-D 8/14/2001 8 - 10	QUAL	S57SB021 S57SB0210303 8/15/2001 14 - 16	QUAL	S57SB021 S57SB0210403 8/15/2001 18 - 20	QUAL
TETRACHLOROETHENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
TOLUENE	3.2	J	6.9	U	6.6	U	6.5	U	6.1	U
TRANS-1,2-DICHLOROETHENE	6.2	U	5.9	J	6.6	U	6.5	U	6.1	U
TRANS-1,3-DICHLOROPROPENE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
TRICHLOROETHENE	82		98		41		6.5	U	6.1	U
VINYL CHLORIDE	6.2	U	6.9	U	6.6	U	6.5	U	6.1	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)	112.9						122.9			
NO. 10 SIEVE %	88.2						95.7			
NO. 100 SIEVE %	76.9						12.4			
NO. 20 SIEVE %	86						74.1			
NO. 200 SIEVE %	66.7						9.8			
NO. 4 SIEVE %	97.1						99.2			
NO. 40 SIEVE %	82.9						27.8			
POROSITY %	45.9						36.7			
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %	100						100			
SPECIFIC GRAVITY S.U.	2.59						2.65			
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1							38			
PH MEQ/1							5.54			
TOTAL ORGANIC CARBON MG/KG							28000			
USCS CLASSIFICATION	ML						SP-SM			
AASHTO CLASSIFICATION	A-4(0)						A-1b			

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB022 S57SS0220103 8/14/2001 0 - 0.5	QUAL	S57SB022 S57SB0220103 8/14/2001 4 - 5	QUAL	S57SB022 S57SB0220203 8/14/2001 8 - 10	QUAL	S57SB022 S57SB0220303 8/14/2001 12 - 14	QUAL	S57SB022 S57SB0220403 8/15/2001 18 - 20	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
1,1,2,2-TETRACHLOROETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
1,1,2-TRICHLOROETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
1,1,2-TRICHLOROTRIFLUOROETHANE									6.8	U
1,1-DICHLOROETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
1,1-DICHLOROETHENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
1,2-DICHLOROETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
1,2-DICHLOROPROPANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
2-BUTANONE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
2-HEXANONE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
4-METHYL-2-PENTANONE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
ACETONE	14	B	14	B	16	B	18	B	12	B
BENZENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
BROMODICHLOROMETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
BROMOFORM	5.6	U	6	U	5.6	U	6.4	U	6.8	U
BROMOMETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CARBON DISULFIDE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CARBON TETRACHLORIDE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CHLOROBENZENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CHLORODIBROMOMETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CHLOROETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CHLOROFORM	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CHLOROMETHANE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CIS-1,2-DICHLOROETHENE	14		15		34		6.4	U	6.8	U
CIS-1,3-DICHLOROPROPENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
CYCLOHEXANE									6.8	U
DIETHYL ETHER	5.6	U	6	U	5.6	U	6.4	U	13	
ETHYLBENZENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
ISOPROPYLBENZENE									6.8	U
M+P-XYLENES	5.6	U	6	U	5.6	U	6.4	U	6.8	U
METHYL ACETATE									6.8	U
METHYL CYCLOHEXANE									6.8	U
METHYL TERT-BUTYL ETHER									6.8	U
METHYLENE CHLORIDE	5.6	U	5.2	B	4.1	B	4.7	B	14	B
O-XYLENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
STYRENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB022 S57SS0220103 8/14/2001 0 - 0.5	QUAL	S57SB022 S57SB0220103 8/14/2001 4 - 5	QUAL	S57SB022 S57SB0220203 8/14/2001 8 - 10	QUAL	S57SB022 S57SB0220303 8/14/2001 12 - 14	QUAL	S57SB022 S57SB0220403 8/15/2001 18 - 20	QUAL
TETRACHLOROETHENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
TOLUENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
TRANS-1,2-DICHLOROETHENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
TRANS-1,3-DICHLOROPROPENE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
TRICHLOROETHENE	21		7.5		43		6.4	U	6.8	U
VINYL CHLORIDE	5.6	U	6	U	5.6	U	6.4	U	6.8	U
INORGANICS (MG/KG)										
ARSENIC	2.7									
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)			127.3				132.9			
NO. 10 SIEVE %			46.7				44.7			
NO. 100 SIEVE %			23.1				6.9			
NO. 20 SIEVE %			42.3				29.8			
NO. 200 SIEVE %							5.3			
NO. 4 SIEVE %			73.7				54.3			
NO. 40 SIEVE %			33.3				16.5			
POROSITY %			32.9				30.1			
SIEVE 1" %							92.8			
SIEVE 1-1/2" %							100			
SIEVE 1/2" %			95.8				65.4			
SIEVE 3/4" %			100				77.4			
SIEVE 3/8" %			88.8				62			
SPECIFIC GRAVITY S.U.			2.57				2.63			
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1			290				17			
PH MEQ/1			4.95				5.17			
TOTAL ORGANIC CARBON MG/KG			30000				20000			
USCS CLASSIFICATION			SM				SP-SM			
AASHTO CLASSIFICATION			A-1-b				A-1a			

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB023 S57SS0230103 8/14/2001 0 - 0.5	QUAL	S57SB023 S57SB0230103 8/14/2001 4 - 5	QUAL	S57SB023 S57SB0230203 8/14/2001 8 - 10	QUAL	S57SB023 S57SB0230303 8/14/2001 12 - 14	QUAL	S57SB024 S57SS0240103 8/15/2001 0 - 0.5	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
1,1,2,2-TETRACHLOROETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
1,1,2-TRICHLOROETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
1,1,2-TRICHLOROTRIFLUOROETHANE										
1,1-DICHLOROETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
1,1-DICHLOROETHENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
1,2-DICHLOROETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
1,2-DICHLOROPROPANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
2-BUTANONE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
2-HEXANONE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
4-METHYL-2-PENTANONE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
ACETONE	25	B	22	B	18	B	18	B	20	B
BENZENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
BROMODICHLOROMETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
BROMOFORM	5.8	U	6.1	U	6	U	5.8	U	5.5	U
BROMOMETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CARBON DISULFIDE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CARBON TETRACHLORIDE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CHLOROBENZENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CHLORODIBROMOMETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CHLOROETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CHLOROFORM	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CHLOROMETHANE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CIS-1,2-DICHLOROETHENE	3.9	J	6.1	U	6	U	5.8	U	5.5	U
CIS-1,3-DICHLOROPROPENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
CYCLOHEXANE										
DIETHYL ETHER	5.8	U	6.1	U	6	U	5.8	U	5.5	U
ETHYLBENZENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
ISOPROPYLBENZENE										
M+P-XYLENES	5.8	U	6.1	U	6	U	5.8	U	2.8	J
METHYL ACETATE										
METHYL CYCLOHEXANE										
METHYL TERT-BUTYL ETHER										
METHYLENE CHLORIDE	5.8	B	4.7	B	5.2	B	13	B	13	B
O-XYLENE	5.8	U	6.1	U	6	U	5.8	U	3	J
STYRENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB023 S57SS0230103 8/14/2001 0 - 0.5	QUAL	S57SB023 S57SB0230103 8/14/2001 4 - 5	QUAL	S57SB023 S57SB0230203 8/14/2001 8 - 10	QUAL	S57SB023 S57SB0230303 8/14/2001 12 - 14	QUAL	S57SB024 S57SS0240103 8/15/2001 0 - 0.5	QUAL
TETRACHLOROETHENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
TOLUENE	5.8	U	6.1	U	3.7	J	5.8	U	5.5	U
TRANS-1,2-DICHLOROETHENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
TRANS-1,3-DICHLOROPROPENE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
TRICHLOROETHENE	20		6.1	U	6	U	5.8	U	5.5	U
VINYL CHLORIDE	5.8	U	6.1	U	6	U	5.8	U	5.5	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)										
NO. 10 SIEVE %										
NO. 100 SIEVE %										
NO. 20 SIEVE %										
NO. 200 SIEVE %										
NO. 4 SIEVE %										
NO. 40 SIEVE %										
POROSITY %										
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %										
SPECIFIC GRAVITY S.U.										
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1										
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION										
AASHTO CLASSIFICATION										

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB024 S57SB0240103 8/15/2001 4 - 5	QUAL	S57SB024 S57SB0240203 8/15/2001 8 - 10	QUAL	S57SB025 S57SS0250103 8/15/2001 0 - 0.5	QUAL	S57SB025 S57SB0250103 8/15/2001 4 - 5	QUAL	S57SB025 S57SB0250203 8/15/2001 8 - 10	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
1,1,2,2-TETRACHLOROETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
1,1,2-TRICHLOROETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
1,1,2-TRICHLOROTRIFLUOROETHANE							6.2	U	5.9	U
1,1-DICHLOROETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
1,1-DICHLOROETHENE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
1,2-DICHLOROETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
1,2-DICHLOROPROPANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
2-BUTANONE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
2-HEXANONE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
4-METHYL-2-PENTANONE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
ACETONE	26	B	23	B	18	B	19	B	20	B
BENZENE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
BROMODICHLOROMETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
BROMOFORM	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
BROMOMETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CARBON DISULFIDE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CARBON TETRACHLORIDE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CHLOROBENZENE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CHLORODIBROMOMETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CHLOROETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CHLOROFORM	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CHLOROMETHANE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CIS-1,2-DICHLOROETHENE	5.7	U	5.7	U	5.5	U	6.2	U	11	
CIS-1,3-DICHLOROPROPENE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
CYCLOHEXANE							6.2	U	5.9	U
DIETHYL ETHER	5.7	U	5.7	U	5.5	U	6.2	U	17	
ETHYLBENZENE	5.7	U	5.7	U	9.6		6.2	U	5.9	U
ISOPROPYLBENZENE							6.2	U	5.9	U
M+P-XYLENES	5.7	U	5.7	U	35		6.2	U	5.9	U
METHYL ACETATE							6.2	U	5.9	U
METHYL CYCLOHEXANE							6.2	U	5.9	U
METHYL TERT-BUTYL ETHER							6.2	U	5.9	U
METHYLENE CHLORIDE	13	B	15	B	11	B	15	B	17	B
O-XYLENE	5.7	U	5.7	U	22		6.2	U	5.9	U
STYRENE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB024 S57SB0240103 8/15/2001 4 - 5	QUAL	S57SB024 S57SB0240203 8/15/2001 8 - 10	QUAL	S57SB025 S57SS0250103 8/15/2001 0 - 0.5	QUAL	S57SB025 S57SB0250103 8/15/2001 4 - 5	QUAL	S57SB025 S57SB0250203 8/15/2001 8 - 10	QUAL
TETRACHLOROETHENE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
TOLUENE	5.7	U	5.7	U	5.2	J	6.2	U	5.9	U
TRANS-1,2-DICHLOROETHENE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
TRANS-1,3-DICHLOROPROPENE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
TRICHLOROETHENE	5.7	U	5.7	U	8		6.2	U	5.9	U
VINYL CHLORIDE	5.7	U	5.7	U	5.5	U	6.2	U	5.9	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)	134.8									
NO. 10 SIEVE %	86.7									
NO. 100 SIEVE %	63.6									
NO. 20 SIEVE %	85.3									
NO. 200 SIEVE %	54.9									
NO. 4 SIEVE %	89.6									
NO. 40 SIEVE %	82.4									
POROSITY %	30.4									
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %	100									
SIEVE 3/4" %										
SIEVE 3/8" %	92.8									
SPECIFIC GRAVITY S.U.	2.62									
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1	210									
PH MEQ/1	5.01									
TOTAL ORGANIC CARBON MG/KG	23000									
USCS CLASSIFICATION	ML									
AASHTO CLASSIFICATION	A-4(0)									

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB025 S57SB0250303 8/15/2001 12 - 14	QUAL	S57SB026 S57SB0260103 8/15/2001 8 - 9	QUAL	S57SB027 S57SS0270103 8/21/2001 0 - 0.5	QUAL	S57SB027 S57SB0270103 8/21/2001 4 - 5	QUAL	S57SB027 S57SB0270203 8/21/2001 8 - 10	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	6	U			5.8	U	6.1	U	6.5	U
1,1,2,2-TETRACHLOROETHANE	6	U			5.8	U	6.1	U	6.5	U
1,1,2-TRICHLOROETHANE	6	U			5.8	U	6.1	U	6.5	U
1,1,2-TRICHLOROTRIFLUOROETHANE	6	U			5.8	U	6.1	U	6.5	U
1,1-DICHLOROETHANE	6	U			5.8	U	6.1	U	6.5	U
1,1-DICHLOROETHENE	6	U			5.8	U	6.1	U	6.5	U
1,2-DICHLOROETHANE	6	U			5.8	U	6.1	U	6.5	U
1,2-DICHLOROPROPANE	6	U			5.8	U	6.1	U	6.5	U
2-BUTANONE	6	U			5.8	U	6.1	U	6.5	U
2-HEXANONE	6	U			5.8	U	6.1	U	6.5	U
4-METHYL-2-PENTANONE	6	U			5.8	U	6.1	U	6.5	U
ACETONE	19	B			19	B	14	B	81	B
BENZENE	6	U			5.8	U	6.1	U	6.5	U
BROMODICHLOROMETHANE	6	U			5.8	U	6.1	U	6.5	U
BROMOFORM	6	U			5.8	U	6.1	U	6.5	U
BROMOMETHANE	6	U			5.8	U	6.1	U	6.5	U
CARBON DISULFIDE	6	U			5.8	U	6.1	U	6.5	U
CARBON TETRACHLORIDE	6	U			5.8	U	6.1	U	6.5	U
CHLOROBENZENE	6	U			5.8	U	6.1	U	6.5	U
CHLORODIBROMOMETHANE	6	U			5.8	U	6.1	U	6.5	U
CHLOROETHANE	6	U			5.8	U	6.1	U	6.5	U
CHLOROFORM	6	U			5.8	U	6.1	U	6.5	U
CHLOROMETHANE	6	U			5.8	U	6.1	U	6.5	U
CIS-1,2-DICHLOROETHENE	4.7	J			5.8	U	6.1	U	6.5	U
CIS-1,3-DICHLOROPROPENE	6	U			5.8	U	6.1	U	6.5	U
CYCLOHEXANE	6	U			5.8	U	6.1	U	6.5	U
DIETHYL ETHER	18				5.8	U	6.1	U	2100	
ETHYLBENZENE	6	U			5.8	U	6.1	U	6.5	U
ISOPROPYLBENZENE	6	U			5.8	U	6.1	U	6.5	U
M+P-XYLENES	2.6	J			5.8	U	6.1	U	6.5	U
METHYL ACETATE	6	U			5.8	U	6.1	U	6.5	U
METHYL CYCLOHEXANE	6	U			5.8	U	6.1	U	6.5	U
METHYL TERT-BUTYL ETHER	6	U			5.8	U	6.1	U	6.5	U
METHYLENE CHLORIDE	14	B			7.6	B	8.5	B	9.8	B
O-XYLENE	6	U			5.8	U	6.1	U	6.5	U
STYRENE	6	U			5.8	U	6.1	U	6.5	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB025 S57SB0250303 8/15/2001 12 - 14	QUAL	S57SB026 S57SB0260103 8/15/2001 8 - 9	QUAL	S57SB027 S57SS0270103 8/21/2001 0 - 0.5	QUAL	S57SB027 S57SB0270103 8/21/2001 4 - 5	QUAL	S57SB027 S57SB0270203 8/21/2001 8 - 10	QUAL
TETRACHLOROETHENE	6	U			5.8	U	6.1	U	6.5	U
TOLUENE	6	U			5.8	U	6.1	U	6.5	U
TRANS-1,2-DICHLOROETHENE	6	U			5.8	U	6.1	U	6.5	U
TRANS-1,3-DICHLOROPROPENE	6	U			5.8	U	6.1	U	6.5	U
TRICHLOROETHENE	6	U			5.8	U	6.1	U	6.5	U
VINYL CHLORIDE	6	U			5.8	U	6.1	U	6.5	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)										
NO. 10 SIEVE %										
NO. 100 SIEVE %										
NO. 20 SIEVE %										
NO. 200 SIEVE %										
NO. 4 SIEVE %										
NO. 40 SIEVE %										
POROSITY %										
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %										
SPECIFIC GRAVITY S.U.										
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1										
TOTAL ORGANIC CARBON MG/KG			51000							
USCS CLASSIFICATION										
AASHTO CLASSIFICATION										

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB027 S57SB0270303 8/21/2001 12 - 14	QUAL	S57SB027 S57SB0270403 8/21/2001 16 - 18	QUAL	S57SB028 S57SS0280103 8/16/2001 0 - 0.5	QUAL	S57SB028 S57SB0280103 8/16/2001 4 - 5	QUAL	S57SB028 S57SB0280103-D 8/16/2001 4 - 5	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
1,1,2,2-TETRACHLOROETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
1,1,2-TRICHLOROETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
1,1,2-TRICHLOROTRIFLUOROETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
1,1-DICHLOROETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
1,1-DICHLOROETHENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
1,2-DICHLOROETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
1,2-DICHLOROPROPANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
2-BUTANONE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
2-HEXANONE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
4-METHYL-2-PENTANONE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
ACETONE	42	B	97	B	22	B	61	B	42	B
BENZENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
BROMODICHLOROMETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
BROMOFORM	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
BROMOMETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CARBON DISULFIDE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CARBON TETRACHLORIDE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CHLOROBENZENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CHLORODIBROMOMETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CHLOROETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CHLOROFORM	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CHLOROMETHANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CIS-1,2-DICHLOROETHENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CIS-1,3-DICHLOROPROPENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
CYCLOHEXANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
DIETHYL ETHER	750		230		6.5	U	6.3	U	6.4	U
ETHYLBENZENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
ISOPROPYLBENZENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
M+P-XYLENES	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
METHYL ACETATE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
METHYL CYCLOHEXANE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
METHYL TERT-BUTYL ETHER	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
METHYLENE CHLORIDE	8	B	9.1	B	21	B	18	B	19	B
O-XYLENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
STYRENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB027 S57SB0270303 8/21/2001 12 - 14	QUAL	S57SB027 S57SB0270403 8/21/2001 16 - 18	QUAL	S57SB028 S57SS0280103 8/16/2001 0 - 0.5	QUAL	S57SB028 S57SB0280103 8/16/2001 4 - 5	QUAL	S57SB028 S57SB0280103-D 8/16/2001 4 - 5	QUAL
TETRACHLOROETHENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
TOLUENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
TRANS-1,2-DICHLOROETHENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
TRANS-1,3-DICHLOROPROPENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
TRICHLOROETHENE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
VINYL CHLORIDE	6.4	U	6.5	U	6.5	U	6.3	U	6.4	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)										
NO. 10 SIEVE %										
NO. 100 SIEVE %										
NO. 20 SIEVE %										
NO. 200 SIEVE %										
NO. 4 SIEVE %										
NO. 40 SIEVE %										
POROSITY %										
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %										
SPECIFIC GRAVITY S.U.										
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1										
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION										
AASHTO CLASSIFICATION										

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB028 S57SB0280203 8/16/2001 10 - 12	QUAL	S57SB028 S57SB0280303 8/16/2001 12 - 14	QUAL	S57SB028 S57SB0280403 8/16/2001 18 - 20	QUAL	S57SB029 S57SS0290103 8/17/2001 0 - 0.5	QUAL	S57SB029 S57SB0290103 8/17/2001 4 - 5	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
1,1,2,2-TETRACHLOROETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
1,1,2-TRICHLOROETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
1,1,2-TRICHLOROTRIFLUOROETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
1,1-DICHLOROETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
1,1-DICHLOROETHENE	6	U	6.2	U	6.5	U	5.8	U	6	U
1,2-DICHLOROETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
1,2-DICHLOROPROPANE	6	U	6.2	U	6.5	U	5.8	U	6	U
2-BUTANONE	6	U	6.2	U	6.5	U	5.8	U	11	
2-HEXANONE	6	U	6.2	U	6.5	U	5.8	U	6	U
4-METHYL-2-PENTANONE	6	U	6.2	U	6.5	U	5.8	U	6	U
ACETONE	23	B	18	B	17	B	20	B	23	B
BENZENE	6	U	6.2	U	6.5	U	5.8	U	6	U
BROMODICHLOROMETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
BROMOFORM	6	U	6.2	U	6.5	U	5.8	U	6	U
BROMOMETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
CARBON DISULFIDE	6	U	6.2	U	6.5	U	5.8	U	6	U
CARBON TETRACHLORIDE	6	U	6.2	U	6.5	U	5.8	U	6	U
CHLOROBENZENE	6	U	6.2	U	6.5	U	5.8	U	6	U
CHLORODIBROMOMETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
CHLOROETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
CHLOROFORM	6	U	6.2	U	6.5	U	5.8	U	6	U
CHLOROMETHANE	6	U	6.2	U	6.5	U	5.8	U	6	U
CIS-1,2-DICHLOROETHENE	6	U	6.2	U	6.5	U	5.8	U	6	U
CIS-1,3-DICHLOROPROPENE	6	U	6.2	U	6.5	U	5.8	U	6	U
CYCLOHEXANE	6	U	6.2	U	6.5	U	5.8	U	6	U
DIETHYL ETHER	11		54		14		5.8	U	6	U
ETHYLBENZENE	6	U	6.2	U	6.5	U	5.8	U	6	U
ISOPROPYLBENZENE	6	U	6.2	U	6.5	U	5.8	U	6	U
M+P-XYLENES	6	U	6.2	U	6.5	U	5.8	U	6	U
METHYL ACETATE	6	U	6.2	U	6.5	U	5.8	U	6	U
METHYL CYCLOHEXANE	6	U	6.2	U	6.5	U	5.8	U	6	U
METHYL TERT-BUTYL ETHER	6	U	6.2	U	6.5	U	5.8	U	6	U
METHYLENE CHLORIDE	15	B	7	B	7.6	B	3	B	2.9	B
O-XYLENE	6	U	6.2	U	6.5	U	5.8	U	6	U
STYRENE	6	U	6.2	U	6.5	U	5.8	U	6	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB028 S57SB0280203 8/16/2001 10 - 12	QUAL	S57SB028 S57SB0280303 8/16/2001 12 - 14	QUAL	S57SB028 S57SB0280403 8/16/2001 18 - 20	QUAL	S57SB029 S57SS0290103 8/17/2001 0 - 0.5	QUAL	S57SB029 S57SB0290103 8/17/2001 4 - 5	QUAL
TETRACHLOROETHENE	6	U	6.2	U	6.5	U	5.8	U	6	U
TOLUENE	6	U	6.2	U	6.5	U	5.8	U	6	U
TRANS-1,2-DICHLOROETHENE	6	U	6.2	U	6.5	U	5.8	U	6	U
TRANS-1,3-DICHLOROPROPENE	6	U	6.2	U	6.5	U	5.8	U	6	U
TRICHLOROETHENE	6	U	6.2	U	6.5	U	5.8	U	6	U
VINYL CHLORIDE	6	U	6.2	U	6.5	U	5.8	U	6	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)										
NO. 10 SIEVE %										
NO. 100 SIEVE %										
NO. 20 SIEVE %										
NO. 200 SIEVE %										
NO. 4 SIEVE %										
NO. 40 SIEVE %										
POROSITY %										
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %										
SPECIFIC GRAVITY S.U.										
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1										
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION										
AASHTO CLASSIFICATION										

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB029 S57SB0290203 8/17/2001 10 - 12	QUAL	S57SB029 S57SB0290303 8/17/2001 20 - 22	QUAL	S57SB029 S57SB0290403 8/17/2001 24 - 26	QUAL	S57SB029 S57SB0290403-D 8/16/2001 24 - 26	QUAL	S57SB030 S57SB0300103 8/24/2001 4 - 6	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
1,1,2,2-TETRACHLOROETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
1,1,2-TRICHLOROETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
1,1,2-TRICHLOROTRIFLUOROETHANE	6.1	U	6.3	U	6.4	U	6.6	U		
1,1-DICHLOROETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
1,1-DICHLOROETHENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
1,2-DICHLOROETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
1,2-DICHLOROPROPANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
2-BUTANONE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
2-HEXANONE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
4-METHYL-2-PENTANONE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
ACETONE	15	B	76	B	12	B	28	B	5.7	U
BENZENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
BROMODICHLOROMETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
BROMOFORM	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
BROMOMETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CARBON DISULFIDE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CARBON TETRACHLORIDE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CHLOROBENZENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CHLORODIBROMOMETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CHLOROETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CHLOROFORM	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CHLOROMETHANE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CIS-1,2-DICHLOROETHENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CIS-1,3-DICHLOROPROPENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
CYCLOHEXANE	6.1	U	6.3	U	6.4	U	6.6	U		
DIETHYL ETHER	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
ETHYLBENZENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
ISOPROPYLBENZENE	6.1	U	6.3	U	6.4	U	6.6	U		
M+P-XYLENES	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
METHYL ACETATE	6.1	U	6.3	U	6.4	U	6.6	U		
METHYL CYCLOHEXANE	6.1	U	6.3	U	6.4	U	6.6	U		
METHYL TERT-BUTYL ETHER	6.1	U	6.3	U	6.4	U	6.6	U		
METHYLENE CHLORIDE	2.6	B	2.1	B	2.6	B	3.2	B	5.7	B
O-XYLENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
STYRENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB029 S57SB0290203 8/17/2001 10 - 12	QUAL	S57SB029 S57SB0290303 8/17/2001 20 - 22	QUAL	S57SB029 S57SB0290403 8/17/2001 24 - 26	QUAL	S57SB029 S57SB0290403-D 8/16/2001 24 - 26	QUAL	S57SB030 S57SB0300103 8/24/2001 4 - 6	QUAL
TETRACHLOROETHENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
TOLUENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
TRANS-1,2-DICHLOROETHENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
TRANS-1,3-DICHLOROPROPENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
TRICHLOROETHENE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
VINYL CHLORIDE	6.1	U	6.3	U	6.4	U	6.6	U	5.7	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)										
NO. 10 SIEVE %										
NO. 100 SIEVE %										
NO. 20 SIEVE %										
NO. 200 SIEVE %										
NO. 4 SIEVE %										
NO. 40 SIEVE %										
POROSITY %										
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %										
SPECIFIC GRAVITY S.U.										
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1										
TOTAL ORGANIC CARBON MG/KG										
USCS CLASSIFICATION										
AASHTO CLASSIFICATION										

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB030 S57SB0300203 8/24/2001 8 - 10	QUAL	S57SB030 S57SB0300203-D 8/24/2001 8 - 10	QUAL	S57SB030 S57SB0300303 8/24/2001 14 - 16	QUAL	S57SB030 S57SB0300403 8/24/2001 22 - 24	QUAL	S57SB031 S57SB0310103 8/24/2001 4 - 6	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
1,1,2,2-TETRACHLOROETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
1,1,2-TRICHLOROETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
1,1,2-TRICHLOROTRIFLUOROETHANE										
1,1-DICHLOROETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
1,1-DICHLOROETHENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
1,2-DICHLOROETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
1,2-DICHLOROPROPANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
2-BUTANONE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
2-HEXANONE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
4-METHYL-2-PENTANONE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
ACETONE	6	U	5.5	U	6.2	U	80	J	35	J
BENZENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
BROMODICHLOROMETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
BROMOFORM	6	U	5.5	U	6.2	U	6.4	U	6.2	U
BROMOMETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CARBON DISULFIDE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CARBON TETRACHLORIDE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CHLOROBENZENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CHLORODIBROMOMETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CHLOROETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CHLOROFORM	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CHLOROMETHANE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CIS-1,2-DICHLOROETHENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CIS-1,3-DICHLOROPROPENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
CYCLOHEXANE										
DIETHYL ETHER	6	U	5.5	U	6.2	U	6.4	U	6.2	U
ETHYLBENZENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
ISOPROPYLBENZENE										
M+P-XYLENES	6	U	5.5	U	6.2	U	6.4	U	6.2	U
METHYL ACETATE										
METHYL CYCLOHEXANE										
METHYL TERT-BUTYL ETHER										
METHYLENE CHLORIDE	6.2	B	6.1	B	7.1	B	11	B	5.8	B
O-XYLENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
STYRENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB030 S57SB0300203 8/24/2001 8 - 10	QUAL	S57SB030 S57SB0300203-D 8/24/2001 8 - 10	QUAL	S57SB030 S57SB0300303 8/24/2001 14 - 16	QUAL	S57SB030 S57SB0300403 8/24/2001 22 - 24	QUAL	S57SB031 S57SB0310103 8/24/2001 4 - 6	QUAL
TETRACHLOROETHENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
TOLUENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
TRANS-1,2-DICHLOROETHENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
TRANS-1,3-DICHLOROPROPENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
TRICHLOROETHENE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
VINYL CHLORIDE	6	U	5.5	U	6.2	U	6.4	U	6.2	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)	130.4						119.2			
NO. 10 SIEVE %	95.9						98.2			
NO. 100 SIEVE %	58.1						92			
NO. 20 SIEVE %	91.4						97.8			
NO. 200 SIEVE %	47.8						77.2			
NO. 4 SIEVE %	97.9						100			
NO. 40 SIEVE %	82.4						96.2			
POROSITY %	29.8						47.3			
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %										
SIEVE 3/4" %										
SIEVE 3/8" %	100						100			
SPECIFIC GRAVITY S.U.	2.57						2.56			
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1	7.4		4.87				5.65			
TOTAL ORGANIC CARBON MG/KG	9900		6600				8900			
USCS CLASSIFICATION	SM						ML			
AASHTO CLASSIFICATION	A-4(0)						A-4(0)			

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB031 S57SB0310203 8/24/2001 8 - 10	QUAL	S57SB031 S57SB0310203-D 8/24/2001 8 - 10	QUAL	S57SB031 S57SB0310303 8/24/2001 14 - 16	QUAL	S57SB031 S57SB0310403 8/24/2001 18 - 20	QUAL	S57SB032 S57SB0320103 8/24/2001 6 - 8	QUAL
VOLATILE ORGANICS (UG/KG)										
1,1,1-TRICHLOROETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
1,1,2,2-TETRACHLOROETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
1,1,2-TRICHLOROETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
1,1,2-TRICHLOROTRIFLUOROETHANE										
1,1-DICHLOROETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
1,1-DICHLOROETHENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
1,2-DICHLOROETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
1,2-DICHLOROPROPANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
2-BUTANONE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
2-HEXANONE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
4-METHYL-2-PENTANONE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
ACETONE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
BENZENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
BROMODICHLOROMETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
BROMOFORM	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
BROMOMETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CARBON DISULFIDE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CARBON TETRACHLORIDE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CHLOROBENZENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CHLORODIBROMOMETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CHLOROETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CHLOROFORM	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CHLOROMETHANE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CIS-1,2-DICHLOROETHENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CIS-1,3-DICHLOROPROPENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
CYCLOHEXANE										
DIETHYL ETHER	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
ETHYLBENZENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
ISOPROPYLBENZENE										
M+P-XYLENES	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
METHYL ACETATE										
METHYL CYCLOHEXANE										
METHYL TERT-BUTYL ETHER										
METHYLENE CHLORIDE	5.9	B	6.1	B	7	B	8.5	B	7.8	B
O-XYLENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
STYRENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB031 S57SB0310203 8/24/2001 8 - 10	QUAL	S57SB031 S57SB0310203-D 8/24/2001 8 - 10	QUAL	S57SB031 S57SB0310303 8/24/2001 14 - 16	QUAL	S57SB031 S57SB0310403 8/24/2001 18 - 20	QUAL	S57SB032 S57SB0320103 8/24/2001 6 - 8	QUAL
TETRACHLOROETHENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
TOLUENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
TRANS-1,2-DICHLOROETHENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
TRANS-1,3-DICHLOROPROPENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
TRICHLOROETHENE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
VINYL CHLORIDE	5.9	U	5.5	U	6.5	U	6.4	U	5.8	U
INORGANICS (MG/KG)										
ARSENIC										
FIELD PARAMETERS										
BULK DENSITY (lb/cu ft)	135.2						123.6			
NO. 10 SIEVE %	94						100			
NO. 100 SIEVE %	59.9						70.8			
NO. 20 SIEVE %	90.9						99.9			
NO. 200 SIEVE %	47						38.2			
NO. 4 SIEVE %	95.4									
NO. 40 SIEVE %	84.6						99.7			
POROSITY %	29.7						40.1			
SIEVE 1" %										
SIEVE 1-1/2" %										
SIEVE 1/2" %	100									
SIEVE 3/4" %										
SIEVE 3/8" %	99.3									
SPECIFIC GRAVITY S.U.	2.61						2.62			
MISCELLANEOUS PARAMETERS										
CATION EXCHANGE CAPACITY MEQ/1										
PH MEQ/1	5.83		5.74				9.08			
TOTAL ORGANIC CARBON MG/KG	10000		8100				12000			
USCS CLASSIFICATION	SM						SM			
AASHTO CLASSIFICATION	A-4(0)						A-4(0)			

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB032 S57SB0320203 8/24/2001 8 - 10	QUAL	S57SB032 S57SB0320303 8/24/2001 14 - 16	QUAL	S57SB032 S57SB0320403 8/24/2001 18 - 20	QUAL	S57SB033 S57SB0330103 8/22/2001 10 - 12	QUAL
VOLATILE ORGANICS (UG/KG)								
1,1,1-TRICHLOROETHANE	5.5	U	5.9	U	5.8	U	5.8	U
1,1,2,2-TETRACHLOROETHANE	5.5	U	5.9	U	5.8	U	5.8	U
1,1,2-TRICHLOROETHANE	5.5	U	5.9	U	5.8	U	5.8	U
1,1,2-TRICHLOROTRIFLUOROETHANE							5.8	U
1,1-DICHLOROETHANE	5.5	U	5.9	U	5.8	U	5.8	U
1,1-DICHLOROETHENE	5.5	U	5.9	U	5.8	U	5.8	U
1,2-DICHLOROETHANE	5.5	U	5.9	U	5.8	U	5.8	U
1,2-DICHLOROPROPANE	5.5	U	5.9	U	5.8	U	5.8	U
2-BUTANONE	5.5	U	5.9	U	5.8	U	5.8	U
2-HEXANONE	5.5	U	5.9	U	5.8	U	5.8	U
4-METHYL-2-PENTANONE	5.5	U	5.9	U	5.8	U	5.8	U
ACETONE	5.5	U	5.9	U	5.8	U	18	B
BENZENE	5.5	U	5.9	U	5.8	U	5.8	U
BROMODICHLOROMETHANE	5.5	U	5.9	U	5.8	U	5.8	U
BROMOFORM	5.5	U	5.9	U	5.8	U	5.8	U
BROMOMETHANE	5.5	U	5.9	U	5.8	U	5.8	U
CARBON DISULFIDE	5.5	U	5.9	U	5.8	U	5.8	U
CARBON TETRACHLORIDE	5.5	U	5.9	U	5.8	U	5.8	U
CHLOROBENZENE	5.5	U	5.9	U	5.8	U	5.8	U
CHLORODIBROMOMETHANE	5.5	U	5.9	U	5.8	U	5.8	U
CHLOROETHANE	5.5	U	5.9	U	5.8	U	5.8	U
CHLOROFORM	5.5	U	5.9	U	5.8	U	5.8	U
CHLOROMETHANE	5.5	U	5.9	U	5.8	U	5.8	U
CIS-1,2-DICHLOROETHENE	5.5	U	5.9	U	5.8	U	5.8	U
CIS-1,3-DICHLOROPROPENE	5.5	U	5.9	U	5.8	U	5.8	U
CYCLOHEXANE								
DIETHYL ETHER	5.5	U	5.9	U	5.8	U	5.8	U
ETHYLBENZENE	5.5	U	5.9	U	5.8	U	5.8	U
ISOPROPYLBENZENE								
M+P-XYLENES	5.5	U	5.9	U	5.8	U	5.8	U
METHYL ACETATE							5.8	U
METHYL CYCLOHEXANE							5.8	U
METHYL TERT-BUTYL ETHER							5.8	U
METHYLENE CHLORIDE	6	B	6.7	B	5.3	B	1.3	J
O-XYLENE	5.5	U	5.9	U	5.8	U	5.8	U
STYRENE	5.5	U	5.9	U	5.8	U	5.8	U

ANALYTICAL RESULTS - SOIL
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57SB032 S57SB0320203 8/24/2001 8 - 10	QUAL	S57SB032 S57SB0320303 8/24/2001 14 - 16	QUAL	S57SB032 S57SB0320403 8/24/2001 18 - 20	QUAL	S57SB033 S57SB0330103 8/22/2001 10 - 12	QUAL
TETRACHLOROETHENE	5.5	U	5.9	U	5.8	U	5.8	U
TOLUENE	5.5	U	5.9	U	5.8	U	5.8	U
TRANS-1,2-DICHLOROETHENE	5.5	U	5.9	U	5.8	U	5.8	U
TRANS-1,3-DICHLOROPROPENE	5.5	U	5.9	U	5.8	U	5.8	U
TRICHLOROETHENE	5.5	U	5.9	U	5.8	U	5.8	U
VINYL CHLORIDE	5.5	U	5.9	U	5.8	U	5.8	U
INORGANICS (MG/KG)								
ARSENIC								
FIELD PARAMETERS								
BULK DENSITY (lb/cu ft)	118.6				120.4			
NO. 10 SIEVE %	83.9				75.2			
NO. 100 SIEVE %	74.5				66.5			
NO. 20 SIEVE %	82				73.6			
NO. 200 SIEVE %	72.1				63.6			
NO. 4 SIEVE %	89.4				85			
NO. 40 SIEVE %	79.9				72			
POROSITY %	41.5				42.8			
SIEVE 1" %								
SIEVE 1-1/2" %								
SIEVE 1/2" %	94.9				93.4			
SIEVE 3/4" %	100				100			
SIEVE 3/8" %	92.6				90.7			
SPECIFIC GRAVITY S.U.	2.55				2.54			
MISCELLANEOUS PARAMETERS								
CATION EXCHANGE CAPACITY MEQ/1								
PH MEQ/1	5.29				5.27			
TOTAL ORGANIC CARBON MG/KG	9000				6500			
USCS CLASSIFICATION	ML				ML			
AASHTO CLASSIFICATION	A-4(0)				A-4(0)			

B.2 SOIL GEOTECHNICAL DATA

ACKENHEIL ENGINEERS, INC.
Civil • Environmental • Materials Testing

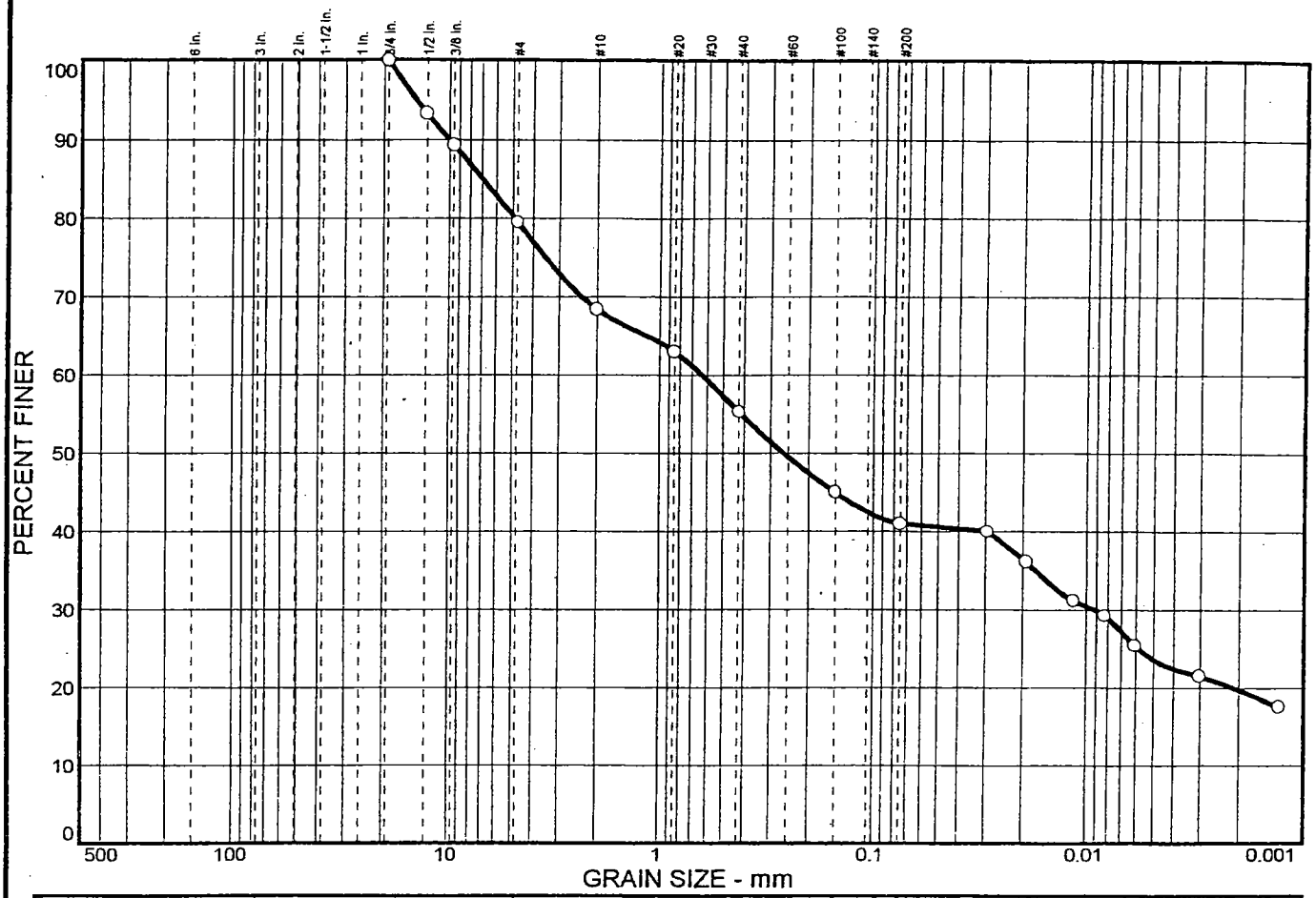
SPECIFIC GRAVITY, POROSITY AND BULK DENSITY

Project: Naval Surface Weapons Center
Indian Head, Maryland
Project No.: 7129 (CTO 245)
Date: 9/8/01

Sample Number	Specific Gravity	Porosity (Percent)	Bulk Density (pcf)
S-57-SB-0160103	2.65	32.9	129.8
S-57-SB-0160303	2.63	43.3	111.7
S-57-SB-0180103	2.58	41.9	122.3
S-57-SB-0180303	2.61	37.2	111.7
S-57-SB-0210103	2.59	45.9	112.9
S-57-SB-0210303	2.65	36.7	122.9
S-57-SB-0220103	2.57	32.9	127.3
S-57-SB-0220303	2.63	30.1	132.9
S-57-SB-0240103	2.62	30.4	134.8
S-57-SB-0300203	2.57	29.8	130.4
S-57-SB-0300403	2.56	47.3	119.2
S-57-SB-0310203	2.61	29.7	135.2
S-57-SB-0310403	2.62	40.1	123.6
S-57-SB-0320203	2.55	41.5	118.6
S-57-SB-0320403	2.54	42.8	120.4

1000 Banksville Road • Pittsburgh, PA 15216 • 412-531-7111 • FAX 412-531-4334

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	20.5	38.5	17.4	23.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	93.3		
.375 in.	89.3		
#4	79.5		
#10	68.4		
#20	63.0		
#40	55.3		
#100	45.0		
#200	41.0		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand with gravel

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 6.97 D_{60}= 0.630 D_{50}= 0.261
D_{30}= 0.0091 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

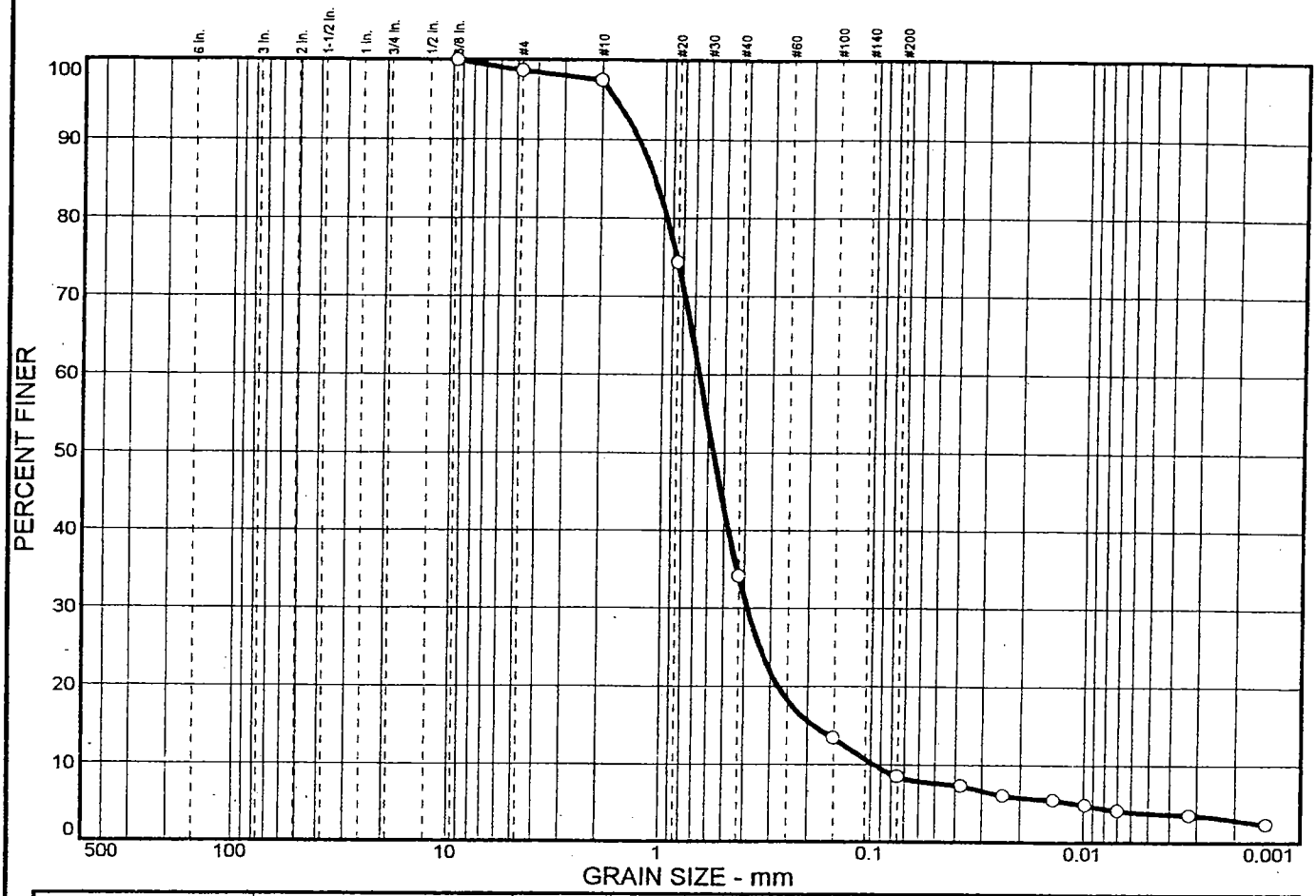
Natural Water Content: 18.8%

Sample No.: S-57-SB-0160103 **Source of Sample:** **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.3	90.2	4.6	3.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	98.7		
#10	97.5		
#20	74.3		
#40	34.1		
#100	13.4		
#200	8.5		

* (no specification provided)

Soil Description

USCS Group Name: Well-graded sand with silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 1.11 D_{60}= 0.661 D_{50}= 0.563
D_{30}= 0.387 D_{15}= 0.186 D_{10}= 0.0969
C_u= 6.82 C_c= 2.34

Classification

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

Remarks

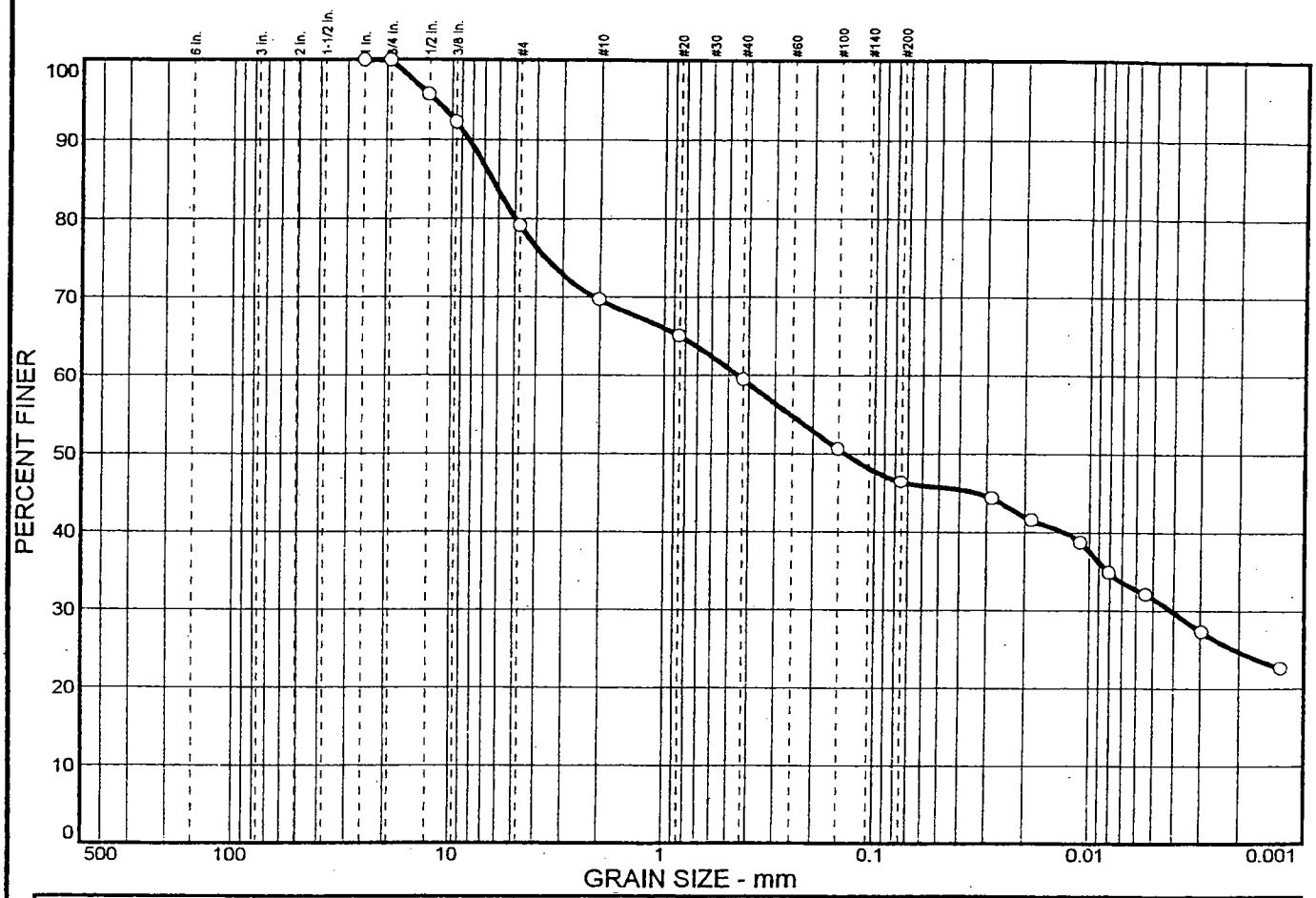
Natural Water Content: 19.8%

Sample No.: S-57-SB-0160303 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	20.9	32.7	14.8	31.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	100.0		
.5 in.	95.7		
.375 in.	92.2		
#4	79.1		
#10	69.6		
#20	65.0		
#40	59.4		
#100	50.6		
#200	46.4		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand with gravel

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 6.44 D_{60}= 0.455 D_{50}= 0.139
D_{30}= 0.0041 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

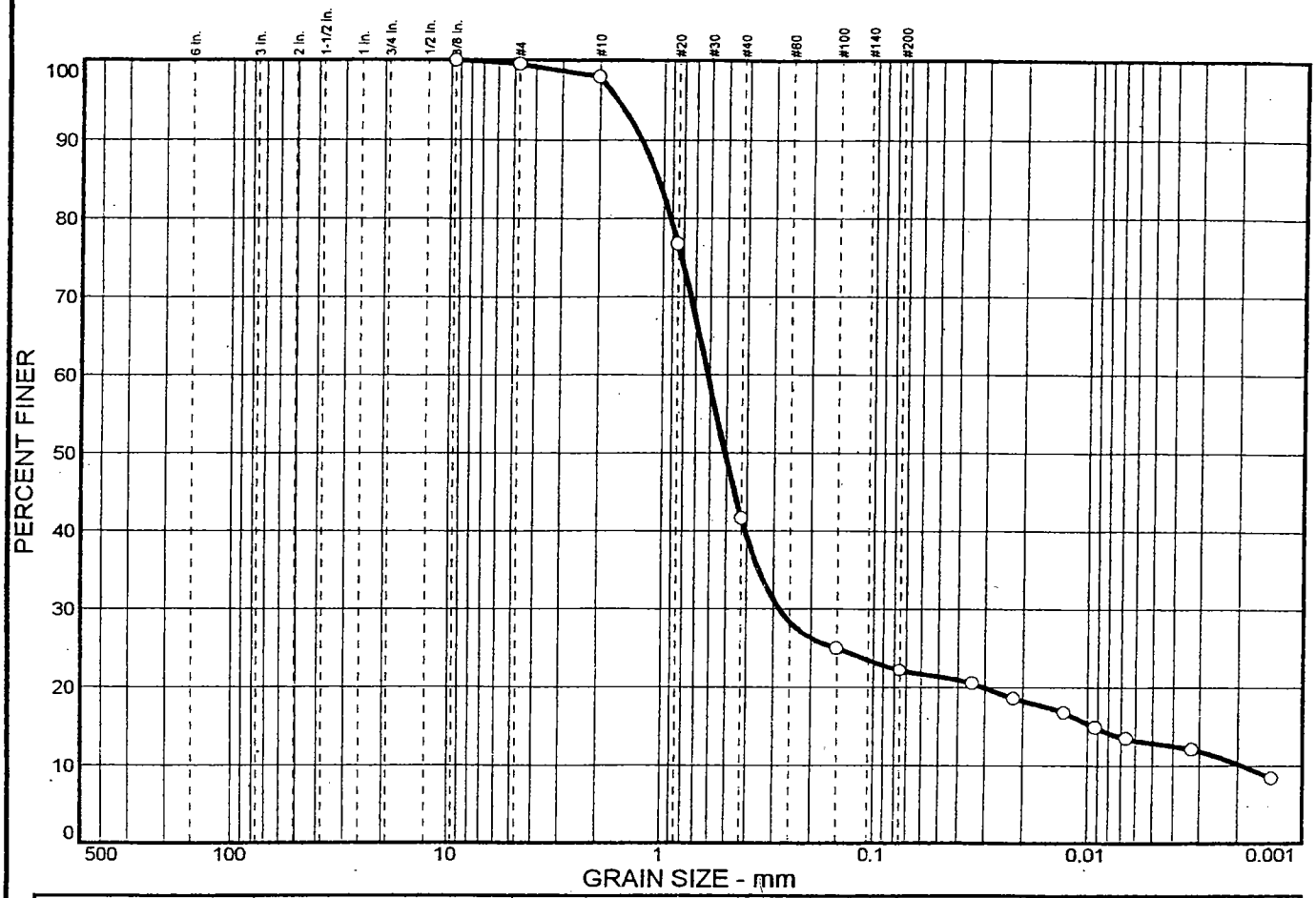
Natural Water Content: 26.3%

Sample No.: S-57-SB-0180103 **Date:** 9-8-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.5	77.3	9.3	12.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.5		
#10	98.0		
#20	76.7		
#40	41.6		
#100	25.0		
#200	22.2		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 1.06 D_{60}= 0.613 D_{50}= 0.509
D_{30}= 0.280 D_{15}= 0.0094 D_{10}= 0.0019
C_u= 322.18 C_c= 67.35

Classification

USCS= SM AASHTO= A-1-b

Remarks

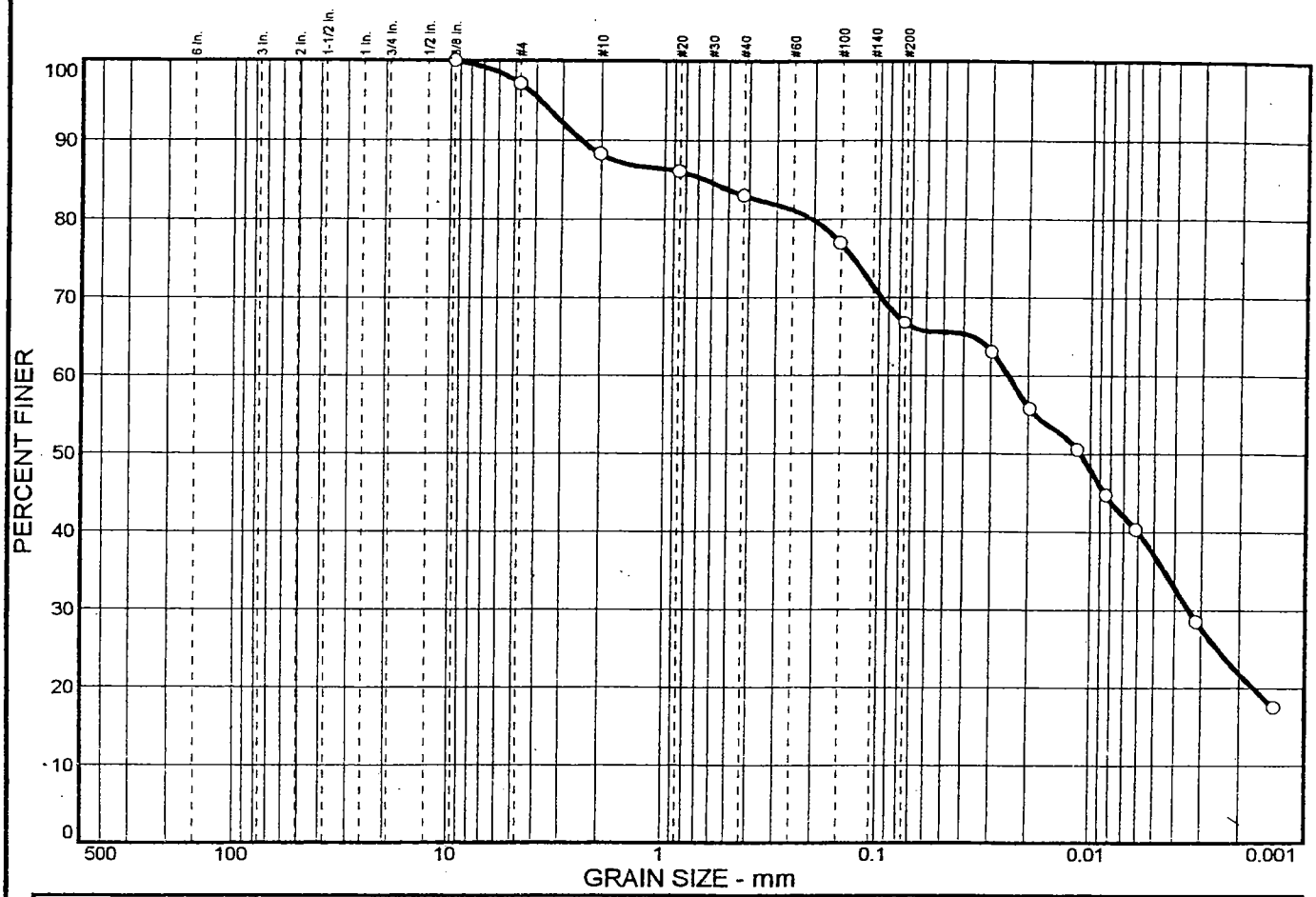
Natural Water Content: 25.6%

Sample No.: S-57-SB-0180303 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	2.9	30.4	29.6	37.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	97.1		
#10	88.2		
#20	86.0		
#40	82.9		
#100	76.9		
#200	66.7		

* (no specification provided)

Soil Description

USCS Group Name: Sandy silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.659 D_{60}= 0.0248 D_{50}= 0.0112
D_{30}= 0.0034 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

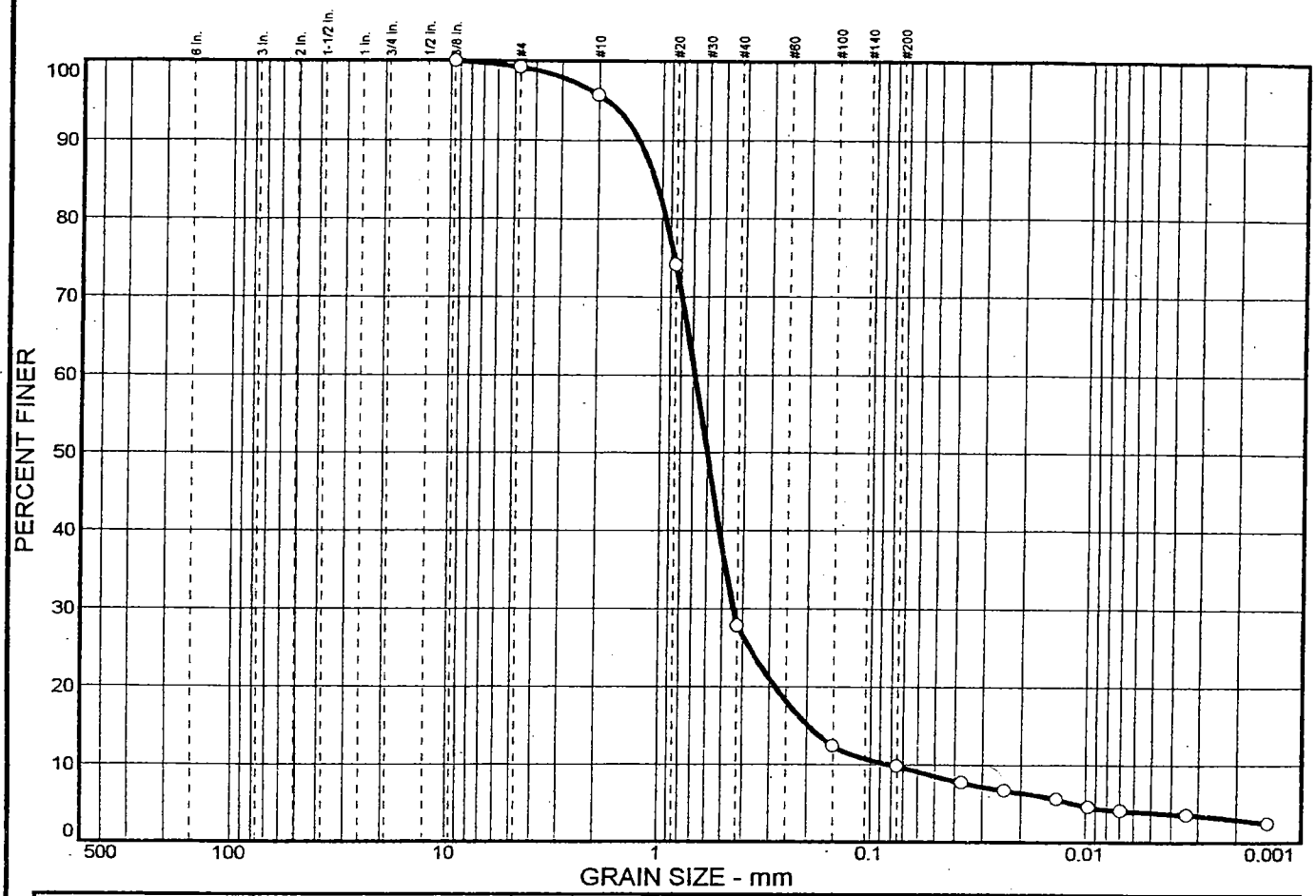
Natural Water Content: 29.4%

Sample No.: S-57-SB-0210103 **Date:** 9-6-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.8	89.4	5.9	3.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	99.2		
#10	95.7		
#20	74.1		
#40	27.8		
#100	12.4		
#200	9.8		

* (no specification provided)

Soil Description

USCS Group Name: Poorly graded sand with silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 1.08 D_{60}= 0.684 D_{50}= 0.596
D_{30}= 0.443 D_{15}= 0.195 D_{10}= 0.0807
C_u= 8.47 C_c= 3.55

Classification

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

Remarks

Natural Water Content: 22.9%

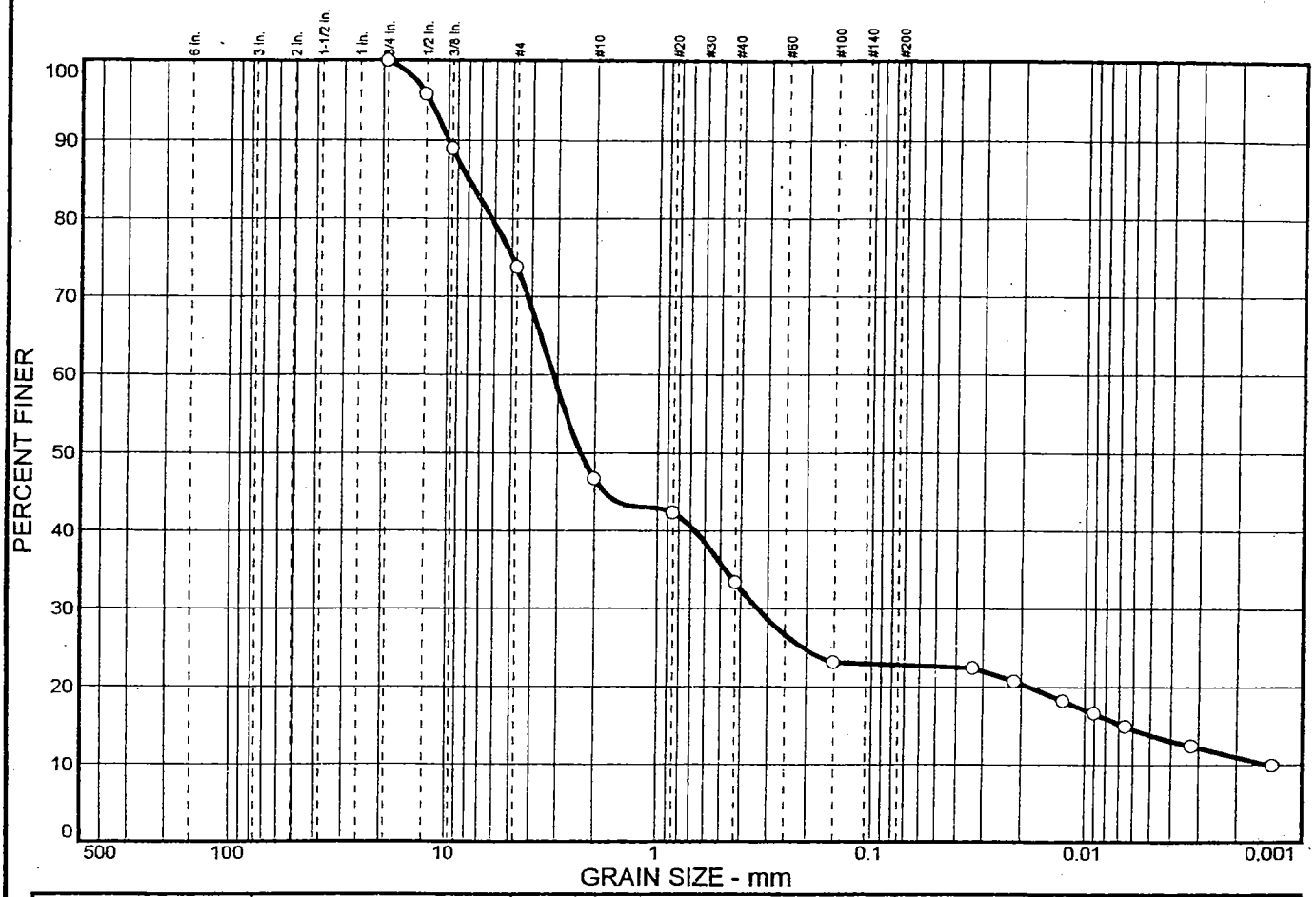
Sample No.: S-57-SB-0210303
Location: Indian Head, Maryland

Date: 9-7-01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	26.3	50.9	9.0	13.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	95.8		
.375 in.	88.8		
#4	73.7		
#10	46.7		
#20	42.3		
#40	33.3		
#100	23.1		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand with gravel

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 8.02 D_{60}= 3.15 D_{50}= 2.31
D_{30}= 0.335 D_{15}= 0.0066 D_{10}= 0.0014
C_u= 2217.01 C_c= 25.05

Classification

USCS= SM AASHTO= A-1-b

Remarks

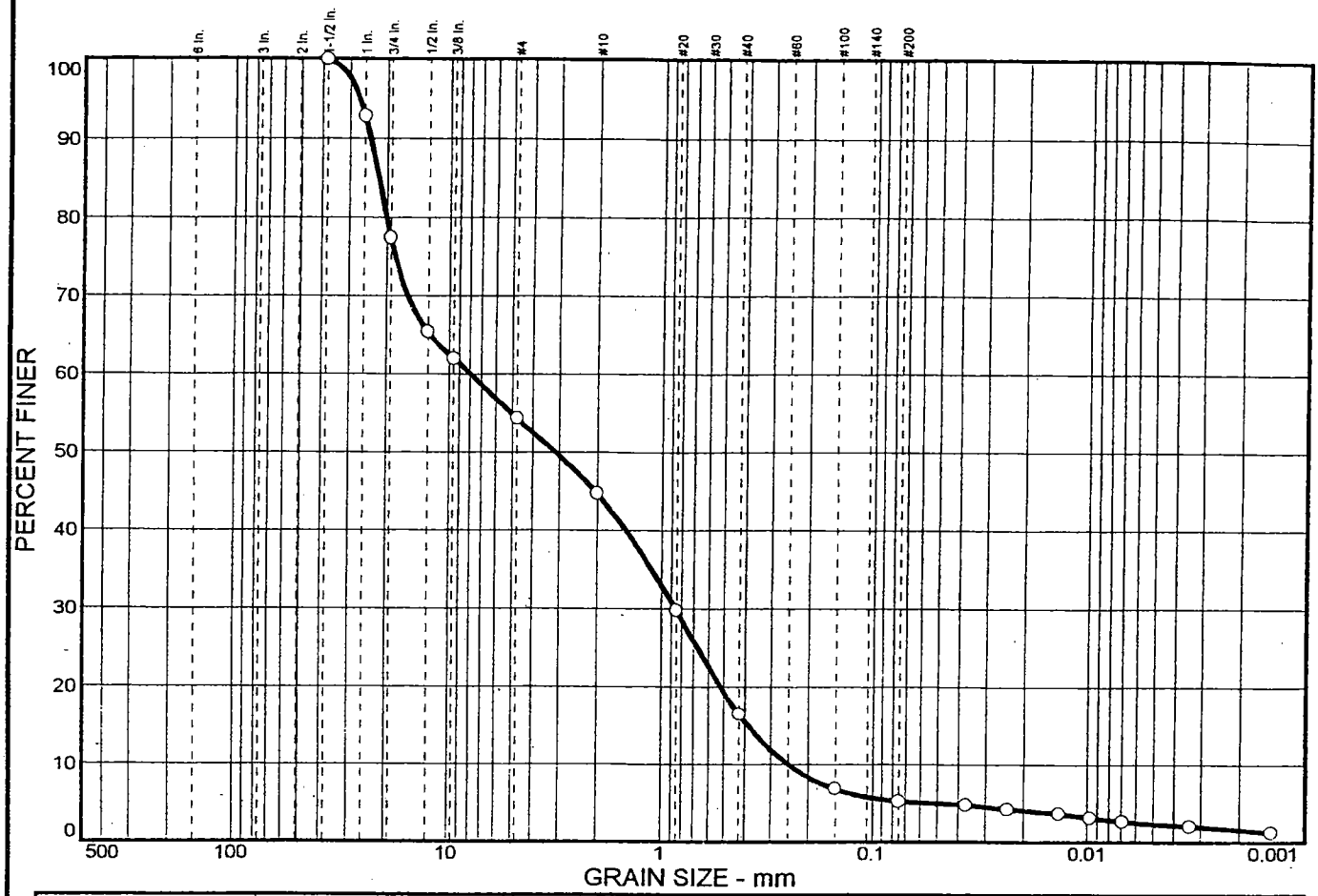
Natural Water Content: 17.5%

Sample No.: S-57-SB-0220103 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	45.7	49.0	2.9	2.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	92.8		
.75 in.	77.4		
.5 in.	65.4		
.375 in.	62.0		
#4	54.3		
#10	44.7		
#20	29.8		
#40	16.5		
#100	6.9		
#200	5.3		

* (no specification provided)

Soil Description

USCS Group Name: Poorly graded sand with silt and gravel

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 21.9 D_{60}= 7.91 D_{50}= 3.13
D_{30}= 0.858 D_{15}= 0.385 D_{10}= 0.248
C_u= 31.91 C_c= 0.38

Classification

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

Remarks

Natural Water Content: 12.2%

Sample No.: S-57-SB-0220303 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report

% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	10.4	34.7	35.1	19.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	92.8		
#4	89.6		
#10	86.7		
#20	85.3		
#40	82.4		
#100	63.6		
#200	54.9		

* (no specification provided)

Soil Description

USCS Group Name: Sandy silt

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.677 D_{60}= 0.119 D_{50}= 0.0383
D_{30}= 0.0115 D_{15}= 0.0022 D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

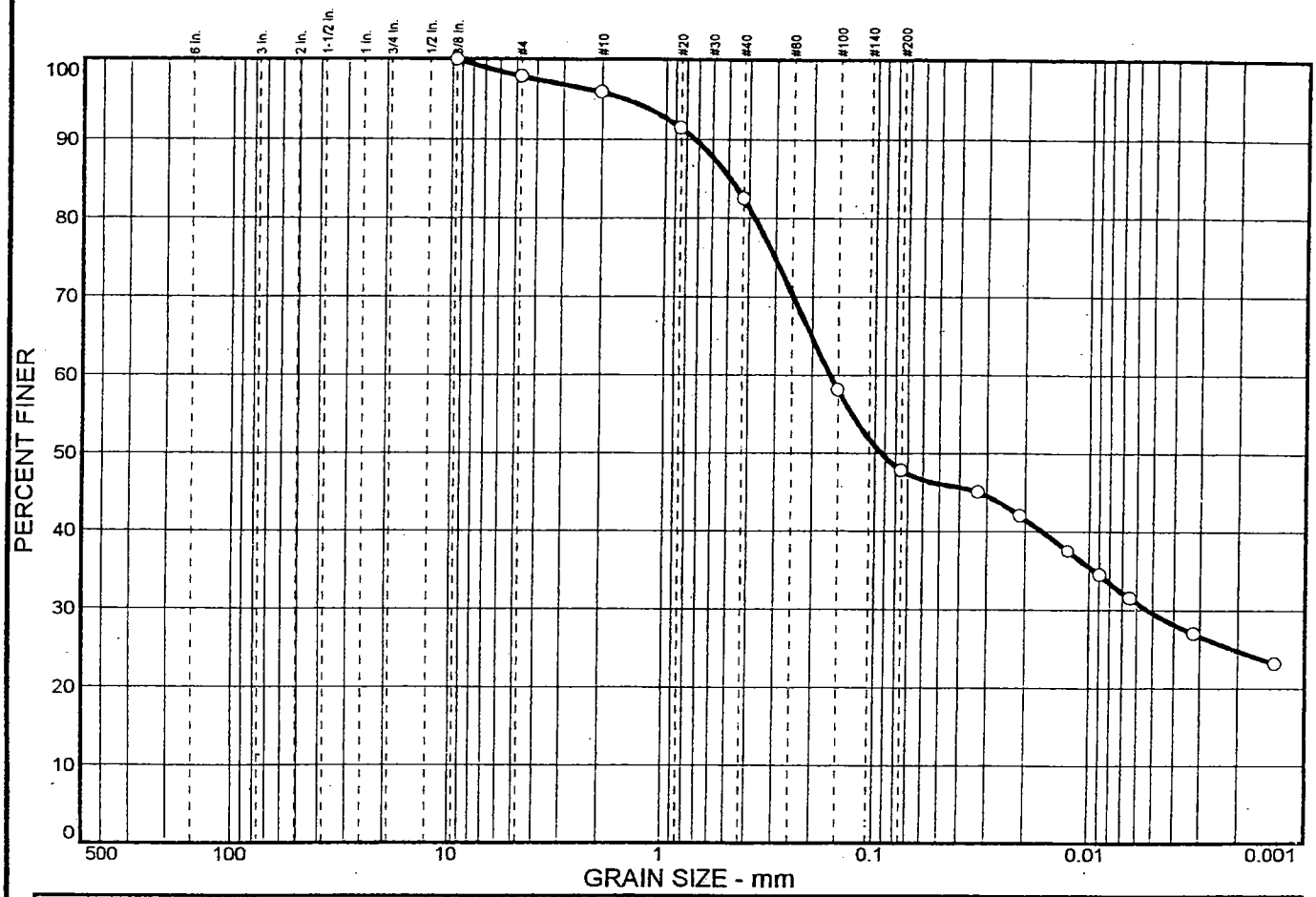
Natural Water Content: 16.4%

Sample No.: S-57-SB-0240103 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	2.1	50.1	18.2	29.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	97.9		
#10	95.9		
#20	91.4		
#40	82.4		
#100	58.1		
#200	47.8		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.494 D_{60}= 0.164 D_{50}= 0.0933
D_{30}= 0.0053 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

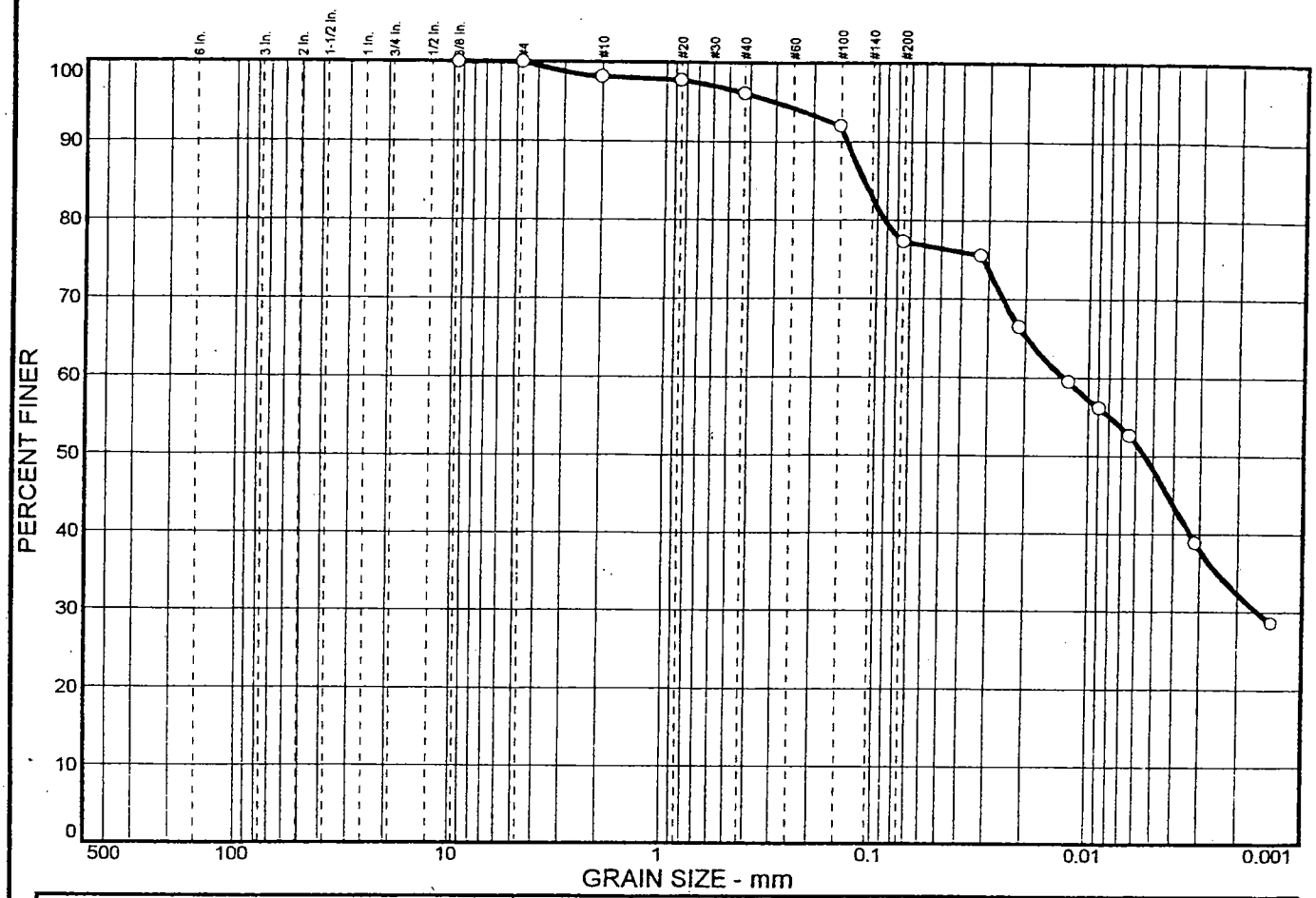
Natural Water Content: 16.7%

Sample No.: S-57-SB-0300203 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	22.8	28.8	48.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375 in.	100.0		
#4	100.0		
#10	98.2		
#20	97.8		
#40	96.2		
#100	92.0		
#200	77.2		

* (no specification provided)

Soil Description

USCS Group Name: Silt with sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.116 D_{60}= 0.0131 D_{50}= 0.0054
D_{30}= 0.0016 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

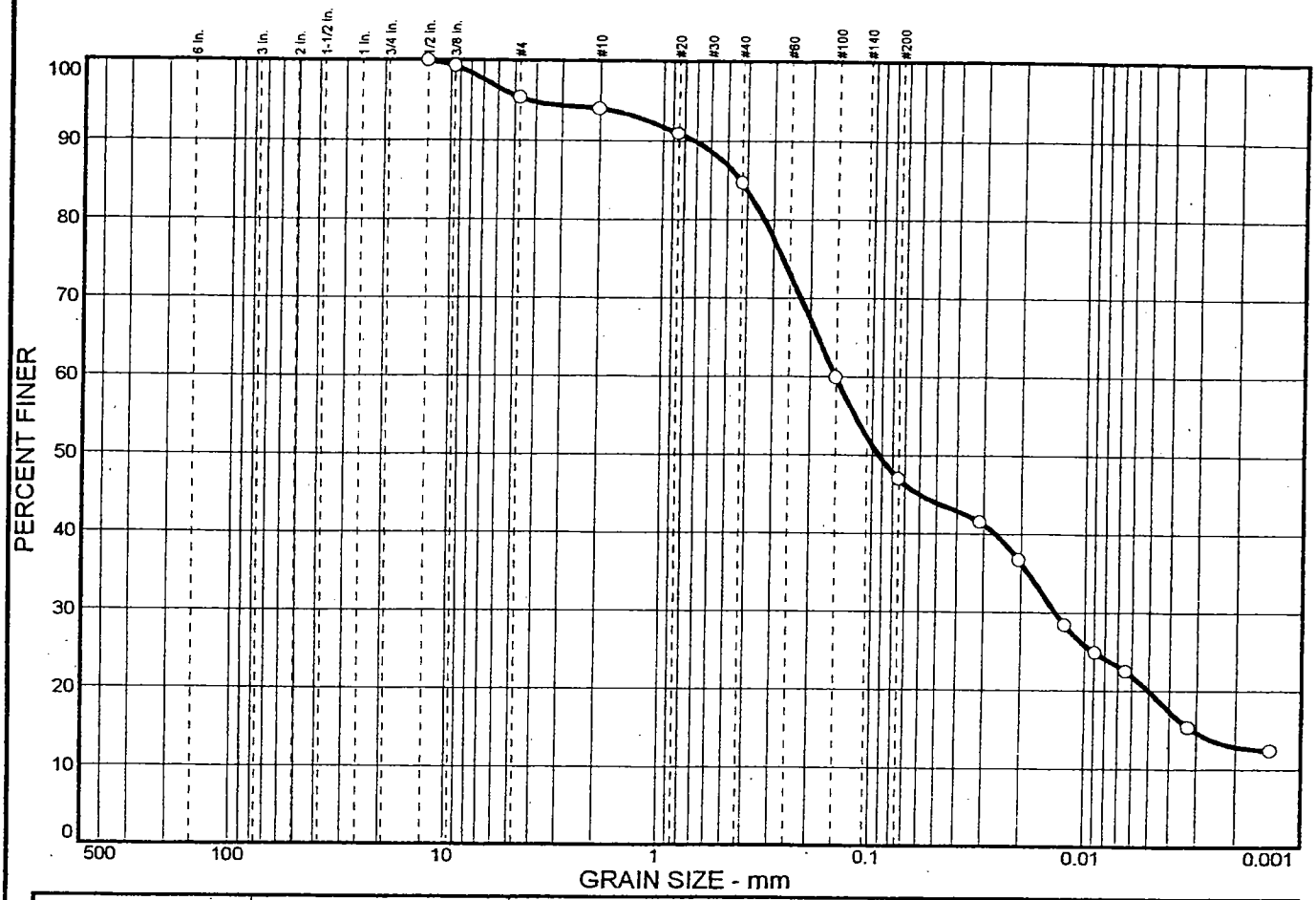
Natural Water Content: 32.8%

Sample No.: S-57-SB-0300403 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	4.6	48.4	27.0	20.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5 in.	100.0		
.375 in.	99.3		
#4	95.4		
#10	94.0		
#20	90.9		
#40	84.6		
#100	59.9		
#200	47.0		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.436 D_{60}= 0.151 D_{50}= 0.0931
D_{30}= 0.0138 D_{15}= 0.0031 D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Natural Water Content: 15.8%

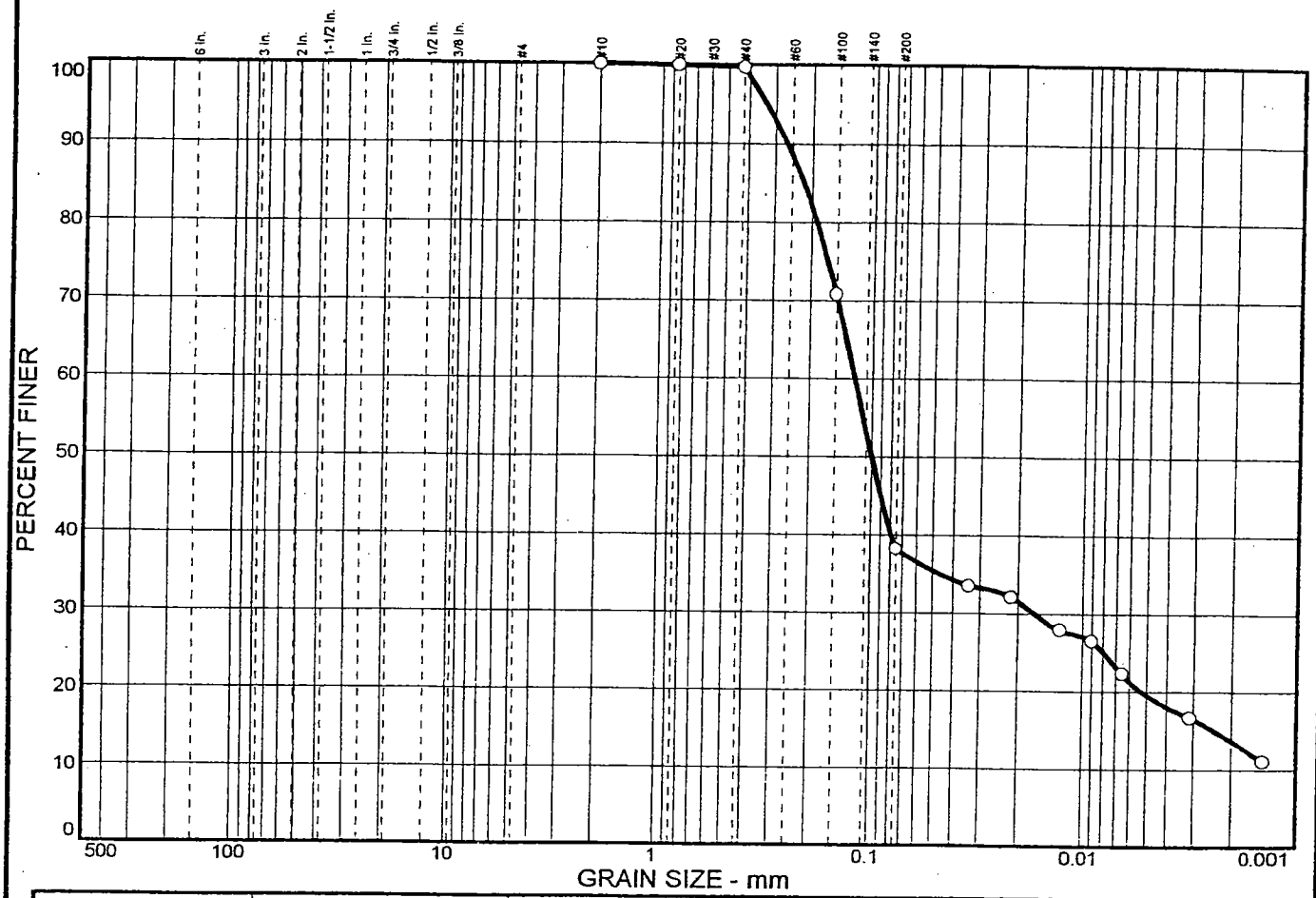
Sample No.: S-57-SB-0310203
Location: Indian Head, Maryland

Date: 9-7-01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	61.8	18.6	19.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	99.9		
#40	99.7		
#100	70.8		
#200	38.2		

* (no specification provided)

Soil Description

USCS Group Name: Silty sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 0.219 D_{60}= 0.121 D_{50}= 0.0998
D_{30}= 0.0168 D_{15}= 0.0024 D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Natural Water Content: 25.4%

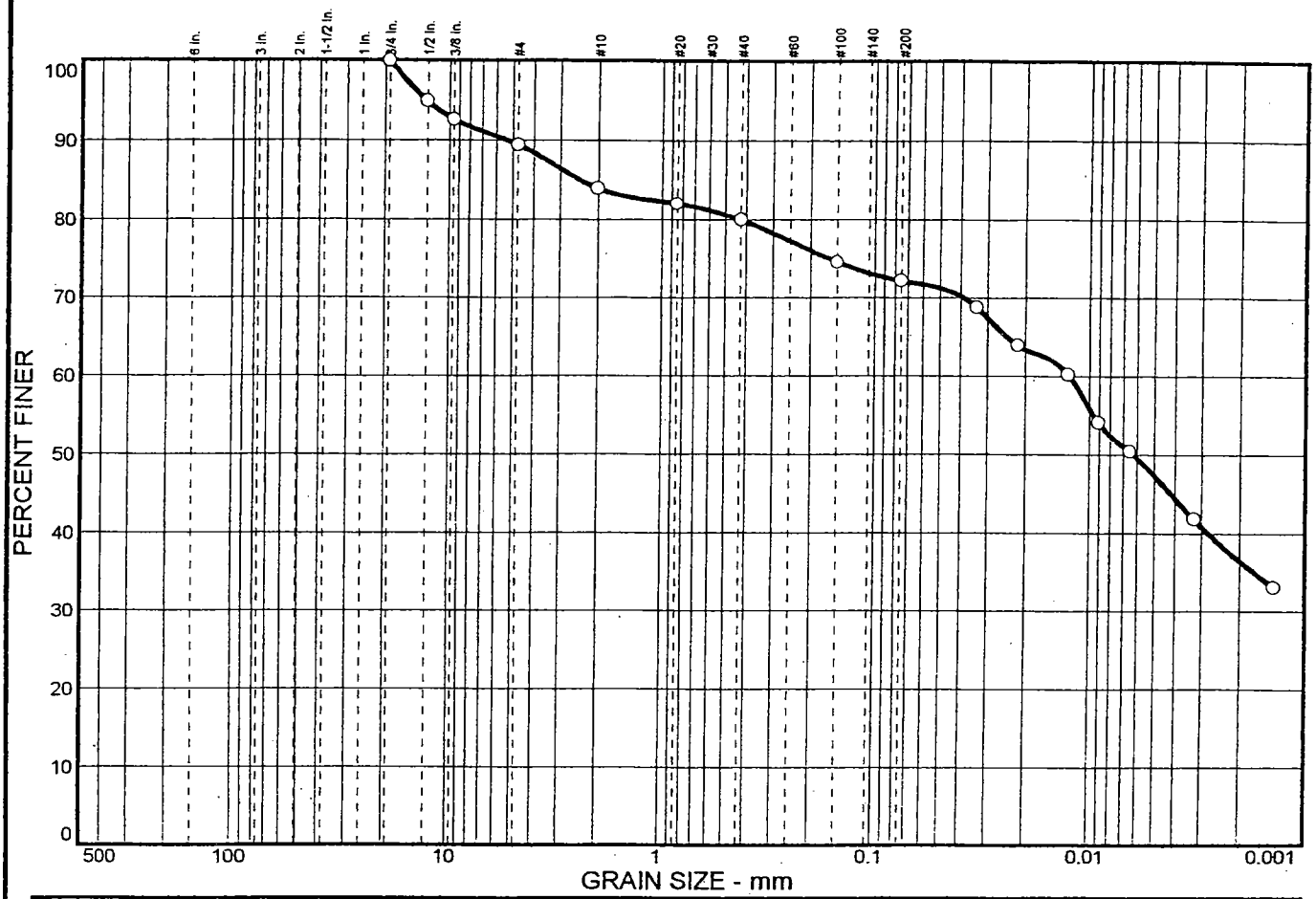
Sample No.: S-57-SB-0310403
Location: Indian Head, Maryland

Date: 9-7-01
Elev./Depth: na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	10.6	17.3	24.7	47.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	94.9		
.375 in.	92.6		
#4	89.4		
#10	83.9		
#20	82.0		
#40	79.9		
#100	74.5		
#200	72.1		

* (no specification provided)

Soil Description

USCS Group Name: Silt with sand

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 2.44 D_{60}= 0.0125 D_{50}= 0.0062
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

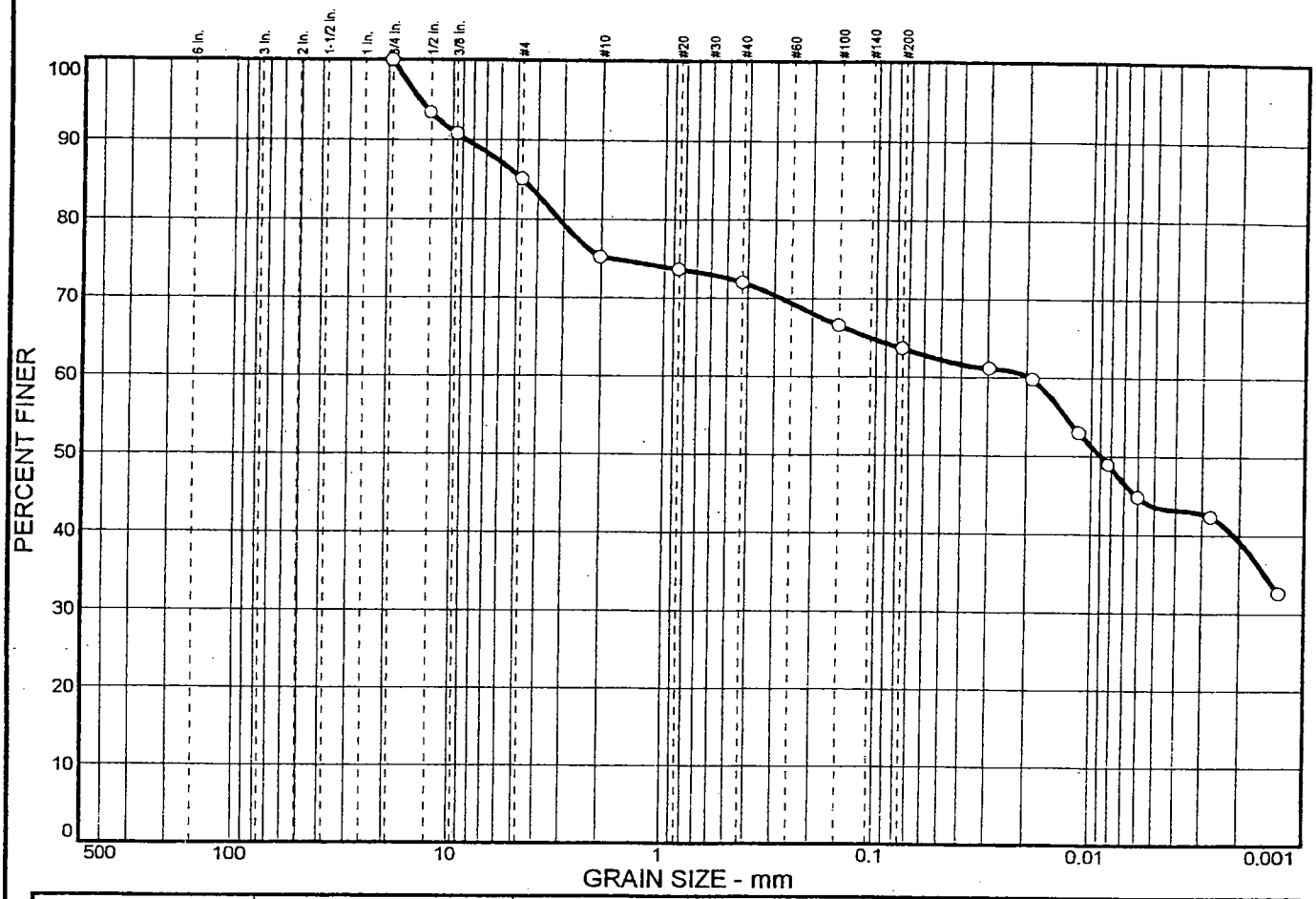
Natural Water Content: 27.9%

Sample No.: S-57-SB-0320203 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

Particle Size Distribution Report



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	15.0	21.4	19.9	43.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.5 in.	93.4		
.375 in.	90.7		
#4	85.0		
#10	75.2		
#20	73.6		
#40	72.0		
#100	66.5		
#200	63.6		

* (no specification provided)

Soil Description

USCS Group Name: Sandy silt with gravel

Atterberg Limits

PL= na LL= na PI= na

Coefficients

D_{85}= 4.75 D_{60}= 0.0196 D_{50}= 0.0090
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Natural Water Content: 28.6%

Sample No.: S-57-SB-0320403 **Date:** 9-7-01
Location: Indian Head, Maryland **Elev./Depth:** na

ACKENHEIL ENGINEERS, INC.

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

B.3 GROUNDWATER ANALYTICAL DATA

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57CP004 S57CP0040103 8/28/2001 -9999 - -9999	QUAL	S57CP005 S57CP0050103 8/29/2001 -9999 - -9999	QUAL	S57CP005 S57CP0050103-D 8/29/2001 -9999 - -9999	QUAL	S57CP006 S57CP0060103 8/29/2001 -9999 - -9999	QUAL	S57CP010 S57CP0100103 8/28/2001 -9999 - -9999	QUAL	S57MW001/SB001 S57MW0010103 8/15/2001 -9999 - -9999	QUAL
VOLATILE ORGANICS (UG/L)												
1,1,1-TRICHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	B
1,1,2,2-TETRACHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	U
1,1,2-TRICHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	5	U	5	U	5	U	5	U	5	U	2	J
1,1-DICHLOROETHENE	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DIBROMO-3-CHLOROPROPANE	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DIBROMOETHANE	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DICHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DICHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DICHLOROPROPANE	5	U	5	U	5	U	5	U	5	U	5	U
1,3-DICHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	U
1,4-DICHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	U
2-BUTANONE	5	U	5	U	5	U	5	U	5	U	5	U
2-HEXANONE	5	U	5	U	5	U	5	U	5	U	5	UR
4-METHYL-2-PENTANONE	5	U	5	U	5	U	5	U	5	U	5	UR
ACETONE	5	U	5	U	5	U	5	U	5	U	5	U
BENZENE	5	U	5	U	5	U	5	U	5	U	5	U
BROMOCHLOROMETHANE	5	U	5	U	5	U	5	U	5	U	5	U
BROMODICHLOROMETHANE	5	U	5	U	5	U	5	U	5	U	5	U
BROMOFORM	5	U	5	U	5	U	5	U	5	U	5	U
BROMOMETHANE	5	U	5	U	5	U	5	U	5	U	5	U
CARBON DISULFIDE	5	U	5	U	5	U	5	U	5	U	5	U
CARBON TETRACHLORIDE	5	U	5	U	5	U	5	U	5	U	5	U
CHLOROBENZENE	5	U	5	U	5	U	5	U	5	U	5	U
CHLORODIBROMOMETHANE	5	U	5	U	5	U	5	U	5	U	5	U
CHLOROETHANE	5	U	5	U	5	U	5	U	5	U	5	U
CHLOROFORM	5	U	5	U	5	U	5	U	5	U	5	U
CHLOROMETHANE	5	U	5	U	5	U	5	U	5	U	5	U
CIS-1,2-DICHLOROETHENE	5	U	5	U	5	U	5	U	5	U	5	U
CIS-1,3-DICHLOROPROPENE	5	U	5	U	5	U	5	U	5	U	5	U
DIETHYL ETHER	5	U	800		720		5	U	5	U	450	L
ETHANE											4	UL
ETHENE											4	UL
ETHYLBENZENE	5	U	5	U	5	U	5	U	5	U	5	U
M+P-XYLENES	5	U	5	U	5	U	5	U	5	U	5	U
METHANE											2	UL
METHYLENE CHLORIDE	5	U	5	U	5	U	5	U	5	U	5	U
O-XYLENE	5	U	5	U	5	U	5	U	5	U	5	U
STYRENE	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	5	U	5	U	5	U	5	U	5	U	5	U
TOLUENE	5	U	5	U	5	U	5	U	5	U	5	U
TRANS-1,2-DICHLOROETHENE	5	U	5	U	5	U	5	U	5	U	5	U

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57CP004 S57CP0040103 8/28/2001 -9999 - -9999	QUAL	S57CP005 S57CP0050103 8/29/2001 -9999 - -9999	QUAL	S57CP005 S57CP0050103-D 8/29/2001 -9999 - -9999	QUAL	S57CP006 S57CP0060103 8/29/2001 -9999 - -9999	QUAL	S57CP010 S57CP0100103 8/28/2001 -9999 - -9999	QUAL	S57MW001/SB001 S57MW0010103 8/15/2001 -9999 - -9999	QUAL
TRANS-1,3-DICHLOROPROPENE	5	U	5	U	5	U	5	U	5	U	5	U
TRICHLOROETHENE	5	U	11		9.4		5	U	5	U	2.6	J
VINYL CHLORIDE	5	U	5	U	5	U	5	U	5	U	5	U
INORGANICS (UG/L)												
CADMIUM											3	U
CHROMIUM											5	U
FILTERED INORGANICS (UG/L)												
IRON												
MISCELLANEOUS PARAEMTERS (MG/L)												
ALKALINITY											12	
BIOCHEMICAL OXYGEN DEMAND												
CARBON DIOXIDE											110	
CHEMICAL OXYGEN DEMAND											5	U
CHLORIDE											6.2	
DISSOLVED ORGANIC CARBON												
DISSOLVED OXYGEN											3.2	
FERROUS IRON											0.1	U
HARDNESS											18.7	
HEXAVALENT CHROMIUM											0.01	U
NITRATE											4.1	
NITRITE											1.2	
OXIDATION REDUCTION POTENTIAL (MV)											155	
PH (S.U.)											5.78	
PHOSPHATE											1	U
SPECIFIC CONDUCTANCE (MS/CM)											0.089	
SULFATE											1.3	
SULFIDE											4	
TEMPERATURE (°C)											21.8	
TOTAL DISSOLVED SOLIDS											60	
TOTAL ORGANIC CARBON											6.8	
TOTAL SUSPENDED SOLIDS											6	

ASSOCIATED SAMPLES

S57CP0040103	S57MW0030103-D	S57MW0070103-D	S57MW0110103-F	S57TW0140103	S57TW0180103-F
S57CP0050103	S57MW0030103-F	S57MW0070103-F	S57MW0120103	S57TW0140103-F	S57TW0180103-F-D
S57CP0050103-D	S57MW0030103-F-D	S57MW0070103-F-D	S57MW0120103-F	S57TW0150103	S57TW0190103
S57CP0060103	S57MW0040103	S57MW0080103	S57MW0130103	S57TW0150103-F	S57TW0190103-F
S57CP0100103	S57MW0040103-F	S57MW0080103-F	S57MW0130103-F	S57TW0160103	S57TW0210103
S57MW0010103	S57MW0050103	S57MW0090103	S57MW0200103	S57TW0160103-F	S57TW0210103-F
S57MW0010103-F	S57MW0050103-F	S57MW0090103-F	S57MW0200103-F	S57TW0170103	
S57MW0020103	S57MW0060103	S57MW0100103	S57MW0220103	S57TW0170103-F	
S57MW0020103-F	S57MW0060103-F	S57MW0100103-F	S57MW0220103-F	S57TW0180103	
S57MW0030103	S57MW0070103	S57MW0110103	S57MW0230103	S57TW0180103-D	

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S57MW001/SB001		S57MW002		S57MW002		S57MW003/SB002		S57MW003/SB002		S57MW003/SB002	
SAMPLE ID	S57MW0010103-F		S57MW0020103		S57MW0020103-F		S57MW0030103		S57MW0030103-D		S57MW0030103-F	
SAMPLE DATE	8/15/2001		8/15/2001		8/15/2001		8/16/2001		8/16/2001		8/16/2001	
DEPTH RANGE	-9999 - -9999	QUAL	-9999 - -9999	QUAL	-9999 - -9999	QUAL	-9999 - -9999	QUAL	-9999 - -9999	QUAL	-9999 - -9999	QUAL
VOLATILE ORGANICS (UG/L)												
1,1,1-TRICHLOROETHANE			5	B			5	U	5	U		
1,1,2,2-TETRACHLOROETHANE			5	U			5	U	5	U		
1,1,2-TRICHLOROETHANE			5	U			5	U	5	U		
1,1-DICHLOROETHANE			5	U			5	U	5	U		
1,1-DICHLOROETHENE			5	U			3	J	5	UJ		
1,2-DIBROMO-3-CHLOROPROPANE			5	U			5	U	5	U		
1,2-DIBROMOETHANE			5	U			5	U	5	U		
1,2-DICHLOROBENZENE			5	U			5	U	5	U		
1,2-DICHLOROETHANE			5	U			5	U	5	U		
1,2-DICHLOROPROPANE			5	U			5	U	5	U		
1,3-DICHLOROBENZENE			5	U			5	U	5	U		
1,4-DICHLOROBENZENE			5	U			5	U	5	U		
2-BUTANONE			5	U			5	U	5	U		
2-HEXANONE			5	UR			5	U	5	U		
4-METHYL-2-PENTANONE			5	UR			5	U	5	U		
ACETONE			5	U			5	U	5	U		
BENZENE			5	U			5	U	5	U		
BROMOCHLOROMETHANE			5	U			5	U	5	U		
BROMODICHLOROMETHANE			5	U			5	U	5	U		
BROMOFORM			5	U			5	U	5	U		
BROMOMETHANE			5	U			5	U	5	U		
CARBON DISULFIDE			5	U			5	U	5	U		
CARBON TETRACHLORIDE			5	U			5	U	5	U		
CHLOROBENZENE			5	U			5	U	5	U		
CHLORODIBROMOMETHANE			5	U			5	U	5	U		
CHLOROETHANE			5	U			5	U	5	U		
CHLOROFORM			5	U			5	U	5	U		
CHLOROMETHANE			5	U			5	U	5	U		
CIS-1,2-DICHLOROETHENE			2.6	J			47	J	14	J		
CIS-1,3-DICHLOROPROPENE			5	U			5	U	5	U		
DIETHYL ETHER			930	L			440	J	320	J		
ETHANE			4	UL			4	UL	4	UL		
ETHENE			4	UL			4	UL	4	UL		
ETHYLBENZENE			5	U			5	U	5	U		
M+P-XYLENES			5	U			5	U	5	U		
METHANE			2	UL			2	UL	2	UL		
METHYLENE CHLORIDE			5	U			5	U	5	U		
O-XYLENE			5	U			5	U	5	U		
STYRENE			5	U			5	U	5	U		
TETRACHLOROETHENE			5	U			5	U	5	U		
TOLUENE			5	U			5	U	5	U		
TRANS-1,2-DICHLOROETHENE			5	U			5	U	5	U		

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57MW001/SB001 S57MW0010103-F 8/15/2001 -9999 - -9999	QUAL	S57MW002 S57MW0020103 8/15/2001 -9999 - -9999	QUAL	S57MW002 S57MW0020103-F 8/15/2001 -9999 - -9999	QUAL	S57MW003/SB002 S57MW0030103 8/16/2001 -9999 - -9999	QUAL	S57MW003/SB002 S57MW0030103-D 8/16/2001 -9999 - -9999	QUAL	S57MW003/SB002 S57MW0030103-F 8/16/2001 -9999 - -9999	QUAL
TRANS-1,3-DICHLOROPROPENE			5	U			5	U	5	U		
TRICHLOROETHENE			43				450	J	280	J		
VINYL CHLORIDE			5	U			5	U	5	U		
INORGANICS (UG/L)												
CADMIUM			3	U			3	U	3	U		
CHROMIUM			5	U			5.6		5	U		
FILTERED INORGANICS (UG/L)												
IRON	155	B			87.3	B					22.5	B
MISCELLANEOUS PARAEMTERS (MG/L)												
ALKALINITY			56				3		3.5			
BIOCHEMICAL OXYGEN DEMAND							4		4.1			
CARBON DIOXIDE			160				80		220			
CHEMICAL OXYGEN DEMAND			5	U			5	U	5	U		
CHLORIDE			9.8				6.1		7.3			
DISSOLVED ORGANIC CARBON							1	U	1	U		
DISSOLVED OXYGEN			3.26				3.43					
FERROUS IRON			0.1	U			0.1	U	0.1	U		
HARDNESS			53.3				7.5		7.7			
HEXAVALENT CHROMIUM			0.01	U			0.01	U	0.01	U		
NITRATE			3.6				4.6		5.1			
NITRITE			1.2				1	U	1	U		
OXIDATION REDUCTION POTENTIAL (MV)			53				258					
PH (S.U.)			6.56				5.29					
PHOSPHATE			1	U			1	U	1	U		
SPECIFIC CONDUCTANCE (MS/CM)			0.172				0.064					
SULFATE			1	U			1.2		1.4			
SULFIDE			4				2.8		2			
TEMPERATURE (°C)			24.4				20.7					
TOTAL DISSOLVED SOLIDS			110				40					
TOTAL ORGANIC CARBON			2.8				1	U	1.2			
TOTAL SUSPENDED SOLIDS			23				5	U	5	U		

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57MW003/SB002 S57MW0030103-F-D 8/16/2001 -9999 - -9999	QUAL	S57MW004 S57MW0040103 8/16/2001 -9999 - -9999	QUAL	S57MW004 S57MW0040103-F 8/16/2001 -9999 - -9999	QUAL	S57MW005/SB015 S57MW0050103 8/23/2001 -9999 - -9999	QUAL	S57MW005/SB015 S57MW0050103-F 8/23/2001 -9999 - -9999	QUAL	S57MW006 S57MW0060103 8/24/2001 -9999 - -9999	QUAL
VOLATILE ORGANICS (UG/L)												
1,1,1-TRICHLOROETHANE			20				5	U			4.6	J
1,1,2,2-TETRACHLOROETHANE			5	U			5	U			10	U
1,1,2-TRICHLOROETHANE			5	U			5	U			10	U
1,1-DICHLOROETHANE			5	U			5	U			10	U
1,1-DICHLOROETHENE			6.5				5	U			6.7	J
1,2-DIBROMO-3-CHLOROPROPANE			5	U			5	U			5	U
1,2-DIBROMOETHANE			5	U			5	U			5	U
1,2-DICHLOROBENZENE			5	U			5	U			5	U
1,2-DICHLOROETHANE			5	U			5	U			10	U
1,2-DICHLOROPROPANE			5	U			5	U			10	U
1,3-DICHLOROBENZENE			5	U			5	U			5	U
1,4-DICHLOROBENZENE			5	U			5	U			5	U
2-BUTANONE			5	U			5	U			10	U
2-HEXANONE			5	U			5	U			10	U
4-METHYL-2-PENTANONE			5	U			5	U			10	U
ACETONE			5	U			5	U			10	U
BENZENE			5	U			5	U			10	U
BROMOCHLOROMETHANE			5	U			5	U			5	U
BROMODICHLOROMETHANE			5	U			5	U			10	U
BROMOFORM			5	U			5	U			10	U
BROMOMETHANE			5	U			5	U			10	U
CARBON DISULFIDE			5	U			5	U			10	U
CARBON TETRACHLORIDE			5	U			5	U			10	U
CHLOROBENZENE			5	U			5	U			10	U
CHLORODIBROMOMETHANE			5	U			5	U			10	U
CHLOROETHANE			5	U			5	U			10	U
CHLOROFORM			5	U			5	U			10	U
CHLOROMETHANE			5	U			5	U			10	U
CIS-1,2-DICHLOROETHENE			620				5	U			46	
CIS-1,3-DICHLOROPROPENE			5	U			5	U			10	U
DIETHYL ETHER			320				570				10	U
ETHANE			4	UL			4	U			4	U
ETHENE			4	UL			4	U			4	U
ETHYLBENZENE			5	U			5	U			10	U
M+P-XYLENES			5	U			5	U			10	U
METHANE			0.1	L			2	U			2	U
METHYLENE CHLORIDE			5	U			5	U			10	U
O-XYLENE			5	U			5	U			10	U
STYRENE			5	U			5	U			10	U
TETRACHLOROETHENE			6.3				5	U			10	U
TOLUENE			5	U			5	U			10	U
TRANS-1,2-DICHLOROETHENE			3.7	J			5	U			10	U

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57MW003/SB002 S57MW0030103-F-D 8/16/2001 -9999 - -9999	QUAL	S57MW004 S57MW0040103 8/16/2001 -9999 - -9999	QUAL	S57MW004 S57MW0040103-F 8/16/2001 -9999 - -9999	QUAL	S57MW005/SB015 S57MW0050103 8/23/2001 -9999 - -9999	QUAL	S57MW005/SB015 S57MW0050103-F 8/23/2001 -9999 - -9999	QUAL	S57MW006 S57MW0060103 8/24/2001 -9999 - -9999	QUAL
TRANS-1,3-DICHLOROPROPENE			5	U			5	U			10	U
TRICHLOROETHENE			12000				5	U			250	
VINYL CHLORIDE			26				5	U			10	U
INORGANICS (UG/L)												
CADMIUM			3	U			3	U			3	U
CHROMIUM			5	U			5	U			5	U
FILTERED INORGANICS (UG/L)												
IRON	32.8	B			7	U			19.6	B		
MISCELLANEOUS PARAEMTERS (MG/L)												
ALKALINITY			50				2	U			2	U
BIOCHEMICAL OXYGEN DEMAND			3.8									
CARBON DIOXIDE			83				2	U			73	
CHEMICAL OXYGEN DEMAND			5	U			5	U			5	U
CHLORIDE			4.8				3.1				15	
DISSOLVED ORGANIC CARBON			1	U								
DISSOLVED OXYGEN			3.26				4.3				4.34	
FERROUS IRON			0.1	U			0.1	U			0.1	U
HARDNESS			42				13				1000	
HEXAVALENT CHROMIUM			0.01	U			0.01	U			0.01	U
NITRATE			4.9				1	U			3.9	
NITRITE			1	U			1	U			1	U
OXIDATION REDUCTION POTENTIAL (MV)			168				315				288	
PH (S.U.)			6.49				4.24				4.88	
PHOSPHATE			1	U			1	U			1	U
SPECIFIC CONDUCTANCE (MS/CM)			0.14				0.113				0.066	
SULFATE			1	U			1	U			1.8	
SULFIDE			4				1.6				5.2	
TEMPERATURE (°C)			22.5				20.5				20.59	
TOTAL DISSOLVED SOLIDS			90				70				40	
TOTAL ORGANIC CARBON			1.4				1	U			1	U
TOTAL SUSPENDED SOLIDS			5	U			5	U			5	U

ANALYTICAL RESULTS - GROUNDWATER
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SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION	S57MW006		S57MW007/SB004		S57MW007/SB004		S57MW007/SB004		S57MW007/SB004		S57MW008
SAMPLE ID	S57MW0060103-F		S57MW0070103		S57MW0070103-D		S57MW0070103-F		S57MW0070103-F-D		S57MW0080103
SAMPLE DATE	8/24/2001		8/23/2001		8/23/2001		8/23/2001		8/23/2001		8/22/2001
DEPTH RANGE	-9999 - -9999	QUAL	-9999 - -9999	QUAL	-9999 - -9999	QUAL	-9999 - -9999	QUAL	-9999 - -9999	QUAL	-9999 - -9999
VOLATILE ORGANICS (UG/L)											
1,1,1-TRICHLOROETHANE			5	U	5	U					5
1,1,2,2-TETRACHLOROETHANE			5	U	5	U					5
1,1,2-TRICHLOROETHANE			5	U	5	U					5
1,1-DICHLOROETHANE			1.7	J	5	U					5
1,1-DICHLOROETHENE			11		5	U					5
1,2-DIBROMO-3-CHLOROPROPANE			5	U	5	U					5
1,2-DIBROMOETHANE			5	U	5	U					5
1,2-DICHLOROBENZENE			5	U	5	U					5
1,2-DICHLOROETHANE			5	U	5	U					5
1,2-DICHLOROPROPANE			5	U	5	U					5
1,3-DICHLOROBENZENE			5	U	5	U					5
1,4-DICHLOROBENZENE			5	U	5	U					5
2-BUTANONE			5	U	5	U					5
2-HEXANONE			5	U	5	U					5
4-METHYL-2-PENTANONE			5	U	5	U					5
ACETONE			9.8	B	5	U					12
BENZENE			5	U	5	U					5
BROMOCHLOROMETHANE			5	U	5	U					5
BROMODICHLOROMETHANE			5	U	5	U					5
BROMOFORM			5	U	5	U					5
BROMOMETHANE			5	U	5	U					5
CARBON DISULFIDE			5	U	5	U					5
CARBON TETRACHLORIDE			5	U	5	U					5
CHLOROBENZENE			5	U	5	U					5
CHLORODIBROMOMETHANE			5	U	5	U					5
CHLOROETHANE			5	U	5	U					5
CHLOROFORM			5	U	5	U					5
CHLOROMETHANE			5	U	5	U					5
CIS-1,2-DICHLOROETHENE			47		5	U					5
CIS-1,3-DICHLOROPROPENE			5	U	5	U					5
DIETHYL ETHER			5	U	750						1300
ETHANE			4	U	4	U					4
ETHENE			4	U	4	U					4
ETHYLBENZENE			5	U	5	U					5
M+P-XYLENES			5	U	5	U					5
METHANE			2	U	0.07						2
METHYLENE CHLORIDE			1	B	5	U					0.7
O-XYLENE			5	U	5	U					5
STYRENE			5	U	5	U					5
TETRACHLOROETHENE			5	U	5	U					5
TOLUENE			5	U	5	U					5
TRANS-1,2-DICHLOROETHENE			5	U	5	U					5

ANALYTICAL RESULTS - GROUNDWATER
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SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57MW006 S57MW0060103-F 8/24/2001 -9999 - -9999	QUAL	S57MW007/SB004 S57MW0070103 8/23/2001 -9999 - -9999	QUAL	S57MW007/SB004 S57MW0070103-D 8/23/2001 -9999 - -9999	QUAL	S57MW007/SB004 S57MW0070103-F 8/23/2001 -9999 - -9999	QUAL	S57MW007/SB004 S57MW0070103-F-D 8/23/2001 -9999 - -9999	QUAL	S57MW008 S57MW0080103 8/22/2001 -9999 - -9999
TRANS-1,3-DICHLOROPROPENE			5	U	5	U					5
TRICHLOROETHENE			280		0.6	J					5
VINYL CHLORIDE			5	U	5	U					5
INORGANICS (UG/L)											
CADMIUM			3	U	3	U					3.9
CHROMIUM			5	U	5	U					5
FILTERED INORGANICS (UG/L)											
IRON	22.7	B					114	B	164		
MISCELLANEOUS PARAEMTERS (MG/L)											
ALKALINITY			20		20						42
BIOCHEMICAL OXYGEN DEMAND			3.9								9.8
CARBON DIOXIDE			120		110						150
CHEMICAL OXYGEN DEMAND			5	U	5	U					5
CHLORIDE			6.9		6.8						60
DISSOLVED ORGANIC CARBON			1	U							1
DISSOLVED OXYGEN			4.06								2.48
FERROUS IRON			0.1	U	0.1	U					0.1
HARDNESS			46		48						93
HEXAVALENT CHROMIUM			0.01	U	0.01	U					0.01
NITRATE			3.2		2.9						6.8
NITRITE			1	U	1	U					1
OXIDATION REDUCTION POTENTIAL (MV)			22								46
PH (S.U.)			5.28								6.45
PHOSPHATE			1	U	1	U					1
SPECIFIC CONDUCTANCE (MS/CM)			0.365								0.365
SULFATE			1	U	1	U					1
SULFIDE			5.6		1	U					2.8
TEMPERATURE (°C)			19.4								26.48
TOTAL DISSOLVED SOLIDS			240								240
TOTAL ORGANIC CARBON			1	U	1	U					1.9
TOTAL SUSPENDED SOLIDS			5	U	5	U					23

ANALYTICAL RESULTS - GROUNDWATER
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IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	QUAL	S57MW008 S57MW0080103-F 8/22/2001 -9999 - -9999	QUAL	S57MW009/SB005 S57MW0090103 8/23/2001 -9999 - -9999	QUAL	S57MW009/SB005 S57MW0090103-F 8/23/2001 -9999 - -9999	QUAL	S57MW010 S57MW0100103 8/23/2001 -9999 - -9999	QUAL	S57MW010 S57MW0100103-F 8/23/2001 -9999 - -9999	QUAL	S57MW011/SB008 S57MW0110103 8/17/2001 -9999 - -9999
VOLATILE ORGANICS (UG/L)												
1,1,1-TRICHLOROETHANE	U			5	U			5	U			5
1,1,2,2-TETRACHLOROETHANE	U			5	U			5	U			5
1,1,2-TRICHLOROETHANE	U			5	U			5	U			5
1,1-DICHLOROETHANE	U			4	J			4.3	J			5
1,1-DICHLOROETHENE	U			28				13				5
1,2-DIBROMO-3-CHLOROPROPANE	U			5	U			5	U			5
1,2-DIBROMOETHANE	U			5	U			5	U			5
1,2-DICHLOROBENZENE	U			5	U			5	U			5
1,2-DICHLOROETHANE	U			5	U			5	U			5
1,2-DICHLOROPROPANE	U			5	U			5	U			5
1,3-DICHLOROBENZENE	U			5	U			5	U			5
1,4-DICHLOROBENZENE	U			5	U			5	U			5
2-BUTANONE	U			5	U			5	U			5
2-HEXANONE	U			5	U			5	U			5
4-METHYL-2-PENTANONE	U			5	U			5	U			5
ACETONE	B			5.9	B			5	U			5
BENZENE	U			5	U			5	U			5
BROMOCHLOROMETHANE	U			5	U			5	U			5
BROMODICHLOROMETHANE	U			5	U			5	U			5
BROMOFORM	U			5	U			5	U			5
BROMOMETHANE	U			5	U			5	U			5
CARBON DISULFIDE	U			5	U			5	U			5
CARBON TETRACHLORIDE	U			5	U			5	U			5
CHLOROBENZENE	U			5	U			5	U			5
CHLORODIBROMOMETHANE	U			5	U			5	U			5
CHLOROETHANE	U			5	U			5	U			5
CHLOROFORM	U			5	U			5	U			5
CHLOROMETHANE	U			5	U			5	U			5
CIS-1,2-DICHLOROETHENE	U			85				150				30
CIS-1,3-DICHLOROPROPENE	U			5	U			5	U			5
DIETHYL ETHER				5	U			5	U			1700
ETHANE	U			4	U			4	U			4
ETHENE	U			4	U			4	U			4
ETHYLBENZENE	U			5	U			5	U			5
M+P-XYLENES	U			5	U			5	U			5
METHANE	U			2	U			0.07				2
METHYLENE CHLORIDE	B			5	U			5	U			5
O-XYLENE	U			5	U			5	U			5
STYRENE	U			5	U			5	U			5
TETRACHLOROETHENE	U			5	U			5	U			5
TOLUENE	U			5	U			5	U			5
TRANS-1,2-DICHLOROETHENE	U			5	U			5	U			5

ANALYTICAL RESULTS - GROUNDWATER
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IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	QUAL	S57MW008 S57MW0080103-F 8/22/2001 -9999 - -9999	QUAL	S57MW009/SB005 S57MW0090103 8/23/2001 -9999 - -9999	QUAL	S57MW009/SB005 S57MW0090103-F 8/23/2001 -9999 - -9999	QUAL	S57MW010 S57MW0100103 8/23/2001 -9999 - -9999	QUAL	S57MW010 S57MW0100103-F 8/23/2001 -9999 - -9999	QUAL	S57MW011/SB008 S57MW0110103 8/17/2001 -9999 - -9999
TRANS-1,3-DICHLOROPROPENE	U			5	U			5	U			5
TRICHLOROETHENE	U			480				330				94
VINYL CHLORIDE	U			5	U			5.5				5
INORGANICS (UG/L)												
CADMIUM	B			3	U			3	U			3
CHROMIUM	U			5	U			5	U			5
FILTERED INORGANICS (UG/L)												
IRON		312				15.8	U			4850		
MISCELLANEOUS PARAEMTERS (MG/L)												
ALKALINITY				2				19				19
BIOCHEMICAL OXYGEN DEMAND												2
CARBON DIOXIDE				54				100				130
CHEMICAL OXYGEN DEMAND	U			5	U			5	U			5
CHLORIDE				1	U			1	U			3.2
DISSOLVED ORGANIC CARBON	U											
DISSOLVED OXYGEN				3.14				3.97				3.3
FERROUS IRON	U			0.1	U			6.3				0.14
HARDNESS				8.2				34				25
HEXAVALENT CHROMIUM	U			0.01	U			0.01	U			0.01
NITRATE				1	U			6.8				1.6
NITRITE	U			1	U			1	U			1
OXIDATION REDUCTION POTENTIAL (MV)				261				57				135
PH (S.U.)				5				5.55				5.79
PHOSPHATE	U			1	U			1	U			1
SPECIFIC CONDUCTANCE (MS/CM)				0.057				0.313				0.104
SULFATE	U			1	U			1	U			1.3
SULFIDE				1	U			2				4
TEMPERATURE (°C)				22.3				23.1				21.34
TOTAL DISSOLVED SOLIDS				40				200				70
TOTAL ORGANIC CARBON				1	U			1.9				
TOTAL SUSPENDED SOLIDS				5	U			5	U			5

ANALYTICAL RESULTS - GROUNDWATER
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IHDIV-NSWC, INDIAN HEAD, MARYLAND

OCATION AMPLE ID AMPLE DATE EPTH RANGE	QUAL	S57MW011/SB008 S57MW0110103-F 8/17/2001 -9999 - -9999	QUAL	S57MW012/SB013 S57MW0120103 8/22/2001 -9999 - -9999	QUAL	S57MW012/SB013 S57MW0120103-F 8/22/2001 -9999 - -9999	QUAL	S57MW013 S57MW0130103 8/22/2001 -9999 - -9999	QUAL	S57MW013 S57MW0130103-F 8/22/2001 -9999 - -9999	QUAL	S57MW020 S57MW0200103 8/29/2001 -9999 - -9999	QUAL
OLATILE ORGANICS (UG/L)													
,1,1-TRICHLOROETHANE	U			5	U			5	U			5	U
,1,2,2-TETRACHLOROETHANE	U			5	U			5	U			5	U
,1,2-TRICHLOROETHANE	U			5	U			5	U			5	U
,1-DICHLOROETHANE	U			5.3				5	U			5	U
,1-DICHLOROETHENE	U			2	J			74				5	U
,2-DIBROMO-3-CHLOROPROPANE	U			5	U			5	U			5	U
,2-DIBROMOETHANE	U			5	U			5	U			5	U
,2-DICHLOROBENZENE	U			5	U			5	U			5	U
,2-DICHLOROETHANE	U			5	U			4.8	J			5	U
,2-DICHLOROPROPANE	U			5	U			5	U			5	U
,3-DICHLOROBENZENE	U			5	U			5	U			5	U
,4-DICHLOROBENZENE	U			5	U			5	U			5	U
-BUTANONE	U			5	U			5	U			5	U
-HEXANONE	U			5	U			5	U			5	U
-METHYL-2-PENTANONE	U			5	U			5	U			5	U
CETONE	U			9.6	B			21	B			5	U
ENZENE	U			5	U			5	U			5	U
ROMOCHLOROMETHANE	U			5	U			5	U			5	U
ROMODICHLOROMETHANE	U			5	U			5	U			5	U
ROMOFORM	U			5	U			5	U			5	U
ROMOMETHANE	U			5	U			5	U			5	U
ARBON DISULFIDE	U			5	U			5	U			5	U
ARBON TETRACHLORIDE	U			5	U			5	U			5	U
HLOROBENZENE	U			5	U			5	U			5	U
HLORODIBROMOMETHANE	U			5	U			5	U			5	U
HLOROETHANE	U			5	U			5	U			5	U
HLOROFORM	U			5	U			5	U			5	U
HLOROMETHANE	U			5	U			5	U			5	U
IS-1,2-DICHLOROETHENE				1.9	J			5	U			5	U
IS-1,3-DICHLOROPROPENE	U			5	U			5	U			5	U
IETHYL ETHER				5	U			5	U			18	
THANE	UL			4	U			4	U			4	U
THENE	UL			4	U			4	U			4	U
THYLBENZENE	U			5	U			5	U			5	U
1+P-XYLENES	U			5	U			5	U			5	U
ETHANE	UL			2	U			2	U			2	U
ETHYLENE CHLORIDE	U			5	U			1.2	B			5	U
-XYLENE	U			5	U			5	U			5	U
TYRENE	U			5	U			5	U			5	U
ETRACHLOROETHENE	U			5	U			5	U			5	U
OLUENE	U			5	U			5	U			5	U
RANS-1,2-DICHLOROETHENE	U			5	U			5	U			5	U

ANALYTICAL RESULTS - GROUNDWATER
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SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	QUAL	S57MW011/SB008 S57MW0110103-F 8/17/2001 -9999 - -9999	QUAL	S57MW012/SB013 S57MW0120103 8/22/2001 -9999 - -9999	QUAL	S57MW012/SB013 S57MW0120103-F 8/22/2001 -9999 - -9999	QUAL	S57MW013 S57MW0130103 8/22/2001 -9999 - -9999	QUAL	S57MW013 S57MW0130103-F 8/22/2001 -9999 - -9999	QUAL	S57MW020 S57MW0200103 8/29/2001 -9999 - -9999	QUAL
TRANS-1,3-DICHLOROPROPENE	U			5	U			5	U			5	U
TRICHLOROETHENE				1.6	J			5	U			5	U
VINYL CHLORIDE	U			5	U			5	U			5	U
INORGANICS (UG/L)													
CADMIUM	U			3	U			3	U			3	U
CHROMIUM	U			5	U			5	U			5	U
FILTERED INORGANICS (UG/L)													
IRON		1060				64.3	B			37	B		
MISCELLANEOUS PARAEMTERS (MG/L)													
ALKALINITY				10				4.5				2	
BIOCHEMICAL OXYGEN DEMAND	U												
CARBON DIOXIDE				120				94				81	
CHEMICAL OXYGEN DEMAND	U			5	U			5	U			5	U
CHLORIDE				7.2				8.6				4.3	
DISSOLVED ORGANIC CARBON													
DISSOLVED OXYGEN				3.92				0				2.84	
FERROUS IRON				0.1	U			0.1	U			0.99	
HARDNESS				16				12				12	
HEXAVALENT CHROMIUM	U			0.01	U			0.01	U			0.01	U
NITRATE				1	U			1	U			2.1	
NITRITE	U			1	U			1	U			1	U
OXIDATION REDUCTION POTENTIAL (MV)				167				306				104	
PH (S.U.)				5.59				4.25				5.62	
PHOSPHATE	U			1	U			1	U			1	U
SPECIFIC CONDUCTANCE (MS/CM)				0.111				0.169				0.089	
SULFATE				1	U			1	U			1	U
SULFIDE				1.6				1	U			1	U
TEMPERATURE (°C)				18.04				19.2				21.02	
TOTAL DISSOLVED SOLIDS				70				110				60	
TOTAL ORGANIC CARBON				1	U			1	U			1	U
TOTAL SUSPENDED SOLIDS	U			5	U			5	U			39	

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57MW020 S57MW0200103-F 8/29/2001 -9999 - -9999	QUAL	S57MW022 S57MW0220103 8/29/2001 -9999 - -9999	QUAL	S57MW022 S57MW0220103-F 8/29/2001 -9999 - -9999	QUAL	S57MW023 S57MW0230103 8/29/2001 -9999 - -9999	QUAL	S57TW014 S57TW0140103 8/23/2001 -9999 - -9999	QUAL	S57TW014 S57TW0140103-F 8/23/2001 -9999 - -9999	QUAL
VOLATILE ORGANICS (UG/L)												
1,1,1-TRICHLOROETHANE			50	U			25	U	5	U		
1,1,2,2-TETRACHLOROETHANE			50	U			25	U	5	U		
1,1,2-TRICHLOROETHANE			50	U			25	U	5	U		
1,1-DICHLOROETHANE			50	U			25	U	5	U		
1,1-DICHLOROETHENE			50	U			25	U	5	U		
1,2-DIBROMO-3-CHLOROPROPANE			50	U			25	U	5	U		
1,2-DIBROMOETHANE			50	U			25	U	5	U		
1,2-DICHLOROBENZENE			50	U			25	U	5	U		
1,2-DICHLOROETHANE			50	U			25	U	5	U		
1,2-DICHLOROPROPANE			50	U			25	U	5	U		
1,3-DICHLOROBENZENE			50	U			25	U	5	U		
1,4-DICHLOROBENZENE			50	U			25	U	5	U		
2-BUTANONE			50	U			25	U	5	U		
2-HEXANONE			50	U			25	U	5	U		
4-METHYL-2-PENTANONE			50	U			25	U	5	U		
ACETONE			50	U			25	U	70			
BENZENE			50	U			900		5	U		
BROMOCHLOROMETHANE			50	U			25	U	5	U		
BROMODICHLOROMETHANE			50	U			25	U	5	U		
BROMOFORM			50	U			25	U	5	U		
BROMOMETHANE			50	U			25	U	5	U		
CARBON DISULFIDE			50	U			25	U	5	U		
CARBON TETRACHLORIDE			50	U			25	U	5	U		
CHLOROBENZENE			50	U			25	U	5	U		
CHLORODIBROMOMETHANE			50	U			25	U	5	U		
CHLOROETHANE			50	U			25	U	5	U		
CHLOROFORM			50	U			25	U	5	U		
CHLOROMETHANE			50	U			25	U	5	U		
CIS-1,2-DICHLOROETHENE			1400				25	U	5	U		
CIS-1,3-DICHLOROPROPENE			50	U			25	U	5	U		
DIETHYL ETHER			50	U			25	U	740			
ETHANE			280	J					4	U		
ETHENE			150	J					4	U		
ETHYLBENZENE			50	U			25	U	5	U		
M+P-XYLENES			50	U			25	U	5	U		
METHANE			740						2	U		
METHYLENE CHLORIDE			50	U			25	U	5	U		
O-XYLENE			50	U			28		5	U		
STYRENE			50	U			25	U	5	U		
TETRACHLOROETHENE			50	U			25	U	5	U		
TOLUENE			50	U			25	U	5	U		
TRANS-1,2-DICHLOROETHENE			50	U			25	U	5	U		

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57MW020 S57MW0200103-F 8/29/2001 -9999 - -9999	QUAL	S57MW022 S57MW0220103 8/29/2001 -9999 - -9999	QUAL	S57MW022 S57MW0220103-F 8/29/2001 -9999 - -9999	QUAL	S57MW023 S57MW0230103 8/29/2001 -9999 - -9999	QUAL	S57TW014 S57TW0140103 8/23/2001 -9999 - -9999	QUAL	S57TW014 S57TW0140103-F 8/23/2001 -9999 - -9999	QUAL
TRANS-1,3-DICHLOROPROPENE			50	U			25	U	5	U		
TRICHLOROETHENE			50	U			30		5	U		
VINYL CHLORIDE			1500				25	U	5	U		
INORGANICS (UG/L)												
CADMIUM			3	U					3	U		
CHROMIUM			5	U					5	U		
FILTERED INORGANICS (UG/L)												
IRON	1370				8430						15500	
MISCELLANEOUS PARAEMTERS (MG/L)												
ALKALINITY			440						6			
BIOCHEMICAL OXYGEN DEMAND												
CARBON DIOXIDE			1300						130			
CHEMICAL OXYGEN DEMAND			29						27			
CHLORIDE			9.8						1	U		
DISSOLVED ORGANIC CARBON												
DISSOLVED OXYGEN			4.45				3.26		2.29			
FERROUS IRON			4.8						15			
HARDNESS			227						77			
HEXAVALENT CHROMIUM			0.01	U					0.01	U		
NITRATE			6.3						9.8			
NITRITE			1	U					1	U		
OXIDATION REDUCTION POTENTIAL (MV)			-11				355		114			
PH (S.U.)			6.82				4.35		5.25			
PHOSPHATE			1	U					1	U		
SPECIFIC CONDUCTANCE (MS/CM)			2.09				0.492		0.368			
SULFATE			1	U					1	U		
SULFIDE			8						8			
TEMPERATURE (°C)			18.52				16.28		26.06			
TOTAL DISSOLVED SOLIDS			1300				320		240			
TOTAL ORGANIC CARBON			13						9.7			
TOTAL SUSPENDED SOLIDS			17						6			

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57TW015 S57TW0150103 8/22/2001 -9999 - -9999	QUAL	S57TW015 S57TW0150103-F 8/22/2001 -9999 - -9999	QUAL	S57TW016 S57TW0160103 8/21/2001 -9999 - -9999	QUAL	S57TW016 S57TW0160103-F 8/20/2001 -9999 - -9999	QUAL	S57TW017 S57TW0170103 8/20/2001 -9999 - -9999	QUAL	S57TW017 S57TW0170103-F 8/20/2001 -9999 - -9999	QUAL
VOLATILE ORGANICS (UG/L)												
1,1,1-TRICHLOROETHANE	5	U			5	U			5	U		
1,1,2,2-TETRACHLOROETHANE	5	U			5	U			5	U		
1,1,2-TRICHLOROETHANE	5	U			5	U			5	U		
1,1-DICHLOROETHANE	5	U			5	U			5	U		
1,1-DICHLOROETHENE	5	U			5	U			5	U		
1,2-DIBROMO-3-CHLOROPROPANE	5	U			5	U			5	U		
1,2-DIBROMOETHANE	5	U			5	U			5	U		
1,2-DICHLOROBENZENE	5	U			5	U			5	U		
1,2-DICHLOROETHANE	5	U			5	U			5	U		
1,2-DICHLOROPROPANE	5	U			5	U			5	U		
1,3-DICHLOROBENZENE	5	U			5	U			5	U		
1,4-DICHLOROBENZENE	5	U			5	U			5	U		
2-BUTANONE	5	U			5	U			5	U		
2-HEXANONE	5	U			5	U			5	U		
4-METHYL-2-PENTANONE	5	U			5	U			5	U		
ACETONE	20	B			12	B			5	U		
BENZENE	5	U			5	U			5	U		
BROMOCHLOROMETHANE	5	U			5	U			5	U		
BROMODICHLOROMETHANE	5	U			5	U			5	U		
BROMOFORM	5	U			5	U			5	U		
BROMOMETHANE	5	U			5	U			5	U		
CARBON DISULFIDE	5	U			5	U			5	U		
CARBON TETRACHLORIDE	5	U			5	U			5	U		
CHLOROBENZENE	5	U			5	U			5	U		
CHLORODIBROMOMETHANE	5	U			5	U			5	U		
CHLOROETHANE	5	U			5	U			5	U		
CHLOROFORM	5	U			5	U			5	U		
CHLOROMETHANE	5	U			5	U			5	U		
CIS-1,2-DICHLOROETHENE	5	U			5	U			5	U		
CIS-1,3-DICHLOROPROPENE	5	U			5	U			5	U		
DIETHYL ETHER	920				5.4				4800			
ETHANE	4	U			4	U			4	UL		
ETHENE	4	U			4	U			4	UL		
ETHYLBENZENE	5	U			5	U			5	U		
M+P-XYLENES	5	U			5	U			5	U		
METHANE	2	U			2	U			2	UL		
METHYLENE CHLORIDE	1.5	B			1.8	B			5	U		
O-XYLENE	5	U			5	U			5	U		
STYRENE	5	U			5	U			5	U		
TETRACHLOROETHENE	7.1				5	U			1.6	J		
TOLUENE	5	U			5	U			5	U		
TRANS-1,2-DICHLOROETHENE	5	U			5	U			5	U		

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57TW015 S57TW0150103 8/22/2001 -9999 - -9999	QUAL	S57TW015 S57TW0150103-F 8/22/2001 -9999 - -9999	QUAL	S57TW016 S57TW0160103 8/21/2001 -9999 - -9999	QUAL	S57TW016 S57TW0160103-F 8/20/2001 -9999 - -9999	QUAL	S57TW017 S57TW0170103 8/20/2001 -9999 - -9999	QUAL	S57TW017 S57TW0170103-F 8/20/2001 -9999 - -9999	QUAL
TRANS-1,3-DICHLOROPROPENE	5	U			5	U			5	U		
TRICHLOROETHENE	2.3	J			5	U			1.1	J		
VINYL CHLORIDE	5	U			5	U			5	U		
INORGANICS (UG/L)												
CADMIUM	3	U			3	U			3	U		
CHROMIUM	5	U			5	U			5	U		
FILTERED INORGANICS (UG/L)												
IRON			43.1	B			41.5	B			47.5	B
MISCELLANEOUS PARAEMTERS (MG/L)												
ALKALINITY	9				27				8.5			
BIOCHEMICAL OXYGEN DEMAND					3.4				9.4			
CARBON DIOXIDE	92				61				110			
CHEMICAL OXYGEN DEMAND	5	U			5	U			5	U		
CHLORIDE	4.8				9.2				4.8			
DISSOLVED ORGANIC CARBON					1	U			1	U		
DISSOLVED OXYGEN	4.53				7.91				4.05			
FERROUS IRON	0.1	U			0.1	U			0.1	U		
HARDNESS	18				31.2				19			
HEXAVALENT CHROMIUM	0.01	U			0.01	U			0.01	U		
NITRATE	2.1				5.6				1.2			
NITRITE	1	U			1	U			1	U		
OXIDATION REDUCTION POTENTIAL (MV)	-21				145				177			
PH (S.U.)	5.46				6.53				5.35			
PHOSPHATE	1	U			1	U			1	U		
SPECIFIC CONDUCTANCE (MS/CM)	0.113				0.107				0.124			
SULFATE	1	U			1	U			1	U		
SULFIDE	2.8				4				1.2			
TEMPERATURE (ºC)	18.06				20.83				18.4			
TOTAL DISSOLVED SOLIDS	70				70				80			
TOTAL ORGANIC CARBON	1				1.4				1.3			
TOTAL SUSPENDED SOLIDS	440				10	J			5	UJ		

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57TW018 S57TW0180103 8/21/2001 -9999 - -9999	QUAL	S57TW018 S57TW0180103-D 8/21/2001 -9999 - -9999	QUAL	S57TW018 S57TW0180103-F 8/20/2001 -9999 - -9999	QUAL	S57TW018 S57TW0180103-F-D 8/20/2001 -9999 - -9999	QUAL	S57TW019 S57TW0190103 8/21/2001 -9999 - -9999	QUAL	S57TW019 S57TW0190103-F 8/20/2001 -9999 - -9999	QUAL
VOLATILE ORGANICS (UG/L)												
1,1,1-TRICHLOROETHANE	5	U	5	U					5	U		
1,1,2,2-TETRACHLOROETHANE	5	U	5	U					5	U		
1,1,2-TRICHLOROETHANE	5	U	5	U					5	U		
1,1-DICHLOROETHANE	2.2	J	1.9	J					5	U		
1,1-DICHLOROETHENE	3.7	J	2.5	J					5	U		
1,2-DIBROMO-3-CHLOROPROPANE	5	U	5	U					5	U		
1,2-DIBROMOETHANE	5	U	5	U					5	U		
1,2-DICHLOROBENZENE	5	U	5	U					5	U		
1,2-DICHLOROETHANE	5	U	5	U					5	U		
1,2-DICHLOROPROPANE	5	U	5	U					5	U		
1,3-DICHLOROBENZENE	5	U	5	U					5	U		
1,4-DICHLOROBENZENE	5	U	5	U					5	U		
2-BUTANONE	5	U	5	U					5	U		
2-HEXANONE	5	U	5	U					5	U		
4-METHYL-2-PENTANONE	5	U	5	U					5	U		
ACETONE	17	B	37	B					14	B		
BENZENE	5	U	5	U					5	U		
BROMOCHLOROMETHANE	5	U	5	U					5	U		
BROMODICHLOROMETHANE	5	U	5	U					5	U		
BROMOFORM	5	U	5	U					5	U		
BROMOMETHANE	5	U	5	U					5	U		
CARBON DISULFIDE	5	U	5	U					5	U		
CARBON TETRACHLORIDE	5	U	5	U					5	U		
CHLOROBENZENE	5	U	5	U					5	U		
CHLORODIBROMOMETHANE	5	U	5	U					5	U		
CHLOROETHANE	5	U	5	U					5	U		
CHLOROFORM	5	U	5	U					5	U		
CHLOROMETHANE	5	U	5	U					5	U		
CIS-1,2-DICHLOROETHENE	64		68						5.5			
CIS-1,3-DICHLOROPROPENE	5	U	5	U					5	U		
DIETHYL ETHER	2.1	J	5	U					77			
ETHANE	4	U	4	U					4	U		
ETHENE	4	U	4	U					4	U		
ETHYLBENZENE	5	U	5	U					5	U		
M+P-XYLENES	5	U	5	U					5	U		
METHANE	2	U	0.19						2	U		
METHYLENE CHLORIDE	1.3	J	5	U					1.9	J		
O-XYLENE	5	U	5	U					5	U		
STYRENE	5	U	5	U					5	U		
TETRACHLOROETHENE	5	U	5	U					5	U		
TOLUENE	5	U	5	U					5	U		
TRANS-1,2-DICHLOROETHENE	5	U	5	U					5	U		

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57TW018 S57TW0180103 8/21/2001 -9999 - -9999	QUAL	S57TW018 S57TW0180103-D 8/21/2001 -9999 - -9999	QUAL	S57TW018 S57TW0180103-F 8/20/2001 -9999 - -9999	QUAL	S57TW018 S57TW0180103-F-D 8/20/2001 -9999 - -9999	QUAL	S57TW019 S57TW0190103 8/21/2001 -9999 - -9999	QUAL	S57TW019 S57TW0190103-F 8/20/2001 -9999 - -9999	QUAL
TRANS-1,3-DICHLOROPROPENE	5	U	5	U					5	U		
TRICHLOROETHENE	210		210						62			
VINYL CHLORIDE	5	U	5	U					5	U		
INORGANICS (UG/L)												
CADMIUM	3	U	3	U					3	U		
CHROMIUM	5	U	5	U					5	U		
FILTERED INORGANICS (UG/L)												
IRON					4700		4280				200	
MISCELLANEOUS PARAEMTERS (MG/L)												
ALKALINITY	7.5		7						14			
BIOCHEMICAL OXYGEN DEMAND	8.5		8.3						2.3			
CARBON DIOXIDE	110		90						2.5			
CHEMICAL OXYGEN DEMAND	5	U	5	U					5	U		
CHLORIDE	2.6		2.8						3			
DISSOLVED ORGANIC CARBON	1.2		1	U					1	U		
DISSOLVED OXYGEN	4.35								4.62			
FERROUS IRON	4.1		4.2						0.3			
HARDNESS	41.1		33.2						22.1			
HEXAVALENT CHROMIUM	0.01	U	0.01						0.01	U		
NITRATE	8.3		8.6						3.8			
NITRITE	1	U	1	U					1	U		
OXIDATION REDUCTION POTENTIAL (MV)	185								64			
PH (S.U.)	4.87								6.01			
PHOSPHATE	1	U	1	U					1	U		
SPECIFIC CONDUCTANCE (MS/CM)	0.189								0.114			
SULFATE	1	U	1	U					1	U		
SULFIDE	1.6		2						2			
TEMPERATURE (°C)	19.47								17.4			
TOTAL DISSOLVED SOLIDS	120								70			
TOTAL ORGANIC CARBON	4.7		4.5						1.5			
TOTAL SUSPENDED SOLIDS	8	J	11	J					17	J		

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57TW021 S57TW0210103 8/22/2001 -9999 - -9999	QUAL	S57TW021 S57TW0210103-F 8/22/2001 -9999 - -9999	QUAL
VOLATILE ORGANICS (UG/L)				
1,1,1-TRICHLOROETHANE	5	U		
1,1,2,2-TETRACHLOROETHANE	5	U		
1,1,2-TRICHLOROETHANE	5	U		
1,1-DICHLOROETHANE	5	U		
1,1-DICHLOROETHENE	5	U		
1,2-DIBROMO-3-CHLOROPROPANE	5	U		
1,2-DIBROMOETHANE	5	U		
1,2-DICHLOROBENZENE	5	U		
1,2-DICHLOROETHANE	5	U		
1,2-DICHLOROPROPANE	5	U		
1,3-DICHLOROBENZENE	5	U		
1,4-DICHLOROBENZENE	5	U		
2-BUTANONE	5	U		
2-HEXANONE	5	U		
4-METHYL-2-PENTANONE	5	U		
ACETONE	37	B		
BENZENE	5	U		
BROMOCHLOROMETHANE	5	U		
BROMODICHLOROMETHANE	5	U		
BROMOFORM	5	U		
BROMOMETHANE	5	U		
CARBON DISULFIDE	5	U		
CARBON TETRACHLORIDE	5	U		
CHLOROBENZENE	5	U		
CHLORODIBROMOMETHANE	5	U		
CHLOROETHANE	5	U		
CHLOROFORM	5	U		
CHLOROMETHANE	5	U		
CIS-1,2-DICHLOROETHENE	5	U		
CIS-1,3-DICHLOROPROPENE	5	U		
DIETHYL ETHER	5	U		
ETHANE	4	U		
ETHENE	4	U		
ETHYLBENZENE	5	U		
M+P-XYLENES	5	U		
METHANE	2	U		
METHYLENE CHLORIDE	0.7	B		
O-XYLENE	5	U		
STYRENE	5	U		
TETRACHLOROETHENE	5	U		
TOLUENE	5	U		
TRANS-1,2-DICHLOROETHENE	5	U		

ANALYTICAL RESULTS - GROUNDWATER
AUGUST 2001
SITE 57 - FORMER DRUM LOADING AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

LOCATION SAMPLE ID SAMPLE DATE DEPTH RANGE	S57TW021 S57TW0210103 8/22/2001 -9999 - -9999	QUAL	S57TW021 S57TW0210103-F 8/22/2001 -9999 - -9999	QUAL
TRANS-1,3-DICHLOROPROPENE	5	U		
TRICHLOROETHENE	5	U		
VINYL CHLORIDE	5	U		
INORGANICS (UG/L)				
CADMIUM	3	U		
CHROMIUM	5	U		
FILTERED INORGANICS (UG/L)				
IRON			5760	
MISCELLANEOUS PARAEMTERS (MG/L)				
ALKALINITY	5			
BIOCHEMICAL OXYGEN DEMAND				
CARBON DIOXIDE	120			
CHEMICAL OXYGEN DEMAND	9			
CHLORIDE	8.9			
DISSOLVED ORGANIC CARBON				
DISSOLVED OXYGEN	7.09			
FERROUS IRON	5.7			
HARDNESS	110			
HEXAVALENT CHROMIUM	0.01	U		
NITRATE	30			
NITRITE	1	U		
OXIDATION REDUCTION POTENTIAL (MV)	-256			
PH (S.U.)	4.83			
PHOSPHATE	1	U		
SPECIFIC CONDUCTANCE (MS/CM)	1.78			
SULFATE	1	U		
SULFIDE	1	U		
TEMPERATURE (°C)	20.7			
TOTAL DISSOLVED SOLIDS	1100			
TOTAL ORGANIC CARBON	3.6			
TOTAL SUSPENDED SOLIDS	24			

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	S57MW001-SB001	S57MW001-SB001	S57MW002	S57MW003-SB002	S57MW004	S57MW004	S57MW005-SB015	S57MW006
SAMPLE	S57MW0010109	S57MW0010109	S57MW0020109	S57MW0030109	S57MW0040109	S57GWDUP0109	S57MW0050109	S57MW0060109
SAMPLE DATE	3/30/2004	3/31/2004	3/30/2004	3/30/2004	3/30/2004	3/30/2004	4/1/2004	4/1/2004
Volatile Organics (µg/L)								
1,1,1-TRICHLOROETHANE	0.5 U		0.3 J	2 U	2 U	0.7	4	3
1,1,2,2-TETRACHLOROETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,1,2-TRICHLOROETHANE	0.5 U		0.5 U	2 U	2 U	0.2 J	0.2 J	0.2 J
1,1,2-TRICHLOROTRIFLUOROETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	1		2	2 U	2 U	0.8	1	1
1,1-DICHLOROETHENE	0.2 J		0.5 U	2 U	3	3	9	8
1,2,3-TRICHLOROBENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	0.5 UJ		0.5 UJ	2 UJ	2 UJ	0.5 UJ	0.5 U	0.5 UJ
1,2-DIBROMOETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROPROPANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
2-BUTANONE	5 U		5 U	25 U	25 U	5 U	5 U	5 U
2-HEXANONE	5 U		5 U	25 U	25 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	5 U		5 U	25 U	25 U	5 U	5 U	5 U
ACETONE	5 U		5 U	25 U	25 U	5 U	5 UJ	5 U
BENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
BROMOCHLOROMETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
BROMOFORM	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
BROMOMETHANE	0.5 UJ		0.5 UJ	2 U	2 U	0.5 UJ	0.5 U	0.5 U
CARBON DISULFIDE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.2 J
CHLOROBENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
CHLORODIBROMOMETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.2 J		0.5 U	2 U	2 U	0.5 U	0.5 U	0.1 J
CHLOROMETHANE	0.3 B		0.3 B	1 B	1 B	0.3 B	0.3 B	0.3 B
CIS-1,2-DICHLOROETHENE	0.5 U		0.7	8	520 L	560	33	38
CIS-1,3-DICHLOROPROPENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
CYCLOHEXANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION SAMPLE SAMPLE DATE	S57MW001-SB001 S57MW0010109 3/30/2004	S57MW001-SB001 S57MW0010109 3/31/2004	S57MW002 S57MW0020109 3/30/2004	S57MW003-SB002 S57MW0030109 3/30/2004	S57MW004 S57MW0040109 3/30/2004	S57MW004 S57GWDUP0109 3/30/2004	S57MW005-SB015 S57MW0050109 4/1/2004	S57MW006 S57MW0060109 4/1/2004
DIETHYL ETHER	420		1200	8	96	120	0.7	1
ETHANE		1.2		0.069	2.1	2		
ETHENE		0.16		0.005 U	2.2	2.4		
ETHYLBENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
ISOPROPYLBENZENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
METHANE		420		1.1	43	42		
METHYL ACETATE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
METHYL CYCLOHEXANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
METHYL TERT-BUTYL ETHER	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.5 UJ		0.5 UJ	5 B	6 B	0.3 B	0.5 UJ	0.5 UJ
STYRENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	0.3 J		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
TOLUENE	0.2 J		0.2 J	2 U	2 U	0.5 U	0.5 U	0.5 U
TOTAL XYLENES	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U		0.5 U	2 U	3	5	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
TRICHLOROETHENE	2		10	400	590	600	240	240
TRICHLOROFLUOROMETHANE	0.5 U		0.5 U	2 U	2 U	0.5 U	0.5 UJ	0.5 U
VINYL CHLORIDE	0.5 U		0.5 U	2 U	14	15	0.4 J	0.6
Total Inorganics (µg/L)								
ALUMINUM	15.70 U		111 B	26.6 B	15.70 U	15.70 U	94.4 B	38.4 B
ANTIMONY	1.74 U		1.74 U	1.74 U	1.74 U	1.74 U	1.74 U	3.4 K
ARSENIC	2.13 U		7.3 K	2.13 U	2.13 U	2.13 U	2.13 U	2.13 U
BARIUM	76.5		54.8	30.0	31.9	32.4	50.2	50.3
BERYLLIUM	0.28 U		0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.30 B
CADMIUM	2.66 U		2.66 U	2.66 U	2.66 U	2.66 U	2.66 U	2.66 U
CALCIUM	4210		11200	1580	3830	3820	1950	1800
CHROMIUM	0.88 U		0.88 U	0.88 U	0.88 U	0.88 U	1.1 B	1.0 B
COBALT	30.4 K		2.96 U	11.8 K	14.1 K	14.2 K	11.4 K	13.7 K
COPPER	3.30 U		3.30 U	3.30 U	3.30 U	3.30 U	15.9 K	3.30 U
IRON	168		293	56.8 B	15.5 B	12.3 B	99.1 B	5.9 B
LEAD	1.56 U		1.56 U	1.56 U	1.56 U	1.56 U	1.56 U	1.56 U
MAGNESIUM	1610		4270	1150	1410	1440	1930	1960
MANGANESE	248		13.1 K	73.0	96.3	97.7	36.1	27.7 K
MERCURY	0.01 U		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
NICKEL	12.10 U		12.10 U	12.10 U	12.10 U	12.10 U	12.10 U	12.10 U

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION SAMPLE SAMPLE DATE	S57MW001-SB001 S57MW0010109 3/30/2004	S57MW001-SB001 S57MW0010109 3/31/2004	S57MW002 S57MW0020109 3/30/2004	S57MW003-SB002 S57MW0030109 3/30/2004	S57MW004 S57MW0040109 3/30/2004	S57MW004 S57GWDUP0109 3/30/2004	S57MW005-SB015 S57MW0050109 4/1/2004	S57MW006 S57MW0060109 4/1/2004
POTASSIUM	2730		2470	3450	2330	2590	3050	3220
SELENIUM	2.32 U		2.32 U	2.32 U	3.7 B	2.32 U	2.32 UL	2.32 UL
SILVER	3.60 U		3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U
SODIUM	15000		18800	11600	12300	12400	9740	9860
THALLIUM	9.2 B		4.6 B	9.6 B	8.4 B	7.0 B	11.6 B	4.7 B
VANADIUM	3.60 U		3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U
ZINC	21.4 K		6.6 K	9.4 K	13.5 K	14.6 K	19.4 K	25.3 K
Filtered Inorganics (µg/L)								
ALUMINUM	15.70 U		37.3 B	15.70 U	15.70 U	15.70 U	19.1 B	30.8 B
ANTIMONY	1.74 U		1.74 U	1.74 U	1.74 U	2.3 K	1.74 U	1.74 U
ARSENIC	2.13 U		6.4 K	2.13 U	2.13 U	2.1 K	2.13 U	2.13 U
BARIUM	76.7		53.4	27.6	31.5	30.9	51.1	50.5
BERYLLIUM	0.28 U		0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
CADMIUM	2.66 U		2.66 U	2.66 U	2.66 U	2.66 U	2.66 U	2.66 U
CALCIUM	4220		11200	1520	3870	3430	1970	1850
CHROMIUM	0.88 U		0.88 U	0.88 U	0.88 U	0.88 U	1.0 B	0.88 U
COBALT	29.9 K		2.96 U	13.5 K	14.0 K	11.9 K	11.3 K	11.9 K
COPPER	3.30 U		3.30 U	5.1 K	3.30 U	3.30 U	3.30 U	3.30 U
IRON	82.8 B		69.5 B	16.2 B	4.80 U	4.80 U	4.80 U	4.80 U
LEAD	1.56 U		1.56 U	1.56 U	1.56 U	1.56 U	3.0 B	2.8 B
MAGNESIUM	1620		4220	1120	1450	1350	2040	1990
MANGANESE	245		11.0 K	74.2	92.7	97.1	36.6	29.2 K
MERCURY	0.01 U		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
NICKEL	12.10 U		12.10 U	12.10 U	12.10 U	12.10 U	12.10 U	12.10 U
POTASSIUM	2750		2570	3640	2280	2380	3420	3220
SELENIUM	2.32 U		2.32 U	2.32 U	2.32 U	2.32 U	2.32 UL	2.32 UL
SILVER	3.60 U		3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U
SODIUM	15300		18600	11400	12600	12400	10400	10200
THALLIUM	8.2 B		9.4 B	7.6 B	6.0 B	8.5 B	13.8 B	10.2 B
VANADIUM	3.60 U		3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U
ZINC	22.7 K		6.9 K	11.2 K	13.4 K	14.1 K	21.8 K	27.8 K
Miscellaneous Parameters (mg/L)								
ACETIC ACID		1 U		1 UJ	1 UJ	1 UJ		
ALKALINITY				6.5	18	18		
BUTANOIC ACID		1 U		1 UJ	1 UJ	1 UJ		
CARBON DIOXIDE		96		75	74	78		

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW001-SB001 S57MW0010109 3/30/2004	S57MW001-SB001 S57MW0010109 3/31/2004	S57MW002 S57MW0020109 3/30/2004	S57MW003-SB002 S57MW0030109 3/30/2004	S57MW004 S57MW0040109 3/30/2004	S57MW004 S57GWDUP0109 3/30/2004	S57MW005-SB015 S57MW0050109 4/1/2004	S57MW006 S57MW0060109 4/1/2004
CHLORIDE				17	15	15		
CYANIDE (UG/L)	10 U		10 U	10 U	10 U	10 U	10 U	10 U
LACTIC ACID		25 U		25 UJ	25 UJ	25 UJ		
NITRATE-N				1.8	0.49	0.51		
NITRITE-N				0.050 U	0.050 U	0.050 U		
ORTHOPHOSPHATE				0.050 U	0.0080 J	0.050 U		
PROPIONIC ACID		1 U		1 UJ	1 UJ	1 UJ		
PYRUVIC ACID		10 U		10 UJ	10 UJ	10 UJ		
SULFATE				1.1	6.6	6.6		
SULFIDE				1.0 U	1.0 U	1.0 U		
TOTAL DISSOLVED SOLIDS	70		100	47	38	42	76	70
TOTAL INORGANIC CARBON				1.0 U	2.7	2.8		
TOTAL ORGANIC CARBON				0.42 J	0.64 J	0.53 J		
TOTAL SUSPENDED SOLIDS	4.0 U		4.0 U	4.0 U	4.0 U	4.0 U	12	4.0 U
Filtered Miscellaneous Parameters (µg/L)								
CYANIDE	10 U		10 U	10 U	10 U	10 U	10 U	10 U

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	S57MW007-SB004	S57MW008	S57MW009-SB005	S57MW010	S57MW011-SB008	S57MW012-SB013	S57MW013	S57MW020
SAMPLE	S57MW0070109	S57MW0080109	S57MW0090109	S57MW0100109	S57MW0110109	S57MW0120109	S57MW0130109	S57MW0200109
SAMPLE DATE	3/31/2004	3/31/2004	3/31/2004	3/31/2004	3/31/2004	3/30/2004	3/30/2004	4/1/2004
Volatile Organics (µg/L)								
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	4	2	0.5 U	0.4 J	8	0.5 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UL	0.5 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.4 J	0.2 J	0.5 U	0.5 U	0.5 UL	0.5 U
1,1,2-TRICHLOROTRIFLUOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-DICHLOROETHANE	0.5 U	0.5 U	3	2	0.3 J	4	0.7	0.5 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	20	8	0.6	2	75	0.5 U
1,2,3-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 U
1,2-DIBROMOETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	0.2 J	0.5 U	0.5 U	2	0.5 U
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,3-DICHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-DICHLOROBENZENE	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-BUTANONE	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-HEXANONE	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	5 U	5 U	5 U	5 U	5 UJ	5 U	5 U	5 U
BENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMODICHLOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOFORM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
BROMOMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U
CARBON DISULFIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.3 J	0.5	0.5 U
CHLOROBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLORODIBROMOMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CHLOROFORM	0.5 U	0.5 U	0.5	0.4 J	0.1 J	0.3 J	2	0.5 U
CHLOROMETHANE	0.3 B	0.3 B	0.4 B	0.3 B	0.3 B	0.4 B	0.3 B	0.4 B
CIS-1,2-DICHLOROETHENE	0.5 U	0.2 J	51 K	43	18	1	0.3 J	0.5 UJ
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 UL	0.5 U	0.5 U	0.5 UL	0.5 U
CYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
DICHLORODIFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW007-SB004 S57MW0070109 3/31/2004	S57MW008 S57MW0080109 3/31/2004	S57MW009-SB005 S57MW0090109 3/31/2004	S57MW010 S57MW0100109 3/31/2004	S57MW011-SB008 S57MW0110109 3/31/2004	S57MW012-SB013 S57MW0120109 3/30/2004	S57MW013 S57MW0130109 3/30/2004	S57MW020 S57MW0200109 4/1/2004
DIETHYL ETHER	580	330	2	1	2100	5	0.5 U	220
ETHANE	0.005 U	0.014	0.027		0.34			0.11
ETHENE	0.063	0.005 U	0.005 U		0.36			0.071
ETHYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
ISOPROPYLBENZENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHANE	1	7.3	0.19		15			14
METHYL ACETATE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYL CYCLOHEXANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYL TERT-BUTYL ETHER	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
METHYLENE CHLORIDE	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ	0.5 UJ
STYRENE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TETRACHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U	0.4 J	0.2 J	0.7	0.5 U
TOLUENE	0.5 U	0.5 U	0.5 U	0.1 J	0.5 U	0.2 J	0.1 J	0.5 U
TOTAL XYLENES	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TRANS-1,2-DICHLOROETHENE	0.5 U	0.5 U	0.3 J	0.5 U	0.4 J	0.5 U	0.5 U	0.5 U
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	0.5 UL	0.5 U	0.5 U	0.5 UL	0.5 U
TRICHLOROETHENE	0.2 J	0.3 J	360	200	91	1	0.4 J	0.2 J
TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U	2	0.7	0.5 U	0.5 U	0.5 U
Total Inorganics (µg/L)								
ALUMINUM	15.70 U	68.3 B	34.3 B	63.2 B	15.70 U	73.4 B	66.5 B	52.6 B
ANTIMONY	1.74 U	2.9 K	1.74 U	1.74 U	3.6 K	1.74 U	1.74 U	1.74 U
ARSENIC	2.13 U	90.2	2.13 U	2.4 K	2.8 K	2.13 U	2.13 U	2.13 U
BARIUM	187	96.1	28.3	39.0	34.4	66.7	75.2	45.8
BERYLLIUM	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
CADMIUM	2.66 U	4.0 K	2.66 U	2.66 U	2.66 U	2.66 U	2.66 U	2.66 U
CALCIUM	16400	35300	1890	8180	6860	3490	3090	2450
CHROMIUM	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U
COBALT	119	19.4 K	14.8 K	13.0 K	27.5 K	10.5 K	9.7 K	29.8 K
COPPER	3.30 U	4.0 K	3.30 U	3.30 U	3.30 U	3.30 U	3.30 U	3.30 U
IRON	87.9 B	861	46.5 B	2230	307	382	120	88.5 B
LEAD	1.56 U	3.1 B	1.56 U	1.56 U	1.56 U	1.56 U	1.56 U	1.56 UL
MAGNESIUM	8780	6740	1490	1740	1530	1830	1890	1810
MANGANESE	946	376	37.5	171	297	77.7	59.8	85.1
MERCURY	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 UL
NICKEL	24.4 K	12.10 U	12.10 U	12.10 U	12.10 U	12.10 U	12.10 U	14.9 K

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	S57MW007-SB004	S57MW008	S57MW009-SB005	S57MW010	S57MW011-SB008	S57MW012-SB013	S57MW013	S57MW020
SAMPLE	S57MW0070109	S57MW0080109	S57MW0090109	S57MW0100109	S57MW0110109	S57MW0120109	S57MW0130109	S57MW0200109
SAMPLE DATE	3/31/2004	3/31/2004	3/31/2004	3/31/2004	3/31/2004	3/30/2004	3/30/2004	4/1/2004
POTASSIUM	5390	4100	2730	2420	3610	3000	2370	4700
SELENIUM	2.32 U	2.32 U	2.32 U	2.32 U	2.32 UL	2.32 U	2.32 U	2.32 U
SILVER	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.7 K	3.60 U
SODIUM	38200	92900	10300	25600	15300	18900	22600	14900
THALLIUM	2.8 B	5.7 B	5.2 B	3.2 B	12.8 B	6.8 B	6.5 B	6.5 B
VANADIUM	3.6 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U
ZINC	142	2050	17.4 K	65.4	34.6 K	19.6 K	16.2 K	29.0 K
Filtered Inorganics (µg/L)								
ALUMINUM	15.70 U	15.70 U	19.7 B	22.0 B	15.70 U	26.2 B	17.6 B	17.9 B
ANTIMONY	1.74 U	1.74 U	3.1 K	1.74 U	2.0 K	1.74 U	1.74 U	1.74 U
ARSENIC	2.13 U	53.0	2.13 U	2.13 U	2.13 U	2.13 U	2.13 U	2.13 U
BARIUM	188	96.8	27.4	37.9	33.5	65.4	73.6	45.3
BERYLLIUM	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
CADMIUM	2.66 U	6.4 K	2.66 U	2.66 U	2.66 U	2.66 U	2.66 U	2.66 U
CALCIUM	16500	33200	1890	7380	7600	3480	3060	2480
CHROMIUM	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U	0.88 U
COBALT	120	20.8 K	16.4 K	12.0 K	29.2 K	13.5 K	9.1 K	32.0 K
COPPER	3.30 U	10.7 K	3.30 U	3.30 U	3.30 U	3.30 U	3.30 U	3.30 U
IRON	81.1 B	91.1 B	4.80 U	1980	256	33.7 B	17.8 B	8.3 B
LEAD	1.56 U	1.56 U	1.56 U	1.56 U	1.56 U	1.56 U	1.56 U	1.56 UL
MAGNESIUM	8900	6660	1480	1710	1550	1850	1870	1840
MANGANESE	958	340	37.0	165	302	66.9	59.9	85.0
MERCURY	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 UL
NICKEL	19.8 K	12.10 U	12.10 U	12.10 U	12.10 U	12.10 U	12.10 U	19.8 K
POTASSIUM	5470	3890	2490	2490	3700	3080	2150	4760
SELENIUM	2.32 U	2.32 U	2.32 U	2.32 U	2.32 UL	2.9 B	2.32 U	2.32 U
SILVER	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U
SODIUM	39200	90500	10300	24000	14800	18900	23200	15000
THALLIUM	4.7 B	2.77 U	2.9 B	8.3 B	9.4 B	4.9 B	7.7 B	4.6 B
VANADIUM	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U	3.60 U
ZINC	142	2010	18.2 K	55.9	15.3 K	19.9 K	21.5 K	32.7 K
Miscellaneous Parameters (mg/L)								
ACETIC ACID	1 U	1 U	1 U		1 U			
ALKALINITY	20	81	5.6	24	22			2.5 J
BUTANOIC ACID	1 U	1 U	1 U		1 U			
CARBON DIOXIDE	110	86	100		110			74

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION	S57MW007-SB004	S57MW008	S57MW009-SB005	S57MW010	S57MW011-SB008	S57MW012-SB013	S57MW013	S57MW020
SAMPLE	S57MW0070109	S57MW0080109	S57MW0090109	S57MW0100109	S57MW0110109	S57MW0120109	S57MW0130109	S57MW0200109
SAMPLE DATE	3/31/2004	3/31/2004	3/31/2004	3/31/2004	3/31/2004	3/30/2004	3/30/2004	4/1/2004
CHLORIDE	81	150	14	45	22			19
CYANIDE (UG/L)	10 U	10 U	5.7 J	10 U	10 U	10 U	10 U	10 U
LACTIC ACID	25 U	25 U	25 U		25 U			
NITRATE-N	0.015 J	0.51 L	1.1 L	0.36 L	0.050 J			4.9
NITRITE-N	0.050 UL	0.050 UL	0.050 UL	0.050 UL	0.050 UL			0.050 U
ORTHOPHOSPHATE	0.050 U	0.020 J	0.050 U	0.050 U	0.050 U			0.050 U
PROPIONIC ACID	1 U	1 U	1 U		1 U			
PYRUVIC ACID	10 U	10 U	10 U		10 U			
SULFATE	31	25	8.5	15	4.6			1.4
SULFIDE	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U			0.50 J
TOTAL DISSOLVED SOLIDS	220	370	71	230	78	37	78	94
TOTAL INORGANIC CARBON	3.3	16	1.0 U	3.8	4.1			1.0 U
TOTAL ORGANIC CARBON	0.46 J	1.9	0.40 J	1.2	0.42 J			0.53 J
TOTAL SUSPENDED SOLIDS	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
Filtered Miscellaneous Parameters (µg/L)								
CYANIDE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION SAMPLE SAMPLE DATE	S57MW022 S57MW0220109 4/1/2004	S57MW023 S57MW0230109 4/1/2004	S57MW024-SB027 S57MW0240109 3/31/2004	S57MW025-SB028 S57MW0250109 4/1/2004	S57MW025-SB028 S57GWDUP0209 4/1/2004
Volatile Organics (µg/L)					
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	10 U	100 U	100 U
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	10 U	100 U	100 U
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	10 U	100 U	100 U
1,1,2-TRICHLOROTRIFLUOROETHANE	0.5 U	0.5 U	10 U	100 U	100 U
1,1-DICHLOROETHANE	4	0.5 J	10 U	100 U	100 U
1,1-DICHLOROETHENE	0.5 U	0.5 U	8 J	78 J	100 U
1,2,3-TRICHLOROBENZENE	0.5 U	0.5 U	10 U	100 U	100 U
1,2,4-TRICHLOROBENZENE	0.5 U	0.5 U	10 U	100 U	100 U
1,2-DIBROMO-3-CHLOROPROPANE	0.5 U	0.5 U	10 U	100 U	100 U
1,2-DIBROMOETHANE	0.5 U	0.5 U	10 U	100 U	100 U
1,2-DICHLOROBENZENE	0.5 U	0.5 U	10 U	100 U	100 U
1,2-DICHLOROETHANE	0.5 U	0.5 U	10 U	100 U	100 U
1,2-DICHLOROPROPANE	0.5 U	0.5 U	10 U	100 U	100 U
1,3-DICHLOROBENZENE	0.5 U	0.5 U	10 U	100 U	100 U
1,4-DICHLOROBENZENE	0.5 U	0.5 U	10 U	100 U	100 U
2-BUTANONE	5 U	5 U	100 U	1000 U	1000 U
2-HEXANONE	5 U	5 U	100 U	1000 U	1000 U
4-METHYL-2-PENTANONE	5 U	5 U	100 U	1000 U	1000 U
ACETONE	5 U	7900	100 UJ	1000 UJ	1000 U
BENZENE	0.5 U	1200	10 U	100 U	100 U
BROMOCHLOROMETHANE	0.5 U	0.5 U	10 U	100 U	100 U
BROMODICHLOROMETHANE	0.5 U	0.5 U	10 U	100 U	100 U
BROMOFORM	0.5 U	0.5 U	10 U	100 U	100 U
BROMOMETHANE	0.5 U	0.5 U	10 U	100 U	100 U
CARBON DISULFIDE	0.5 U	0.5 U	10 U	100 U	100 U
CARBON TETRACHLORIDE	0.5 U	0.5 U	10 U	100 U	100 U
CHLOROBENZENE	0.5 U	0.5 U	10 U	100 U	100 U
CHLORODIBROMOMETHANE	0.5 U	0.5 U	10 U	100 U	100 U
CHLOROETHANE	0.5 U	0.5 U	10 U	100 U	100 U
CHLOROFORM	0.5 U	0.5 U	10 U	100 U	100 U
CHLOROMETHANE	0.5 U	0.5 U	7 B	78 B	74 B
CIS-1,2-DICHLOROETHENE	200 J	0.6 B	4600	58000	40000 J
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	10 U	100 U	100 U
CYCLOHEXANE	0.5 U	12	10 U	100 U	100 U
DICHLORODIFLUOROMETHANE	0.5 U	0.5 U	10 U	100 U	100 U

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW022 S57MW0220109 4/1/2004	S57MW023 S57MW0230109 4/1/2004	S57MW024-SB027 S57MW0240109 3/31/2004	S57MW025-SB028 S57MW0250109 4/1/2004	S57MW025-SB028 S57GWDUP0209 4/1/2004
DIETHYL ETHER	130	0.5 U	77	130	120
ETHANE	79		24	100	87
ETHENE	56		280	250	210
ETHYLBENZENE	0.5 U	0.5 U	10 U	100 U	100 U
ISOPROPYLBENZENE	0.5 U	6	10 U	100 U	100 U
METHANE	2200		4300	3000	2600
METHYL ACETATE	0.5 U	0.5 U	10 U	100 U	100 U
METHYL CYCLOHEXANE	0.5 U	6	10 U	100 U	100 U
METHYL TERT-BUTYL ETHER	0.5 U	1700	10 U	100 U	100 U
METHYLENE CHLORIDE	0.5 UJ	0.5 UJ	29 B	320 B	380 B
STYRENE	0.5 U	0.5 U	10 U	100 U	100 U
TETRACHLOROETHENE	0.5 U	0.4 J	10 U	100 U	100 U
TOLUENE	0.4 J	0.3 J	10 U	100 U	100 U
TOTAL XYLENES	0.5 U	38	10 U	100 U	100 U
TRANS-1,2-DICHLOROETHENE	2	0.5 U	15	260	230
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	10 U	100 U	100 U
TRICHLOROETHENE	0.5 U	40 J	350	72 J	62 J
TRICHLOROFLUOROMETHANE	0.5 U	0.5 U	10 UJ	100 UJ	100 U
VINYL CHLORIDE	850	0.5 U	1300	11000	9800
Total Inorganics (µg/L)					
ALUMINUM	43.1 B	1170	50.2 B	18.2 B	25.6 B
ANTIMONY	1.74 U	1.74 U	1.74 U	1.74 U	1.74 UL
ARSENIC	4.5	2.13 U	5.8 K	13.0 J	12.0 K
BARIUM	23.2	28	72.0	149	142
BERYLLIUM	0.28 U	4.3 K	0.28 U	0.28 U	0.28 U
CADMIUM	2.66 U	2.66 U	2.66 U	2.66 U	2.66 U
CALCIUM	45100	19000	12300	14400	13300
CHROMIUM	0.88 U	0.88 U	0.88 U	0.88 UL	0.88 UL
COBALT	2.96 U	88.8 K	58.5 K	33.9 J	33.9 J
COPPER	12.8 K	12.8 K	3.30 U	3.30 U	3.30 U
IRON	31200	7.1 B	46100	124000	117000
LEAD	1.56 UL	1.56 UL	1.56 U	7.80 UL	7.8 UL
MAGNESIUM	20500	13500	6940	7800	7540
MANGANESE	1540	504	1780	1330	1270
MERCURY	0.01 UL	0.54	0.01 U	0.01 U	0.01 UL
NICKEL	12.10 U	61.7 K	12.10 U	12.10 UL	18.1 J

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW022 S57MW0220109 4/1/2004	S57MW023 S57MW0230109 4/1/2004	S57MW024-SB027 S57MW0240109 3/31/2004	S57MW025-SB028 S57MW0250109 4/1/2004	S57MW025-SB028 S57GWDUP0209 4/1/2004
POTASSIUM	13100	6310	3700	3550	3950
SELENIUM	2.32 U	2.32 U	2.32 U	2.32 UL	2.32 U
SILVER	3.60 U	3.60 U	3.60 U	6.0 B	4.5 B
SODIUM	362000	53800	17400	17600	17100
THALLIUM	6.0 B	6.2 B	2.77 U	4.3 B	5.5 B
VANADIUM	3.60 U	3.60 U	3.60 U	3.60 UL	3.60 UL
ZINC	3.1 K	138	2.00 U	7.3 J	7.2 K
Filtered Inorganics (µg/L)					
ALUMINUM	39.6 B	1160	17.8 B	15.70 U	20.1 B
ANTIMONY	1.74 U	1.74 U	1.74 U	1.74 U	1.74 UL
ARSENIC	2.6	2.13 U	4.1 K	10.3 J	11.9 K
BARIUM	24.5	29.1	69.9	141	143
BERYLLIUM	0.28 U	4.2 K	0.28 U	0.28 U	0.28 U
CADMIUM	2.66 U	2.66 U	2.66 U	2.66 U	2.66 U
CALCIUM	47000	19400	12000	13600	13400
CHROMIUM	0.88 U	0.88 U	0.88 U	0.88 UL	0.88 UL
COBALT	2.96 U	89.0 K	59.3 K	32.1 J	34.4 J
COPPER	15.5 K	13.2 K	3.30 U	3.30 U	3.30 U
IRON	28600	4.80 U	46300	116000	118000
LEAD	1.56 UL	1.56 UL	1.56 U	7.80 UL	7.80 UL
MAGNESIUM	21100	13800	6820	7630	7680
MANGANESE	1490	509	1790	1280	1290
MERCURY	0.04 L	0.50	0.01 U	0.01 U	0.01 UL
NICKEL	12.10 U	65.5 K	12.10 U	12.10 UL	15.6 J
POTASSIUM	12400	6470	3660	3410	3730
SELENIUM	2.32 U	2.32 U	2.32 U	2.32 UL	2.32 U
SILVER	3.60 U	3.60 U	4.5 K	7.1 B	4.8 B
SODIUM	350000	55100	16500	17300	17200
THALLIUM	3.3 B	3.0 B	2.77 U	6.4 B	4.2 B
VANADIUM	3.6 U	3.60 U	3.60 U	3.60 UL	3.60 UL
ZINC	9.9 K	142	2.00 U	3.4 J	5.4 K
Miscellaneous Parameters (mg/L)					
ACETIC ACID			13	83	78
ALKALINITY	320		96	100 L	92
BUTANOIC ACID			2.2	33	30
CARBON DIOXIDE	420		92	180	170

ANALYTICAL RESULTS - GROUNDWATER (2004)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW022 S57MW0220109 4/1/2004	S57MW023 S57MW0230109 4/1/2004	S57MW024-SB027 S57MW0240109 3/31/2004	S57MW025-SB028 S57MW0250109 4/1/2004	S57MW025-SB028 S57GWDUP0209 4/1/2004
CHLORIDE	48		22	96	90
CYANIDE (UG/L)	10 U	10 U	8.3 J	10 U	10 U
LACTIC ACID			25 U	25 U	25 U
NITRATE-N	0.050 U		0.050 UR	0.050 U	0.032 J
NITRITE-N	0.050 U		0.050 UL	0.050 U	0.050 U
ORTHOPHOSPHATE	0.13		0.030 J	0.050 U	0.050 U
PROPIONIC ACID			6.6	25	24
PYRUVIC ACID			10 U	10 U	10 U
SULFATE	570		2.6	1.7	2.4
SULFIDE	1.0 U		1.0 U	1.0 U	0.80 J
TOTAL DISSOLVED SOLIDS	1500		170	320	320
TOTAL INORGANIC CARBON	68		13	1.0 U	12
TOTAL ORGANIC CARBON	6.9		19	120	97
TOTAL SUSPENDED SOLIDS	76		8.4	36 J	28
Filtered Miscellaneous Parameters (µg/L)					
CYANIDE	10 U	10 U	10 U	10 U	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION SAMPLE SAMPLE DATE	S41MW01 S41MW0010109 9/30/2005	S41MW02 S41MW0020109 10/6/2005	S41MW04 S41MW0040109 9/30/2005	S57SB033 S57GB0330109 10/3/2005	S57SB035 S57GB0350109 10/6/2005	S57SB035 S57GBDUP0109 10/6/2005	S57SB036 S57GB0360109 10/5/2005	S57MW001-SB001 S57MW0010109 10/4/2005	S57MW002 S57MW0020109 10/4/2005
Volatile Organics (µg/L)									
1,1,1-TRICHLOROETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,1,2,2-TETRACHLOROETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,1,2-TRICHLOROETHANE	10 UJ	10 U	10 UJ	10 U	4 J	4 J	10 UJ	10 U	10 U
1,1,2-TRICHLOROTRIFLUOROETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,1-DICHLOROETHANE	10 UJ	10 U	10 UJ	10 U	18 J	22 J	10 UJ	2 J	10 U
1,1-DICHLOROETHENE	10 UJ	10 U	10 UJ	10 U	120 J	110 J	10 UJ	10 U	10 U
1,2,4-TRICHLOROBENZENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,2-DIBROMO-3-CHLOROPROPANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,2-DIBROMOETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,2-DICHLOROBENZENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,2-DICHLOROETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,2-DICHLOROPROPANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,3-DICHLOROBENZENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
1,4-DICHLOROBENZENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
2-BUTANONE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
2-HEXANONE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
4-METHYL-2-PENTANONE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
ACETONE	10 UJ	10 U	10 UJ	24 B	1 B	2 B	10 B	10 U	10 U
BENZENE	260	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
BROMODICHLOROMETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
BROMOFORM	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
BROMOMETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
CARBON DISULFIDE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
CARBON TETRACHLORIDE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
CHLOROBENZENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
CHLORODIBROMOMETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
CHLOROETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
CHLOROFORM	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
CHLOROMETHANE	8 J	10 U	10 UJ	10 U	10 UJ	10 UJ	2 J	10 U	10 U
CIS-1,2-DICHLOROETHENE	10 UJ	10 U	10 UJ	27	46000	41000	10 UJ	10 U	10 U
CIS-1,3-DICHLOROPROPENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
CYCLOHEXANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
DICHLORODIFLUOROMETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
DIETHYL ETHER	10 UR	10 UR	10 UR	10 UR	5000 UR	5000 UR	4200 L	100 L	1600 L
ETHYLBENZENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
ISOPROPYLBENZENE	1 J	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
M+P-XYLENES	10 UJ	10 U	10 UJ	20 U	10 UJ	10 UJ	10 UJ	20 U	20 U
METHYL ACETATE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S41MW01 S41MW0010109 9/30/2005	S41MW02 S41MW0020109 10/6/2005	S41MW04 S41MW0040109 9/30/2005	S57SB033 S57GB0330109 10/3/2005	S57SB035 S57GB0350109 10/6/2005	S57SB035 S57GBDUP0109 10/6/2005	S57SB036 S57GB0360109 10/5/2005	S57MW001-SB001 S57MW0010109 10/4/2005	S57MW002 S57MW0020109 10/4/2005
METHYL CYCLOHEXANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
METHYL TERT-BUTYL ETHER	510	10 U	51 J	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
METHYLENE CHLORIDE	10 UJ	10 U	10 UJ	10 U	15 B	11 B	10 UJ	10 U	10 U
O-XYLENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
STYRENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
TETRACHLOROETHENE	10 UJ	10 U	10 UJ	10 U	3 J	3 J	10 UJ	10 U	10 U
TOLUENE	10 UJ	10 U	10 UJ	10 U	2 J	2 J	10 UJ	10 U	10 U
TOTAL 1,2-DICHLOROETHENE	10 UJ	10 U	10 UJ	27	46000	41000	10 UJ	20 U	20 U
TOTAL XYLENES	10 UJ	10 U	10 UJ	30 U	10 UJ	10 UJ	10 UJ	30 U	30 U
TRANS-1,2-DICHLOROETHENE	10 UJ	10 U	10 UJ	10 U			10 UJ	10 U	10 U
TRANS-1,3-DICHLOROPROPENE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
TRICHLOROETHENE	17 J	10 U	33 J	78	36000	32000	10 UJ	3 J	5 J
TRICHLOROFLUOROMETHANE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 U	10 U
VINYL CHLORIDE	10 UJ	10 U	10 UJ	4 J	4400	3900	10 UJ	10 U	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW003-SB002 S57MW0030109 10/5/2005	S57MW003-SB002 S57MWDUP0109 10/5/2005	S57MW004 S57MW0040109 10/5/2005	S57MW005-SB015 S57MW0050109 10/5/2005	S57MW006 S57MW0060109 10/5/2005	S57MW007-SB004 S57MW0070109 9/28/2005
Volatile Organics (µg/L)						
1,1,1-TRICHLOROETHANE	10 U	10 U	2 J	2 J	3 J	10 U
1,1,2,2-TETRACHLOROETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,1,2-TRICHLOROTRIFLUOROETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,1-DICHLOROETHANE	10 U	10 U	10 U	1 J	1 J	10 U
1,1-DICHLOROETHENE	1 J	1 J	4 J	6 J	7 J	10 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,2-DIBROMO-3-CHLOROPROPANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,2-DIBROMOETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,2-DICHLOROBENZENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,2-DICHLOROETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,2-DICHLOROPROPANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,3-DICHLOROBENZENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
1,4-DICHLOROBENZENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
2-BUTANONE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
2-HEXANONE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
ACETONE	10 U	10 U	10 U	2 B	10 UJ	10 U
BENZENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
BROMODICHLOROMETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
BROMOFORM	10 U	10 U	10 U	10 UJ	10 UJ	10 U
BROMOMETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CARBON DISULFIDE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CARBON TETRACHLORIDE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CHLORODIBROMOMETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CHLOROETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CHLOROFORM	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CHLOROMETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CIS-1,2-DICHLOROETHENE	7 J	7 J	72	36 J	38 J	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
CYCLOHEXANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
DICHLORODIFLUOROMETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
DIETHYL ETHER	140 L	160 L	120 J	10 UR	10 UR	410 L
ETHYLBENZENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
ISOPROPYLBENZENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
M+P-XYLENES	10 U	10 U	20 U	10 UJ	10 UJ	10 U
METHYL ACETATE	10 U	10 U	10 U	10 UJ	10 UJ	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW003-SB002 S57MW0030109 10/5/2005	S57MW003-SB002 S57MWDUP0109 10/5/2005	S57MW004 S57MW0040109 10/5/2005	S57MW005-SB015 S57MW0050109 10/5/2005	S57MW006 S57MW0060109 10/5/2005	S57MW007-SB004 S57MW0070109 9/28/2005
METHYL CYCLOHEXANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
METHYL TERT-BUTYL ETHER	10 U	10 U	10 U	10 UJ	10 UJ	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
O-XYLENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
STYRENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
TETRACHLOROETHENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
TOLUENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
TOTAL 1,2-DICHLOROETHENE	7 J	7 J	72	36 J	38 J	10 U
TOTAL XYLENES	10 U	10 U	30 U	10 UJ	10 UJ	10 U
TRANS-1,2-DICHLOROETHENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
TRICHLOROETHENE	200	150	950 J	230	230	10 U
TRICHLOROFLUOROMETHANE	10 U	10 U	10 U	10 UJ	10 UJ	10 U
VINYL CHLORIDE	10 U	10 U	13	10 UJ	6 J	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION SAMPLE SAMPLE DATE	S57MW008 S57MW0080109 9/29/2005	S57MW009-SB005 S57MW0090109 10/4/2005	S57MW010 S57MW0100109 10/4/2005	S57MW011-SB008 S57MW0110109 9/28/2005	S57MW012-SB013 S57MW0120109 10/3/2005	S57MW013 S57MW0130109 10/4/2005
Volatile Organics (µg/L)						
1,1,1-TRICHLOROETHANE	10 U	3 J	2 J	10 U	10 UJ	5 J
1,1,2,2-TETRACHLOROETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,1,2-TRICHLOROTRIFLUOROETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,1-DICHLOROETHANE	10 U	3 J	2 J	10 U	6 J	10 U
1,1-DICHLOROETHENE	10 U	20	9 J	10 U	2 J	62
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,2-DIBROMO-3-CHLOROPROPANE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,2-DIBROMOETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,2-DICHLOROBENZENE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,2-DICHLOROETHANE	10 U	10 U	10 U	10 U	10 UJ	3 J
1,2-DICHLOROPROPANE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,3-DICHLOROBENZENE	10 U	10 U	10 U	10 U	10 UJ	10 U
1,4-DICHLOROBENZENE	10 U	10 U	10 U	10 U	10 UJ	10 U
2-BUTANONE	10 U	10 U	10 U	10 U	10 UJ	10 U
2-HEXANONE	10 U	10 U	10 U	10 U	10 UJ	10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U	10 U	10 UJ	10 U
ACETONE	10 U	10 U	10 U	10 U	1 B	10 UJ
BENZENE	10 U	10 U	10 U	10 U	10 UJ	10 U
BROMODICHLOROMETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
BROMOFORM	10 U	10 U	10 U	10 U	10 UJ	10 U
BROMOMETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
CARBON DISULFIDE	10 U	10 U	10 U	10 U	10 UJ	10 U
CARBON TETRACHLORIDE	10 U	10 U	10 U	10 U	10 UJ	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 UJ	10 U
CHLORODIBROMOMETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
CHLOROETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
CHLOROFORM	10 U	10 U	10 U	10 U	10 UJ	2 J
CHLOROMETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
CIS-1,2-DICHLOROETHENE	10 U	50	59	18	1 J	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U	10 UJ	10 U
CYCLOHEXANE	10 U	10 U	10 U	10 U	10 UJ	10 U
DICHLORODIFLUOROMETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
DIETHYL ETHER	320 L	1 L	10 UR	2000 L	14 J	10 UR
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 UJ	10 U
ISOPROPYLBENZENE	10 U	10 U	10 U	10 U	10 UJ	10 U
M+P-XYLENES	10 U	20 U	10 U	10 U	10 UJ	10 U
METHYL ACETATE	10 U	10 U	10 U	10 U	10 UJ	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW008 S57MW0080109 9/29/2005	S57MW009-SB005 S57MW0090109 10/4/2005	S57MW010 S57MW0100109 10/4/2005	S57MW011-SB008 S57MW0110109 9/28/2005	S57MW012-SB013 S57MW0120109 10/3/2005	S57MW013 S57MW0130109 10/4/2005
METHYL CYCLOHEXANE	10 U	10 U	10 U	10 U	10 UJ	10 U
METHYL TERT-BUTYL ETHER	10 U	10 U	10 U	10 U	10 UJ	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U	10 U	10 UJ	10 U
O-XYLENE	10 U	10 U	10 U	10 U	10 UJ	10 U
STYRENE	10 U	10 U	10 U	10 U	10 UJ	10 U
TETRACHLOROETHENE	10 U	10 U	10 U	10 U	10 UJ	10 U
TOLUENE	10 U	10 U	10 U	10 U	10 UJ	10 U
TOTAL 1,2-DICHLOROETHENE	10 U	50	59	18	1 J	10 U
TOTAL XYLENES	10 U	30 U	10 U	10 U	10 UJ	10 U
TRANS-1,2-DICHLOROETHENE	10 U	10 U	10 U	10 U	10 UJ	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U	10 UJ	10 U
TRICHLOROETHENE	10 U	330 J	160	27	2 J	10 U
TRICHLOROFLUOROMETHANE	10 U	10 U	10 U	10 U	10 UJ	10 U
VINYL CHLORIDE	10 U	10 U	2 J	10 U	10 UJ	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION SAMPLE SAMPLE DATE	S57MW020 S57MW0200109 10/12/2005	S57MW022 S57MW0220109 9/29/2005	S57MW023 S57MW0230109 10/6/2005	S57MW024-SB027 S57MW0240109 10/5/2005	S57MW025-SB028 S57MW0250109 10/5/2005	S57MW025-SB028 S57MWDUP0209 10/5/2005
Volatile Organics (µg/L)						
1,1,1-TRICHLOROETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,1,2,2-TETRACHLOROETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,1,2-TRICHLOROETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,1,2-TRICHLOROTRIFLUOROETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,1-DICHLOROETHANE	10 U	4 J	10 UJ	1 J	5 J	6 J
1,1-DICHLOROETHENE	10 U	10 U	10 UJ	4 J	12 J	12 J
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,2-DIBROMO-3-CHLOROPROPANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,2-DIBROMOETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,2-DICHLOROBENZENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,2-DICHLOROETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,2-DICHLOROPROPANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,3-DICHLOROBENZENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
1,4-DICHLOROBENZENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
2-BUTANONE	10 U	10 U	10 UJ	10 U	49 J	47 J
2-HEXANONE	10 U	10 U	2 J	10 U	10 UJ	10 UJ
4-METHYL-2-PENTANONE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
ACETONE	10 U	10 U	10 UJ	10 U	13 B	11 B
BENZENE	10 U	10 U	1400	10 U	10 UJ	10 UJ
BROMODICHLOROMETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
BROMOFORM	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
BROMOMETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
CARBON DISULFIDE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
CARBON TETRACHLORIDE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
CHLOROBENZENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
CHLORODIBROMOMETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
CHLOROETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
CHLOROFORM	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
CHLOROMETHANE	10 U	10 U	37 J	10 U	10 UJ	10 UJ
CIS-1,2-DICHLOROETHENE	10 U	210	5 J	820 J	10000	8900
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
CYCLOHEXANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
DICHLORODIFLUOROMETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
DIETHYL ETHER	260 L	160 J	10 UR	58 L	23 L	25 L
ETHYLBENZENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
ISOPROPYLBENZENE	10 U	10 U	5 J	10 U	10 UJ	10 UJ
M+P-XYLENES	20 U	10 U	10 UJ	20 U	10 UJ	10 UJ
METHYL ACETATE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW020 S57MW0200109 10/12/2005	S57MW022 S57MW0220109 9/29/2005	S57MW023 S57MW0230109 10/6/2005	S57MW024-SB027 S57MW0240109 10/5/2005	S57MW025-SB028 S57MW0250109 10/5/2005	S57MW025-SB028 S57MWDUP0209 10/5/2005
METHYL CYCLOHEXANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
METHYL TERT-BUTYL ETHER	10 U	10 U	1400	10 U	10 UJ	10 UJ
METHYLENE CHLORIDE	10 U	10 U	10 UJ	10 U	7 B	6 B
O-XYLENE	10 U	10 U	19 J	10 U	10 UJ	10 UJ
STYRENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
TETRACHLOROETHENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
TOLUENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
TOTAL 1,2-DICHLOROETHENE	20 U	260	5 J	820 J	10000	8900
TOTAL XYLENES	30 U	10 U	19 J	30 U	10 UJ	10 UJ
TRANS-1,2-DICHLOROETHENE	10 U	10 U	10 UJ	6 J	160 J	160 J
TRANS-1,3-DICHLOROPROPENE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
TRICHLOROETHENE	10 U	10 U	79 J	580 J	72 J	71 J
TRICHLOROFLUOROMETHANE	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ
VINYL CHLORIDE	10 U	400	10 UJ	250 J	25000	22000

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57SB026 S57MW0260109 10/11/2005	S57SB027 S57MW0270109 10/12/2005	S57SB027 S57MWDUP0309 10/12/2005	S57SB028 S57MW0280109 10/11/2005	S57MW029 S57MW0290109 10/11/2005	S57MW003-SB002 S57MW0300109 10/12/2005
Volatile Organics (µg/L)						
1,1,1-TRICHLOROETHANE	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
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-TRICHLOROTRIFLUOROETHANE	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
1,1-DICHLOROETHENE	10 U	10 U	1 J	10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
1,2-DIBROMO-3-CHLOROPROPANE	10 U	10 U	10 U	10 U	10 U	10 U
1,2-DIBROMOETHANE	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
1,2-DICHLOROETHANE	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
1,3-DICHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
1,4-DICHLOROBENZENE	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
2-HEXANONE	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
ACETONE	4 B	3 B	2 B	2 B	3 B	10 U
BENZENE	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
BROMOFORM	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
CARBON DISULFIDE	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
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
CHLORODIBROMOMETHANE	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
CHLOROFORM	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
CIS-1,2-DICHLOROETHENE	10 U	5 J	5 J	10 U	10 U	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U	10 U	10 U	10 U	10 U
CYCLOHEXANE	10 U	10 U	10 U	10 U	10 U	10 U
DICHLORODIFLUOROMETHANE	10 U	10 U	10 U	10 U	10 U	10 U
DIETHYL ETHER	10 UR	10 UR	10 UR	10 UR	1 L	10 UR
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
ISOPROPYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
M+P-XYLENES	10 U	10 U	10 U	10 U	10 U	20 U
METHYL ACETATE	10 U	10 U	10 U	10 U	10 U	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57SB026 S57MW0260109 10/11/2005	S57SB027 S57MW0270109 10/12/2005	S57SB027 S57MWDUP0309 10/12/2005	S57SB028 S57MW0280109 10/11/2005	S57MW029 S57MW0290109 10/11/2005	S57MW003-SB002 S57MW0300109 10/12/2005
METHYL CYCLOHEXANE	10 U	10 U	10 U	10 U	10 U	10 U
METHYL TERT-BUTYL ETHER	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
O-XYLENE	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
TETRACHLOROETHENE	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
TOTAL 1,2-DICHLOROETHENE	10 U	5 J	5 J	10 U	10 U	20 U
TOTAL XYLENES	10 U	10 U	10 U	10 U	10 U	30 U
TRANS-1,2-DICHLOROETHENE	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
TRICHLOROETHENE	10 U	28	33	10 U	10 U	10 U
TRICHLOROFLUOROMETHANE	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

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION SAMPLE SAMPLE DATE	S57MW031 S57MW0310109 10/12/2005	S57MW031 S57MWDUP0409 10/13/2005	S57MW032 S57MW0320109 10/7/2005	S57MW033 S57MW0330109 10/6/2005	S57MW034 S57MW0340109 10/12/2005	S57MW035 S57MW0350109 10/7/2005
Volatile Organics (µg/L)						
1,1,1-TRICHLOROETHANE	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
1,1,2-TRICHLOROETHANE	10 U	10 U	10 U	10 U	10 U	10 U
1,1,2-TRICHLOROTRIFLUOROETHANE	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
1,1-DICHLOROETHENE	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
1,2-DIBROMO-3-CHLOROPROPANE	10 U	10 U	10 U	10 U	10 U	10 U
1,2-DIBROMOETHANE	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
1,2-DICHLOROETHANE	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
1,3-DICHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
1,4-DICHLOROBENZENE	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
2-HEXANONE	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
ACETONE	10 U	10 U	2 B	10 U	10 U	10 U
BENZENE	10 U	10 U	10 U	10 U	10 U	1 J
BROMODICHLOROMETHANE	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
BROMOMETHANE	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
CARBON TETRACHLORIDE	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
CHLORODIBROMOMETHANE	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
CHLOROFORM	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
CIS-1,2-DICHLOROETHENE	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
CYCLOHEXANE	10 U	10 U	10 U	10 U	10 U	10 U
DICHLORODIFLUOROMETHANE	10 U	10 U	10 U	10 U	10 U	10 U
DIETHYL ETHER	27 L	27 L	5 L	4 L	49 L	10 UR
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
ISOPROPYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
M+P-XYLENES	20 U	20 U	10 U	10 U	20 U	10 U
METHYL ACETATE	10 U	10 U	10 U	10 U	10 U	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW031 S57MW0310109 10/12/2005	S57MW031 S57MWDUP0409 10/13/2005	S57MW032 S57MW0320109 10/7/2005	S57MW033 S57MW0330109 10/6/2005	S57MW034 S57MW0340109 10/12/2005	S57MW035 S57MW0350109 10/7/2005
METHYL CYCLOHEXANE	10 U	10 U	10 U	10 U	10 U	10 U
METHYL TERT-BUTYL ETHER	10 U	10 U	10 U	10 U	10 U	36
METHYLENE CHLORIDE	10 U	10 U	10 U	10 U	10 U	10 U
O-XYLENE	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
TETRACHLOROETHENE	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
TOTAL 1,2-DICHLOROETHENE	20 U	20 U	10 U	10 U	20 U	10 U
TOTAL XYLENES	30 U	30 U	10 U	10 U	30 U	10 U
TRANS-1,2-DICHLOROETHENE	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
TRICHLOROETHENE	10 U	10 U	10 U	10 U	5 J	28
TRICHLOROFLUOROMETHANE	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

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW036 S57MW0360109 10/6/2005	S57MW037 S57MW0370109 10/12/2005
Volatile Organics (µg/L)		
1,1,1-TRICHLOROETHANE	10 U	10 U
1,1,2,2-TETRACHLOROETHANE	10 U	10 U
1,1,2-TRICHLOROETHANE	10 U	10 U
1,1,2-TRICHLOROTRIFLUOROETHANE	10 U	10 U
1,1-DICHLOROETHANE	10 U	10 U
1,1-DICHLOROETHENE	10 U	10 U
1,2,4-TRICHLOROBENZENE	10 U	10 U
1,2-DIBROMO-3-CHLOROPROPANE	10 U	10 U
1,2-DIBROMOETHANE	10 U	10 U
1,2-DICHLOROBENZENE	10 U	10 U
1,2-DICHLOROETHANE	10 U	10 U
1,2-DICHLOROPROPANE	10 U	10 U
1,3-DICHLOROBENZENE	10 U	10 U
1,4-DICHLOROBENZENE	10 U	10 U
2-BUTANONE	10 U	10 U
2-HEXANONE	10 U	10 U
4-METHYL-2-PENTANONE	10 U	10 U
ACETONE	10 U	2 B
BENZENE	10 U	10 U
BROMODICHLOROMETHANE	10 U	10 U
BROMOFORM	10 U	10 U
BROMOMETHANE	10 U	10 U
CARBON DISULFIDE	10 U	10 U
CARBON TETRACHLORIDE	10 U	10 U
CHLOROBENZENE	10 U	10 U
CHLORODIBROMOMETHANE	10 U	10 U
CHLOROETHANE	10 U	10 U
CHLOROFORM	10 U	10 U
CHLOROMETHANE	10 U	10 U
CIS-1,2-DICHLOROETHENE	10 U	10 U
CIS-1,3-DICHLOROPROPENE	10 U	10 U
CYCLOHEXANE	10 U	10 U
DICHLORODIFLUOROMETHANE	10 U	10 U
DIETHYL ETHER	44 L	10 UR
ETHYLBENZENE	10 U	10 U
ISOPROPYLBENZENE	10 U	10 U
M+P-XYLENES	10 U	10 U
METHYL ACETATE	10 U	10 U

ANALYTICAL RESULTS - GROUNDWATER (2005)
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

LOCATION **SAMPLE** **SAMPLE DATE**	S57MW036 S57MW0360109 10/6/2005	S57MW037 S57MW0370109 10/12/2005
METHYL CYCLOHEXANE	10 U	10 U
METHYL TERT-BUTYL ETHER	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U
O-XYLENE	10 U	10 U
STYRENE	10 U	10 U
TETRACHLOROETHENE	10 U	10 U
TOLUENE	10 U	10 U
TOTAL 1,2-DICHLOROETHENE	10 U	10 U
TOTAL XYLENES	10 U	10 U
TRANS-1,2-DICHLOROETHENE	10 U	10 U
TRANS-1,3-DICHLOROPROPENE	10 U	10 U
TRICHLOROETHENE	10 U	10 U
TRICHLOROFLUOROMETHANE	10 U	10 U
VINYL CHLORIDE	10 U	10 U

APPENDIX C

DATA VALIDATION MEMORANDA

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**DECEMBER 3, 2001**
FROM:	**DOUGLAS S. SCHLOER**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA / DISSOLVED GASES**
CTO 245, NSWC INDIAN HEAD
SDG: N5719

SAMPLES: 2 / Aqueous / VOA

S57TB0010003 S57TB011003

10 / Aqueous / VOA / DISSOLVED GASES

S57CP0040103	S57CP0050103	S57CP0060103
S57CP0100103	S57CPDUP01	S57MW0200103
S57MW0220103	S57MW0230103	

OVERVIEW

The sample set for CTO 245; SDG N5719, NSWC Indian Head consists of ten (10) aqueous environmental samples and two (2) aqueous field quality control blanks. The trip blanks were analyzed for Target Compound List (TCL) volatile organic compounds (VOA) only. The groundwater environmental samples were analyzed for TCL volatile organic compounds (VOA) and 2 selected samples were analyzed for dissolved gases (ethane, ethene and methane). One field duplicate pair was included in this SDG: S57CP0050103 and S57CPDUP01.

The samples were collected by TetraTech NUS on August 28th and 29th, 2001 and analyzed by Chemtech. The dissolved gases analyses were subcontracted by Chemtech to New Jersey Analytical Laboratories (NJAL) Inc. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using USEPA SW-846 Methods 8260B and the U.S. EPA Robert S. Kerr (RSK) SOP 147 (SW-846 8015B Modified) analytical and reporting protocols.

The findings in this report are based upon a general review of all available data including: data completeness, system performance, holding times, initial / continuing calibrations, laboratory method blank results, surrogate spike/internal standard recoveries, blank spike results, field duplicate results, matrix spike/matrix spike duplicate results, compound identification, and detection limits. Areas of concern are listed below. The text of this report is formulated to address only gross noncompliances and the rejection of analytical data.

Major Problems

- No major problems were noted.

Minor Problems

- The following compound was detected in the trip blanks at the maximum concentration as indicated below:

Compound	Concentration (µg/L)	Action Level (µg/L)
Methylene chloride	5	50

Blank Actions

- Value < Reporting Limit (RL); report value followed by a B.
- Value > RL and < Action Level; report value followed by a B.
- Value > RL and > Action Level; report value unqualified.

An action level of 10X the maximum contaminant concentration was established to evaluate laboratory contamination for methylene chloride. Dilution factors, % solids (where applicable) and sample aliquots were taken into consideration during the application of all action levels. Field quality control blanks were not qualified based on method blank contamination.

Notes

Due to the presence of diethyl ether at concentrations that exceeded the linear range of the instrument calibration, samples S57CP0050103 and S57CPDUP01 were re-analyzed at 50X dilution. The laboratory reported both sets of analytical data. Positive results for diethyl ether were transposed onto the Electronic Data Deliverable (EDD) from the 50X dilution and the remaining compounds were reported form the undiluted sample analysis.

Due to the presence of cis-1,2-dichloroethene and vinyl chloride, sample S57MW0220103 was analyzed and reported at a 10X dilution. This accounts for the elevated reporting limits for this sample.

Due to the presence of benzene, sample S57MW0230103 was analyzed and reported at a 5X dilution. This accounts for the elevated reporting limits for this sample.

Due to the presence of methane at a concentration that exceeded the linear range of the instrument calibration, sample S57MW0220103 was analyzed and reported at a 100X dilution. Only the data for the 100X dilution was reported. This accounts for the elevated reporting limits for this sample.

The following aqueous target compounds (OLC 02.1) were requested but not initially reported:

1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,3-dichlorobenzene
1,4-dichlorobenzene	1,2-dibromoethane	bromochloromethane

The reviewer requested that the contracted laboratory update all sample Form I results and all associated QC data to reflect the inclusion of the above target compounds and that the data be resubmitted in a timely fashion. However, following numerous correspondence with laboratory representatives, the sample results were delayed 4-5 weeks from the initial request. Data processing delays resulted from the untimely reporting of the requested analytical parameters.

The dissolved gases (methane, ethane, and ethene) analysis was subcontracted by Chemtech to New Jersey Analytical Laboratories. The data reported on the EDD for this analytical fraction was not in agreement with sample Form I results. The reviewer contacted the laboratory and requested resubmitted versions of the EDD and Form I results which were in agreement.

As detailed in the Statement of Work for Analytical Services, the requested method of analysis for aqueous environmental samples is CLP OLC02.1. However, the laboratory analyzed the samples by SW-846 method 8260B. Consequently, Target Compound List and detection limit requirements were not met for the volatile analysis for the aqueous samples in this SDG.

There were calibration verification noncompliances (%Ds); however, no action was taken, as only a limited data review is being performed.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Methylene chloride was detected in the trip blanks. Several target compounds were not reported as detailed in the SOW. The laboratory analyzed and reported the groundwater environmental samples using SW-846 methodology. However, the Specification for Laboratory Services specifies that CLP OLC02.1 methodology be used to analyze the samples. This accounts for the elevated detection limits.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy IRCDQM" (September, 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

TetraTech NUS

Douglas S. Schloer
Chemist/Data Validator

TetraTech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

FIELD DUPLICATE SUMMARY
NSWC INDIAN HEAD SITE 57

Analytical Fraction	Compound	S57CP0050103 (ug/L)	S57CPDUP01 (ug/L)	RPD
Volatiles				
	Diethyl Ether	800	720	10.5
	Trichloroethene	11	9.4	15.7

ND - Compound not detected.
NC - RPD not calculated.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**JANUARY 7, 2002**
FROM:	**SETH STAFFEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA / OVG**
CTO 245 – NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5562

SAMPLES:

4/Aqueous/VOA

S57FB0010003	S57MW0010103	S57MW0020103	S57TB0030003

12/Solid/VOA

S57SB0210303	S57SB0210403	S57SB0220403	S57SB0250103
S57SB0250203	S57SB0250303	S57SB0280103	S57SB0280203
S57SB0280303	S57SB0280403	S57SBDUP02	S57SS0280103

Overview

The sample set for CTO 245, SDG: N5532, NSWC Indian Head, two (2) aqueous environmental samples, one (1) field blank, one (1) trip blank, and twelve (12) solid environmental samples. All environmental samples for Target Compound List (TCL) volatile organic compounds. Samples S57MW0010103 and S57MW0020103 were analyzed for methane, ethane, and ethene. One field duplicate pair was included in this SDG: S57SB0280103 / S57SBDUP02.

The samples were collected by Tetra Tech NUS on August 15 and 16, 2001 and analyzed by Chemtech. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and analyzed according to SW-846 Methods 8260B and the U.S. EPA Robert S. Kerr (RSK) SOP 147 (SW-846 8015B modified) analytical and reporting protocols.

Summary

All samples were successfully analyzed. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, initial/continuing calibrations, laboratory method blank results, field duplicate precision, and detection limits. Areas of concern are listed below.

Major Problems

- The initial calibration on 08/25/01 on instrument E contained RRFs that were less than the 0.05 quality control limit for 4-methyl-2-pentanone and 2-hexanone. Nondetected results for the aforementioned compounds were qualified as rejected, UR, in the aqueous samples and are considered to be biased very low. No positive results were reported for these compounds.

- The continuing calibrations on 08/28/01 at 1418 and 08/29/01 at 1409 on instrument E contained RRFs that were less than the 0.05 quality control limit for 4-methyl-2-pentanone, 2-hexanone, and diethyl ether. Nondetected results for the aforementioned compounds were qualified as rejected, UR, in the associated aqueous samples. The positive results reported for diethyl ether were qualified as, L, biased low.

Minor Problems

- The following compounds were detected in the laboratory method blanks and/or field quality control blank (*) at the maximum concentration indicated below:

Compound	Concentration	Action Level
Methylene chloride*	5.4 µg/L	54 µg/Kg
1,1,1-Trichloroethane	2.0 µg/L	10 µg/L
Acetone	19 µg/Kg	190 µg/Kg

  Sample aliquot and dilution factors were taken into consideration when applying the blank action limit. Positive results for methylene chloride and 1,1,1-trichloroethane below the blank action level were qualified as, B. Field quality control blanks were not qualified based on contamination in other field quality control blanks.

- Samples S57MW0010103 and S57MW0020103 of the dissolved gases fraction were analyzed on the 20th day from collection date. The results in the aforementioned samples were qualified as estimated, UL, biased low.

- Positive results < Reporting Limit were qualified as estimated, J.

Notes

The linear calibration range of the instrument was exceeded by diethyl ether in samples S57MW0010103 and S57MW0020103. The result from the dilution analysis was transposed over and used for validation.

The initial calibration on 08/24/01 on instrument H contained a %RSD >50% quality control limit for acetone. No qualification action was taken since acetone was already qualifications for blank contamination.

The dissolved gases (methane, ethane, and ethene) analysis was subcontracted by Chemtech to New Jersey Analytical Laboratories. The data reported on the EDD for this analytical fraction was not in agreement with sample Form I results. The reviewer contacted the laboratory and requested a resubmitted version of the EDD/Form I results that agree with each other.

As detailed in the Statement of Work for Analytical Services, the requested method of analysis for aqueous environmental samples is CLP OLC02.1. However, the laboratory analyzed the samples by SW-846 method 8260B. Consequently, Target Compound List and detection limit requirements were not met for the volatile analysis for the aqueous samples in this SDG.

The laboratory analyzed the samples by Method 8260B instead of OLM04.2, as stated in the Statement of Work. In addition the following target compounds were listed in the statement of work but were not reported by the laboratory in the soil samples:

1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,3-dichlorobenzene
1,4-dichlorobenzene	1,2-dibromoethane	bromochloromethane

TO: G. Latulippe
01/07/02

Executive Summary

Laboratory Performance: Several compounds did not met the initial and/or continuing calibration RRF criteria. Methylene chloride, acetone, and 1,1,1-trichloroethane were detected in the method blank or field quality control blank. Diethyl ether exceeded the linear calibration range of the instrument.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", (September 1994) as amended for use within USEPA Region III, and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Seth Staffen
Environmental Scientist

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**JANUARY 7, 2002**
FROM:	**SETH STAFFEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA / OVG**
CTO 245 – NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5584

SAMPLES:

7/Aqueous/VOA

S57FB0020003	S57MW0030103*	S57MW0040103*	S57MW0110103*
S57MWDUP01*	S57RB0020003	S57TB0040003	

6/Solid/VOA

S57SB0290103	S57SB0290203	S57SB0290303	S57SB0290403
S57SBDUP03	S57SS0290103		

Overview

The sample set for CTO 245, SDG: N5584, NSWC Indian Head, three (3) aqueous environmental samples, one (1) field blank, one (1) trip blank, one (1) rinsate blank, and six (6) solid environmental samples. All environmental samples for Target Compound List (TCL) volatile organic compounds and diethyl ether. In addition, samples designated (*) were analyzed for methane, ethane, and ethene. Two field duplicate pairs were included in this SDG: S57MW0030103 / S57MWDUP01 and S57SB0290403 / S57SBDUP03.

The samples were collected by Tetra Tech NUS on August 16 and 17, 2001 and analyzed by Chemtech. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and analyzed according to SW-846 Methods 8260B and the U.S. EPA Robert S. Kerr (RSK) SOP 147 (SW-846 8015B modified) analytical and reporting protocols.

Summary

All samples were successfully analyzed. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, initial/continuing calibrations, laboratory method blank results, field duplicate precision, and detection limits. Areas of concern are listed below.

Major Problems

- No major problems were noted that would have resulted in the rejection of data.

Minor Problems

- The following compounds were detected in the laboratory method blanks at the maximum concentration indicated below:

Compound	Concentration	Action Level
Acetone	7.8 µg/Kg	78 µg/Kg
Methylene chloride	1.9 µg/Kg	19 µg/Kg

  Sample aliquot, percent moisture, and dilution factors were taken into consideration when applying the blank action limit. Positive results for acetone and methylene chloride below the blank action level were qualified as, B. Field quality control blanks were not qualified based on contamination in other field quality control blanks.

- Field duplicate imprecision occurred between sample S57MW030103 and its duplicate S57MWDUP01, for 1,1-dichloroethene, cis-1,2-dichloroethene, diethyl ether, and trichloroethene. Positive and nondetected results were qualified as estimated, J, and UJ, respectively.

- Samples S57MW0030103, S57MW0040103, S57MW0110103, and S57MWDUP01 of the dissolved gases fraction were analyzed on the 19th day from collection date. Positive and nondetected results were qualified as estimated, L, and, UL, biased low, respectively.

- Positive results < Reporting Limit were qualified as estimated, J.

Notes

The continuing calibration on 08/30/01 contained %Ds that were greater than the quality control limit on instrument D for acetone and 2-butanone. No qualification action was taken because the exceedances were less than 50%. Acetone was already qualified for blank contamination.

The continuing calibration on 08/28/01 contained a %D that was greater than the quality control limit on instrument B for methylene chloride. No qualification action was taken because the exceedance was less than 50% and methylene chloride was already qualified for blank contamination.

The linear calibration range of the instrument was exceeded by diethyl ether and trichloroethene in sample S57MW0030103. The results from the 10X-dilution analysis were transposed over and used for validation.

The linear calibration range of the instrument was exceeded by diethyl ether, cis-1,2-dichloroethene, and trichloroethene in sample S57MW0040103. The results for diethyl ether and cis-1,2-dichloroethene were transposed over and used for validation from the 50X dilution and trichloroethene was transposed over and used for validation from the 100X dilution .

The linear calibration range of the instrument was exceeded by diethyl ether in sample S57MW0110103. The result from the 20X-dilution analysis was transposed over and used for validation.

The linear calibration range of the instrument was exceeded by diethyl ether and trichloroethene in sample S57MWDUP01. The result from the 10X-dilution analysis was transposed over and used for validation.

The matrix spike and matrix spike percent recoveries were less than 10% for trichloroethene in sample S57MW0040103. No action was taken basis on the presents of trichloroethene in the native sample and the reported result is from a 100X dilution analysis.

The rinsate blank, S57RB0020003, contained a positive result for trichloroethene. No qualification action was taken.

The dissolved gases (methane, ethane, and ethene) analysis was subcontracted by Chemtech to New Jersey Analytical Laboratories. The data reported on the EDD for this analytical fraction was not in agreement with sample Form I results. The reviewer contacted the laboratory and requested a resubmitted version of the EDD/Form I results that agree with each other.

As detailed in the Statement of Work for Analytical Services, the requested method of analysis for aqueous environmental samples is CLP OLC02.1. However, the laboratory analyzed the samples by SW-846 method 8260B. Consequently, Target Compound List and detection limit requirements were not met for the volatile analysis for the aqueous samples in this SDG. The following target compounds were requested but not reported:

1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,3-dichlorobenzene
1,4-dichlorobenzene	1,2-dibromoethane	bromochloromethane

The laboratory analyzed the soil samples by Method 8260B instead of OLM04.2, as stated in the Statement of Work. In addition, the following target compounds were listed in the statement of work.

Executive Summary

Laboratory Performance: Methylene chloride and acetone were detected in the method blank or field quality control blank. Diethyl ether, cis-1,2-dichloroethene, and trichloroethene exceeded the linear calibration range of the instrument.

Other Factors Affecting Data Quality: None.

TO: G. Latulippe
01/07/02

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", (September 1994) as amended for use within USEPA Region III, and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Seth Staffen
Environmental Scientist

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**JANUARY 7, 2002**
FROM:	**SETH STAFFEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA / OVG**
CTO 245 – NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5683

SAMPLES: 1/Aqueous/VOA/OVG

S57MW0060103 S57RB0070003 S57TB0090003

14/Soil/VOA

S57SB0300103	S57SB0300203	S57SB0300303	S57SB0300403
S57SB0310103	S57SB0310203	S57SB0310303	S57SB0310403
S57SB0320103	S57SB0320203	S57SB0320303	S57SB0320403
S57SBDUP05	S57SBDUP06		

Overview

The sample set for CTO 245, SDG: N5683, NSWC Indian Head, consists of one (1) aqueous environmental sample, one (1) trip blank, one (1) rinsate blank, and fourteen (14) solid environmental samples. All environmental samples were analyzed for Target Compound List (TCL) volatile organic compounds and diethyl ether. Sample S57MW0060103 was analyzed for methane, ethane, and ethene. Two field duplicate pairs were included in this SDG: S57SB0310203 / S57SBDUP05 and S57SB0300203 / S57SBDUP06.

The samples were collected by Tetra Tech NUS on August 24, 2001 and analyzed by Chemtech. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and analyzed according to SW-846 Methods 8260B and the U.S. EPA Robert S. Kerr (RSK) SOP 147 (SW-846 8015B modified) analytical and reporting protocols.

Summary

All samples were successfully analyzed. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, initial/continuing calibrations, laboratory method blank results, field duplicate precision, and detection limits. Areas of concern are listed below.

Major Problems

- No problems were noted that would have resulted in the rejection of data.

Minor Problems

- The following compounds were detected in the laboratory method blanks and/or field quality control blank (*) at the maximum concentration indicated below:

Compound	Concentration	Action Level
Methylene chloride*	4.9 µg/L	49 µg/Kg
Methylene chloride	4.4 µg/Kg	44 µg/Kg

  Sample aliquot, percent moisture, and dilution factors were taken into consideration when applying the blank action limit. Positive results for methylene chloride below the blank action level were qualified as, B. Field quality control blanks were not qualified based on contamination in other field quality control blanks.

- Despite the absence of acetone in the laboratory method blank, acetone is a common laboratory contaminant. Therefore, the presence of acetone in environmental samples is a suspected laboratory contaminant. Positive results were qualified as estimated, J.

- Positive results < Reporting Limit were qualified as estimated, J.

Notes

The initial calibration on 08/24/01 on instrument H contained a relative standard deviation (%RSD) that was greater than the 30% quality control limit for acetone. No qualification action was taken because the exceedance was not a gross noncompliance.

The rinsate blank, S57RB0070003, contained a positive result for acetone. No qualification action was taken.

The dissolved gases (methane, ethane, and ethene) analysis was subcontracted by Chemtech to New Jersey Analytical Laboratories. The data reported on the EDD for this analytical fraction was not in agreement with sample Form I results. The reviewer contacted the laboratory and requested a resubmitted version of the EDD/Form I results that agree with each other.

The continuing calibration contained a %D that was greater than the 25% quality control limit for acetone on instrument D. No qualification action was taken because the exceedance was not a gross noncompliance.

The continuing calibration contained %Ds that were greater than the 25% quality control limit for several compounds. No qualification action was taken because the exceedance was not a gross noncompliance.

The matrix spike and matrix spike duplicate RPD was greater than the upper quality control limit for benzene. No qualification action was taken based on RPD noncompliance.

As detailed in the Statement of Work for Analytical Services, the requested method of analysis for aqueous environmental samples is CLP OLC02.1. However, the laboratory analyzed the samples by SW-846 method 8260B for sample S57MW0060103. Consequently, Target Compound List and detection limit requirements were not met for the volatile analysis for the aqueous samples in this SDG.

The laboratory analyzed the soil samples by Method 8260B instead of OLM04.2, as stated in the Statement of Work. In addition the following target compounds were listed in the statement of work but were not reported by the laboratory in the soil samples:

1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,3-dichlorobenzene
1,4-dichlorobenzene	1,2-dibromoethane	bromochloromethane

Executive Summary

Laboratory Performance: Acetone did not met %RSD quality control criteria in the volatile fraction. Methylene chloride was detected in the method blank and/or field quality control blank.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", (September 1994) as amended for use within USEPA Region III, and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Seth Staffen
Environmental Scientist

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**NOVEMBER 20, 2001**
FROM:	**DOUGLAS S. SCHLOER**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA / DISSOLVED GASES**
CTO 245, NSWC INDIAN HEAD
SDG: N5622

SAMPLES: 5 / Soil / VOA

S57SB0270103	S57SB0270203	S57SB0270303
S57SB0270403	S57SS0270103	

4 / Aqueous / VOA

S57RB0030003	S57RB0040003	S57TB0050003
S57TB0060003		

5 / Aqueous / VOA / DISSOLVED GASES

S57MWDUP02	S57TW0160103	S57TW0170103
S57TW0180103	S57TW0190103	

OVERVIEW

The sample set for CTO 245; SDG N5622, NSWC Indian Head consists of nine (9) aqueous environmental samples including four (4) aqueous field quality control blanks. The trip blanks and rinsate blanks were analyzed for Target Compound List (TCL) volatile organic compounds (VOA) only. The environmental samples were analyzed for TCL volatile organic compounds (VOA) and selected environmental samples were analyzed for dissolved gases (ethane, ethene and methane). One field duplicate pair was included in this SDG: S57TW0180103 and S57MWDUP02.

The samples were collected by TetraTech NUS on August 20th and 21st, 2001 and analyzed by Chemtech. The dissolved gases analyses were subcontracted by Chemtech to New Jersey Analytical Laboratories (NJAL) Inc. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using USEPA SW-846 Methods 8260B and the U.S. EPA Robert S. Kerr (RSK) SOP 147 (SW-846 8015B Modified) analytical and reporting protocols.

The findings in this report are based upon a general review of all available data including: data completeness, system performance, holding times, initial / continuing calibrations, laboratory method blank results, surrogate spike/internal standard recoveries, blank spike results, field duplicate results, matrix spike/matrix spike duplicate results, compound identification, and detection limits. Areas of concern are listed below. The text of this report is formulated to address only gross noncompliances and the rejection of analytical data.

Major Problems

- No major problems were noted.

Minor Problems

- The following compounds were detected in the method blanks and/or *trip blanks at the maximum concentrations as indicated below:

Compound	Concentration (µg/L)	Action Level (µg/L),(ug/kg)
*Acetone	28	280
*Methylene chloride	7.9	79

Compound	Concentration (µg/kg)	Action Level (µg/kg)
Acetone	15	150

Blank Actions

- Value < Reporting Limit (RL); report value followed by a B.
- Value > RL and < Action Level; report value followed by a B.
- Value > RL and > Action Level; report value unqualified.

An action level of 10X the maximum contaminant concentration was established to evaluate laboratory contamination for acetone and methylene chloride. Dilution factors, % solids (where applicable) and sample aliquots were taken into consideration during the application of all action levels. The affected positive results were qualified (B) as a result of blank contamination for acetone and methylene chloride. Field quality control blanks were not qualified based on method blank contamination.

- The analysis of the aqueous sample S57TW0170103 for dissolved gases (ethane, ethene and methane) exceeded the 14-day hold-time requirement by one day. Only nondetected results were reported for ethane, ethene and methane and these were qualified as estimated (UL), due to hold-time noncompliance. The results are considered biased low.

Notes

The following aqueous target compounds (OLC 02.1) were requested but not initially reported:

1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,3-dichlorobenzene
1,4-dichlorobenzene	1,2-dibromoethane	bromochloromethane

The reviewer requested that the contracted laboratory update all sample Form I results and all associated QC data to reflect the inclusion of the above target compounds and that the data be resubmitted in a timely fashion. However, following numerous correspondence with laboratory representatives, the sample results were delayed 4-5 weeks from the initial request. Data processing delays resulted from the untimely reporting of the requested analytical parameters.

The dissolved gases (methane, ethane, ethene) analysis was subcontracted by Chemtech to New Jersey Analytical Laboratories. The data reported on the EDD for this analytical fraction was not in agreement with sample Form I results. The reviewer contacted the laboratory and requested resubmitted versions of EDD and Form I results which were in agreement.

An initial calibration percent Relative Standard Deviation (%RSD) exceeded the 30% quality control limit for acetone on 8/31/01, on instrument B. No action was taken based on this noncompliance as only a limited data review is being performed.

Initial calibration %RSDs exceeded the 30% quality control limit for acetone on 8/26/01, on instrument H. No action was taken based on this noncompliance as only a limited data review is being performed.

Calibration verification %Ds exceeded the 25% quality control limit for chloroethane, acetone and dibromochloromethane on 9/2/01, on instrument B, at 13:54. No action was taken based on this noncompliance as only a limited data review is being performed.

Calibration verification %Ds exceeded the 25% quality control limit for trichlorofluoromethane, acetone, 2-chloroethylvinyl ether, 2-hexanone and tetrachloroethene on 9/3/01, on instrument B, at 13:39. No action was taken based on this noncompliance as only a limited data review is being performed.

Due to the presence of diethyl ether at a concentration that exceeded the linear range of the instrument calibration, sample S57TW0170103 was re-analyzed a 500X dilution. The laboratory reported both sets of analytical data. Positive results for diethyl ether were transposed onto the Electronic Data Deliverable (EDD) from the 500X dilution and the remaining parameters were reported from the undiluted sample analysis.

Due to the presence of diethyl ether at a concentration that exceeded the linear range of the instrument calibration, sample S57TSB0270203 was re-analyzed a 10X dilution. The laboratory reported both sets of analytical data. Positive results for diethyl ether were transposed onto the Electronic Data Deliverable (EDD) from the 10X dilution and the remaining parameters were reported from the undiluted sample analysis.

Due to the presence of diethyl ether at concentrations that exceeded the linear range of the instrument calibration, samples S57SB0270303 and S57SB0270403 were re-analyzed a 5X dilutions. The laboratory reported both sets of analytical data. Positive results for diethyl ether were transposed onto the Electronic Data Deliverable (EDD) from the 5X dilutions and the remaining parameters were reported from the undiluted sample analysis.

The following soil surrogate recoveries fell below quality control limits for the analysis of sample S57SB0270203: dibromofluoromethane, toluene-d8 and 4-bromofluorobenzene. No action was taken based on this noncompliance as only a limited data review is being performed.

The following aqueous surrogate recoveries exceeded quality control limits for the analysis of sample S57TW0160103: dibromofluoromethane, toluene-d8 and 4-bromofluorobenzene. No action was taken as only a limited data review is being performed.

Recovery of trichloroethene fell below the 70%-120% quality control limit for the Matrix Spike Duplicate (MSD) analysis of the aqueous sample S57MW0090103. Matrix Spike (MS) recovery of trichloroethene was complaint. No action was taken based on this noncompliance as only a limited data review is being performed.

The volatile compound diethyl ether was not present on the EDD submitted by the laboratory for SDG N5622. However, this compound was present on the sample Form I. The EDD was corrected accordingly.

As detailed in the Statement of Work for Analytical Services, the requested method of analysis for aqueous environmental samples is CLP OLC02.1. However, the laboratory analyzed the samples by SW-846 method 8260B. Consequently, Target Compound List and detection limit requirements were not met for the volatile analysis for the aqueous samples in this SDG.

The field quality control blanks S57RB0030003, S57RB0040003, S57TB0050003 and S57TB0060003 contained acetone and methylene chloride at concentrations above sample reporting limits. The aforementioned compounds were also present in the laboratory method blanks. However, field quality control blanks were not qualified based on method blank contamination.

EXECUTIVE SUMMARY

Laboratory Performance Issues: The Initial calibration of several volatile and semivolatile compounds failed to meet linearity and/or %D criteria. Methylene chloride and acetone were detected in field quality control samples and laboratory method blanks resulting in the qualification of analytical data. The laboratory failed to analyze the environmental samples by the methodologies as detailed in the Specification for Analytical Services. A total of six target compounds were not reported in the volatile fraction.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy IRCDQM" (September, 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

TetraTech NUS

Douglas S. Schloer
Chemist/Data Validator

TetraTech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**JANUARY 7, 2002**
FROM:	**SETH STAFFEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA**
CTO 245 – NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5669

SAMPLES:

1/Aqueous/VOA
S57RB0060003

22/Solid/VOA

S57SB0160103	S57SB0160203	S57SB0160303
S57SB0170103	S57SB0170203	S57SB0170303
S57SB0170403	S57SB0180103	S57SB0180203
S57SB0180303	S57SB0180403	S57SB0190103
S57SB0190203	S57SB0190303	S57SB0190403
S57SBDUP04	S57SS0160103	S57SS0170103
S57SS0180103	S57SS0190103	57SSDUP01
S57SSDUP02		

Overview

The sample set for CTO 245, SDG: N5669, NSWC Indian Head, consists of one (1) rinsate blank and twenty-two (22) solid environmental samples. All environmental samples for Target Compound List (TCL) volatile organic compounds and diethyl ether. Three field duplicate pairs were included in this SDG: S57SBDUP04 / S57SS0160103, S57SS0180103 / 57SSDUP01, and S57SS0170103 / S57SSDUP02.

The samples were collected by Tetra Tech, NUS on August 23, 2001 and analyzed by Chemtech. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and analyzed according to SW-846 Method 8260B analytical and reporting protocols.

Summary

All samples were successfully analyzed. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, initial/continuing calibrations, laboratory method blank results, field duplicate precision, and detection limits. Areas of concern are listed below.

Major Problems

- No major problems were noted that would have resulted in the rejection of data.

Minor Problems

- The following compound was detected in the laboratory method blanks at the maximum concentration indicated below:

Compound	Concentration	Action Level
Methylene chloride	4.8 µg/Kg	48 µg/Kg

  Sample aliquot, percent moisture and dilution factors were taken into consideration when applying the blank action limit. Positive results for methylene chloride below the blank action level were qualified as, B. Field quality control blanks were not qualified based on contamination in other field quality control blanks.

- Despite the absence of acetone in the laboratory method blank, acetone is a common laboratory contaminant. Therefore, the presence of acetone in environmental samples is a suspected laboratory contaminant. Positive results were qualified as estimated, J.

- Positive results < Reporting Limit were qualified as estimated, J.

Notes

The linear calibration range of the instrument was exceeded by acetone in sample S57SB0190303. The result from the 10X-dilution analysis was transposed over and used for data validation.

The original sample, S57SB0160203, had three surrogates that were less than the lower quality control (QC) limits. The re-analysis was compliant. Therefore, The re-analysis of sample S57SB0160203 was used for data validation. No qualification action was taken since this is only a limited data validation review. The reviewer used professional judgement in deciding between the original sample and the re-analysis in determining which sample has the best representative data.

The original sample, S57SS0160103, had four surrogates that were less than the lower quality control limits. The re-analysis had two SMCs greater than QC limits and four internal standards that were less than the lower QC limits. Therefore, the original analysis sample S57SS0160103 was used for data validation. No qualification action was taken since this is only a limited data validation review. The reviewer used professional judgement in deciding between the original sample and the re-analysis in determining which sample has the best representative data.

The original sample, S57SS0170103, had two surrogates that were greater than the upper quality control limits and one internal standard that was less than the lower QC limits. The re-analysis had four SMCs and one internal standard that were less than the lower QC limits. Therefore, the original analysis sample S57SS0170103 was used for data validation. No qualification action was taken since this is only a limited data validation review. The reviewer used professional judgement in deciding between the original sample and the re-analysis in determining which sample has the best representative data.

The original sample, S57SS0190103, had four surrogates that were less than the lower quality control limits. The re-analysis had four internal standards that were less than the lower QC limits. Therefore, the original analysis sample S57SS0190103 was used for data validation. No qualification action was taken since this is only a limited data validation review. The reviewer used professional judgement in deciding between the original sample and the re-analysis in determining which sample has the best representative data.

The original samples, S57SSDUP01 and S57SSDUP02, had three surrogates that were less than the lower quality control limits. The re-analyses had four internal standards that were less than the lower QC limits. Therefore, the original analyses were used for data validation. No qualification action was taken since this is only a limited data validation review. The reviewer used professional judgement in deciding between the original sample and the re-analysis in determining which sample has the best representative data.

The initial calibration on 08/24/01 contained a %RSD that was greater than the 30% quality control limit for methylene chloride on instrument H. No qualification action was taken because the exceedance was less than 50% and methylene chloride was already qualified was blank contamination.

The continuing calibration on 09/06/01 (instrument D) and 09/02/01 (instrument H) contained %Ds that were greater than the 25% quality control limit for several compounds. No qualification action was taken because the exceedances were less than 50%.

The matrix spike duplicate RPD was greater than the upper quality control limit for benzene. No qualification action was taken based on RPD noncompliance.

The laboratory analyzed the samples by Method 8260B instead of OLM04.2, as stated in the Statement of Work. In addition the following target compounds were listed in the statement of work but were not reported by the laboratory in the soil samples:

1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,3-dichlorobenzene
1,4-dichlorobenzene	1,2-dibromoethane	bromochloromethane

Executive Summary

Laboratory Performance: Methylene chloride was detected in the laboratory method blank. Acetone exceeded the linear calibration range of the instrument.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", (September 1994) as amended for use within USEPA Region III, and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Seth Staffen
Environmental Scientist

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**NOVEMBER 19, 2001**
FROM:	**DOUGLAS S. SCHLOER**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA / DISSOLVED GASES**
CTO 245, NSWC INDIAN HEAD
SDG: N5651

SAMPLES: 1 / Soil / VOA

S57SB0330103

3 / Aqueous / VOA

S57RB0050003	S57TB0070003	S57TB0080003

11 / Aqueous / VOA / DISSOLVED GASES

S57MW0070103	S57MW0050103	S57MW0080103
S57MW0090103	S57MW0100103	S57MW0120103
S57MW0130103	S57MWDUP03	S57TW01400103
S57TW0150103	S57TW0210103	

OVERVIEW

The sample set for CTO 245; SDG N5651, NSWC Indian Head consists of eleven (11) aqueous environmental samples and three (3) aqueous field quality control blanks. The trip blanks and rinsate blank were analyzed for Target Compound List (TCL) volatile organic compounds (VOA) only. The environmental samples were analyzed for TCL volatile organic compounds (VOA) and 11 selected samples were analyzed for dissolved gases (ethane, ethene and methane). One field duplicate pair was included in this SDG: S57MW0070103 and S57MWDUP03.

The samples were collected by TetraTech NUS on August 22nd and 23rd, 2001 and analyzed by Chemtech. The dissolved gases analyses were subcontracted by Chemtech to New Jersey Analytical Laboratories (NJAL) Inc. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using USEPA SW-846 Methods 8260B and the U.S. EPA Robert S. Kerr (RSK) SOP 147 (SW-846 8015B Modified) analytical and reporting protocols.

The findings in this report are based upon a general review of all available data including: data completeness, system performance, holding times, initial / continuing calibrations, laboratory method blank results, surrogate spike/internal standard recoveries, blank spike results, field duplicate results, matrix spike/matrix spike duplicate results, compound identification, and detection limits. Areas of concern are listed below. The text of this report is formulated to address only gross noncompliances and the rejection of analytical data.

Major Problems

- No major problems were noted.

Minor Problems

- The following compounds were detected in the method blanks and/or *trip blank at the maximum concentrations as indicated below:

Compound	Concentration (µg/L)	Action Level (µg/L),(ug/kg)
*Acetone	41	410
*Methylene chloride	6.8	68

Compound	Concentration (µg/kg)	Action Level (µg/kg)
Acetone	7.8	78

Blank Actions

- Value < Reporting Limit (RL); report value followed by a B.
- Value > RL and < Action Level; report value followed by a B.
- Value > RL and > Action Level; report value unqualified.

An action level of 10X the maximum contaminant concentration was established to evaluate laboratory contamination for acetone and methylene chloride. Dilution factors, % solids (where applicable) and sample aliquots were taken into consideration during the application of all action levels. The affected positive results were qualified (B) as a result of blank contamination for acetone and methylene chloride. Field quality control blanks were not qualified based on method blank contamination.

Notes

The following aqueous target compounds (OLC 02.1) were requested but not initially reported:

1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,3-dichlorobenzene
1,4-dichlorobenzene	1,2-dibromoethane	bromochloromethane

The reviewer requested that the contracted laboratory update all sample Form I results and all associated QC data to reflect the inclusion of the above target compounds and that the data be resubmitted in a timely fashion. However, following numerous correspondence with laboratory representatives, the sample results were delayed 4-5 weeks from the initial request. Data processing delays resulted from the untimely reporting of the requested analytical parameters.

An initial calibration percent Relative Standard Deviation (%RSD) exceeded the 30% quality control limit for acetone on 8/31/01, on instrument B. No action was taken based on this noncompliance as only a limited data review is being performed.

Initial calibration %RSDs exceeded the 30% quality control limit for bromomethane, chloroethane and acetone on 8/28/01, on instrument B. No action was taken based on this noncompliance as only a limited data review is being performed.

Calibration verification %Ds exceeded the 25% quality control limit for chloroethane, acetone, 2-hexanone and tetrachloroethene on 9/3/01, on instrument B, at 13:39. No action was taken based on this noncompliance as only a limited data review is being performed.

Calibration verification %Ds exceeded the 25% quality control limit for chloroethane and 2-butanone on 9/4/01, on instrument B, at 12:27. No action was taken based on this noncompliance as only a limited data review is being performed.

Due to the presence of trichloroethene and/or diethyl ether at concentrations that exceeded the linear range of the instrument calibration, the following samples were re-analyzed a 10X dilution:

Sample	Over cal compound
S57MW0070103	Trichloroethene
S57MW0050103	Diethyl ether
S57MW0080103	Diethyl ether
S57MW0090103	Trichloroethene
S57MW0100103	Trichloroethene
S57MWDUP03	Diethyl ether
S57TW0140103	Diethyl ether
S57MW0150103	Diethyl ether

The laboratory reported both sets of analytical data for each sample. For data validation purposes, the positive results for trichloroethene and/or diethyl ether were transposed onto the Electronic Data Deliverable (EDD) from the 10X dilutions and the remaining parameters were reported from the undiluted sample analyses.

Matrix Spike (MS) recovery of trichloroethene fell below the 71%-120% quality control limit for the analysis of sample S57MW0090103 and Matrix Spike Duplicate (MSD) recovery of trichloroethene exceeded the 71%-120% quality control limit. In addition, the Relative Percent Difference (RPD) exceeded the 14% quality control limit for trichloroethene. RPDs also exceeded their respective quality control limits for 1,1-dichloroethene, benzene, toluene and chlorobenzene. However, the native sample S57MW0090103 contained trichloroethene at approximately 10X the spiked amount. No action was taken based on these noncompliances.

The dissolved gases (methane, ethane, and ethene) analysis was subcontracted by Chemtech to New Jersey Analytical Laboratories. The data reported on the EDD for this analytical fraction was not in agreement with sample Form I results. The reviewer contacted the laboratory and requested a resubmitted version of the EDD/Form I results that agree with each other.

As detailed in the Statement of Work for Analytical Services, the requested method of analysis for aqueous environmental samples is CLP OLC02.1. However, the laboratory analyzed the samples by SW-846 method 8260B. Consequently, Target Compound List and detection limit requirements were not met for the volatile analysis for the aqueous samples in this SDG. The detection limits for the volatile organic compounds were approximately 5X higher than would have been achieved using CLP methodology.

As identified on the Chain of Custody (COC) documentation, sample S57MW0070103 was incorrectly identified and logged into the electronic database as S57MQ0070103. The reviewer updated the Form I and the EDD to reflect the correct sample identification.

Volatile organic compound analysis (VOC) was not indicated on the COC for sample S57MW0120103; however, VOC results were provided by the laboratory.

As received from the laboratory, the volatile compound diethyl ether was not present on the EDD for sample S57SB030103. However, this compound was present on the sample Form I. The reviewer added diethyl ether to the volatile database.

FIELD DUPLICATE SUMMARY
NSWC INDIAN HEAD SITE 57

Analytical Fraction	Compound	S57MW0180103 (ug/L)	S57MWDUP02 (ug/L)	RPD	S57MW0070103 (ug/L)	S57MWDUP03 (ug/L)	RPD
Volatiles							
	1,1-dichloroethene	2.2 J	1.9 J	14.6	1.7 J	ND	NC
	1,1,-dichloroethane	3.7 J	2.5 J	38.7	11	ND	NC
	acetone	17	37	74.1	9.8	ND	NC
	cis-1,2-dichloroethene	64	68	6.1	47	ND	NC
	methylene chloride	1.3 J	ND	NC	1 J	ND	NC
	trichloroethene	210	210	0.0	280	0.6 J	199.1
	diethyl ether	ND	ND		ND	750	NC
Dissolved Gases							
	methane				ND	7	NC

ND - Compound not detected.
NC - RPD not calculated.

The field quality control blanks S57TB007003, S57TB008003 and S57RB005003 contained acetone and methylene chloride. The aforementioned compounds were also present in the laboratory method blanks.

EXECUTIVE SUMMARY

Laboratory Performance Issues: The Initial calibration of several volatile and semivolatile compounds failed to meet linearity and/or %D criteria. Methylene chloride and acetone was detected in trip blanks and laboratory method blanks resulting in the qualification of analytical data. Numerous and reoccurring transcription errors were noted during the review of the data reported within this SDG.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (9/94) as modified by Region III and the NFESC guidelines "Navy IRCDQM" (September, 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

TetraTech NUS

Douglas S. Schloer
Chemist/Data Validator

TetraTech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**JANUARY 7, 2002**
FROM:	**SETH STAFFEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA**
CTO 245 – NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5555

SAMPLES:

3/Aqueous/VOA

S57RB0010003	S57TB0010003	S57TB0020003

16/Solid/VOA

S57FD0010003	S57SB0210103	S57SB0210203
S57SB0220103	S57SB0220203	S57SB0220303
S57SB0230103	S57SB0230203	S57SB0230303
S57SB0240103	S57SB0240203	S57SS0210103
S57SS0220103	S57SS0230103	S57SS0240103
S57SS0250103		

Overview

The sample set for CTO 245, SDG: N5555, NSWC Indian Head, consists of one (1) rinsate blank, two (2) trip blanks, and sixteen (16) solid environmental samples. All environmental samples for Target Compound List (TCL) volatile organic compounds and diethyl ether. One field duplicate pair was included in this SDG: S57FD0010003 / S57SB0210203.

The samples were collected by Tetra Tech NUS on August 14 and 15, 2001 and analyzed by Chemtech. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and analyzed according to SW-846 Method 8260B analytical and reporting protocols.

Summary

All samples were successfully analyzed. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, initial/continuing calibrations, laboratory method blank results, field duplicate precision, and detection limits. Areas of concern are listed below.

Major Problems

- No major problems were noted that would have resulted in the rejection of data.

Minor Problems

- The following compound was detected in the laboratory method blanks and/or field quality blanks (*) at the maximum concentration indicated below:

Compound	Concentration	Action Level
Methylene chloride	7.5 µg/L	75 µg/L
Methylene chloride*	4.5 µg/L	45 µg/L
Acetone	15 µg/kg	150 µg/kg
Methylene chloride	3.7 µg/kg	37 µg/kg

  Sample aliquot, percent moisture and dilution factors were taken into consideration when applying the blank action limit. Positive results for methylene chloride and acetone below the blank action level were qualified as, B. Field quality control blanks were not qualified based on contamination in other field quality control blanks.

- Field duplicate imprecision occurred between sample S57SB0210203 and its duplicate S57FD0010003 for cis-1,2-dichloroethene and trichloroethene. The positive results were qualified as estimated, J, in the field pair.

- Positive results < Reporting Limit were qualified as estimated, J.

Notes

The linear calibration range of the instrument was exceeded by cis-1,2-dichloroethene in sample S57SB0210203. The result from the 10-X dilution analysis was transposed over and used for data validation.

The original sample, S57SS0250103, had two surrogates that were less than the lower quality control (QC) limits. The re-analysis had four surrogates that were greater than the upper QC limits and four internal standards that were less than the lower QC limits. Therefore, the original analysis of sample S57SS0250103 was used for data validation. The reviewer used professional judgement in deciding between the original sample and the re-analysis in determining which sample has the best representative data. No qualification action was taken since this is only a limited data validation review.

The initial calibration on instrument H contained a %RSD that was greater than the 30% for methylene chloride. No qualification action was taken because the exceedance was less than 50%.

The continuing calibration on instrument G contained %Ds that were greater than the 25% quality control limit for several compounds. No qualification action was taken because the exceedance was less than 50%.

The laboratory analyzed the samples by Method 8260B instead of OLM04.2, as stated in the Statement of Work. In addition the following target compounds were listed in the statement of work but were not reported by the laboratory in the soil samples:

1,2-dibromo-3-chloropropane	1,2-dichlorobenzene	1,3-dichlorobenzene
1,4-dichlorobenzene	1,2-dibromoethane	bromochloromethane

TO: G. Latulippe
01/07/02

Executive Summary

Laboratory Performance: Methylene chloride and acetone were detected in the laboratory method blank and/or field quality control blanks. Cis-1,2-dichloroethene exceeded the linear calibration range of the instrument.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", (September 1994) as amended for use within USEPA Region III, and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS

Seth Staffen
Environmental Scientist

Tetra Tech NUS

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**DECEMBER 26, 2001**
FROM:	**CATHERINE NORONHA & ERIN FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – METALS AND MISCELLANEOUS PARAMETERS**
CTO-245 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5584

SAMPLES: 10/Aqueous/

S57FB0020003	S57MW0030103	S57MW0030103-F
S57MW0040103	S57MW0040103-F	S57MW0110103
S57MW0110103-F	S57MWDUP01	S57MWDUP01-F
S57RB0020003		

Overview

The sample set for CTO 245, NSWC Indian Head, SDG N5584, consists of eight (8) aqueous environmental samples, one (1) aqueous field blank, S57FB0020003 and one (1) aqueous rinsate blank, S57RB0020003. Two (2) field duplicate pairs (S57MWDUP01 / S57MW0030103 and S57MWDUP01-F / S57MW0030103-F) are included within this SDG.

Samples S57FB0020003 and S57RB0020003 were analyzed for arsenic only. Samples designated -F were analyzed for dissolved iron only. The remaining samples were analyzed for cadmium, chromium, chloride, dissolved organic carbon (DOC), ferrous iron, hardness, nitrate, nitrite, phosphate, alkalinity, biochemical oxygen demand (BOD), carbon dioxide, chemical oxygen demand (COD), hexavalent chromium, sulfate, sulfide, total organic carbon (TOC) and total suspended solids (TSS), with the exception of sample S57MW0110103, which was not analyzed for TOC or DOC. The samples were collected by TetraTech NUS on August 16-17, 2001 and analyzed by Chemtech Consulting Group under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria.

Metals analyses were conducted using Contract Laboratory Program (CLP) method ILM04.1. Sulfide, alkalinity, BOD and TSS analyses were conducted using EPA methods 376.1, 310.1, 405.1 and 160.2, respectively. Chloride, nitrate, nitrite, phosphate, and sulfate were analyzed by ion chromatography using EPA method 300.0. Analyses for COD and ferrous iron were conducted using HACH methods 8000 and 8146, respectively. Analyses for hardness and carbon dioxide were conducted using Standard Methods, 18th Edition, methods 2340B and 4500, respectively. TOC and DOC analyses were conducted using the Lloyd Kahn method. Hexavalent chromium was analyzed using SW 846 method 7196.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
  • Laboratory Blank Analyses
* • Field Duplicate Results
* • Detection Limits

  * - All quality control criteria were met for this parameter.

- The following contaminant was detected in the laboratory method blanks at the following maximum concentration:

Analyte	Maximum Concentration	Action Level
Iron	34.4 µg/L	172.0 µg/L

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. Positive results less than the action level reported for iron were qualified "B" as a result of blank contamination.

Notes

Sample S57MW0110103 should have been analyzed for TOC, according to the chain of custody (COC); however, no results for TOC were provided by the laboratory for this sample.

Executive Summary

Laboratory Performance: Iron was present in the laboratory method blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Catherine Noronha & Erin M. Faust
Environmental Scientists

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U - Value is a nondetect as reported by the laboratory.

B - Positive result is considered to be an artifact of blank contamination and should not be considered present.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**JANUARY 3, 2002**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – ARSENIC, TOC, CEC AND pH**
CTO 245 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5555

SAMPLES: 7/Soil/

S57SS0200103	S57SB0200103	S57SS0210103
S57SS0220103	S57SB0220103	S57SB0220303
S57SB0240103		

1/Aqueous/

S57RB0010003

Overview

The sample set for CTO 245, NSWC Indian Head, SDG N5555, consists of seven (7) soil environmental samples and one (1) aqueous rinsate blank.

Samples S57SS0200103, S57SB0200103, S57SS0210103 and S57SS0220103 were analyzed for arsenic only. Samples S57SB0220103, S57SB0220303 and S57SB0240103 were analyzed for total organic carbon (TOC), cation exchange capacity (CEC) and pH. Sample S57RB0010003 was analyzed for arsenic and TOC only. The samples were collected by Tetra Tech NUS on August 14 and 15, 2001 and analyzed by Chemtech under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. Arsenic analyses were conducted using Contact Laboratory Program (CLP) method ILM04.1. CEC analyses were conducted using EPA method 9080. Analyses for pH were conducted using SW 846 method 9045. Analyses for TOC were conducted using the Lloyd Kahn method.

Arsenic analyses were conducted using Inductively Coupled Plasma (ICP) instrumentation.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data. The data review was based on data completeness, holding times, calibration data, laboratory method/preparation blanks, detection limits and analyte quantitation.

Areas of concern with respect to data quality are listed below.

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Chemical Data Quality Manual" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M Faust

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
J	-	Positive result is considered estimated, "J", as a result of technical noncompliances.
UJ	-	Nondetected result is considered estimated, "UJ", as a result of technical noncompliances.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO :	**G. LATULIPPE**	**DATE:**	**JANUARY 3, 2002**
FROM:	**ERIN M. FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – ARSENIC, CEC AND pH**
CTO 245 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5669

SAMPLES: 11/Soil/

S57SS0180103	S57SB0180103	S57SB0180303
S57SS0160103	S57SB0160103	S57SB0160303
S57SBDUP04	S57SSDUP01	S57SSDUP02
S57SS0170103	S57SB0170103	

1/Aqueous/

S57RB0060003

Overview

The sample set for CTO 245, NSWC Indian Head, SDG N5669, consists of eleven (11) soil environmental samples and one (1) aqueous rinsate blank. Three (3) field duplicate pairs (S57SBDUP04 / S57SB0160103, S57SSDUP01 / S57SS0180103 and S57SSDUP02 / S57SS0170103) are included within this SDG.

All samples were analyzed for arsenic, with the exception of samples S57SB0180303 and S57SB0160303, which were analyzed for Cation Exchange Capacity (CEC) and pH only. In addition to arsenic, samples S57SB0180103, S57SB0160103 and S57SBDUP04 were also analyzed for CEC and pH. The samples were collected by Tetra Tech NUS on August 23, 2001 and analyzed by Chemtech under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. Arsenic analyses were conducted using Contact Laboratory Program (CLP) method ILM04.1. CEC analyses were conducted using EPA method 9080. Analyses for pH were conducted using SW 846 method 9045.

Arsenic analyses were conducted using Inductively Coupled Plasma (ICP) instrumentation.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data. The data review was based on data completeness, holding times, calibration data, laboratory method/preparation blanks, field duplicate results, detection limits and analyte quantitation.

Areas of concern with respect to data quality are listed below.

Minor Problems

- Field duplicate imprecision (difference > 4X CRDL) was noted for arsenic in the S57SBDUP04 / S57SB0160103 sample pair. The positive and nondetected results reported for arsenic in this sample pair were qualified as estimated, "J".

- Field duplicate imprecision (RPD>50%) was noted for CEC. Positive results reported for CEC were qualified as estimated, "J".

Notes

The result reported by the laboratory for arsenic for sample S57SS0160103 was incorrect. The laboratory used the incorrect percent solid when determining the arsenic concentration. The data reviewer corrected the arsenic result.

Executive Summary

Laboratory Performance: The result reported by the laboratory for sample S57SS0160103 was incorrect.

Other Factors Affecting Data Quality: Field duplicate imprecision was noted for arsenic and CEC.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Chemical Data Quality Manual" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M Faust

Tetra Tech NUS
Erin M. Faust
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
J	-	Positive result is considered estimated, "J", as a result of technical noncompliances.
UJ	-	Nondetected result is considered estimated, "UJ", as a result of technical noncompliances.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**DECEMBER 21, 2001**
FROM:	**CATHERINE NORONHA & ERIN FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – METALS AND MISCELLANEOUS PARAMETERS**
CTO-245 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5622

SAMPLES: 11/Aqueous/

S57MWDUP02	S57MWDUP02-F	S57RB0030003
S57TW0160103	S57TW0160103-F	S57TW0170103
S57TWO17103-F	S57TW0180103	S57TW0180103-F
S57TW0190103	S57TW0190103-F	

Overview

The sample set for CTO 245, NSWC Indian Head, SDG N5722, consists of ten (10) aqueous environmental samples and one (1) aqueous rinsate blank, S57RB0030003. Two (2) field duplicate pairs (S57MWDUP02 / S57TW0180103 and S57MWDUP02-F / S57TW0180103-F) are included within this SDG.

Samples designated -F were analyzed for dissolved iron. The remaining samples, with the exception of sample S57RB0030003, were analyzed for cadmium, chromium, hardness, chloride, nitrate, nitrite, phosphate, sulfate, ferrous iron, hexavalent chromium, sulfide, alkalinity, carbon dioxide, biochemical oxygen demand (BOD), chemical oxygen demand (COD), total organic carbon (TOC), dissolved organic carbon (DOC) and total suspended solids (TSS). Sample S57RB0030003 was analyzed for cadmium, chromium, chloride, nitrate, nitrite, phosphate, sulfate, ferrous iron, hexavalent chromium and sulfide. The samples were collected by TetraTech NUS on August 20-21 2001 and analyzed by Chemtech Consulting Group under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria.

Metals analyses were conducted using Contract Laboratory Program (CLP) method ILM04.1. Sulfide, alkalinity, BOD and TSS analyses were conducted using EPA methods 376.1, 310.1, 405.1 and 160.2, respectively. Chloride, nitrate, nitrite, phosphate, and sulfate were analyzed by ion chromatography using EPA method 300.0. Analyses for COD and ferrous iron were conducted using HACH methods 8000 and 8146, respectively. Analyses for hardness and carbon dioxide were conducted using Standard Methods, 18th Edition, methods 2340B and 4500, respectively. TOC and DOC analyses were conducted using the Lloyd Kahn method. Hexavalent chromium was analyzed using SW 846 method 7196.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
  • Laboratory Blank Analyses
  • Field Duplicate Results
* • Detection Limits

  * - All quality control criteria were met for this parameter.

- The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Chromium	1.355 µg/L	6.775 µg/L
Iron	34.4 µg/L	172.0 µg/L

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. Positive results less than the action level reported for iron were qualified "B" as a result of blank contamination.

- Field duplicate imprecision (RPD > 50%) was noted for TSS. Positive and nondetected results reported for TSS were qualified as estimated, "J" and "UJ", respectively.

Executive Summary

Laboratory Performance: Chromium and iron were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: Field duplicate imprecision was noted for TSS.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Erin M. Faust

Tetra Tech NUS
Catherine Noronha & Erin M. Faust
Environmental Scientists

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
J	-	Positive result is qualified as estimated, "J", due to technical noncompliances.
UJ	-	Nondetected result is qualified as estimated, "UJ", due to technical noncompliances.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. LATULIPPE**	**DATE:**	**DECEMBER 26, 2001**
FROM:	**CATHERINE NORONHA & ERIN FAUST**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – METALS AND MISCELLANEOUS PARAMETERS**
CTO-245 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – N5683

SAMPLES: 3/Aqueous/

S57MW0060103	S57MW0060103-F	S57RB0070003

8/Soils/

S57SB0300203	S57SB0300403	S57SB0310203
S57SB0310403	S57SB0320203	S57SB0320403
S57SBDUP05	S57SBDUP06	

Overview

The sample set for CTO 245, NSWC Indian Head, SDG N5683, consists of two (2) aqueous environmental samples, one (1) aqueous rinsate blank, S57RB0070003, and eight (8) soil environmental samples. Two (2) field duplicate pairs (S57SBDUP05 / S57SB0310203 and S57SBDUP06 / S57SB0300203) were included in this SDG.

All soil samples were analyzed for total organic carbon (TOC) and pH. Sample S57MW0060103 was analyzed for cadmium, chromium, alkalinity, carbon dioxide, chemical oxygen demand (COD), chloride, nitrite, hexavalent chromium, ferrous iron, hardness, nitrate, phosphate, sulfate, sulfide, TOC and total suspended solids (TSS). Sample S57MW0060103-F was analyzed for dissolved iron only. Sample S57RB0070003 was analyzed for TOC only. The samples were collected by TetraTech NUS on August 24, 2001 and analyzed by Chemtech Consulting Group under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria.

Metals analyses were conducted using Contract Laboratory Program (CLP) method ILM04.1. Sulfide, alkalinity and TSS analyses were conducted using EPA methods 376.1, 310.1 and 160.2, respectively. Chloride, nitrate, nitrite, phosphate, and sulfate were analyzed by ion chromatography using EPA method 300.0. Analyses for COD and ferrous iron were conducted using HACH methods 8000 and 8146, respectively. Analyses for hardness and carbon dioxide were conducted using Standard Methods, 18th Edition, methods 2340B and 4500, respectively. TOC analyses were conducted using the Lloyd Kahn method. Hexavalent chromium was analyzed using SW 846 method 7196.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
  • Laboratory Blank Analyses
* • Field Duplicate Results
* • Detection Limits

  * - All quality control criteria were met for this parameter.

- The following contaminant was detected in the laboratory method blanks at the following maximum concentration:

Analyte	Maximum Concentration	Action Level
Iron	33.5 µg/L	167.5 µg/L

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive result less than the action level reported for iron was qualified "B" as a result of blank contamination.

Executive Summary

Laboratory Performance: Iron was present in the laboratory method blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Catherine Noronha & Erin M. Faust
Environmental Scientists

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U - Value is a nondetect as reported by the laboratory.

B - Positive result is considered to be an artifact of blank contamination and should not be considered present.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**K. TURNBULL**	**DATE:**	**JUNE 1, 2004**
FROM:	**BERNARD F SPADA III**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION- VOC CTO 805, NSWC INDIAN HEAD SDG 8057**		
SAMPLES:	5/Aqueous		

IW80	S57GWDUP0209	S57MW0200109
S57MW0220109	S57MW0230109	

Overview

The sample set for CTO 805, NSWC Indian Head, SDG 8057 consists of four (4) environmental aqueous samples and one (1) field duplicate. All samples were analyzed for volatile organic compounds (VOC) plus diethyl ether. The field duplicate pair included in this SDG is S57GWDUP0209 and S57MW0250109. Sample S57MW0250109 was contained in SDG 8056.

The samples were collected by Tetra Tech NUS on April 1, 2004 and analyzed by Katahdin Analytical Services. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using CLP OLC03.2 analytical and reporting protocols.

All samples were successfully analyzed. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, GCMS tuning, initial/continuing calibrations, laboratory method blank results, surrogate spike recoveries, blank spike/blank spike duplicate results, internal standard recoveries, chromatographic resolution, compound identification, compound quantitation and detection limits. Areas of concern are listed below.

Major

- None.

Minor

- The initial (3/31/04) and both continuing calibrations (4/7/04 and 4/8/04) exceeded the 30% difference quality control criterion for methylene chloride. Non-detected results for methylene chloride were qualified as estimated (UJ) in all samples. No further qualifications were made to positive results for methylene chloride on this basis because they were qualified for method blank contamination.

- The continuing calibration performed on April 8 at 08:22 exceeded the 30% difference quality control criterion for cis-1,2-dichloroethene. Positive results for cis-1,2-dichloroethene were qualified as estimated (J) in samples S57GWDUP0209 and S57MW0220109. The non-detected result for cis-1,2-dichloroethene was qualified as estimated (UJ) in sample S57MW0200109.

- The following compounds were detected in the aqueous method blanks:

Compound	Maximum Concentration	Blank Action Level
Methylene chloride	2.0 ug/L	20 ug/L
1,2,3-Trichlorobenzene	0.3 ug/L	1.5 ug/L
Chloromethane	0.4 ug/L	2.0 ug/L
cis-1,2-Dichloroethene	0.2 ug/L	1.0 ug/L

  Sample aliquot and dilution factors were taken into consideration when applying the blank action levels. Positive results for the aforementioned compounds below the blank action level were qualified as non-detected, (B). The trip blanks were not qualified for method blank contamination.

- Positive results below the reporting limit were qualified as estimated (J) due to uncertainty near the detection limit.

Notes

The initial calibration performed on March 31, 2004 exceeded the 30% RSD quality control criterion for bromomethane, 1,2,3-trichlorobenzene, and methyl acetate. No qualifications were made on this basis because all results for the aforementioned compounds were non-detected or were qualified for method blank contamination.

The deuterated monitoring compound vinyl chloride-d3 exceeded the percent recovery quality control criterion in sample S57MW0220109. No qualifications were made on this basis because the result for vinyl chloride was taken from the diluted anlaysis.

The deuterated monitoring compound trans-1,3-dichloropropene-d4 was below the percent recovery quality control criteria in the dilution of sample S57MW0220109. No qualifications were made on this basis because the undiluted sample was compliant.

The deuterated monitoring compound chloroethane-d5 exceeded the percent recovery quality control criteria in all samples.

No MS/MSD or LCS was analyzed with this SDG.

All samples were analyzed at dilutions because the concentration of target analytes present exceeded the linear calibration range of the instrument. Sample S57GWDUP0209 was not analyzed un-diluted. This accounts for the elevated reporting limits for all non-detected compounds in sample S57GWDUP0209. The results from the greater diluted analyses were transposed to the un-diluted or less diluted analyses and used for validation. No qualifications were made on this basis.

Executive Summary

Laboratory Performance: Qualifications were made based on method blank contamination, calibration non-compliances, and deuterated monitoring compound non-compliances.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to U.S. EPA National Functional Guidelines for Low Concentration Organic Data Review (6/01) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Bernard F Spada III

Tetra Tech NUS
Bernard F Spada III
Chemist/Data Validator

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**K. TURNBULL**	**DATE:**	**MAY 17, 2004**
FROM:	**JACQUELINE J. RASPANTI**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS, AND MISCELLANEOUS PARAMETERS**
CTO- 805 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – 8057

SAMPLES: 5/AQUEOUS/

IW80	S57GWDUP0209	S57MW0200109
S57MW0220109	S57MW0230109	

Overview

The sample set for NSWC Indian Head, SDG 8057, consists of five (5) aqueous environmental samples. One (1) field duplicate pair (S57GWDUP0209 / S57MW0250109) is included in this SDG. Sample S57MW0250109 is part of NSWC Indian Head, SDG 8056.

All samples were analyzed for total and dissolved target analyte list (TAL) metals, and total and dissolved cyanide. Samples S57GWDUP0209, S57MW0200109, and S57MW0220109 were additionally analyzed for alkalinity, chloride, nitrate, nitrite, orthophosphate, sulfate, sulfide, total dissolved solids, total inorganic carbon, total organic carbon, and total suspended solids. The samples were collected by Tetra Tech NUS on April 1, 2004, and analyzed by Katahdin Analytical Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metals and total and dissolved cyanide analyses were conducted using CLP method ILM04.0. Analyses for alkalinity were conducted using EPA method 310.1. Chloride analyses were conducted using EPA method 325.2. Nitrate and nitrite analyses were conducted using EPA method 353.2. Orthophosphate analyses were conducted using EPA method 365.2. Sulfate analyses were conducted using EPA method 375.4. Sulfide analyses were conducted using EPA method 376.1. Total dissolved solids analyses were conducted using EPA method 160.1. Total organic carbon and total inorganic carbon analyses were conducted using EPA method 415.1. Total suspended solids analyses were conducted using EPA method 160.2.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data. The data review was based on data completeness, holding times, calibration data, laboratory method/preparation blanks, interference check sample (ICS) results, matrix spike results, matrix spike duplicate results, laboratory duplicate results, laboratory control sample (LCS) results, field duplicate results, detection limits, and analyte quantitation.

All metals analyses, with the exception of mercury, were conducted using Inductively Coupled Plasma (ICP) methodologies. Mercury analyses were conducted using Cold Vapor Atomic Absorption (CVAA) methodology.

Minor Problems

- The Contract Required Detection Limit (CRDL) percent recovery (%R) run on April 22, 2004 at 4:16 pm were < 90% quality control limit for lead applicable to all total and dissolved samples. The positive result reported for lead in total sample IW80 which was >IDL but <2 times the CRDL was qualified as biased high (K). The non-detected results reported for lead in the remaining samples were qualified as biased low (UL).

- The Contract Required Detection Limit (CRDL) percent recoveries (%R's) run on April 9, 2004 at 9:42 am and 12:00 pm were > 110% quality control limit for beryllium, cobalt, copper, nickel, vanadium, and zinc applicable to all total and dissolved samples. Positive results reported for beryllium, cobalt, copper, nickel, vanadium, and zinc in the samples which were >IDL but <2 times the CRDL was qualified as biased high (K).

- The Contract Required Detection Limit (CRDL) percent recovery (%R) run on April 13, 2004 at 9:56 am were < 80% quality control limit for mercury applicable to all total and dissolved samples. Positive results reported for mercury in the samples which were >IDL but <2 times the CRDL were qualified as biased high (K). Non-detected results reported for mercury in the samples were qualified as biased low (UL).

- The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Aluminum	78.16 ug/L	390.8 ug/L
Beryllium	0.32 ug/L	1.6 ug/L
Calcium	81.89 ug/L	409.45 ug/L
Iron	35.01 ug/L	175.05 ug/L
Magnesium	77.94 ug/L	389.7 ug/L
Silver[1]	3.79 ug/L	18.95 ug/L
Sodium[1]	173.73 ug/L	868.65 ug/L
Thallium[1]	5.05 ug/L	25.25 ug/L

[1] Maximum concentration present in aqueous preparation blank.

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the action level reported for aluminum, iron, silver, and thallium were qualified (B) as a result of blank contamination. The remaining analytes were not qualified for blank contamination because the results were either greater than the action level or they were non-detects.

- The interfering analyte iron was present in total and dissolved sample S57GWDUP0209 at concentrations comparable to the concentrations of iron in the ICS solution. Several analytes, namely antimony, arsenic, barium, cadmium, chromium, cobalt, lead, manganese, nickel, selenium, sodium, thallium, vanadium, and zinc were present in the ICS solution at concentrations that exceeded the absolute value of the IDL. Interference effects exist for antimony, arsenic, chromium, cobalt, nickel, vanadium, and zinc in the affected samples. The positive results reported for arsenic and zinc were qualified as biased high (K). The non-detected results reported for antimony, chromium, and vanadium were qualified as biased low (UL). The positive results reported for cobalt and nickel were qualified as estimated (J) due to conflicting directional bias.

- Positive results reported below the reporting limit for alkalinity, nitrate, sulfide, and total organic carbon were qualified as estimated (J).

Notes

The CRDL %R's run on April 19, 2004 at 9:49 am and 12:44 pm were > 110% quality control limit for antimony applicable to all total and dissolved samples. No qualification action was required because the results reported for antimony in the samples were all non-detects.

The CRDL %R's run on April 19, 2004 at 12:44 pm were > 110% quality control limit for chromium, selenium, and thallium applicable to all total and dissolved samples. No qualification action was required because the results reported for chromium, selenium, and thallium in the samples were either non-detects, or already qualified for blank contamination.

The CRDL %R run on April 9, 2004 at 9:42 am was > 110% quality control limit for cadmium applicable to all total and dissolved samples. No qualification action was required because the results reported for cadmium in the samples were all non-detects.

The CRDL %R's run on April 9, 2004 at 12:00 pm were > 110% quality control limit for silver applicable to all total and dissolved samples. No qualification action was required because the results reported for silver in the samples were either non-detects, or already qualified for blank contamination.

The Practical Quantitation Limit (PQL) %R's run on April 17, 2004 at 10:04 am were outside quality control limits for aluminum, antimony, iron, lead, and selenium. No qualification action was taken based on PQL results.

The PQL %R's run on April 19, 2004 at 9:43 pm were outside quality control limits for aluminum, antimony, arsenic, chromium, selenium, and thallium. No qualification action was taken based on PQL results.

The PQL %R's run on April 22, 2004 at 1:24 9m were outside quality control limits for aluminum, iron, lead, and magnesium. No qualification action was taken based on PQL results.

The PQL %R's run on April 23, 2004 at 9:55 am were outside quality control limits for magnesium and thallium. No qualification action was taken based on PQL results.

The PQL %R's run on April 7, 2004 at 9:57 am were outside quality control limits for barium, calcium, cobalt, nickel, potassium, and vanadium. No qualification action was taken based on PQL results.

The PQL %R's run on April 09, 2004 at 9:37 am were outside quality control limits for cobalt, magnesium, manganese, nickel, and vanadium. No qualification action was taken based on PQL results.

A 5X Dilution was made for lead in total and dissolved sample S57GWDUP0209.

A Matrix Spike (MS), laboratory duplicate, and serial dilution were not performed for metals analyses except mercury in this SDG. A MS and laboratory duplicate was performed for mercury on sample S57MW0220109.

Executive Summary

- **Laboratory Performance:** Several analytes were qualified due to calibration noncompliance. Several analytes were present in the laboratory method/preparation blanks. Alkalinity, nitrate, sulfide, and total organic carbon were qualified due to uncertainty near the detection limit.

Other Factors Affecting Data Quality: Antimony, arsenic, chromium, cobalt, nickel, vanadium, and zinc were qualified due to ICP interference.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", Region III Modifications (April 1993), and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Jacqueline J. Raspanti
Environmental Scientist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
UL	-	Nondetect is considered biased low as a result of technical noncompliance.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
J	-	Positive result is considered estimated as a result of technical noncompliance.
K	-	Positive result is considered biased high as a result of technical noncompliance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

TO:	**K. TURNBULL**	**DATE:**	**JUNE 3, 2004**
FROM:	**BERNARD F SPADA III**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION- VOC CTO 805, NSWC INDIAN HEAD SDG 8056**		

SAMPLES: 20/Aqueous

S57GWDUP0109	S57MW0010109	S57MW0020109
S57MW0030109	S57MW0040109	S57MW0050109
S57MW0060109	S57MW0070109	S57MW0080109
S57MW0090109	S57MW0100109	S57MW0110109
S57MW0120109	S57MW0130109	S57MW0240109
S57MW0250109	S57RB0010109	S57TB0010009
S57TB0020009	S57TB0030009	

Overview

The sample set for CTO 805, NSWC Indian Head, SDG 8056 consists of fifteen (15) environmental aqueous samples, three (3) trip blanks, one (1) field duplicate, and one (1) rinse blank. All environmental samples were analyzed for volatile organic compounds (VOC) plus diethyl ether. The field duplicate pair included in this SDG is S57GWDUP0109 and S57MW0040109.

The samples were collected by Tetra Tech NUS on March 30 and 31 and April 1, 2004 and analyzed by Katahdin Analytical Services. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using CLP OLC03.2 analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters: data completeness, holding times, GCMS tuning, initial/continuing calibrations, laboratory method blank results, surrogate recoveries, internal standard recoveries, compound quantitation, MS/MSD recoveries, field duplicate precision, and detection limits. Areas of concern are listed below.

Major

- None.

Minor

- The initial calibration performed on 3/31/04 exceeded the 30% (and was >50%) relative standard deviation (RSD) quality control criterion and all continuing calibrations exceeded the 30% (and were >50%) difference quality control criterion for methylene chloride. Non-detected results for methylene chloride were qualified as estimated (UJ) in all samples. Positive results for methylene chloride were qualified as estimated (J) in the trip blanks. No further qualifications were made to positive results for methylene chloride on this basis because they were qualified for method blank contamination.

- The continuing calibration performed on April 1 at 09:16 exceeded the 30% (and was >50%) difference quality control criterion for bromomethane and 1,2-dibromo-3-chloropropane. Non-detected results for bromomethane were qualified as estimated (UJ) in samples S57GWDUP0109, S57MW0010109, S57MW0020109, S57MW0120109, S57MW0130109, S57RB0010109, and S57TB0010009.

- The continuing calibration performed on April 5 at 09:18 exceeded the 30% (and was >50%) difference quality control criterion for 1,2-dibromo-3-chloropropane. Non-detected results for 1,2-dibromo-3-chloropropane were qualified as estimated (UJ) in samples S57MW0030109, S57MW0040109, S57MW0060109, S57MW0070109, S57MW0100109, S57TB0020009, and S57TB0030009.

- The continuing calibration performed on April 6 at 08:47 exceeded the 30% (and was >50%) difference quality control criterion for acetone. Non-detected results for acetone were qualified as estimated (UJ) in samples S57MW0050109 and S57MW0110109.

- The following compound was detected in the aqueous method blanks:

Compound	Maximum Concentration	Blank Action Level
Methylene chloride	2.0 ug/L	20 ug/L
1,2,3-Trichlorobenzene	0.5 ug/L	2.5 ug/L
1,2,4-Trichlorobenzene	0.2 ug/L	1.0 ug/L
Chloromethane	0.4 ug/L	2.0 ug/L

  Sample aliquot and dilution factors were taken into consideration when applying the blank action levels. Positive results for chloroform below the blank action level were qualified as non-detected, (B). The trip blanks were not qualified for method blank contamination.

- The deuterated monitoring compound 1,1-dichloroethene-d2 exceeded the percent recovery quality control criteria in samples S57MW0090109 and S57MW0130109 and was below the percent recovery quality control criterion in sample S57MW0040109. The positive results for cis-1,2-dichloroethene and trans-1,2-dichloroethene were qualified as biased high (K) and estimated (J) respectively, in sample S57MW0090109. No qualifications were made to cis-1,2-dichloroethene in sample S57MW0130109 because the result was qualified for method blank contamination. No qualifications were made to trans-1,2-dichloroethene in sample S57MW0130109 because the result was non-detected. The result for cis-1,2-dichloroethene was qualified as biased low (L) in sample S57MW0040109.

- The deuterated monitoring compound 1,1,2,2-tetrachloroethane-d2 was below the percent recovery quality control criteria in sample S57MW0130109. The result for 1,1,2,2-tetrachloroethane was qualified as biased low (UL) and the result for 1,2-dibromo-3-chloropropane was qualified as estimated (UJ).

- The deuterated monitoring compound trans-1,3-dichloropropene-d4 was below the percent recovery quality control criteria in samples S57MW0100109, and S57MW0130109. Positive and non-detected results for cis-1,3-dihcloropropene, trans-1,3-dichloropropene, and 1,1,2-trichloroethane were qualified as estimated and biased low (J and UL) respectively in the aforementioned samples.

- The deuterated monitoring compound chloroethane-d5 exceeded the percent recovery quality control criterion in samples S57RB0010109, S57TB0010009, and S57TB0020009. The results for chloromethane were qualified as estimated (J) in the aforementioned samples. Chloroethane-d5 exceeded the percent recovery quality control criterion in several samples in addition to S57RB0010109, S57TB0010009, and S57TB0020009. No further qualifications were made on this basis because all remaining results for the associated target compounds were either non-detected or qualified for method blank contamination.

- Positive results below the reporting limit were qualified as estimated (J) due to uncertainty near the detection limit.

Notes

The initial calibration performed on March 31, 2004 exceeded the 30% RSD quality control criterion for bromomethane, 1,2,3-trichlorobenzene, and methyl acetate. No qualifications were made on this basis because all results for the aforementioned compounds were non-detected or were qualified for method blank contamination.

The MS/MSD of sample S57MW0240109 were outside the percent recovery quality control criteria for trichloroethene. No qualifications were made on this basis because the concentration of trichloroethene in the un-spiked sample was >2X the spiked amount. The recovery of 1,1-dichloroethene was not calculated correctly on the Form III. The reviewer amended the form and the recovery was compliant.

All environmental samples except S57MW0120109 were analyzed at dilutions because the concentration of target analytes present exceeded the linear calibration range of the instrument. Samples S57MW0030109, S57MW0040109, S57MW0240109, and S57MW0250109 were not analyzed un-diluted. This accounts for the elevated reporting limits for all non-detected compounds in samples S57MW0030109, S57MW0040109, S57MW0240109, and S57MW0250109. The results from the greater diluted analyses were transposed to the un-diluted or less diluted analyses and used for validation. No qualifications were made on this basis.

Executive Summary

Laboratory Performance: Qualifications were made based on method blank contamination, calibration non-compliances and deuterated monitoring compound non-compliances.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to U.S. EPA National Functional Guidelines for Low Concentration Data Review (6/2001) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Bernard F Spada III

Tetra Tech NUS
Bernard F Spada III
Chemist/Data Validator

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**K. TURNBULL**	**DATE:**	**JUNE 2, 2004**
FROM:	**BERNARD F SPADA III**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- OVG/VFA/CARBON DIOXIDE**
CTO 805, NSWC INDIAN HEAD
SDG P0404055

SAMPLES: 14/Aqueous

S57GWDUP0109	S57GWDUP0209	S57MW0100109
S57MW0030109	S57MW0040109	S57MW0070109
S57MW0080109	S57MW0090109	S57MW0110109
S57MW0200109	S57MW0220109	S57MW0240109
S57MW0250109	IW80	

Overview

The sample set for CTO 805, NSWC Indian Head, SDG P0404055 consists of twelve (12) environmental aqueous samples and two (2) field duplicates. All samples except IW80 were analyzed for ethane, ethene, and methane organic volatile gases (OVG) and carbon dioxide. All samples except S57MW0200109 and S57MW0220109 were also analyzed for volatile fatty acids (VFA). The field duplicate pairs included in this SDG are (S57GWDUP0109 / S57MW0040109) and (S57GWDUP0209 / S57MW0250109).

The samples were collected by Tetra Tech NUS on March 30 and 31 and April 1, 2004 and analyzed by Microseeps. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using Methods AM20GAX and AM21G analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters: data completeness, holding times, initial/continuing calibrations, laboratory method blank results, surrogate spike recoveries, blank spike/blank spike duplicate results, field duplicate precision, and detection limits. Areas of concern are listed below.

Major

- None.

Minor

- Samples S57GWDUP0109, S57MW0030109, and S57MW0040109 exceeded the 14 day collection to analysis holding time for volatile fatty acids. Positive and non-detected results were qualified as estimated (J, UJ) respectively.

Notes

The laboratory mis-identified sample S57MW0100109 as S57MW0010109 in the EDD. The sample name was changed to S57MW0100109 in the EDD.

The MS/MSD of sample S57MW0240109 had 0% recovery of methane and ethene. No qualifications were made on this basis because the concentration of ethene and methane in the un-spiked sample were >10X the spiked concentration.

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to U.S. EPA National Functional Guidelines for Data Validation as modified by EPA Region III (9/94) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Bernard F Spada III

Tetra Tech NUS
Bernard F Spada III
Chemist/Data Validator

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**K. TURNBULL**	**DATE:**	**JUNE 4, 2004**
FROM:	**JACQUELINE J. RASPANTI**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS, AND MISCELLANEOUS PARAMETERS**
CTO- 805 NSWC INDIAN HEAD
SAMPLE DELIVERY GROUP (SDG) – 8056

SAMPLES: 17/AQUEOUS/

S57GWDUP0109	S57MW0010109	S57MW0020109
S57MW0030109	S57MW0040109	S57MW0050109
S57MW0060109	S57MW0070109	S57MW0080109
S57MW0090109	S57MW0100109	S57MW0110109
S57MW0120109	S57MW0130109	S57MW0240109
S57MW0250109	S57RB0010009	

Overview

The sample set for NSWC Indian Head, SDG 8056, consists of sixteen (16) aqueous environmental samples and one (1) rinse blank. Two (2) field duplicate pairs (S57GWDUP0109 / S57MW0040109 and S57GWDUP0209 / S57MW0250109) are included in this SDG. Sample S57GWDUP0209 is part of NSWC Indian Head, SDG 8057.

All samples except for S57RB0010009 were analyzed for total and dissolved target analyte list (TAL) metals, total and dissolved cyanide, total dissolved solids, and total suspended solids. Samples S57GWDUP0109, S57MW0030109, S57MW0040109, S57MW0070109, S57MW0080109, S57MW0090109, S57MW0100109, S57MW0110109, S57MW0240109, and S57MW0250109 were additionally analyzed for alkalinity, chloride, nitrate, nitrite, orthophosphate, sulfate, sulfide, total inorganic carbon, and total organic carbon. Sample S57RB0010009 was analyzed for total TAL metals, total cyanide, alkalinity, chloride, nitrate, nitrite, orthophosphate, sulfate, sulfide, total dissolved solids, total inorganic carbon, total organic carbon, and total suspended solids. The samples were collected by Tetra Tech NUS on March 30 and 31, 2004, and April 1, 2004, and analyzed by Katahdin Analytical Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metals and total and dissolved cyanide analyses were conducted using CLP method ILM04.0. Analyses for alkalinity were conducted using EPA method 310.1. Chloride analyses were conducted using EPA method 325.2. Nitrate and nitrite analyses were conducted using EPA method 353.2. Orthophosphate analyses were conducted using EPA method 365.2. Sulfate analyses were conducted using EPA method 375.4. Sulfide analyses were conducted using EPA method 376.1. Total dissolved solids analyses were conducted using EPA method 160.1. Total organic carbon and total inorganic carbon analyses were conducted using EPA method 415.1. Total suspended solids analyses were conducted using EPA method 160.2.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data. The data review was based on data completeness, holding times, calibration data, laboratory method/preparation blanks, interference check sample (ICS)

results, matrix spike results, matrix spike duplicate results, laboratory duplicate results, laboratory control sample (LCS) results, ICP serial dilution results, field duplicate results, detection limits, and analyte quantitation.

All metals analyses, with the exception of mercury, were conducted using Inductively Coupled Plasma (ICP) methodologies. Mercury analyses were conducted using Cold Vapor Atomic Absorption (CVAA) methodology.

Major Problems

- The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) percent recoveries (%R's) were < 30% quality control limit for nitrate in quality control batch WG6697 affecting samples S57MW0070109, S57MW0080109, S57MW0090109, S57MW0100109, S57MW0110109, and S57MW0240109. The non-detected result reported for nitrate in sample S57MW0240109 was qualified as rejected (UR). The positive results reported for nitrate in samples S57MW0070109 and S57MW0110109 were qualified as estimated (J) due to conflicting directional bias. The positive results reported for nitrate in the remaining samples were qualified as extremely low (L).

Minor Problems

- The Contract Required Detection Limit (CRDL) %R's run on April 7, 2004 were > 110% quality control limit for antimony, arsenic, and thallium applicable to total and dissolved samples S57GWDUP0109, S57MW0010109, S57MW0020109, S57MW0030109, S57MW0040109, S57MW0120109, and S57MW0130109, and total sample S57RB0010009. Positive results reported for antimony, arsenic, and thallium in these samples which were >IDL but <2 times the CRDL and not already qualified for blank contamination were qualified as biased high (K).

- The CRDL %R's run on April 9, 2004 at 1:00 pm and 3:41 pm were > 110% quality control limit for antimony and arsenic applicable to total and dissolved samples S57MW0070109, S57MW0080109, S57MW0090109, S57MW0100109, and S57MW0240109. Positive results reported for antimony and arsenic in these samples which were >IDL but <2 times the CRDL were qualified as biased high (K).

- The CRDL %R's run on April 17, 2004 at 10:18 am and 12:59 pm were > 110% quality control limit for antimony and arsenic applicable to total and dissolved samples S57MW0050109, S57MW0060109, S57MW0110109, and S57MW0250109. Positive results reported for antimony in these samples which were >IDL but <2 times the CRDL was qualified as biased high (K). Positive results for arsenic in total and dissolved sample S57MW0250109 which were > IDL but <2 times the CRDL were qualified as estimated (J) due to conflicting directional bias. The positive results for arsenic in total sample S57MW0110109 which was > IDL but <2 times the CRDL was qualified as biased high (K).

- The CRDL %R run on April 17, 2004 at 10:18 am was < 90% quality control limit for selenium applicable to total and dissolved samples S57MW0050109, S57MW0060109, S57MW0110109, and S57MW0250109. The non-detected results reported for selenium in these samples were qualified as biased low (UL).

- The CRDL %R's run on April 7, 2004 were > 110% quality control limit for cadmium, cobalt, copper, manganese, nickel, silver, and zinc applicable to all total and dissolved samples. Positive results reported for cadmium, cobalt, copper, manganese, nickel, silver, and zinc in these samples which were >IDL but <2 times the CRDL were qualified as biased high (K). The positive results reported for silver in total and dissolved sample S57MW0250109 were not qualified, because the results in these samples were already qualified for blank contamination. The positive results reported for cobalt and zinc in total and dissolved sample

S57MW0250109 which were >IDL but <2 times the CRDL were qualified as estimated (J) due to conflicting directional bias.

- The CRDL %R's run on April 7, 2004 at 10:03 am and 2:35 pm were > 110% quality control limit for cadmium applicable to all total and dissolved samples. Positive results reported for cadmium in total and dissolved sample S57MW0080109 which were >IDL but <2 times the CRDL were qualified as biased high (K).

- The CRDL %R's run on April 7, 2004 at 12:20 pm and 2:35 pm were > 110% quality control limit for nickel applicable to all total and dissolved samples. Positive results reported for nickel in total and dissolved sample S57MW0070109 which were >IDL but <2 times the CRDL were qualified as biased high (K).

- The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Aluminum	46.04 ug/L	230.2 ug/L
Barium	0.64 ug/L	3.2 ug/L
Beryllium	0.31 ug/L	1.55 ug/L
Calcium	62.13 ug/L	310.65 ug/L
Chromium	1.15 ug/L	5.75 ug/L
Iron	22.78 ug/L	113.9 ug/L
Lead	2.38 ug/L	11.9 ug/L
Magnesium	42.99 ug/L	214.95 ug/L
Mercury(2)	0.021 ug/L	0.105 ug/L
Selenium	2.47 ug/L	12.35 ug/L
Silver(3)	3.790 ug/L	18.95 ug/L
Sodium(1)	169.11 ug/L	845.55 ug/L
Sodium(3)	173.73 ug/L	868.65 ug/L
Sodium(4)	152.19 ug/L	760.95 ug/L
Thallium	6.78 ug/L	33.9 ug/L
Thallium(1)	8.68 ug/L	43.4 ug/L

(1) Maximum concentration present in aqueous preparation blank PBWUD01ICW0 applicable to total and dissolved samples S57GWDUP0109, S57MW0010109, S57MW0020109, S57MW0030109, S57MW0040109, S57MW0120109, S57MW0130109, and total sample S57RB0010009.
(2) Maximum concentration present in aqueous preparation blank PBWUD05HGW1 applicable to total and dissolved samples S57MW0050109, S57MW0060109, S57MW0070109, S57MW0080109, S57MW0090109, S57MW0100109, S57MW0110109, S57MW0240109, S57MW0250109.

(3) Maximum concentration present in aqueous preparation blank PBWUD06ICW1 applicable to total and dissolved samples S57MW0050109, S57MW0060109, and S57MW0250109
(4) Maximum concentration present in aqueous preparation blank PBWUD06ICW0 applicable to total and dissolved samples S57MW0070109, S57MW0080109, S57MW0090109, S57MW0100109, S57MW0110109, S57MW0240109.

An action level of 5X the maximum concentration was used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. The positive results less than the action level reported for aluminum, beryllium, chromium, iron, lead, selenium, silver, and thallium were qualified (B) as a result of blank contamination. The remaining analytes

were not qualified for blank contamination because the results were either greater than the action level or they were non-detects. The rinse blank was not qualified for blank contamination, and was not used to establish blank action levels.

- The interfering analyte iron was present in total and dissolved sample S57MW0250109 at concentrations comparable to the concentrations of iron in the ICS solution. Several analytes, namely antimony, arsenic, barium, cadmium, chromium, cobalt, lead, manganese, nickel, selenium, sodium, thallium, vanadium, and zinc were present in the ICS solution at concentrations that exceeded the absolute value of the IDL. Interference effects exist for arsenic, chromium, cobalt, lead, nickel, selenium, vanadium, and zinc in the affected samples. The non-detected results reported for chromium, lead, nickel, selenium, and vanadium were qualified as biased low (UL). The positive results reported for arsenic, cobalt, and zinc were qualified as estimated (J) due to conflicting directional bias.

- The MS %R was > 125% quality control limit for orthophosphate in quality control batch WG6688 affecting samples S57GWDUP0109, S57MW0030109, S57MW0040109, and S57RB0010009. The positive result in sample S57MW0040109 was qualified as estimated (J) due to conflicting directional bias.

- The MS and MSD %R's were < 75% quality control limit for nitrite in quality control batch WG6697 affecting samples S57MW0070109, S57MW0080109, S57MW0090109, S57MW0100109, S57MW0110109, and S57MW0240109. The non-detected result reported for nitrite in these samples were qualified as biased low (UL).

- The MS %R was < 75% quality control limit for alkalinity in quality control batch WG6765 affecting sample S57MW0250109. The positive result reported for alkalinity in this sample was qualified as biased low (L).

- Positive results reported below the reporting limit for alkalinity, total cyanide, nitrate, orthophosphate, and total organic carbon were qualified as estimated (J).

Notes

The CRDL percent recoveries %R's run on April 7, 2004 at 10:40 am, 1:23 pm, and 2:57 pm were > 110% quality control limit for chromium, lead, and selenium applicable to total and dissolved samples S57GWDUP0109, S57MW0010109, S57MW0020109, S57MW0030109, S57MW0040109, S57MW0120109, and S57MW0130109, and total sample S57RB0010009. No qualification action was required because the results reported for chromium, lead, and selenium in these samples were either non-detects, or already qualified for blank contamination.

The CRDL %R's run on April 9, 2004 at 1:00 pm, 3:41 pm, and 6:22 pm were > 110% quality control limit for chromium applicable to total and dissolved samples S57MW0050109, S57MW0060109, S57MW0070109, S57MW0080109, S57MW0090109, S57MW0100109, S57MW0110109, S57MW0240109, and S57MW0250109. No qualification action was required because the results reported for chromium in these samples were either non-detects, or already qualified for blank contamination.

The CRDL %R's run on April 9, 2004 at 1:00 pm and 3:41 pm were > 110% quality control limit for lead and selenium applicable to total and dissolved samples S57MW0070109, S57MW0080109, S57MW0090109, S57MW0100109, and S57MW0240109. No qualification action was required because the results reported for lead and selenium in these samples were either non-detects, or already qualified for blank contamination.

The CRDL %R's run on April 17, 2004 at 10:18 am and 12:59 pm were > 110% quality control limit for thallium applicable to total and dissolved samples S57MW0050109, S57MW0060109,

S57MW0110109, and S57MW0250109. No qualification action was required because the results reported for thallium in these samples were already qualified for blank contamination.

The CRDL %R run on April 17, 2004 at 10:18 am and 12:59 pm was > 110% quality control limit for lead applicable to total and dissolved samples S57MW0050109, S57MW0060109, and S57MW0110109. No qualification action was required because the results reported for lead in these samples were either non-detects, or already qualified for blank contamination.

The CRDL %R run on April 20, 2004 at 11:17 am was > 110% quality control limit for lead applicable to total and dissolved sample S57MW0250109. No qualification action was required because the results reported for lead in these samples were non-detects.

The CRDL %R's run on April 7, 2004 at 10:03 am, 12:20 pm, 2:35 pm, and 4:51 pm were > 110% quality control limit for beryllium and vanadium applicable to all total and dissolved samples. No qualification action was required because the results reported for beryllium and vanadium in these samples were either non-detects, or already qualified for blank contamination.

The Practical Quantitation Limit (PQL) %R's run on April 7, 2004 at 10:33 am were outside quality control limits for aluminum, lead, magnesium, and selenium. No qualification action was taken based on PQL results.

The PQL %R's run on April 9, 2004 at 12:53 pm were outside quality control limits for aluminum, antimony, lead, magnesium, and selenium. No qualification action was taken based on PQL results.

The PQL %R's run on April 17, 2004 at 10:04 am were outside quality control limits for aluminum, antimony, iron, lead, and selenium. No qualification action was taken based on PQL results.

The PQL %R's run on April 20, 2004 at 11:11 am were outside quality control limits for aluminum, iron, and magnesium. No qualification action was taken based on PQL results.

The PQL %R's run on April 23, 2004 at 9:55 am were outside quality control limits for magnesium and thallium. No qualification action was taken based on PQL results.

The PQL %R's run on April 07, 2004 at 9:57 am were outside quality control limits for barium, calcium, cobalt, nickel, potassium, and vanadium. No qualification action was taken based on PQL results.

A 5X Dilution was made for lead in total and dissolved sample S57MW0250109.

A MSD for total organic carbon was not submitted with the original data package. A copy of the MSD for total organic carbon was received by the laboratory and included in this data validation package.

A MS and MSD were not performed by the laboratory for alkalinity for laboratory sample ID WU0851-10.

For dissolved sample S57MW0250109, the measured total carbon concentration is significantly less than the measured organic carbon. The laboratory states that this is attributed to differences between the two sample aliquots (from two different bottles) used in the laboratory to obtain the results. The total inorganic carbon result for this sample was reported as 1.0 U mg/L.

Executive Summary

Laboratory Performance: Several analytes were qualified due to calibration noncompliance. Several analytes were present in the laboratory method/preparation blanks. Alkalinity, total

cyanide, nitrate, orthophosphate, and total organic carbon were qualified due to uncertainty near the detection limit.

Other Factors Affecting Data Quality: Arsenic, chromium, cobalt, lead, nickel, selenium, vanadium, and zinc were qualified due to ICP interference. Alkalinity, nitrate, nitrite, and orthophosphate were qualified due to matrix spike noncompliance.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", Region III Modifications (April 1993), and the NFESC document entitled "Navy IRCDQM" (September 1999).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Jacqueline J. Raspanti

Tetra Tech NUS
Jacqueline J. Raspanti
Environmental Scientist

Eric M Fanot for

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
UL	-	Nondetect is considered biased low as a result of technical noncompliance.
UR	-	The data are unusable. (Note: The analyte may or may not be present.)
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
J	-	Positive result is considered estimated as a result of technical noncompliance.

K - Positive result is considered biased high as a result of technical noncompliance.

L - Positive result is considered biased low as a result of technical noncompliance.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**K. TURNBULL**	**DATE:**	**JANUARY 11, 2006**
FROM:	**KELLY CARPER**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOC/Diethyl ether**
CTO 007, NDW INDIAN HEAD
SDG CTO007-1 and CTO007-1A

SAMPLES: 21/Aqueous/

S41MW0010109	S41MW0020109	S41MW0040109
S57GB0330109	S57GB0360109	S57MW0010109
S57MW0020109	S57MW0030109	S57MW0040109
S57MW0070109	S57MW0080109	S57MW0090109
S57MW0100109	S57MW0110109	S57MW0120109
S57MW0130109	S57MW0220109	S57MW0240109
S57MWDUP0109	S57TB0209	S57TB0109

Overview

The sample set for CTO 007, NDW Indian Head, SDGs CTO007-1 and CTO007-1A consists of nineteen (19) environmental aqueous samples (including one field duplicate pair S57MWDUP0109/S57MW0030109) and two (2) trip blanks. All samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) and dielthyl ether. Analysis for diethyl ether was performed separately because the laboratory forgot to add it to the calibration mixture for the full volatiles analysis.

The samples were collected by Tetra Tech NUS on September 28, 29, 30, October 3, 4,and 5, 2005 and analyzed by Katahdin Analytical Services. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using CLP SOW OLM04.3 analytical and reporting protocols.

The findings in this report are based upon a general review of all available data including: data completeness, system performance, holding times, GC/MS tuning, initial / continuing calibrations, laboratory method blank results, surrogate spike/internal standard recoveries, blank spike results, MS/MSD results, field duplicate precision, compound identification, compound quantitation, and detection limits.

Areas of concern are listed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A. Results as reported by the laboratory are presented in Appendix B.

Major

- All diethyl ether analyses were performed grossly outside the 14-day turnaround time from sample collection to analysis. Positive results were qualified as biased low (L) or estimated (J) and nondetects are considered unreliable and were rejected, qualified (UR).

Minor

- The following compounds were detected at the maximum concentration in the aqueous method and trip blanks:

Compound	Maximum Concentration	Blank Action Level
Acetone	5 ug/L	50 ug/L
Methylene Chloride*	3 ug/L	30 ug/L
1,2,4-Trichlorobenzene	1 ug/L	5 ug/L

*detected in the trip blank

An action level of 10X the maximum contaminant concentration was established to evaluate laboratory contamination for acetone and methylene chloride. An action level of 5X the maximum contaminant concentration was established to evaluate laboratory contamination for 1,2,4-trichlorobenzene. Dilution factors and sample aliquots were taken into consideration during the application of the action level. The affected positive results for acetone and methylene chloride were qualified (B). Positive detections of these compounds were not qualified in the trip blanks. Methylene chloride and acetone were also detected in the trip blanks

- The continuing calibration Percent Difference (%D) for acetone run on instrument GCMS-F on 10/11/05 at 8:36 was greater than 50%. The nondetected result for acetone reported in sample S57MW0130109 was qualified as estimated (UJ), no bias could be determined. No actions were warranted in the remaining affected samples as the acetone results were qualified as a result of blank contamination and did not warrant further qualification.

- The surrogate Percent Recoveries (%Rs) for 1,2-dichloroethane-d4 were high in samples S57MW0110109MS, S41MW0010109RA, S57TB0209, S57MW0120109, S57MW0120109MS, and S57MW0120109MSD. No actions were warranted in S57MW0110109MS, S57MW0120109MS, and S57MW0120109MSD as these are quality control samples. Positive and nondetected results in the remaining samples were qualified as estimated, (J) and (UJ), respectively. No bias could be determined.

- The surrogate %R for toluene-d8 was high in sample S41MW0040109. Positive and nondetected results in this sample were qualified as estimated, (J) and (UJ), respectively. No bias could be determined.

- The surrogate %Rs for p-bromoflurobenzene were low in samples WG21614-LCS, WG21614-BLANK, S57GB0360109RA, S57MW0090109DL, S57MW0240109DL, and S57MW0040109DL. No actions were warranted in WG21614-LCS and WG21614-BLANK as these are quality control samples. Only positive results were reported from the remaining samples were qualified as estimated, (J). No bias could be determined.

- The surrogate %Rs for 1,2-dichloroethane-d4 were high in the dielthyl ether analyses of samples S57MW0040109, S57TB0209, and S57MW0120109. The positive results reported in samples S57MW0040109 and S57MW0120109 were qualified as estimated, (J). The nondetect reported in S57TB0209 was rejected due to the gross holding time noncompliance and did not require further qualification. No bias could be determined.

- The surrogate %Rs for all three surrogate compounds were high in the diethyl ether analyses of samples S57MW0220109 and S41MW0010109. The positive result reported in sample S57MW0220109 was qualified as estimated, (J). The nondetect reported in S41MW0010109 was rejected due to the gross holding time noncompliance and did not require further qualification. No bias could be determined.

- Positive results below the reporting limit were qualified as estimated (J) due to uncertainty near the detection limit.

Notes

The laboratory did not report diethyl ether as requested in the lab scope, hence the laboratory had to reanalyze samples for diethyl ether and these analyses were performed grossly outside the holding time and reported as an addendum data package.

The continuing calibration %Ds for dichlorofluoromethane, trichlorofluoromethane, and 1,2,4-trichlorobenzene run on instrument GCMS-F at 13:46 on 10/10/05 were greater than 25% but less than 50%. No actions were warranted as only positive results are affected by this noncompliance and only nondetects were reported for these compounds in the affected samples.

The continuing calibration %Ds for trichlorofluoromethane and 2-butanone run on instrument GCMS-F at 8:36 on 10/11/05 were greater than 25% but less than 50%. No actions were warranted as only positive results are affected by this noncompliance and only nondetects were reported for these compounds in the affected samples.

The continuing calibration %Ds for acetone, 2-butanone, and 1,2,4-trichlorobenzene run on instrument GCMS-F at 8:10 on 10/12/05 were greater than 25% but less than 50%. Positive acetone results were qualified for blank contamination. No actions were warranted for the remaining compounds as only positive results are affected by this noncompliance and only nondetects were reported for these compounds in the affected samples.

The following TCL VOC samples were diluted:

Sample	Dilution	Reason for dilution
S41MW0010109	10x	Use only the benzene and methyl tert butyl ether results.
S57MW0040209	10x	Use only the trichloroethene result.
S57MW0090109	5x	Use only the trichloroethene result.
S57MW0100109	2x	Use only the trichloroethene result.
S57MW0220109	10x	Use only the vinyl chloride, cis-1,2-dichloroethene, and 1,2-dichloroethene (total) results.
S57MW0240109	5x	Use only the vinyl chloride, cis-1,2-dichloroethene, 1,2-dichloroethene (total), and trichloroethene results.
S57MWDUP0109	2X	Use only the trichloroethene result.

The following diethyl ether samples were diluted:

Sample	Dilution
S57GB360109	100x
S57MW0020109	20x
S57MW0030109	2x
S57MW0070109	2x
S57MW0080109	2x
S57MW0110109	50x
S57MWDUP0109	2x

The laboratory named sample S57TB0109 incorrectly. The Form Is and database identify this sample as S57TP0109. The Form Is and data base have been corrected by the data reviewer.

The diethyl ether analysis of sample S57MW0070109 was performed at a 2-fold dilution but still was in excess of the linear calibration range. The positive result in this sample was qualified as biased low due to the gross holding time exceedence and was not further qualified.

Executive Summary

Laboratory Performance: The laboratory forgot to analyze samples for diethyl ether and once they caught this oversight and reanalyzed the samples for diethyl ether the reanalysis was performed grossly outside the holding time which resulted in rejecting nondetected results for diethyl ether. Methylene chloride, acetone, and 1,2,4-trichlorobenzene were detected in the laboratory blanks. Qualifications were made based on noncompliant surrogate recoveries in several samples.

Other Factors Affecting Data Quality: Methylene chloride and acetone was detected in the trip blank.

The data for these analyses were reviewed with reference to Region III modifications to U.S. EPA National Functional Guidelines for Data Validation (9/94) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Kelly A. Carper

Tetra Tech NUS
Kelly Carper
Chemist/Data Validator

Edward Hedlund for

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**K. TURNBULL**	**DATE:**	**JANUARY 11, 2006**
FROM:	**KELLY CARPER**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOC/Diethyl ether**
CTO 007, NDW INDIAN HEAD
SDG CTO007-2 and CTO007-2A

SAMPLES: 21/Aqueous/

S41MW0020109	S57GB0350109	S57GBDUP0109
S57MW0050109	S57MW0060109	S57MW0230109
S57MW0250109	S57MW0260109	S57MW0270109
S57MW0280109	S57MW0290109	S57MW0320109
S57MW0330109	S57MW0330109	S57MW0350109
S57MW0360109	S57MW0370109	S57MWDUP0209
S57MWDUP0309	S57TB0309	S57TB0409

Overview

The sample set for CTO 007, NDW Indian Head, SDGs CTO007-2 and CTO007-2A consists of nineteen (19) environmental aqueous samples (including 3 field duplicate pairs S57GBDUP0109/S57GB0350109, S57MWDUP0209/S57MW0250109, and S57MWDUP0309/S57MW0270109) and two (2) trip blanks. All samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) and dielthyl ether. Analysis for diethyl ether was performed separately because the laboratory forgot to add it to the calibration mixture for the full volatiles analysis.

The samples were collected by Tetra Tech NUS on October 5, 6, 7, and 11, 2005 and analyzed by Katahdin Analytical Services. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using CLP SOW OLM04.3 analytical and reporting protocols.

The findings in this report are based upon a general review of all available data including: data completeness, system performance, holding times, GC/MS tuning, initial / continuing calibrations, laboratory method blank results, surrogate spike/internal standard recoveries, blank spike results, MS/MSD results, field duplicate precision, compound identification, compound quantitation, and detection limits.

Areas of concern are listed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A. Results as reported by the laboratory are presented in Appendix B.

Major

- All diethyl ether analyses were performed grossly outside the 14-day turnaround time from sample collection to analysis. Positive results were qualified as biased low (L) and nondetects are considered unreliable and were rejected, qualified (UR).

Minor

- The following compounds were detected at the maximum concentration in the aqueous method and trip blanks:

Compound	Maximum Concentration	Blank Action Level
Acetone	5 ug/L	50 ug/L
Methylene Chloride	2 ug/L	20 ug/L

An action level of 10X the maximum contaminant concentration was established to evaluate laboratory contamination for acetone and methylene chloride. Dilution factors and sample aliquots were taken into consideration during the application of the action level. The affected positive results for acetone and methylene chloride were qualified (B). Positive detections of these compounds were not qualified in the trip blanks. Methylene chloride was also detected in the trip blanks. Additionally trimethylsilanol was detected as a tentatively identified compound in some samples. This compound is an artifact and should not be used.

- The surrogate Percent Recoveries (%Rs) for 1,2-dichloroethane-d4 and toluene-d8 were high in sample S57MW0250109. The sample was reanalyzed at a dilution due to high concentrations of vinyl chloride, cis-1,2-dichloroethene, and 1,2-dichloroethene (total). The surrogate recoveries in the dilution were compliant. Only results for vinyl chloride cis-1,2-dichloroethene, and 1,2-dichloroethene (total) were used from the dilution analysis. The original analysis was used in the validation of this SDG for the remaining compounds. Positive and nondetected results in this sample were qualified as estimated, (J) and (UJ), respectively. No bias could be determined.

- The surrogate %R for toluene-d8 was low in the diethyl ether analysis of sample S57MW0250109. The positive result in this sample was qualified as biased low, (L) as a result of this low recovery and gross holding time exceedence.

- The surrogate %Rs for 1,2-dichloroethane-d4 were high in samples S57MWDUP0209, S57MW0060109, S57MW0050109RA, S57GB0350109, S57GBDUP0109, S57MW0360109, S57MW0330109, S57MW0230109, S57MW0290109, S57MW0280109, S57MW0260109, and S57TB0309. Samples S57MWDUP0209, S57MW0050109, S57MW0060109, S57GB0350109, S57GBDUP0109, and S57MW0230109 were reanalyzed at a dilution due to high concentrations of various combinations of target compounds. The surrogate recoveries in the dilution analyses were compliant. Only results for target compounds that exceeded the linear calibration range in the original analysis were reported/used in validation from the dilution analysis. The original analyses of the remaining compounds were used in the validation of this SDG. Positive and nondetected results in these samples were qualified as estimated, (J) and (UJ), respectively. No bias could be determined.

- Positive results below the reporting limit were qualified as estimated (J) due to uncertainty near the detection limit.

Notes

The laboratory did not report diethyl ether as requested in the lab scope, hence the laboratory had to reanalyze samples for diethyl ether and these analyses were performed grossly outside the holding time and reported as an addendum data package.

The continuing calibration Percent Differences (%Ds) for dichlorofluoromethane, trichlorofluoromethane, and 1,2,4-trichlorobenzene run on instrument GCMS-F at 13:46 on 10/10/05 were greater than 25% but less than 50%. No actions were warranted as only positive results are affected by this noncompliance and only nondetects were reported for these compounds in the affected samples.

The continuing calibration %Ds for trichlorofluoromethane and 2-butanone run on instrument GCMS-F at 8:36 on 10/11/05 were greater than 25% but less than 50%. No actions were warranted as only positive results are affected by this noncompliance and only nondetects were reported for these compounds in the affected samples. Additionally the %D for acetone was in excess of 50% but no action was warranted as all acetone results were qualified as a result of blank contamination and did not require further qualification.

The continuing calibration %Ds for acetone, 2-butanone, and 1,2,4-trichlorobenzene run on instrument GCMS-F at 8:10 on 10/12/05 were greater than 25% but less than 50%. Positive acetone results were qualified for blank contamination. No actions were warranted for the remaining compounds as only positive results are affected by this noncompliance and only nondetects were reported for these compounds in the affected samples.

The surrogate %R for p-bromofluorobenzene was low in the diethyl ether analysis of sample S57TB0409. Additionally the surrogate %Rs for toluene-d8 and p-bromofluorobenzene in sample S57MW0230109 were low. The nondetected results reported for these samples were rejected due to gross holding time noncompliances and were not further qualified.

The following samples were diluted:

Sample	Dilution	Reason for dilution
S57MW0250109	200x	Use only the vinyl chloride, cis-1,2-dichloroethene, and 1,2-dichloroethene (total) results.
S57MWDUP0209	200x	Use only the vinyl chloride, cis-1,2-dichloroethene, and 1,2-dichloroethene (total) results.
S57MW0050109	5x	Use only the trichloroethene result.
S57MW0060109	5x	Use only the trichloroethene result.
S57GB0350109	250x	Use only the vinyl chloride, trans-1,2-dichloroethene, cis-1,2-dichloroethene, 1,2-dichloroethene (total), and trichloroethene results.
S57GBDUP0109	250x	Use only the vinyl chloride, trans-1,2-dichloroethene, cis-1,2-dichloroethene, 1,2-dichloroethene (total), and trichloroethene results.
S57MW0230109	100X	Use only the benzene and methyl tert butyl ether results.

The diethyl ether samples S57GB0350109 and D57GBDUP0109 were diluted 500-fold. No undiluted data is presented for these samples. It should be noted that the undiluted volatiles analysis did not report any ethers as tentatively identified compounds.

The relative percent difference for acetone in the field duplicate pair S57MW0270109/S57MWDUP0309 was in excess of the 30% quality control limit. No actions were necessary as these results were reported at concentrations below the contract required quantitation limit and acetone was also qualified for blank contamination.

The relative percent differences for acetone and methylene chloride in the field duplicate pair S57GB0350109/S57GBDUP0109 were in excess of the 30% quality control limit. No actions were necessary as acetone results were reported at concentrations below the contract required quantitation limit and both acetone and methylene chloride were qualified for blank contamination.

Executive Summary

Laboratory Performance: The laboratory forgot to analyze samples for diethyl ether and once they caught this oversight and reanalyzed the samples for diethyl ether the renaalysis was performed grossly outside the holding time which resulted in rejecting nondetected results for diethyl ether. Methylene chloride and acetone were detected in the laboratory blanks. Qualifications were made based on surrogate recovery noncompliances in several samples.

Other Factors Affecting Data Quality: Methylene chloride was detected in the trip blank.

The data for these analyses were reviewed with reference to Region III modifications to U.S. EPA National Functional Guidelines for Data Validation (9/94) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Kelly B Carper

Tetra Tech NUS
Kelly Carper
Chemist/Data Validator

Edward Sedlmayer (for

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**K. TURNBULL**	**DATE:**	**JANUARY 9, 2006**
FROM:	**KELLY CARPER**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOC/Diethyl ether**
CTO 007, NDW INDIAN HEAD
SDG CTO007-3 and CTO007-3A

SAMPLES: 8/Aqueous/

S57FB0109	S57FB0209	S57MW0020109
S57MW0300109	S57MW0310109	S57MW0340109
S57MWDUP0409	S57RB0109	

Overview

The sample set for CTO 007, NDW Indian Head, SDGs CTO007-3 and CTO007-3A consists of five (5) environmental aqueous samples (including one field duplicate pair S57MWDUP0409/S57MW0310109), two (2) field blanks, and one (1) rinsate blank. All samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) and dielthyl ether. Analysis for diethyl ether was performed separately because the laboratory forgot to add it to the calibration mixture for the full volatiles analysis.

The samples were collected by Tetra Tech NUS on October 12 and 13, 2005 and analyzed by Katahdin Analytical Services. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using CLP SOW OLM04.3 analytical and reporting protocols.

The findings in this report are based upon a general review of all available data including: data completeness, system performance, holding times, GC/MS tuning, initial / continuing calibrations, laboratory method blank results, surrogate spike/internal standard recoveries, blank spike results, MS/MSD results, field duplicate precision, compound identification, compound quantitation, and detection limits.

Areas of concern are listed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A. Results as reported by the laboratory are presented in Appendix B.

Major

- All diethyl ether analyses were performed grossly outside the 14-day turnaround time from sample collection to analysis. Positive results were qualified as biased low (L) and nondetects are considered unreliable and were rejected, qualified (UR).

Minor

- Positive results below the reporting limit were qualified as estimated (J) due to uncertainty near the detection limit.

Notes

The following compound was detected at the maximum concentration in the aqueous method blank:

Compound	Maximum Concentration	Blank Action Level
Methylene Chloride	2 ug/L	20 ug/L

An action level of 10X the maximum contaminant concentration was established to evaluate laboratory contamination for methylene chloride. No actions were taken as no positive results were reported for methylene chloride in environmental samples.

Bromodichloromethane (7 ug/L), bromoform (9 ug/L), chlorodibromomethane (12 ug/L), chloroform (2 ug/L), 2-butanone (7 ug/L), and acetone (34 ug/L) were detected at these maximum concentrations in the field blanks. No actions were taken based on field blank contamination.

Acetone (30 ug/L) and 2-butanone (6 ug/L) were detected in the rinsate blank. No actions were taken based on rinsate blank contamination.

The laboratory did not report diethyl ether as requested in the lab scope, hence the laboratory had to reanalyze samples for diethyl ether and these analyses were performed grossly outside the holding time and reported as an addendum data package.

The surrogate Percent Recovery (%Rs) for toluene-d8 were high in the dielthyl ether analyses of samples WG23188-BLANK and S57MW0300109. The nondetects reported in these samples were rejected due to the gross holding time noncompliance and did not require further qualification. No bias could be determined.

The surrogate %R for p-bromoflurobenzene was low in the dielthyl ether analyses of sample S57FB0209. The nondetect reported in this sample was rejected due to the gross holding time noncompliance and did not require further qualification. No bias could be determined.

The diethyl ether analysis of sample S57MW0020109 was performed at a 2-fold dilution but still was in excess of the linear calibration range. The positive result in this sample was qualified as biased low due to the gross holding time exceedence and was not further qualified.

Executive Summary

Laboratory Performance: The laboratory forgot to analyze samples for diethyl ether and once they caught this oversight and reanalyzed the samples for diethyl ether the renaalysis was performed grossly outside the holding time which resulted in rejecting nondetected results for diethyl ether. Methylene chloride was detected in the laboratory blank.

Other Factors Affecting Data Quality: Bromodichloromethane, bromoform, chlorodibromomethane, chloroform, 2-butanone, and acetone were detected at these maximum concentrations in the field blanks.

The data for these analyses were reviewed with reference to Region III modifications to U.S. EPA National Functional Guidelines for Data Validation (9/94) and the NFESC guidelines entitled Navy IRCDQM (Sept. 1999). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Kelly Carper
Chemist/Data Validator

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
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APPENDIX D

AQUIFER TEST MEASUREMENTS AND CALCULATIONS

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW01

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" ID SCREEN LENGTH/DEPTH: 10', 16.18-26.18 TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 7.35 DATE: 10-24-01

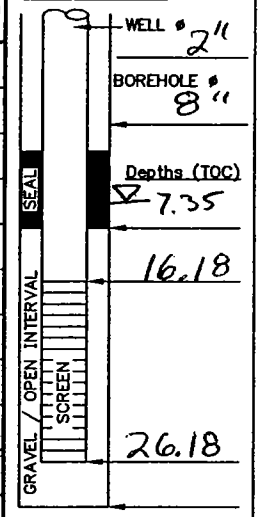
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 2 x 1 Liter Bailers PAGE ..... OF .....

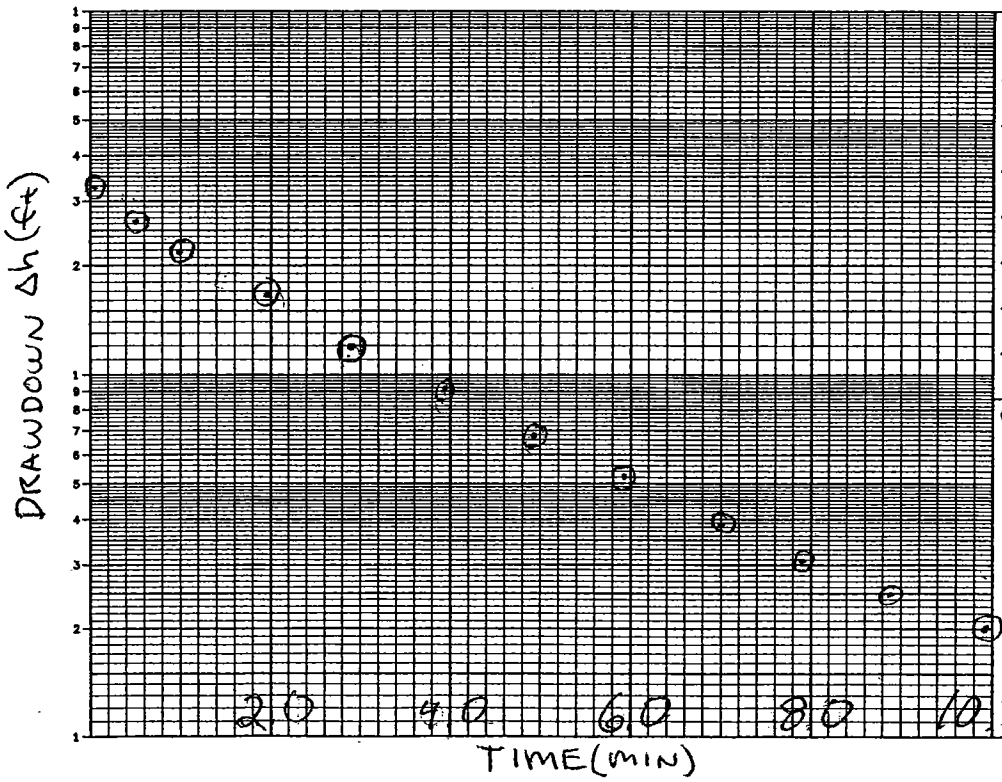
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, Ref to 0.00

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	9.9497		0.200
0.050		3.375			
0.4963		2.681			
1.04		2.23			
1.9678		1.658			
2.9530		1.227			
3.9463		0.914			
4.9728		0.682			
5.9145		0.529			
7.0345		0.395			
7.8962		0.318			
8.8645		0.252			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:
INSERTED BAILERS
1527 HRS
1551 START
WL @ STOP = 7.40

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57MW01	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2L T_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 10'$ (INPUT LENGTH, Ft)
$T_o = 3.2$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

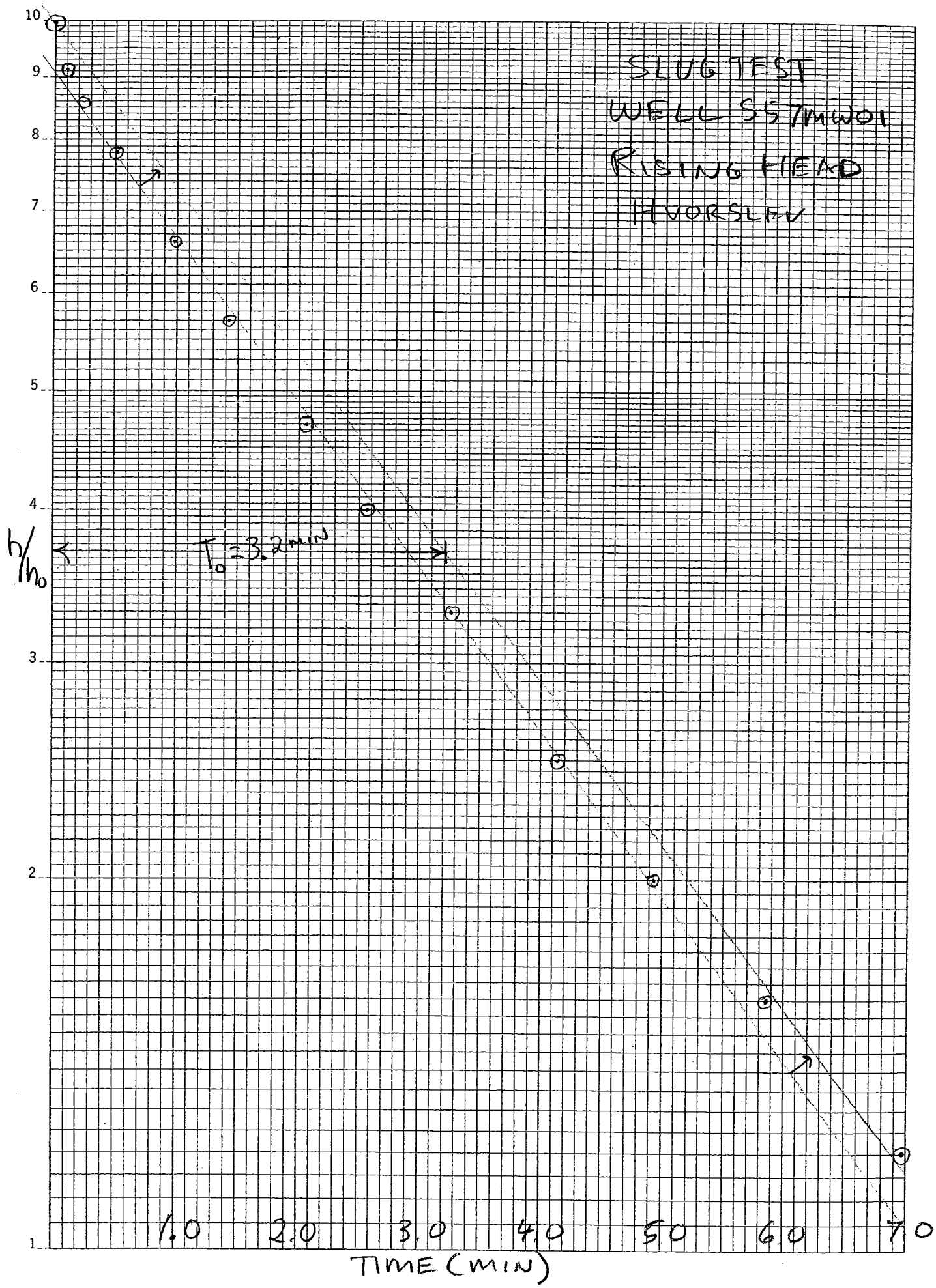
$$K = \frac{(0.083)^2 \ln(10/0.083)}{2(10)(3.2)}$$

$$= \frac{3.30086419 \times 10^{-2}}{64}$$

$$= 5.16 \times 10^{-4} \text{ ft/min}$$

$$= 2.6 \times 10^{-4} \text{ cm/sec}$$

$$= 0.743 \text{ ft/day}$$



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/30/01 15:07:19
Report from file: C:\Win-Situ\Data\SN01966 2001-10-24 155047 s57mw01rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw01rhno1

Test defined on: 10/24/01 15:20:25
Test started on: 10/24/01 15:50:47
Test stopped on: 10/24/01 16:17:56
Test extracted on: N/A

Data gathered using Logarithmic testing
ximum time between data points: 10. Minutes.
Number of data samples: 118

TOTAL DATA SAMPLES 118

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 11.435 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj. ET (min)	h/ho	ho= 3.375
10/24/01	15:50	0	19.28	0			
10/24/01	15:50	0.005	19.28	0			
10/24/01	15:50	0.01	19.29	-0.002			
10/24/01	15:50	0.015	19.29	-0.002			
10/24/01	15:50	0.02	19.29	-0.004			
10/24/01	15:50	0.025	19.31	0.077			
10/24/01	15:50	0.03	19.31	16.167			
10/24/01	15:50	0.035	19.31	4.154			
10/24/01	15:50	0.04	19.31	3.526			
10/24/01	15:50	0.045	19.31	3.36			
10/24/01	15:50	0.05	19.31	3.375	0	1.00	
10/24/01	15:50	0.055	19.31	3.312	0.005	0.98	
10/24/01	15:50	0.06	19.31	3.296	0.01	0.98	

10/24/01 15:50	0.065	19.31	3.294	0.015	0.98
10/24/01 15:50	0.07	19.31	3.265	0.02	0.97
10/24/01 15:50	0.075	19.32	3.29	0.025	0.97
10/24/01 15:50	0.08	19.32	3.23	0.03	0.96
10/24/01 15:50	0.0848	19.32	3.209	0.0348	0.95
10/24/01 15:50	0.09	19.32	3.16	0.04	0.94
10/24/01 15:50	0.095	19.32	3.17	0.045	0.94
10/24/01 15:50	0.1	19.32	3.178	0.05	0.94
10/24/01 15:50	0.1058	19.32	3.168	0.0558	0.94
10/24/01 15:50	0.112	19.32	3.156	0.062	0.94
10/24/01 15:50	0.1185	19.32	3.143	0.0685	0.93
10/24/01 15:50	0.1255	19.32	3.129	0.0755	0.93
10/24/01 15:50	0.1328	19.32	3.116	0.0828	0.92
10/24/01 15:50	0.1407	19.32	3.102	0.0907	0.92
10/24/01 15:50	0.149	19.32	3.087	0.099	0.91
10/24/01 15:50	0.1578	19.32	3.073	0.1078	0.91
10/24/01 15:50	0.167	19.32	3.058	0.117	0.91
10/24/01 15:50	0.177	19.32	3.044	0.127	0.90
10/24/01 15:50	0.1875	19.32	3.029	0.1375	0.90
10/24/01 15:50	0.1985	19.32	3.013	0.1485	0.89
10/24/01 15:50	0.2102	19.31	2.996	0.1602	0.89
10/24/01 15:51	0.2227	19.32	2.982	0.1727	0.88
10/24/01 15:51	0.2358	19.31	2.963	0.1858	0.88
10/24/01 15:51	0.2498	19.31	2.946	0.1998	0.87
10/24/01 15:51	0.2647	19.31	2.928	0.2147	0.87
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10/24/01 15:51	0.297	19.31	2.888	0.247	0.86
10/24/01 15:51	0.3147	19.31	2.868	0.2647	0.85
10/24/01 15:51	0.3333	19.31	2.847	0.2833	0.84
10/24/01 15:51	0.3532	19.31	2.826	0.3032	0.84
10/24/01 15:51	0.3742	19.31	2.804	0.3242	0.83
10/24/01 15:51	0.3963	19.31	2.781	0.3463	0.82
10/24/01 15:51	0.4198	19.31	2.756	0.3698	0.82
10/24/01 15:51	0.4447	19.29	2.731	0.3947	0.81
10/24/01 15:51	0.4697	19.29	2.706	0.4197	0.80
10/24/01 15:51	0.4963	19.29	2.681	0.4463	0.79
10/24/01 15:51	0.5247	19.29	2.654	0.4747	0.79
10/24/01 15:51	0.5547	19.29	2.625	0.5047	0.78
10/24/01 15:51	0.5863	19.29	2.596	0.5363	0.77
10/24/01 15:51	0.6213	19.29	2.567	0.5713	0.76
10/24/01 15:51	0.6578	19.29	2.534	0.6078	0.75
10/24/01 15:51	0.6963	19.29	2.501	0.6463	0.74
10/24/01 15:51	0.738	19.28	2.466	0.688	0.73
10/24/01 15:51	0.7813	19.28	2.431	0.7313	0.72
10/24/01 15:51	0.828	19.28	2.393	0.778	0.71
10/24/01 15:51	0.8763	19.28	2.354	0.8263	0.70
10/24/01 15:51	0.928	19.28	2.315	0.878	0.69
10/24/01 15:51	0.983	19.27	2.271	0.933	0.67
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10/24/01 15:51	1.103	19.27	2.184	1.053	0.65
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10/24/01 15:52	1.473	19.24	1.94	1.423	0.57

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10/24/01 15:52	1.753	19.23	1.776	1.703	0.53
10/24/01 15:52	1.858	19.22	1.718	1.808	0.51
10/24/01 15:52	1.968	19.22	1.658	1.918	0.49
10/24/01 15:52	2.0847	19.2	1.599	2.0347	0.47
10/24/01 15:52	2.2097	19.2	1.539	2.1597	0.46
10/24/01 15:53	2.3412	19.2	1.477	2.2912	0.44
10/24/01 15:53	2.4813	19.19	1.415	2.4313	0.42
10/24/01 15:53	2.6297	19.19	1.353	2.5797	0.40
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10/24/01 15:53	2.953	19.18	1.227	2.903	0.36
10/24/01 15:53	3.1297	19.18	1.162	3.0797	0.34
10/24/01 15:54	3.3163	19.18	1.1	3.2663	0.33
10/24/01 15:54	3.5147	19.17	1.038	3.4647	0.31
10/24/01 15:54	3.7247	19.17	0.974	3.6747	0.29
10/24/01 15:54	3.9463	19.18	0.914	3.8963	0.27
10/24/01 15:54	4.1813	19.18	0.854	4.1313	0.25
10/24/01 15:55	4.4295	19.18	0.796	4.3795	0.24
10/24/01 15:55	4.693	19.17	0.738	4.643	0.22
10/24/01 15:55	4.973	19.18	0.682	4.923	0.20
10/24/01 15:56	5.2697	19.18	0.631	5.2197	0.19
10/24/01 15:56	5.583	19.18	0.577	5.533	0.17
10/24/01 15:56	5.9147	19.17	0.529	5.8647	0.16
10/24/01 15:57	6.2663	19.17	0.484	6.2163	0.14
10/24/01 15:57	6.6397	19.17	0.438	6.5897	0.13
10/24/01 15:57	7.0347	19.17	0.395	6.9847	0.12
10/24/01 15:58	7.453	19.17	0.355	7.403	0.11
10/24/01 15:58	7.8963	19.17	0.318	7.8463	0.09
10/24/01 15:59	8.3663	19.18	0.285	8.3163	0.08
10/24/01 15:59	8.8647	19.18	0.252	8.8147	0.07
10/24/01 16:00	9.3913	19.18	0.225	9.3413	0.07
10/24/01 16:00	9.9497	19.18	0.2	9.8997	0.06
10/24/01 16:01	10.5413	19.18	0.178	10.4913	0.05
10/24/01 16:01	11.168	19.18	0.157	11.118	0.05
10/24/01 16:02	11.8313	19.18	0.141	11.7813	0.04
10/24/01 16:03	12.5347	19.19	0.124	12.4847	0.04
10/24/01 16:04	13.2797	19.2	0.11	13.2297	0.03
10/24/01 16:04	14.0697	19.22	0.096	14.0197	0.03
10/24/01 16:05	14.9063	19.19	0.081	14.8563	0.02
10/24/01 16:06	15.7913	19.17	0.068	15.7413	0.02
10/24/01 16:07	16.7297	19.15	0.061	16.6797	0.02
10/24/01 16:08	17.723	19.14	0.055	17.673	0.02
10/24/01 16:09	18.7763	19.15	0.051	18.7263	0.02
10/24/01 16:10	19.8913	19.14	0.047	19.8413	0.01
10/24/01 16:11	21.073	19.17	0.045	21.023	0.01
10/24/01 16:13	22.3247	19.14	0.038	22.2747	0.01
10/24/01 16:14	23.6497	19.14	0.04	23.5997	0.01
10/24/01 16:15	25.0547	19.15	0.034	25.0047	0.01
10/24/01 16:17	26.543	19.1	0.025	26.493	0.01

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW02

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" ID SCREEN LENGTH/DEPTH: 10', 4.15'-14.15' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 8.01 DATE: 10-24-01

TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

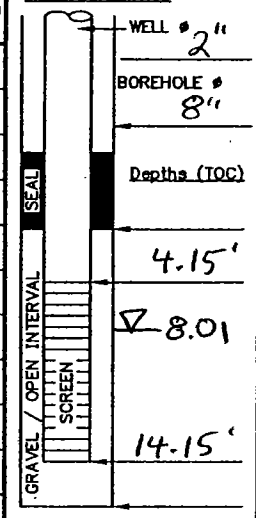
METHOD OF INDUCING WATER LEVEL CHANGE: 2 x 1 liter bailer PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.):

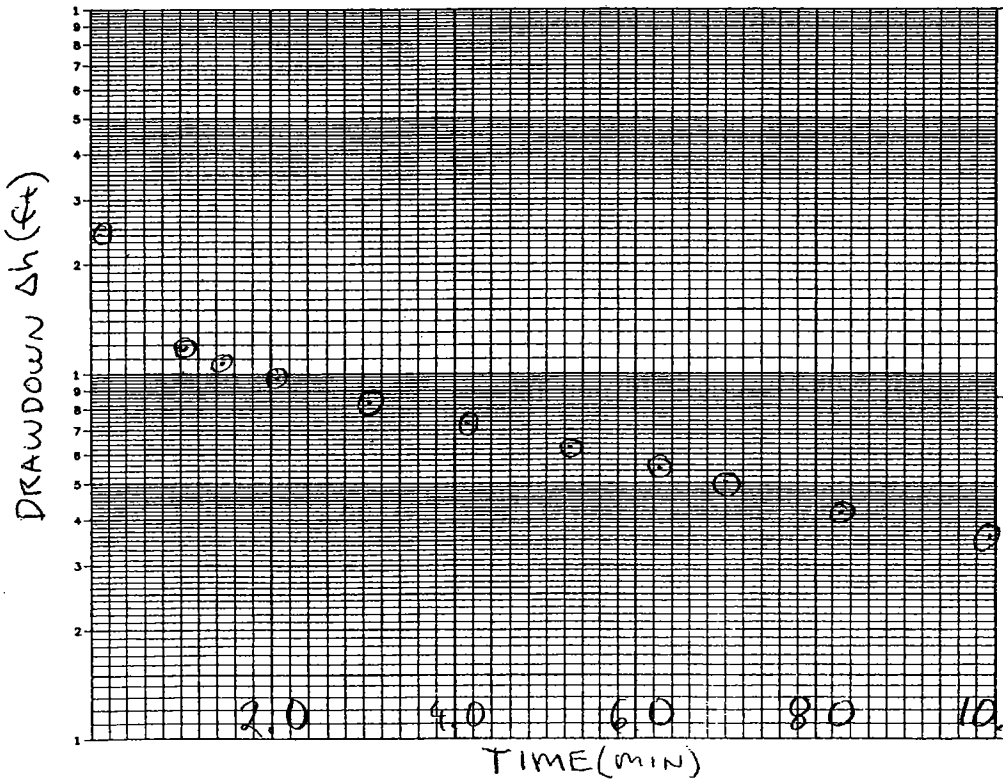
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	7.0345		0.500
0.015		3.104	8.3663		0.430
0.100		2.436	9.9497		0.357
0.4963		1.453			
0.7380		1.308			
1.0412		1.198			
1.4728		1.091			
2.0845		0.983			
3.1297		0.838			
4.1812		0.722			
5.2697		0.622			
6.2663		0.548			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

Head = 5.983

WL = 8.03 @ END OF TEST

CALCS, SKETCH MAPS, ETC.:

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW02	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: gh	APPROVED BY: / DATE:

EQ:

$$K = \frac{r^2 \ln(L/R)}{2L T_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 6.14$ (INPUT LENGTH, Ft)
$T_o = 3.18$ (FROM PLOT, MIN)
K = HYDRAULIC COND. (ft/min)

SUB:

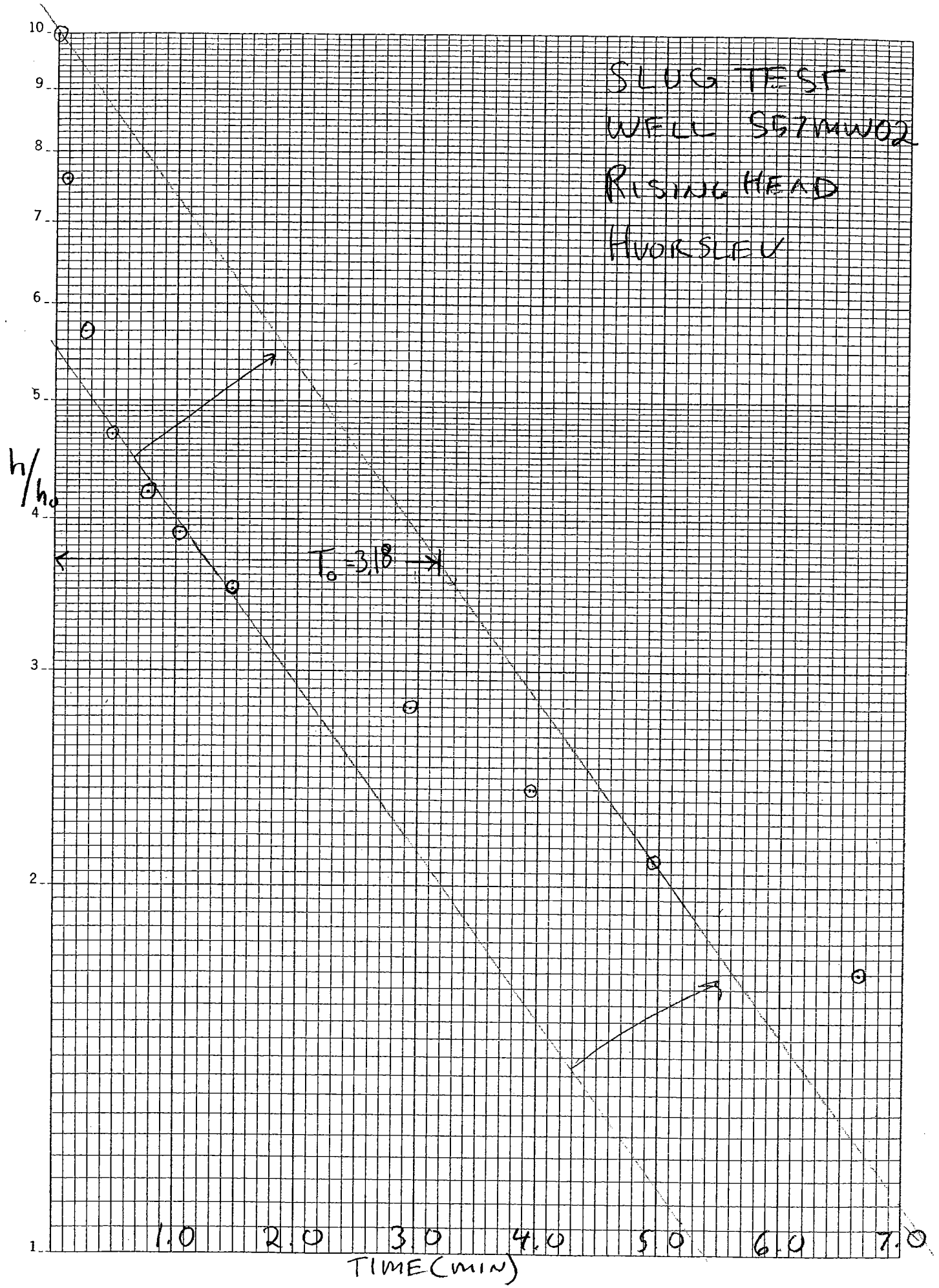
$$K = \frac{(0.083)^2 \ln(6.14/0.083)}{2(6.14)(3.18)}$$

$$K = \frac{2.965 \times 10^{-2}}{39.0504}$$

$K = 7.59 \times 10^{-4}$ ft/min

$K = 3.86 \times 10^{-4}$ cm/sec

$K = 1.1$ ft/day



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 9:32:31
Report from file: C:\Win-Situ\Data\SN01966 2001-10-24 145354 s57mw02rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw02rhno1

Test defined on: 10/24/01 14:29:36
Test started on: 10/24/01 14:53:54
Test stopped on: 10/24/01 15:19:13
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between data points:10. Minutes.
Number of data samples: 117

TOTAL DATA SAMPLES 117

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 5.927 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 3.104
10/24/01	14:53	0	20.66	0			
10/24/01	14:53	0.005	20.67	1.449			
10/24/01	14:53	0.01	20.67	10.729			
10/24/01	14:53	0.015	20.67	3.104	0	1.00	
10/24/01	14:53	0.02	20.69	2.988	0.005	0.96	
10/24/01	14:53	0.025	20.69	2.895	0.01	0.93	
10/24/01	14:53	0.03	20.69	2.858	0.015	0.92	
10/24/01	14:53	0.035	20.69	2.802	0.02	0.90	
10/24/01	14:53	0.04	20.69	2.769	0.025	0.89	
10/24/01	14:53	0.045	20.7	2.734	0.03	0.88	
10/24/01	14:53	0.05	20.7	2.705	0.035	0.87	
10/24/01	14:53	0.055	20.7	2.684	0.04	0.86	
10/24/01	14:53	0.06	20.7	2.649	0.045	0.85	

10/24/01 14:53	0.065	20.7	2.624	0.05	0.85
10/24/01 14:53	0.07	20.7	2.591	0.055	0.83
10/24/01 14:53	0.075	20.7	2.568	0.06	0.83
10/24/01 14:53	0.08	20.7	2.539	0.065	0.82
10/24/01 14:53	0.0848	20.7	2.513	0.0698	0.81
10/24/01 14:54	0.09	20.7	2.488	0.075	0.80
10/24/01 14:54	0.095	20.7	2.461	0.08	0.79
10/24/01 14:54	0.1	20.71	2.436	0.085	0.78
10/24/01 14:54	0.1058	20.71	2.403	0.0908	0.77
10/24/01 14:54	0.112	20.71	2.374	0.097	0.76
10/24/01 14:54	0.1185	20.71	2.341	0.1035	0.75
10/24/01 14:54	0.1255	20.71	2.308	0.1105	0.74
10/24/01 14:54	0.1328	20.71	2.273	0.1178	0.73
10/24/01 14:54	0.1407	20.71	2.238	0.1257	0.72
10/24/01 14:54	0.149	20.71	2.198	0.134	0.71
10/24/01 14:54	0.1578	20.71	2.161	0.1428	0.70
10/24/01 14:54	0.167	20.71	2.12	0.152	0.68
10/24/01 14:54	0.177	20.71	2.078	0.162	0.67
10/24/01 14:54	0.1875	20.71	2.037	0.1725	0.66
10/24/01 14:54	0.1985	20.71	1.996	0.1835	0.64
10/24/01 14:54	0.2102	20.7	1.952	0.1952	0.63
10/24/01 14:54	0.2227	20.7	1.91	0.2077	0.62
10/24/01 14:54	0.2358	20.7	1.865	0.2208	0.60
10/24/01 14:54	0.2498	20.7	1.824	0.2348	0.59
10/24/01 14:54	0.2647	20.7	1.784	0.2497	0.57
10/24/01 14:54	0.2803	20.7	1.743	0.2653	0.56
10/24/01 14:54	0.297	20.7	1.706	0.282	0.55
10/24/01 14:54	0.3147	20.7	1.67	0.2997	0.54
10/24/01 14:54	0.3333	20.7	1.637	0.3183	0.53
10/24/01 14:54	0.3532	20.7	1.604	0.3382	0.52
10/24/01 14:54	0.3742	20.7	1.577	0.3592	0.51
10/24/01 14:54	0.3963	20.7	1.548	0.3813	0.50
10/24/01 14:54	0.4198	20.7	1.524	0.4048	0.49
10/24/01 14:54	0.4447	20.7	1.497	0.4297	0.48
10/24/01 14:54	0.4697	20.7	1.476	0.4547	0.48
10/24/01 14:54	0.4963	20.7	1.453	0.4813	0.47
10/24/01 14:54	0.5247	20.7	1.433	0.5097	0.46
10/24/01 14:54	0.5547	20.7	1.412	0.5397	0.45
10/24/01 14:54	0.5863	20.7	1.389	0.5713	0.45
10/24/01 14:54	0.6213	20.7	1.368	0.6063	0.44
10/24/01 14:54	0.6578	20.69	1.349	0.6428	0.43
10/24/01 14:54	0.6963	20.69	1.329	0.6813	0.43
10/24/01 14:54	0.738	20.69	1.308	0.723	0.42
10/24/01 14:54	0.7813	20.69	1.289	0.7663	0.42
10/24/01 14:54	0.828	20.69	1.271	0.813	0.41
10/24/01 14:54	0.8763	20.69	1.252	0.8613	0.40
10/24/01 14:54	0.928	20.69	1.234	0.913	0.40
10/24/01 14:54	0.983	20.69	1.215	0.968	0.39
10/24/01 14:54	1.0413	20.69	1.198	1.0263	0.39
10/24/01 14:55	1.103	20.69	1.18	1.088	0.38
10/24/01 14:55	1.168	20.69	1.163	1.153	0.37
10/24/01 14:55	1.238	20.69	1.147	1.223	0.37
10/24/01 14:55	1.3113	20.69	1.13	1.2963	0.36
10/24/01 14:55	1.3897	20.67	1.111	1.3747	0.36
10/24/01 14:55	1.473	20.67	1.091	1.458	0.35

10/24/01 14:55	1.5613	20.67	1.074	1.5463	0.35
10/24/01 14:55	1.6547	20.67	1.057	1.6397	0.34
10/24/01 14:55	1.753	20.67	1.041	1.738	0.34
10/24/01 14:55	1.858	20.67	1.022	1.843	0.33
10/24/01 14:55	1.968	20.67	1.002	1.953	0.32
10/24/01 14:55	2.0847	20.67	0.983	2.0697	0.32
10/24/01 14:56	2.2097	20.67	0.964	2.1947	0.31
10/24/01 14:56	2.3412	20.67	0.944	2.3262	0.30
10/24/01 14:56	2.4813	20.67	0.923	2.4663	0.30
10/24/01 14:56	2.6297	20.66	0.902	2.6147	0.29
10/24/01 14:56	2.7863	20.67	0.882	2.7713	0.28
10/24/01 14:56	2.953	20.66	0.861	2.938	0.28
10/24/01 14:57	3.1297	20.66	0.838	3.1147	0.27
10/24/01 14:57	3.3163	20.66	0.815	3.3013	0.26
10/24/01 14:57	3.5147	20.66	0.792	3.4997	0.26
10/24/01 14:57	3.7247	20.66	0.768	3.7097	0.25
10/24/01 14:57	3.9463	20.66	0.745	3.9313	0.24
10/24/01 14:58	4.1813	20.66	0.722	4.1663	0.23
10/24/01 14:58	4.4295	20.66	0.699	4.4145	0.23
10/24/01 14:58	4.693	20.65	0.674	4.678	0.22
10/24/01 14:58	4.973	20.65	0.647	4.958	0.21
10/24/01 14:59	5.2697	20.65	0.622	5.2547	0.20
10/24/01 14:59	5.583	20.65	0.602	5.568	0.19
10/24/01 14:59	5.9147	20.65	0.575	5.8997	0.19
10/24/01 15:00	6.2663	20.65	0.548	6.2513	0.18
10/24/01 15:00	6.6397	20.65	0.523	6.6247	0.17
10/24/01 15:00	7.0347	20.65	0.5	7.0197	0.16
10/24/01 15:01	7.453	20.65	0.476	7.438	0.15
10/24/01 15:01	7.8963	20.65	0.455	7.8813	0.15
10/24/01 15:02	8.3663	20.63	0.43	8.3513	0.14
10/24/01 15:02	8.8647	20.63	0.405	8.8497	0.13
10/24/01 15:03	9.3913	20.63	0.38	9.3763	0.12
10/24/01 15:03	9.9497	20.63	0.357	9.9347	0.12
10/24/01 15:04	10.5413	20.63	0.333	10.5263	0.11
10/24/01 15:05	11.168	20.63	0.308	11.153	0.10
10/24/01 15:05	11.8313	20.63	0.285	11.8163	0.09
10/24/01 15:06	12.5347	20.62	0.26	12.5197	0.08
10/24/01 15:07	13.2797	20.62	0.235	13.2647	0.08
10/24/01 15:07	14.0697	20.62	0.212	14.0547	0.07
10/24/01 15:08	14.9063	20.62	0.19	14.8913	0.06
10/24/01 15:09	15.7913	20.62	0.167	15.7763	0.05
10/24/01 15:10	16.7297	20.62	0.144	16.7147	0.05
10/24/01 15:11	17.723	20.62	0.121	17.708	0.04
10/24/01 15:12	18.7763	20.62	0.103	18.7613	0.03
10/24/01 15:13	19.8913	20.62	0.088	19.8763	0.03
10/24/01 15:14	21.073	20.61	0.071	21.058	0.02
10/24/01 15:16	22.3247	20.61	0.061	22.3097	0.02
10/24/01 15:17	23.6497	20.61	0.051	23.6347	0.02
10/24/01 15:18	25.0547	20.6	0.042	25.0397	0.01

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW03

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 5' / 18.99'-23.99' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 8.95 DATE: 10-23-01

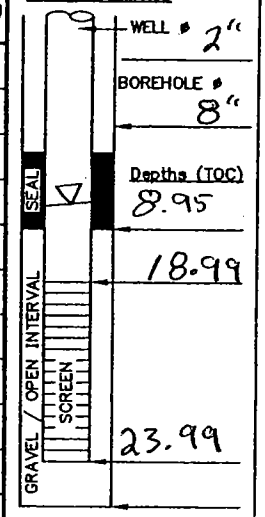
TEST TYPE (Rising/Falling/Constant Head): RISINGS CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: PULL TWO X 1 liter Bailer PAGE ..... OF .....

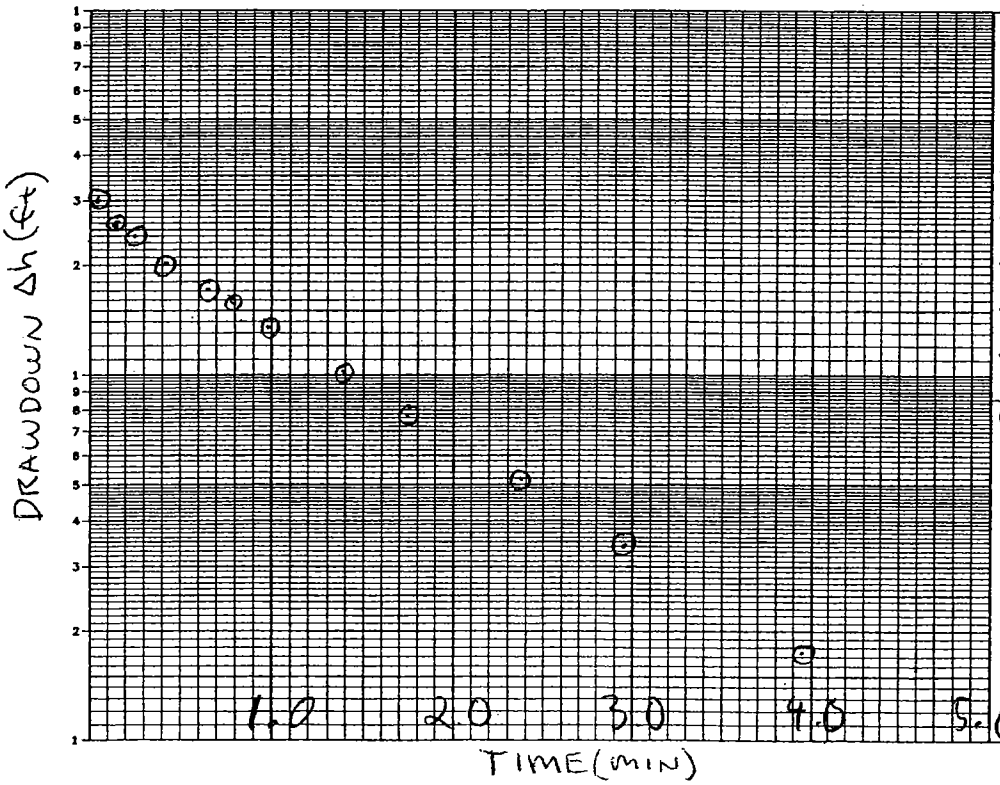
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.):

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.05		3.07			
0.15		2.669			
0.25		2.425			
0.42		2.094			
0.658		1.73			
0.7813		1.57			
0.9828		1.35			
1.389		1.01			
1.75		0.78			
2.34		0.522			
2.95		0.347			
3.946		0.175			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:
HEAD = 14.595
ABOVE MINI-TROLL
DONE

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW03 RISING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY:	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 5$ (INPUT LENGTH, Ft)
$T_o = 1.28$ (FROM PLOT, MIN)
K = HYDRAULIC COND. (ft/min)

SUB:

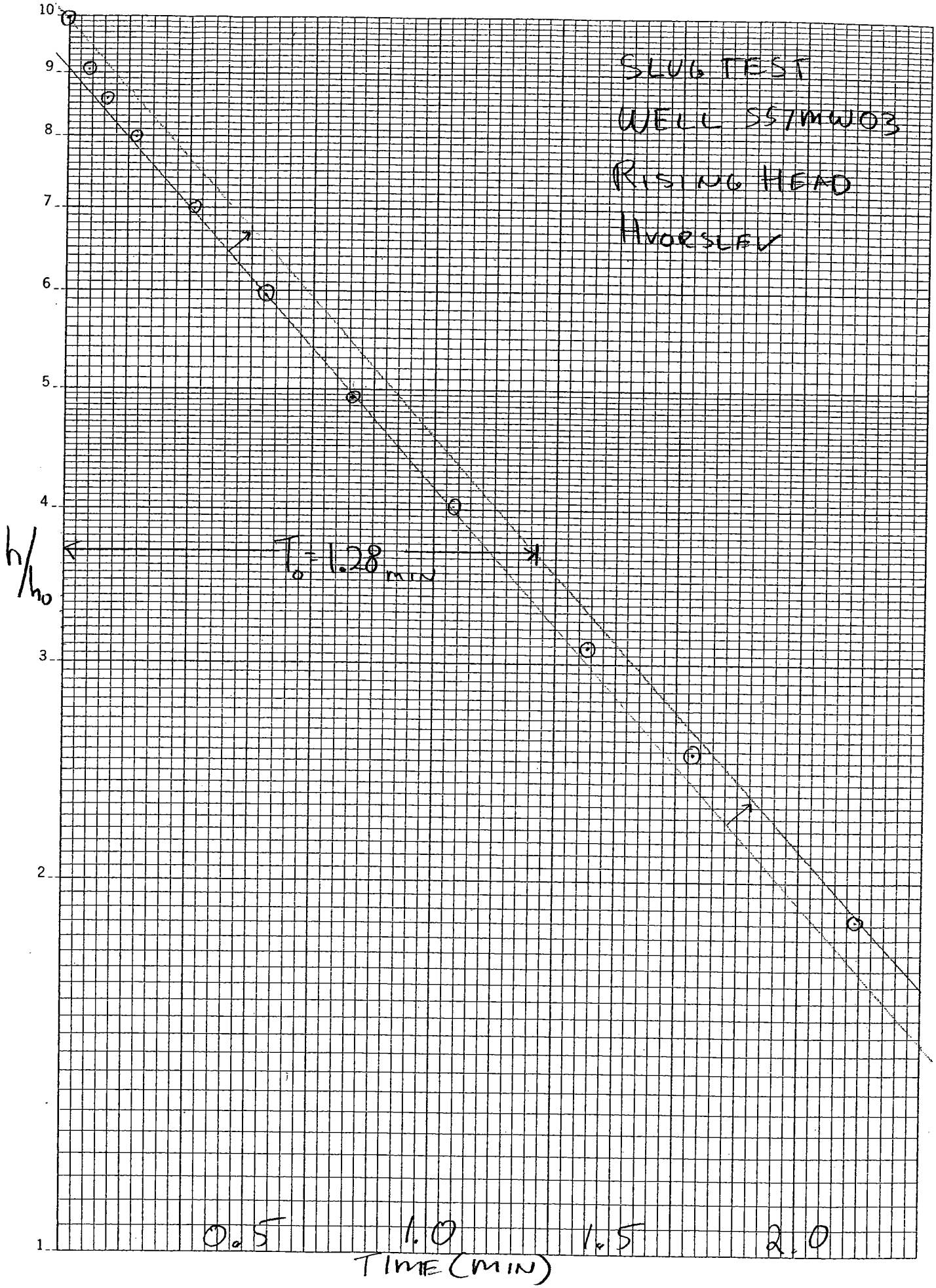
$$K = \frac{(0.083)^2 \ln(5/0.083)}{2(5)(1.28)}$$

$$K = \frac{2.82335509 \times 10^{-2}}{12.8}$$

$K = 2.21 \times 10^{-3}$ ft/min

$K = 1.120 \times 10^{-3}$ cm/sec

$K = 3.18$ ft/day ✓



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 10:53:39
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 170218 s57mw3rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw3rhno1

Test defined on: 10/23/01 16:50:47
Test started on: 10/23/01 17:02:18
Test stopped on: 10/23/01 17:16:27
Test extracted on: N/A

ata gathered using Logarithmic testing
mum time between data points: 1 Minutes.
Number of data samples: 107

TOTAL DATA SAMPLES 107

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 14.436 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 3.072
10/23/01	17:02	0	19.28	0			
10/23/01	17:02	0.005	19.29	4.569			
10/23/01	17:02	0.01	19.29	10.985			
10/23/01	17:02	0.015	19.29	9.138			
10/23/01	17:02	0.02	19.31	9.477			
10/23/01	17:02	0.025	19.31	9.51			
10/23/01	17:02	0.03	19.31	7.969			
10/23/01	17:02	0.035	19.31	5.259			
10/23/01	17:02	0.04	19.31	2.824			
10/23/01	17:02	0.045	19.31	3.159			

10/23/01 17:02	0.05	19.32	3.072	0	1.000
10/23/01 17:02	0.055	19.32	3.029	0.005	0.986
10/23/01 17:02	0.06	19.32	3.012	0.01	0.980
10/23/01 17:02	0.065	19.32	2.971	0.015	0.967
10/23/01 17:02	0.07	19.32	2.965	0.02	0.965
10/23/01 17:02	0.075	19.32	2.932	0.025	0.954
10/23/01 17:02	0.08	19.32	2.909	0.03	0.947
10/23/01 17:02	0.0848	19.32	2.886	0.0348	0.939
10/23/01 17:02	0.09	19.32	2.863	0.04	0.932
10/23/01 17:02	0.095	19.32	2.845	0.045	0.926
10/23/01 17:02	0.1	19.32	2.826	0.05	0.920
10/23/01 17:02	0.1058	19.32	2.805	0.0558	0.913
10/23/01 17:02	0.112	19.32	2.785	0.062	0.907
10/23/01 17:02	0.1185	19.32	2.764	0.0685	0.900
10/23/01 17:02	0.1255	19.32	2.741	0.0755	0.892
10/23/01 17:02	0.1328	19.33	2.717	0.0828	0.884
10/23/01 17:02	0.1407	19.33	2.692	0.0907	0.876
10/23/01 17:02	0.149	19.33	2.669	0.099	0.869
10/23/01 17:02	0.1578	19.33	2.644	0.1078	0.861
10/23/01 17:02	0.167	19.32	2.621	0.117	0.853
10/23/01 17:02	0.177	19.32	2.595	0.127	0.845
10/23/01 17:02	0.1875	19.32	2.57	0.1375	0.837
10/23/01 17:02	0.1985	19.32	2.543	0.1485	0.828
10/23/01 17:02	0.2102	19.32	2.514	0.1602	0.818
10/23/01 17:02	0.2227	19.32	2.485	0.1727	0.809
10/23/01 17:02	0.2358	19.32	2.456	0.1858	0.799
10/23/01 17:02	0.2498	19.31	2.425	0.1998	0.789
10/23/01 17:02	0.2647	19.32	2.394	0.2147	0.779
10/23/01 17:02	0.2803	19.31	2.36	0.2303	0.768
10/23/01 17:02	0.297	19.31	2.325	0.247	0.757
10/23/01 17:02	0.3147	19.31	2.29	0.2647	0.745
10/23/01 17:02	0.3333	19.32	2.253	0.2833	0.733
10/23/01 17:02	0.3532	19.31	2.216	0.3032	0.721
10/23/01 17:02	0.3742	19.31	2.176	0.3242	0.708
10/23/01 17:02	0.3963	19.31	2.137	0.3463	0.696
10/23/01 17:02	0.4198	19.31	2.094	0.3698	0.682
10/23/01 17:02	0.4447	19.31	2.052	0.3947	0.668
10/23/01 17:02	0.4697	19.31	2.011	0.4197	0.655
10/23/01 17:02	0.4963	19.31	1.967	0.4463	0.640
10/23/01 17:02	0.5247	19.31	1.922	0.4747	0.626
10/23/01 17:02	0.5547	19.31	1.876	0.5047	0.611
10/23/01 17:02	0.5863	19.31	1.831	0.5363	0.596
10/23/01 17:02	0.6213	19.31	1.779	0.5713	0.579
10/23/01 17:02	0.6578	19.31	1.728	0.6078	0.563
10/23/01 17:03	0.6963	19.31	1.678	0.6463	0.546
10/23/01 17:03	0.738	19.31	1.624	0.688	0.529
10/23/01 17:03	0.7813	19.31	1.572	0.7313	0.512
10/23/01 17:03	0.828	19.29	1.518	0.778	0.494
10/23/01 17:03	0.8763	19.31	1.463	0.8263	0.476
10/23/01 17:03	0.928	19.31	1.407	0.878	0.458
10/23/01 17:03	0.983	19.31	1.351	0.933	0.440
10/23/01 17:03	1.0413	19.31	1.293	0.9913	0.421

10/23/01 17:03	1.103	19.31	1.237	1.053	0.403
10/23/01 17:03	1.168	19.31	1.182	1.118	0.385
10/23/01 17:03	1.238	19.31	1.119	1.188	0.364
10/23/01 17:03	1.3113	19.31	1.068	1.2613	0.348
10/23/01 17:03	1.3897	19.31	1.006	1.3397	0.327
10/23/01 17:03	1.473	19.31	0.95	1.423	0.309
10/23/01 17:03	1.5613	19.31	0.892	1.5113	0.290
10/23/01 17:03	1.6547	19.31	0.836	1.6047	0.272
10/23/01 17:04	1.753	19.31	0.78	1.703	0.254
10/23/01 17:04	1.858	19.31	0.727	1.808	0.237
10/23/01 17:04	1.968	19.32	0.673	1.918	0.219
10/23/01 17:04	2.0847	19.32	0.621	2.0347	0.202
10/23/01 17:04	2.2097	19.32	0.57	2.1597	0.186
10/23/01 17:04	2.3412	19.32	0.522	2.2912	0.170
10/23/01 17:04	2.4813	19.33	0.475	2.4313	0.155
10/23/01 17:04	2.6297	19.33	0.431	2.5797	0.140
10/23/01 17:05	2.7863	19.33	0.388	2.7363	0.126
10/23/01 17:05	2.953	19.33	0.347	2.903	0.113
10/23/01 17:05	3.1297	19.34	0.307	3.0797	0.100
10/23/01 17:05	3.3163	19.34	0.27	3.2663	0.088
10/23/01 17:05	3.5147	19.34	0.237	3.4647	0.077
10/23/01 17:06	3.7247	19.34	0.204	3.6747	0.066
10/23/01 17:06	3.9463	19.34	0.175	3.8963	0.057
10/23/01 17:06	4.1813	19.34	0.148	4.1313	0.048
10/23/01 17:06	4.4295	19.34	0.123	4.3795	0.040
10/23/01 17:07	4.693	19.36	0.101	4.643	0.033
10/23/01 17:07	4.973	19.36	0.08	4.923	0.026
10/23/01 17:07	5.2697	19.36	0.064	5.2197	0.021
10/23/01 17:07	5.583	19.37	0.045	5.533	0.015
10/23/01 17:08	5.9147	19.37	0.033	5.8647	0.011
10/23/01 17:08	6.2663	19.38	0.019	6.2163	0.006
10/23/01 17:08	6.6397	19.41	0.013	6.5897	0.004
10/23/01 17:09	7.0347	19.43	0.003	6.9847	0.001
10/23/01 17:09	7.453	19.47	-0.008	7.403	-0.003
10/23/01 17:10	7.8963	19.48	-0.016	7.8463	-0.005
10/23/01 17:10	8.3663	19.48	-0.02	8.3163	-0.007
10/23/01 17:11	8.8647	19.5	-0.024	8.8147	-0.008
10/23/01 17:11	9.3913	19.52	-0.028	9.3413	-0.009
10/23/01 17:12	9.9497	19.53	-0.03	9.8997	-0.010
10/23/01 17:12	10.5413	19.53	-0.032	10.4913	-0.010
10/23/01 17:13	11.168	19.53	-0.036	11.118	-0.012
10/23/01 17:14	11.8313	19.55	-0.038	11.7813	-0.012
10/23/01 17:14	12.5347	19.56	-0.037	12.4847	-0.012
10/23/01 17:15	13.2797	19.57	-0.037	13.2297	-0.012
10/23/01 17:16	14.0697	19.6	-0.034	14.0197	-0.011

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW04

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" ID SCREEN LENGTH/DEPTH: 10, 7.97'-17.97' TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 8.91 TPVC DATE: 10-23-01

TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

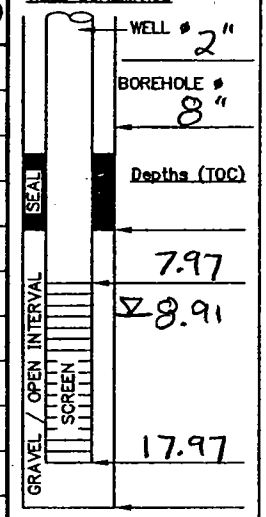
METHOD OF INDUCING WATER LEVEL CHANGE: 7.8' x 0.1' SOLID SLUG PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.):

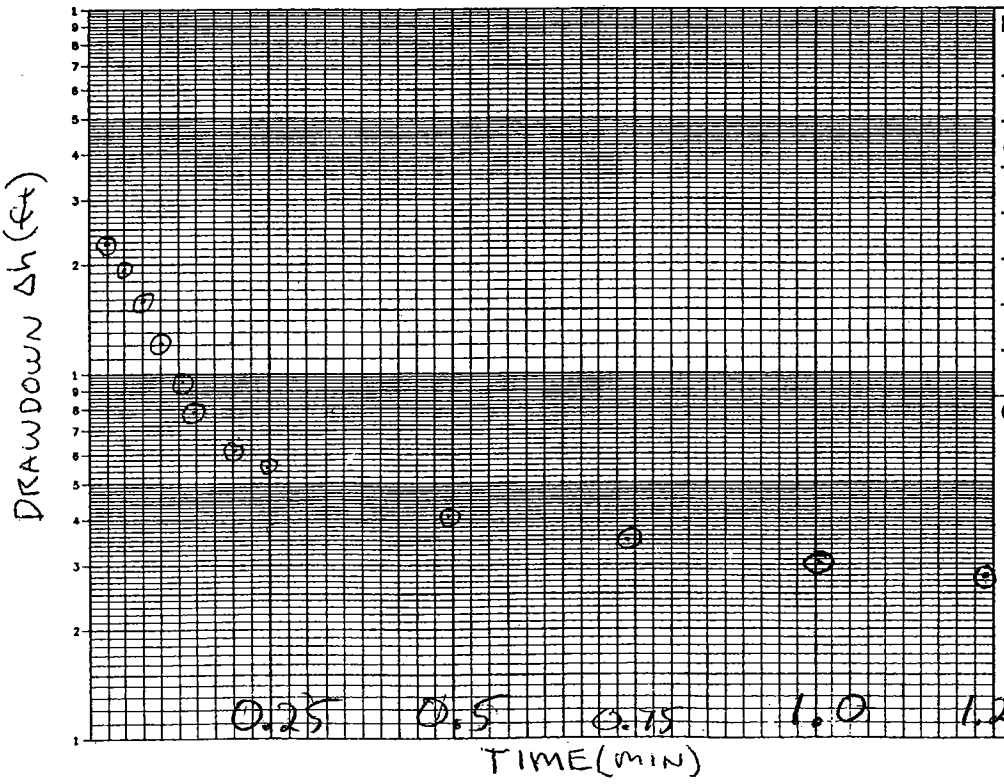
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.025	2.353	2.353	0.876		0.332
0.050		1.970	1.04		0.309
0.075		1.559	1.17		0.294
0.100		1.223	1.24		0.284
0.126		0.954			
0.149		0.795			
0.210		0.611			
0.2498		0.551			
0.2970		0.503			
0.4963		0.410			
0.6213		0.379			
0.740		0.354			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

NOTE: 0.000 ON COMPUTER DOES NOT REPRESENT SWL of 8.91.

STOPPED TEST WL=8.93

CALCS, SKETCH MAPS, ETC.:

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW04 RISING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: [illegible]	APPROVED BY: / DATE: 11-02-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 9.06$ (INPUT LENGTH, Ft)
$T_o = 0.1688$ (FROM PLOT, MIN)
K = HYDRAULIC COND. (ft/min)

SUB:

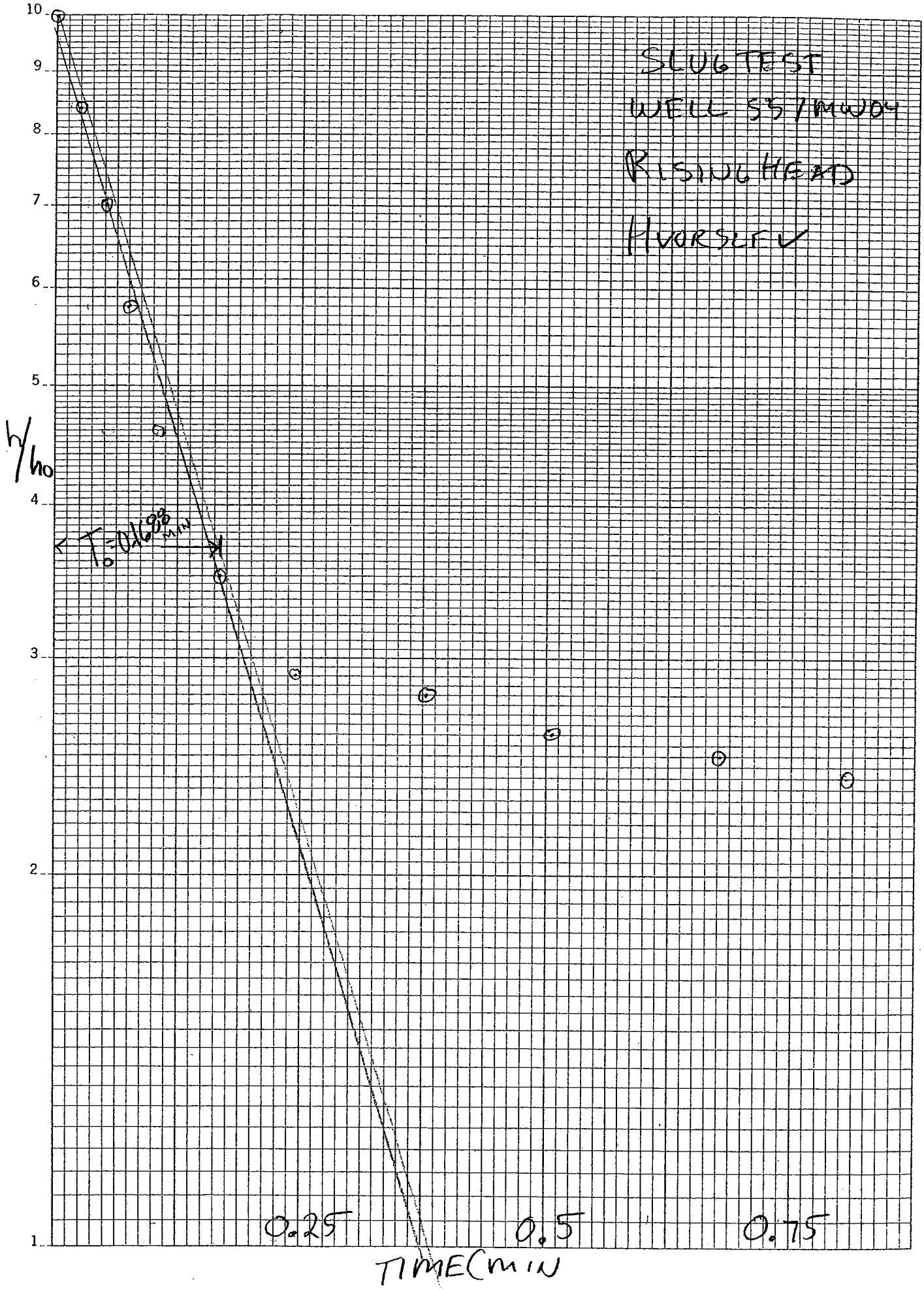
$$K = \frac{(0.083)^2 \ln(9.06/0.083)}{2(9.06)(0.1688)}$$

$$= \frac{3.23 \times 10^{-2}}{3.058}$$

$$= 1.06 \times 10^{-2} \text{ ft/min}$$

$$= 5.37 \times 10^{-3} \text{ cm/sec}$$

$$= 15.2 \text{ ft/day}$$



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/31/01 9:31:39
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 175342 s57mw4rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw4rhno1

Test defined on: 10/23/01 17:34:13
Test started on: 10/23/01 17:53:42
Test stopped on: 10/23/01 18:20:48
Test extracted on: N/A

Data gathered using Logarithmic testing
aximum time between data points: 10.0 Minutes.
Number of data samples: 118

TOTAL DATA SAMPLES 118

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 8.398 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj Feet H2O	Adj ET (min)	Adj h/ho	Adj ho= 2.756
10/23/01	17:53	0	20.65	0	0.313			
10/23/01	17:53	0.005	20.65	4.409	4.722			
10/23/01	17:53	0.01	20.66	0.664	0.977			
10/23/01	17:53	0.015	20.66	2.232	2.545			
10/23/01	17:53	0.02	20.66	2.443	2.756	0	1.00	
10/23/01	17:53	0.025	20.67	2.353	2.666	0.005	0.97	
10/23/01	17:53	0.03	20.67	2.276	2.589	0.01	0.94	
10/23/01	17:53	0.035	20.67	2.185	2.498	0.015	0.91	
10/23/01	17:53	0.04	20.67	2.106	2.419	0.02	0.88	
10/23/01	17:53	0.045	20.67	2.013	2.326	0.025	0.84	
10/23/01	17:53	0.05	20.67	1.97	2.283	0.03	0.83	
10/23/01	17:53	0.055	20.67	1.854	2.167	0.035	0.79	
10/23/01	17:53	0.06	20.67	1.784	2.097	0.04	0.76	
10/23/01	17:53	0.065	20.67	1.701	2.014	0.045	0.73	
10/23/01	17:53	0.07	20.69	1.629	1.942	0.05	0.70	
10/23/01	17:53	0.075	20.69	1.559	1.872	0.055	0.68	

10/23/01 17:53	0.08	20.69	1.486	1.799	0.06	0.65
10/23/01 17:53	0.0848	20.69	1.418	1.731	0.0648	0.63
10/23/01 17:53	0.09	20.69	1.352	1.665	0.07	0.60
10/23/01 17:53	0.095	20.69	1.283	1.596	0.075	0.58
10/23/01 17:53	0.1	20.69	1.223	1.536	0.08	0.56
10/23/01 17:53	0.1058	20.69	1.153	1.466	0.0858	0.53
10/23/01 17:53	0.112	20.69	1.087	1.4	0.092	0.51
10/23/01 17:53	0.1185	20.69	1.021	1.334	0.0985	0.48
10/23/01 17:53	0.1255	20.69	0.954	1.267	0.1055	0.46
10/23/01 17:53	0.1328	20.69	0.899	1.212	0.1128	0.44
10/23/01 17:53	0.1407	20.7	0.845	1.158	0.1207	0.42
10/23/01 17:53	0.149	20.7	0.795	1.108	0.129	0.40
10/23/01 17:53	0.1578	20.7	0.756	1.069	0.1378	0.39
10/23/01 17:53	0.167	20.69	0.721	1.034	0.147	0.38
10/23/01 17:53	0.177	20.69	0.69	1.003	0.157	0.36
10/23/01 17:53	0.1875	20.69	0.659	0.972	0.1675	0.35
10/23/01 17:53	0.1985	20.69	0.634	0.947	0.1785	0.34
10/23/01 17:53	0.2102	20.69	0.611	0.924	0.1902	0.34
10/23/01 17:53	0.2227	20.69	0.59	0.903	0.2027	0.33
10/23/01 17:53	0.2358	20.69	0.57	0.883	0.2158	0.32
10/23/01 17:53	0.2498	20.69	0.551	0.864	0.2298	0.31
10/23/01 17:53	0.2647	20.69	0.537	0.85	0.2447	0.31
10/23/01 17:53	0.2803	20.69	0.518	0.831	0.2603	0.30
10/23/01 17:54	0.297	20.69	0.503	0.816	0.277	0.30
10/23/01 17:54	0.3147	20.67	0.491	0.804	0.2947	0.29
10/23/01 17:54	0.3333	20.67	0.478	0.791	0.3133	0.29
10/23/01 17:54	0.3532	20.69	0.466	0.779	0.3332	0.28
10/23/01 17:54	0.3742	20.67	0.456	0.769	0.3542	0.28
10/23/01 17:54	0.3963	20.67	0.445	0.758	0.3763	0.28
10/23/01 17:54	0.4198	20.67	0.437	0.75	0.3998	0.27
10/23/01 17:54	0.4447	20.67	0.427	0.74	0.4247	0.27
10/23/01 17:54	0.4697	20.67	0.42	0.733	0.4497	0.27
10/23/01 17:54	0.4963	20.67	0.41	0.723	0.4763	0.26
10/23/01 17:54	0.5247	20.67	0.402	0.715	0.5047	0.26
10/23/01 17:54	0.5547	20.67	0.396	0.709	0.5347	0.26
10/23/01 17:54	0.5863	20.67	0.385	0.698	0.5663	0.25
10/23/01 17:54	0.6213	20.67	0.379	0.692	0.6013	0.25
10/23/01 17:54	0.6578	20.67	0.371	0.684	0.6378	0.25
10/23/01 17:54	0.6963	20.67	0.363	0.676	0.6763	0.25
10/23/01 17:54	0.738	20.67	0.354	0.667	0.718	0.24
10/23/01 17:54	0.7813	20.67	0.348	0.661	0.7613	0.24
10/23/01 17:54	0.828	20.67	0.34	0.653	0.808	0.24
10/23/01 17:54	0.8763	20.67	0.332	0.645	0.8563	0.23
10/23/01 17:54	0.928	20.67	0.323	0.636	0.908	0.23
10/23/01 17:54	0.983	20.67	0.317	0.63	0.963	0.23
10/23/01 17:54	1.0413	20.67	0.309	0.622	1.0213	0.23
10/23/01 17:54	1.103	20.67	0.303	0.616	1.083	0.22
10/23/01 17:54	1.168	20.66	0.294	0.607	1.148	0.22
10/23/01 17:54	1.238	20.66	0.284	0.597	1.218	0.22
10/23/01 17:55	1.3113	20.66	0.275	0.588	1.2913	0.21
10/23/01 17:55	1.3897	20.66	0.265	0.578	1.3697	0.21
10/23/01 17:55	1.473	20.66	0.257	0.57	1.453	0.21
10/23/01 17:55	1.5613	20.66	0.251	0.564	1.5413	0.20
10/23/01 17:55	1.6547	20.66	0.24	0.553	1.6347	0.20
10/23/01 17:55	1.753	20.66	0.23	0.543	1.733	0.20
10/23/01 17:55	1.858	20.66	0.22	0.533	1.838	0.19
10/23/01 17:55	1.968	20.66	0.211	0.524	1.948	0.19
10/23/01 17:55	2.0847	20.66	0.201	0.514	2.0647	0.19

10/23/01 17:55	2.2097	20.66	0.191	0.504	2.1897	0.18
10/23/01 17:56	2.3412	20.66	0.18	0.493	2.3212	0.18
10/23/01 17:56	2.4813	20.66	0.17	0.483	2.4613	0.18
10/23/01 17:56	2.6297	20.65	0.157	0.47	2.6097	0.17
10/23/01 17:56	2.7863	20.65	0.149	0.462	2.7663	0.17
10/23/01 17:56	2.953	20.65	0.134	0.447	2.933	0.16
10/23/01 17:56	3.1297	20.65	0.124	0.437	3.1097	0.16
10/23/01 17:57	3.3163	20.65	0.114	0.427	3.2963	0.15
10/23/01 17:57	3.5147	20.65	0.101	0.414	3.4947	0.15
10/23/01 17:57	3.7247	20.65	0.089	0.402	3.7047	0.15
10/23/01 17:57	3.9463	20.65	0.077	0.39	3.9263	0.14
10/23/01 17:57	4.1813	20.65	0.062	0.375	4.1613	0.14
10/23/01 17:58	4.4295	20.65	0.052	0.365	4.4095	0.13
10/23/01 17:58	4.693	20.65	0.037	0.35	4.673	0.13
10/23/01 17:58	4.973	20.65	0.025	0.338	4.953	0.12
10/23/01 17:58	5.2697	20.65	0.012	0.325	5.2497	0.12
10/23/01 17:59	5.583	20.65	-0.002	0.311	5.563	0.11
10/23/01 17:59	5.9147	20.65	-0.014	0.299	5.8947	0.11
10/23/01 17:59	6.2663	20.65	-0.029	0.284	6.2463	0.10
10/23/01 18:00	6.6397	20.65	-0.041	0.272	6.6197	0.10
10/23/01 18:00	7.0347	20.63	-0.054	0.259	7.0147	0.09
10/23/01 18:01	7.453	20.65	-0.066	0.247	7.433	0.09
10/23/01 18:01	7.8963	20.65	-0.079	0.234	7.8763	0.08
10/23/01 18:02	8.3663	20.65	-0.093	0.22	8.3463	0.08
10/23/01 18:02	8.8647	20.65	-0.105	0.208	8.8447	0.08
10/23/01 18:03	9.3913	20.66	-0.118	0.195	9.3713	0.07
10/23/01 18:03	9.9497	20.67	-0.13	0.183	9.9297	0.07
10/23/01 18:04	10.5413	20.69	-0.142	0.171	10.5213	0.06
10/23/01 18:04	11.168	20.69	-0.154	0.159	11.148	0.06
10/23/01 18:05	11.8313	20.7	-0.164	0.149	11.8113	0.05
10/23/01 18:06	12.5347	20.71	-0.177	0.136	12.5147	0.05
10/23/01 18:06	13.2797	20.72	-0.189	0.124	13.2597	0.04
10/23/01 18:07	14.0697	20.72	-0.203	0.11	14.0497	0.04
10/23/01 18:08	14.9063	20.74	-0.217	0.096	14.8863	0.03
10/23/01 18:09	15.7913	20.75	-0.244	0.069	15.7713	0.03
10/23/01 18:10	16.7297	20.75	-0.256	0.057	16.7097	0.02
10/23/01 18:11	17.723	20.75	-0.269	0.044	17.703	0.02
10/23/01 18:12	18.7763	20.75	-0.273	0.04	18.7563	0.01
10/23/01 18:13	19.8913	20.75	-0.283	0.03	19.8713	0.01
10/23/01 18:14	21.073	20.74	-0.292	0.021	21.053	0.01
10/23/01 18:16	22.3247	20.74	-0.298	0.015	22.3047	0.01
10/23/01 18:17	23.6497	20.72	-0.307	0.006	23.6297	0.00
10/23/01 18:18	25.0547	20.72	-0.313	0	25.0347	0.00
10/23/01 18:20	26.543	20.71	-0.319	-0.006	26.523	0.00

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

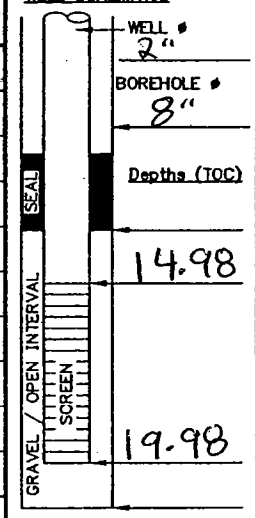
Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: 57MW05
PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER
WELL DIAMETER: 2" ID SCREEN LENGTH/DEPTH: 5'/ 19.98 TEST NO.:
STATIC WATER LEVEL (Depth/Elevation): 6.16' TPVC DATE: 10-25-01
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:
METHOD OF INDUCING WATER LEVEL CHANGE: BAIL x 2 PAGE ..... OF .....
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): 0.00 (TOC)

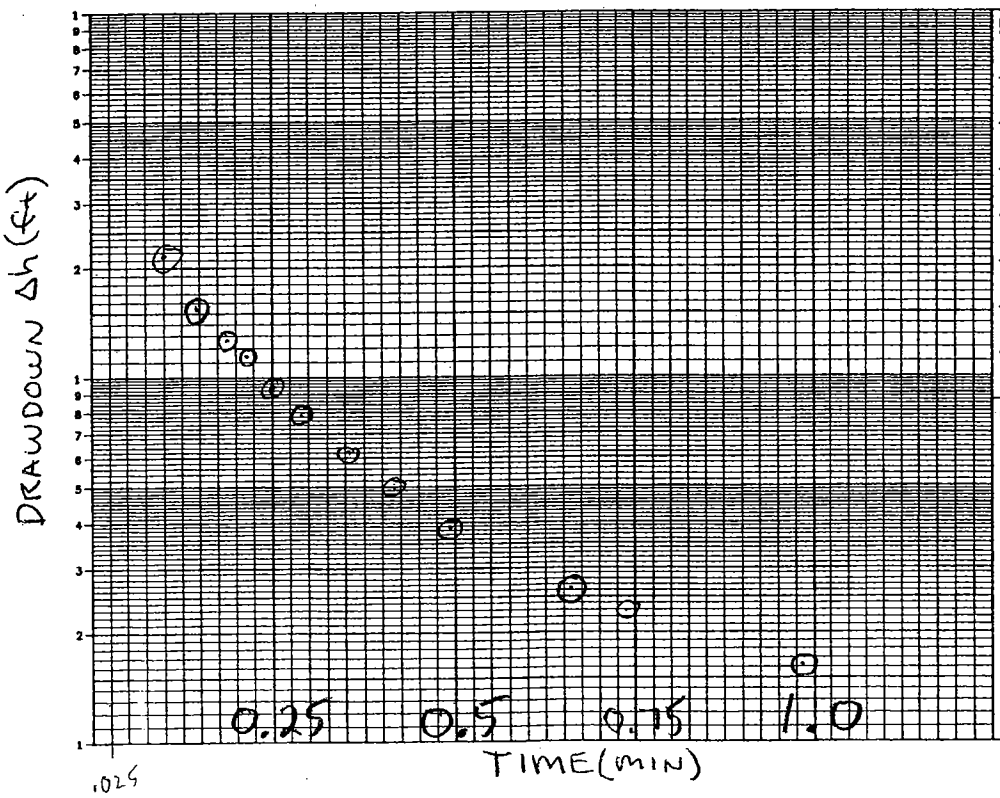
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0000	0.7380		0.230
0.0600		2.866	0.9828		0.164
0.1000		2.126			
0.1488		1.561			
0.1875		1.269			
0.2100		1.132			
0.2498		0.940			
0.2970		0.768			
0.3532		0.619			
0.4198		0.493			
0.4963		0.394			
0.6578		0.269			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:
INSERTED BAILERS @ 0893
PULLED Bailers @ 0916

CALCS, SKETCH MAPS, ETC.:

.025

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW05 RISING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: CK	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2L T_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 5'$ (INPUT LENGTH, Ft)
$T_o = 0.22$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

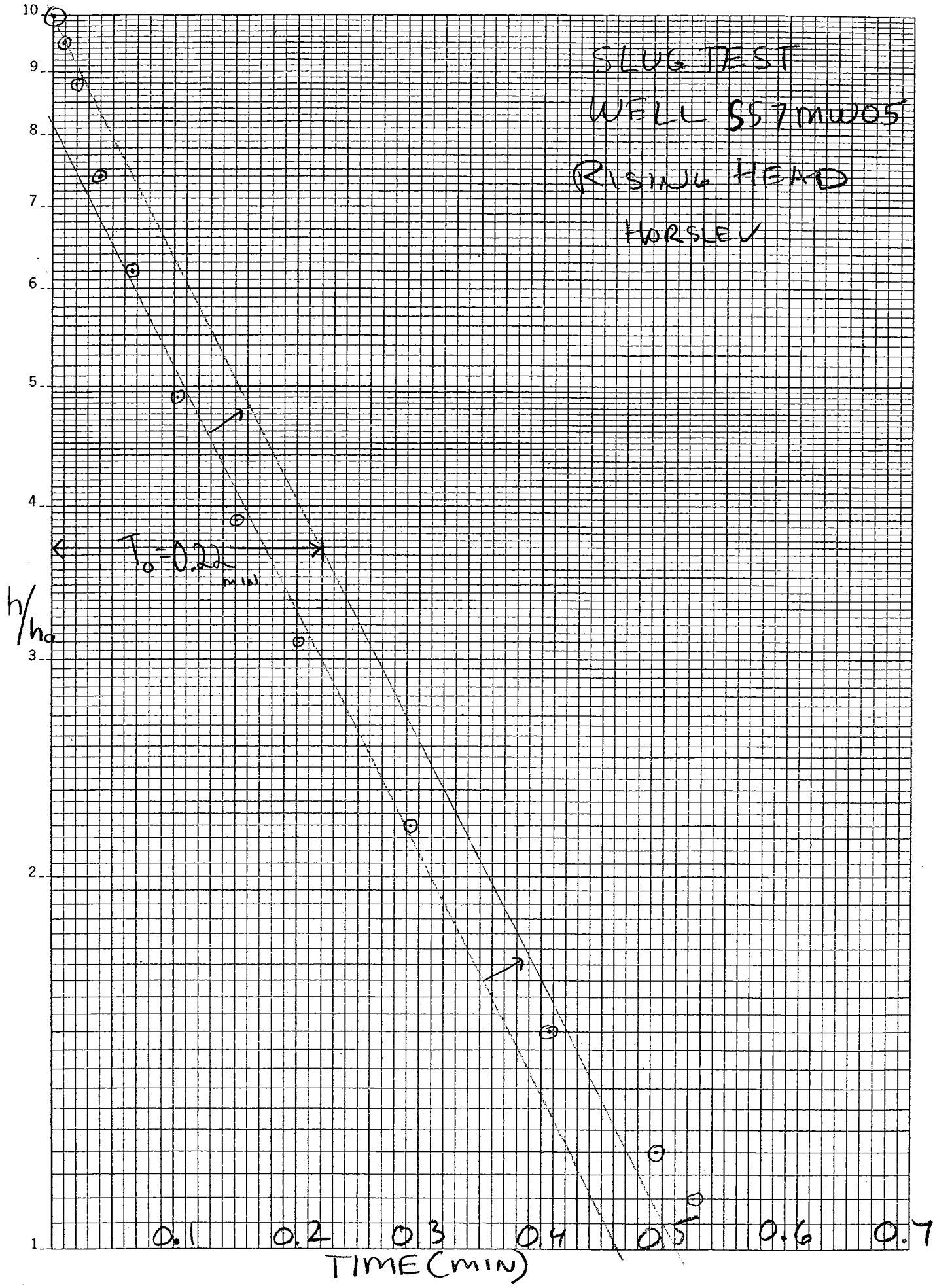
$$K = \frac{(0.083)^2 \ln(5/0.083)}{2(5)(0.22)}$$

$$\frac{2.8234 \times 10^{-2}}{2.2}$$

$K = 1.28 \times 10^{-2}$ ft/min

$K = 6.52 \times 10^{-3}$ cm/sec

$K = 18.4$ ft/day



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/30/01 14:52:07
Report from file: C:\Win-Situ\Data\SN01966 2001-10-25 091505 s57mw5rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw5rhno1

Test defined on: 10/25/01 8:58:03
Test started on: 10/25/01 9:15:05
Test stopped on: 10/25/01 9:23:49
Test extracted on: N/A

)ata gathered using Logarithmic testing
:imum time between data points: 1(Minutes.
Number of data samples: 98

TOTAL DATA SAMPLES 98

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 11.401 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj. ET (min)	h/ho	ho= 2.866
10/25/01	9:15	0	18.2	0			
10/25/01	9:15	0.005	18.22	0.004			
10/25/01	9:15	0.01	18.23	0.003			
10/25/01	9:15	0.015	18.23	0.005			
10/25/01	9:15	0.02	18.23	0.001			
10/25/01	9:15	0.025	18.24	-0.001			
10/25/01	9:15	0.03	18.24	0.001			
10/25/01	9:15	0.035	18.24	0.001			
10/25/01	9:15	0.04	18.24	-0.001			
10/25/01	9:15	0.045	18.24	7.601			

10/25/01 9:15	0.05	18.24	6.92		
10/25/01 9:15	0.055	18.24	3.154		
10/25/01 9:15	0.06	18.24	2.866	0	1.00
10/25/01 9:15	0.065	18.24	2.783	0.005	0.97
10/25/01 9:15	0.07	18.24	2.713	0.01	0.95
10/25/01 9:15	0.075	18.24	2.61	0.015	0.91
10/25/01 9:15	0.08	18.24	2.521	0.02	0.88
10/25/01 9:15	0.0848	18.24	2.388	0.0248	0.83
10/25/01 9:15	0.09	18.26	2.302	0.03	0.80
10/25/01 9:15	0.095	18.24	2.223	0.035	0.78
10/25/01 9:15	0.1	18.26	2.126	0.04	0.74
10/25/01 9:15	0.1058	18.26	2.026	0.0458	0.71
10/25/01 9:15	0.112	18.26	1.946	0.052	0.68
10/25/01 9:15	0.1185	18.26	1.867	0.0585	0.65
10/25/01 9:15	0.1255	18.26	1.788	0.0655	0.62
10/25/01 9:15	0.1328	18.26	1.714	0.0728	0.60
10/25/01 9:15	0.1407	18.26	1.635	0.0807	0.57
10/25/01 9:15	0.149	18.26	1.561	0.089	0.54
10/25/01 9:15	0.1578	18.26	1.484	0.0978	0.52
10/25/01 9:15	0.167	18.26	1.412	0.107	0.49
10/25/01 9:15	0.177	18.26	1.34	0.117	0.47
10/25/01 9:15	0.1875	18.26	1.269	0.1275	0.44
10/25/01 9:15	0.1985	18.24	1.201	0.1385	0.42
10/25/01 9:15	0.2102	18.24	1.132	0.1502	0.39
10/25/01 9:15	0.2227	18.24	1.066	0.1627	0.37
10/25/01 9:15	0.2358	18.24	1.002	0.1758	0.35
10/25/01 9:15	0.2498	18.24	0.94	0.1898	0.33
10/25/01 9:15	0.2647	18.24	0.88	0.2047	0.31
10/25/01 9:15	0.2803	18.24	0.824	0.2203	0.29
10/25/01 9:15	0.297	18.24	0.768	0.237	0.27
10/25/01 9:15	0.3147	18.24	0.717	0.2547	0.25
10/25/01 9:15	0.3333	18.24	0.667	0.2733	0.23
10/25/01 9:15	0.3532	18.24	0.619	0.2932	0.22
10/25/01 9:15	0.3742	18.24	0.574	0.3142	0.20
10/25/01 9:15	0.3963	18.24	0.532	0.3363	0.19
10/25/01 9:15	0.4198	18.23	0.493	0.3598	0.17
10/25/01 9:15	0.4447	18.23	0.458	0.3847	0.16
10/25/01 9:15	0.4697	18.23	0.425	0.4097	0.15
10/25/01 9:15	0.4963	18.23	0.394	0.4363	0.14
10/25/01 9:15	0.5247	18.23	0.367	0.4647	0.13
10/25/01 9:15	0.5547	18.23	0.34	0.4947	0.12
10/25/01 9:15	0.5863	18.23	0.315	0.5263	0.11
10/25/01 9:15	0.6213	18.23	0.29	0.5613	0.10
10/25/01 9:15	0.6578	18.23	0.269	0.5978	0.09
10/25/01 9:15	0.6963	18.23	0.251	0.6363	0.09
10/25/01 9:15	0.738	18.22	0.23	0.678	0.08
10/25/01 9:15	0.7813	18.22	0.215	0.7213	0.08
10/25/01 9:15	0.828	18.22	0.201	0.768	0.07
10/25/01 9:15	0.8763	18.22	0.189	0.8163	0.07
10/25/01 9:16	0.928	18.22	0.176	0.868	0.06
10/25/01 9:16	0.983	18.22	0.164	0.923	0.06
10/25/01 9:16	1.0413	18.22	0.155	0.9813	0.05

10/25/01 9:16	1.103	18.22	0.145	1.043	0.05
10/25/01 9:16	1.168	18.22	0.137	1.108	0.05
10/25/01 9:16	1.238	18.22	0.131	1.178	0.05
10/25/01 9:16	1.3113	18.22	0.122	1.2513	0.04
10/25/01 9:16	1.3897	18.22	0.116	1.3297	0.04
10/25/01 9:16	1.473	18.22	0.112	1.413	0.04
10/25/01 9:16	1.5613	18.22	0.104	1.5013	0.04
10/25/01 9:16	1.6547	18.2	0.099	1.5947	0.03
10/25/01 9:16	1.753	18.2	0.095	1.693	0.03
10/25/01 9:16	1.858	18.2	0.091	1.798	0.03
10/25/01 9:17	1.968	18.2	0.091	1.908	0.03
10/25/01 9:17	2.0847	18.2	0.089	2.0247	0.03
10/25/01 9:17	2.2097	18.2	0.085	2.1497	0.03
10/25/01 9:17	2.3412	18.2	0.081	2.2812	0.03
10/25/01 9:17	2.4813	18.19	0.078	2.4213	0.03
10/25/01 9:17	2.6297	18.19	0.076	2.5697	0.03
10/25/01 9:17	2.7863	18.19	0.072	2.7263	0.03
10/25/01 9:18	2.953	18.19	0.068	2.893	0.02
10/25/01 9:18	3.1297	18.19	0.066	3.0697	0.02
10/25/01 9:18	3.3163	18.19	0.064	3.2563	0.02
10/25/01 9:18	3.5147	18.2	0.062	3.4547	0.02
10/25/01 9:18	3.7247	18.19	0.06	3.6647	0.02
10/25/01 9:19	3.9463	18.2	0.058	3.8863	0.02
10/25/01 9:19	4.1813	18.2	0.056	4.1213	0.02
10/25/01 9:19	4.4295	18.2	0.054	4.3695	0.02
10/25/01 9:19	4.693	18.2	0.052	4.633	0.02
10/25/01 9:20	4.973	18.2	0.052	4.913	0.02
10/25/01 9:20	5.2697	18.2	0.05	5.2097	0.02
10/25/01 9:20	5.583	18.22	0.052	5.523	0.02
10/25/01 9:21	5.9147	18.23	0.05	5.8547	0.02
10/25/01 9:21	6.2663	18.26	0.049	6.2063	0.02
10/25/01 9:21	6.6397	18.27	0.047	6.5797	0.02
10/25/01 9:22	7.0347	18.28	0.047	6.9747	0.02
10/25/01 9:22	7.453	18.28	0.045	7.393	0.02
10/25/01 9:22	7.8963	18.28	0.041	7.8363	0.01
10/25/01 9:23	8.3663	18.29	0.041	8.3063	0.01

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW06

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' 4.39-14.39 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 6.28 DATE: 10-25-01

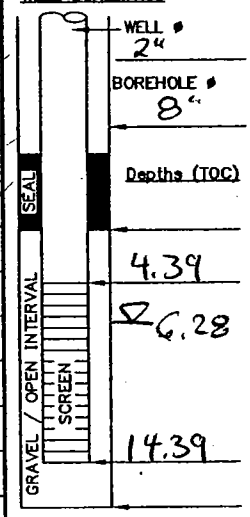
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Bailer x 2 PAGE ..... OF .....

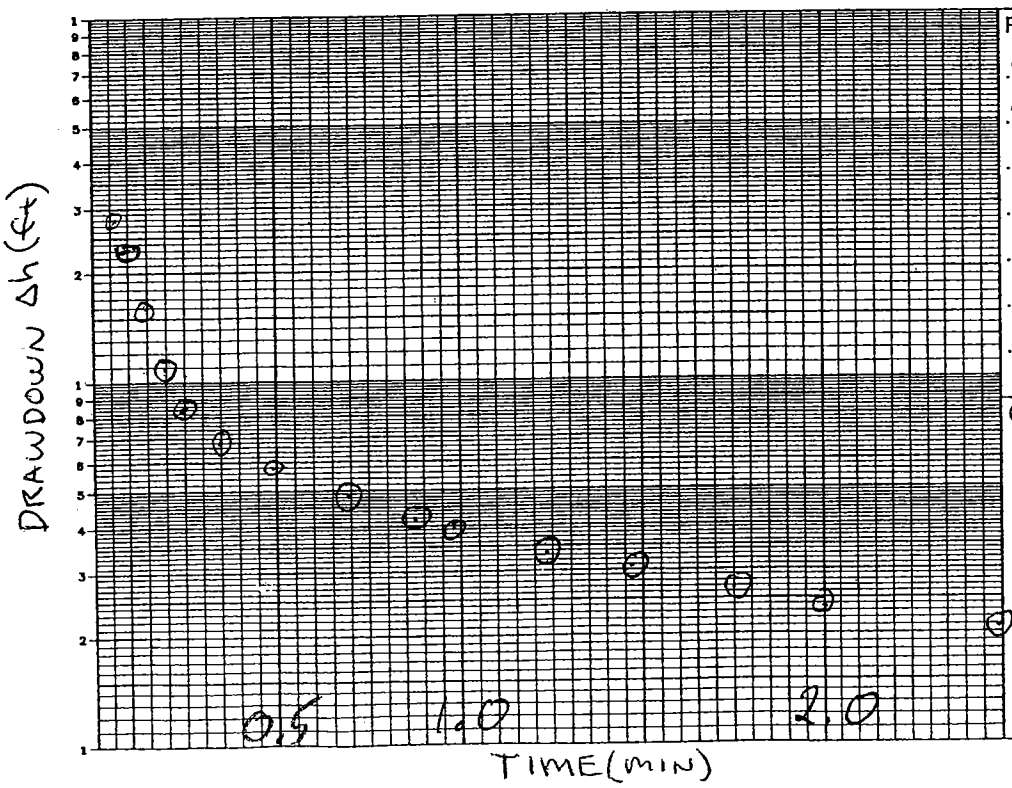
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): 0.00 ref

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	1.2380		0.336
0.0548		3.324	1.4728		0.303
0.0700		2.837	1.7530		0.270
0.100		2.300	1.9678		0.245
0.1488		1.592	2.4812		0.204
0.1985		1.089	2.9530		0.177
0.2498		0.855			
0.3532		0.694			
0.4963		0.588			
0.6963		0.489			
0.8762		0.423			
0.9828		0.390			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:
WL @ END OF TEST
6.31

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW06 RISING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: RMB 4/16/02	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

WHERE:

$r = 8.33 \times 10^{-2}$ (RISER RADIUS, Ft)
$R = 8.33 \times 10^{-2}$ (SCREEN RADIUS, Ft)
$L = 8.11$ (INPUT LENGTH, Ft)
$T_o = 0.19$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

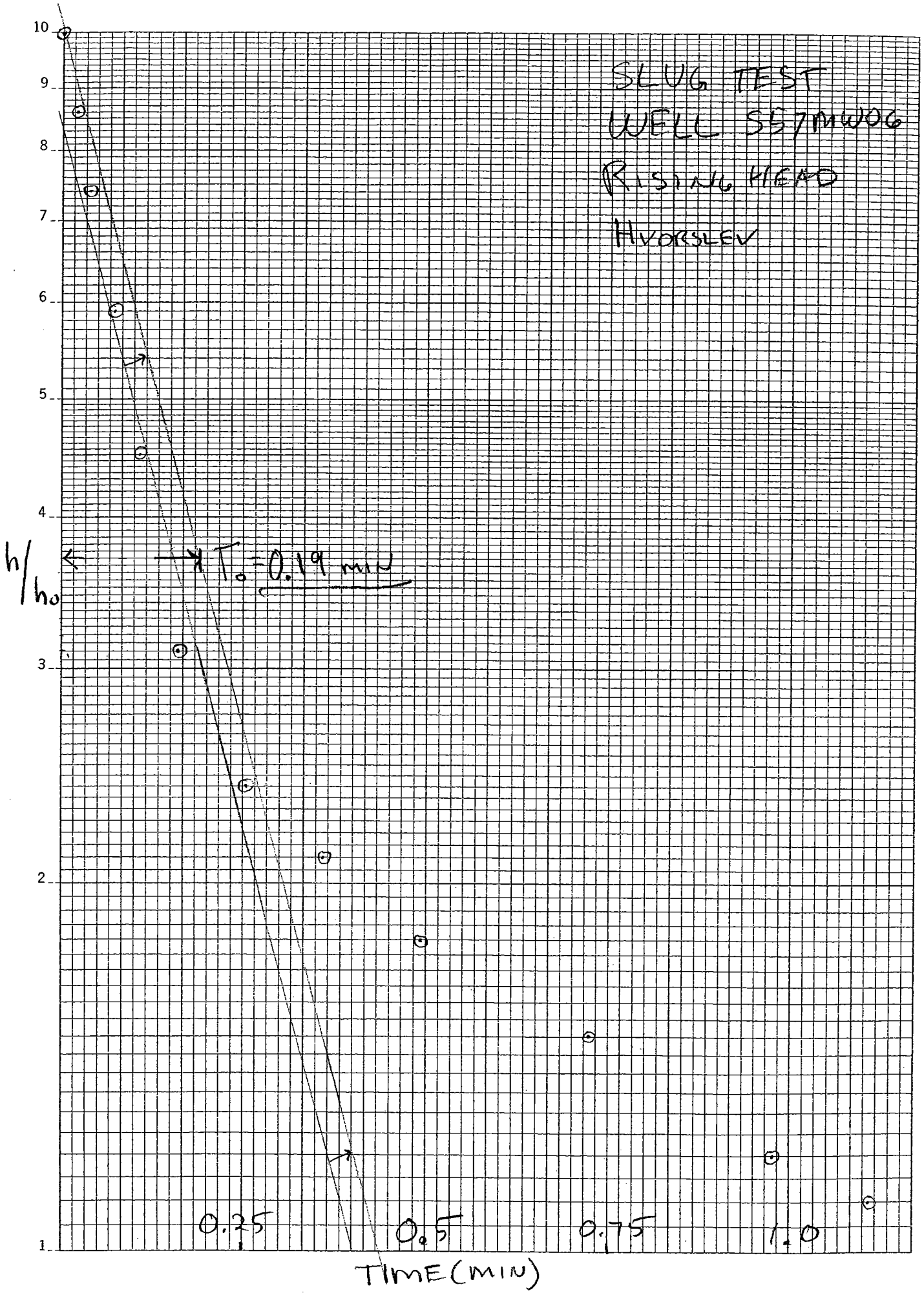
$$K = \frac{(8.33\times10^{-2})^2 \ln(8.11/8.33\times10^{-2})}{2(8.11)(0.19)}$$

$$K = \frac{3.177 \times 10^{-2}}{3.0818}$$

$K = 1.0 \times 10^{-2}$ ft/min

$K = 5.24 \times 10^{-3}$ cm/sec

$K = 14.9$ ft/day



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/31/01 15:33:29
Report from file: C:\Win-Situ\Data\SN01966 2001-10-25 094958 s57mw6rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw6rhno1

Test defined on: 10/25/01 9:25:17
Test started on: 10/25/01 9:49:58
Test stopped on: 10/25/01 10:01:57
Test extracted on: N/A

Data gathered using Logarithmic testing
aximum time between data points: 10.0 Minutes.
Number of data samples: 104

TOTAL DATA SAMPLES 104

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 7.622 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 3.092
10/25/01	9:49	0	19	0			
10/25/01	9:49	0.005	19	-0.002			
10/25/01	9:49	0.01	19.01	-0.002			
10/25/01	9:49	0.015	19.01	-0.002			
10/25/01	9:49	0.02	19.01	-0.002			
10/25/01	9:50	0.025	19.01	-0.002			
10/25/01	9:50	0.03	19.01	-0.002			
10/25/01	9:50	0.035	19.03	-0.002			
10/25/01	9:50	0.04	19.03	-0.002			
10/25/01	9:50	0.045	19.03	8.485			

10/25/01 9:50	0.05	19.03	5.857		
10/25/01 9:50	0.055	19.03	3.324		
10/25/01 9:50	0.06	19.03	3.092	0	1.00
10/25/01 9:50	0.065	19.03	2.949	0.005	0.95
10/25/01 9:50	0.07	19.03	2.837	0.01	0.92
10/25/01 9:50	0.075	19.03	2.74	0.015	0.89
10/25/01 9:50	0.08	19.03	2.645	0.02	0.86
10/25/01 9:50	0.0848	19.03	2.552	0.0248	0.83
10/25/01 9:50	0.09	19.03	2.467	0.03	0.80
10/25/01 9:50	0.095	19.03	2.38	0.035	0.77
10/25/01 9:50	0.1	19.04	2.3	0.04	0.74
10/25/01 9:50	0.1058	19.04	2.204	0.0458	0.71
10/25/01 9:50	0.112	19.03	2.109	0.052	0.68
10/25/01 9:50	0.1185	19.04	2.012	0.0585	0.65
10/25/01 9:50	0.1255	19.04	1.908	0.0655	0.62
10/25/01 9:50	0.1328	19.04	1.809	0.0728	0.59
10/25/01 9:50	0.1407	19.04	1.699	0.0807	0.55
10/25/01 9:50	0.149	19.04	1.592	0.089	0.51
10/25/01 9:50	0.1578	19.04	1.484	0.0978	0.48
10/25/01 9:50	0.167	19.04	1.379	0.107	0.45
10/25/01 9:50	0.177	19.04	1.273	0.117	0.41
10/25/01 9:50	0.1875	19.04	1.176	0.1275	0.38
10/25/01 9:50	0.1985	19.04	1.089	0.1385	0.35
10/25/01 9:50	0.2102	19.03	1.014	0.1502	0.33
10/25/01 9:50	0.2227	19.03	0.95	0.1627	0.31
10/25/01 9:50	0.2358	19.03	0.898	0.1758	0.29
10/25/01 9:50	0.2498	19.03	0.855	0.1898	0.28
10/25/01 9:50	0.2647	19.03	0.814	0.2047	0.26
10/25/01 9:50	0.2803	19.03	0.787	0.2203	0.25
10/25/01 9:50	0.297	19.03	0.758	0.237	0.25
10/25/01 9:50	0.3147	19.03	0.735	0.2547	0.24
10/25/01 9:50	0.3333	19.03	0.712	0.2733	0.23
10/25/01 9:50	0.3532	19.03	0.694	0.2932	0.22
10/25/01 9:50	0.3742	19.03	0.675	0.3142	0.22
10/25/01 9:50	0.3963	19.03	0.654	0.3363	0.21
10/25/01 9:50	0.4198	19.03	0.638	0.3598	0.21
10/25/01 9:50	0.4447	19.03	0.621	0.3847	0.20
10/25/01 9:50	0.4697	19.03	0.605	0.4097	0.20
10/25/01 9:50	0.4963	19.03	0.588	0.4363	0.19
10/25/01 9:50	0.5247	19.03	0.574	0.4647	0.19
10/25/01 9:50	0.5547	19.03	0.557	0.4947	0.18
10/25/01 9:50	0.5863	19.03	0.541	0.5263	0.17
10/25/01 9:50	0.6213	19.03	0.524	0.5613	0.17
10/25/01 9:50	0.6578	19.03	0.505	0.5978	0.16
10/25/01 9:50	0.6963	19.03	0.489	0.6363	0.16
10/25/01 9:50	0.738	19.03	0.47	0.678	0.15
10/25/01 9:50	0.7813	19.03	0.454	0.7213	0.15
10/25/01 9:50	0.828	19.03	0.437	0.768	0.14
10/25/01 9:50	0.8763	19.03	0.423	0.8163	0.14
10/25/01 9:50	0.928	19.03	0.406	0.868	0.13
10/25/01 9:50	0.983	19.03	0.39	0.923	0.13
10/25/01 9:51	1.0413	19.03	0.373	0.9813	0.12

10/25/01 9:51	1.103	19.03	0.361	1.043	0.12
10/25/01 9:51	1.168	19.03	0.348	1.108	0.11
10/25/01 9:51	1.238	19.03	0.336	1.178	0.11
10/25/01 9:51	1.3113	19.03	0.325	1.2513	0.11
10/25/01 9:51	1.3897	19.03	0.313	1.3297	0.10
10/25/01 9:51	1.473	19.03	0.303	1.413	0.10
10/25/01 9:51	1.5613	19.03	0.288	1.5013	0.09
10/25/01 9:51	1.6547	19.03	0.28	1.5947	0.09
10/25/01 9:51	1.753	19.03	0.27	1.693	0.09
10/25/01 9:51	1.858	19.03	0.257	1.798	0.08
10/25/01 9:51	1.968	19.03	0.245	1.908	0.08
10/25/01 9:52	2.0847	19.03	0.232	2.0247	0.08
10/25/01 9:52	2.2097	19.03	0.222	2.1497	0.07
10/25/01 9:52	2.3412	19.04	0.214	2.2812	0.07
10/25/01 9:52	2.4813	19.04	0.204	2.4213	0.07
10/25/01 9:52	2.6297	19.04	0.195	2.5697	0.06
10/25/01 9:52	2.7863	19.04	0.187	2.7263	0.06
10/25/01 9:52	2.953	19.04	0.177	2.893	0.06
10/25/01 9:53	3.1297	19.04	0.168	3.0697	0.05
10/25/01 9:53	3.3163	19.04	0.16	3.2563	0.05
10/25/01 9:53	3.5147	19.04	0.152	3.4547	0.05
10/25/01 9:53	3.7247	19.04	0.146	3.6647	0.05
10/25/01 9:53	3.9463	19.05	0.14	3.8863	0.05
10/25/01 9:54	4.1813	19.05	0.131	4.1213	0.04
10/25/01 9:54	4.4295	19.05	0.125	4.3695	0.04
10/25/01 9:54	4.693	19.05	0.121	4.633	0.04
10/25/01 9:54	4.973	19.05	0.115	4.913	0.04
10/25/01 9:55	5.2697	19.05	0.109	5.2097	0.04
10/25/01 9:55	5.583	19.05	0.102	5.523	0.03
10/25/01 9:55	5.9147	19.05	0.098	5.8547	0.03
10/25/01 9:56	6.2663	19.07	0.094	6.2063	0.03
10/25/01 9:56	6.6397	19.07	0.094	6.5797	0.03
10/25/01 9:57	7.0347	19.07	0.088	6.9747	0.03
10/25/01 9:57	7.453	19.07	0.086	7.393	0.03
10/25/01 9:57	7.8963	19.07	0.084	7.8363	0.03
10/25/01 9:58	8.3663	19.07	0.078	8.3063	0.03
10/25/01 9:58	8.8647	19.07	0.076	8.8047	0.02
10/25/01 9:59	9.3913	19.07	0.074	9.3313	0.02
10/25/01 9:59	9.9497	19.08	0.072	9.8897	0.02
10/25/01 10:00	10.5413	19.07	0.068	10.4813	0.02
10/25/01 10:01	11.168	19.07	0.066	11.108	0.02
10/25/01 10:01	11.8313	19.08	0.064	11.7713	0.02

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW07

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10', 17.96-27.96 TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 9.16 DATE: 10-25-01

TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

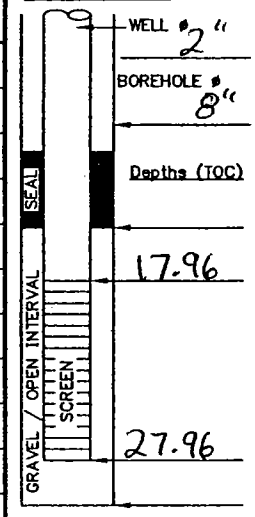
METHOD OF INDUCING WATER LEVEL CHANGE: Bailer x 2 (1 liter bailers) PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): 0.00 ref.

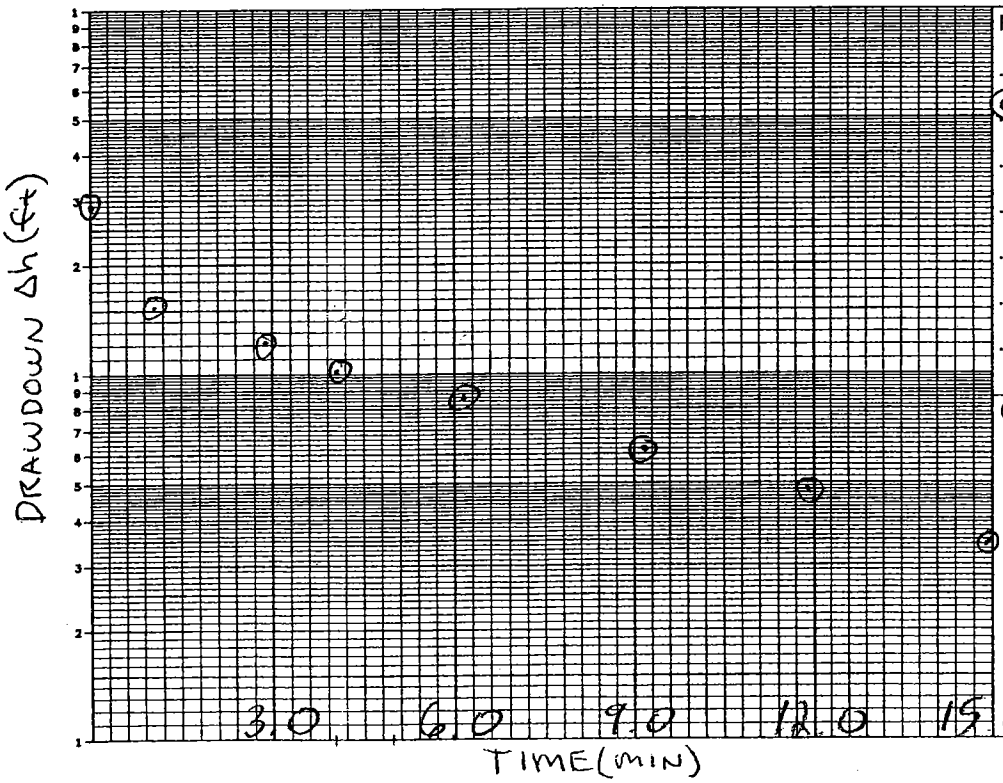
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	6.2663		0.860
0.0398		2.949	7.4530		0.756
0.0600		2.618	8.3663		0.686
0.1000		2.308	9.3913		0.616
0.1985		1.991	10.5413		0.547
0.3963		1.810	11.8312		0.479
0.7813		1.671	13.2795		0.413
1.103		1.589	14.9062		0.349
1.9678		1.413			
2.9530		1.254			
4.1812		1.089			
5.2697		0.960			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:
INSERTED Bailers @ 10:18 HRS
STARTED TEST @ 1040
WL = 9.25 @ END OF TEST

CALCS, SKETCH MAPS, ETC.:

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57MW07	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2L T_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 10.0$ (INPUT LENGTH, Ft)
$T_o = 4.2$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

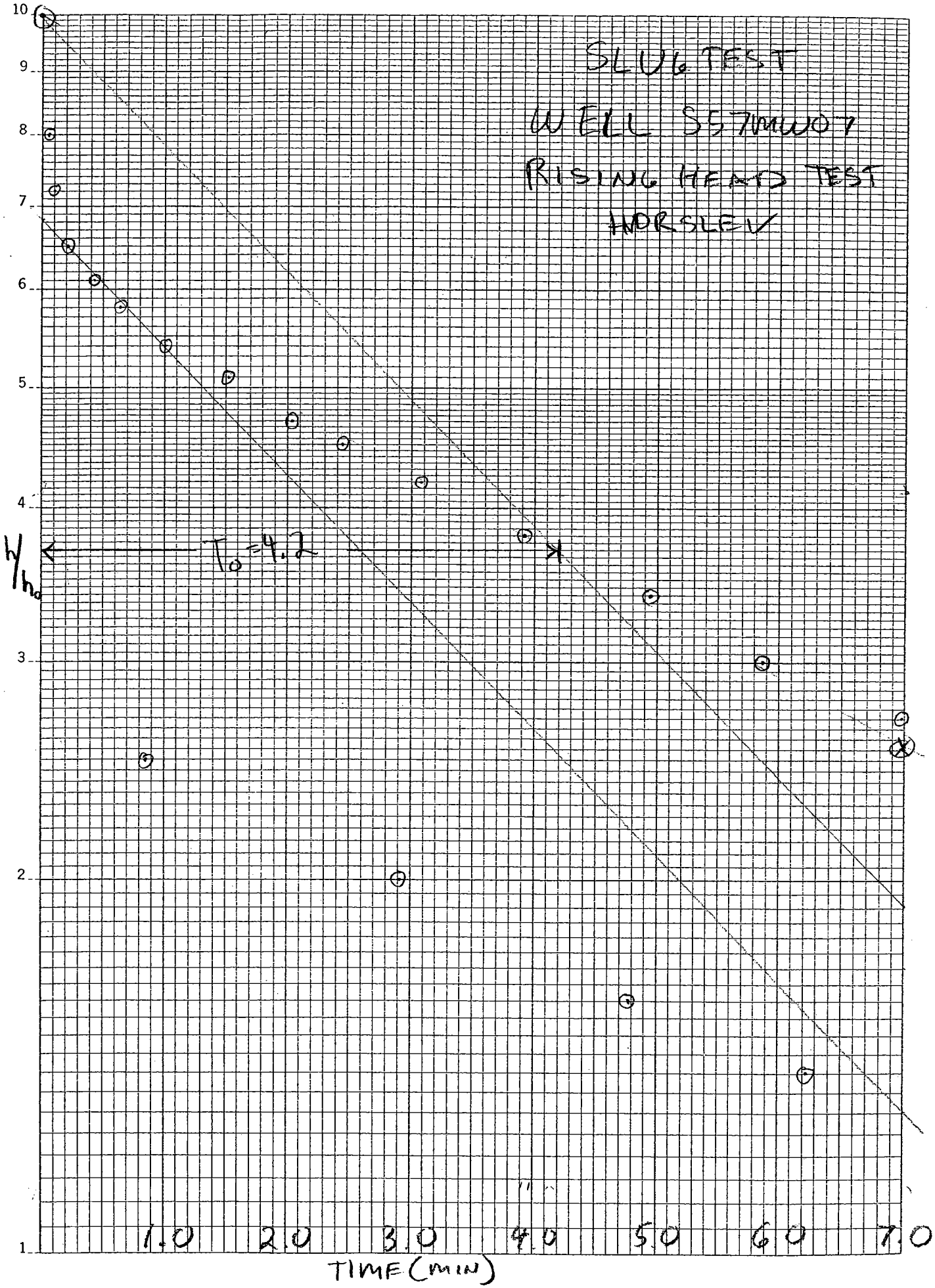
$$K = \frac{(0.083)^2 \ln(10/0.083)}{2(10)(4.2)}$$

$$K = \frac{3.300864 \times 10^{-2}}{84}$$

$K = 3.93 \times 10^{-4}$ ft/min

$K = 2.0 \times 10^{-4}$ cm/sec

$K = 5.7 \times 10^{-1}$ ft/day



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/30/01 13:41:33
Report from file: C:\Win-Situ\Data\SN01966 2001-10-25 104056 s57mw7rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw7rhno1

Test defined on: 10/25/01 10:37:34
Test started on: 10/25/01 10:40:56
Test stopped on: 10/25/01 11:14:06
Test extracted on: N/A

Data gathered using Logarithmic testing
aximum time between data points: 10.(Minutes.
Number of data samples: 121

TOTAL DATA SAMPLES 121

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 7.94 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	ET(min) adj.	h/ho	ho= 2.949
10/25/01	10:40	0	19.61	0			
10/25/01	10:40	0.005	19.62	0			
10/25/01	10:40	0.01	19.62	-0.002			
10/25/01	10:40	0.015	19.64	-0.002			
10/25/01	10:40	0.02	19.64	0.565			
10/25/01	10:40	0.025	19.64	7.897			
10/25/01	10:40	0.03	19.64	5.064			
10/25/01	10:40	0.035	19.64	2.897			
10/25/01	10:40	0.04	19.65	2.949	0	1.00	—
10/25/01	10:40	0.045	19.65	2.86	0.005	0.97	
10/25/01	10:40	0.05	19.65	2.759	0.01	0.94	
10/25/01	10:41	0.055	19.65	2.705	0.015	0.92	

10/25/01 10:41	0.06	19.65	2.618	0.02	0.89
10/25/01 10:41	0.065	19.65	2.575	0.025	0.87
10/25/01 10:41	0.07	19.65	2.527	0.03	0.86
10/25/01 10:41	0.075	19.65	2.475	0.035	0.84
10/25/01 10:41	0.08	19.65	2.438	0.04	0.83
10/25/01 10:41	0.0848	19.65	2.403	0.0448	0.81
10/25/01 10:41	0.09	19.65	2.366	0.05	0.80
10/25/01 10:41	0.095	19.65	2.339	0.055	0.79
10/25/01 10:41	0.1	19.65	2.308	0.06	0.78
10/25/01 10:41	0.1058	19.66	2.279	0.0658	0.77
10/25/01 10:41	0.112	19.65	2.246	0.072	0.76
10/25/01 10:41	0.1185	19.65	2.217	0.0785	0.75
10/25/01 10:41	0.1255	19.65	2.188	0.0855	0.74
10/25/01 10:41	0.1328	19.66	2.157	0.0928	0.73
10/25/01 10:41	0.1407	19.66	2.13	0.1007	0.72
10/25/01 10:41	0.149	19.66	2.103	0.109	0.71
10/25/01 10:41	0.1578	19.66	2.078	0.1178	0.70
10/25/01 10:41	0.167	19.65	2.055	0.127	0.70
10/25/01 10:41	0.177	19.65	2.032	0.137	0.69
10/25/01 10:41	0.1875	19.65	2.012	0.1475	0.68
10/25/01 10:41	0.1985	19.65	1.991	0.1585	0.68
10/25/01 10:41	0.2102	19.65	1.975	0.1702	0.67
10/25/01 10:41	0.2227	19.65	1.956	0.1827	0.66
10/25/01 10:41	0.2358	19.64	1.937	0.1958	0.66
10/25/01 10:41	0.2498	19.64	1.923	0.2098	0.65
10/25/01 10:41	0.2647	19.64	1.906	0.2247	0.65
10/25/01 10:41	0.2803	19.64	1.889	0.2403	0.64
10/25/01 10:41	0.297	19.64	1.877	0.257	0.64
10/25/01 10:41	0.3147	19.62	1.862	0.2747	0.63
10/25/01 10:41	0.3333	19.62	1.85	0.2933	0.63
10/25/01 10:41	0.3532	19.62	1.835	0.3132	0.62
10/25/01 10:41	0.3742	19.62	1.823	0.3342	0.62
10/25/01 10:41	0.3963	19.61	1.81	0.3563	0.61
10/25/01 10:41	0.4198	19.61	1.798	0.3798	0.61
10/25/01 10:41	0.4447	19.61	1.788	0.4047	0.61
10/25/01 10:41	0.4697	19.6	1.775	0.4297	0.60
10/25/01 10:41	0.4963	19.6	1.764	0.4563	0.60
10/25/01 10:41	0.5247	19.6	1.754	0.4847	0.59
10/25/01 10:41	0.5547	19.58	1.741	0.5147	0.59
10/25/01 10:41	0.5863	19.58	1.731	0.5463	0.59
10/25/01 10:41	0.6213	19.58	1.719	0.5813	0.58
10/25/01 10:41	0.6578	19.57	1.706	0.6178	0.58
10/25/01 10:41	0.6963	19.57	1.696	0.6563	0.58
10/25/01 10:41	0.738	19.56	1.683	0.698	0.57
10/25/01 10:41	0.7813	19.56	1.671	0.7413	0.57
10/25/01 10:41	0.828	19.55	1.658	0.788	0.56
10/25/01 10:41	0.8763	19.53	1.645	0.8363	0.56
10/25/01 10:41	0.928	19.53	1.633	0.888	0.55
10/25/01 10:41	0.983	19.52	1.618	0.943	0.55
10/25/01 10:41	1.0413	19.52	1.604	1.0013	0.54
10/25/01 10:42	1.103	19.51	1.589	1.063	0.54
10/25/01 10:42	1.168	19.5	1.574	1.128	0.53
10/25/01 10:42	1.238	19.5	1.557	1.198	0.53
10/25/01 10:42	1.3113	19.48	1.543	1.2713	0.52
10/25/01 10:42	1.3897	19.47	1.526	1.3497	0.52

10/25/01 10:42	1.473	19.46	1.509	1.433	0.51
10/25/01 10:42	1.5613	19.45	1.49	1.5213	0.51
10/25/01 10:42	1.6547	19.43	1.471	1.6147	0.50
10/25/01 10:42	1.753	19.42	1.452	1.713	0.49
10/25/01 10:42	1.858	19.41	1.434	1.818	0.49
10/25/01 10:42	1.968	19.39	1.413	1.928	0.48
10/25/01 10:43	2.0847	19.38	1.394	2.0447	0.47
10/25/01 10:43	2.2097	19.37	1.371	2.1697	0.46
10/25/01 10:43	2.3412	19.36	1.35	2.3012	0.46
10/25/01 10:43	2.4813	19.34	1.327	2.4413	0.45
10/25/01 10:43	2.6297	19.34	1.296	2.5897	0.44
10/25/01 10:43	2.7863	19.33	1.277	2.7463	0.43
10/25/01 10:43	2.953	19.32	1.254	2.913	0.43
10/25/01 10:44	3.1297	19.31	1.229	3.0897	0.42
10/25/01 10:44	3.3163	19.29	1.201	3.2763	0.41
10/25/01 10:44	3.5147	19.28	1.176	3.4747	0.40
10/25/01 10:44	3.7247	19.27	1.145	3.6847	0.39
10/25/01 10:44	3.9463	19.26	1.116	3.9063	0.38
10/25/01 10:45	4.1813	19.24	1.089	4.1413	0.37
10/25/01 10:45	4.4295	19.24	1.056	4.3895	0.36
10/25/01 10:45	4.693	19.23	1.024	4.653	0.35
10/25/01 10:45	4.973	19.22	0.993	4.933	0.34
10/25/01 10:46	5.2697	19.2	0.96	5.2297	0.33
10/25/01 10:46	5.583	19.2	0.926	5.543	0.31
10/25/01 10:46	5.9147	19.19	0.893	5.8747	0.30
10/25/01 10:47	6.2663	19.19	0.86	6.2263	0.29
10/25/01 10:47	6.6397	19.18	0.824	6.5997	0.28
10/25/01 10:47	7.0347	19.18	0.791	6.9947	0.27
10/25/01 10:48	7.453	19.18	0.756	7.413	0.26
10/25/01 10:48	7.8963	19.17	0.723	7.8563	0.25
10/25/01 10:49	8.3663	19.17	0.686	8.3263	0.23
10/25/01 10:49	8.8647	19.17	0.652	8.8247	0.22
10/25/01 10:50	9.3913	19.18	0.616	9.3513	0.21
10/25/01 10:50	9.9497	19.18	0.58	9.9097	0.20
10/25/01 10:51	10.5413	19.18	0.547	10.5013	0.19
10/25/01 10:52	11.168	19.19	0.512	11.128	0.17
10/25/01 10:52	11.8313	19.19	0.479	11.7913	0.16
10/25/01 10:53	12.5347	19.19	0.444	12.4947	0.15
10/25/01 10:54	13.2797	19.2	0.413	13.2397	0.14
10/25/01 10:55	14.0697	19.2	0.38	14.0297	0.13
10/25/01 10:55	14.9063	19.2	0.349	14.8663	0.12
10/25/01 10:56	15.7913	19.22	0.318	15.7513	0.11
10/25/01 10:57	16.7297	19.22	0.294	16.6897	0.10
10/25/01 10:58	17.723	19.23	0.263	17.683	0.09
10/25/01 10:59	18.7763	19.23	0.234	18.7363	0.08
10/25/01 11:00	19.8913	19.24	0.211	19.8513	0.07
10/25/01 11:02	21.073	19.24	0.184	21.033	0.06
10/25/01 11:03	22.3247	19.24	0.162	22.2847	0.05
10/25/01 11:04	23.6497	19.26	0.143	23.6097	0.05
10/25/01 11:06	25.0547	19.27	0.123	25.0147	0.04
10/25/01 11:07	26.543	19.27	0.104	26.503	0.04
10/25/01 11:09	28.118	19.28	0.086	28.078	0.03
10/25/01 11:10	29.7863	19.28	0.072	29.7463	0.02
10/25/01 11:12	31.5547	19.29	0.059	31.5147	0.02

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW08

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 6.64-16.64 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 8.45 DATE: 10-25-01

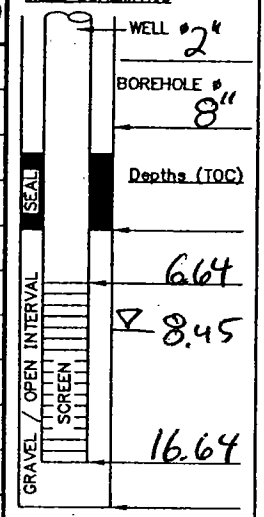
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 2x 3' S.S. Bailer PAGE ..... OF .....

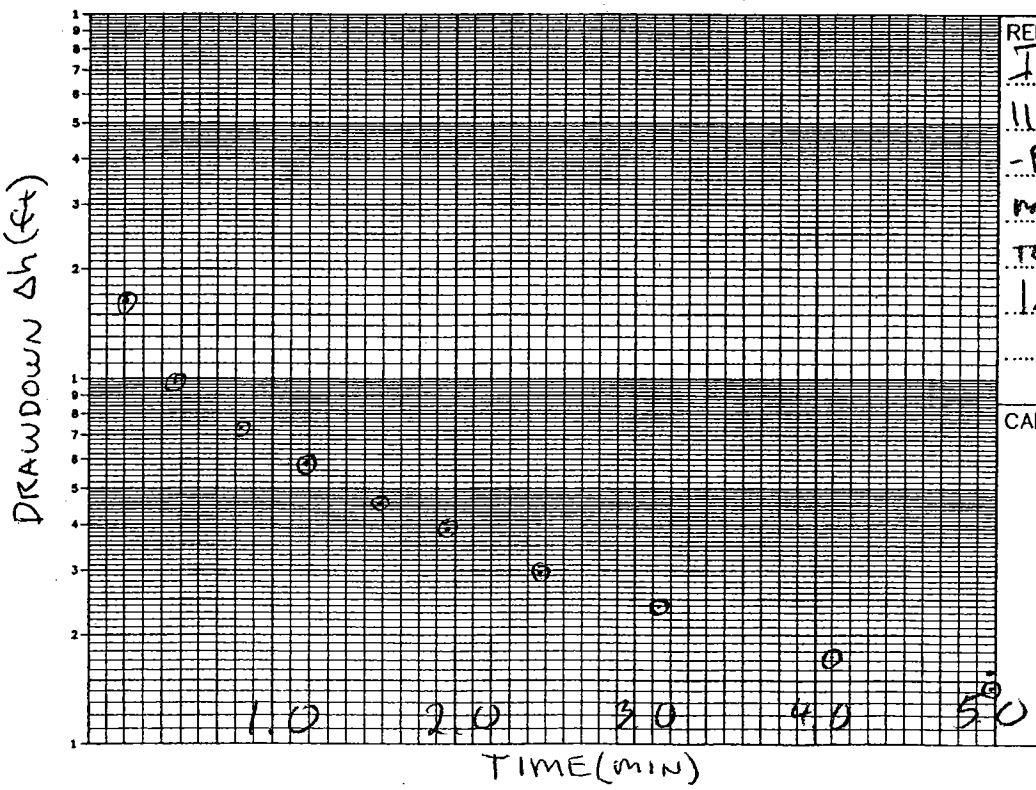
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): Ref to 0.00

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	1.1678		0.590
0.0548		3.371	1.5613		0.460
0.0700		3.003	1.9678		0.371
0.0900		2.728	2.4812		0.298
0.1488		2.066	3.1297		0.242
0.1875		1.776	4.1812		0.178
0.2100		1.648	4.9728		0.145
0.2498		1.464			
0.3532		1.180			
0.4695		1.021			
0.6218		0.880			
0.8278		0.744			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:
INSERTED BAILERS
1118
-POCKET SITU PC
MALFUNCTION HAD
TO REDO
1207 START 2ND

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW08 RISING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY:	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 8.33 \times 10^{-2}$ (RISER RADIUS, Ft)
$R = 8.33 \times 10^{-2}$ (SCREEN RADIUS, Ft)
$L = 8.19$ ft (INPUT LENGTH, Ft)
$T_o = 0.30$ min (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

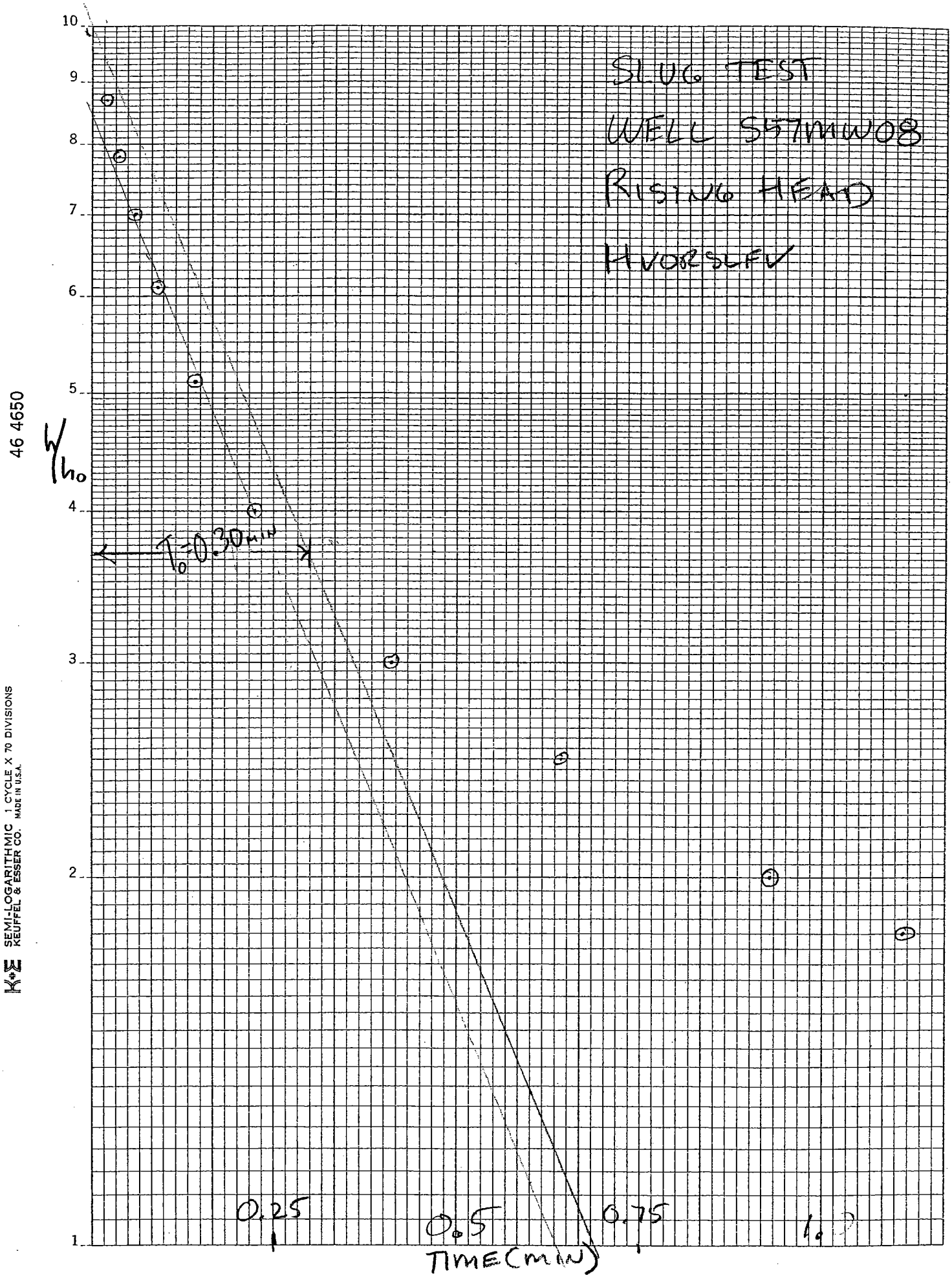
$$K = \frac{(8.33 \times 10^{-2})^2 \ln(8.19/8.33 \times 10^{-2})}{2(8.19)(0.30)}$$

$$K = \frac{3.184 \times 10^{-2}}{4.914}$$

$K = 6.48 \times 10^{-3}$ ft/min

$K = 3.29 \times 10^{-3}$ cm/sec

$K = 9.33$ ft/day


SLUG TEST
WELL 557MW08
RISING HEAD
HVORSLEV
h/h_0
$T_0 = 0.30$ min
10
9
8
7
6
5
4
3
2
1
0.25
0.5
0.75
1.0
TIME (min)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/31/01 14:48:01
Report from file: C:\Win-Situ\Data\SN01966 2001-10-25 120739 s57mw8rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw8rhno1

Test defined on: 10/25/01 11:44:07
Test started on: 10/25/01 12:07:39
Test stopped on: 10/25/01 12:25:42
Test extracted on: N/A

Data gathered using Logarithmic testing
laximum time between data points: 10.0 Minutes.
Number of data samples: 111

TOTAL DATA SAMPLES 111

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 7.875 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 3.371
10/25/01	12:07	0	19.34	0			
10/25/01	12:07	0.005	19.36	0			
10/25/01	12:07	0.01	19.37	-0.002			
10/25/01	12:07	0.015	19.37	-0.002			
10/25/01	12:07	0.02	19.37	-0.002			
10/25/01	12:07	0.025	19.37	-0.002			
10/25/01	12:07	0.03	19.38	-0.001			
10/25/01	12:07	0.035	19.38	-0.001			
10/25/01	12:07	0.04	19.38	1.329			
10/25/01	12:07	0.045	19.38	8.137			

10/25/01 12:07	0.05	19.38	5.973		
10/25/01 12:07	0.055	19.38	3.371	0	1.00
10/25/01 12:07	0.06	19.38	3.216	0.005	0.95
10/25/01 12:07	0.065	19.38	3.092	0.01	0.92
10/25/01 12:07	0.07	19.38	3.003	0.015	0.89
10/25/01 12:07	0.075	19.39	2.933	0.02	0.87
10/25/01 12:07	0.08	19.39	2.858	0.025	0.85
10/25/01 12:07	0.0848	19.38	2.786	0.0298	0.83
10/25/01 12:07	0.09	19.39	2.728	0.035	0.81
10/25/01 12:07	0.095	19.39	2.641	0.04	0.78
10/25/01 12:07	0.1	19.39	2.565	0.045	0.76
10/25/01 12:07	0.1058	19.39	2.5	0.0508	0.74
10/25/01 12:07	0.112	19.39	2.434	0.057	0.72
10/25/01 12:07	0.1185	19.39	2.36	0.0635	0.70
10/25/01 12:07	0.1255	19.39	2.296	0.0705	0.68
10/25/01 12:07	0.1328	19.39	2.227	0.0778	0.66
10/25/01 12:07	0.1407	19.39	2.155	0.0857	0.64
10/25/01 12:07	0.149	19.39	2.066	0.094	0.61
10/25/01 12:07	0.1578	19.39	1.991	0.1028	0.59
10/25/01 12:07	0.167	19.39	1.917	0.112	0.57
10/25/01 12:07	0.177	19.39	1.847	0.122	0.55
10/25/01 12:07	0.1875	19.39	1.776	0.1325	0.53
10/25/01 12:07	0.1985	19.39	1.712	0.1435	0.51
10/25/01 12:07	0.2102	19.39	1.648	0.1552	0.49
10/25/01 12:07	0.2227	19.38	1.584	0.1677	0.47
10/25/01 12:07	0.2358	19.38	1.524	0.1808	0.45
10/25/01 12:07	0.2498	19.38	1.464	0.1948	0.43
10/25/01 12:07	0.2647	19.38	1.408	0.2097	0.42
10/25/01 12:07	0.2803	19.38	1.354	0.2253	0.40
10/25/01 12:07	0.297	19.38	1.306	0.242	0.39
10/25/01 12:07	0.3147	19.38	1.261	0.2597	0.37
10/25/01 12:07	0.3333	19.38	1.219	0.2783	0.36
10/25/01 12:08	0.3532	19.38	1.18	0.2982	0.35
10/25/01 12:08	0.3742	19.38	1.145	0.3192	0.34
10/25/01 12:08	0.3963	19.38	1.11	0.3413	0.33
10/25/01 12:08	0.4198	19.38	1.077	0.3648	0.32
10/25/01 12:08	0.4447	19.38	1.046	0.3897	0.31
10/25/01 12:08	0.4697	19.38	1.021	0.4147	0.30
10/25/01 12:08	0.4963	19.38	0.99	0.4413	0.29
10/25/01 12:08	0.5247	19.38	0.963	0.4697	0.29
10/25/01 12:08	0.5547	19.38	0.934	0.4997	0.28
10/25/01 12:08	0.5863	19.38	0.909	0.5313	0.27
10/25/01 12:08	0.6213	19.38	0.88	0.5663	0.26
10/25/01 12:08	0.6578	19.38	0.853	0.6028	0.25
10/25/01 12:08	0.6963	19.38	0.826	0.6413	0.25
10/25/01 12:08	0.738	19.38	0.799	0.683	0.24
10/25/01 12:08	0.7813	19.38	0.773	0.7263	0.23
10/25/01 12:08	0.828	19.38	0.744	0.773	0.22
10/25/01 12:08	0.8763	19.38	0.717	0.8213	0.21
10/25/01 12:08	0.928	19.38	0.692	0.873	0.21
10/25/01 12:08	0.983	19.38	0.665	0.928	0.20
10/25/01 12:08	1.0413	19.37	0.64	0.9863	0.19

10/25/01 12:08	1.103	19.37	0.613	1.048	0.18
10/25/01 12:08	1.168	19.37	0.59	1.113	0.18
10/25/01 12:08	1.238	19.37	0.563	1.183	0.17
10/25/01 12:08	1.3113	19.37	0.538	1.2563	0.16
10/25/01 12:09	1.3897	19.37	0.514	1.3347	0.15
10/25/01 12:09	1.473	19.37	0.487	1.418	0.14
10/25/01 12:09	1.5613	19.37	0.46	1.5063	0.14
10/25/01 12:09	1.6547	19.37	0.435	1.5997	0.13
10/25/01 12:09	1.753	19.37	0.412	1.698	0.12
10/25/01 12:09	1.858	19.36	0.391	1.803	0.12
10/25/01 12:09	1.968	19.36	0.371	1.913	0.11
10/25/01 12:09	2.0847	19.36	0.352	2.0297	0.10
10/25/01 12:09	2.2097	19.36	0.333	2.1547	0.10
10/25/01 12:09	2.3412	19.36	0.315	2.2862	0.09
10/25/01 12:10	2.4813	19.36	0.298	2.4263	0.09
10/25/01 12:10	2.6297	19.36	0.282	2.5747	0.08
10/25/01 12:10	2.7863	19.36	0.267	2.7313	0.08
10/25/01 12:10	2.953	19.36	0.259	2.898	0.08
10/25/01 12:10	3.1297	19.36	0.242	3.0747	0.07
10/25/01 12:10	3.3163	19.36	0.224	3.2613	0.07
10/25/01 12:11	3.5147	19.36	0.213	3.4597	0.06
10/25/01 12:11	3.7247	19.36	0.201	3.6697	0.06
10/25/01 12:11	3.9463	19.36	0.195	3.8913	0.06
10/25/01 12:11	4.1813	19.36	0.178	4.1263	0.05
10/25/01 12:12	4.4295	19.36	0.168	4.3745	0.05
10/25/01 12:12	4.693	19.36	0.155	4.638	0.05
10/25/01 12:12	4.973	19.36	0.145	4.918	0.04
10/25/01 12:12	5.2697	19.36	0.135	5.2147	0.04
10/25/01 12:13	5.583	19.36	0.124	5.528	0.04
10/25/01 12:13	5.9147	19.36	0.114	5.8597	0.03
10/25/01 12:13	6.2663	19.34	0.108	6.2113	0.03
10/25/01 12:14	6.6397	19.34	0.097	6.5847	0.03
10/25/01 12:14	7.0347	19.34	0.091	6.9797	0.03
10/25/01 12:15	7.453	19.34	0.083	7.398	0.02
10/25/01 12:15	7.8963	19.34	0.077	7.8413	0.02
10/25/01 12:16	8.3663	19.34	0.072	8.3113	0.02
10/25/01 12:16	8.8647	19.34	0.066	8.8097	0.02
10/25/01 12:17	9.3913	19.34	0.06	9.3363	0.02
10/25/01 12:17	9.9497	19.34	0.058	9.8947	0.02
10/25/01 12:18	10.5413	19.34	0.05	10.4863	0.01
10/25/01 12:18	11.168	19.34	0.046	11.113	0.01
10/25/01 12:19	11.8313	19.34	0.041	11.7763	0.01
10/25/01 12:20	12.5347	19.34	0.037	12.4797	0.01
10/25/01 12:20	13.2797	19.34	0.035	13.2247	0.01
10/25/01 12:21	14.0697	19.34	0.031	14.0147	0.01
10/25/01 12:22	14.9063	19.34	0.029	14.8513	0.01
10/25/01 12:23	15.7913	19.34	0.023	15.7363	0.01
10/25/01 12:24	16.7297	19.34	0.019	16.6747	0.01
10/25/01 12:25	17.723	19.34	0.019	17.668	0.01

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW09

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 5'/15.85-20.85 TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 9.08' TPVC DATE: 10-24-01

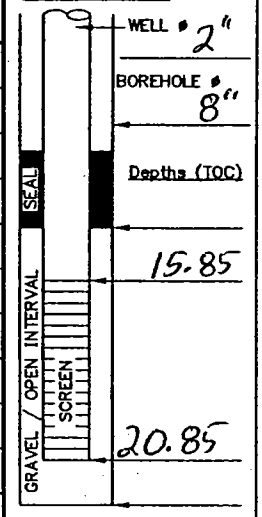
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 2x 1L bailers PAGE ..... OF .....

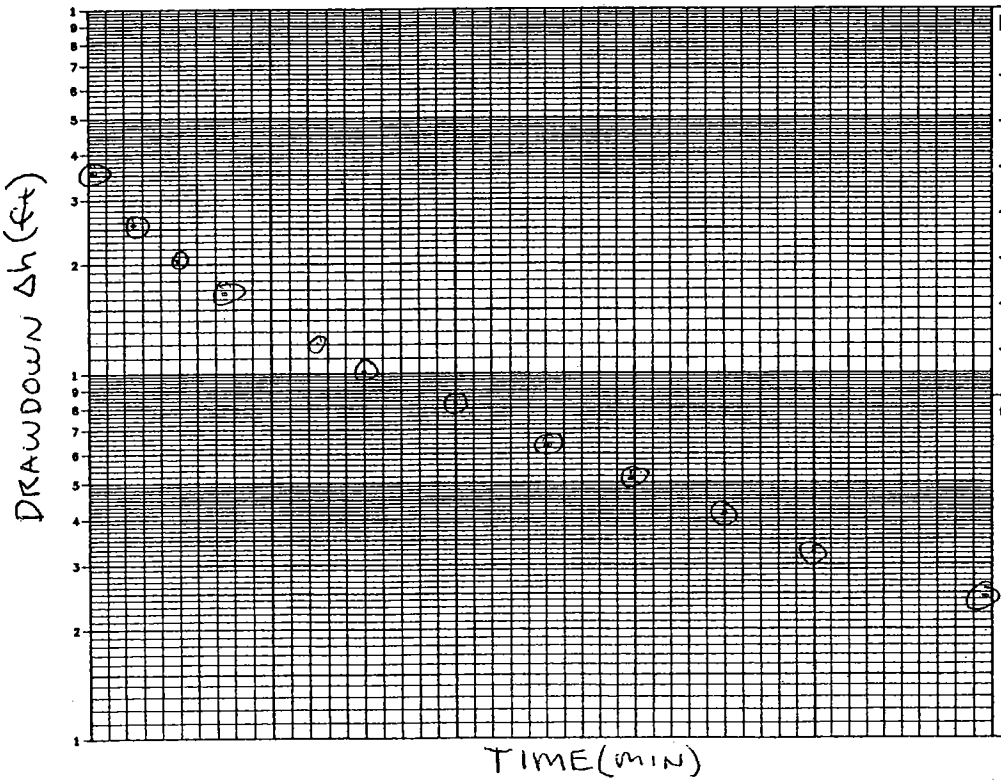
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, Ref to 0.00

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	6.6397		0.433
0.025		3.516	8.3663		0.315
0.085		3.189	9.9497		0.246
0.2647		2.850			
0.6963		2.334			
1.0413		2.028			
1.473		1.724			
1.968		1.453			
2.6297		1.176			
3.9463		0.807			
4.6930		0.668			
5.583		0.542			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

STARTED: 0822

STOPPED TEST @ 0937

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57MW09	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY JK	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_0}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 5$ (INPUT LENGTH, Ft)
$T_0 = 2.75$ min (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

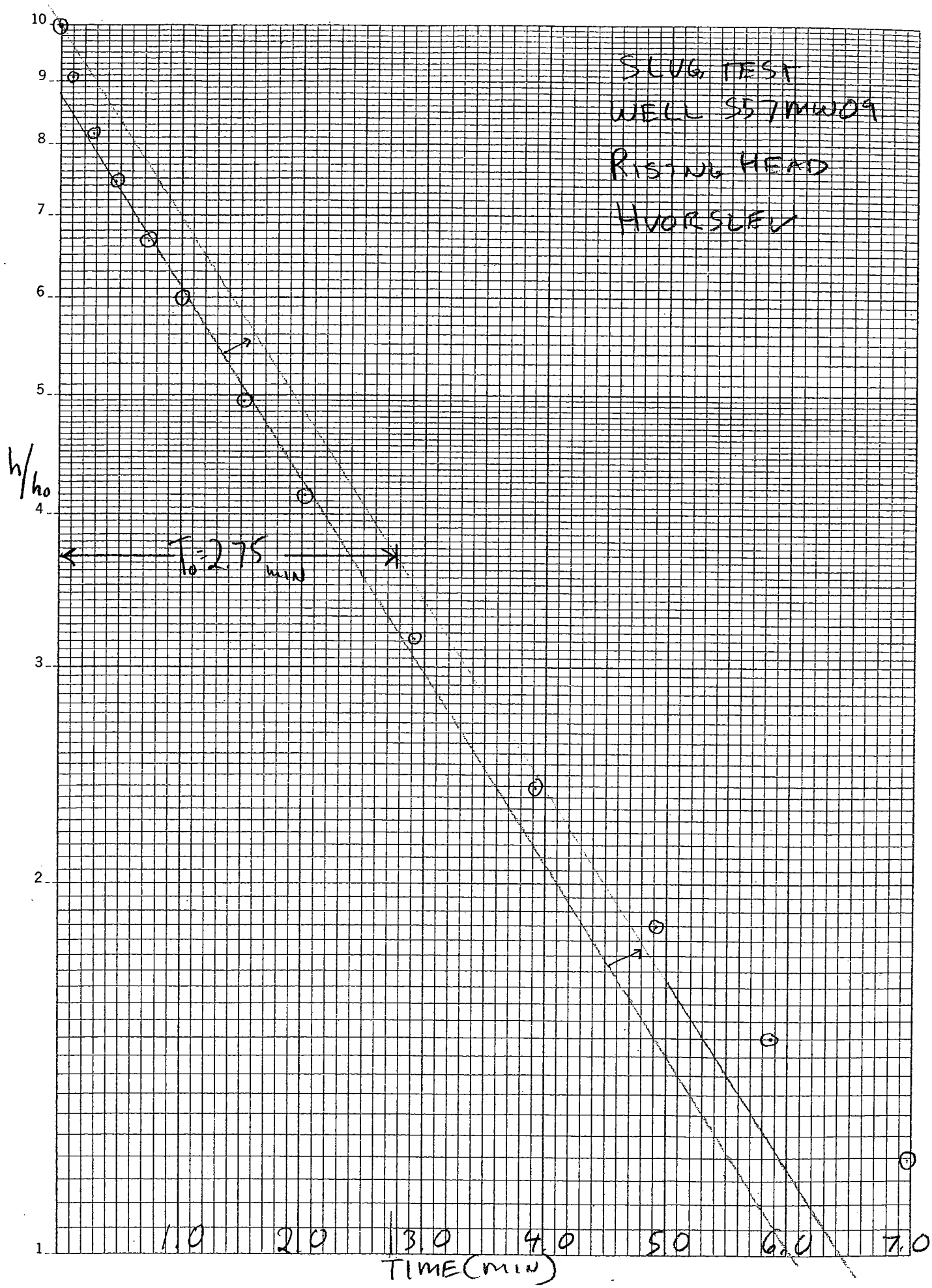
$$K = \frac{(0.083)^2 \ln(5/.083)}{2(5)(2.75)}$$

$$K = \frac{2.82335509 \times 10^{-2}}{27.5}$$

$K = 1.03 \times 10^{-3}$ ft/min

$K = 5.22 \times 10^{-4}$ cm/sec

$K = 1.5$ ft/day



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 10:30:06
Report from file: C:\Win-Situ\Data\SN01966 2001-10-24 082207 s57mw9rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw9rhno1

Test defined on: 10/24/01 7:56:10
Test started on: 10/24/01 8:22:07
Test stopped on: 10/24/01 9:37:32
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between data points:10 Minutes.
Number of data samples: 136

TOTAL DATA SAMPLES 136

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 11.1 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 3.375
10/24/01	8:22	0	18.62	0			
10/24/01	8:22	0.005	18.64	-0.002			
10/24/01	8:22	0.01	18.64	9.572			
10/24/01	8:22	0.015	18.65	4.78			
10/24/01	8:22	0.02	18.65	3.269			
10/24/01	8:22	0.025	18.65	3.518			
10/24/01	8:22	0.03	18.65	3.418			
10/24/01	8:22	0.035	18.66	3.418			
10/24/01	8:22	0.04	18.66	3.375	0	1	
10/24/01	8:22	0.045	18.66	3.321	0.005	0.984	
10/24/01	8:22	0.05	18.66	3.342	0.01	0.99	
10/24/01	8:22	0.055	18.66	3.315	0.015	0.982	
10/24/01	8:22	0.06	18.66	3.265	0.02	0.967	
10/24/01	8:22	0.065	18.66	3.253	0.025	0.964	
10/24/01	8:22	0.07	18.66	3.238	0.03	0.959	
10/24/01	8:22	0.075	18.66	3.22	0.035	0.954	
10/24/01	8:22	0.08	18.66	3.203	0.04	0.949	
10/24/01	8:22	0.0848	18.66	3.189	0.0448	0.945	

10/24/01 8:22	0.09	18.67	3.175	0.05	0.941
10/24/01 8:22	0.095	18.66	3.164	0.055	0.937
10/24/01 8:22	0.1	18.67	3.15	0.06	0.933
10/24/01 8:22	0.1058	18.67	3.137	0.0658	0.929
10/24/01 8:22	0.112	18.67	3.121	0.072	0.925
10/24/01 8:22	0.1185	18.67	3.106	0.0785	0.92
10/24/01 8:22	0.1255	18.67	3.092	0.0855	0.916
10/24/01 8:22	0.1328	18.67	3.075	0.0928	0.911
10/24/01 8:22	0.1407	18.67	3.059	0.1007	0.906
10/24/01 8:22	0.149	18.67	3.04	0.109	0.901
10/24/01 8:22	0.1578	18.67	3.024	0.1178	0.896
10/24/01 8:22	0.167	18.67	3.009	0.127	0.892
10/24/01 8:22	0.177	18.67	2.99	0.137	0.886
10/24/01 8:22	0.1875	18.66	2.972	0.1475	0.881
10/24/01 8:22	0.1985	18.66	2.955	0.1585	0.876
10/24/01 8:22	0.2102	18.66	2.934	0.1702	0.869
10/24/01 8:22	0.2227	18.66	2.914	0.1827	0.863
10/24/01 8:22	0.2358	18.66	2.893	0.1958	0.857
10/24/01 8:22	0.2498	18.66	2.872	0.2098	0.851
10/24/01 8:22	0.2647	18.66	2.85	0.2247	0.844
10/24/01 8:22	0.2803	18.66	2.827	0.2403	0.838
10/24/01 8:22	0.297	18.66	2.802	0.257	0.83
10/24/01 8:22	0.3147	18.66	2.779	0.2747	0.823
10/24/01 8:22	0.3333	18.66	2.752	0.2933	0.815
10/24/01 8:22	0.3532	18.66	2.727	0.3132	0.808
10/24/01 8:22	0.3742	18.66	2.698	0.3342	0.799
10/24/01 8:22	0.3963	18.66	2.67	0.3563	0.791
10/24/01 8:22	0.4198	18.66	2.641	0.3798	0.783
10/24/01 8:22	0.4447	18.66	2.612	0.4047	0.774
10/24/01 8:22	0.4697	18.66	2.581	0.4297	0.765
10/24/01 8:22	0.4963	18.66	2.55	0.4563	0.756
10/24/01 8:22	0.5247	18.66	2.516	0.4847	0.745
10/24/01 8:22	0.5547	18.66	2.483	0.5147	0.736
10/24/01 8:22	0.5863	18.66	2.448	0.5463	0.725
10/24/01 8:22	0.6213	18.66	2.411	0.5813	0.714
10/24/01 8:22	0.6578	18.66	2.374	0.6178	0.703
10/24/01 8:22	0.6963	18.66	2.334	0.6563	0.692
10/24/01 8:22	0.738	18.65	2.293	0.698	0.679
10/24/01 8:22	0.7813	18.65	2.251	0.7413	0.667
10/24/01 8:22	0.828	18.65	2.208	0.788	0.654
10/24/01 8:23	0.8763	18.65	2.164	0.8363	0.641
10/24/01 8:23	0.928	18.65	2.121	0.888	0.628
10/24/01 8:23	0.983	18.65	2.075	0.943	0.615
10/24/01 8:23	1.0413	18.65	2.028	1.0013	0.601
10/24/01 8:23	1.103	18.65	1.98	1.063	0.587
10/24/01 8:23	1.168	18.65	1.931	1.128	0.572
10/24/01 8:23	1.238	18.65	1.881	1.198	0.557
10/24/01 8:23	1.3113	18.65	1.831	1.2713	0.543
10/24/01 8:23	1.3897	18.65	1.778	1.3497	0.527
10/24/01 8:23	1.473	18.65	1.724	1.433	0.511
10/24/01 8:23	1.5613	18.65	1.672	1.5213	0.495
10/24/01 8:23	1.6547	18.65	1.618	1.6147	0.479
10/24/01 8:23	1.753	18.65	1.562	1.713	0.463
10/24/01 8:23	1.858	18.65	1.509	1.818	0.447
10/24/01 8:24	1.968	18.65	1.453	1.928	0.431
10/24/01 8:24	2.0847	18.65	1.399	2.0447	0.415
10/24/01 8:24	2.2097	18.65	1.343	2.1697	0.398
10/24/01 8:24	2.3412	18.64	1.287	2.3012	0.381
10/24/01 8:24	2.4813	18.65	1.231	2.4413	0.365
10/24/01 8:24	2.6297	18.65	1.176	2.5897	0.348

10/24/01 8:24	2.7863	18.64	1.122	2.7463	0.332
10/24/01 8:25	2.953	18.64	1.066	2.913	0.316
10/24/01 8:25	3.1297	18.65	1.014	3.0897	0.3
10/24/01 8:25	3.3163	18.64	0.96	3.2763	0.284
10/24/01 8:25	3.5147	18.64	0.908	3.4747	0.269
10/24/01 8:25	3.7247	18.64	0.857	3.6847	0.254
10/24/01 8:26	3.9463	18.64	0.807	3.9063	0.239
10/24/01 8:26	4.1813	18.64	0.759	4.1413	0.225
10/24/01 8:26	4.4295	18.64	0.712	4.3895	0.211
10/24/01 8:26	4.693	18.64	0.668	4.653	0.198
10/24/01 8:27	4.973	18.64	0.625	4.933	0.185
10/24/01 8:27	5.2697	18.64	0.582	5.2297	0.172
10/24/01 8:27	5.583	18.64	0.542	5.543	0.161
10/24/01 8:28	5.9147	18.64	0.505	5.8747	0.15
10/24/01 8:28	6.2663	18.64	0.468	6.2263	0.139
10/24/01 8:28	6.6397	18.64	0.433	6.5997	0.128
10/24/01 8:29	7.0347	18.64	0.402	6.9947	0.119
10/24/01 8:29	7.453	18.64	0.368	7.413	0.109
10/24/01 8:30	7.8963	18.64	0.34	7.8563	0.101
10/24/01 8:30	8.3663	18.64	0.315	8.3263	0.093
10/24/01 8:30	8.8647	18.64	0.29	8.8247	0.086
10/24/01 8:31	9.3913	18.64	0.267	9.3513	0.079
10/24/01 8:32	9.9497	18.64	0.246	9.9097	0.073
10/24/01 8:32	10.5413	18.64	0.228	10.5013	0.068
10/24/01 8:33	11.168	18.64	0.207	11.128	0.061
10/24/01 8:33	11.8313	18.65	0.193	11.7913	0.057
10/24/01 8:34	12.5347	18.66	0.177	12.4947	0.052
10/24/01 8:35	13.2797	18.66	0.164	13.2397	0.049
10/24/01 8:36	14.0697	18.67	0.15	14.0297	0.044
10/24/01 8:37	14.9063	18.67	0.138	14.8663	0.041
10/24/01 8:37	15.7913	18.67	0.125	15.7513	0.037
10/24/01 8:38	16.7297	18.69	0.117	16.6897	0.035
10/24/01 8:39	17.723	18.69	0.111	17.683	0.033
10/24/01 8:40	18.7763	18.69	0.103	18.7363	0.031
10/24/01 8:42	19.8913	18.69	0.097	19.8513	0.029
10/24/01 8:43	21.073	18.69	0.086	21.033	0.025
10/24/01 8:44	22.3247	18.69	0.082	22.2847	0.024
10/24/01 8:45	23.6497	18.69	0.082	23.6097	0.024
10/24/01 8:47	25.0547	18.69	0.076	25.0147	0.023
10/24/01 8:48	26.543	18.7	0.072	26.503	0.021
10/24/01 8:50	28.118	18.7	0.068	28.078	0.02
10/24/01 8:51	29.7863	18.69	0.063	29.7463	0.019
10/24/01 8:53	31.5547	18.69	0.061	31.5147	0.018
10/24/01 8:55	33.428	18.69	0.057	33.388	0.017
10/24/01 8:57	35.4112	18.69	0.053	35.3712	0.016
10/24/01 8:59	37.513	18.69	0.049	37.473	0.015
10/24/01 9:01	39.7397	18.69	0.045	39.6997	0.013
10/24/01 9:04	42.098	18.67	0.038	42.058	0.011
10/24/01 9:06	44.5963	18.67	0.036	44.5563	0.011
10/24/01 9:09	47.243	18.67	0.036	47.203	0.011
10/24/01 9:12	50.0463	18.67	0.034	50.0063	0.01
10/24/01 9:15	53.0147	18.67	0.034	52.9747	0.01
10/24/01 9:18	56.1597	18.67	0.036	56.1197	0.011
10/24/01 9:21	59.4913	18.66	0.034	59.4513	0.01
10/24/01 9:25	63.0197	18.66	0.032	62.9797	0.009
10/24/01 9:28	66.758	18.66	0.022	66.718	0.007
10/24/01 9:32	70.718	18.66	0.024	70.678	0.007
10/24/01 9:37	74.9113	18.66	0.009	74.8713	0.003

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW10

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10'/5.88-15.88 TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 9.15 DATE: 10-24-01

TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

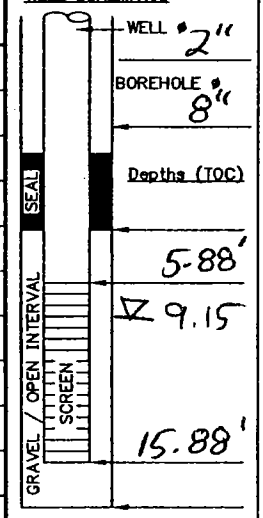
METHOD OF INDUCING WATER LEVEL CHANGE: 2x2.8' SS BAILERS PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

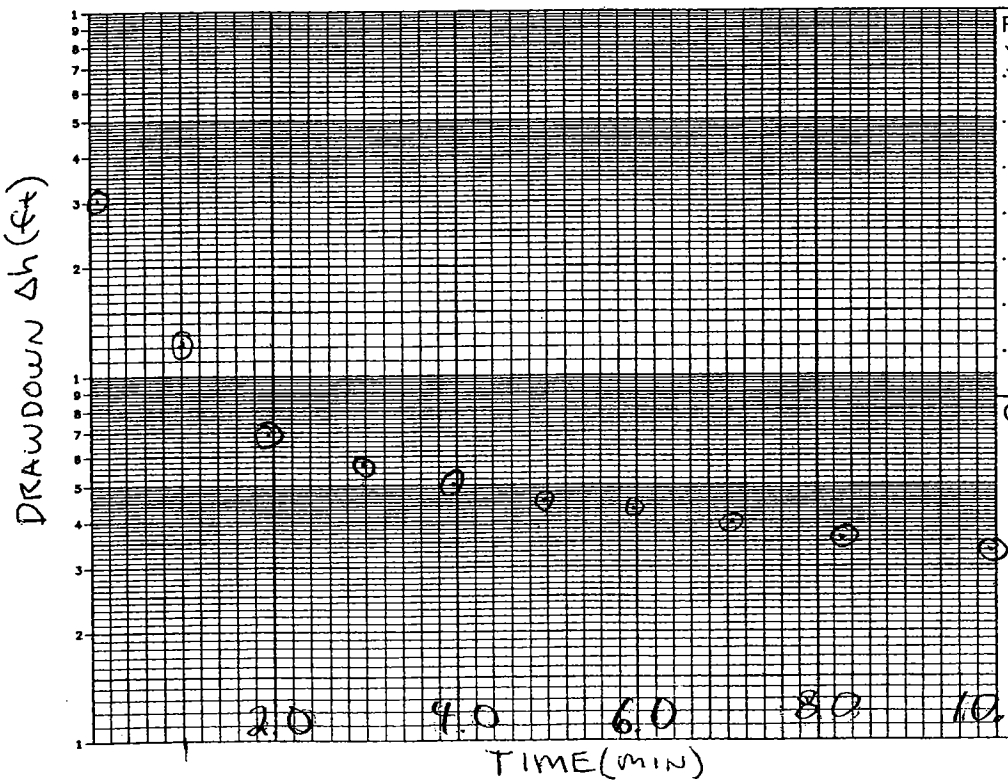
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	8.3663		0.368
0.03		3.381	9.9497		0.337
0.1000		3.078			
0.3963		2.231			
0.738		1.594			
1.0412		1.211			
1.9678		0.695			
2.953		0.571			
3.9463		0.511			
4.9728		0.463			
5.9145		0.430			
7.0345		0.397			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

INSERTED SLUG 0950

6.471 = head x-D

CALCS, SKETCH MAPS, ETC.:

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57MW10	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 6.73$ (INPUT LENGTH, Ft)
$T_o = 1.1$ min (FROM PLOT, MIN)
K = HYDRAULIC COND. (ft/min)

SUB:

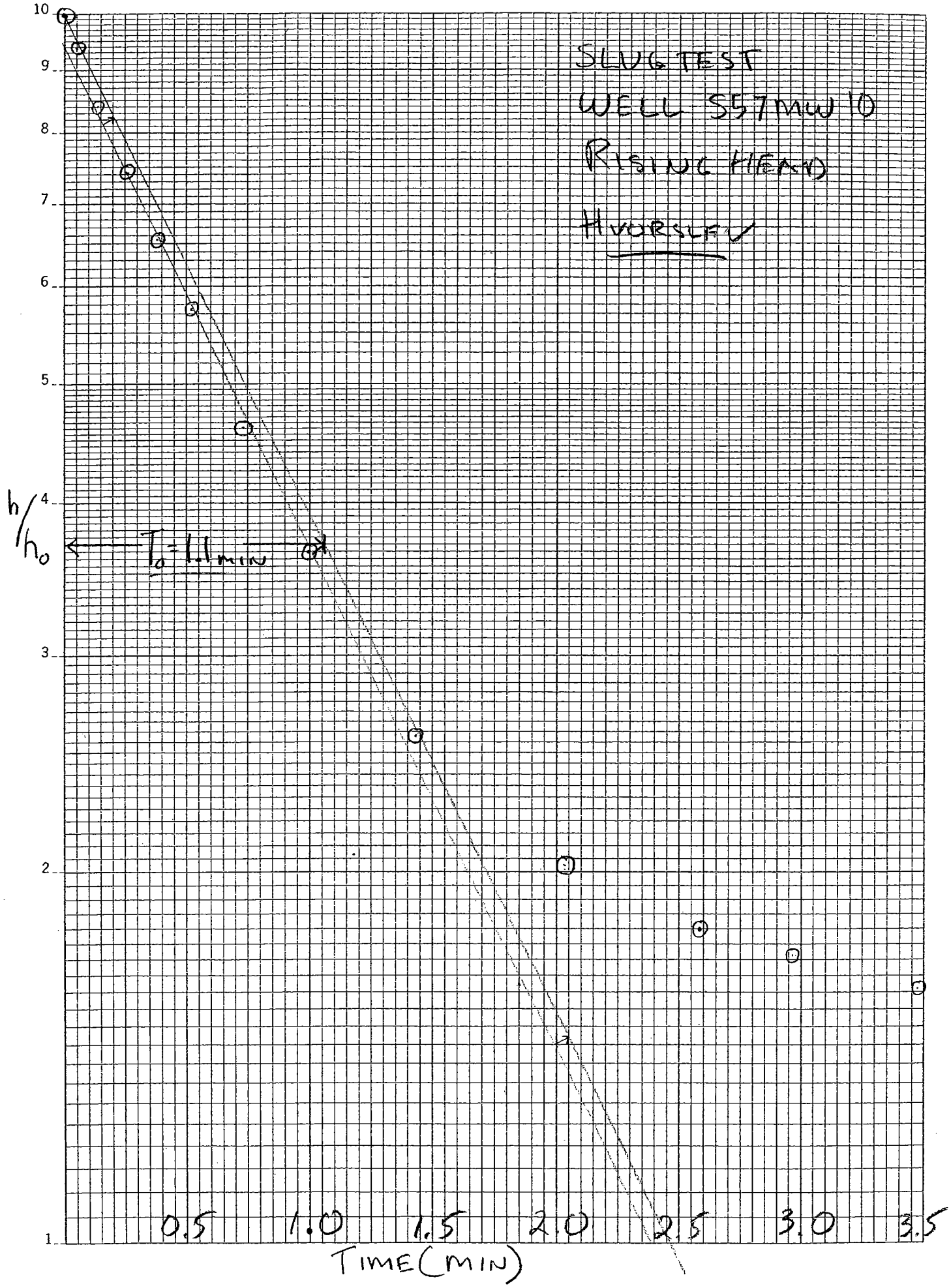
$$K = \frac{(0.083)^2 \ln(6.73/0.083)}{2(6.73)(1.1)}$$

$$K = \frac{3.028052 93 \times 10^{-2}}{14.806}$$

$K = 2.05 \times 10^{-3}$ ft/min

$K = 1.04 \times 10^{-3}$ cm/sec

$K = 2.95$ ft/day



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/31/01 8:51:22
Report from file: C:\Win-Situ\Data\SN01966 2001-10-24 101004 s57mw10rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw10rhno1

Test defined on: 10/24/01 9:46:16
Test started on: 10/24/01 10:10:04
Test stopped on: 10/24/01 11:36:16
Test extracted on: N/A

Data gathered using Logarithmic testing
ximum time between data points: 10. Minutes.
Number of data samples: 138

TOTAL DATA SAMPLES 138

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 6.466 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 3.317
10/24/01	10:10	0	19.74	0			
10/24/01	10:10	0.005	19.74	3.619			
10/24/01	10:10	0.01	19.74	8.371			
10/24/01	10:10	0.015	19.75	3.642			
10/24/01	10:10	0.02	19.75	3.516			
10/24/01	10:10	0.025	19.75	3.377			
10/24/01	10:10	0.03	19.75	3.381			
10/24/01	10:10	0.035	19.75	3.35			
10/24/01	10:10	0.04	19.76	3.317	0	1	
10/24/01	10:10	0.045	19.76	3.301	0.005	0.995	
10/24/01	10:10	0.05	19.76	3.276	0.01	0.988	
10/24/01	10:10	0.055	19.76	3.245	0.015	0.978	
10/24/01	10:10	0.06	19.76	3.226	0.02	0.973	
10/24/01	10:10	0.065	19.76	3.208	0.025	0.967	
10/24/01	10:10	0.07	19.76	3.185	0.03	0.96	
10/24/01	10:10	0.075	19.76	3.168	0.035	0.955	
10/24/01	10:10	0.08	19.76	3.148	0.04	0.949	
10/24/01	10:10	0.0848	19.76	3.129	0.0448	0.943	

10/24/01 10:10	0.09	19.76	3.113	0.05	0.938
10/24/01 10:10	0.095	19.77	3.094	0.055	0.933
10/24/01 10:10	0.1	19.77	3.078	0.06	0.928
10/24/01 10:10	0.1058	19.77	3.057	0.0658	0.922
10/24/01 10:10	0.112	19.77	3.034	0.072	0.915
10/24/01 10:10	0.1185	19.77	3.013	0.0785	0.908
10/24/01 10:10	0.1255	19.77	2.989	0.0855	0.901
10/24/01 10:10	0.1328	19.77	2.964	0.0928	0.894
10/24/01 10:10	0.1407	19.77	2.939	0.1007	0.886
10/24/01 10:10	0.149	19.77	2.91	0.109	0.877
10/24/01 10:10	0.1578	19.77	2.883	0.1178	0.869
10/24/01 10:10	0.167	19.77	2.852	0.127	0.86
10/24/01 10:10	0.177	19.77	2.821	0.137	0.85
10/24/01 10:10	0.1875	19.77	2.79	0.1475	0.841
10/24/01 10:10	0.1985	19.77	2.755	0.1585	0.831
10/24/01 10:10	0.2102	19.77	2.72	0.1702	0.82
10/24/01 10:10	0.2227	19.76	2.684	0.1827	0.809
10/24/01 10:10	0.2358	19.76	2.645	0.1958	0.797
10/24/01 10:10	0.2498	19.76	2.606	0.2098	0.786
10/24/01 10:10	0.2647	19.76	2.564	0.2247	0.773
10/24/01 10:10	0.2803	19.76	2.521	0.2403	0.76
10/24/01 10:10	0.297	19.76	2.477	0.257	0.747
10/24/01 10:10	0.3147	19.76	2.43	0.2747	0.733
10/24/01 10:10	0.3333	19.76	2.382	0.2933	0.718
10/24/01 10:10	0.3532	19.76	2.332	0.3132	0.703
10/24/01 10:10	0.3742	19.76	2.283	0.3342	0.688
10/24/01 10:10	0.3963	19.76	2.231	0.3563	0.673
10/24/01 10:10	0.4198	19.76	2.177	0.3798	0.656
10/24/01 10:10	0.4447	19.76	2.125	0.4047	0.641
10/24/01 10:10	0.4697	19.76	2.072	0.4297	0.625
10/24/01 10:10	0.4963	19.76	2.016	0.4563	0.608
10/24/01 10:10	0.5247	19.76	1.96	0.4847	0.591
10/24/01 10:10	0.5547	19.76	1.902	0.5147	0.573
10/24/01 10:10	0.5863	19.76	1.844	0.5463	0.556
10/24/01 10:10	0.6213	19.76	1.782	0.5813	0.537
10/24/01 10:10	0.6578	19.76	1.72	0.6178	0.519
10/24/01 10:10	0.6963	19.76	1.658	0.6563	0.5
10/24/01 10:10	0.738	19.76	1.594	0.698	0.481
10/24/01 10:10	0.7813	19.76	1.532	0.7413	0.462
10/24/01 10:10	0.828	19.76	1.465	0.788	0.442
10/24/01 10:10	0.8763	19.76	1.403	0.8363	0.423
10/24/01 10:11	0.928	19.75	1.341	0.888	0.404
10/24/01 10:11	0.983	19.75	1.275	0.943	0.384
10/24/01 10:11	1.0413	19.75	1.211	1.0013	0.365
10/24/01 10:11	1.103	19.75	1.149	1.063	0.346
10/24/01 10:11	1.168	19.75	1.084	1.128	0.327
10/24/01 10:11	1.238	19.75	1.022	1.198	0.308
10/24/01 10:11	1.3113	19.75	0.964	1.2713	0.291
10/24/01 10:11	1.3897	19.75	0.911	1.3497	0.275
10/24/01 10:11	1.473	19.75	0.859	1.433	0.259
10/24/01 10:11	1.5613	19.75	0.818	1.5213	0.247
10/24/01 10:11	1.6547	19.75	0.78	1.6147	0.235
10/24/01 10:11	1.753	19.75	0.749	1.713	0.226
10/24/01 10:11	1.858	19.75	0.72	1.818	0.217
10/24/01 10:12	1.968	19.74	0.695	1.928	0.21
10/24/01 10:12	2.0847	19.75	0.673	2.0447	0.203
10/24/01 10:12	2.2097	19.74	0.65	2.1697	0.196
10/24/01 10:12	2.3412	19.74	0.631	2.3012	0.19
10/24/01 10:12	2.4813	19.74	0.614	2.4413	0.185
10/24/01 10:12	2.6297	19.74	0.598	2.5897	0.18

10/24/01 10:12	2.7863	19.74	0.586	2.7463	0.177
10/24/01 10:13	2.953	19.74	0.571	2.913	0.172
10/24/01 10:13	3.1297	19.74	0.559	3.0897	0.169
10/24/01 10:13	3.3163	19.74	0.546	3.2763	0.165
10/24/01 10:13	3.5147	19.74	0.534	3.4747	0.161
10/24/01 10:13	3.7247	19.74	0.521	3.6847	0.157
10/24/01 10:14	3.9463	19.74	0.511	3.9063	0.154
10/24/01 10:14	4.1813	19.74	0.499	4.1413	0.15
10/24/01 10:14	4.4295	19.74	0.486	4.3895	0.147
10/24/01 10:14	4.693	19.74	0.476	4.653	0.144
10/24/01 10:15	4.973	19.74	0.463	4.933	0.14
10/24/01 10:15	5.2697	19.74	0.451	5.2297	0.136
10/24/01 10:15	5.583	19.74	0.441	5.543	0.133
10/24/01 10:15	5.9147	19.74	0.43	5.8747	0.13
10/24/01 10:16	6.2663	19.74	0.42	6.2263	0.127
10/24/01 10:16	6.6397	19.74	0.408	6.5997	0.123
10/24/01 10:17	7.0347	19.74	0.397	6.9947	0.12
10/24/01 10:17	7.453	19.74	0.387	7.413	0.117
10/24/01 10:17	7.8963	19.74	0.377	7.8563	0.114
10/24/01 10:18	8.3663	19.74	0.368	8.3263	0.111
10/24/01 10:18	8.8647	19.74	0.358	8.8247	0.108
10/24/01 10:19	9.3913	19.72	0.347	9.3513	0.105
10/24/01 10:20	9.9497	19.72	0.337	9.9097	0.102
10/24/01 10:20	10.5413	19.72	0.329	10.5013	0.099
10/24/01 10:21	11.168	19.74	0.319	11.128	0.096
10/24/01 10:21	11.8313	19.74	0.31	11.7913	0.093
10/24/01 10:22	12.5347	19.74	0.302	12.4947	0.091
10/24/01 10:23	13.2797	19.74	0.294	13.2397	0.089
10/24/01 10:24	14.0697	19.74	0.283	14.0297	0.085
10/24/01 10:24	14.9063	19.72	0.273	14.8663	0.082
10/24/01 10:25	15.7913	19.72	0.265	15.7513	0.08
10/24/01 10:26	16.7297	19.72	0.256	16.6897	0.077
10/24/01 10:27	17.723	19.74	0.246	17.683	0.074
10/24/01 10:28	18.7763	19.74	0.238	18.7363	0.072
10/24/01 10:29	19.8913	19.72	0.227	19.8513	0.068
10/24/01 10:31	21.073	19.72	0.217	21.033	0.065
10/24/01 10:32	22.3247	19.72	0.211	22.2847	0.064
10/24/01 10:33	23.6497	19.74	0.201	23.6097	0.061
10/24/01 10:35	25.0547	19.74	0.194	25.0147	0.058
10/24/01 10:36	26.543	19.72	0.186	26.503	0.056
10/24/01 10:38	28.118	19.72	0.176	28.078	0.053
10/24/01 10:39	29.7863	19.74	0.168	29.7463	0.051
10/24/01 10:41	31.5547	19.74	0.159	31.5147	0.048
10/24/01 10:43	33.428	19.74	0.151	33.388	0.046
10/24/01 10:45	35.4112	19.74	0.139	35.3712	0.042
10/24/01 10:47	37.513	19.74	0.13	37.473	0.039
10/24/01 10:49	39.7397	19.72	0.124	39.6997	0.037
10/24/01 10:52	42.098	19.72	0.111	42.058	0.033
10/24/01 10:54	44.5963	19.72	0.103	44.5563	0.031
10/24/01 10:57	47.243	19.74	0.097	47.203	0.029
10/24/01 11:00	50.0463	19.74	0.091	50.0063	0.027
10/24/01 11:03	53.0147	19.74	0.083	52.9747	0.025
10/24/01 11:06	56.1597	19.72	0.078	56.1197	0.024
10/24/01 11:09	59.4913	19.72	0.078	59.4513	0.024
10/24/01 11:13	63.0197	19.72	0.076	62.9797	0.023
10/24/01 11:16	66.758	19.74	0.072	66.718	0.022
10/24/01 11:20	70.718	19.72	0.074	70.678	0.022
10/24/01 11:24	74.9113	19.74	0.072	74.8713	0.022
10/24/01 11:29	79.3547	19.74	0.07	79.3147	0.021
10/24/01 11:34	84.0613	19.74	0.064	84.0213	0.019

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

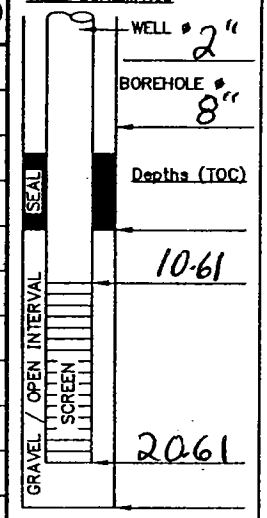
Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW11
PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER
WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10 / 10.61-20.61' TEST NO.:
STATIC WATER LEVEL (Depth/Elevation): 9.23 TPVC DATE: 10-24-01
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:
METHOD OF INDUCING WATER LEVEL CHANGE: 2x 1 liter BAILERS PAGE ..... OF .....
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): 0.00 TOC

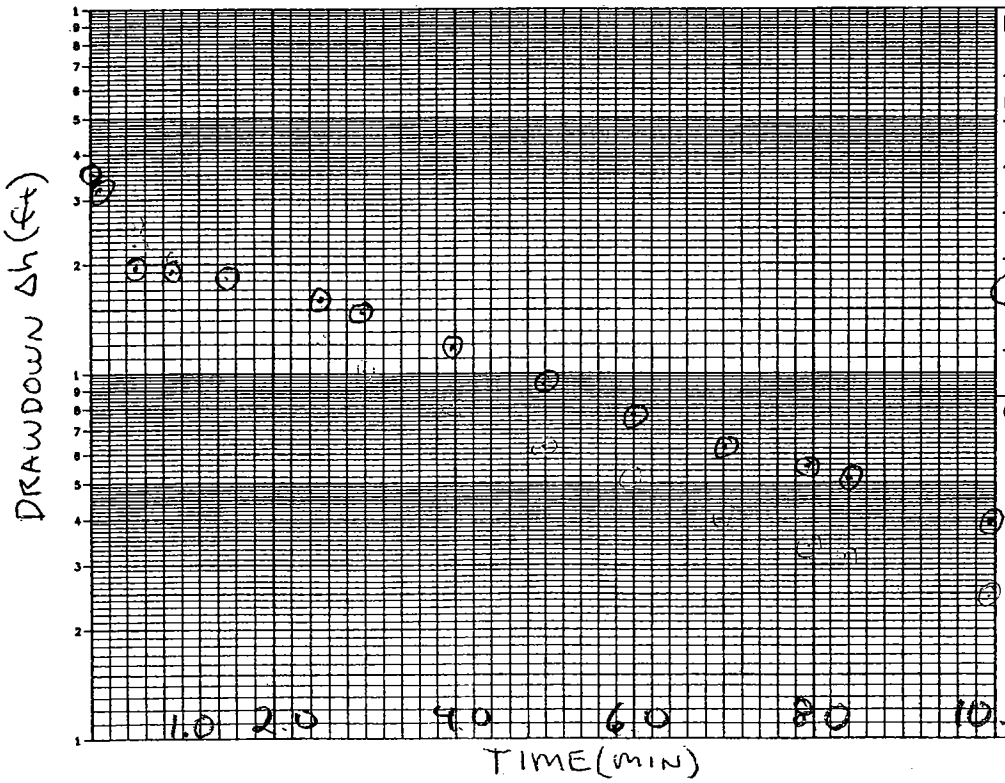
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	7.8962		0.542
0.035		3.300	8.3663		0.501
0.1488		2.289	9.9497		0.399
0.4963		1.995			
0.9828		1.891			
1.4728		1.814			
2.4812		1.589			
2.9530		1.487			
3.9463		1.173			
4.9728		0.935			
5.9145		0.770			
7.0345		0.627			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:
INSERTED BAILER 1635
STARTED TEST @ 1705
STOPPED TEST @ 1743 WL = 9.31

CALCS, SKETCH MAPS, ETC.:

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW11	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: [illegible]	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 10$ (INPUT LENGTH, Ft)
$T_o = 4.8$ min (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

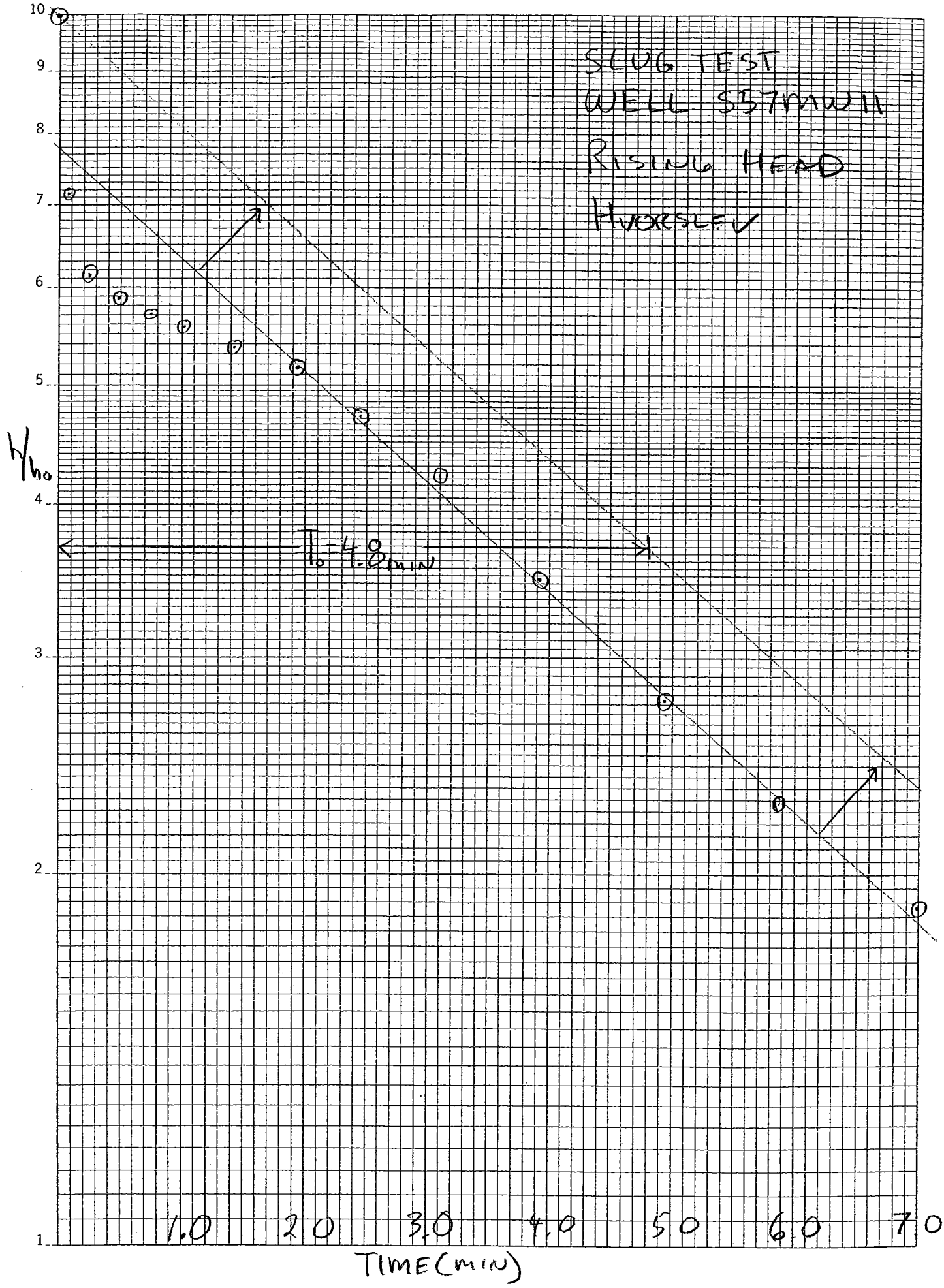
$$K = \frac{(0.083)^2 \ln(10/0.083)}{2(10)(4.8)}$$

$$= \frac{3.30086419 \times 10^{-2}}{96}$$

$$= 3.44 \times 10^{-4} \text{ ft/min}$$

$$= 1.75 \times 10^{-4} \text{ cm/sec}$$

$$= 0.495 \text{ ft/day}$$



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 8:58:11
Report from file: C:\Win-Situ\Data\SN01966 2001-10-24 170552 s57mw11rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw11rhno1

Test defined on: 10/24/01 17:03:56
Test started on: 10/24/01 17:05:52
Test stopped on: 10/24/01 17:41:58
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between data points:10.00(Minutes.
Number of data samples: 123

TOTAL DATA SAMPLES 123

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 9.863 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 3.373
10/24/01	17:05	0	19.76	0			
10/24/01	17:05	0.005	19.77	-0.002			
10/24/01	17:05	0.01	19.77	-0.004			
10/24/01	17:05	0.015	19.77	8.798			
10/24/01	17:05	0.02	19.79	7.815			
10/24/01	17:05	0.025	19.79	4.012			
10/24/01	17:05	0.03	19.79	3.373	0	1.000	
10/24/01	17:05	0.035	19.79	3.3	0.005	0.978	
10/24/01	17:05	0.04	19.79	3.226	0.01	0.956	
10/24/01	17:05	0.045	19.79	3.128	0.015	0.927	
10/24/01	17:05	0.05	19.79	3.1	0.02	0.919	
10/24/01	17:05	0.055	19.8	3.034	0.025	0.899	
10/24/01	17:05	0.06	19.8	2.978	0.03	0.883	

10/24/01 17:05	0.065	19.8	2.926	0.035	0.867
10/24/01 17:05	0.07	19.8	2.876	0.04	0.853
10/24/01 17:05	0.075	19.8	2.829	0.045	0.839
10/24/01 17:05	0.08	19.8	2.765	0.05	0.820
10/24/01 17:05	0.0848	19.8	2.723	0.0548	0.807
10/24/01 17:05	0.09	19.8	2.68	0.06	0.795
10/24/01 17:05	0.095	19.8	2.638	0.065	0.782
10/24/01 17:05	0.1	19.8	2.595	0.07	0.769
10/24/01 17:05	0.1058	19.8	2.549	0.0758	0.756
10/24/01 17:05	0.112	19.8	2.502	0.082	0.742
10/24/01 17:06	0.1185	19.8	2.456	0.0885	0.728
10/24/01 17:06	0.1255	19.8	2.411	0.0955	0.715
10/24/01 17:06	0.1328	19.8	2.367	0.1028	0.702
10/24/01 17:06	0.1407	19.81	2.326	0.1107	0.690
10/24/01 17:06	0.149	19.81	2.289	0.119	0.679
10/24/01 17:06	0.1578	19.81	2.256	0.1278	0.669
10/24/01 17:06	0.167	19.8	2.225	0.137	0.660
10/24/01 17:06	0.177	19.8	2.2	0.147	0.652
10/24/01 17:06	0.1875	19.8	2.179	0.1575	0.646
10/24/01 17:06	0.1985	19.8	2.161	0.1685	0.641
10/24/01 17:06	0.2102	19.8	2.14	0.1802	0.634
10/24/01 17:06	0.2227	19.8	2.125	0.1927	0.630
10/24/01 17:06	0.2358	19.8	2.113	0.2058	0.626
10/24/01 17:06	0.2498	19.8	2.098	0.2198	0.622
10/24/01 17:06	0.2647	19.8	2.088	0.2347	0.619
10/24/01 17:06	0.2803	19.8	2.076	0.2503	0.615
10/24/01 17:06	0.297	19.8	2.067	0.267	0.613
10/24/01 17:06	0.3147	19.79	2.057	0.2847	0.610
10/24/01 17:06	0.3333	19.8	2.049	0.3033	0.607
10/24/01 17:06	0.3532	19.79	2.04	0.3232	0.605
10/24/01 17:06	0.3742	19.79	2.032	0.3442	0.602
10/24/01 17:06	0.3963	19.79	2.024	0.3663	0.600
10/24/01 17:06	0.4198	19.8	2.016	0.3898	0.598
10/24/01 17:06	0.4447	19.79	2.009	0.4147	0.596
10/24/01 17:06	0.4697	19.79	2.001	0.4397	0.593
10/24/01 17:06	0.4963	19.79	1.995	0.4663	0.591
10/24/01 17:06	0.5247	19.79	1.986	0.4947	0.589
10/24/01 17:06	0.5547	19.79	1.978	0.5247	0.586
10/24/01 17:06	0.5863	19.79	1.972	0.5563	0.585
10/24/01 17:06	0.6213	19.79	1.962	0.5913	0.582
10/24/01 17:06	0.6578	19.79	1.953	0.6278	0.579
10/24/01 17:06	0.6963	19.79	1.945	0.6663	0.577
10/24/01 17:06	0.738	19.79	1.937	0.708	0.574
10/24/01 17:06	0.7813	19.79	1.929	0.7513	0.572
10/24/01 17:06	0.828	19.79	1.92	0.798	0.569
10/24/01 17:06	0.8763	19.79	1.912	0.8463	0.567
10/24/01 17:06	0.928	19.79	1.902	0.898	0.564
10/24/01 17:06	0.983	19.79	1.891	0.953	0.561
10/24/01 17:06	1.0413	19.79	1.883	1.0113	0.558
10/24/01 17:06	1.103	19.79	1.873	1.073	0.555
10/24/01 17:07	1.168	19.77	1.864	1.138	0.553
10/24/01 17:07	1.238	19.77	1.852	1.208	0.549
10/24/01 17:07	1.3113	19.77	1.839	1.2813	0.545
10/24/01 17:07	1.3897	19.77	1.827	1.3597	0.542
10/24/01 17:07	1.473	19.77	1.814	1.443	0.538

10/24/01 17:07	1.5613	19.77	1.802	1.5313	0.534
10/24/01 17:07	1.6547	19.77	1.792	1.6247	0.531
10/24/01 17:07	1.753	19.77	1.775	1.723	0.526
10/24/01 17:07	1.858	19.77	1.759	1.828	0.521
10/24/01 17:07	1.968	19.77	1.744	1.938	0.517
10/24/01 17:07	2.0847	19.77	1.723	2.0547	0.511
10/24/01 17:08	2.2097	19.77	1.701	2.1797	0.504
10/24/01 17:08	2.3412	19.77	1.645	2.3112	0.488
10/24/01 17:08	2.4813	19.77	1.589	2.4513	0.471
10/24/01 17:08	2.6297	19.76	1.537	2.5997	0.456
10/24/01 17:08	2.7863	19.76	1.518	2.7563	0.450
10/24/01 17:08	2.953	19.76	1.487	2.923	0.441
10/24/01 17:09	3.1297	19.76	1.425	3.0997	0.422
10/24/01 17:09	3.3163	19.76	1.361	3.2863	0.403
10/24/01 17:09	3.5147	19.76	1.299	3.4847	0.385
10/24/01 17:09	3.7247	19.76	1.237	3.6947	0.367
10/24/01 17:09	3.9463	19.76	1.173	3.9163	0.348
10/24/01 17:10	4.1813	19.76	1.113	4.1513	0.330
10/24/01 17:10	4.4295	19.76	1.053	4.3995	0.312
10/24/01 17:10	4.693	19.76	0.989	4.663	0.293
10/24/01 17:10	4.973	19.76	0.935	4.943	0.277
10/24/01 17:11	5.2697	19.76	0.879	5.2397	0.261
10/24/01 17:11	5.583	19.76	0.823	5.553	0.244
10/24/01 17:11	5.9147	19.76	0.77	5.8847	0.228
10/24/01 17:12	6.2663	19.76	0.718	6.2363	0.213
10/24/01 17:12	6.6397	19.76	0.67	6.6097	0.199
10/24/01 17:12	7.0347	19.76	0.627	7.0047	0.186
10/24/01 17:13	7.453	19.76	0.581	7.423	0.172
10/24/01 17:13	7.8963	19.75	0.542	7.8663	0.161
10/24/01 17:14	8.3663	19.76	0.501	8.3363	0.149
10/24/01 17:14	8.8647	19.75	0.463	8.8347	0.137
10/24/01 17:15	9.3913	19.75	0.432	9.3613	0.128
10/24/01 17:15	9.9497	19.75	0.399	9.9197	0.118
10/24/01 17:16	10.5413	19.75	0.37	10.5113	0.110
10/24/01 17:17	11.168	19.75	0.343	11.138	0.102
10/24/01 17:17	11.8313	19.75	0.32	11.8013	0.095
10/24/01 17:18	12.5347	19.75	0.293	12.5047	0.087
10/24/01 17:19	13.2797	19.75	0.275	13.2497	0.082
10/24/01 17:19	14.0697	19.75	0.256	14.0397	0.076
10/24/01 17:20	14.9063	19.75	0.24	14.8763	0.071
10/24/01 17:21	15.7913	19.75	0.223	15.7613	0.066
10/24/01 17:22	16.7297	19.75	0.211	16.6997	0.063
10/24/01 17:23	17.723	19.75	0.196	17.693	0.058
10/24/01 17:24	18.7763	19.75	0.213	18.7463	0.063
10/24/01 17:25	19.8913	19.75	0.205	19.8613	0.061
10/24/01 17:26	21.073	19.75	0.186	21.043	0.055
10/24/01 17:28	22.3247	19.75	0.169	22.2947	0.050
10/24/01 17:29	23.6497	19.75	0.157	23.6197	0.047
10/24/01 17:30	25.0547	19.75	0.142	25.0247	0.042
10/24/01 17:32	26.543	19.75	0.134	26.513	0.040
10/24/01 17:34	28.118	19.75	0.122	28.088	0.036
10/24/01 17:35	29.7863	19.75	0.116	29.7563	0.034
10/24/01 17:37	31.5547	19.75	0.107	31.5247	0.032
10/24/01 17:39	33.428	19.75	0.099	33.398	0.029
10/24/01 17:41	35.4112	19.75	0.095	35.3812	0.028

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW12

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 34.09 - 44.09 TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 6.08 TPVC DATE: 10-24-01

TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

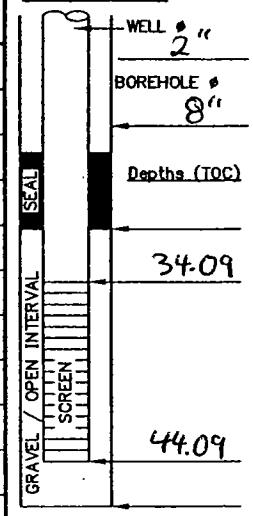
METHOD OF INDUCING WATER LEVEL CHANGE: 2x 1 liter bailer PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC Ref to 0.00

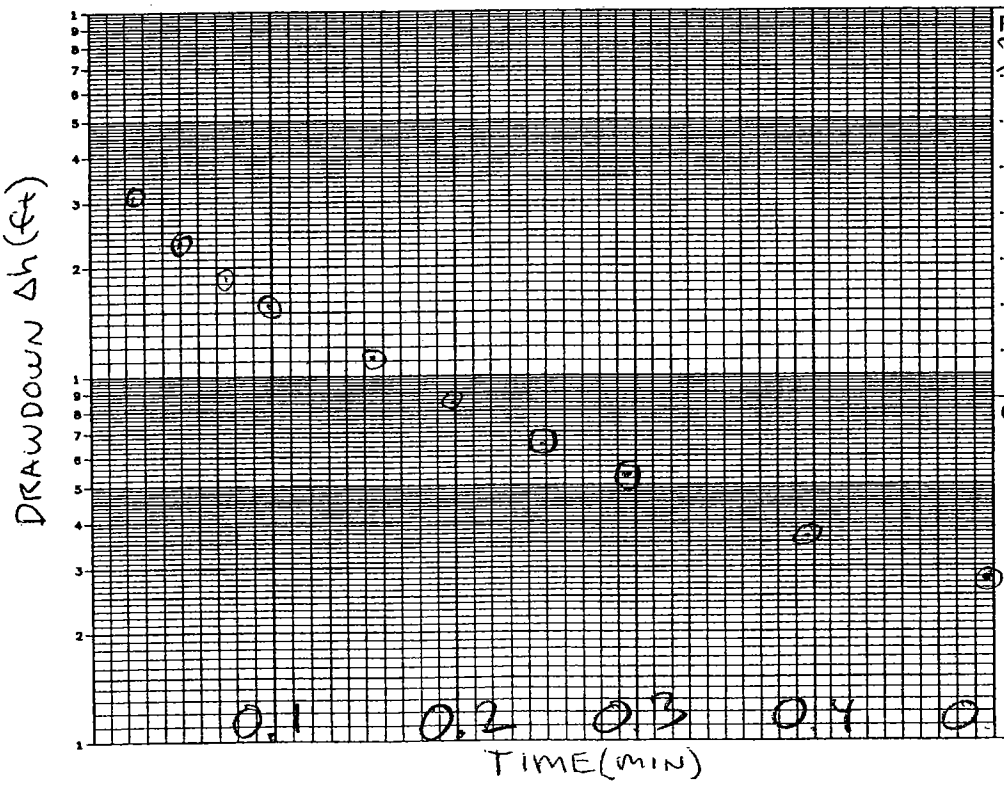
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000			
0.025		3.110			
0.05		2.337			
0.075		1.888			
0.100		1.550			
0.1488		1.106			
0.1985		0.830			
0.2498		0.642			
0.2970		0.523			
0.3963		0.366			
0.4963		0.244			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

INSERT SLUG @ 1300

STARTED TEST @ 1323

STOPPED 1336

CALCS, SKETCH MAPS, ETC.:

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57MW12 RISING HEAD	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY CJK	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_0}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 10.0$ (INPUT LENGTH, Ft)
$T_0 = 0.1325$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

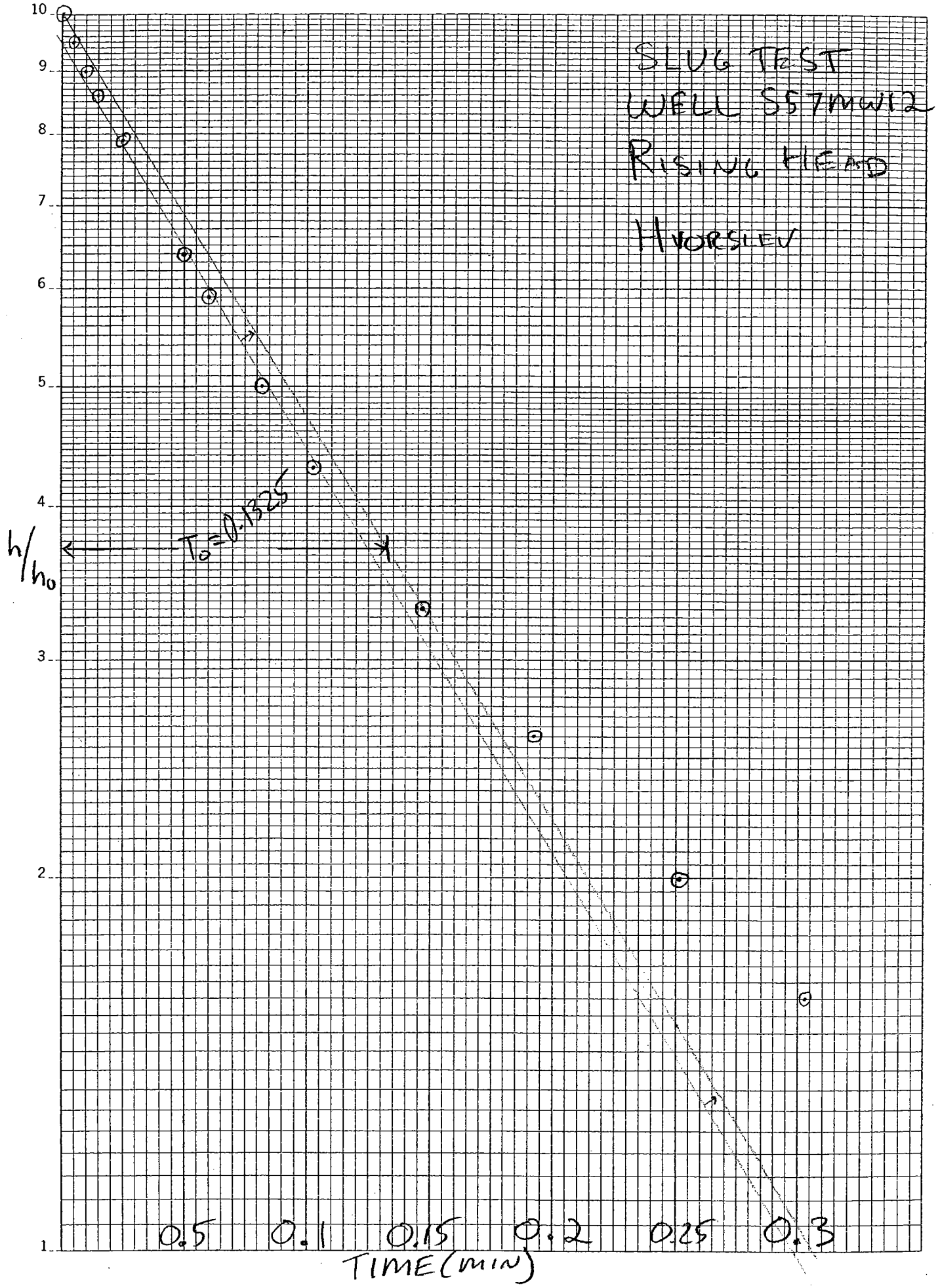
$$K = \frac{(0.083)^2 \ln(10/0.083)}{2(10)(0.1325)}$$

$$= \frac{3.30086419 \times 10^{-2}}{2.65}$$

$$= 1.25 \times 10^{-2} \text{ ft/min}$$

$$= 6.33 \times 10^{-3} \text{ cm/sec}$$

$$= 17.94 \text{ ft/day}$$



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/30/01 16:04:31
Report from file: C:\Win-Situ\Data\SN01966 2001-10-24 132329 s57mw12rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw12rhno1

Test defined on: 10/24/01 13:03:40
Test started on: 10/24/01 13:23:29
Test stopped on: 10/24/01 13:36:42
Test extracted on: N/A

Data gathered using Logarithmic testing
ximum time between data points: 10. Minutes.
Number of data samples: 105

TOTAL DATA SAMPLES 105

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 11.608 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 2.837
10/24/01	13:23	0	17.05	0			
10/24/01	13:23	0.005	17.06	-0.002			
10/24/01	13:23	0.01	17.06	0.011			
10/24/01	13:23	0.015	17.06	5.728			
10/24/01	13:23	0.02	17.06	3.793			
10/24/01	13:23	0.025	17.08	3.11			
10/24/01	13:23	0.03	17.08	2.837	0	1.00	
10/24/01	13:23	0.035	17.08	2.707	0.005	0.95	
10/24/01	13:23	0.04	17.08	2.552	0.01	0.90	
10/24/01	13:23	0.045	17.08	2.452	0.015	0.86	

10/24/01 13:23	0.05	17.09	2.337	0.02	0.82
10/24/01 13:23	0.055	17.09	2.235	0.025	0.79
10/24/01 13:23	0.06	17.09	2.14	0.03	0.75
10/24/01 13:23	0.065	17.09	2.053	0.035	0.72
10/24/01 13:23	0.07	17.09	1.966	0.04	0.69
10/24/01 13:23	0.075	17.09	1.888	0.045	0.67
10/24/01 13:23	0.08	17.09	1.817	0.05	0.64
10/24/01 13:23	0.0848	17.09	1.741	0.0548	0.61
10/24/01 13:23	0.09	17.09	1.673	0.06	0.59
10/24/01 13:23	0.095	17.09	1.608	0.065	0.57
10/24/01 13:23	0.1	17.09	1.55	0.07	0.55
10/24/01 13:23	0.1058	17.09	1.486	0.0758	0.52
10/24/01 13:23	0.112	17.09	1.418	0.082	0.50
10/24/01 13:23	0.1185	17.09	1.356	0.0885	0.48
10/24/01 13:23	0.1255	17.09	1.29	0.0955	0.45
10/24/01 13:23	0.1328	17.09	1.228	0.1028	0.43
10/24/01 13:23	0.1407	17.09	1.166	0.1107	0.41
10/24/01 13:23	0.149	17.09	1.106	0.119	0.39
10/24/01 13:23	0.1578	17.09	1.046	0.1278	0.37
10/24/01 13:23	0.167	17.09	0.99	0.137	0.35
10/24/01 13:23	0.177	17.09	0.934	0.147	0.33
10/24/01 13:23	0.1875	17.08	0.88	0.1575	0.31
10/24/01 13:23	0.1985	17.08	0.83	0.1685	0.29
10/24/01 13:23	0.2102	17.08	0.781	0.1802	0.28
10/24/01 13:23	0.2227	17.08	0.731	0.1927	0.26
10/24/01 13:23	0.2358	17.06	0.685	0.2058	0.24
10/24/01 13:23	0.2498	17.06	0.642	0.2198	0.23
10/24/01 13:23	0.2647	17.06	0.6	0.2347	0.21
10/24/01 13:23	0.2803	17.05	0.561	0.2503	0.20
10/24/01 13:23	0.297	17.05	0.523	0.267	0.18
10/24/01 13:23	0.3147	17.05	0.488	0.2847	0.17
10/24/01 13:23	0.3333	17.04	0.455	0.3033	0.16
10/24/01 13:23	0.3532	17.04	0.424	0.3232	0.15
10/24/01 13:23	0.3742	17.04	0.393	0.3442	0.14
10/24/01 13:23	0.3963	17.03	0.366	0.3663	0.13
10/24/01 13:23	0.4198	17.03	0.339	0.3898	0.12
10/24/01 13:23	0.4447	17.01	0.314	0.4147	0.11
10/24/01 13:23	0.4697	17	0.293	0.4397	0.10
10/24/01 13:23	0.4963	17	0.274	0.4663	0.10
10/24/01 13:24	0.5247	16.99	0.253	0.4947	0.09
10/24/01 13:24	0.5547	16.99	0.234	0.5247	0.08
10/24/01 13:24	0.5863	16.98	0.218	0.5563	0.08
10/24/01 13:24	0.6213	16.96	0.201	0.5913	0.07
10/24/01 13:24	0.6578	16.95	0.186	0.6278	0.07
10/24/01 13:24	0.6963	16.94	0.173	0.6663	0.06
10/24/01 13:24	0.738	16.93	0.159	0.708	0.06
10/24/01 13:24	0.7813	16.91	0.146	0.7513	0.05
10/24/01 13:24	0.828	16.9	0.133	0.798	0.05
10/24/01 13:24	0.8763	16.89	0.123	0.8463	0.04
10/24/01 13:24	0.928	16.87	0.112	0.898	0.04
10/24/01 13:24	0.983	16.86	0.101	0.953	0.04
10/24/01 13:24	1.0413	16.85	0.091	1.0113	0.03

10/24/01 13:24	1.103	16.84	0.082	1.073	0.03
10/24/01 13:24	1.168	16.81	0.073	1.138	0.03
10/24/01 13:24	1.238	16.8	0.063	1.208	0.02
10/24/01 13:24	1.3113	16.79	0.058	1.2813	0.02
10/24/01 13:24	1.3897	16.77	0.052	1.3597	0.02
10/24/01 13:24	1.473	16.76	0.041	1.443	0.01
10/24/01 13:25	1.5613	16.75	0.035	1.5313	0.01
10/24/01 13:25	1.6547	16.72	0.03	1.6247	0.01
10/24/01 13:25	1.753	16.71	0.024	1.723	0.01
10/24/01 13:25	1.858	16.7	0.017	1.828	0.01
10/24/01 13:25	1.968	16.68	0.013	1.938	0.00
10/24/01 13:25	2.0847	16.67	0.008	2.0547	0.00
10/24/01 13:25	2.2097	16.66	0.004	2.1797	0.00
10/24/01 13:25	2.3412	16.65	0.002	2.3112	0.00
10/24/01 13:25	2.4813	16.63	0.001	2.4513	0.00
10/24/01 13:26	2.6297	16.62	-0.001	2.5997	0.00
10/24/01 13:26	2.7863	16.62	-0.005	2.7563	0.00
10/24/01 13:26	2.953	16.61	-0.008	2.923	0.00
10/24/01 13:26	3.1297	16.6	-0.012	3.0997	0.00
10/24/01 13:26	3.3163	16.58	-0.012	3.2863	0.00
10/24/01 13:27	3.5147	16.58	-0.014	3.4847	0.00
10/24/01 13:27	3.7247	16.57	-0.017	3.6947	-0.01
10/24/01 13:27	3.9463	16.57	-0.017	3.9163	-0.01
10/24/01 13:27	4.1813	16.56	-0.019	4.1513	-0.01
10/24/01 13:27	4.4295	16.56	-0.017	4.3995	-0.01
10/24/01 13:28	4.693	16.55	-0.019	4.663	-0.01
10/24/01 13:28	4.973	16.55	-0.019	4.943	-0.01
10/24/01 13:28	5.2697	16.55	-0.019	5.2397	-0.01
10/24/01 13:29	5.583	16.55	-0.021	5.553	-0.01
10/24/01 13:29	5.9147	16.55	-0.019	5.8847	-0.01
10/24/01 13:29	6.2663	16.55	-0.019	6.2363	-0.01
10/24/01 13:30	6.6397	16.55	-0.019	6.6097	-0.01
10/24/01 13:30	7.0347	16.55	-0.021	7.0047	-0.01
10/24/01 13:30	7.453	16.55	-0.021	7.423	-0.01
10/24/01 13:31	7.8963	16.55	-0.021	7.8663	-0.01
10/24/01 13:31	8.3663	16.55	-0.019	8.3363	-0.01
10/24/01 13:32	8.8647	16.56	-0.019	8.8347	-0.01
10/24/01 13:32	9.3913	16.56	-0.021	9.3613	-0.01
10/24/01 13:33	9.9497	16.56	-0.019	9.9197	-0.01
10/24/01 13:34	10.5413	16.57	-0.021	10.5113	-0.01
10/24/01 13:34	11.168	16.57	-0.019	11.138	-0.01
10/24/01 13:35	11.8313	16.58	-0.018	11.8013	-0.01
10/24/01 13:36	12.5347	16.58	-0.018	12.5047	-0.01

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW13

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 7.76 - 17.76 TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 5.87 DATE: 10-24-01

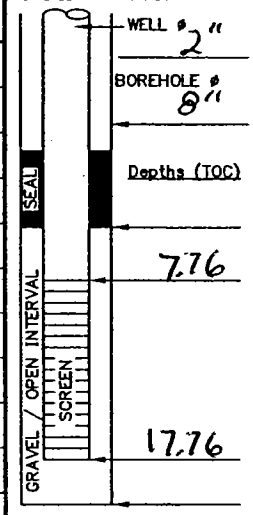
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: 2 x 1 liter bailers PAGE ..... OF .....

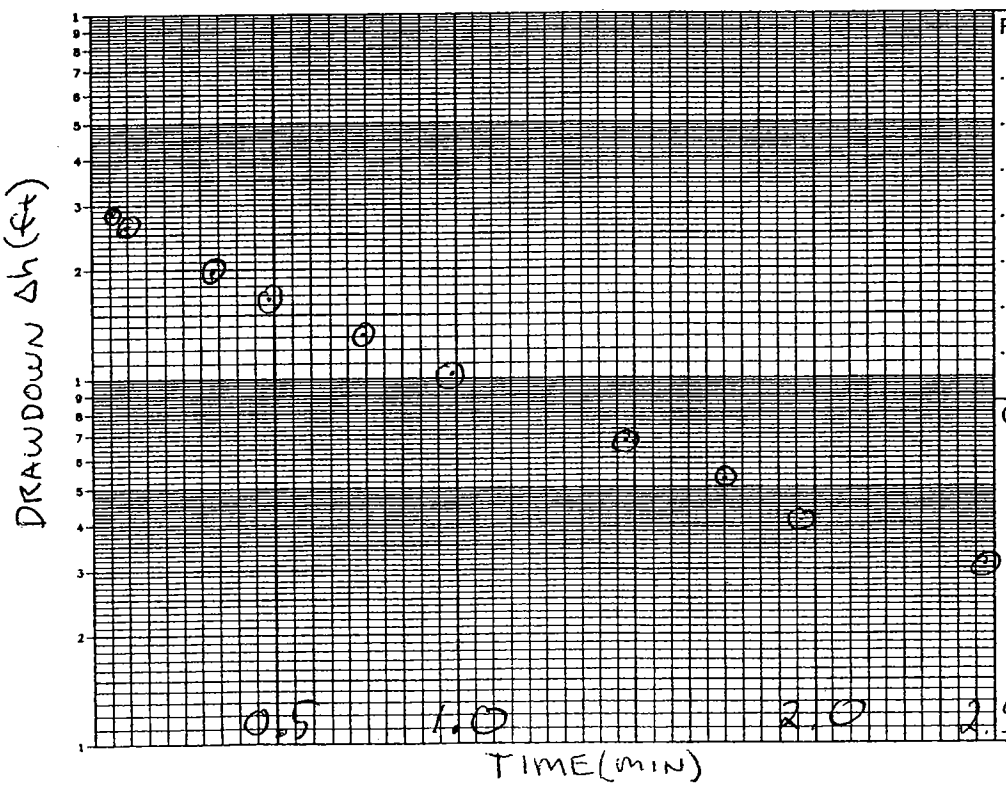
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC Ref = 0.00

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000			
0.025		3.098			
0.050		2.868			
0.100		2.622			
0.333		1.999			
0.4963		1.685			
0.7380		1.323			
0.9828		1.044			
1.4728		0.671			
1.7530		0.535			
1.9678		0.452			
2.4812		0.312			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

head = 11.577

INSERT BAILER 11.55 HRS

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE _____ OF _____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW13	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY:	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2L T_o}$$

WHERE:

$r = 0.083$ (RISER RADIUS, Ft)
$R = 0.083$ (SCREEN RADIUS, Ft)
$L = 10$ (INPUT LENGTH, Ft)
$T_o = 1.002$ min (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

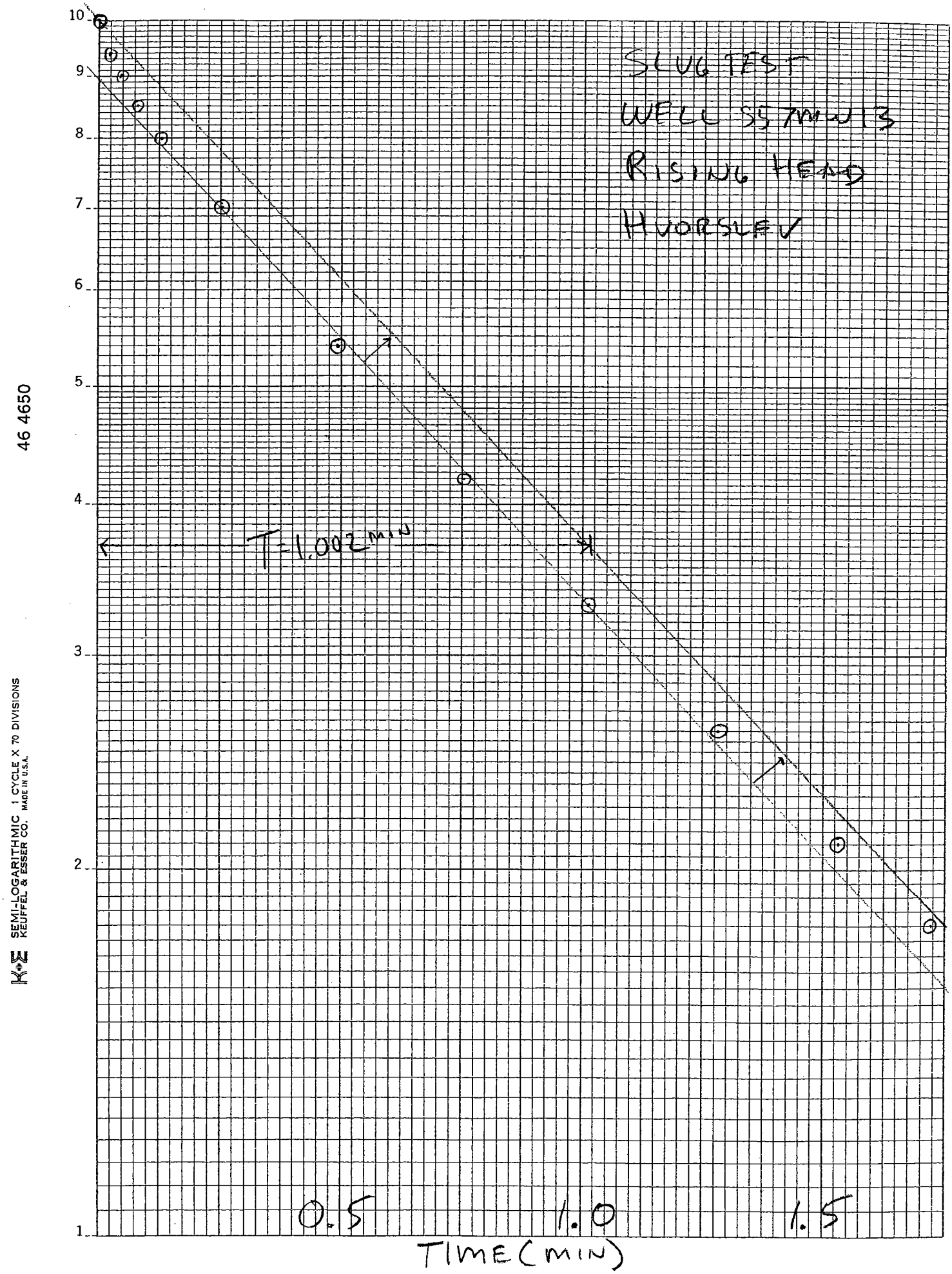
$$K = \frac{(0.083)^2 \ln(10/0.083)}{2(10)(1.002)}$$

$$\frac{3.30086419 \times 10^{-2}}{40.08}$$

$= 1.65 \times 10^{-3}$ ft/min

$= 8.37 \times 10^{-4}$ cm/sec

$= 2.37$ ft/day


SLUG TEST
WELL 55 7N-J13
RISING HEAD
HVORSLEV
T=1.002 MIN
10
9
8
7
6
5
4
3
2
1
0.5
1.0
1.5
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 9:59:42
Report from file: C:\Win-Situ\Data\SN01966 2001-10-24 123922 s57mw13rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw13rhno1

Test defined on: 10/24/01 11:51:42
Test started on: 10/24/01 12:39:22
Test stopped on: 10/24/01 12:53:12
Test extracted on: N/A

ata gathered using Logarithmic testing
mum time between data points: 1 Minutes.
Number of data samples: 106

TOTAL DATA SAMPLES 106

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 11.56 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 3.027
10/24/01	12:39	0	17.17	0			
10/24/01	12:39	0.005	17.18	0.004			
10/24/01	12:39	0.01	17.18	3.412			
10/24/01	12:39	0.015	17.19	7.659			
10/24/01	12:39	0.02	17.19	3.075			
10/24/01	12:39	0.025	17.19	3.098			
10/24/01	12:39	0.03	17.19	3.027	0	1	
10/24/01	12:39	0.035	17.19	2.963	0.005	0.98	
10/24/01	12:39	0.04	17.19	2.943	0.01	0.97	
10/24/01	12:39	0.045	17.19	2.893	0.015	0.96	

10/24/01 12:39	0.05	17.2	2.868	0.02	0.95
10/24/01 12:39	0.055	17.2	2.835	0.025	0.94
10/24/01 12:39	0.06	17.2	2.81	0.03	0.93
10/24/01 12:39	0.065	17.2	2.79	0.035	0.92
10/24/01 12:39	0.07	17.2	2.765	0.04	0.91
10/24/01 12:39	0.075	17.2	2.726	0.045	0.9
10/24/01 12:39	0.08	17.2	2.711	0.05	0.9
10/24/01 12:39	0.0848	17.2	2.688	0.0548	0.89
10/24/01 12:39	0.09	17.2	2.668	0.06	0.88
10/24/01 12:39	0.095	17.2	2.643	0.065	0.87
10/24/01 12:39	0.1	17.2	2.622	0.07	0.87
10/24/01 12:39	0.1058	17.2	2.599	0.0758	0.86
10/24/01 12:39	0.112	17.2	2.577	0.082	0.85
10/24/01 12:39	0.1185	17.2	2.556	0.0885	0.84
10/24/01 12:39	0.1255	17.2	2.533	0.0955	0.84
10/24/01 12:39	0.1328	17.22	2.509	0.1028	0.83
10/24/01 12:39	0.1407	17.22	2.484	0.1107	0.82
10/24/01 12:39	0.149	17.22	2.459	0.119	0.81
10/24/01 12:39	0.1578	17.22	2.432	0.1278	0.8
10/24/01 12:39	0.167	17.22	2.405	0.137	0.79
10/24/01 12:39	0.177	17.2	2.378	0.147	0.79
10/24/01 12:39	0.1875	17.2	2.349	0.1575	0.78
10/24/01 12:39	0.1985	17.2	2.32	0.1685	0.77
10/24/01 12:39	0.2102	17.2	2.289	0.1802	0.76
10/24/01 12:39	0.2227	17.2	2.256	0.1927	0.75
10/24/01 12:39	0.2358	17.2	2.223	0.2058	0.73
10/24/01 12:39	0.2498	17.2	2.19	0.2198	0.72
10/24/01 12:39	0.2647	17.2	2.155	0.2347	0.71
10/24/01 12:39	0.2803	17.2	2.117	0.2503	0.7
10/24/01 12:39	0.297	17.2	2.08	0.267	0.69
10/24/01 12:39	0.3147	17.19	2.038	0.2847	0.67
10/24/01 12:39	0.3333	17.2	1.999	0.3033	0.66
10/24/01 12:39	0.3532	17.2	1.956	0.3232	0.65
10/24/01 12:39	0.3742	17.19	1.912	0.3442	0.63
10/24/01 12:39	0.3963	17.19	1.869	0.3663	0.62
10/24/01 12:39	0.4198	17.19	1.823	0.3898	0.6
10/24/01 12:39	0.4447	17.2	1.778	0.4147	0.59
10/24/01 12:39	0.4697	17.19	1.732	0.4397	0.57
10/24/01 12:39	0.4963	17.19	1.685	0.4663	0.56
10/24/01 12:39	0.5247	17.19	1.637	0.4947	0.54
10/24/01 12:39	0.5547	17.2	1.588	0.5247	0.52
10/24/01 12:39	0.5863	17.19	1.538	0.5563	0.51
10/24/01 12:39	0.6213	17.19	1.484	0.5913	0.49
10/24/01 12:40	0.6578	17.19	1.432	0.6278	0.47
10/24/01 12:40	0.6963	17.2	1.377	0.6663	0.45
10/24/01 12:40	0.738	17.19	1.323	0.708	0.44
10/24/01 12:40	0.7813	17.2	1.267	0.7513	0.42
10/24/01 12:40	0.828	17.2	1.211	0.798	0.4
10/24/01 12:40	0.8763	17.2	1.155	0.8463	0.38
10/24/01 12:40	0.928	17.2	1.099	0.898	0.36
10/24/01 12:40	0.983	17.2	1.044	0.953	0.34
10/24/01 12:40	1.0413	17.2	0.99	1.0113	0.33

10/24/01 12:40	1.103	17.2	0.934	1.073	0.31
10/24/01 12:40	1.168	17.2	0.878	1.138	0.29
10/24/01 12:40	1.238	17.2	0.826	1.208	0.27
10/24/01 12:40	1.3113	17.22	0.773	1.2813	0.26
10/24/01 12:40	1.3897	17.22	0.721	1.3597	0.24
10/24/01 12:40	1.473	17.22	0.671	1.443	0.22
10/24/01 12:40	1.5613	17.22	0.624	1.5313	0.21
10/24/01 12:41	1.6547	17.22	0.58	1.6247	0.19
10/24/01 12:41	1.753	17.22	0.535	1.723	0.18
10/24/01 12:41	1.858	17.22	0.493	1.828	0.16
10/24/01 12:41	1.968	17.22	0.452	1.938	0.15
10/24/01 12:41	2.0847	17.23	0.415	2.0547	0.14
10/24/01 12:41	2.2097	17.23	0.378	2.1797	0.12
10/24/01 12:41	2.3412	17.23	0.345	2.3112	0.11
10/24/01 12:41	2.4813	17.23	0.312	2.4513	0.1
10/24/01 12:42	2.6297	17.23	0.283	2.5997	0.09
10/24/01 12:42	2.7863	17.23	0.256	2.7563	0.08
10/24/01 12:42	2.953	17.23	0.229	2.923	0.08
10/24/01 12:42	3.1297	17.23	0.208	3.0997	0.07
10/24/01 12:42	3.3163	17.24	0.188	3.2863	0.06
10/24/01 12:42	3.5147	17.24	0.171	3.4847	0.06
10/24/01 12:43	3.7247	17.24	0.155	3.6947	0.05
10/24/01 12:43	3.9463	17.24	0.142	3.9163	0.05
10/24/01 12:43	4.1813	17.24	0.13	4.1513	0.04
10/24/01 12:43	4.4295	17.25	0.118	4.3995	0.04
10/24/01 12:44	4.693	17.25	0.11	4.663	0.04
10/24/01 12:44	4.973	17.25	0.101	4.943	0.03
10/24/01 12:44	5.2697	17.27	0.095	5.2397	0.03
10/24/01 12:44	5.583	17.27	0.089	5.553	0.03
10/24/01 12:45	5.9147	17.28	0.087	5.8847	0.03
10/24/01 12:45	6.2663	17.29	0.077	6.2363	0.03
10/24/01 12:46	6.6397	17.29	0.077	6.6097	0.03
10/24/01 12:46	7.0347	17.31	0.073	7.0047	0.02
10/24/01 12:46	7.453	17.32	0.074	7.423	0.02
10/24/01 12:47	7.8963	17.33	0.07	7.8663	0.02
10/24/01 12:47	8.3663	17.34	0.07	8.3363	0.02
10/24/01 12:48	8.8647	17.34	0.07	8.8347	0.02
10/24/01 12:48	9.3913	17.36	0.066	9.3613	0.02
10/24/01 12:49	9.9497	17.36	0.07	9.9197	0.02
10/24/01 12:49	10.5413	17.37	0.071	10.5113	0.02
10/24/01 12:50	11.168	17.37	0.069	11.138	0.02
10/24/01 12:51	11.8313	17.37	0.071	11.8013	0.02
10/24/01 12:51	12.5347	17.38	0.071	12.5047	0.02
10/24/01 12:52	13.2797	17.38	0.071	13.2497	0.02

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57TW15

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 1" SCREEN LENGTH/DEPTH: 5' / TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 8.70 TPVC DATE: 10-3-01

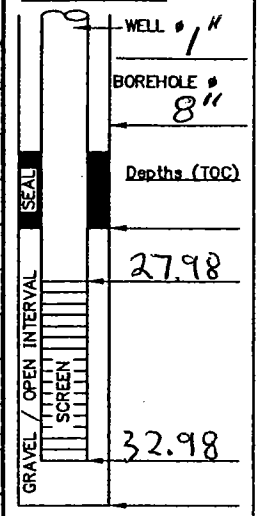
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: ~~PE BAILER 3'1" x 3/8" 6' x 1/2"~~ STEEL SLUG PAGE ..... OF .....

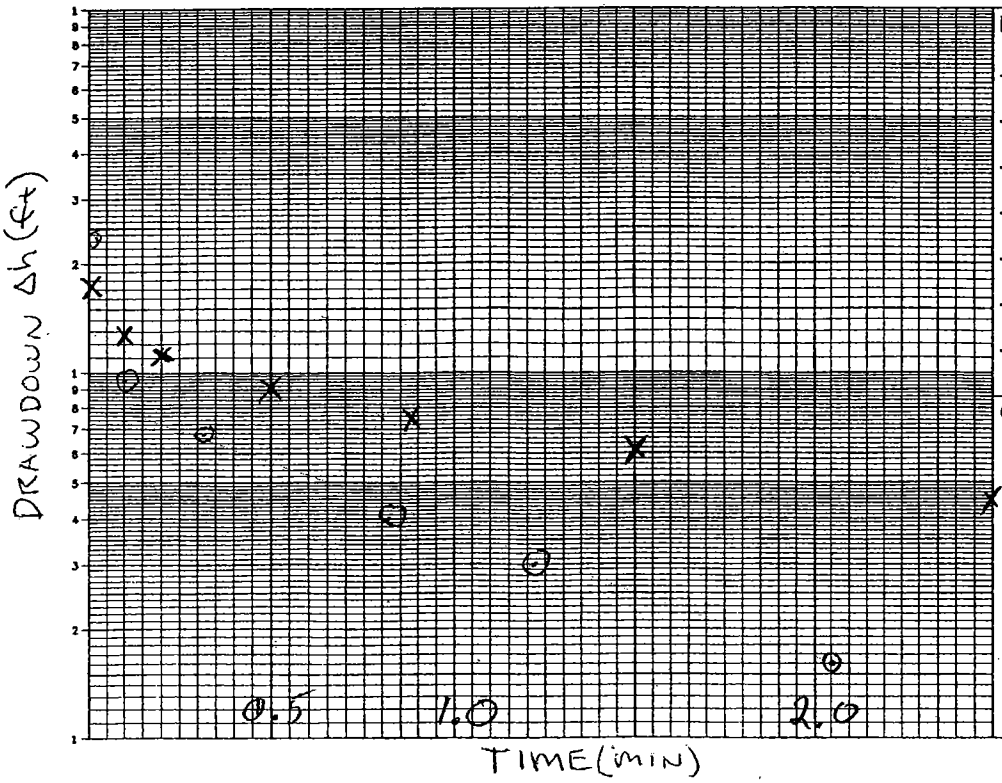
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.):

← FALLING HEAD →			← RISING HEAD →		
ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.00	16.23		0.00	16.05	
0.035	18.60	2.37	0.02	14.29	1.73
0.100	17.18	0.95	0.10	14.78	1.27
0.333	16.91	0.68	0.21	14.93	1.12
0.83	16.63	0.40	0.50	15.13	0.92
1.24	16.53	0.30	0.88	15.30	0.75
2.2	16.39	0.16	1.50	15.44	0.61
			2.48	15.60	0.45

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

REDO TEST
10-4-01
- PLACED X-DUCER
23' BTPVC
- 16.25' OF WATER
ABOVE X-DUCER
SWL @ 8.68 START
OF RISING HEAD

CALCS, SKETCH MAPS, ETC.:

FALLING HEAD ⊙
RISING HEAD 'X'

REDO = 2 FH
TEST II 3 RH

~ 1.4' DISPLACEMENT w/ SLUG

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57TW15 RISING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: JK	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

WHERE:

$r = 0.041667$ (RISER RADIUS, Ft)
$R = 0.041667$ (SCREEN RADIUS, Ft)
$L = 5'$ (INPUT LENGTH, Ft)
$T_o = 3.0$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

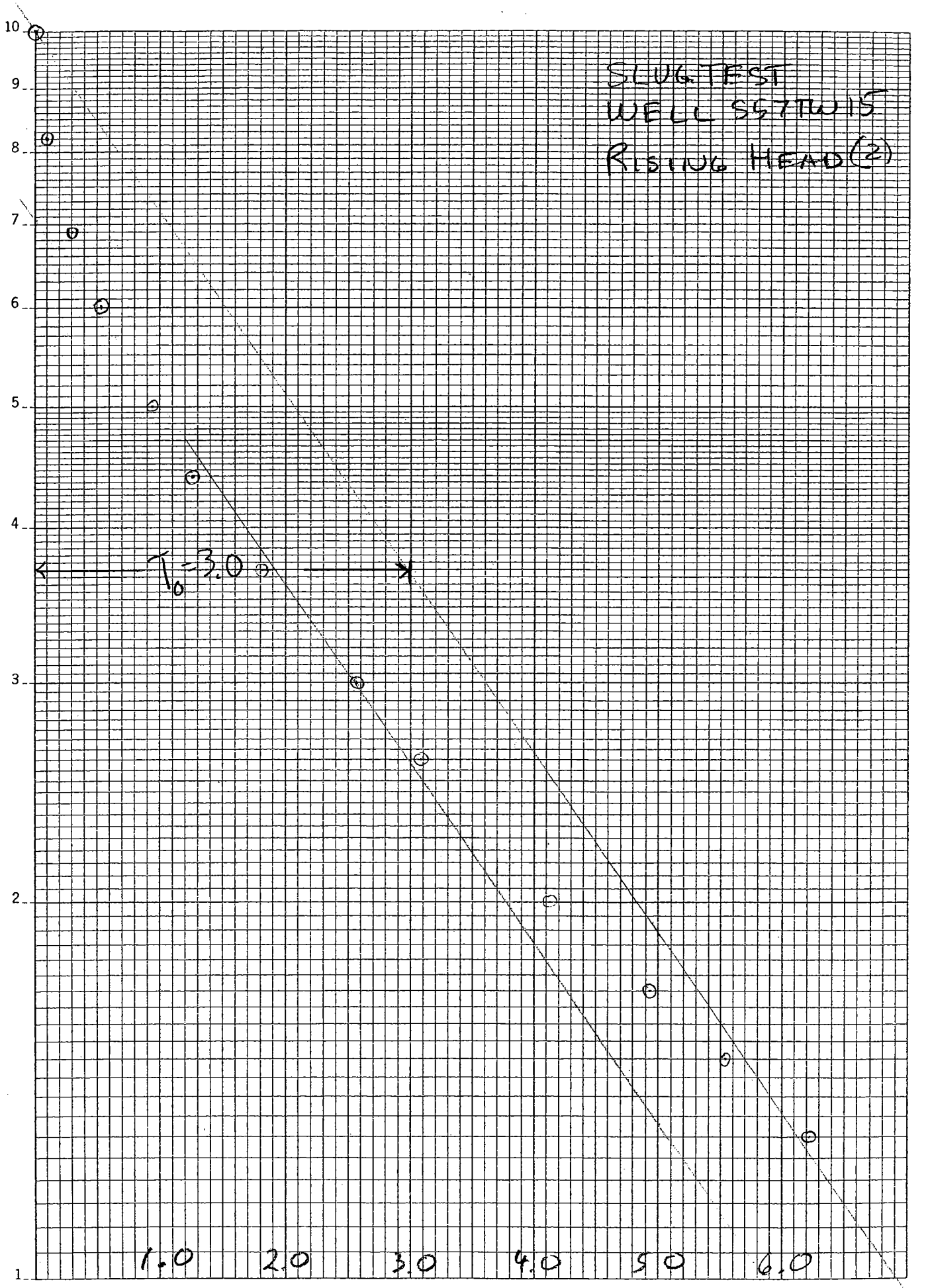
$$K = \frac{(0.041667)^2 \ln(5/0.041667)}{2(5)(3.0)}$$

$$\frac{8.31160372 \times 10^{-3}}{30}$$

$= 2.8 \times 10^{-4}$ ft/min

$= 1.4 \times 10^{-4}$ cm/sec

$= 3.99 \times 10^{-1}$ ft/day ✓



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/18/01 13:17:22
Report from file: C:\Win-Situ\Data\SN00956 2001-10-04 155054 s57tw15rhno3.bin
DataMgr Version 3.68

Serial number: 956
Firmware Version 3.01
Unit name: P-4

Test name: s57tw15rhno3

Test defined on: 10/4/01 15:50:05
Test started on: 10/4/01 15:50:54
Test stopped on: 10/4/01 16:11:04
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between (Minutes.
Number of data samples 113

TOTAL DATA SAMPLES 113

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at referen(16.049 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	ET (min) adj	h/ho	ho= 1.45
10/4/01	15:50	0	16.49	0			
10/4/01	15:50	0.005	16.52	-0.027			
10/4/01	15:50	0.01	16.52	1.471			
10/4/01	15:50	0.015	16.52	2.243			
10/4/01	15:50	0.02	16.52	1.763			
10/4/01	15:50	0.025	16.52	1.611			
10/4/01	15:50	0.03	16.53	1.684			
10/4/01	15:50	0.035	16.53	1.579			
10/4/01	15:50	0.04	16.53	1.518			
10/4/01	15:50	0.045	16.53	1.482			

10/4/01 15:50	0.05	16.53	1.45	0	1.00
10/4/01 15:50	0.055	16.53	1.411	0.005	0.97
10/4/01 15:50	0.06	16.54	1.394	0.01	0.96
10/4/01 15:50	0.065	16.54	1.368	0.015	0.94
10/4/01 15:50	0.07	16.54	1.347	0.02	0.93
10/4/01 15:50	0.075	16.54	1.325	0.025	0.91
10/4/01 15:50	0.08	16.54	1.314	0.03	0.91
10/4/01 15:50	0.0848	16.54	1.304	0.0348	0.90
10/4/01 15:50	0.09	16.54	1.297	0.04	0.89
10/4/01 15:50	0.095	16.54	1.245	0.045	0.86
10/4/01 15:51	0.1	16.54	1.276	0.05	0.88
10/4/01 15:51	0.1058	16.54	1.25	0.0558	0.86
10/4/01 15:51	0.112	16.54	1.241	0.062	0.86
10/4/01 15:51	0.1185	16.54	1.23	0.0685	0.85
10/4/01 15:51	0.1255	16.54	1.22	0.0755	0.84
10/4/01 15:51	0.1328	16.54	1.207	0.0828	0.83
10/4/01 15:51	0.1407	16.54	1.198	0.0907	0.83
10/4/01 15:51	0.149	16.54	1.187	0.099	0.82
10/4/01 15:51	0.1578	16.55	1.177	0.1078	0.81
10/4/01 15:51	0.167	16.53	1.168	0.117	0.81
10/4/01 15:51	0.177	16.53	1.159	0.127	0.80
10/4/01 15:51	0.1875	16.53	1.148	0.1375	0.79
10/4/01 15:51	0.1985	16.53	1.137	0.1485	0.78
10/4/01 15:51	0.2102	16.53	1.125	0.1602	0.78
10/4/01 15:51	0.2227	16.53	1.114	0.1727	0.77
10/4/01 15:51	0.2358	16.52	1.103	0.1858	0.76
10/4/01 15:51	0.2498	16.52	1.09	0.1998	0.75
10/4/01 15:51	0.2647	16.52	1.075	0.2147	0.74
10/4/01 15:51	0.2803	16.52	1.064	0.2303	0.73
10/4/01 15:51	0.297	16.52	1.049	0.247	0.72
10/4/01 15:51	0.3147	16.52	1.034	0.2647	0.71
10/4/01 15:51	0.3333	16.52	1.021	0.2833	0.70
10/4/01 15:51	0.3532	16.52	1.006	0.3032	0.69
10/4/01 15:51	0.3742	16.52	0.991	0.3242	0.68
10/4/01 15:51	0.3963	16.52	0.978	0.3463	0.67
10/4/01 15:51	0.4198	16.52	0.963	0.3698	0.66
10/4/01 15:51	0.4447	16.52	0.946	0.3947	0.65
10/4/01 15:51	0.4697	16.52	0.935	0.4197	0.64
10/4/01 15:51	0.4963	16.5	0.917	0.4463	0.63
10/4/01 15:51	0.5247	16.52	0.905	0.4747	0.62
10/4/01 15:51	0.5547	16.52	0.89	0.5047	0.61
10/4/01 15:51	0.5863	16.5	0.874	0.5363	0.60
10/4/01 15:51	0.6213	16.5	0.857	0.5713	0.59
10/4/01 15:51	0.6578	16.5	0.842	0.6078	0.58
10/4/01 15:51	0.6963	16.5	0.825	0.6463	0.57
10/4/01 15:51	0.738	16.5	0.807	0.688	0.56
10/4/01 15:51	0.7813	16.5	0.792	0.7313	0.55
10/4/01 15:51	0.828	16.49	0.777	0.778	0.54
10/4/01 15:51	0.8763	16.49	0.76	0.8263	0.52
10/4/01 15:51	0.928	16.49	0.743	0.878	0.51
10/4/01 15:51	0.983	16.49	0.725	0.933	0.50
10/4/01 15:51	1.0413	16.49	0.708	0.9913	0.49

10/4/01 15:52	1.103	16.48	0.693	1.053	0.48
10/4/01 15:52	1.168	16.48	0.675	1.118	0.47
10/4/01 15:52	1.238	16.48	0.658	1.188	0.45
10/4/01 15:52	1.3113	16.47	0.641	1.2613	0.44
10/4/01 15:52	1.3897	16.47	0.623	1.3397	0.43
10/4/01 15:52	1.473	16.47	0.606	1.423	0.42
10/4/01 15:52	1.5613	16.47	0.587	1.5113	0.40
10/4/01 15:52	1.6547	16.47	0.57	1.6047	0.39
10/4/01 15:52	1.753	16.45	0.552	1.703	0.38
10/4/01 15:52	1.858	16.45	0.535	1.808	0.37
10/4/01 15:52	1.968	16.45	0.518	1.918	0.36
10/4/01 15:52	2.0847	16.45	0.5	2.0347	0.34
10/4/01 15:53	2.2097	16.44	0.483	2.1597	0.33
10/4/01 15:53	2.3412	16.44	0.463	2.2912	0.32
10/4/01 15:53	2.4813	16.43	0.448	2.4313	0.31
10/4/01 15:53	2.6297	16.43	0.429	2.5797	0.30
10/4/01 15:53	2.7863	16.43	0.411	2.7363	0.28
10/4/01 15:53	2.953	16.43	0.394	2.903	0.27
10/4/01 15:54	3.1297	16.41	0.377	3.0797	0.26
10/4/01 15:54	3.3163	16.41	0.359	3.2663	0.25
10/4/01 15:54	3.5147	16.41	0.342	3.4647	0.24
10/4/01 15:54	3.7247	16.41	0.325	3.6747	0.22
10/4/01 15:54	3.9463	16.4	0.31	3.8963	0.21
10/4/01 15:55	4.1813	16.4	0.292	4.1313	0.20
10/4/01 15:55	4.4295	16.4	0.277	4.3795	0.19
10/4/01 15:55	4.693	16.4	0.26	4.643	0.18
10/4/01 15:55	4.973	16.4	0.245	4.923	0.17
10/4/01 15:56	5.2697	16.39	0.23	5.2197	0.16
10/4/01 15:56	5.583	16.39	0.215	5.533	0.15
10/4/01 15:56	5.9147	16.39	0.202	5.8647	0.14
10/4/01 15:57	6.2663	16.39	0.187	6.2163	0.13
10/4/01 15:57	6.6397	16.39	0.172	6.5897	0.12
10/4/01 15:57	7.0347	16.39	0.161	6.9847	0.11
10/4/01 15:58	7.453	16.38	0.145	7.403	0.10
10/4/01 15:58	7.8963	16.38	0.135	7.8463	0.09
10/4/01 15:59	8.3663	16.38	0.124	8.3163	0.09
10/4/01 15:59	8.8647	16.38	0.113	8.8147	0.08
10/4/01 16:00	9.3913	16.38	0.102	9.3413	0.07
10/4/01 16:00	9.9497	16.38	0.092	9.8997	0.06
10/4/01 16:01	10.5413	16.38	0.083	10.4913	0.06
10/4/01 16:02	11.168	16.38	0.072	11.118	0.05
10/4/01 16:02	11.8313	16.38	0.066	11.7813	0.05
10/4/01 16:03	12.5347	16.38	0.057	12.4847	0.04
10/4/01 16:04	13.2797	16.38	0.051	13.2297	0.04
10/4/01 16:04	14.0697	16.38	0.044	14.0197	0.03
10/4/01 16:05	14.9063	16.38	0.038	14.8563	0.03
10/4/01 16:06	15.7913	16.38	0.031	15.7413	0.02
10/4/01 16:07	16.7297	16.38	0.029	16.6797	0.02
10/4/01 16:08	17.723	16.38	0.023	17.673	0.02
10/4/01 16:09	18.7763	16.38	0.018	18.7263	0.01
10/4/01 16:10	19.8913	16.38	0.016	19.8413	0.01

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57 TW15 RISING HEAD	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY JK	APPROVED BY / DATE

EQ:

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

$L/R = 5'/.042$

WHERE:

$r = 0.042$ feet (riser radius)
$R = 0.042$ (screen radius)
$L = 5'$ (INPUT LENGTH)
$T_0 = 3.3$ (FROM PLOT)
K = HYDRAULIC COND (ft/min)

SUB:

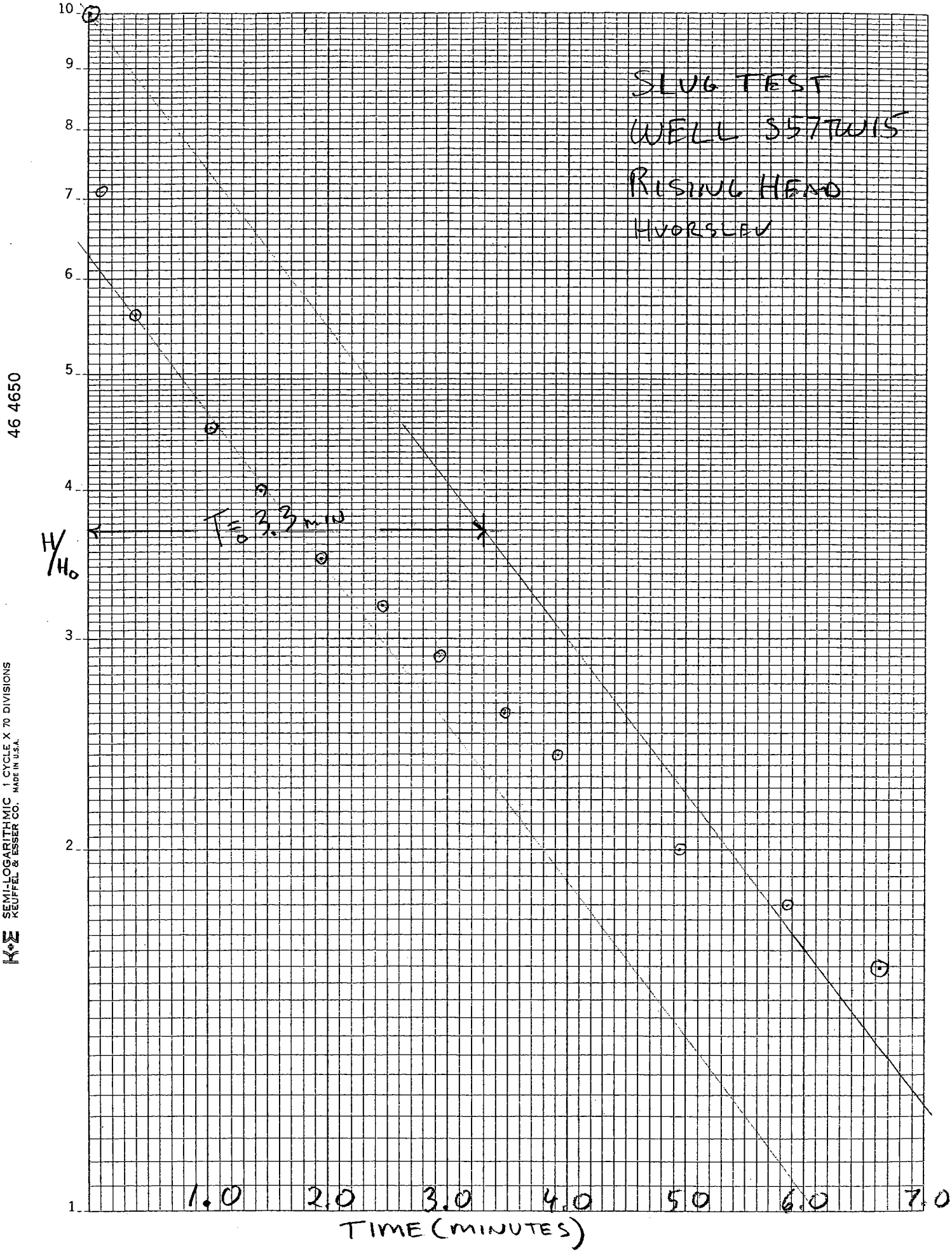
$$K = \frac{(0.042)^2 \ln(5/0.042)}{2(5)(3.3)}$$

$$= \frac{8.43 \times 10^{-3}}{33}$$

$$= 2.56 \times 10^{-4} \text{ ft/min}$$

$$= 1.3 \times 10^{-4} \text{ cm/sec}$$

$$= 3.69 \times 10^{-1} \text{ ft/day}$$ ✓


SLUG TEST
WELL 557W15
RISING HEAD
HVORSLEV
T = 3.3 min
H/H0
10
9
8
7
6
5
4
3
2
1
1.0
2.0
3.0
4.0
5.0
6.0
7.0
TIME (MINUTES)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/18/01 10:36:22
Report from file: C:\Win-Situ\Data\SN00856 2001-10-03 155907 s57tw15rhno1.bin
DataMgr Version 3.68

Serial number: 856
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw15rhno1

Test defined on: 10/3/01 15:44:20
Test started on: 10/3/01 15:59:07
Test stopped on: 10/3/01 17:08:20

Data gathered using Logarithmic testing
Maximum time between data points: 10.00(Minutes.
Number of data samples: 134

TOTAL DATA SAMPLES 134

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Density: 1.000 g/cm3
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 4.808 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	ET (min)adj	h/ho	ho= 0.623
10/3/01	15:59	0	21	0		0.00	
10/3/01	15:59	0.005	21.01	0.366		0.59	
10/3/01	15:59	0.01	21.02	0.3		0.48	
10/3/01	15:59	0.015	21.02	0.442		0.71	
10/3/01	15:59	0.02	21.02	0.623	0	1.00	
10/3/01	15:59	0.025	21.02	0.589	0.005	0.95	
10/3/01	15:59	0.03	21.02	0.571	0.01	0.92	
10/3/01	15:59	0.035	21.02	0.564	0.015	0.91	
10/3/01	15:59	0.04	21.04	0.55	0.02	0.88	
10/3/01	15:59	0.045	21.04	0.552	0.025	0.89	
10/3/01	15:59	0.05	21.04	0.536	0.03	0.86	
10/3/01	15:59	0.055	21.04	0.529	0.035	0.85	
10/3/01	15:59	0.06	21.04	0.525	0.04	0.84	
10/3/01	15:59	0.065	21.04	0.519	0.045	0.83	
10/3/01	15:59	0.07	21.04	0.515	0.05	0.83	
10/3/01	15:59	0.075	21.04	0.508	0.055	0.82	
10/3/01	15:59	0.08	21.04	0.502	0.06	0.81	
10/3/01	15:59	0.0848	21.04	0.494	0.0648	0.79	
10/3/01	15:59	0.09	21.04	0.488	0.07	0.78	

10/3/01 15:59	0.095	21.04	0.477	0.075	0.77
10/3/01 15:59	0.1	21.04	0.471	0.08	0.76
10/3/01 15:59	0.1058	21.04	0.463	0.0858	0.74
10/3/01 15:59	0.112	21.04	0.456	0.092	0.73
10/3/01 15:59	0.1185	21.04	0.446	0.0985	0.72
10/3/01 15:59	0.1255	21.04	0.44	0.1055	0.71
10/3/01 15:59	0.1328	21.05	0.434	0.1128	0.70
10/3/01 15:59	0.1407	21.05	0.43	0.1207	0.69
10/3/01 15:59	0.149	21.05	0.424	0.129	0.68
10/3/01 15:59	0.1578	21.05	0.419	0.1378	0.67
10/3/01 15:59	0.167	21.04	0.413	0.147	0.66
10/3/01 15:59	0.177	21.04	0.409	0.157	0.66
10/3/01 15:59	0.1875	21.04	0.404	0.1675	0.65
10/3/01 15:59	0.1985	21.04	0.402	0.1785	0.65
10/3/01 15:59	0.2102	21.04	0.396	0.1902	0.64
10/3/01 15:59	0.2227	21.04	0.394	0.2027	0.63
10/3/01 15:59	0.2358	21.02	0.39	0.2158	0.63
10/3/01 15:59	0.2498	21.02	0.385	0.2298	0.62
10/3/01 15:59	0.2647	21.02	0.381	0.2447	0.61
10/3/01 15:59	0.2803	21.02	0.377	0.2603	0.61
10/3/01 15:59	0.297	21.02	0.373	0.277	0.60
10/3/01 15:59	0.3147	21.02	0.369	0.2947	0.59
10/3/01 15:59	0.3333	21.02	0.365	0.3133	0.59
10/3/01 15:59	0.3532	21.02	0.363	0.3332	0.58
10/3/01 15:59	0.3742	21.02	0.356	0.3542	0.57
10/3/01 15:59	0.3963	21.02	0.352	0.3763	0.57
10/3/01 15:59	0.4198	21.02	0.348	0.3998	0.56
10/3/01 15:59	0.4447	21.02	0.346	0.4247	0.56
10/3/01 15:59	0.4697	21.02	0.342	0.4497	0.55
10/3/01 15:59	0.4963	21.01	0.335	0.4763	0.54
10/3/01 15:59	0.5247	21.01	0.333	0.5047	0.53
10/3/01 15:59	0.5547	21.01	0.327	0.5347	0.52
10/3/01 15:59	0.5863	21.01	0.323	0.5663	0.52
10/3/01 15:59	0.6213	21.01	0.321	0.6013	0.52
10/3/01 15:59	0.6578	21.01	0.314	0.6378	0.50
10/3/01 15:59	0.6963	21.01	0.31	0.6763	0.50
10/3/01 15:59	0.738	21	0.306	0.718	0.49
10/3/01 15:59	0.7813	21	0.299	0.7613	0.48
10/3/01 15:59	0.828	21	0.297	0.808	0.48
10/3/01 15:59	0.8763	21	0.291	0.8563	0.47
10/3/01 16:00	0.928	20.99	0.287	0.908	0.46
10/3/01 16:00	0.983	20.99	0.283	0.963	0.45
10/3/01 16:00	1.0413	20.99	0.278	1.0213	0.45
10/3/01 16:00	1.103	20.99	0.274	1.083	0.44
10/3/01 16:00	1.168	20.97	0.268	1.148	0.43
10/3/01 16:00	1.238	20.97	0.263	1.218	0.42
10/3/01 16:00	1.3113	20.96	0.257	1.2913	0.41
10/3/01 16:00	1.3897	20.96	0.253	1.3697	0.41
10/3/01 16:00	1.473	20.96	0.247	1.453	0.40
10/3/01 16:00	1.5613	20.95	0.24	1.5413	0.39
10/3/01 16:00	1.6547	20.95	0.236	1.6347	0.38
10/3/01 16:00	1.753	20.95	0.232	1.733	0.37
10/3/01 16:00	1.858	20.94	0.225	1.838	0.36
10/3/01 16:01	1.968	20.94	0.219	1.948	0.35
10/3/01 16:01	2.0847	20.92	0.214	2.0647	0.34
10/3/01 16:01	2.2097	20.92	0.208	2.1897	0.33
10/3/01 16:01	2.3412	20.92	0.204	2.3212	0.33
10/3/01 16:01	2.4813	20.91	0.197	2.4613	0.32
10/3/01 16:01	2.6297	20.91	0.191	2.6097	0.31
10/3/01 16:01	2.7863	20.9	0.185	2.7663	0.30

10/3/01 16:02	2.953	20.9	0.18	2.933	0.29
10/3/01 16:02	3.1297	20.89	0.174	3.1097	0.28
10/3/01 16:02	3.3163	20.89	0.168	3.2963	0.27
10/3/01 16:02	3.5147	20.87	0.159	3.4947	0.26
10/3/01 16:02	3.7247	20.87	0.155	3.7047	0.25
10/3/01 16:03	3.9463	20.86	0.15	3.9263	0.24
10/3/01 16:03	4.1813	20.86	0.144	4.1613	0.23
10/3/01 16:03	4.4295	20.85	0.137	4.4095	0.22
10/3/01 16:03	4.693	20.85	0.133	4.673	0.21
10/3/01 16:04	4.973	20.84	0.127	4.953	0.20
10/3/01 16:04	5.2697	20.84	0.12	5.2497	0.19
10/3/01 16:04	5.583	20.82	0.114	5.563	0.18
10/3/01 16:05	5.9147	20.82	0.11	5.8947	0.18
10/3/01 16:05	6.2663	20.81	0.103	6.2463	0.17
10/3/01 16:05	6.6397	20.81	0.099	6.6197	0.16
10/3/01 16:06	7.0347	20.8	0.092	7.0147	0.15
10/3/01 16:06	7.453	20.8	0.088	7.433	0.14
10/3/01 16:07	7.8963	20.78	0.082	7.8763	0.13
10/3/01 16:07	8.3663	20.78	0.078	8.3463	0.13
10/3/01 16:07	8.8647	20.77	0.073	8.8447	0.12
10/3/01 16:08	9.3913	20.77	0.069	9.3713	0.11
10/3/01 16:09	9.9497	20.77	0.065	9.9297	0.10
10/3/01 16:09	10.5413	20.76	0.06	10.5213	0.10
10/3/01 16:10	11.168	20.76	0.058	11.148	0.09
10/3/01 16:10	11.8313	20.76	0.054	11.8113	0.09
10/3/01 16:11	12.5347	20.75	0.049	12.5147	0.08
10/3/01 16:12	13.2797	20.75	0.047	13.2597	0.08
10/3/01 16:13	14.0697	20.75	0.043	14.0497	0.07
10/3/01 16:14	14.9063	20.75	0.043	14.8863	0.07
10/3/01 16:14	15.7913	20.75	0.039	15.7713	0.06
10/3/01 16:15	16.7297	20.73	0.037	16.7097	0.06
10/3/01 16:16	17.723	20.73	0.035	17.703	0.06
10/3/01 16:17	18.7763	20.73	0.033	18.7563	0.05
10/3/01 16:19	19.8913	20.73	0.03	19.8713	0.05
10/3/01 16:20	21.073	20.73	0.03	21.053	0.05
10/3/01 16:21	22.3247	20.72	0.028	22.3047	0.04
10/3/01 16:22	23.6497	20.72	0.028	23.6297	0.04
10/3/01 16:24	25.0547	20.72	0.026	25.0347	0.04
10/3/01 16:25	26.543	20.72	0.026	26.523	0.04
10/3/01 16:27	28.118	20.72	0.026	28.098	0.04
10/3/01 16:28	29.7863	20.72	0.024	29.7663	0.04
10/3/01 16:30	31.5547	20.72	0.026	31.5347	0.04
10/3/01 16:32	33.428	20.72	0.026	33.408	0.04
10/3/01 16:34	35.4112	20.71	0.026	35.3912	0.04
10/3/01 16:36	37.513	20.71	0.024	37.493	0.04
10/3/01 16:38	39.7397	20.71	0.024	39.7197	0.04
10/3/01 16:41	42.098	20.71	0.024	42.078	0.04
10/3/01 16:43	44.5963	20.71	0.021	44.5763	0.03
10/3/01 16:46	47.243	20.71	0.021	47.223	0.03
10/3/01 16:49	50.0463	20.71	0.021	50.0263	0.03
10/3/01 16:52	53.0147	20.7	0.021	52.9947	0.03
10/3/01 16:55	56.1597	20.7	0.021	56.1397	0.03
10/3/01 16:58	59.4913	20.7	0.019	59.4713	0.03
10/3/01 17:02	63.0197	20.7	0.019	62.9997	0.03
10/3/01 17:05	66.758	20.7	0.019	66.738	0.03

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57TW16

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 1" SCREEN LENGTH/DEPTH: 5'/ TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 6.61 TPVC DATE: 10-23-01

TEST TYPE (Rising/Falling/Constant Head): FALLING HEAD CHECKED:

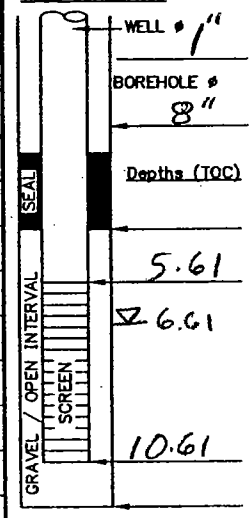
METHOD OF INDUCING WATER LEVEL CHANGE: DI H_2O PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

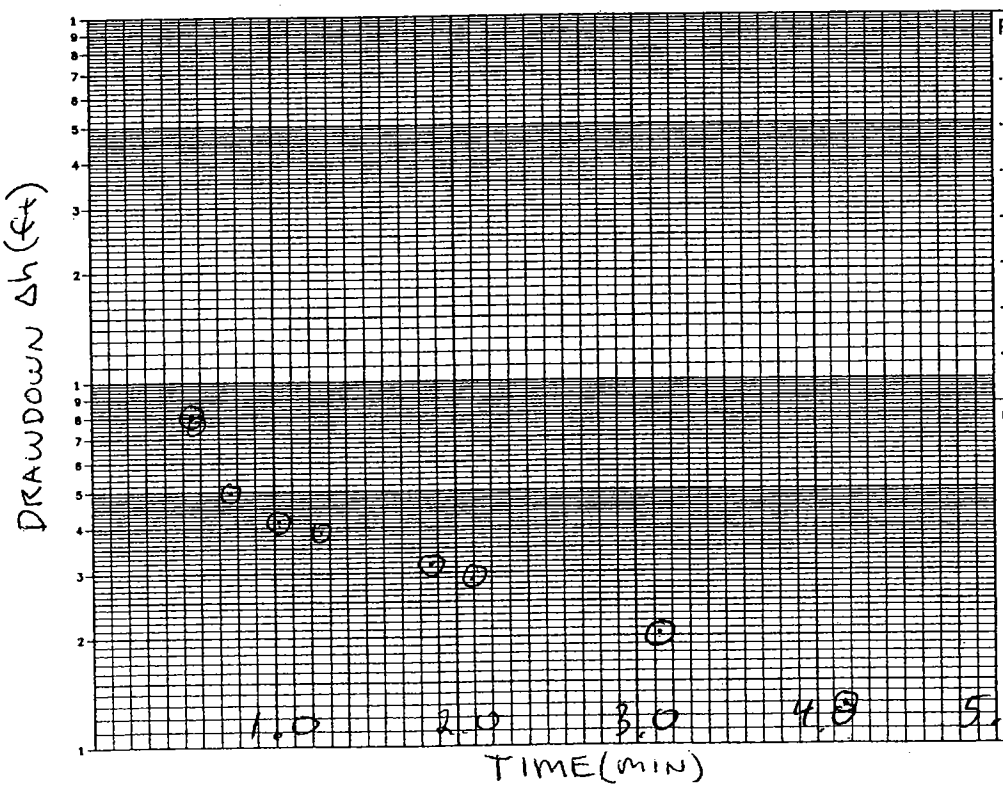
FALLING HI

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.555		0.811	3.13		0.203
0.586		0.792			
0.621		0.722			
0.658		0.672			
0.696		0.583			
0.781		0.494			
1.04		0.432			
1.24		0.397			
1.86		0.315			
2.09		0.294			
4.18		0.131			
4.97		0.094			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

3.293 head @ 10:11 HRS

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL	S57 TW16 FALLING HEAD
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY:	APPROVED BY: / DATE:

EQ:

$$K = \frac{r^2 \ln(L/R)}{2L T_o}$$

WHERE:

$r = 0.04166$ (RISER RADIUS, Ft)
$R = 0.04166$ (SCREEN RADIUS, Ft)
$L = 4$ (INPUT LENGTH, Ft)
$T_o = 2.7$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

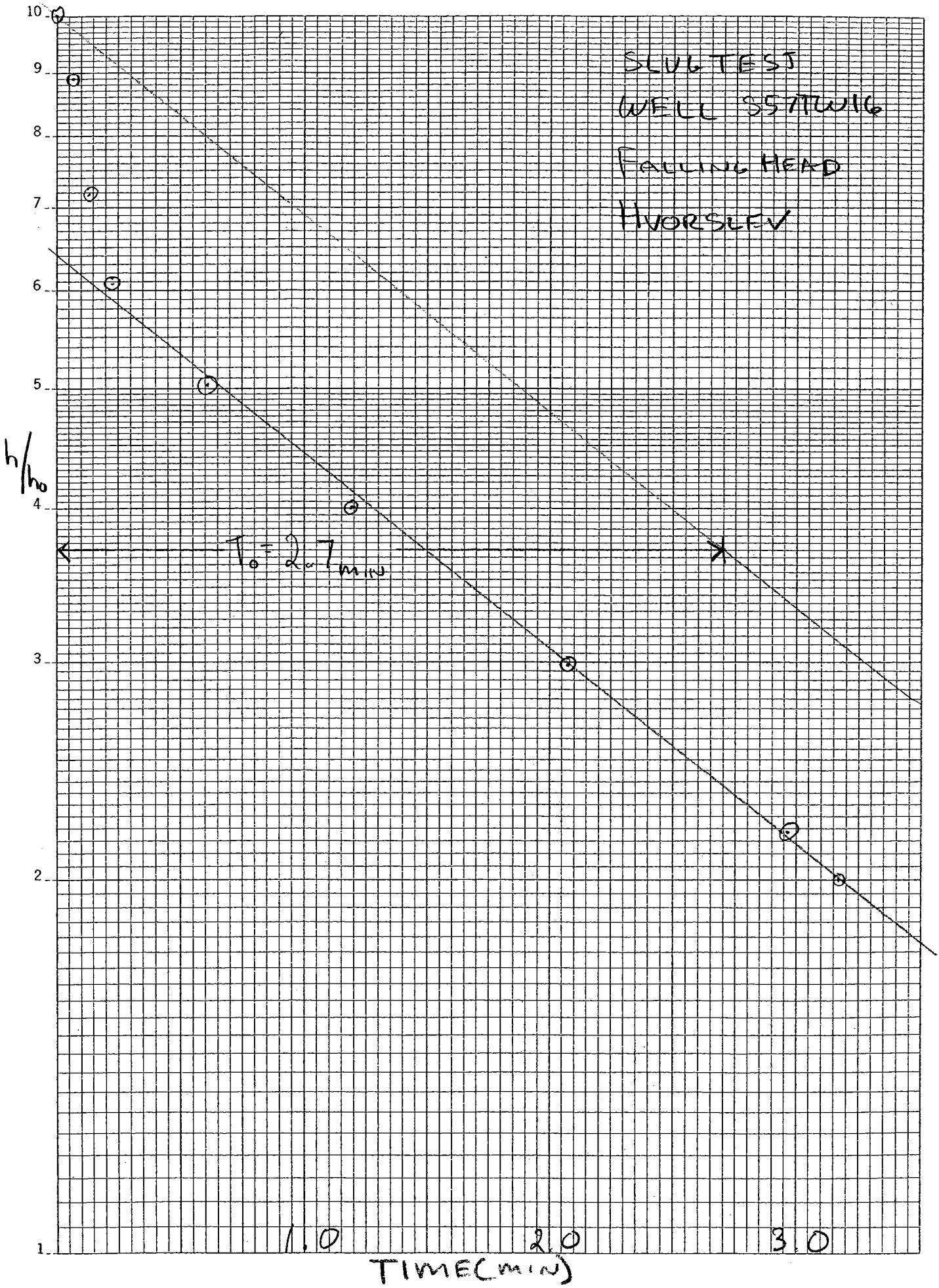
$$K = \frac{(0.04166)^2 \ln(4/0.04166)}{2(4)(2.7)}$$

$$= \frac{7.92195778 \times 10^{-3}}{21.6}$$

$$= 3.67 \times 10^{-4} \text{ ft/min}$$

$$= 1.86 \times 10^{-4} \text{ cm/sec}$$

$$= 5.28 \times 10^{-1} \text{ ft/day}$$



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 13:39:05
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 101741 s57tw16fhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw16fhno1

Test defined on: 10/23/01 10:16:46
Test started on: 10/23/01 10:17:41
Test stopped on: 10/23/01 10:36:40
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between data points:10. Minutes.
Number of data samples: 112

TOTAL DATA SAMPLES 112

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 3.225 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 0.811
10/23/01	10:17	0	18.71	0			
10/23/01	10:17	0.005	18.72	0			
10/23/01	10:17	0.01	18.72	0			
10/23/01	10:18	0.4963	18.74	0.738			
10/23/01	10:18	0.5247	18.74	0.761			
10/23/01	10:18	0.5547	18.74	0.811	0	1.000	
10/23/01	10:18	0.5863	18.74	0.792	0.0316	0.977	
10/23/01	10:18	0.6213	18.74	0.722	0.0666	0.890	
10/23/01	10:18	0.6578	18.74	0.672	0.1031	0.829	
10/23/01	10:18	0.6963	18.74	0.583	0.1416	0.719	

10/23/01 10:18	0.738	18.74	0.523	0.1833	0.645
10/23/01 10:18	0.7813	18.74	0.494	0.2266	0.609
10/23/01 10:18	0.828	18.74	0.478	0.2733	0.589
10/23/01 10:18	0.8763	18.74	0.467	0.3216	0.576
10/23/01 10:18	0.928	18.74	0.455	0.3733	0.561
10/23/01 10:18	0.983	18.72	0.445	0.4283	0.549
10/23/01 10:18	1.0413	18.72	0.432	0.4866	0.533
10/23/01 10:18	1.103	18.72	0.42	0.5483	0.518
10/23/01 10:18	1.168	18.72	0.409	0.6133	0.504
10/23/01 10:18	1.238	18.72	0.397	0.6833	0.490
10/23/01 10:19	1.3113	18.72	0.385	0.7566	0.475
10/23/01 10:19	1.3897	18.72	0.374	0.835	0.461
10/23/01 10:19	1.473	18.72	0.362	0.9183	0.446
10/23/01 10:19	1.5613	18.71	0.35	1.0066	0.432
10/23/01 10:19	1.6547	18.72	0.337	1.1	0.416
10/23/01 10:19	1.753	18.71	0.325	1.1983	0.401
10/23/01 10:19	1.858	18.71	0.315	1.3033	0.388
10/23/01 10:19	1.968	18.71	0.304	1.4133	0.375
10/23/01 10:19	2.0847	18.71	0.294	1.53	0.363
10/23/01 10:19	2.2097	18.71	0.281	1.655	0.346
10/23/01 10:20	2.3412	18.71	0.269	1.7865	0.332
10/23/01 10:20	2.4813	18.7	0.255	1.9266	0.314
10/23/01 10:20	2.6297	18.7	0.242	2.075	0.298
10/23/01 10:20	2.7863	18.7	0.23	2.2316	0.284
10/23/01 10:20	2.953	18.7	0.215	2.3983	0.265
10/23/01 10:20	3.1297	18.7	0.203	2.575	0.250
10/23/01 10:21	3.3163	18.7	0.189	2.7616	0.233
10/23/01 10:21	3.5147	18.7	0.176	2.96	0.217
10/23/01 10:21	3.7247	18.7	0.162	3.17	0.200
10/23/01 10:21	3.9463	18.69	0.143	3.3916	0.176
10/23/01 10:21	4.1813	18.69	0.131	3.6266	0.162
10/23/01 10:22	4.4295	18.69	0.116	3.8748	0.143
10/23/01 10:22	4.693	18.69	0.106	4.1383	0.131
10/23/01 10:22	4.973	18.69	0.094	4.4183	0.116
10/23/01 10:22	5.2697	18.69	0.081	4.715	0.100
10/23/01 10:23	5.583	18.67	0.075	5.0283	0.092
10/23/01 10:23	5.9147	18.67	0.065	5.36	0.080
10/23/01 10:23	6.2663	18.67	0.057	5.7116	0.070
10/23/01 10:24	6.6397	18.67	0.048	6.085	0.059
10/23/01 10:24	7.0347	18.67	0.04	6.48	0.049
10/23/01 10:25	7.453	18.67	0.032	6.8983	0.039
10/23/01 10:25	7.8963	18.67	0.026	7.3416	0.032
10/23/01 10:26	8.3663	18.67	0.017	7.8116	0.021
10/23/01 10:26	8.8647	18.66	0.007	8.31	0.009
10/23/01 10:27	9.3913	18.66	0.003	8.8366	0.004
10/23/01 10:27	9.9497	18.66	-0.003	9.395	-0.004
10/23/01 10:28	10.5413	18.66	-0.007	9.9866	-0.009
10/23/01 10:28	11.168	18.65	-0.013	10.6133	-0.016
10/23/01 10:29	11.8313	18.66	-0.02	11.2766	-0.025
10/23/01 10:30	12.5347	18.65	-0.023	11.98	-0.028
10/23/01 10:30	13.2797	18.65	-0.026	12.725	-0.032
10/23/01 10:31	14.0697	18.65	-0.032	13.515	-0.039

10/23/01 10:32	14.9063	18.65	-0.036	14.3516	-0.044
10/23/01 10:33	15.7913	18.65	-0.04	15.2366	-0.049
10/23/01 10:34	16.7297	18.65	-0.044	16.175	-0.054
10/23/01 10:35	17.723	18.65	-0.048	17.1683	-0.059
10/23/01 10:36	18.7763	18.64	-0.048	18.2216	-0.059

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57TW17

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 1" SCREEN LENGTH/DEPTH: 10'/ TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 6.76' TPVC DATE: 10-23-01

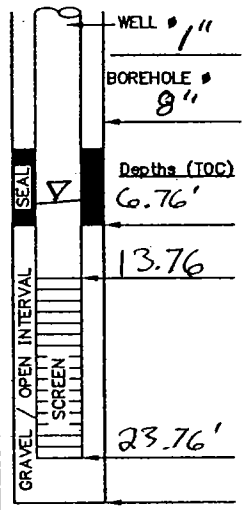
TEST TYPE (Rising/Falling/Constant Head): FALLING+RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG 1/2" x 6' PAGE ..... OF .....

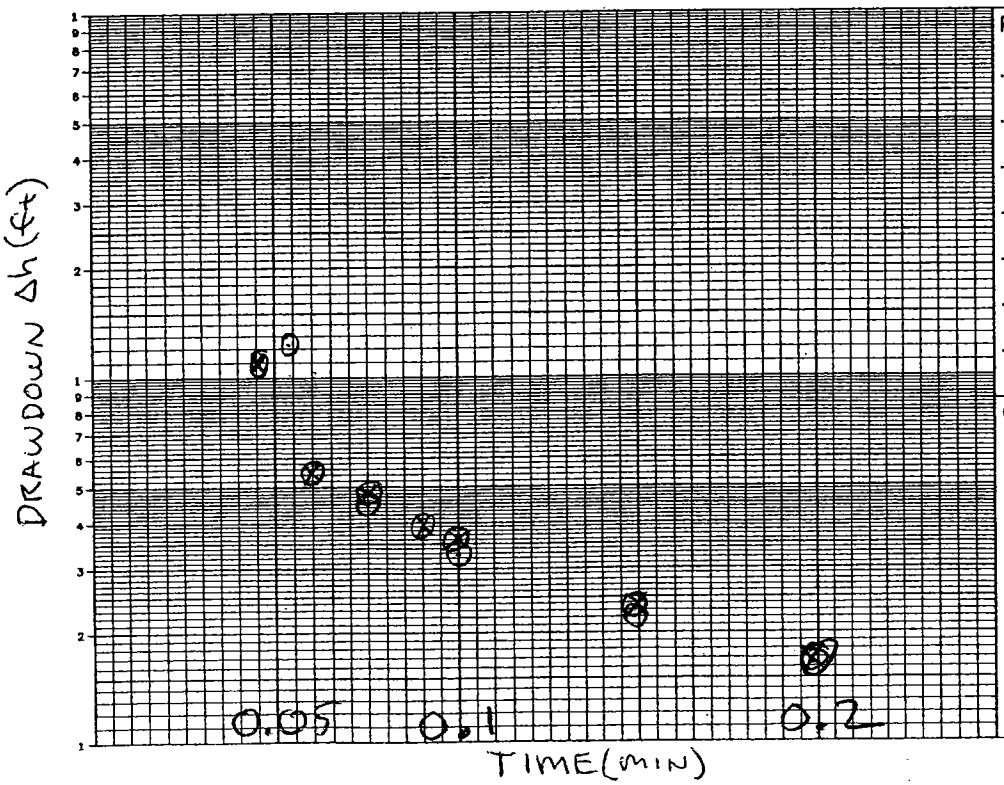
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

FALLING HEAD			RISING HEAD		
ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.0548		1.207	0.045		-1.118
0.075		0.442	0.060		.578
0.100		0.326	0.075		.487
0.149		0.224	0.090		.398
0.1985		0.165	0.100		.355
			0.149		.227
			0.199		.162

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

⊙ = FALLING HEAD

⊗ = RISING HEAD

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57TW17 RISING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY:	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.041667$ (RISER RADIUS, Ft)
$R = 0.041667$ (SCREEN RADIUS, Ft)
$L = 10$ (INPUT LENGTH, Ft)
$\rightarrow T_o = 0.132$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

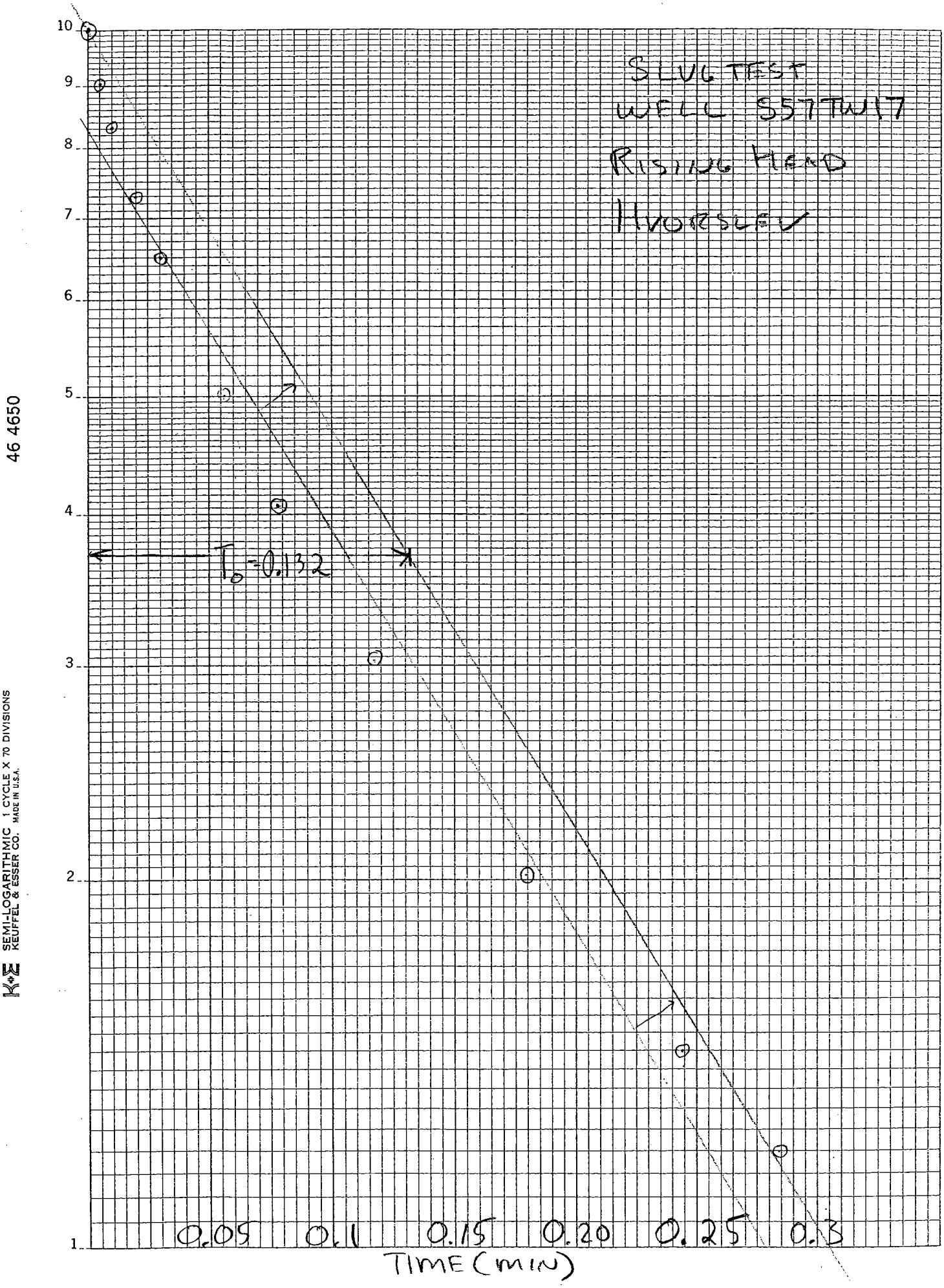
$$K = \frac{(0.041667)^2 \ln(10/0.041667)}{2(10)(0.132)}$$

$$= \frac{9.51513648 \times 10^{-3}}{2.64}$$

$$= 3.60 \times 10^{-3} \text{ ft/min}$$

$$= 1.83 \times 10^{-3} \text{ cm/sec}$$

$$= 5.2 \text{ ft/day}$$


SLUG TEST
WELL S57TW17
RISING HEAD
HYDRSLEV
T_0=0.132
10
9
8
7
6
5
4
3
2
1
0.05
0.1
0.15
0.20
0.25
0.3
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 13:06:01
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 105121 s57tw17rhno2.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw17rhno2

Test defined on: 10/23/01 10:50:31
Test started on: 10/23/01 10:51:21
Test stopped on: 10/23/01 10:57:55
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between data points:10 Minutes.
Number of data samples: 93

TOTAL DATA SAMPLES 93

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 16.407 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	adj Feet H2O	Adj ET (min)	h/ho	ho= 0.525
10/23/01	10:51	0	16.3	0	-0.014			
10/23/01	10:51	0.005	16.32	-0.004	-0.018			
10/23/01	10:51	0.01	16.32	-0.006	-0.02			
10/23/01	10:51	0.065	16.34	0.582	0.568			
10/23/01	10:51	0.07	16.34	0.539	0.525	0	1	
10/23/01	10:51	0.075	16.34	0.487	0.473	0.005	0.901	
10/23/01	10:51	0.08	16.34	0.45	0.436	0.01	0.83	
10/23/01	10:51	0.0848	16.34	0.423	0.409	0.0148	0.779	
10/23/01	10:51	0.09	16.34	0.398	0.384	0.02	0.731	
10/23/01	10:51	0.095	16.34	0.375	0.361	0.025	0.688	
10/23/01	10:51	0.1	16.34	0.355	0.341	0.03	0.65	
10/23/01	10:51	0.1058	16.36	0.334	0.32	0.0358	0.61	
10/23/01	10:51	0.112	16.34	0.315	0.301	0.042	0.573	
10/23/01	10:51	0.1185	16.36	0.295	0.281	0.0485	0.535	
10/23/01	10:51	0.1255	16.36	0.278	0.264	0.0555	0.503	
10/23/01	10:51	0.1328	16.36	0.262	0.248	0.0628	0.472	

10/23/01 10:51	0.1407	16.36	0.245	0.231	0.0707	0.44
10/23/01 10:51	0.149	16.36	0.227	0.213	0.079	0.406
10/23/01 10:51	0.1578	16.36	0.212	0.198	0.0878	0.377
10/23/01 10:51	0.167	16.34	0.199	0.185	0.097	0.352
10/23/01 10:51	0.177	16.34	0.187	0.173	0.107	0.33
10/23/01 10:51	0.1875	16.34	0.173	0.159	0.1175	0.303
10/23/01 10:51	0.1985	16.34	0.162	0.148	0.1285	0.282
10/23/01 10:51	0.2102	16.34	0.15	0.136	0.1402	0.259
10/23/01 10:51	0.2227	16.34	0.141	0.127	0.1527	0.242
10/23/01 10:51	0.2358	16.34	0.131	0.117	0.1658	0.223
10/23/01 10:51	0.2498	16.34	0.121	0.107	0.1798	0.204
10/23/01 10:51	0.2647	16.34	0.11	0.096	0.1947	0.183
10/23/01 10:51	0.2803	16.34	0.102	0.088	0.2103	0.168
10/23/01 10:51	0.297	16.33	0.096	0.082	0.227	0.156
10/23/01 10:51	0.3147	16.33	0.09	0.076	0.2447	0.145
10/23/01 10:51	0.3333	16.33	0.083	0.069	0.2633	0.131
10/23/01 10:51	0.3532	16.33	0.077	0.063	0.2832	0.12
10/23/01 10:51	0.3742	16.33	0.071	0.057	0.3042	0.109
10/23/01 10:51	0.3963	16.33	0.067	0.053	0.3263	0.101
10/23/01 10:51	0.4198	16.33	0.063	0.049	0.3498	0.093
10/23/01 10:51	0.4447	16.33	0.058	0.044	0.3747	0.084
10/23/01 10:51	0.4697	16.33	0.054	0.04	0.3997	0.076
10/23/01 10:51	0.4963	16.33	0.052	0.038	0.4263	0.072
10/23/01 10:51	0.5247	16.33	0.05	0.036	0.4547	0.069
10/23/01 10:51	0.5547	16.33	0.046	0.032	0.4847	0.061
10/23/01 10:51	0.5863	16.33	0.044	0.03	0.5163	0.057
10/23/01 10:51	0.6213	16.33	0.042	0.028	0.5513	0.053
10/23/01 10:52	0.6578	16.33	0.04	0.026	0.5878	0.05
10/23/01 10:52	0.6963	16.33	0.038	0.024	0.6263	0.046
10/23/01 10:52	0.738	16.33	0.036	0.022	0.668	0.042
10/23/01 10:52	0.7813	16.33	0.034	0.02	0.7113	0.038
10/23/01 10:52	0.828	16.33	0.034	0.02	0.758	0.038
10/23/01 10:52	0.8763	16.33	0.03	0.016	0.8063	0.03
10/23/01 10:52	0.928	16.33	0.032	0.018	0.858	0.034
10/23/01 10:52	0.983	16.32	0.029	0.015	0.913	0.029
10/23/01 10:52	1.0413	16.32	0.027	0.013	0.9713	0.025
10/23/01 10:52	1.103	16.32	0.025	0.011	1.033	0.021
10/23/01 10:52	1.168	16.32	0.023	0.009	1.098	0.017
10/23/01 10:52	1.238	16.32	0.023	0.009	1.168	0.017
10/23/01 10:52	1.3113	16.32	0.019	0.005	1.2413	0.01
10/23/01 10:52	1.3897	16.32	0.019	0.005	1.3197	0.01
10/23/01 10:52	1.473	16.32	0.019	0.005	1.403	0.01
10/23/01 10:52	1.5613	16.32	0.017	0.003	1.4913	0.006
10/23/01 10:53	1.6547	16.3	0.017	0.003	1.5847	0.006
10/23/01 10:53	1.753	16.3	0.014	0	1.683	0
10/23/01 10:53	1.858	16.3	0.014	0	1.788	0
10/23/01 10:53	1.968	16.3	0.014	0	1.898	0
10/23/01 10:53	2.0847	16.3	0.017	0.003	2.0147	0.006
10/23/01 10:53	2.2097	16.3	0.017	0.003	2.1397	0.006
10/23/01 10:53	2.3412	16.3	0.017	0.003	2.2712	0.006
10/23/01 10:53	2.4813	16.3	0.017	0.003	2.4113	0.006
10/23/01 10:53	2.6297	16.3	0.017	0.003	2.5597	0.006
10/23/01 10:54	2.7863	16.29	0.016	0.002	2.7163	0.004
10/23/01 10:54	2.953	16.3	0.017	0.003	2.883	0.006
10/23/01 10:54	3.1297	16.29	0.018	0.004	3.0597	0.008
10/23/01 10:54	3.3163	16.29	0.016	0.002	3.2463	0.004
10/23/01 10:54	3.5147	16.29	0.018	0.004	3.4447	0.008
10/23/01 10:55	3.7247	16.29	0.016	0.002	3.6547	0.004

10/23/01 10:55	3.9463	16.29	0.02	0.006	3.8763	0.011
10/23/01 10:55	4.1813	16.29	0.02	0.006	4.1113	0.011
10/23/01 10:55	4.4295	16.29	0.02	0.006	4.3595	0.011
10/23/01 10:56	4.693	16.28	0.022	0.008	4.623	0.015
10/23/01 10:56	4.973	16.28	0.022	0.008	4.903	0.015
10/23/01 10:56	5.2697	16.28	0.022	0.008	5.1997	0.015
10/23/01 10:56	5.583	16.28	0.022	0.008	5.513	0.015
10/23/01 10:57	5.9147	16.28	0.022	0.008	5.8447	0.015
10/23/01 10:57	6.2663	16.27	0.026	0.012	6.1963	0.023

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE _____ OF _____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57TW17 FALLING HEAD	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2L T_0}$$

WHERE:

$r = 0.041667$ (RISER RADIUS, Ft)
$R = 0.041667$ (SCREEN RADIUS, Ft)
$L = 10.0$ (INPUT LENGTH, Ft)
$T_0 = 0.189$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

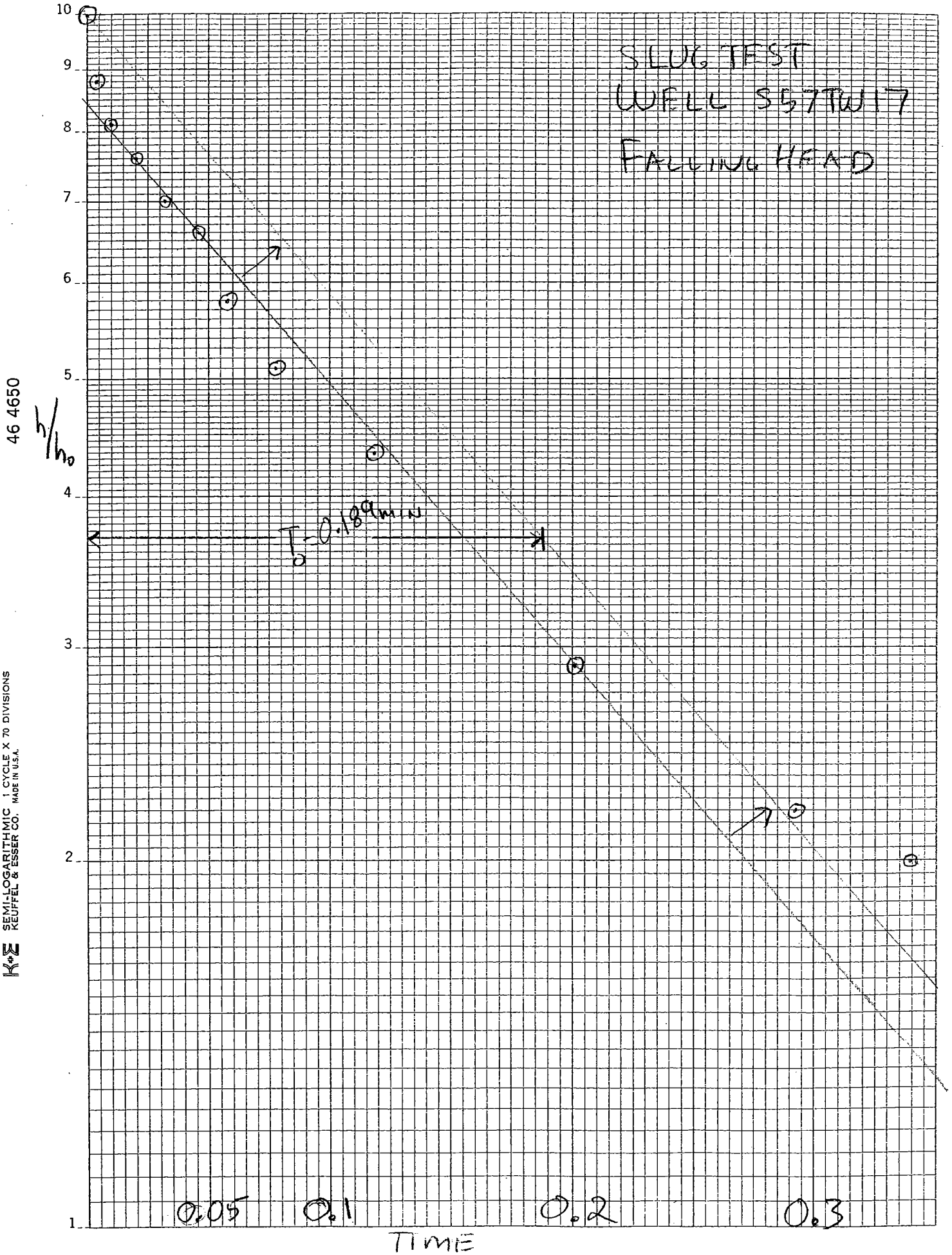
$$K = \frac{(0.041667)^2 \ln(10/0.041667)}{2(10)(0.189)}$$

$$K = \frac{9.51513648 \times 10^{-3}}{3.78}$$

$K = 2.52 \times 10^{-3}$ ft/min

$K = 1.28 \times 10^{-3}$ cm/sec

$K = 3.6$ ft/day



K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 4650

In-Situ Inc. MiniTroll Pro

Report generated: 10/31/01 14:11:20
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 104247 s57tw17fhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw17fhno1

Test defined on: 10/23/01 10:40:51
Test started on: 10/23/01 10:42:47
Test stopped on: 10/23/01 10:49:01
Test extracted on: N/A

Data gathered using Logarithmic testing
aximum time between data points: 10.0 Minutes.
Number of data samples: 92

TOTAL DATA SAMPLES 92

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 16.464 Feet H2O

Adj h/ho= 0.489

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	Adj Feet H2O	Adj h/ho
10/23/01	10:42	0	16.44	0			
10/23/01	10:42	0.005	16.46	0.006			
10/23/01	10:42	0.01	16.47	0.008			
10/23/01	10:42	0.015	16.47	0.43			
10/23/01	10:42	0.02	16.47	3.056			
10/23/01	10:42	0.025	16.47	3.784			
10/23/01	10:42	0.03	16.48	0.63			
10/23/01	10:42	0.035	16.48	0.74			
10/23/01	10:42	0.04	16.48	0.08			
10/23/01	10:42	0.045	16.48	0.386			
10/23/01	10:42	0.05	16.48	0.75			
10/23/01	10:42	0.055	16.48	1.207			
10/23/01	10:42	0.06	16.48	0.411			
10/23/01	10:42	0.065	16.48	0.101			
10/23/01	10:42	0.07	16.48	0.293			
10/23/01	10:42	0.075	16.48	0.442			
10/23/01	10:42	0.08	16.48	0.442	0	0.489	1.00
10/23/01	10:42	0.0848	16.48	0.384	0.0048	0.431	0.88

10/23/01 10:42	0.09	16.48	0.349	0.01	0.396	0.81
10/23/01 10:42	0.095	16.48	0.332	0.015	0.379	0.78
10/23/01 10:42	0.1	16.48	0.326	0.02	0.373	0.76
10/23/01 10:42	0.1058	16.48	0.311	0.0258	0.358	0.73
10/23/01 10:42	0.112	16.48	0.295	0.032	0.342	0.70
10/23/01 10:42	0.1185	16.48	0.28	0.0385	0.327	0.67
10/23/01 10:42	0.1255	16.49	0.276	0.0455	0.323	0.66
10/23/01 10:42	0.1328	16.48	0.235	0.0528	0.282	0.58
10/23/01 10:42	0.1407	16.49	0.222	0.0607	0.269	0.55
10/23/01 10:42	0.149	16.49	0.224	0.069	0.271	0.55
10/23/01 10:42	0.1578	16.49	0.202	0.0778	0.249	0.51
10/23/01 10:42	0.167	16.48	0.115	0.087	0.162	0.33
10/23/01 10:42	0.177	16.48	0.177	0.097	0.224	0.46
10/23/01 10:42	0.1875	16.48	0.177	0.1075	0.224	0.46
10/23/01 10:42	0.1985	16.48	0.165	0.1185	0.212	0.43
10/23/01 10:43	0.2102	16.48	0.107	0.1302	0.154	0.31
10/23/01 10:43	0.2227	16.47	0.167	0.1427	0.214	0.44
10/23/01 10:43	0.2358	16.47	0.119	0.1558	0.166	0.34
10/23/01 10:43	0.2498	16.47	0.113	0.1698	0.16	0.33
10/23/01 10:43	0.2647	16.47	0.103	0.1847	0.15	0.31
10/23/01 10:43	0.2803	16.47	0.095	0.2003	0.142	0.29
10/23/01 10:43	0.297	16.47	0.086	0.217	0.133	0.27
10/23/01 10:43	0.3147	16.47	0.08	0.2347	0.127	0.26
10/23/01 10:43	0.3333	16.47	0.074	0.2533	0.121	0.25
10/23/01 10:43	0.3532	16.47	0.068	0.2732	0.115	0.24
10/23/01 10:43	0.3742	16.46	0.062	0.2942	0.109	0.22
10/23/01 10:43	0.3963	16.47	0.057	0.3163	0.104	0.21
10/23/01 10:43	0.4198	16.46	0.051	0.3398	0.098	0.20
10/23/01 10:43	0.4447	16.46	0.047	0.3647	0.094	0.19
10/23/01 10:43	0.4697	16.46	0.043	0.3897	0.09	0.18
10/23/01 10:43	0.4963	16.46	0.039	0.4163	0.086	0.18
10/23/01 10:43	0.5247	16.46	0.035	0.4447	0.082	0.17
10/23/01 10:43	0.5547	16.46	0.033	0.4747	0.08	0.16
10/23/01 10:43	0.5863	16.46	0.029	0.5063	0.076	0.16
10/23/01 10:43	0.6213	16.46	0.025	0.5413	0.072	0.15
10/23/01 10:43	0.6578	16.46	0.02	0.5778	0.067	0.14
10/23/01 10:43	0.6963	16.44	0.021	0.6163	0.068	0.14
10/23/01 10:43	0.738	16.44	0.019	0.658	0.066	0.13
10/23/01 10:43	0.7813	16.44	0.017	0.7013	0.064	0.13
10/23/01 10:43	0.828	16.44	0.012	0.748	0.059	0.12
10/23/01 10:43	0.8763	16.44	0.01	0.7963	0.057	0.12
10/23/01 10:43	0.928	16.43	0.009	0.848	0.056	0.11
10/23/01 10:43	0.983	16.43	0.006	0.903	0.053	0.11
10/23/01 10:43	1.0413	16.43	0.004	0.9613	0.051	0.10
10/23/01 10:43	1.103	16.43	0.002	1.023	0.049	0.10
10/23/01 10:43	1.168	16.43	0	1.088	0.047	0.10
10/23/01 10:44	1.238	16.42	0.001	1.158	0.048	0.10
10/23/01 10:44	1.3113	16.42	-0.002	1.2313	0.045	0.09
10/23/01 10:44	1.3897	16.42	-0.004	1.3097	0.043	0.09
10/23/01 10:44	1.473	16.42	-0.006	1.393	0.041	0.08
10/23/01 10:44	1.5613	16.42	-0.008	1.4813	0.039	0.08
10/23/01 10:44	1.6547	16.41	-0.007	1.5747	0.04	0.08
10/23/01 10:44	1.753	16.41	-0.007	1.673	0.04	0.08
10/23/01 10:44	1.858	16.41	-0.012	1.778	0.035	0.07
10/23/01 10:44	1.968	16.41	-0.012	1.888	0.035	0.07
10/23/01 10:44	2.0847	16.39	-0.013	2.0047	0.034	0.07
10/23/01 10:45	2.2097	16.39	-0.015	2.1297	0.032	0.07
10/23/01 10:45	2.3412	16.39	-0.017	2.2612	0.03	0.06
10/23/01 10:45	2.4813	16.39	-0.02	2.4013	0.027	0.06
10/23/01 10:45	2.6297	16.38	-0.021	2.5497	0.026	0.05

10/23/01 10:45	2.7863	16.38	-0.023	2.7063	0.024	0.05
10/23/01 10:45	2.953	16.38	-0.025	2.873	0.022	0.04
10/23/01 10:45	3.1297	16.38	-0.028	3.0497	0.019	0.04
10/23/01 10:46	3.3163	16.37	-0.029	3.2363	0.018	0.04
10/23/01 10:46	3.5147	16.37	-0.031	3.4347	0.016	0.03
10/23/01 10:46	3.7247	16.37	-0.033	3.6447	0.014	0.03
10/23/01 10:46	3.9463	16.36	-0.035	3.8663	0.012	0.02
10/23/01 10:46	4.1813	16.36	-0.035	4.1013	0.012	0.02
10/23/01 10:47	4.4295	16.36	-0.037	4.3495	0.01	0.02
10/23/01 10:47	4.693	16.34	-0.039	4.613	0.008	0.02
10/23/01 10:47	4.973	16.34	-0.041	4.893	0.006	0.01
10/23/01 10:48	5.2697	16.34	-0.043	5.1897	0.004	0.01
10/23/01 10:48	5.583	16.33	-0.045	5.503	0.002	0.00
10/23/01 10:48	5.9147	16.33	-0.047	5.8347	0	0.00

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57TW1B

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 1" SCREEN LENGTH/DEPTH: 5' / TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 10.77 DATE: 10-23-01

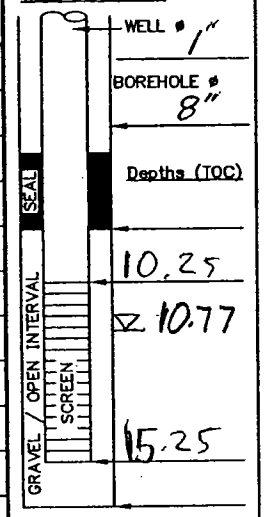
TEST TYPE (Rising/Falling/Constant Head): FALLING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: ADD DI H_2O PAGE ..... OF .....

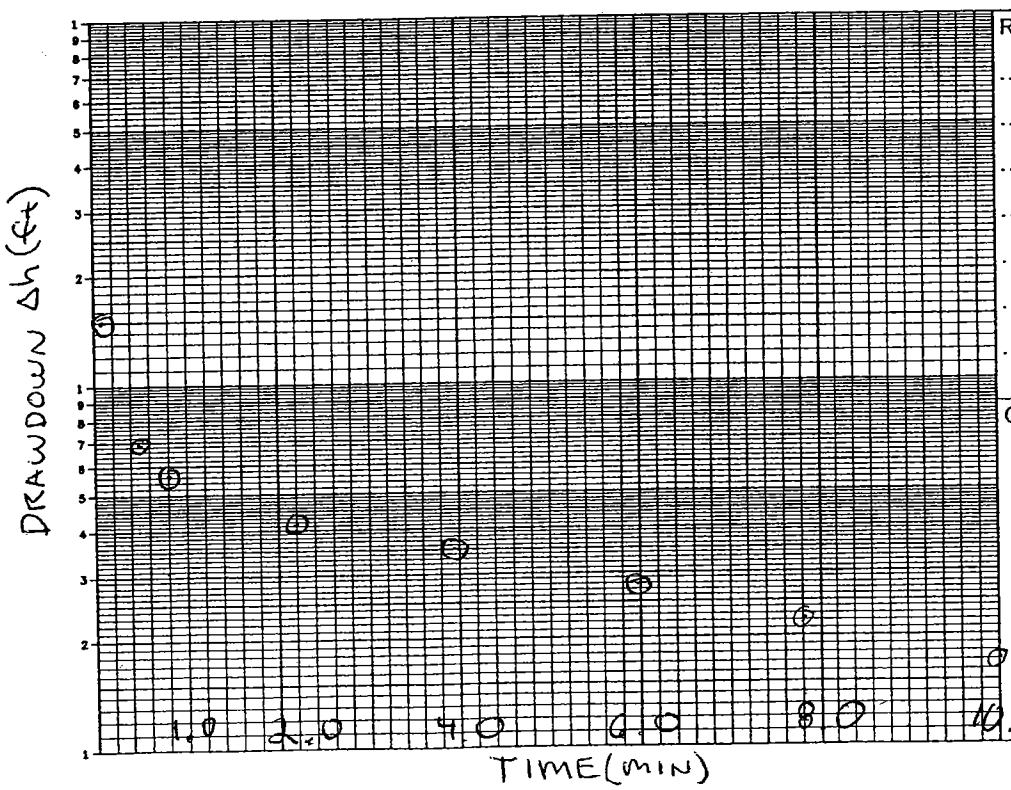
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.3145		1.512	3.946		0.354
0.3740		1.288	5.9145		0.282
0.3963		1.034			
0.4198		0.906			
0.4695		0.788			
0.5547		0.699			
0.8278		0.564			
1.103		0.519			
1.4728		0.486			
2.21		0.435			
7.896		0.224			
9.95		0.171			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

head = 3.967

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57TW18 FALLING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: [illegible]	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_0}$$

WHERE:

$r = 0.041667$ (RISER RADIUS, Ft)
$R = 0.041667$ (SCREEN RADIUS, Ft)
$L = 4.48$ (INPUT LENGTH, Ft)
$T_0 = 7.93$ min (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

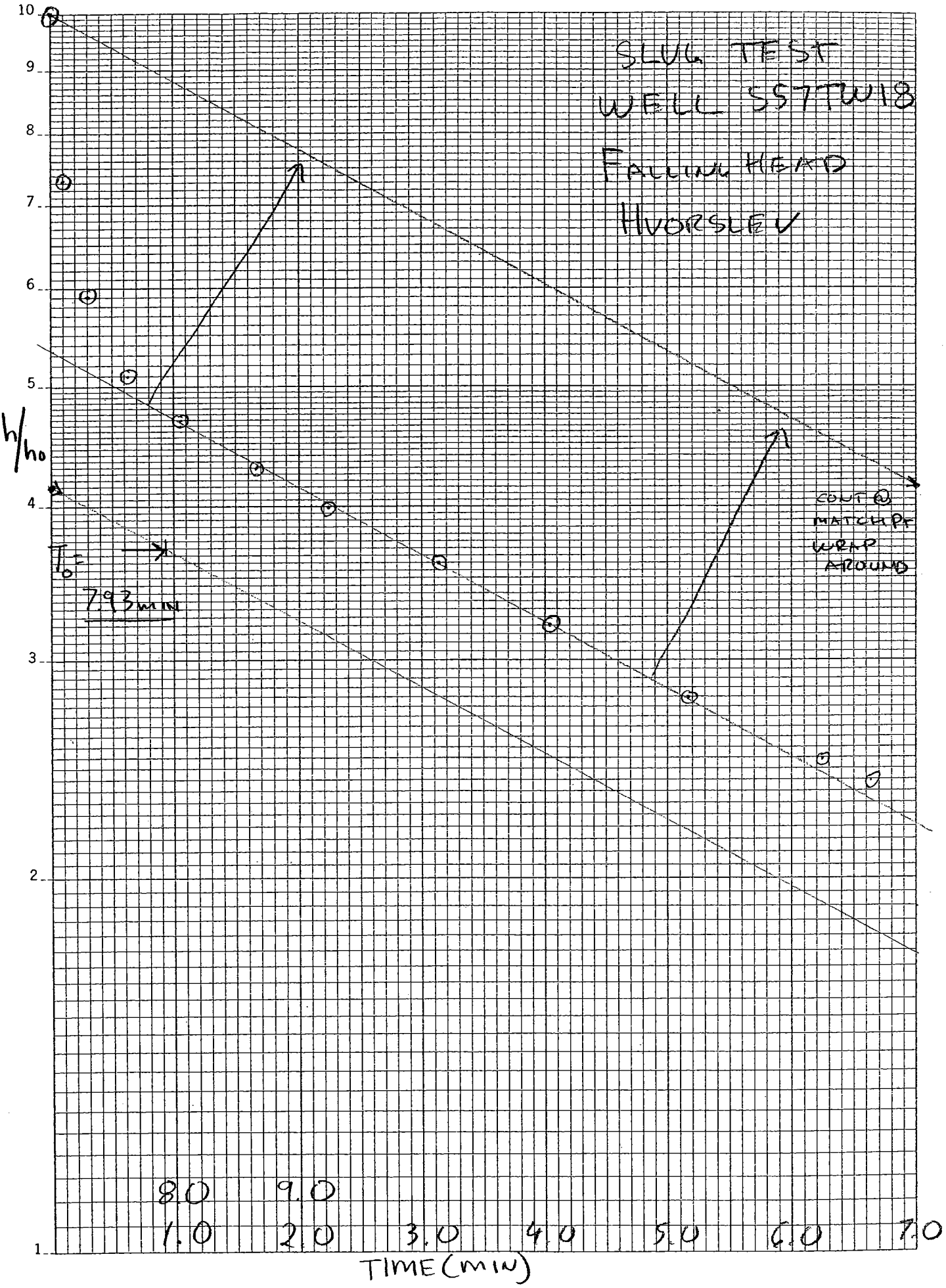
$$K = \frac{(0.041667)^2 \ln(4.48/0.041667)}{2(4.48)(7.93)}$$

$$= \frac{8.12108285 \times 10^{-5}}{71.0528}$$

$K = 1.14 \times 10^{-4}$ ft/min

$K = 5.8 \times 10^{-5}$ cm/sec

$K = 1.65 \times 10^{-1}$ ft/day ✓



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/31/01 12:54:18
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 112411 s57tw18fhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw18fhno1

Test defined on: 10/23/01 11:14:42
Test started on: 10/23/01 11:24:11
Test stopped on: 10/23/01 11:54:32
Test extracted on: N/A

Data gathered using Logarithmic testing
aximum time between data points: 10.(Minutes.
Number of data samples: 120

TOTAL DATA SAMPLES 120

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 3.963 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 1.034
10/23/01	11:24	0	17.67	0			
10/23/01	11:24	0.005	17.67	0			
10/23/01	11:24	0.01	17.69	0			
10/23/01	11:24	0.015	17.69	0.002			
10/23/01	11:24	0.02	17.7	0.004			
10/23/01	11:24	0.025	17.7	0.004			
10/23/01	11:24	0.03	17.7	0.008			
10/23/01	11:24	0.035	17.7	0.008			
10/23/01	11:24	0.04	17.7	0.008			
10/23/01	11:24	0.3963	17.7	1.034	0	1.00	

10/23/01 11:24	0.4198	17.7	0.906	0.0235	0.88
10/23/01 11:24	0.4447	17.7	0.831	0.0484	0.80
10/23/01 11:24	0.4697	17.7	0.788	0.0734	0.76
10/23/01 11:24	0.4963	17.7	0.753	0.1	0.73
10/23/01 11:24	0.5247	17.7	0.724	0.1284	0.70
10/23/01 11:24	0.5547	17.7	0.699	0.1584	0.68
10/23/01 11:24	0.5863	17.7	0.676	0.19	0.65
10/23/01 11:24	0.6213	17.7	0.656	0.225	0.63
10/23/01 11:24	0.6578	17.7	0.633	0.2615	0.61
10/23/01 11:24	0.6963	17.7	0.612	0.3	0.59
10/23/01 11:24	0.738	17.7	0.595	0.3417	0.58
10/23/01 11:24	0.7813	17.7	0.579	0.385	0.56
10/23/01 11:25	0.828	17.7	0.564	0.4317	0.55
10/23/01 11:25	0.8763	17.7	0.552	0.48	0.53
10/23/01 11:25	0.928	17.69	0.544	0.5317	0.53
10/23/01 11:25	0.983	17.69	0.534	0.5867	0.52
10/23/01 11:25	1.0413	17.69	0.527	0.645	0.51
10/23/01 11:25	1.103	17.69	0.519	0.7067	0.50
10/23/01 11:25	1.168	17.69	0.511	0.7717	0.49
10/23/01 11:25	1.238	17.69	0.505	0.8417	0.49
10/23/01 11:25	1.3113	17.69	0.498	0.915	0.48
10/23/01 11:25	1.3897	17.69	0.494	0.9934	0.48
10/23/01 11:25	1.473	17.69	0.486	1.0767	0.47
10/23/01 11:25	1.5613	17.69	0.478	1.165	0.46
10/23/01 11:25	1.6547	17.67	0.472	1.2584	0.46
10/23/01 11:25	1.753	17.67	0.468	1.3567	0.45
10/23/01 11:26	1.858	17.67	0.459	1.4617	0.44
10/23/01 11:26	1.968	17.67	0.449	1.5717	0.43
10/23/01 11:26	2.0847	17.67	0.441	1.6884	0.43
10/23/01 11:26	2.2097	17.67	0.435	1.8134	0.42
10/23/01 11:26	2.3412	17.67	0.426	1.9449	0.41
10/23/01 11:26	2.4813	17.67	0.418	2.085	0.40
10/23/01 11:26	2.6297	17.67	0.412	2.2334	0.40
10/23/01 11:26	2.7863	17.67	0.406	2.39	0.39
10/23/01 11:27	2.953	17.66	0.398	2.5567	0.38
10/23/01 11:27	3.1297	17.67	0.391	2.7334	0.38
10/23/01 11:27	3.3163	17.66	0.381	2.92	0.37
10/23/01 11:27	3.5147	17.66	0.373	3.1184	0.36
10/23/01 11:27	3.7247	17.66	0.365	3.3284	0.35
10/23/01 11:28	3.9463	17.66	0.354	3.55	0.34
10/23/01 11:28	4.1813	17.66	0.344	3.785	0.33
10/23/01 11:28	4.4295	17.66	0.336	4.0332	0.32
10/23/01 11:28	4.693	17.65	0.328	4.2967	0.32
10/23/01 11:29	4.973	17.66	0.317	4.5767	0.31
10/23/01 11:29	5.2697	17.65	0.305	4.8734	0.29
10/23/01 11:29	5.583	17.66	0.294	5.1867	0.28
10/23/01 11:30	5.9147	17.65	0.282	5.5184	0.27
10/23/01 11:30	6.2663	17.65	0.272	5.87	0.26
10/23/01 11:30	6.6397	17.65	0.261	6.2434	0.25
10/23/01 11:31	7.0347	17.65	0.249	6.6384	0.24
10/23/01 11:31	7.453	17.65	0.236	7.0567	0.23
10/23/01 11:32	7.8963	17.65	0.224	7.5	0.22

10/23/01 11:32	8.3663	17.65	0.212	7.97	0.21
10/23/01 11:33	8.8647	17.65	0.197	8.4684	0.19
10/23/01 11:33	9.3913	17.63	0.187	8.995	0.18
10/23/01 11:34	9.9497	17.63	0.171	9.5534	0.17
10/23/01 11:34	10.5413	17.63	0.158	10.145	0.15
10/23/01 11:35	11.168	17.63	0.144	10.7717	0.14
10/23/01 11:36	11.8313	17.63	0.131	11.435	0.13
10/23/01 11:36	12.5347	17.63	0.119	12.1384	0.12
10/23/01 11:37	13.2797	17.63	0.106	12.8834	0.10
10/23/01 11:38	14.0697	17.63	0.096	13.6734	0.09
10/23/01 11:39	14.9063	17.63	0.086	14.51	0.08
10/23/01 11:39	15.7913	17.63	0.077	15.395	0.07
10/23/01 11:40	16.7297	17.63	0.067	16.3334	0.06
10/23/01 11:41	17.723	17.63	0.059	17.3267	0.06
10/23/01 11:42	18.7763	17.63	0.055	18.38	0.05
10/23/01 11:44	19.8913	17.63	0.048	19.495	0.05
10/23/01 11:45	21.073	17.63	0.042	20.6767	0.04
10/23/01 11:46	22.3247	17.63	0.036	21.9284	0.03
10/23/01 11:47	23.6497	17.63	0.032	23.2534	0.03
10/23/01 11:49	25.0547	17.63	0.028	24.6584	0.03
10/23/01 11:50	26.543	17.63	0.022	26.1467	0.02
10/23/01 11:52	28.118	17.63	0.017	27.7217	0.02
10/23/01 11:53	29.7863	17.63	0.015	29.39	0.01

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57TW19

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 1" SCREEN LENGTH/DEPTH: 5' / TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 10.74' TPVC DATE: 10-23-01

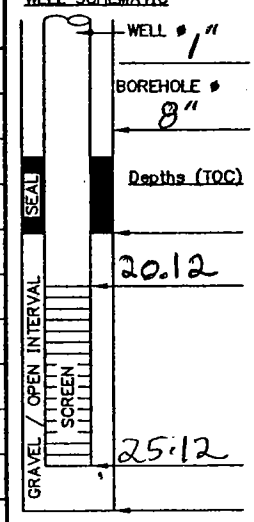
TEST TYPE (Rising/Falling/Constant Head): FALLING/RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE ..... OF .....

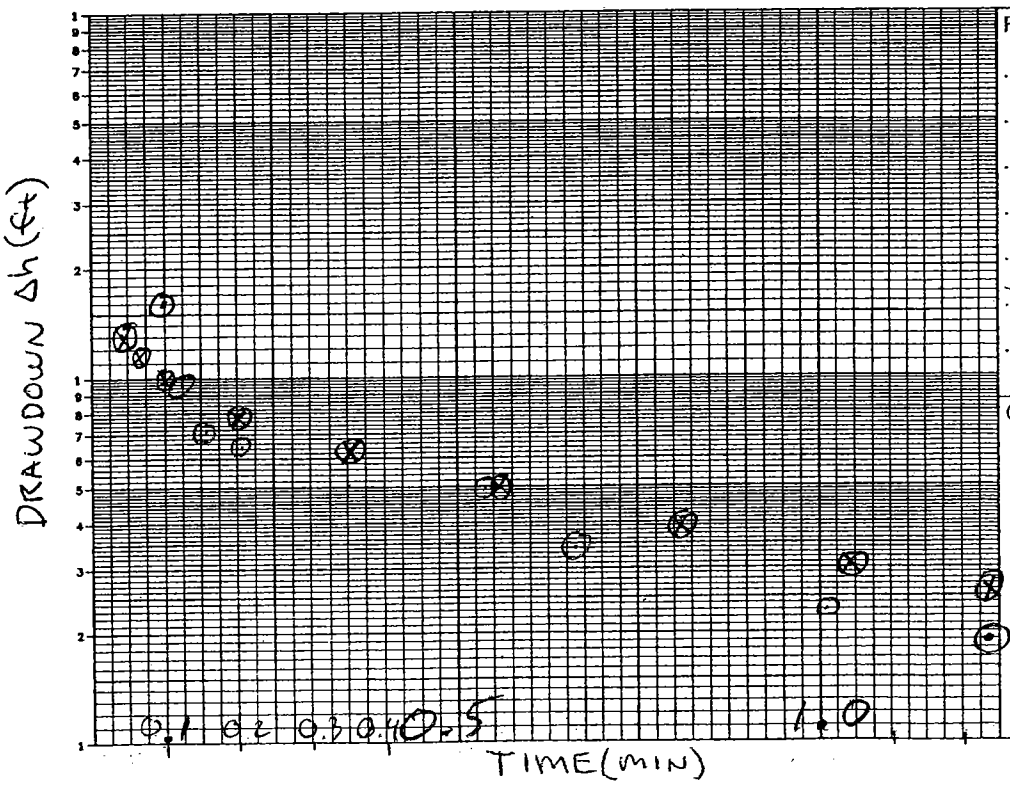
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE (FH) TOC (RH)

FALLING HEAD			RISING HEAD		
ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.100		1.625	0.045		1.311
0.1255		0.967	0.060		1.159
0.1578		0.709	0.100		0.994
0.2100		0.636	0.210		0.781
0.5247		0.409	0.3532		0.630
0.6578		0.349	0.5547		0.495
0.7813		0.306	0.7813		0.394
0.9278		0.260	1.0412		0.313
1.0412		0.231	1.238		0.267
1.238		0.190	1.4728		0.224
			1.7530		0.186

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

head = 12.622

- RISING BENT SLUG DID NOT LOWER FREELY
- RISING HEAD TEST MORE RELIABLE

CALCS, SKETCH MAPS, ETC.:

⊙ – FALLING HEAD

⊗ – RISING HEAD

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE _____ OF _____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL	S57TW19 FALLING HEAD
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.041667$ (RISER RADIUS, Ft)
$R = 0.041667$ (SCREEN RADIUS, Ft)
$L = 5$ (INPUT LENGTH, Ft)
$T_o = 0.983$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

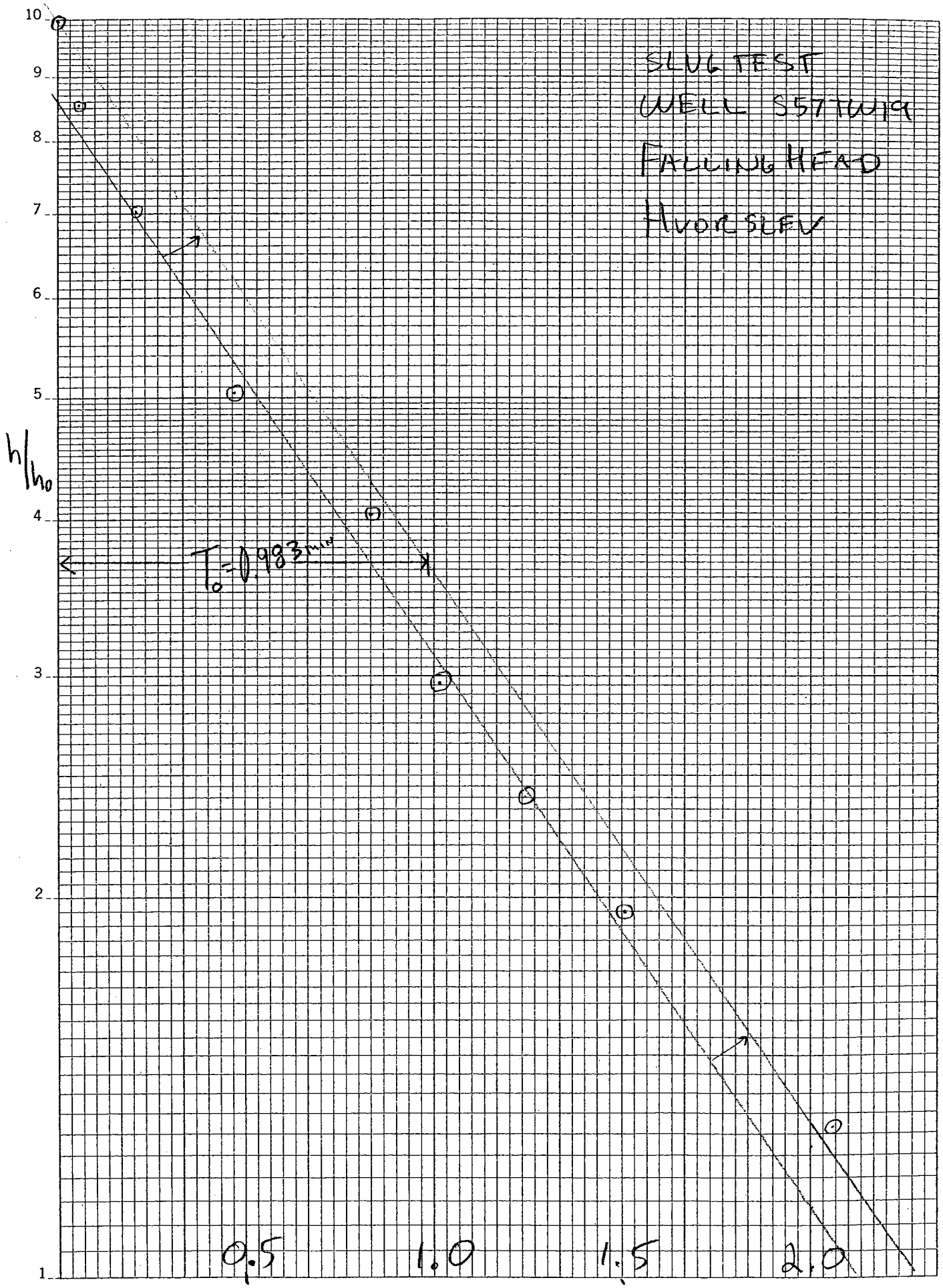
$$K = \frac{(0.041667)^2 \ln(5/0.041667)}{2(5)(0.983)}$$

$$K = \frac{8.31160372 \times 10^{-3}}{9.83}$$

$K = 8.5 \times 10^{-4}$ ft/min

$K = 4.3 \times 10^{-4}$ cm/sec

$K = 1.22$ ft/day ✓



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 12:08:48
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 121018 s57tw19fhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw19fhno1

Test defined on: 10/23/01 12:04:23
Test started on: 10/23/01 12:10:18
Test stopped on: 10/23/01 12:19:11
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between data points:10 Minutes.
Number of data samples: 99

TOTAL DATA SAMPLES 99

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 12.649 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj Feet H2O	ho= 0.768 h/ho	Adj ET (min)
10/23/01	12:10	0	15.79	0	0.022		
10/23/01	12:10	0.005	15.8	0	0.022		
10/23/01	12:10	0.01	15.8	0.002	0.024		
10/23/01	12:10	0.1407	15.84	0.721	0.743		
10/23/01	12:10	0.149	15.84	0.746	0.768	1.000	0
10/23/01	12:10	0.1578	15.84	0.709	0.731	0.952	0.0088
10/23/01	12:10	0.167	15.84	0.704	0.726	0.945	0.018
10/23/01	12:10	0.177	15.82	0.682	0.704	0.917	0.028
10/23/01	12:10	0.1875	15.82	0.663	0.685	0.892	0.0385
10/23/01	12:10	0.1985	15.82	0.651	0.673	0.876	0.0495
10/23/01	12:10	0.2102	15.82	0.636	0.658	0.857	0.0612
10/23/01	12:10	0.2227	15.82	0.632	0.654	0.852	0.0737
10/23/01	12:10	0.2358	15.82	0.609	0.631	0.822	0.0868

10/23/01 12:10	0.2498	15.82	0.593	0.615	0.801	0.1008
10/23/01 12:10	0.2647	15.82	0.578	0.6	0.781	0.1157
10/23/01 12:10	0.2803	15.82	0.574	0.596	0.776	0.1313
10/23/01 12:10	0.297	15.82	0.558	0.58	0.755	0.148
10/23/01 12:10	0.3147	15.82	0.543	0.565	0.736	0.1657
10/23/01 12:10	0.3333	15.81	0.531	0.553	0.720	0.1843
10/23/01 12:10	0.3532	15.81	0.517	0.539	0.702	0.2042
10/23/01 12:10	0.3742	15.81	0.498	0.52	0.677	0.2252
10/23/01 12:10	0.3963	15.81	0.653	0.675	0.879	0.2473
10/23/01 12:10	0.4198	15.81	0.436	0.458	0.596	0.2708
10/23/01 12:10	0.4447	15.81	0.674	0.696	0.906	0.2957
10/23/01 12:10	0.4697	15.81	0.508	0.53	0.690	0.3207
10/23/01 12:10	0.4963	15.81	0.422	0.444	0.578	0.3473
10/23/01 12:10	0.5247	15.81	0.409	0.431	0.561	0.3757
10/23/01 12:10	0.5547	15.81	0.395	0.417	0.543	0.4057
10/23/01 12:10	0.5863	15.81	0.38	0.402	0.523	0.4373
10/23/01 12:10	0.6213	15.81	0.366	0.388	0.505	0.4723
10/23/01 12:10	0.6578	15.81	0.349	0.371	0.483	0.5088
10/23/01 12:11	0.6963	15.81	0.335	0.357	0.465	0.5473
10/23/01 12:11	0.738	15.8	0.318	0.34	0.443	0.589
10/23/01 12:11	0.7813	15.8	0.306	0.328	0.427	0.6323
10/23/01 12:11	0.828	15.8	0.289	0.311	0.405	0.679
10/23/01 12:11	0.8763	15.8	0.273	0.295	0.384	0.7273
10/23/01 12:11	0.928	15.8	0.26	0.282	0.367	0.779
10/23/01 12:11	0.983	15.8	0.246	0.268	0.349	0.834
10/23/01 12:11	1.0413	15.8	0.231	0.253	0.329	0.8923
10/23/01 12:11	1.103	15.8	0.217	0.239	0.311	0.954
10/23/01 12:11	1.168	15.8	0.205	0.227	0.296	1.019
10/23/01 12:11	1.238	15.8	0.19	0.212	0.276	1.089
10/23/01 12:11	1.3113	15.8	0.176	0.198	0.258	1.1623
10/23/01 12:11	1.3897	15.79	0.163	0.185	0.241	1.2407
10/23/01 12:11	1.473	15.79	0.151	0.173	0.225	1.324
10/23/01 12:11	1.5613	15.79	0.139	0.161	0.210	1.4123
10/23/01 12:11	1.6547	15.79	0.128	0.15	0.195	1.5057
10/23/01 12:12	1.753	15.79	0.118	0.14	0.182	1.604
10/23/01 12:12	1.858	15.79	0.108	0.13	0.169	1.709
10/23/01 12:12	1.968	15.79	0.097	0.119	0.155	1.819
10/23/01 12:12	2.0847	15.79	0.087	0.109	0.142	1.9357
10/23/01 12:12	2.2097	15.77	0.079	0.101	0.132	2.0607
10/23/01 12:12	2.3412	15.77	0.071	0.093	0.121	2.1922
10/23/01 12:12	2.4813	15.77	0.062	0.084	0.109	2.3323
10/23/01 12:12	2.6297	15.77	0.054	0.076	0.099	2.4807
10/23/01 12:13	2.7863	15.77	0.048	0.07	0.091	2.6373
10/23/01 12:13	2.953	15.77	0.04	0.062	0.081	2.804
10/23/01 12:13	3.1297	15.77	0.035	0.057	0.074	2.9807
10/23/01 12:13	3.3163	15.77	0.027	0.049	0.064	3.1673
10/23/01 12:13	3.5147	15.77	0.023	0.045	0.059	3.3657
10/23/01 12:14	3.7247	15.77	0.019	0.041	0.053	3.5757
10/23/01 12:14	3.9463	15.76	0.013	0.035	0.046	3.7973
10/23/01 12:14	4.1813	15.76	0.009	0.031	0.040	4.0323
10/23/01 12:14	4.4295	15.76	0.005	0.027	0.035	4.2805
10/23/01 12:15	4.693	15.76	0.001	0.023	0.030	4.544
10/23/01 12:15	4.973	15.76	-0.002	0.02	0.026	4.824
10/23/01 12:15	5.2697	15.76	-0.004	0.018	0.023	5.1207
10/23/01 12:15	5.583	15.76	-0.006	0.016	0.021	5.434

noise

10/23/01 12:16	5.9147	15.76	-0.008	0.014	0.018	5.7657
10/23/01 12:16	6.2663	15.76	-0.012	0.01	0.013	6.1173
10/23/01 12:16	6.6397	15.75	-0.014	0.008	0.010	6.4907
10/23/01 12:17	7.0347	15.75	-0.018	0.004	0.005	6.8857
10/23/01 12:17	7.453	15.75	-0.02	0.002	0.003	7.304
10/23/01 12:18	7.8963	15.75	-0.02	0.002	0.003	7.7473
10/23/01 12:18	8.3663	15.75	-0.022	0	0.000	8.2173
10/23/01 12:19	8.8647	15.75	-0.022	0	0.000	8.7157

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57TW19 RISING HEAD	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.041667$ (RISER RADIUS, Ft)
$R = 0.041667$ (SCREEN RADIUS, Ft)
$L = 5$ (INPUT LENGTH, Ft)
$T_o = 0.583$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

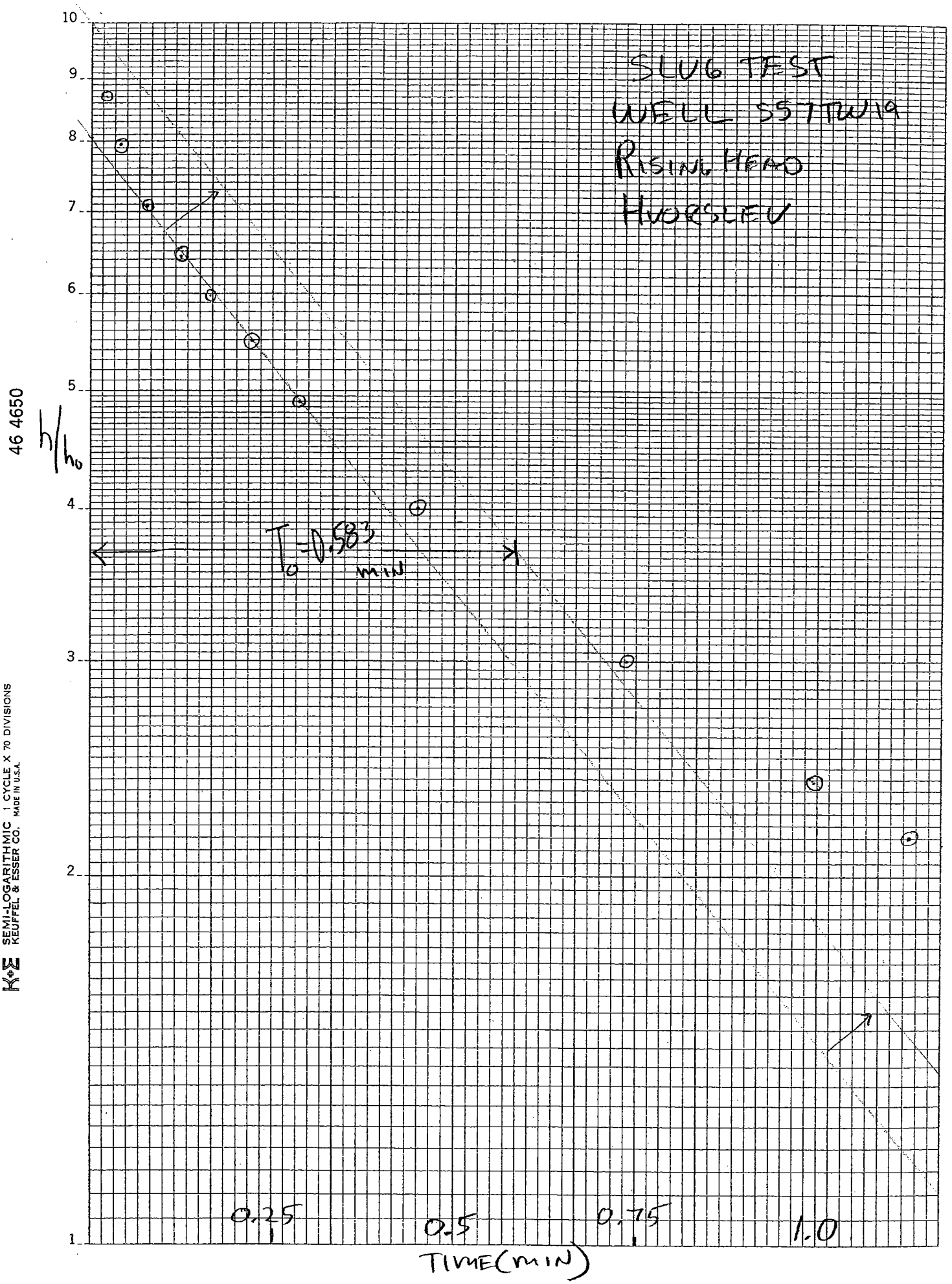
$$K = \frac{(0.041667)^2 \ln(5/0.041667)}{2(5)(0.583)}$$

$$= \frac{8.31173671 \times 10^{-3}}{5.83}$$

$$= 1.43 \times 10^{-3} \text{ ft/min}$$

$$= 7.24 \times 10^{-4} \text{ cm/sec}$$

$$= 2.1 \text{ ft/day}$$ ✓


SLUG TEST
WELL 557TW19
RISING HEAD
HVORSLEV
$T_0 = 0.58$ min
h/h_0
10
9
8
7
6
5
4
3
2
1
0.25
0.5
0.75
1.0
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/31/01 12:24:39
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 122122 s57tw19rhno2.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw19rhno2

Test defined on: 10/23/01 12:20:47
Test started on: 10/23/01 12:21:22
Test stopped on: 10/23/01 12:35:28
Test extracted on: N/A

Data gathered using Logarithmic testing
/laximum time between data points: 10.0(Minutes.
Number of data samples: 107

TOTAL DATA SAMPLES 107

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 12.619 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 1.311
10/23/01	12:21	0	15.73	0			
10/23/01	12:21	0.005	15.75	0.191			
10/23/01	12:21	0.01	15.76	2.663			
10/23/01	12:21	0.015	15.76	2.475			
10/23/01	12:21	0.02	15.76	0.961			
10/23/01	12:21	0.025	15.76	1.383			
10/23/01	12:21	0.03	15.76	1.691			
10/23/01	12:21	0.035	15.77	1.284			
10/23/01	12:21	0.04	15.77	1.186			
10/23/01	12:21	0.045	15.77	1.311	0	1	

				ET	h/ho
10/23/01 12:21	0.05	15.77	1.257	0.005	0.959
10/23/01 12:21	0.055	15.77	1.17	0.01	0.892
10/23/01 12:21	0.06	15.77	1.159	0.015	0.884
10/23/01 12:21	0.065	15.77	1.145	0.02	0.873
10/23/01 12:21	0.07	15.77	1.108	0.025	0.845
10/23/01 12:21	0.075	15.77	1.085	0.03	0.828
10/23/01 12:21	0.08	15.79	1.069	0.035	0.815
10/23/01 12:21	0.0848	15.79	1.04	0.0398	0.793
10/23/01 12:21	0.09	15.79	1.017	0.045	0.776
10/23/01 12:21	0.095	15.79	1.005	0.05	0.767
10/23/01 12:21	0.1	15.79	0.994	0.055	0.758
10/23/01 12:21	0.1058	15.77	0.973	0.0608	0.742
10/23/01 12:21	0.112	15.79	0.959	0.067	0.732
10/23/01 12:21	0.1185	15.79	0.942	0.0735	0.719
10/23/01 12:21	0.1255	15.79	0.926	0.0805	0.706
10/23/01 12:21	0.1328	15.79	0.911	0.0878	0.695
10/23/01 12:21	0.1407	15.79	0.895	0.0957	0.683
10/23/01 12:21	0.149	15.79	0.876	0.104	0.668
10/23/01 12:21	0.1578	15.79	0.862	0.1128	0.658
10/23/01 12:21	0.167	15.79	0.845	0.122	0.645
10/23/01 12:21	0.177	15.79	0.831	0.132	0.634
10/23/01 12:21	0.1875	15.77	0.814	0.1425	0.621
10/23/01 12:21	0.1985	15.79	0.802	0.1535	0.612
10/23/01 12:21	0.2102	15.77	0.781	0.1652	0.596
10/23/01 12:21	0.2227	15.77	0.764	0.1777	0.583
10/23/01 12:21	0.2358	15.77	0.748	0.1908	0.571
10/23/01 12:21	0.2498	15.77	0.731	0.2048	0.558
10/23/01 12:21	0.2647	15.77	0.717	0.2197	0.547
10/23/01 12:21	0.2803	15.77	0.698	0.2353	0.532
10/23/01 12:21	0.297	15.77	0.682	0.252	0.52
10/23/01 12:21	0.3147	15.77	0.665	0.2697	0.507
10/23/01 12:21	0.3333	15.77	0.648	0.2883	0.494
10/23/01 12:21	0.3532	15.77	0.63	0.3082	0.481
10/23/01 12:21	0.3742	15.77	0.613	0.3292	0.468
10/23/01 12:21	0.3963	15.77	0.597	0.3513	0.455
10/23/01 12:21	0.4198	15.77	0.578	0.3748	0.441
10/23/01 12:21	0.4447	15.77	0.562	0.3997	0.429
10/23/01 12:21	0.4697	15.77	0.545	0.4247	0.416
10/23/01 12:21	0.4963	15.77	0.528	0.4513	0.403
10/23/01 12:21	0.5247	15.77	0.512	0.4797	0.391
10/23/01 12:21	0.5547	15.77	0.495	0.5097	0.378
10/23/01 12:21	0.5863	15.76	0.478	0.5413	0.365
10/23/01 12:21	0.6213	15.76	0.46	0.5763	0.351
10/23/01 12:22	0.6578	15.76	0.443	0.6128	0.338
10/23/01 12:22	0.6963	15.76	0.427	0.6513	0.326
10/23/01 12:22	0.738	15.76	0.41	0.693	0.313
10/23/01 12:22	0.7813	15.76	0.394	0.7363	0.301
10/23/01 12:22	0.828	15.76	0.377	0.783	0.288
10/23/01 12:22	0.8763	15.76	0.361	0.8313	0.275
10/23/01 12:22	0.928	15.76	0.344	0.883	0.262
10/23/01 12:22	0.983	15.76	0.327	0.938	0.249
10/23/01 12:22	1.0413	15.76	0.313	0.9963	0.239

10/23/01 12:22	1.103	15.76	0.296	1.058	0.226
10/23/01 12:22	1.168	15.76	0.282	1.123	0.215
10/23/01 12:22	1.238	15.76	0.267	1.193	0.204
10/23/01 12:22	1.3113	15.75	0.253	1.2663	0.193
10/23/01 12:22	1.3897	15.75	0.236	1.3447	0.18
10/23/01 12:22	1.473	15.75	0.224	1.428	0.171
10/23/01 12:22	1.5613	15.75	0.211	1.5163	0.161
10/23/01 12:23	1.6547	15.75	0.199	1.6097	0.152
10/23/01 12:23	1.753	15.75	0.186	1.708	0.142
10/23/01 12:23	1.858	15.75	0.176	1.813	0.134
10/23/01 12:23	1.968	15.75	0.164	1.923	0.125
10/23/01 12:23	2.0847	15.75	0.153	2.0397	0.117
10/23/01 12:23	2.2097	15.75	0.143	2.1647	0.109
10/23/01 12:23	2.3412	15.75	0.135	2.2962	0.103
10/23/01 12:23	2.4813	15.75	0.124	2.4363	0.095
10/23/01 12:23	2.6297	15.75	0.116	2.5847	0.088
10/23/01 12:24	2.7863	15.73	0.108	2.7413	0.082
10/23/01 12:24	2.953	15.75	0.102	2.908	0.078
10/23/01 12:24	3.1297	15.73	0.093	3.0847	0.071
10/23/01 12:24	3.3163	15.73	0.087	3.2713	0.066
10/23/01 12:24	3.5147	15.73	0.083	3.4697	0.063
10/23/01 12:25	3.7247	15.73	0.077	3.6797	0.059
10/23/01 12:25	3.9463	15.73	0.07	3.9013	0.053
10/23/01 12:25	4.1813	15.73	0.068	4.1363	0.052
10/23/01 12:25	4.4295	15.73	0.066	4.3845	0.05
10/23/01 12:26	4.693	15.73	0.062	4.648	0.047
10/23/01 12:26	4.973	15.73	0.058	4.928	0.044
10/23/01 12:26	5.2697	15.73	0.056	5.2247	0.043
10/23/01 12:26	5.583	15.73	0.052	5.538	0.04
10/23/01 12:27	5.9147	15.73	0.052	5.8697	0.04
10/23/01 12:27	6.2663	15.73	0.05	6.2213	0.038
10/23/01 12:28	6.6397	15.73	0.048	6.5947	0.037
10/23/01 12:28	7.0347	15.73	0.046	6.9897	0.035
10/23/01 12:28	7.453	15.73	0.043	7.408	0.033
10/23/01 12:29	7.8963	15.73	0.046	7.8513	0.035
10/23/01 12:29	8.3663	15.72	0.041	8.3213	0.031
10/23/01 12:30	8.8647	15.72	0.043	8.8197	0.033
10/23/01 12:30	9.3913	15.72	0.043	9.3463	0.033
10/23/01 12:31	9.9497	15.72	0.041	9.9047	0.031
10/23/01 12:31	10.5413	15.72	0.039	10.4963	0.03
10/23/01 12:32	11.168	15.72	0.039	11.123	0.03
10/23/01 12:33	11.8313	15.72	0.037	11.7863	0.028
10/23/01 12:33	12.5347	15.72	0.039	12.4897	0.03
10/23/01 12:34	13.2797	15.72	0.039	13.2347	0.03
10/23/01 12:35	14.0697	15.72	0.041	14.0247	0.031

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW20

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10'/ TEST NO.: 4, 5

STATIC WATER LEVEL (Depth/Elevation): 6.50 DATE: 10-4-01

TEST TYPE (Rising/Falling/Constant Head): FALLING + RISING CHECKED:

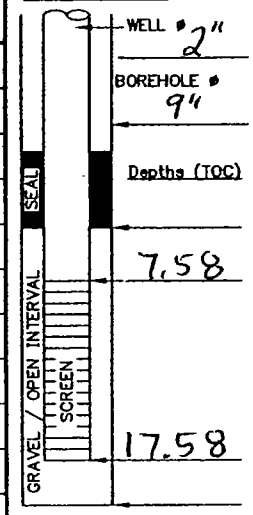
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE 1 OF

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.):

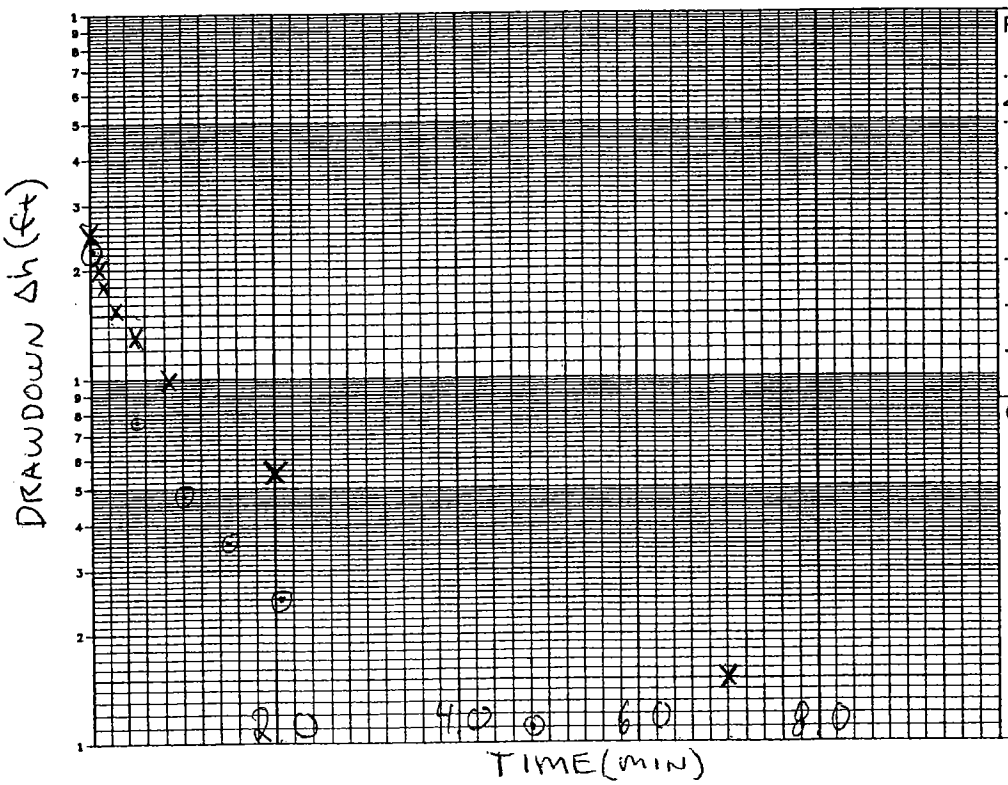
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

FALLING HEAD DATA			RISING HEAD		
ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.01	-12.79	2.24	0.02	8.08	2.47
0.03	-11.73	1.18	0.05	8.5	2.05
0.10	-11.92	1.37	0.15	8.74	1.81
0.1985	-11.69	1.14	0.30	8.99	1.56
0.50	-11.31	0.76	0.5	9.22	1.33
1.04	-11.02	0.47	1.1	9.64	0.91
1.47	-10.9	0.35	2.2	10.0	0.55
2.09	-10.8	0.25	7.0	10.4	0.15
4.97	-10.66	0.11	19.89	10.5	0.05
9.94	-10.6				

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

PLACED Y-DUPER ~0.5 FROM BOTTOM

(10.55 REF 0.00)

CALCS, SKETCH MAPS, ETC.:

RISING HEAD X

FALLING HEAD ⊙

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW20 FALLING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: [illegible]	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.0833$ (RISER RADIUS, Ft)
$R = 0.0833$ (SCREEN RADIUS, Ft)
$L = 10$ (INPUT LENGTH, Ft)
$T_o = 0.74$ (FROM PLOT, MIN)
K = HYDRAULIC COND. (ft/min)

SUB:

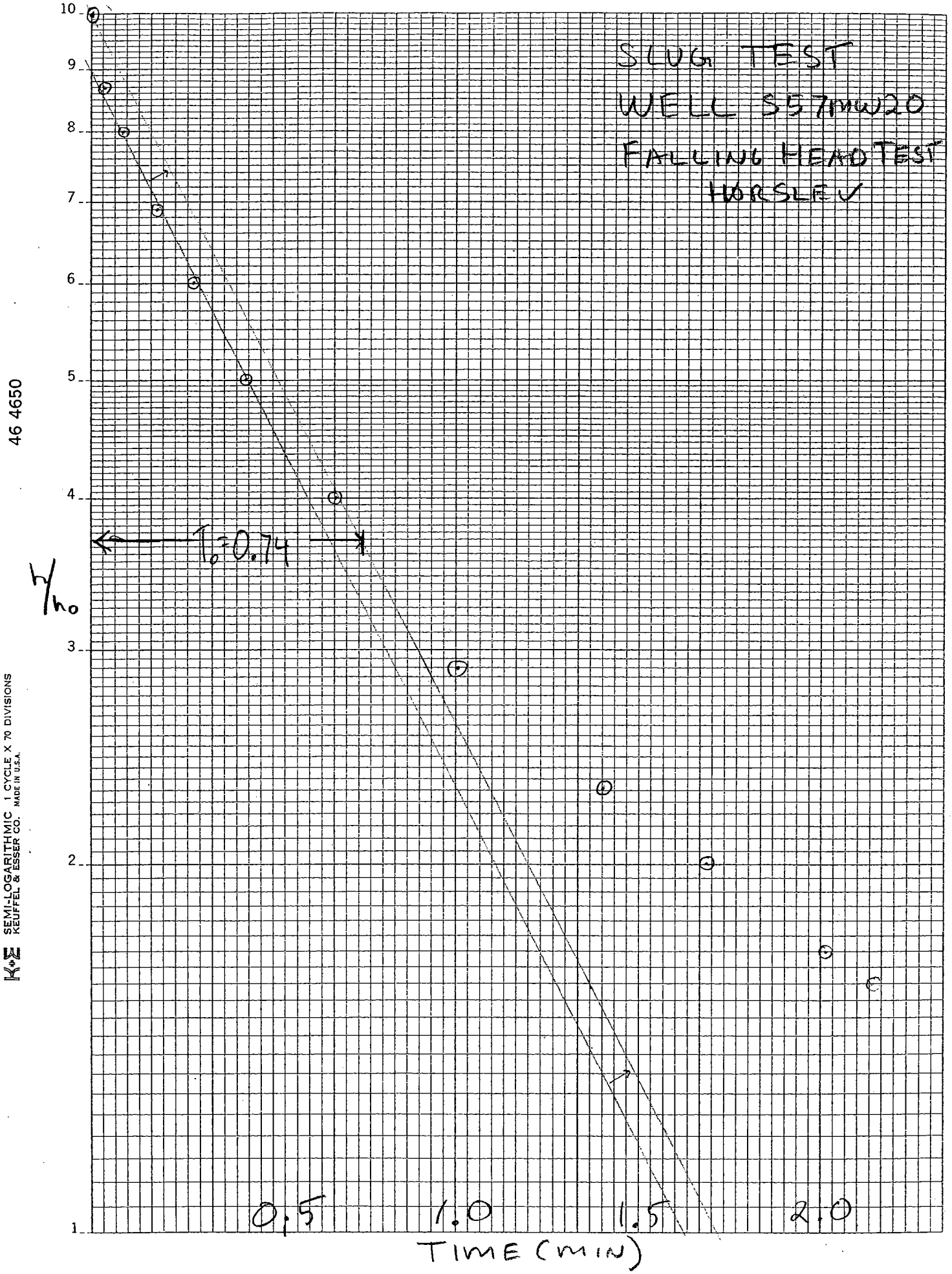
$$K = \frac{(0.0833)^2 \ln(10/0.0833)}{2(10)(0.74)}$$

$$= \frac{3.32492488 \times 10^{-2}}{14.8}$$

$$= 2.25 \times 10^{-3} \text{ ft/min}$$

$$= 1.14 \times 10^{-3} \text{ cm/sec}$$

$$= 3.2 \text{ ft/day}$$ ✓


SLUG TEST
WELL 557MW20
FALLING HEAD TEST
HORSLEY
$T_0 = 0.74$
h/ho
10
9
8
7
6
5
4
3
2
1
0.5
1.0
1.5
2.0
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/18/01 14:15:19
Report from file: C:\Win-Situ\Data\SN00856 2001-10-04 094955 s57mw20fhno4.bin
DataMgr Version 3.68

Serial number: 856
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw20fhno4

Test defined on: 10/4/01 9:38:09
Test started on: 10/4/01 9:49:55
Test stopped on: 10/4/01 10:13:28
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between data points: Minutes.
Number of data samples: 115

TOTAL DATA SAMPLES 115

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	H2O feet adj by 10.55	ET (min) adj	h/ho	ho= 1.53
10/4/01	9:49	0	18.52	12.14	1.59			
10/4/01	9:49	0.005	18.54	12.526	1.976			
10/4/01	9:49	0.01	18.55	12.791	2.241			
10/4/01	9:49	0.015	18.55	12.677	2.127			
10/4/01	9:49	0.02	18.55	12.706	2.156			
10/4/01	9:49	0.025	18.55	11.871	1.321			
10/4/01	9:49	0.03	18.55	11.73	1.18			
10/4/01	9:49	0.035	18.55	11.873	1.323			
10/4/01	9:49	0.04	18.55	12.262	1.712			
10/4/01	9:49	0.045	18.56	12.388	1.838			
10/4/01	9:49	0.05	18.56	12.195	1.645			
10/4/01	9:49	0.055	18.56	11.979	1.429			
10/4/01	9:49	0.06	18.56	11.954	1.404			
10/4/01	9:49	0.065	18.56	12.045	1.495			
10/4/01	9:49	0.07	18.56	12.08	1.53	0	1.00	
10/4/01	9:49	0.075	18.56	12.024	1.474	0.005	0.96	
10/4/01	9:50	0.08	18.56	11.968	1.418	0.01	0.93	
10/4/01	9:50	0.0848	18.56	11.952	1.402	0.0148	0.92	
10/4/01	9:50	0.09	18.56	11.962	1.412	0.02	0.92	
10/4/01	9:50	0.095	18.56	11.937	1.387	0.025	0.91	

10/4/01 9:50	0.1	18.56	11.918	1.368	0.03	0.89
10/4/01 9:50	0.1058	18.56	11.875	1.325	0.0358	0.87
10/4/01 9:50	0.112	18.56	11.891	1.341	0.042	0.88
10/4/01 9:50	0.1185	18.56	11.881	1.331	0.0485	0.87
10/4/01 9:50	0.1255	18.56	11.854	1.304	0.0555	0.85
10/4/01 9:50	0.1328	18.56	11.837	1.287	0.0628	0.84
10/4/01 9:50	0.1407	18.58	11.822	1.272	0.0707	0.83
10/4/01 9:50	0.149	18.56	11.802	1.252	0.079	0.82
10/4/01 9:50	0.1578	18.58	11.781	1.231	0.0878	0.80
10/4/01 9:50	0.167	18.56	11.76	1.21	0.097	0.79
10/4/01 9:50	0.177	18.55	11.738	1.188	0.107	0.78
10/4/01 9:50	0.1875	18.55	11.717	1.167	0.1175	0.76
10/4/01 9:50	0.1985	18.55	11.694	1.144	0.1285	0.75
10/4/01 9:50	0.2102	18.55	11.675	1.125	0.1402	0.74
10/4/01 9:50	0.2227	18.55	11.651	1.101	0.1527	0.72
10/4/01 9:50	0.2358	18.55	11.63	1.08	0.1658	0.71
10/4/01 9:50	0.2498	18.55	11.607	1.057	0.1798	0.69
10/4/01 9:50	0.2647	18.55	11.584	1.034	0.1947	0.68
10/4/01 9:50	0.2803	18.55	11.559	1.009	0.2103	0.66
10/4/01 9:50	0.297	18.55	11.538	0.988	0.227	0.65
10/4/01 9:50	0.3147	18.55	11.513	0.963	0.2447	0.63
10/4/01 9:50	0.3333	18.55	11.493	0.943	0.2633	0.62
10/4/01 9:50	0.3532	18.55	11.47	0.92	0.2832	0.60
10/4/01 9:50	0.3742	18.55	11.445	0.895	0.3042	0.58
10/4/01 9:50	0.3963	18.55	11.42	0.87	0.3263	0.57
10/4/01 9:50	0.4198	18.55	11.397	0.847	0.3498	0.55
10/4/01 9:50	0.4447	18.55	11.372	0.822	0.3747	0.54
10/4/01 9:50	0.4697	18.55	11.339	0.789	0.3997	0.52
10/4/01 9:50	0.4963	18.55	11.314	0.764	0.4263	0.50
10/4/01 9:50	0.5247	18.55	11.303	0.753	0.4547	0.49
10/4/01 9:50	0.5547	18.55	11.279	0.729	0.4847	0.48
10/4/01 9:50	0.5863	18.55	11.256	0.706	0.5163	0.46
10/4/01 9:50	0.6213	18.55	11.231	0.681	0.5513	0.45
10/4/01 9:50	0.6578	18.55	11.206	0.656	0.5878	0.43
10/4/01 9:50	0.6963	18.55	11.183	0.633	0.6263	0.41
10/4/01 9:50	0.738	18.55	11.158	0.608	0.668	0.40
10/4/01 9:50	0.7813	18.55	11.135	0.585	0.7113	0.38
10/4/01 9:50	0.828	18.55	11.11	0.56	0.758	0.37
10/4/01 9:50	0.8763	18.55	11.087	0.537	0.8063	0.35
10/4/01 9:50	0.928	18.55	11.064	0.514	0.858	0.34
10/4/01 9:50	0.983	18.54	11.042	0.492	0.913	0.32
10/4/01 9:50	1.0413	18.54	11.021	0.471	0.9713	0.31
10/4/01 9:51	1.103	18.54	11	0.45	1.033	0.29
10/4/01 9:51	1.168	18.54	10.98	0.43	1.098	0.28
10/4/01 9:51	1.238	18.54	10.959	0.409	1.168	0.27
10/4/01 9:51	1.3113	18.54	10.938	0.388	1.2413	0.25
10/4/01 9:51	1.3897	18.54	10.919	0.369	1.3197	0.24
10/4/01 9:51	1.473	18.54	10.905	0.355	1.403	0.23
10/4/01 9:51	1.5613	18.54	10.886	0.336	1.4913	0.22
10/4/01 9:51	1.6547	18.54	10.869	0.319	1.5847	0.21
10/4/01 9:51	1.753	18.54	10.855	0.305	1.683	0.20
10/4/01 9:51	1.858	18.54	10.84	0.29	1.788	0.19
10/4/01 9:51	1.968	18.54	10.828	0.278	1.898	0.18
10/4/01 9:52	2.0847	18.52	10.816	0.266	2.0147	0.17
10/4/01 9:52	2.2097	18.52	10.801	0.251	2.1397	0.16
10/4/01 9:52	2.3412	18.52	10.791	0.241	2.2712	0.16
10/4/01 9:52	2.4813	18.52	10.778	0.228	2.4113	0.15
10/4/01 9:52	2.6297	18.51	10.768	0.218	2.5597	0.14

10/4/01 9:52	2.7863	18.51	10.756	0.206	2.7163	0.13
10/4/01 9:52	2.953	18.51	10.745	0.195	2.883	0.13
10/4/01 9:53	3.1297	18.51	10.729	0.179	3.0597	0.12
10/4/01 9:53	3.3163	18.5	10.727	0.177	3.2463	0.12
10/4/01 9:53	3.5147	18.5	10.717	0.167	3.4447	0.11
10/4/01 9:53	3.7247	18.5	10.706	0.156	3.6547	0.10
10/4/01 9:53	3.9463	18.5	10.698	0.148	3.8763	0.10
10/4/01 9:54	4.1813	18.5	10.69	0.14	4.1113	0.09
10/4/01 9:54	4.4295	18.5	10.679	0.129	4.3595	0.08
10/4/01 9:54	4.693	18.49	10.671	0.121	4.623	0.08
10/4/01 9:54	4.973	18.49	10.663	0.113	4.903	0.07
10/4/01 9:55	5.2697	18.49	10.655	0.105	5.1997	0.07
10/4/01 9:55	5.583	18.49	10.646	0.096	5.513	0.06
10/4/01 9:55	5.9147	18.49	10.642	0.092	5.8447	0.06
10/4/01 9:56	6.2663	18.49	10.634	0.084	6.1963	0.05
10/4/01 9:56	6.6397	18.5	10.625	0.075	6.5697	0.05
10/4/01 9:56	7.0347	18.5	10.623	0.073	6.9647	0.05
10/4/01 9:57	7.453	18.51	10.619	0.069	7.383	0.05
10/4/01 9:57	7.8963	18.52	10.614	0.064	7.8263	0.04
10/4/01 9:58	8.3663	18.54	10.61	0.06	8.2963	0.04
10/4/01 9:58	8.8647	18.56	10.605	0.055	8.7947	0.04
10/4/01 9:59	9.3913	18.59	10.6	0.05	9.3213	0.03
10/4/01 9:59	9.9497	18.61	10.595	0.045	9.8797	0.03
10/4/01 10:00	10.5413	18.65	10.592	0.042	10.4713	0.03
10/4/01 10:01	11.168	18.68	10.587	0.037	11.098	0.02
10/4/01 10:01	11.8313	18.7	10.582	0.032	11.7613	0.02
10/4/01 10:02	12.5347	18.73	10.58	0.03	12.4647	0.02
10/4/01 10:03	13.2797	18.73	10.578	0.028	13.2097	0.02
10/4/01 10:03	14.0697	18.74	10.573	0.023	13.9997	0.02
10/4/01 10:04	14.9063	18.74	10.571	0.021	14.8363	0.01
10/4/01 10:05	15.7913	18.75	10.569	0.019	15.7213	0.01
10/4/01 10:06	16.7297	18.75	10.564	0.014	16.6597	0.01
10/4/01 10:07	17.723	18.75	10.564	0.014	17.653	0.01
10/4/01 10:08	18.7763	18.74	10.561	0.011	18.7063	0.01
10/4/01 10:09	19.8913	18.74	10.559	0.009	19.8213	0.01
10/4/01 10:10	21.073	18.74	10.559	0.009	21.003	0.01
10/4/01 10:12	22.3247	18.74	10.556	0.006	22.2547	0.00

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL	S57MW20 RISING HEAD
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: [illegible]	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.0833$ (RISER RADIUS, Ft)
$R = 0.0833$ (SCREEN RADIUS, Ft)
$L = 10$ (INPUT LENGTH, Ft)
$T_o = 1.8$ (FROM PLOT, MIN)
K = HYDRAULIC COND. (ft/min)

SUB:

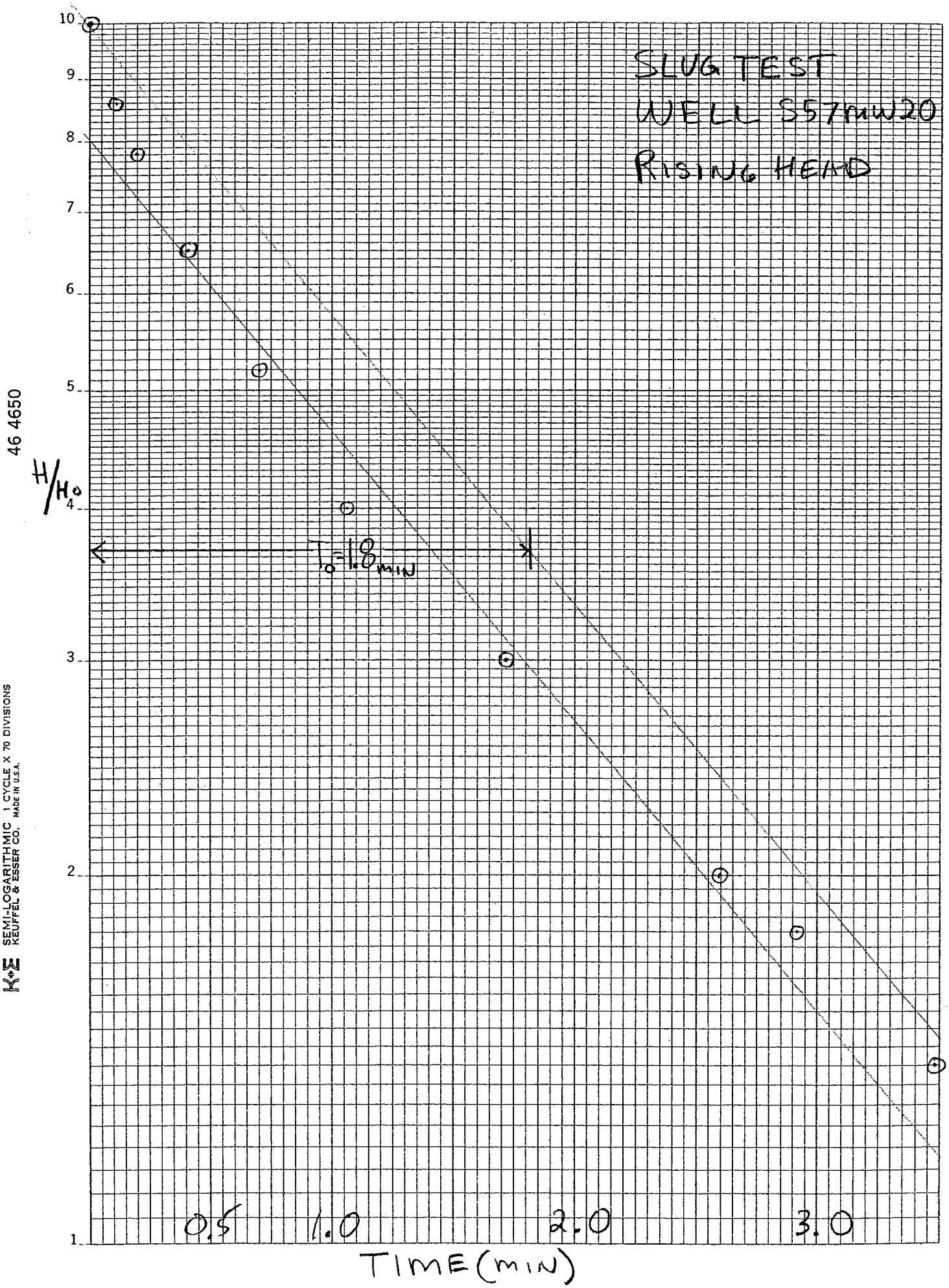
$$K = \frac{(0.0833)^2 \ln(10/0.0833)}{2(10)(1.8)}$$

$$K = \frac{3.32226547 \times 10^{-2}}{36.0}$$

$K = 9.23 \times 10^{-4}$ ft/min

$K = 4.7 \times 10^{-4}$ cm/sec

$K = 1.33$ ft/day


SLUG TEST
WELL S57MW20
RISING HEAD
H/H0
10
9
8
7
6
5
4
3
2
1
T0=1.8 MIN
0.5
1.0
2.0
3.0
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/18/01 14:53:45
Report from file: C:\Win-Situ\Data\SN00856 2001-10-04 101756 s57mw20rhno5.bin
DataMgr Version 3.68

Serial number: 856
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw20rhno5

Test defined on: 10/4/01 10:16:16
Test started on: 10/4/01 10:17:56
Test stopped on: 10/4/01 10:54:36
Test extracted on: N/A

ata gathered using Logarithmic testing
num time between data points: 1 Minutes.
Number of data samples: 123

TOTAL DATA SAMPLES 123

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Feet H2O adj by 10.5	ET adj	h/ho	ho = 2.058
10/4/01	10:17	0	18.7	8.809	1.691			
10/4/01	10:17	0.005	18.73	8.476	2.024			
10/4/01	10:17	0.01	18.73	9.166	1.334			
10/4/01	10:17	0.015	18.73	8.542	1.958			
10/4/01	10:17	0.02	18.74	8.078	2.422			
10/4/01	10:17	0.025	18.74	8.432	2.068			
10/4/01	10:17	0.03	18.74	8.382	2.118			
10/4/01	10:17	0.035	18.74	8.442	2.058	0	1.00	
10/4/01	10:17	0.04	18.74	8.461	2.039	0.005	0.99	
10/4/01	10:17	0.045	18.74	8.498	2.002	0.01	0.97	
10/4/01	10:17	0.05	18.74	8.515	1.985	0.015	0.96	
10/4/01	10:17	0.055	18.74	8.496	2.004	0.02	0.97	
10/4/01	10:17	0.06	18.75	8.527	1.973	0.025	0.96	
10/4/01	10:18	0.065	18.75	8.548	1.952	0.03	0.95	
10/4/01	10:18	0.07	18.75	8.565	1.935	0.035	0.94	
10/4/01	10:18	0.075	18.75	8.577	1.923	0.04	0.93	
10/4/01	10:18	0.08	18.75	8.592	1.908	0.045	0.93	

10/4/01 10:18	0.0848	18.75	8.6	1.9	0.0498	0.92
10/4/01 10:18	0.09	18.75	8.612	1.888	0.055	0.92
10/4/01 10:18	0.095	18.75	8.623	1.877	0.06	0.91
10/4/01 10:18	0.1	18.75	8.635	1.865	0.065	0.91
10/4/01 10:18	0.1058	18.75	8.648	1.852	0.0708	0.90
10/4/01 10:18	0.112	18.75	8.662	1.838	0.077	0.89
10/4/01 10:18	0.1185	18.75	8.675	1.825	0.0835	0.89
10/4/01 10:18	0.1255	18.75	8.691	1.809	0.0905	0.88
10/4/01 10:18	0.1328	18.75	8.706	1.794	0.0978	0.87
10/4/01 10:18	0.1407	18.75	8.723	1.777	0.1057	0.86
10/4/01 10:18	0.149	18.75	8.739	1.761	0.114	0.86
10/4/01 10:18	0.1578	18.75	8.756	1.744	0.1228	0.85
10/4/01 10:18	0.167	18.74	8.775	1.725	0.132	0.84
10/4/01 10:18	0.177	18.74	8.792	1.708	0.142	0.83
10/4/01 10:18	0.1875	18.74	8.81	1.69	0.1525	0.82
10/4/01 10:18	0.1985	18.74	8.829	1.671	0.1635	0.81
10/4/01 10:18	0.2102	18.74	8.85	1.65	0.1752	0.80
10/4/01 10:18	0.2227	18.74	8.873	1.627	0.1877	0.79
10/4/01 10:18	0.2358	18.74	8.893	1.607	0.2008	0.78
10/4/01 10:18	0.2498	18.74	8.916	1.584	0.2148	0.77
10/4/01 10:18	0.2647	18.74	8.939	1.561	0.2297	0.76
10/4/01 10:18	0.2803	18.74	8.964	1.536	0.2453	0.75
10/4/01 10:18	0.297	18.74	8.989	1.511	0.262	0.73
10/4/01 10:18	0.3147	18.74	9.014	1.486	0.2797	0.72
10/4/01 10:18	0.3333	18.74	9.037	1.463	0.2983	0.71
10/4/01 10:18	0.3532	18.74	9.064	1.436	0.3182	0.70
10/4/01 10:18	0.3742	18.74	9.091	1.409	0.3392	0.68
10/4/01 10:18	0.3963	18.74	9.116	1.384	0.3613	0.67
10/4/01 10:18	0.4198	18.74	9.145	1.355	0.3848	0.66
10/4/01 10:18	0.4447	18.74	9.17	1.33	0.4097	0.65
10/4/01 10:18	0.4697	18.74	9.197	1.303	0.4347	0.63
10/4/01 10:18	0.4963	18.74	9.224	1.276	0.4613	0.62
10/4/01 10:18	0.5247	18.73	9.253	1.247	0.4897	0.61
10/4/01 10:18	0.5547	18.73	9.28	1.22	0.5197	0.59
10/4/01 10:18	0.5863	18.73	9.31	1.19	0.5513	0.58
10/4/01 10:18	0.6213	18.73	9.339	1.161	0.5863	0.56
10/4/01 10:18	0.6578	18.73	9.368	1.132	0.6228	0.55
10/4/01 10:18	0.6963	18.73	9.399	1.101	0.6613	0.53
10/4/01 10:18	0.738	18.73	9.428	1.072	0.703	0.52
10/4/01 10:18	0.7813	18.73	9.459	1.041	0.7463	0.51
10/4/01 10:18	0.828	18.73	9.49	1.01	0.793	0.49
10/4/01 10:18	0.8763	18.73	9.52	0.98	0.8413	0.48
10/4/01 10:18	0.928	18.73	9.553	0.947	0.893	0.46
10/4/01 10:18	0.983	18.73	9.582	0.918	0.948	0.45
10/4/01 10:18	1.0413	18.73	9.613	0.887	1.0063	0.43
10/4/01 10:19	1.103	18.73	9.644	0.856	1.068	0.42
10/4/01 10:19	1.168	18.73	9.675	0.825	1.133	0.40
10/4/01 10:19	1.238	18.73	9.707	0.793	1.203	0.39
10/4/01 10:19	1.3113	18.73	9.738	0.762	1.2763	0.37
10/4/01 10:19	1.3897	18.73	9.769	0.731	1.3547	0.36
10/4/01 10:19	1.473	18.73	9.8	0.7	1.438	0.34
10/4/01 10:19	1.5613	18.71	9.832	0.668	1.5263	0.32
10/4/01 10:19	1.6547	18.71	9.861	0.639	1.6197	0.31
10/4/01 10:19	1.753	18.73	9.892	0.608	1.718	0.30
10/4/01 10:19	1.858	18.71	9.921	0.579	1.823	0.28

10/4/01 10:19	1.968	18.71	9.95	0.55	1.933	0.27
10/4/01 10:20	2.0847	18.71	9.979	0.521	2.0497	0.25
10/4/01 10:20	2.2097	18.71	10.006	0.494	2.1747	0.24
10/4/01 10:20	2.3412	18.71	10.035	0.465	2.3062	0.23
10/4/01 10:20	2.4813	18.73	10.062	0.438	2.4463	0.21
10/4/01 10:20	2.6297	18.73	10.089	0.411	2.5947	0.20
10/4/01 10:20	2.7863	18.73	10.114	0.386	2.7513	0.19
10/4/01 10:20	2.953	18.74	10.139	0.361	2.918	0.18
10/4/01 10:21	3.1297	18.74	10.164	0.336	3.0947	0.16
10/4/01 10:21	3.3163	18.75	10.186	0.314	3.2813	0.15
10/4/01 10:21	3.5147	18.75	10.209	0.291	3.4797	0.14
10/4/01 10:21	3.7247	18.76	10.229	0.271	3.6897	0.13
10/4/01 10:21	3.9463	18.76	10.25	0.25	3.9113	0.12
10/4/01 10:22	4.1813	18.78	10.269	0.231	4.1463	0.11
10/4/01 10:22	4.4295	18.78	10.285	0.215	4.3945	0.10
10/4/01 10:22	4.693	18.78	10.302	0.198	4.658	0.10
10/4/01 10:22	4.973	18.79	10.318	0.182	4.938	0.09
10/4/01 10:23	5.2697	18.79	10.335	0.165	5.2347	0.08
10/4/01 10:23	5.583	18.79	10.349	0.151	5.548	0.07
10/4/01 10:23	5.9147	18.82	10.361	0.139	5.8797	0.07
10/4/01 10:24	6.2663	18.83	10.373	0.127	6.2313	0.06
10/4/01 10:24	6.6397	18.85	10.385	0.115	6.6047	0.06
10/4/01 10:24	7.0347	18.88	10.395	0.105	6.9997	0.05
10/4/01 10:25	7.453	18.92	10.406	0.094	7.418	0.05
10/4/01 10:25	7.8963	18.94	10.414	0.086	7.8613	0.04
10/4/01 10:26	8.3663	18.97	10.422	0.078	8.3313	0.04
10/4/01 10:26	8.8647	18.99	10.429	0.071	8.8297	0.03
10/4/01 10:27	9.3913	18.99	10.435	0.065	9.3563	0.03
10/4/01 10:27	9.9497	19	10.443	0.057	9.9147	0.03
10/4/01 10:28	10.5413	19.02	10.449	0.051	10.506	0.02
10/4/01 10:29	11.168	19.03	10.455	0.045	11.133	0.02
10/4/01 10:29	11.8313	19.04	10.461	0.039	11.796	0.02
10/4/01 10:30	12.5347	19.05	10.467	0.033	12.5	0.02
10/4/01 10:31	13.2797	19.08	10.47	0.03	13.245	0.01
10/4/01 10:32	14.0697	19.09	10.476	0.024	14.035	0.01
10/4/01 10:32	14.9063	19.11	10.48	0.02	14.871	0.01
10/4/01 10:33	15.7913	19.12	10.484	0.016	15.756	0.01
10/4/01 10:34	16.7297	19.12	10.488	0.012	16.695	0.01
10/4/01 10:35	17.723	19.12	10.492	0.008	17.688	0.00
10/4/01 10:36	18.7763	19.11	10.495	0.005	18.741	0.00
10/4/01 10:37	19.8913	19.11	10.499	0.001	19.856	0.00
10/4/01 10:39	21.073	19.09	10.501	-0.001	21.038	0.00
10/4/01 10:40	22.3247	19.09	10.505	-0.005	22.29	0.00
10/4/01 10:41	23.6497	19.09	10.508	-0.008	23.615	0.00
10/4/01 10:42	25.0547	19.08	10.512	-0.012	25.02	-0.01
10/4/01 10:44	26.543	19.08	10.514	-0.014	26.508	-0.01
10/4/01 10:46	28.118	19.08	10.516	-0.016	28.083	-0.01
10/4/01 10:47	29.7863	19.05	10.517	-0.017	29.751	-0.01
10/4/01 10:49	31.5547	19.05	10.519	-0.019	31.52	-0.01
10/4/01 10:51	33.428	19.03	10.522	-0.022	33.393	-0.01
10/4/01 10:53	35.4112	19.02	10.522	-0.022	35.376	-0.01

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57TW21

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 1" SCREEN LENGTH/DEPTH: 5' / TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 6.51 TPVC DATE: 10-23-01

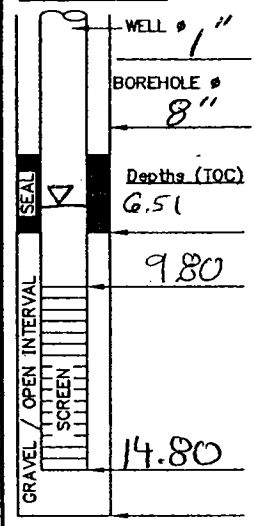
TEST TYPE (Rising/Falling/Constant Head): RISING + FALLING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG 0.5" x 6' PAGE ..... OF .....

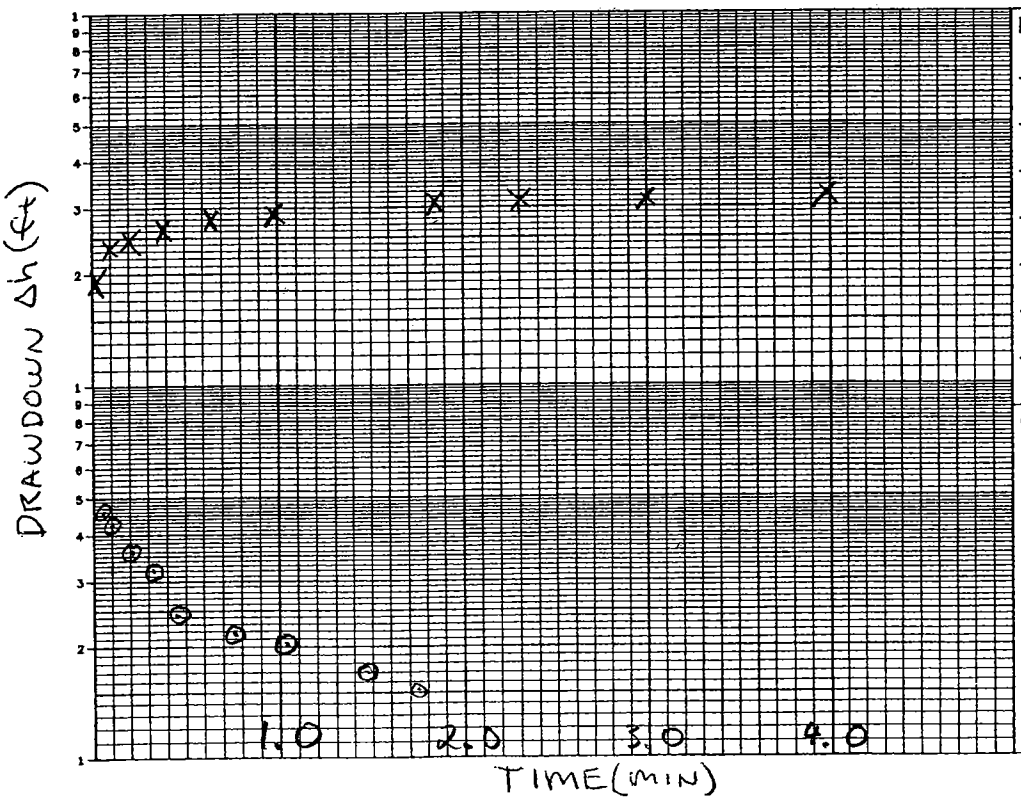
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE (FH) TOC (RH)

FALLING HEAD			RISING HEAD		
ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.05		0.453	0.015		1.945
0.06		0.446	0.05		2.261
0.09		0.427	0.075		2.319
0.1255		0.405	0.100		2.362
0.2100		0.367	0.210		2.482
0.3333		0.322	0.3963		2.613
0.4695		0.289	0.6963		2.754
0.7813		0.237	0.9828		2.851
1.0412		0.207	1.858		3.035
1.238		0.188	2.34		3.097
1.4728		0.170	2.953		3.154
1.753		0.151	3.9463		3.211

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

TD w/TROLL = 13.20'
− 6.51
6.69

CALCS, SKETCH MAPS, ETC.:

⊙ - FALLING HEAD
X - RISING HEAD

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL	S57TW21 RISING HEAD
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

WHERE:

$r = 0.041667$ ft (RISER RADIUS, Ft)
$R = 0.041667$ ft (SCREEN RADIUS, Ft)
$L = 5$ ft (INPUT LENGTH, Ft)
$T_0 = 1.22$ min (FROM PLOT, MIN)
K = HYDRAULIC COND. (ft/min)

SUB:

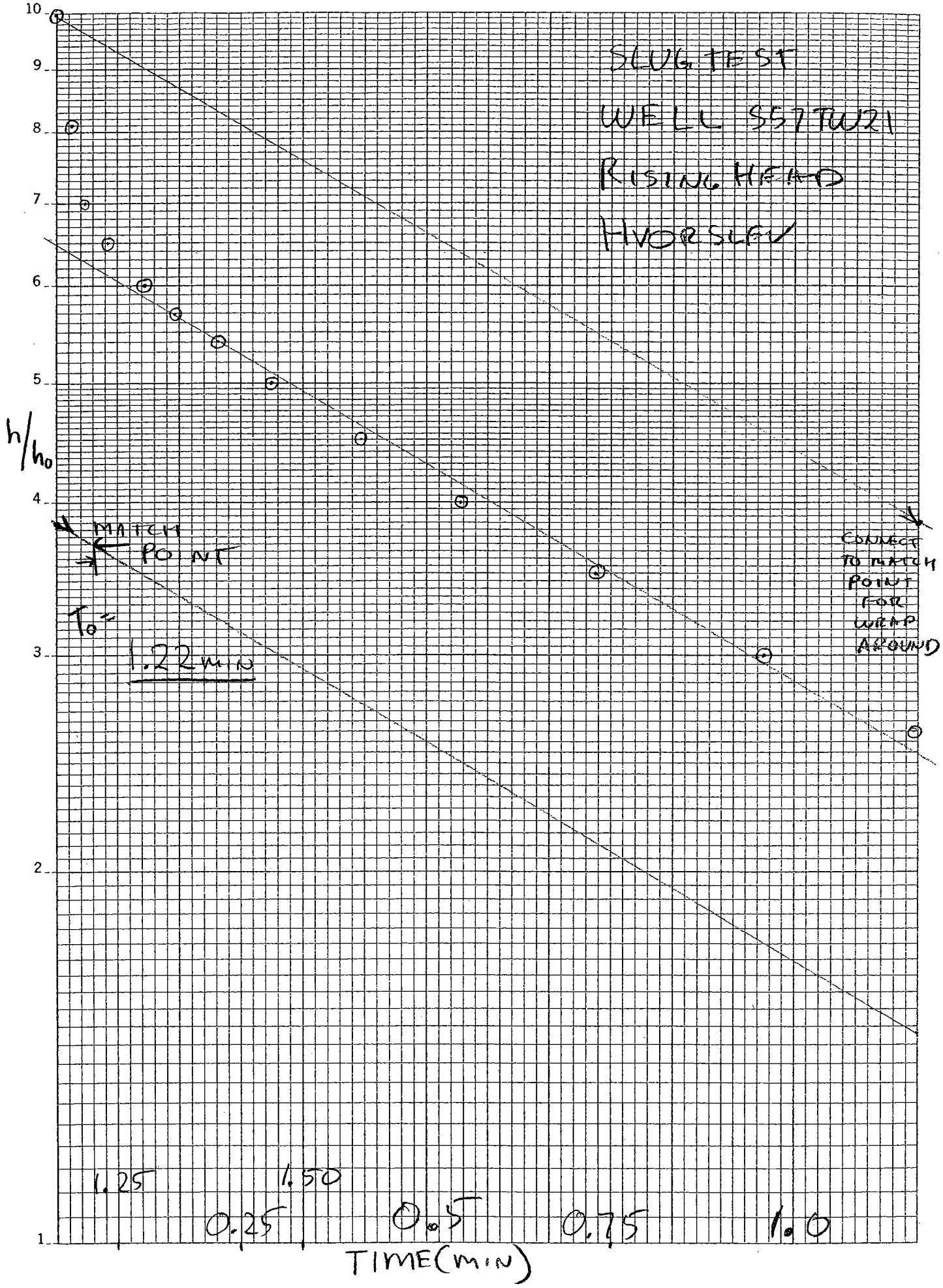
$$K = \frac{(0.041667)^2 \ln(5/0.041667)}{2(5)(1.22)}$$

$$\frac{8.31173671 \times 10^{-3}}{12.2}$$

$= 6.8 \times 10^{-4}$ ft/min

$= 3.5 \times 10^{-4}$ cm/sec

$= 9.8 \times 10^{-1}$ ft/day



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/31/01 11:38:36
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 152803 s57tw21rhno2.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw21rhno2

Test defined on: 10/23/01 15:27:13
Test started on: 10/23/01 15:28:03
Test stopped on: 10/23/01 15:45:03
Test extracted on: N/A

Data gathered using Logarithmic testing
ximum time between data points: 10. Minutes.
Number of data samples: 110

TOTAL DATA SAMPLES 110

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 4.064 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj Feet H2O	Adj ET (min)	h/ho	ho= 1.501
10/23/01	15:28	0	18.66	0	3.297			
10/23/01	15:28	0.005	18.67	1.796	1.501	0	1.00	
10/23/01	15:28	0.01	18.67	2.034	1.263	0.005	0.84	
10/23/01	15:28	0.015	18.69	1.945	1.352	0.01	0.90	
10/23/01	15:28	0.02	18.69	2.023	1.274	0.015	0.85	
10/23/01	15:28	0.025	18.69	2.087	1.21	0.02	0.81	
10/23/01	15:28	0.03	18.69	2.164	1.133	0.025	0.75	
10/23/01	15:28	0.035	18.69	2.189	1.108	0.03	0.74	
10/23/01	15:28	0.04	18.69	2.228	1.069	0.035	0.71	
10/23/01	15:28	0.045	18.7	2.242	1.055	0.04	0.70	
10/23/01	15:28	0.05	18.7	2.261	1.036	0.045	0.69	
10/23/01	15:28	0.055	18.7	2.273	1.024	0.05	0.68	
10/23/01	15:28	0.06	18.7	2.288	1.009	0.055	0.67	

10/23/01 15:28	0.065	18.7	2.296	1.001	0.06	0.67
10/23/01 15:28	0.07	18.7	2.309	0.988	0.065	0.66
10/23/01 15:28	0.075	18.7	2.319	0.978	0.07	0.65
10/23/01 15:28	0.08	18.7	2.329	0.968	0.075	0.64
10/23/01 15:28	0.0848	18.7	2.34	0.957	0.0798	0.64
10/23/01 15:28	0.09	18.7	2.348	0.949	0.085	0.63
10/23/01 15:28	0.095	18.71	2.356	0.941	0.09	0.63
10/23/01 15:28	0.1	18.71	2.362	0.935	0.095	0.62
10/23/01 15:28	0.1058	18.71	2.372	0.925	0.1008	0.62
10/23/01 15:28	0.112	18.71	2.381	0.916	0.107	0.61
10/23/01 15:28	0.1185	18.71	2.389	0.908	0.1135	0.60
10/23/01 15:28	0.1255	18.71	2.397	0.9	0.1205	0.60
10/23/01 15:28	0.1328	18.71	2.405	0.892	0.1278	0.59
10/23/01 15:28	0.1407	18.71	2.416	0.881	0.1357	0.59
10/23/01 15:28	0.149	18.71	2.424	0.873	0.144	0.58
10/23/01 15:28	0.1578	18.71	2.432	0.865	0.1528	0.58
10/23/01 15:28	0.167	18.71	2.443	0.854	0.162	0.57
10/23/01 15:28	0.177	18.71	2.451	0.846	0.172	0.56
10/23/01 15:28	0.1875	18.71	2.463	0.834	0.1825	0.56
10/23/01 15:28	0.1985	18.7	2.474	0.823	0.1935	0.55
10/23/01 15:28	0.2102	18.7	2.482	0.815	0.2052	0.54
10/23/01 15:28	0.2227	18.7	2.493	0.804	0.2177	0.54
10/23/01 15:28	0.2358	18.7	2.505	0.792	0.2308	0.53
10/23/01 15:28	0.2498	18.7	2.515	0.782	0.2448	0.52
10/23/01 15:28	0.2647	18.7	2.526	0.771	0.2597	0.51
10/23/01 15:28	0.2803	18.7	2.538	0.759	0.2753	0.51
10/23/01 15:28	0.297	18.7	2.551	0.746	0.292	0.50
10/23/01 15:28	0.3147	18.7	2.563	0.734	0.3097	0.49
10/23/01 15:28	0.3333	18.7	2.575	0.722	0.3283	0.48
10/23/01 15:28	0.3532	18.7	2.588	0.709	0.3482	0.47
10/23/01 15:28	0.3742	18.7	2.6	0.697	0.3692	0.46
10/23/01 15:28	0.3963	18.7	2.613	0.684	0.3913	0.46
10/23/01 15:28	0.4198	18.7	2.627	0.67	0.4148	0.45
10/23/01 15:28	0.4447	18.7	2.64	0.657	0.4397	0.44
10/23/01 15:28	0.4697	18.7	2.654	0.643	0.4647	0.43
10/23/01 15:28	0.4963	18.7	2.669	0.628	0.4913	0.42
10/23/01 15:28	0.5247	18.69	2.681	0.616	0.5197	0.41
10/23/01 15:28	0.5547	18.69	2.696	0.601	0.5497	0.40
10/23/01 15:28	0.5863	18.69	2.71	0.587	0.5813	0.39
10/23/01 15:28	0.6213	18.69	2.725	0.572	0.6163	0.38
10/23/01 15:28	0.6578	18.69	2.739	0.558	0.6528	0.37
10/23/01 15:28	0.6963	18.69	2.754	0.543	0.6913	0.36
10/23/01 15:28	0.738	18.69	2.77	0.527	0.733	0.35
10/23/01 15:28	0.7813	18.69	2.785	0.512	0.7763	0.34
10/23/01 15:28	0.828	18.69	2.803	0.494	0.823	0.33
10/23/01 15:28	0.8763	18.69	2.818	0.479	0.8713	0.32
10/23/01 15:28	0.928	18.69	2.834	0.463	0.923	0.31
10/23/01 15:29	0.983	18.69	2.851	0.446	0.978	0.30
10/23/01 15:29	1.0413	18.69	2.869	0.428	1.0363	0.29
10/23/01 15:29	1.103	18.69	2.886	0.411	1.098	0.27
10/23/01 15:29	1.168	18.69	2.903	0.394	1.163	0.26
10/23/01 15:29	1.238	18.69	2.919	0.378	1.233	0.25
10/23/01 15:29	1.3113	18.69	2.936	0.361	1.3063	0.24
10/23/01 15:29	1.3897	18.69	2.952	0.345	1.3847	0.23
10/23/01 15:29	1.473	18.69	2.969	0.328	1.468	0.22

10/23/01 15:29	1.5613	18.67	2.986	0.311	1.5563	0.21
10/23/01 15:29	1.6547	18.67	3.002	0.295	1.6497	0.20
10/23/01 15:29	1.753	18.67	3.019	0.278	1.748	0.19
10/23/01 15:29	1.858	18.67	3.035	0.262	1.853	0.17
10/23/01 15:30	1.968	18.67	3.052	0.245	1.963	0.16
10/23/01 15:30	2.0847	18.67	3.066	0.231	2.0797	0.15
10/23/01 15:30	2.2097	18.67	3.083	0.214	2.2047	0.14
10/23/01 15:30	2.3412	18.67	3.097	0.2	2.3362	0.13
10/23/01 15:30	2.4813	18.67	3.11	0.187	2.4763	0.12
10/23/01 15:30	2.6297	18.67	3.126	0.171	2.6247	0.11
10/23/01 15:30	2.7863	18.66	3.139	0.158	2.7813	0.11
10/23/01 15:31	2.953	18.66	3.154	0.143	2.948	0.10
10/23/01 15:31	3.1297	18.66	3.166	0.131	3.1247	0.09
10/23/01 15:31	3.3163	18.66	3.178	0.119	3.3113	0.08
10/23/01 15:31	3.5147	18.66	3.189	0.108	3.5097	0.07
10/23/01 15:31	3.7247	18.66	3.199	0.098	3.7197	0.07
10/23/01 15:32	3.9463	18.66	3.211	0.086	3.9413	0.06
10/23/01 15:32	4.1813	18.66	3.22	0.077	4.1763	0.05
10/23/01 15:32	4.4295	18.66	3.228	0.069	4.4245	0.05
10/23/01 15:32	4.693	18.66	3.238	0.059	4.688	0.04
10/23/01 15:33	4.973	18.66	3.247	0.05	4.968	0.03
10/23/01 15:33	5.2697	18.65	3.251	0.046	5.2647	0.03
10/23/01 15:33	5.583	18.66	3.259	0.038	5.578	0.03
10/23/01 15:33	5.9147	18.65	3.265	0.032	5.9097	0.02
10/23/01 15:34	6.2663	18.65	3.27	0.027	6.2613	0.02
10/23/01 15:34	6.6397	18.66	3.274	0.023	6.6347	0.02
10/23/01 15:35	7.0347	18.65	3.278	0.019	7.0297	0.01
10/23/01 15:35	7.453	18.65	3.282	0.015	7.448	0.01
10/23/01 15:35	7.8963	18.65	3.284	0.013	7.8913	0.01
10/23/01 15:36	8.3663	18.65	3.288	0.009	8.3613	0.01
10/23/01 15:36	8.8647	18.65	3.29	0.007	8.8597	0.00
10/23/01 15:37	9.3913	18.65	3.292	0.005	9.3863	0.00
10/23/01 15:38	9.9497	18.65	3.284	0.013	9.9447	0.01
10/23/01 15:38	10.5413	18.64	3.291	0.006	10.5363	0.00
10/23/01 15:39	11.168	18.64	3.295	0.002	11.163	0.00
10/23/01 15:39	11.8313	18.64	3.297	0	11.8263	0.00
10/23/01 15:40	12.5347	18.64	3.295	0.002	12.5297	0.00
10/23/01 15:41	13.2797	18.64	3.297	0	13.2747	0.00
10/23/01 15:42	14.0697	18.64	3.297	0	14.0647	0.00
10/23/01 15:42	14.9063	18.64	3.295	0.002	14.9013	0.00
10/23/01 15:43	15.7913	18.64	3.291	0.006	15.7863	0.00
10/23/01 15:44	16.7297	18.64	3.297	0	16.7247	0.00

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL	S57TW21 FALLING HEAD
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY CJK	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_o}$$

WHERE:

$r = 0.041667$ (RISER RADIUS, Ft)
$R = 0.041667$ (SCREEN RADIUS, Ft)
$L = 5$ (INPUT LENGTH, Ft)
$T_o = 2.21$ (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/min)

SUB:

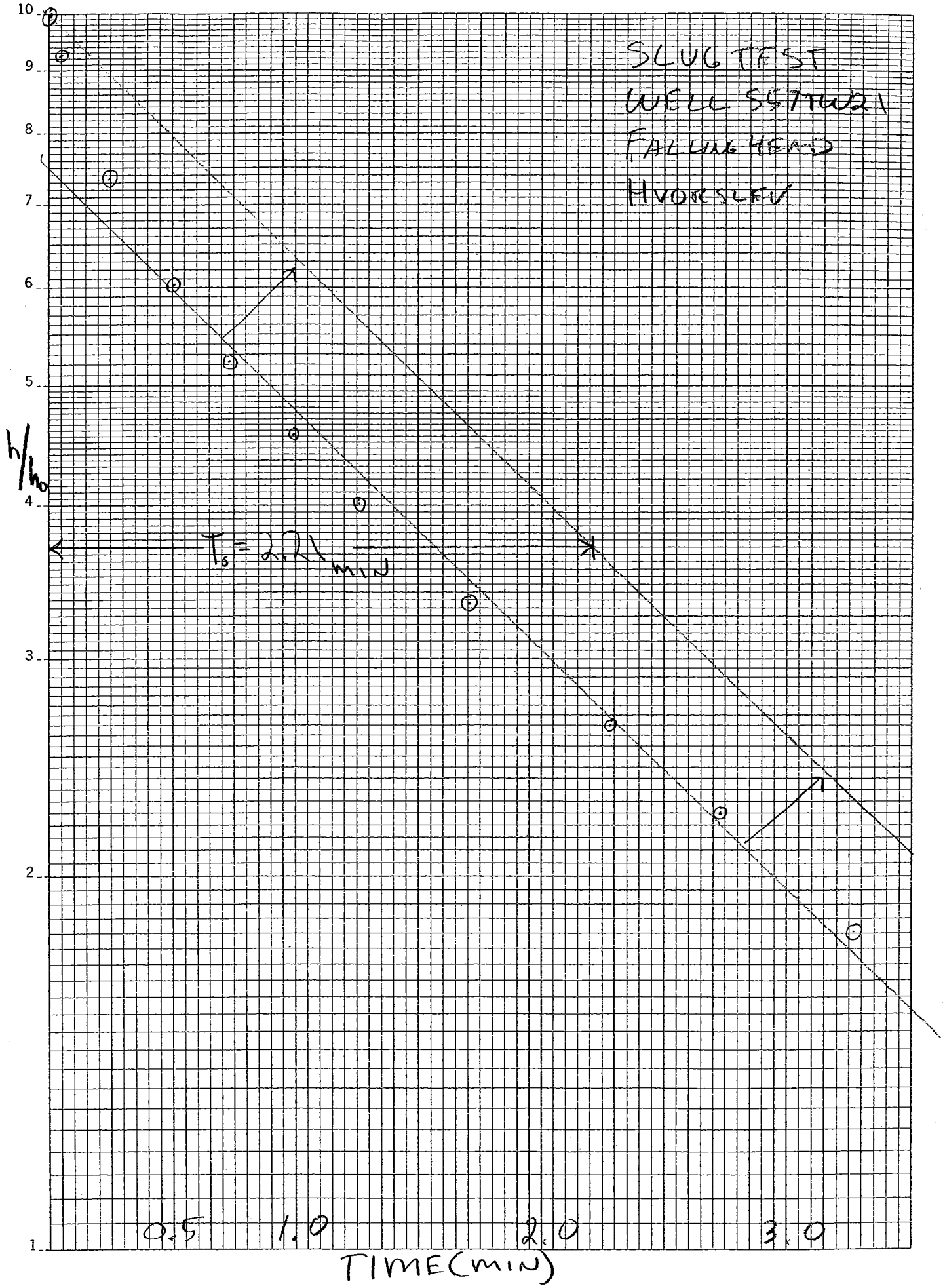
$$K = \frac{(0.041667)^2 \ln(5/0.041667)}{2(5)(2.21)}$$

$$= \frac{8.31160372 \times 10^{-3}}{22.1}$$

$$= 3.76 \times 10^{-4} \text{ ft/min}$$

$$= 1.91 \times 10^{-4} \text{ cm/sec}$$

$$= 5.4 \times 10^{-1} \text{ ft/day}$$



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 11:14:17
Report from file: C:\Win-Situ\Data\SN01966 2001-10-23 151325 s57tw21fhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57tw21fhno1

Test defined on: 10/23/01 14:58:38
Test started on: 10/23/01 15:13:25
Test stopped on: 10/23/01 15:24:37
Test extracted on: N/A

)ata gathered using Logarithmic testing
:imum time between data points: 1C Minutes.
Number of data samples: 103

TOTAL DATA SAMPLES 103

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 7.4 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 0.453
10/23/01	15:13	0	18.75	0			
10/23/01	15:13	0.005	18.75	0			
10/23/01	15:13	0.01	18.76	0			
10/23/01	15:13	0.015	18.76	0.422			
10/23/01	15:13	0.02	18.77	2.029			
10/23/01	15:13	0.025	18.77	4.613			
10/23/01	15:13	0.03	18.77	0.581			
10/23/01	15:13	0.035	18.77	-0.003			
10/23/01	15:13	0.04	18.77	0.442			
10/23/01	15:13	0.045	18.77	0.399			

10/23/01 15:13	0.05	18.77	0.453	0	1.000
10/23/01 15:13	0.055	18.79	0.452	0.005	0.998
10/23/01 15:13	0.06	18.77	0.446	0.01	0.985
10/23/01 15:13	0.065	18.79	0.444	0.015	0.980
10/23/01 15:13	0.07	18.79	0.44	0.02	0.971
10/23/01 15:13	0.075	18.79	0.438	0.025	0.967
10/23/01 15:13	0.08	18.79	0.432	0.03	0.954
10/23/01 15:13	0.0848	18.79	0.43	0.0348	0.949
10/23/01 15:13	0.09	18.79	0.427	0.04	0.943
10/23/01 15:13	0.095	18.79	0.423	0.045	0.934
10/23/01 15:13	0.1	18.79	0.419	0.05	0.925
10/23/01 15:13	0.1058	18.79	0.415	0.0558	0.916
10/23/01 15:13	0.112	18.79	0.413	0.062	0.912
10/23/01 15:13	0.1185	18.79	0.409	0.0685	0.903
10/23/01 15:13	0.1255	18.79	0.405	0.0755	0.894
10/23/01 15:13	0.1328	18.79	0.403	0.0828	0.890
10/23/01 15:13	0.1407	18.79	0.396	0.0907	0.874
10/23/01 15:13	0.149	18.79	0.535	0.099	1.181
10/23/01 15:13	0.1578	18.8	0.336	0.1078	0.742
10/23/01 15:13	0.167	18.79	0.463	0.117	1.022
10/23/01 15:13	0.177	18.79	0.398	0.127	0.879
10/23/01 15:13	0.1875	18.79	0.367	0.1375	0.810
10/23/01 15:13	0.1985	18.79	0.374	0.1485	0.826
10/23/01 15:13	0.2102	18.79	0.367	0.1602	0.810
10/23/01 15:13	0.2227	18.79	0.361	0.1727	0.797
10/23/01 15:13	0.2358	18.79	0.357	0.1858	0.788
10/23/01 15:13	0.2498	18.77	0.349	0.1998	0.770
10/23/01 15:13	0.2647	18.77	0.343	0.2147	0.757
10/23/01 15:13	0.2803	18.77	0.339	0.2303	0.748
10/23/01 15:13	0.297	18.77	0.333	0.247	0.735
10/23/01 15:13	0.3147	18.77	0.326	0.2647	0.720
10/23/01 15:13	0.3333	18.77	0.322	0.2833	0.711
10/23/01 15:13	0.3532	18.77	0.299	0.3032	0.660
10/23/01 15:13	0.3742	18.77	0.31	0.3242	0.684
10/23/01 15:13	0.3963	18.77	0.306	0.3463	0.675
10/23/01 15:13	0.4198	18.77	0.299	0.3698	0.660
10/23/01 15:13	0.4447	18.77	0.293	0.3947	0.647
10/23/01 15:13	0.4697	18.77	0.289	0.4197	0.638
10/23/01 15:13	0.4963	18.77	0.283	0.4463	0.625
10/23/01 15:13	0.5247	18.77	0.281	0.4747	0.620
10/23/01 15:13	0.5547	18.77	0.273	0.5047	0.603
10/23/01 15:14	0.5863	18.77	0.266	0.5363	0.587
10/23/01 15:14	0.6213	18.77	0.26	0.5713	0.574
10/23/01 15:14	0.6578	18.77	0.256	0.6078	0.565
10/23/01 15:14	0.6963	18.77	0.248	0.6463	0.547
10/23/01 15:14	0.738	18.76	0.242	0.688	0.534
10/23/01 15:14	0.7813	18.77	0.237	0.7313	0.523
10/23/01 15:14	0.828	18.76	0.231	0.778	0.510
10/23/01 15:14	0.8763	18.76	0.223	0.8263	0.492
10/23/01 15:14	0.928	18.76	0.217	0.878	0.479
10/23/01 15:14	0.983	18.76	0.213	0.933	0.470
10/23/01 15:14	1.0413	18.76	0.207	0.9913	0.457

10/23/01 15:14	1.103	18.76	0.198	1.053	0.437
10/23/01 15:14	1.168	18.76	0.194	1.118	0.428
10/23/01 15:14	1.238	18.76	0.188	1.188	0.415
10/23/01 15:14	1.3113	18.76	0.182	1.2613	0.402
10/23/01 15:14	1.3897	18.76	0.171	1.3397	0.377
10/23/01 15:14	1.473	18.75	0.17	1.423	0.375
10/23/01 15:14	1.5613	18.75	0.163	1.5113	0.360
10/23/01 15:15	1.6547	18.75	0.157	1.6047	0.347
10/23/01 15:15	1.753	18.75	0.151	1.703	0.333
10/23/01 15:15	1.858	18.75	0.145	1.808	0.320
10/23/01 15:15	1.968	18.75	0.139	1.918	0.307
10/23/01 15:15	2.0847	18.75	0.134	2.0347	0.296
10/23/01 15:15	2.2097	18.74	0.126	2.1597	0.278
10/23/01 15:15	2.3412	18.74	0.12	2.2912	0.265
10/23/01 15:15	2.4813	18.74	0.114	2.4313	0.252
10/23/01 15:16	2.6297	18.74	0.106	2.5797	0.234
10/23/01 15:16	2.7863	18.74	0.102	2.7363	0.225
10/23/01 15:16	2.953	18.72	0.096	2.903	0.212
10/23/01 15:16	3.1297	18.74	0.087	3.0797	0.192
10/23/01 15:16	3.3163	18.72	0.083	3.2663	0.183
10/23/01 15:16	3.5147	18.72	0.077	3.4647	0.170
10/23/01 15:17	3.7247	18.72	0.071	3.6747	0.157
10/23/01 15:17	3.9463	18.72	0.065	3.8963	0.143
10/23/01 15:17	4.1813	18.71	0.061	4.1313	0.135
10/23/01 15:17	4.4295	18.72	0.054	4.3795	0.119
10/23/01 15:18	4.693	18.71	0.013	4.643	0.029
10/23/01 15:18	4.973	18.71	0.046	4.923	0.102
10/23/01 15:18	5.2697	18.71	0.04	5.2197	0.088
10/23/01 15:19	5.583	18.71	0.036	5.533	0.079
10/23/01 15:19	5.9147	18.71	0.03	5.8647	0.066
10/23/01 15:19	6.2663	18.7	0.028	6.2163	0.062
10/23/01 15:20	6.6397	18.7	0.022	6.5897	0.049
10/23/01 15:20	7.0347	18.7	0.018	6.9847	0.040
10/23/01 15:20	7.453	18.7	0.014	7.403	0.031
10/23/01 15:21	7.8963	18.69	0.01	7.8463	0.022
10/23/01 15:21	8.3663	18.69	0.005	8.3163	0.011
10/23/01 15:22	8.8647	18.69	0.003	8.8147	0.007
10/23/01 15:22	9.3913	18.69	-0.003	9.3413	-0.007
10/23/01 15:23	9.9497	18.69	-0.005	9.8997	-0.011
10/23/01 15:23	10.5413	18.69	0.001	10.4913	0.002
10/23/01 15:24	11.168	18.67	-0.005	11.118	-0.011

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW22

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / TEST NO.: 3

STATIC WATER LEVEL (Depth/Elevation): 8.02TPVC DATE: 10-4-01

TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

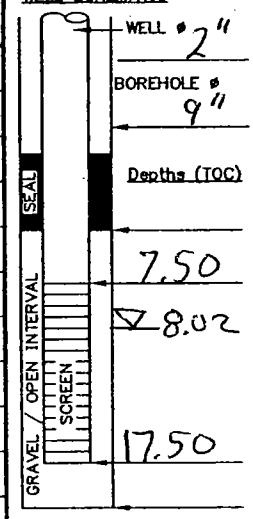
METHOD OF INDUCING WATER LEVEL CHANGE: SOLID SLUG PAGE ..... OF .....

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.):

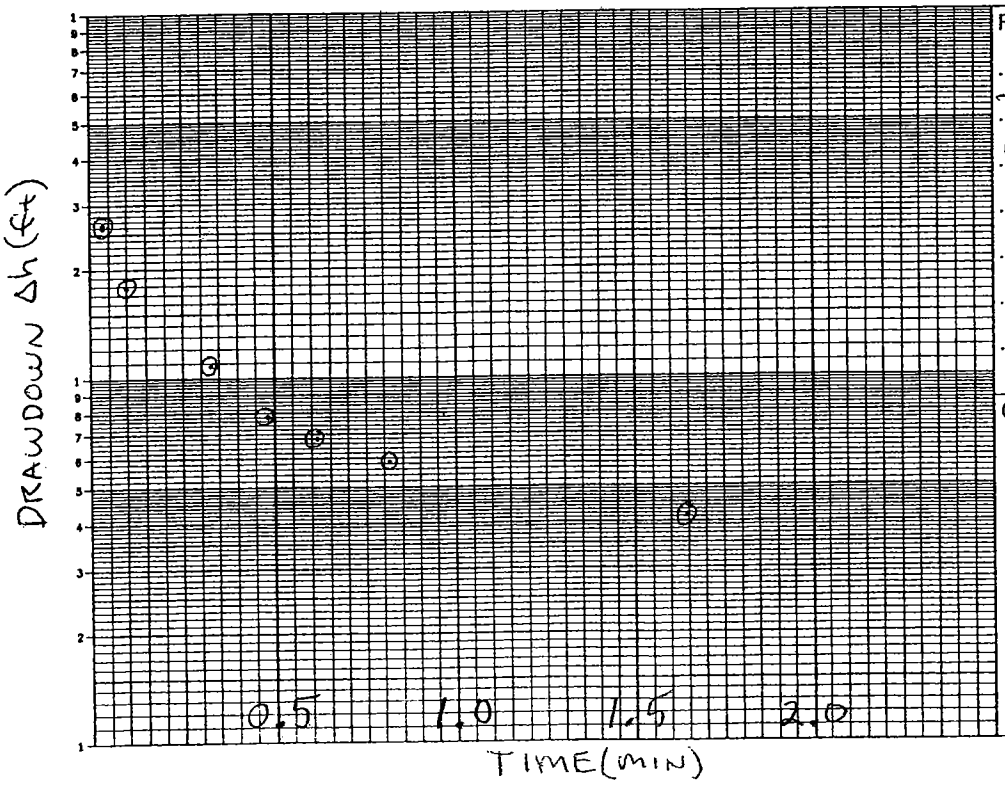
ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.03	6.52	2.54			
0.10	7.28	1.78			
0.333	7.96	1.09			
0.496		0.793			
0.621	8.363	0.697			
0.828	8.48	0.58			
1.65	8.64	0.42			
9.94	8.94	0.12			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

DATA LOGGER MINI TROLL S/N 856 (1.2' LONG PROBE) PLACED ~.2'

CALCS, SKETCH MAPS, ETC.:

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT INDIAN HEAD NSWC	JOB NUMBER 7129 SITE 57 FS
SUBJECT SLUG TEST WELL S57MW22	
BASED ON HVORSLEV	DRAWING NUMBER
BY FRED R. / CHECKED BY gk	APPROVED BY / DATE 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2L T_o}$$

WHERE:

$r = .083$ ft (RISER RADIUS, Ft)
$R = .083$ ft (SCREEN RADIUS, Ft)
$L = 9.48$ ft (INPUT LENGTH, Ft)
$T_o = 0.75$ MIN (FROM PLOT, MIN)
$K =$ HYDRAULIC COND. (ft/MIN)

SUB:

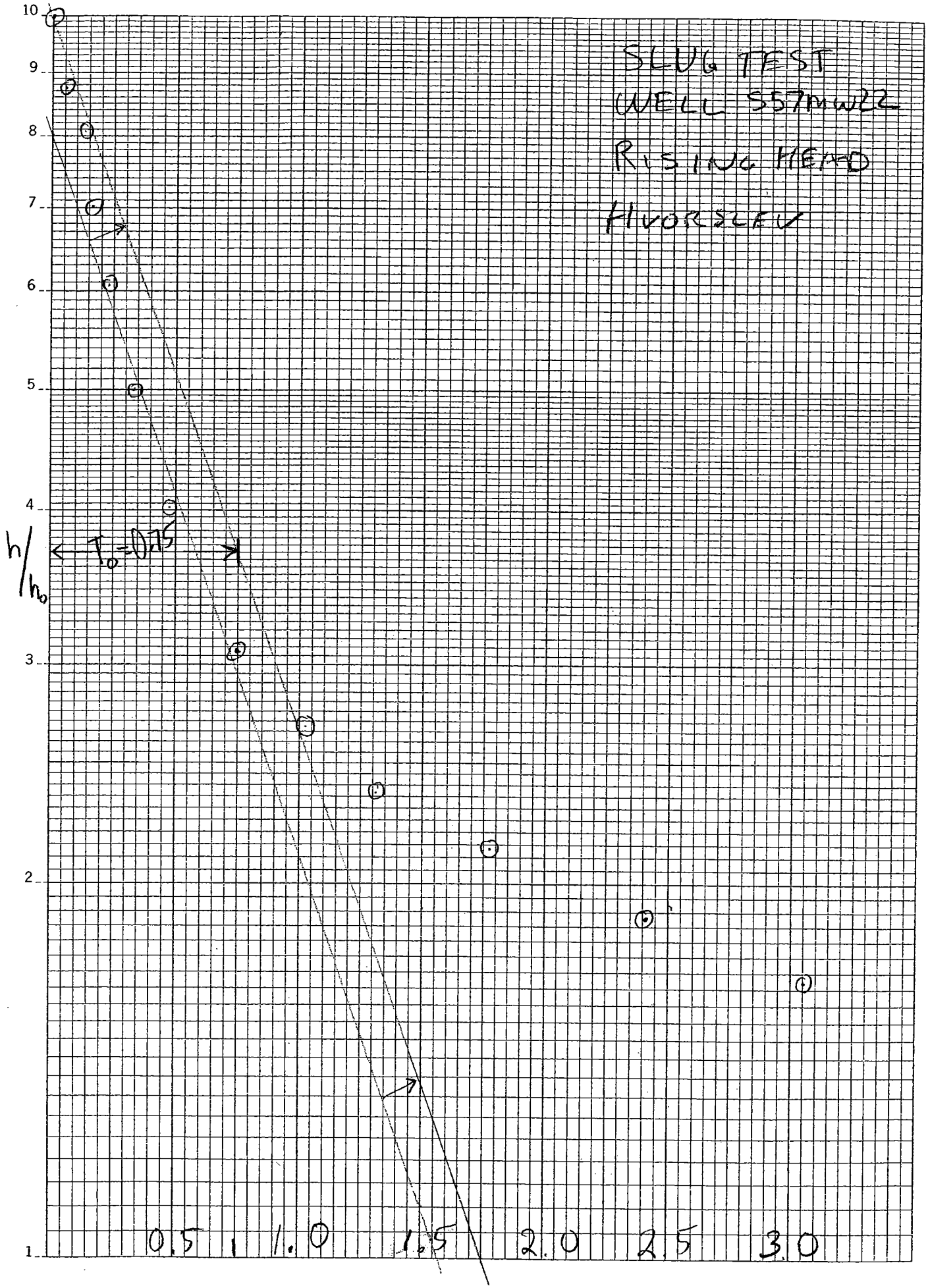
$$K = \frac{(.083)^2 \ln(9.48/.083)}{2(9.48)(0.75)}$$

$$K = \frac{3.26 \times 10^{-2}}{14.22}$$

$K = 2.3 \times 10^{-3}$ ft/MIN

$K = 1.17 \times 10^{-3}$ cm/sec

$K = 3.3$ ft/day ✓



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 11/1/01 14:35:51
Report from file: C:\Win-Situ\Data\SN00856 2001-10-04 084146 s57mw22rhno3.bin
DataMgr Version 3.68

Serial number: 856
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw22rhno3

Test defined on: 10/4/01 8:24:36
Test started on: 10/4/01 8:41:46
Test stopped on: 10/4/01 9:08:20
Test extracted on: N/A

Data gathered using Logarithmic testing
Maximum time between data points:10 Minutes.
Number of data samples: 118

TOTAL DATA SAMPLES 118

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 9.06 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	Adj ET (min)	h/ho	ho= 1.881
10/4/01	8:41	0	16.07	0			
10/4/01	8:41	0.005	16.09	-0.006			
10/4/01	8:41	0.075	16.11	1.885			
10/4/01	8:41	0.08	16.11	1.881	0	1.000	
10/4/01	8:41	0.0848	16.11	1.843	0.0048	0.980	
10/4/01	8:41	0.09	16.11	1.827	0.01	0.971	
10/4/01	8:41	0.095	16.11	1.8	0.015	0.957	
10/4/01	8:41	0.1	16.11	1.779	0.02	0.946	
10/4/01	8:41	0.1058	16.11	1.754	0.0258	0.932	
10/4/01	8:41	0.112	16.11	1.729	0.032	0.919	

10/4/01 8:41	0.1185	16.11	1.702	0.0385	0.905
10/4/01 8:41	0.1255	16.12	1.675	0.0455	0.890
10/4/01 8:41	0.1328	16.12	1.644	0.0528	0.874
10/4/01 8:41	0.1407	16.12	1.615	0.0607	0.859
10/4/01 8:41	0.149	16.12	1.586	0.069	0.843
10/4/01 8:41	0.1578	16.12	1.552	0.0778	0.825
10/4/01 8:41	0.167	16.11	1.521	0.087	0.809
10/4/01 8:41	0.177	16.11	1.49	0.097	0.792
10/4/01 8:41	0.1875	16.11	1.459	0.1075	0.776
10/4/01 8:41	0.1985	16.11	1.425	0.1185	0.758
10/4/01 8:41	0.2102	16.1	1.394	0.1302	0.741
10/4/01 8:41	0.2227	16.1	1.361	0.1427	0.724
10/4/01 8:42	0.2358	16.1	1.323	0.1558	0.703
10/4/01 8:42	0.2498	16.1	1.288	0.1698	0.685
10/4/01 8:42	0.2647	16.1	1.248	0.1847	0.663
10/4/01 8:42	0.2803	16.1	1.213	0.2003	0.645
10/4/01 8:42	0.297	16.1	1.175	0.217	0.625
10/4/01 8:42	0.3147	16.1	1.136	0.2347	0.604
10/4/01 8:42	0.3333	16.1	1.099	0.2533	0.584
10/4/01 8:42	0.3532	16.1	1.061	0.2732	0.564
10/4/01 8:42	0.3742	16.1	1.022	0.2942	0.543
10/4/01 8:42	0.3963	16.1	0.98	0.3163	0.521
10/4/01 8:42	0.4198	16.1	0.94	0.3398	0.500
10/4/01 8:42	0.4447	16.1	0.901	0.3647	0.479
10/4/01 8:42	0.4697	16.1	0.864	0.3897	0.459
10/4/01 8:42	0.4963	16.1	0.828	0.4163	0.440
10/4/01 8:42	0.5247	16.1	0.793	0.4447	0.422
10/4/01 8:42	0.5547	16.1	0.76	0.4747	0.404
10/4/01 8:42	0.5863	16.1	0.728	0.5063	0.387
10/4/01 8:42	0.6213	16.1	0.697	0.5413	0.371
10/4/01 8:42	0.6578	16.1	0.668	0.5778	0.355
10/4/01 8:42	0.6963	16.1	0.641	0.6163	0.341
10/4/01 8:42	0.738	16.1	0.618	0.658	0.329
10/4/01 8:42	0.7813	16.1	0.595	0.7013	0.316
10/4/01 8:42	0.828	16.1	0.577	0.748	0.307
10/4/01 8:42	0.8763	16.1	0.56	0.7963	0.298
10/4/01 8:42	0.928	16.1	0.543	0.848	0.289
10/4/01 8:42	0.983	16.09	0.528	0.903	0.281
10/4/01 8:42	1.0413	16.09	0.516	0.9613	0.274
10/4/01 8:42	1.103	16.09	0.503	1.023	0.267
10/4/01 8:42	1.168	16.09	0.489	1.088	0.260
10/4/01 8:43	1.238	16.09	0.479	1.158	0.255
10/4/01 8:43	1.3113	16.09	0.466	1.2313	0.248
10/4/01 8:43	1.3897	16.09	0.445	1.3097	0.237
10/4/01 8:43	1.473	16.09	0.443	1.393	0.236
10/4/01 8:43	1.5613	16.09	0.433	1.4813	0.230
10/4/01 8:43	1.6547	16.09	0.422	1.5747	0.224
10/4/01 8:43	1.753	16.09	0.412	1.673	0.219
10/4/01 8:43	1.858	16.09	0.402	1.778	0.214
10/4/01 8:43	1.968	16.09	0.393	1.888	0.209
10/4/01 8:43	2.0847	16.09	0.383	2.0047	0.204
10/4/01 8:43	2.2097	16.09	0.373	2.1297	0.198

10/4/01 8:44	2.3412	16.09	0.362	2.2612	0.192
10/4/01 8:44	2.4813	16.09	0.354	2.4013	0.188
10/4/01 8:44	2.6297	16.09	0.343	2.5497	0.182
10/4/01 8:44	2.7863	16.09	0.335	2.7063	0.178
10/4/01 8:44	2.953	16.09	0.325	2.873	0.173
10/4/01 8:44	3.1297	16.09	0.314	3.0497	0.167
10/4/01 8:45	3.3163	16.1	0.306	3.2363	0.163
10/4/01 8:45	3.5147	16.1	0.298	3.4347	0.158
10/4/01 8:45	3.7247	16.1	0.288	3.6447	0.153
10/4/01 8:45	3.9463	16.1	0.279	3.8663	0.148
10/4/01 8:45	4.1813	16.1	0.269	4.1013	0.143
10/4/01 8:46	4.4295	16.1	0.258	4.3495	0.137
10/4/01 8:46	4.693	16.1	0.248	4.613	0.132
10/4/01 8:46	4.973	16.1	0.238	4.893	0.127
10/4/01 8:47	5.2697	16.1	0.229	5.1897	0.122
10/4/01 8:47	5.583	16.1	0.219	5.503	0.116
10/4/01 8:47	5.9147	16.1	0.209	5.8347	0.111
10/4/01 8:48	6.2663	16.11	0.201	6.1863	0.107
10/4/01 8:48	6.6397	16.11	0.19	6.5597	0.101
10/4/01 8:48	7.0347	16.11	0.18	6.9547	0.096
10/4/01 8:49	7.453	16.11	0.169	7.373	0.090
10/4/01 8:49	7.8963	16.11	0.159	7.8163	0.085
10/4/01 8:50	8.3663	16.11	0.149	8.2863	0.079
10/4/01 8:50	8.8647	16.12	0.139	8.7847	0.074
10/4/01 8:51	9.3913	16.12	0.128	9.3113	0.068
10/4/01 8:51	9.9497	16.14	0.116	9.8697	0.062
10/4/01 8:52	10.5413	16.15	0.108	10.4613	0.057
10/4/01 8:52	11.168	16.15	0.098	11.088	0.052
10/4/01 8:53	11.8313	16.16	0.088	11.7513	0.047
10/4/01 8:54	12.5347	16.17	0.08	12.4547	0.043
10/4/01 8:55	13.2797	16.19	0.07	13.1997	0.037
10/4/01 8:55	14.0697	16.2	0.062	13.9897	0.033
10/4/01 8:56	14.9063	16.22	0.054	14.8263	0.029
10/4/01 8:57	15.7913	16.24	0.044	15.7113	0.023
10/4/01 8:58	16.7297	16.26	0.038	16.6497	0.020
10/4/01 8:59	17.723	16.27	0.032	17.643	0.017
10/4/01 9:00	18.7763	16.3	0.025	18.6963	0.013
10/4/01 9:01	19.8913	16.33	0.019	19.8113	0.010
10/4/01 9:02	21.073	16.35	0.014	20.993	0.007
10/4/01 9:04	22.3247	16.36	0.01	22.2447	0.005
10/4/01 9:05	23.6497	16.38	0.004	23.5697	0.002
10/4/01 9:06	25.0547	16.4	0.002	24.9747	0.001
10/4/01 9:08	26.543	16.41	-0.001	26.463	-0.001

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

Tetra Tech NUS, Inc.

PROJECT NAME: INDIANHEAD SITE 57 FS WELL/BORING NO.: S57MW23

PROJECT NO.: 7129-2920 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10'/ TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 14.83 DATE: 10-25-01

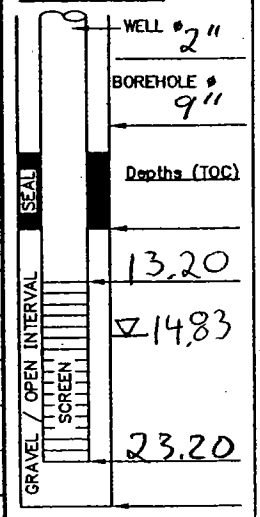
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER X 2 PAGE ..... OF .....

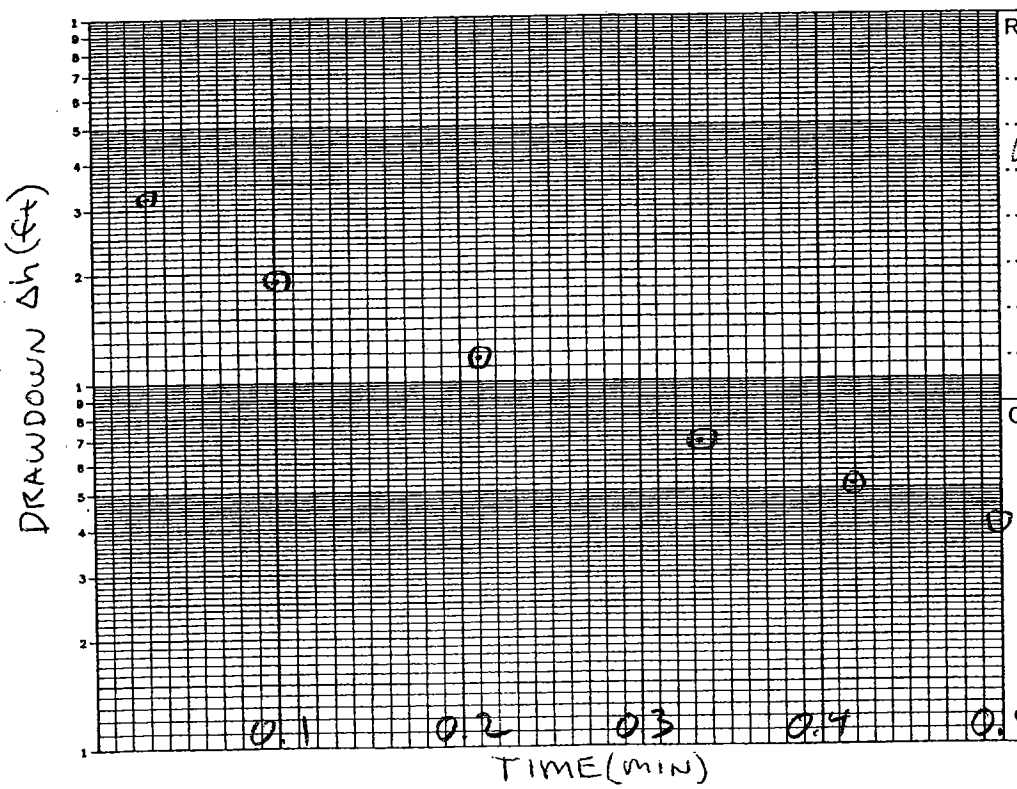
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): 0.00 ref

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		6.000	0.4198		0.508
0.030		3.242	0.4963		0.400
0.045		2.648	0.6963		0.226
0.060		2.391	0.8762		0.147
0.075		2.190	1.0412		0.104
0.090		2.006			
0.1000		1.907			
0.1405		1.566			
0.1768		1.336			
0.2100		1.154			
0.2498		0.971			
0.3333		0.688			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

WL = 14.85 @ END OF TEST

CALCS, SKETCH MAPS, ETC.:

ACAD:FORM_HYDCONTST.dwg 07/06/99 INL

TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT: INDIAN HEAD NSWC	JOB NUMBER: 7129 SITE 57 FS
SUBJECT: SLUG TEST WELL S57MW23 RISING HEAD	
BASED ON: HVORSLEV	DRAWING NUMBER:
BY: FRED R. / CHECKED BY: JK	APPROVED BY: / DATE: 11-2-01

EQ:

$$K = \frac{r^2 \ln(L/R)}{2 L T_0}$$

WHERE:

$r = 0.0833$ (RISER RADIUS, Ft)
$R = 0.0833$ (SCREEN RADIUS, Ft)
$L = 8.37$ (INPUT LENGTH, Ft)
$T_0 = 0.215$ (FROM PLOT, MIN)
K = HYDRAULIC COND. (ft/min)

SUB:

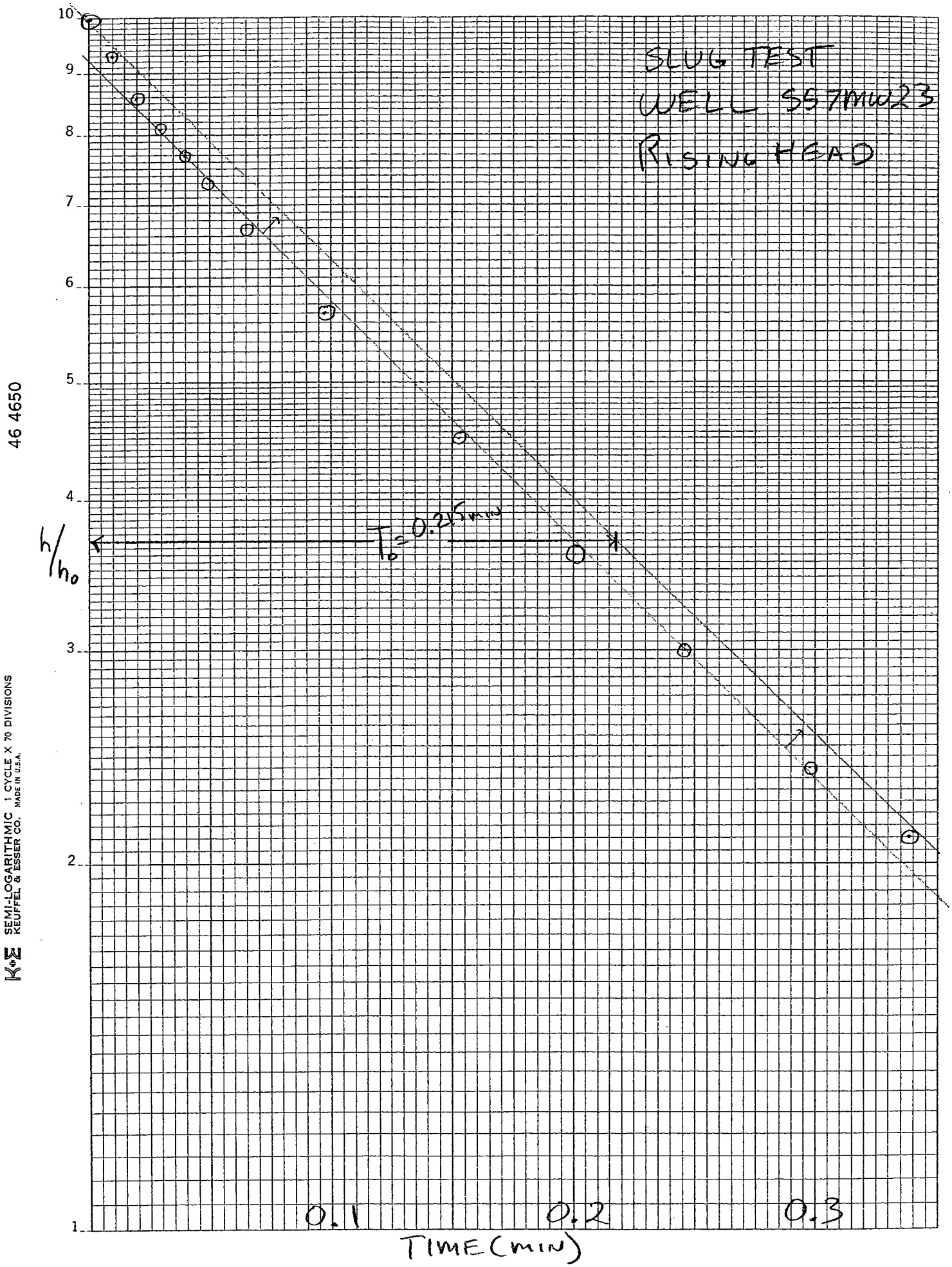
$$K = \frac{(0.0833)^2 \ln(8.37/0.0833)}{2(8.37)(0.215)}$$

$$= \frac{3.19880096 \times 10^{-2}}{3.5991}$$

$$= 8.9 \times 10^{-3} \text{ ft/min}$$

$$= 4.5 \times 10^{-3}$$

$$= 12.8 \text{ ft/day}$$


SLUG TEST
WELL 557MW23
RISING HEAD
h/h0
T0 = 0.215 min
10
9
8
7
6
5
4
3
2
1
0.1
0.2
0.3
TIME (MIN)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/30/01 12:24:37
Report from file: C:\Win-Situ\Data\SN01966 2001-10-25 125200 s57mw23rhno1.bin
DataMgr Version 3.68

Serial number: 1966
Firmware Version 3.01
Unit name: miniTROLL

Test name: s57mw23rhno1

Test defined on: 10/25/01 12:39:03
Test started on: 10/25/01 12:52:00
Test stopped on: 10/25/01 13:00:29
Test extracted on: N/A

Data gathered using Logarithmic testing
aximum time between data points: 10.C Minutes.
Number of data samples: 98

TOTAL DATA SAMPLES 98

Channel number [1]
Measurement type: Temperature
Channel name: OnBoard Temp

Channel number [2]
Measurement type: Pressure
Channel name: OnBoard Pressure
Sensor Range: 30 PSI.
Specific gravity: 1
Mode: TOC
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 7.801 Feet H2O

Date	Time	ET (min)	Chan[1] Celsius	Chan[2] Feet H2O	ET (min) adj	h/ho	ho= 2.861
10/25/01	12:52	0	15.9	0			
10/25/01	12:52	0.005	15.91	-0.002			
10/25/01	12:52	0.01	15.91	0.004			
10/25/01	12:52	0.015	15.91	3.531			
10/25/01	12:52	0.02	15.91	7.164			
10/25/01	12:52	0.025	15.92	6.216			
10/25/01	12:52	0.03	15.92	3.242			
10/25/01	12:52	0.035	15.92	2.861	0	1.00	—
10/25/01	12:52	0.04	15.92	2.747	0.005	0.96	
10/25/01	12:52	0.045	15.92	2.648	0.01	0.93	–

10/25/01 12:52	0.05	15.92	2.554	0.015	0.89
10/25/01 12:52	0.055	15.92	2.472	0.02	0.86
10/25/01 12:52	0.06	15.94	2.391	0.025	0.84
10/25/01 12:52	0.065	15.94	2.331	0.03	0.81
10/25/01 12:52	0.07	15.94	2.248	0.035	0.79
10/25/01 12:52	0.075	15.94	2.19	0.04	0.77
10/25/01 12:52	0.08	15.94	2.126	0.045	0.74
10/25/01 12:52	0.0848	15.94	2.079	0.0498	0.73
10/25/01 12:52	0.09	15.94	2.006	0.055	0.70
10/25/01 12:52	0.095	15.94	1.952	0.06	0.68
10/25/01 12:52	0.1	15.94	1.907	0.065	0.67
10/25/01 12:52	0.1058	15.94	1.855	0.0708	0.65
10/25/01 12:52	0.112	15.94	1.791	0.077	0.63
10/25/01 12:52	0.1185	15.94	1.737	0.0835	0.61
10/25/01 12:52	0.1255	15.94	1.679	0.0905	0.59
10/25/01 12:52	0.1328	15.94	1.623	0.0978	0.57
10/25/01 12:52	0.1407	15.95	1.566	0.1057	0.55
10/25/01 12:52	0.149	15.94	1.507	0.114	0.53
10/25/01 12:52	0.1578	15.95	1.452	0.1228	0.51
10/25/01 12:52	0.167	15.94	1.394	0.132	0.49
10/25/01 12:52	0.177	15.94	1.336	0.142	0.47
10/25/01 12:52	0.1875	15.94	1.278	0.1525	0.45
10/25/01 12:52	0.1985	15.94	1.216	0.1635	0.43
10/25/01 12:52	0.2102	15.94	1.154	0.1752	0.40
10/25/01 12:52	0.2227	15.94	1.094	0.1877	0.38
10/25/01 12:52	0.2358	15.94	1.031	0.2008	0.36
10/25/01 12:52	0.2498	15.94	0.971	0.2148	0.34
10/25/01 12:52	0.2647	15.94	0.911	0.2297	0.32
10/25/01 12:52	0.2803	15.94	0.853	0.2453	0.30
10/25/01 12:52	0.297	15.94	0.795	0.262	0.28
10/25/01 12:52	0.3147	15.92	0.739	0.2797	0.26
10/25/01 12:52	0.3333	15.92	0.688	0.2983	0.24
10/25/01 12:52	0.3532	15.94	0.638	0.3182	0.22
10/25/01 12:52	0.3742	15.92	0.59	0.3392	0.21
10/25/01 12:52	0.3963	15.92	0.549	0.3613	0.19
10/25/01 12:52	0.4198	15.92	0.508	0.3848	0.18
10/25/01 12:52	0.4447	15.92	0.47	0.4097	0.16
10/25/01 12:52	0.4697	15.92	0.433	0.4347	0.15
10/25/01 12:52	0.4963	15.92	0.4	0.4613	0.14
10/25/01 12:52	0.5247	15.92	0.365	0.4897	0.13
10/25/01 12:52	0.5547	15.92	0.336	0.5197	0.12
10/25/01 12:52	0.5863	15.92	0.305	0.5513	0.11
10/25/01 12:52	0.6213	15.92	0.276	0.5863	0.10
10/25/01 12:52	0.6578	15.92	0.249	0.6228	0.09
10/25/01 12:52	0.6963	15.92	0.226	0.6613	0.08
10/25/01 12:52	0.738	15.92	0.203	0.703	0.07
10/25/01 12:52	0.7813	15.92	0.185	0.7463	0.06
10/25/01 12:52	0.828	15.92	0.166	0.793	0.06
10/25/01 12:52	0.8763	15.92	0.147	0.8413	0.05
10/25/01 12:52	0.928	15.91	0.133	0.893	0.05
10/25/01 12:52	0.983	15.92	0.116	0.948	0.04
10/25/01 12:53	1.0413	15.91	0.104	1.0063	0.04

10/25/01 12:53	1.103	15.91	0.091	1.068	0.03
10/25/01 12:53	1.168	15.91	0.081	1.133	0.03
10/25/01 12:53	1.238	15.91	0.071	1.203	0.02
10/25/01 12:53	1.3113	15.91	0.062	1.2763	0.02
10/25/01 12:53	1.3897	15.91	0.056	1.3547	0.02
10/25/01 12:53	1.473	15.91	0.05	1.438	0.02
10/25/01 12:53	1.5613	15.91	0.046	1.5263	0.02
10/25/01 12:53	1.6547	15.91	0.04	1.6197	0.01
10/25/01 12:53	1.753	15.9	0.035	1.718	0.01
10/25/01 12:53	1.858	15.9	0.033	1.823	0.01
10/25/01 12:53	1.968	15.9	0.031	1.933	0.01
10/25/01 12:54	2.0847	15.9	0.029	2.0497	0.01
10/25/01 12:54	2.2097	15.9	0.029	2.1747	0.01
10/25/01 12:54	2.3412	15.9	0.027	2.3062	0.01
10/25/01 12:54	2.4813	15.9	0.025	2.4463	0.01
10/25/01 12:54	2.6297	15.9	0.023	2.5947	0.01
10/25/01 12:54	2.7863	15.9	0.023	2.7513	0.01
10/25/01 12:54	2.953	15.9	0.023	2.918	0.01
10/25/01 12:55	3.1297	15.9	0.021	3.0947	0.01
10/25/01 12:55	3.3163	15.9	0.021	3.2813	0.01
10/25/01 12:55	3.5147	15.9	0.019	3.4797	0.01
10/25/01 12:55	3.7247	15.89	0.018	3.6897	0.01
10/25/01 12:55	3.9463	15.89	0.018	3.9113	0.01
10/25/01 12:56	4.1813	15.89	0.018	4.1463	0.01
10/25/01 12:56	4.4295	15.89	0.016	4.3945	0.01
10/25/01 12:56	4.693	15.89	0.016	4.658	0.01
10/25/01 12:56	4.973	15.89	0.014	4.938	0.00
10/25/01 12:57	5.2697	15.89	0.014	5.2347	0.00
10/25/01 12:57	5.583	15.89	0.014	5.548	0.00
10/25/01 12:57	5.9147	15.89	0.014	5.8797	0.00
10/25/01 12:58	6.2663	15.89	0.014	6.2313	0.00
10/25/01 12:58	6.6397	15.89	0.016	6.6047	0.01
10/25/01 12:59	7.0347	15.89	0.016	6.9997	0.01
10/25/01 12:59	7.453	15.89	0.014	7.418	0.00
10/25/01 12:59	7.8963	15.89	0.014	7.8613	0.00
10/25/01 13:00	8.3663	15.89	0.012	8.3313	0.00

TETRA TECH NUS, INC. **CALCULATION WORKSHEET**

CLIENT NAVY INDIAN HEAD	JOB NUMBER 4020 1110
SUBJECT HYDRAULIC GRADIENT	
BASED ON	DRAWING NUMBER
BY FWR / CHECKED BY FCW	APPROVED BY / DATE 4-17-02

ESTIMATED GRAPHICALLY FROM POTENTIOMETRIC SURFACE MAP. FIGURE 1-9

$$\frac{dh}{dl} = i$$

TOP

$$\frac{dh}{dl} = \left(\frac{2}{20} + \frac{2}{30} + \frac{2}{34} + \frac{2}{48} + \frac{2}{65} + \frac{2}{94} + \frac{2}{88} + \frac{2}{73} + \frac{2}{94} + \frac{2}{120}\right)\frac{1}{10}$$

$$= \underline{0.0407} \checkmark$$

BOTTOM

$$\frac{dh}{dl} = \left(\frac{2}{50} + \frac{2}{64} + \frac{2}{137} + \frac{2}{188} + \frac{2}{140}\right)\frac{1}{5}$$

$$= \underline{0.022} \checkmark$$

CLIENT NAVY INDIAN HEAD	JOB NUMBER 4020 1110
SUBJECT SEEPAGE VELOCITY	
BASED ON	DRAWING NUMBER
BY FWR / CHECKED BY FCW	APPROVED BY / DATE 4-17-02

$V_s = K \times i \, (1/n)$

V_s = SEEPAGE VELOCITY (feet/day)

K = HORIZONTAL HYDRAULIC COND. (FEET/DAY)

i = HYDRAULIC GRADIENT (FEET/FEET)

n = EFFECTIVE POROSITY

NORTHERN PORTION

$K = 2.3$ FEET/DAY

$i = 0.04$

$n = 0.25$

SUB:

$V_s = 2.3 \times 0.04 (1/0.25)$

$V_s = 0.37$ ✓

SOUTHERN PORTION

$K = 2.3$ FEET/day

$i = 0.022$ FEET/FEET

$n = 0.25$

SUB:

$V_s = 2.3 \times 0.022 (1/0.25)$

$= 0.20$ ✓

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE ____ OF ____

CLIENT: INDIAN HEAD	JOB NUMBER: 2194 1110
SUBJECT: HYDRAULIC GRADIENTS + SEEPAGE VELOCITY SITE 57	
BASED ON:	DRAWING NUMBER:
BY: FWR / CHECKED BY: MGC	APPROVED BY: / DATE:

I $V_s = K\,i/n$ where: V_s = seepage velocity ft/da
K = HYDRAULIC COND ft/da
i = HYDRAULIC GRADIENT
n = POROSITY (ft/ft)

II ASSUME: n = 0.25 (SAND + GRAVEL)

KNOWN: K = 3.6 ft/day (WATER TABLE)

III HYDRAULIC GRADIENT: OCTOBER 11, 2005

a) NORTHERN PORTION OF SITE

$$i = \frac{dh}{dl} = \frac{38-18}{720} = \frac{20}{720} = \underline{0.028}$$

b) SOUTHERN PORTION OF SITE

$$i = \frac{dh}{dl} = \frac{\text{SUM OF RISE}}{\text{SUM OF RUN}}$$

$$i = \frac{2}{90} + \frac{2}{80} + \frac{2}{150} + \frac{2}{160} \quad (a + b + c + d)$$

$$= \frac{8}{480}$$

$$= 0.017$$

IV SEEPAGE VELOCITY

a) NORTHERN: $V = (3.6)\frac{0.028}{0.25}$
$= 0.40$ ft/day

b) SOUTHERN: $V = (3.6)\frac{0.017}{0.25}$
$= 0.25$ ft/day

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW027
Project No.:	N2194	**Aquifer Type:**	Sand with some silt.
Test Type:	Slug test, rising head.	**Test Date:**	13-Oct-05

Done By:
Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	2.80 = To

Hydraulic Conductivity (K) : 5.89

5.94E-04	ft./min.
9.89E-06	ft./sec.
8.55E-01	ft./day
3.02E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

In-Situ Inc. MiniTroll Pro

Report generated: 10/20/2005 15:56:13
Report from file: ...\SN11059 2005-10-13 143350 S57MW027R.bin
Win-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW027R

Test defined on: 10/13/2005 14:05:17
Test started on: 10/13/2005 14:33:50
Test stopped on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between data Minutes.
Number of data samples: 113

TOTAL DATA SAMPLES 113

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 12.575 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho	
10/13/2005	14:33:50	0	64.8	0			Plotted data
10/13/2005	14:33:50	0.005	64.84	0.006			
10/13/2005	14:33:51	0.01	64.84	0.009			
10/13/2005	14:33:51	0.015	64.87	0.01			
10/13/2005	14:33:51	0.02	64.87	0.011			
10/13/2005	14:33:52	0.025	64.87	0.012			
10/13/2005	14:33:52	0.03	64.87	0.012			
10/13/2005	14:33:52	0.035	64.87	0.012			
10/13/2005	14:33:53	0.04	64.87	0.012			
10/13/2005	14:33:53	0.045	64.89	0.012			
10/13/2005	14:33:53	0.05	64.89	0.012			
10/13/2005	14:33:53	0.055	64.89	0.012			
10/13/2005	14:33:54	0.06	64.89	0.012			
10/13/2005	14:33:54	0.065	64.89	0.013			
10/13/2005	14:33:54	0.07	64.89	0.013			
10/13/2005	14:33:55	0.075	64.89	0.013			
10/13/2005	14:33:55	0.08	64.89	0.013			

10/13/2005	14:33:55	0.085	64.89	0.013		
10/13/2005	14:33:56	0.09	64.89	0.013		
10/13/2005	14:33:56	0.095	64.89	0.013		
10/13/2005	14:33:56	0.1	64.89	0.002		
10/13/2005	14:33:57	0.1058	64.91	-2.275		
10/13/2005	14:33:57	0.112	64.89	-7.412		
10/13/2005	14:33:57	0.1185	64.89	-1.471		
10/13/2005	14:33:58	0.1255	64.89	-3.817		
10/13/2005	14:33:58	0.1328	64.89	-2.622		
10/13/2005	14:33:59	0.1407	64.89	-2.711		
10/13/2005	14:33:59	0.149	64.91	-2.931		
10/13/2005	14:34:00	0.1578	64.91	-2.712	0.0000	1.0000
10/13/2005	14:34:00	0.1672	64.89	-2.635	0.0094	0.9716
10/13/2005	14:34:01	0.177	64.87	-2.628	0.0192	0.9690
10/13/2005	14:34:01	0.1875	64.87	-2.597	0.0297	0.9576
10/13/2005	14:34:02	0.1985	64.87	-2.53	0.0407	0.9329
10/13/2005	14:34:03	0.2102	64.87	-2.486	0.0524	0.9167
10/13/2005	14:34:04	0.2227	64.87	-2.446	0.0649	0.9019
10/13/2005	14:34:04	0.2358	64.87	-2.408	0.0780	0.8879
10/13/2005	14:34:05	0.2498	64.87	-2.361	0.0920	0.8706
10/13/2005	14:34:06	0.2647	64.87	-2.324	0.1069	0.8569
10/13/2005	14:34:07	0.2803	64.87	-2.289	0.1225	0.8440
10/13/2005	14:34:08	0.297	64.84	-2.255	0.1392	0.8315
10/13/2005	14:34:09	0.3147	64.84	-2.22	0.1569	0.8186
10/13/2005	14:34:10	0.3333	64.84	-2.185	0.1755	0.8057
10/13/2005	14:34:11	0.3532	64.84	-2.151	0.1954	0.7931
10/13/2005	14:34:13	0.3742	64.84	-2.114	0.2164	0.7795
10/13/2005	14:34:14	0.3963	64.84	-2.079	0.2385	0.7666
10/13/2005	14:34:15	0.4198	64.84	-2.044	0.2620	0.7537
10/13/2005	14:34:17	0.4447	64.84	-2.007	0.2869	0.7400
10/13/2005	14:34:18	0.4697	64.84	-1.973	0.3119	0.7275
10/13/2005	14:34:20	0.4963	64.84	-1.938	0.3385	0.7146
10/13/2005	14:34:22	0.5247	64.84	-1.903	0.3669	0.7017
10/13/2005	14:34:23	0.5547	64.82	-1.866	0.3969	0.6881
10/13/2005	14:34:25	0.5863	64.82	-1.83	0.4285	0.6748
10/13/2005	14:34:27	0.6213	64.82	-1.79	0.4635	0.6600
10/13/2005	14:34:30	0.658	64.82	-1.746	0.5002	0.6438
10/13/2005	14:34:32	0.6963	64.82	-1.711	0.5385	0.6309
10/13/2005	14:34:34	0.738	64.8	-1.67	0.5802	0.6158
10/13/2005	14:34:37	0.7813	64.8	-1.632	0.6235	0.6018
10/13/2005	14:34:40	0.828	64.8	-1.593	0.6702	0.5874
10/13/2005	14:34:43	0.8763	64.78	-1.553	0.7185	0.5726
10/13/2005	14:34:46	0.928	64.78	-1.512	0.7702	0.5575
10/13/2005	14:34:49	0.983	64.78	-1.472	0.8252	0.5428
10/13/2005	14:34:53	1.0413	64.75	-1.431	0.8835	0.5277
10/13/2005	14:34:56	1.103	64.75	-1.389	0.9452	0.5122
10/13/2005	14:35:00	1.168	64.73	-1.349	1.0102	0.4974
10/13/2005	14:35:04	1.238	64.73	-1.307	1.0802	0.4819
10/13/2005	14:35:09	1.3113	64.71	-1.268	1.1535	0.4676
10/13/2005	14:35:14	1.3897	64.69	-1.227	1.2319	0.4524
10/13/2005	14:35:19	1.473	64.69	-1.185	1.3152	0.4369
10/13/2005	14:35:24	1.5613	64.66	-1.146	1.4035	0.4226
10/13/2005	14:35:29	1.6547	64.64	-1.105	1.4969	0.4074
10/13/2005	14:35:35	1.753	64.62	-1.066	1.5952	0.3931
10/13/2005	14:35:42	1.858	64.6	-1.025	1.7002	0.3779
10/13/2005	14:35:48	1.968	64.57	-0.987	1.8102	0.3639
10/13/2005	14:35:55	2.0847	64.57	-0.949	1.9269	0.3499
10/13/2005	14:36:03	2.2097	64.55	-0.912	2.0519	0.3363
10/13/2005	14:36:11	2.3413	64.51	-0.874	2.1835	0.3223
10/13/2005	14:36:19	2.4813	64.48	-0.838	2.3235	0.3090

10/13/2005	14:36:28	2.6297	64.48	-0.803	2.4719	0.2961
10/13/2005	14:36:37	2.7863	64.46	-0.768	2.6285	0.2832
10/13/2005	14:36:47	2.953	64.44	-0.734	2.7952	0.2706
10/13/2005	14:36:58	3.1297	64.41	-0.699	2.9719	0.2577
10/13/2005	14:37:09	3.3163	64.39	-0.667	3.1585	0.2459
10/13/2005	14:37:21	3.5147	64.39	-0.635	3.3569	0.2341
10/13/2005	14:37:34	3.7247	64.37	-0.604	3.5669	0.2227
10/13/2005	14:37:47	3.9463	64.35	-0.575	3.7885	0.2120
10/13/2005	14:38:01	4.1813	64.35	-0.547	4.0235	0.2017
10/13/2005	14:38:16	4.4297	64.35	-0.521	4.2719	0.1921
10/13/2005	14:38:32	4.693	64.32	-0.495	4.5352	0.1825
10/13/2005	14:38:49	4.973	64.32	-0.47	4.8152	0.1733
10/13/2005	14:39:06	5.2697	64.32	-0.448	5.1119	0.1652
10/13/2005	14:39:25	5.583	64.32	-0.426	5.4252	0.1571
10/13/2005	14:39:45	5.9147	64.3	-0.406	5.7569	0.1497
10/13/2005	14:40:06	6.2663	64.3	-0.386	6.1085	0.1423
10/13/2005	14:40:29	6.6397	64.3	-0.368	6.4819	0.1357
10/13/2005	14:40:52	7.0347	64.3	-0.353	6.8769	0.1302
10/13/2005	14:41:17	7.453	64.28	-0.337	7.2952	0.1243
10/13/2005	14:41:44	7.8963	64.28	-0.322	7.7385	0.1187
10/13/2005	14:42:12	8.3663	64.26	-0.308	8.2085	0.1136
10/13/2005	14:42:42	8.8647	64.26	-0.296	8.7069	0.1091
10/13/2005	14:43:14	9.3913	64.26	-0.285	9.2335	0.1051
10/13/2005	14:43:47	9.9497	64.26	-0.275	9.7919	0.1014
10/13/2005	14:44:23	10.5413	64.26	-0.266	10.3835	0.0981
10/13/2005	14:45:00	11.168	64.26	-0.257	11.0102	0.0948
10/13/2005	14:45:40	11.8313	64.28	-0.249	11.6735	0.0918
10/13/2005	14:46:22	12.5347	64.3	-0.243	12.3769	0.0896
10/13/2005	14:47:07	13.2797	64.3	-0.236	13.1219	0.0870
10/13/2005	14:47:54	14.0697	64.3	-0.231	13.9119	0.0852
10/13/2005	14:48:45	14.9063	64.3	-0.226	14.7485	0.0833
10/13/2005	14:49:38	15.7913	64.3	-0.222	15.6335	0.0819
10/13/2005	14:50:34	16.7297	64.3	-0.216	16.5719	0.0796
10/13/2005	14:51:34	17.723	64.32	-0.213	17.5652	0.0785
10/13/2005	14:52:37	18.7763	64.35	-0.21	18.6185	0.0774
10/13/2005	14:53:44	19.8913	64.39	-0.206	19.7335	0.0760

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: S57 INDIAN HEAD WELL/BORING NO.: S57MW027

PROJECT NO.: 2194 GEOLOGIST: FRED WRAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 22.73 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 6.80 TPVC DATE: 10-13-05

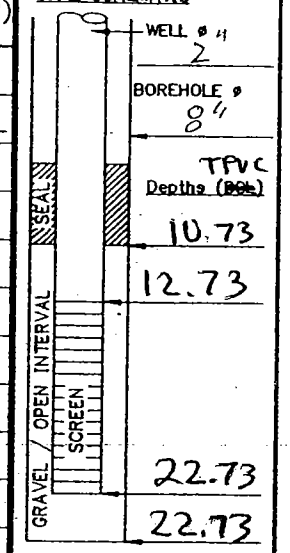
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER x 2 PAGE 1 OF 1

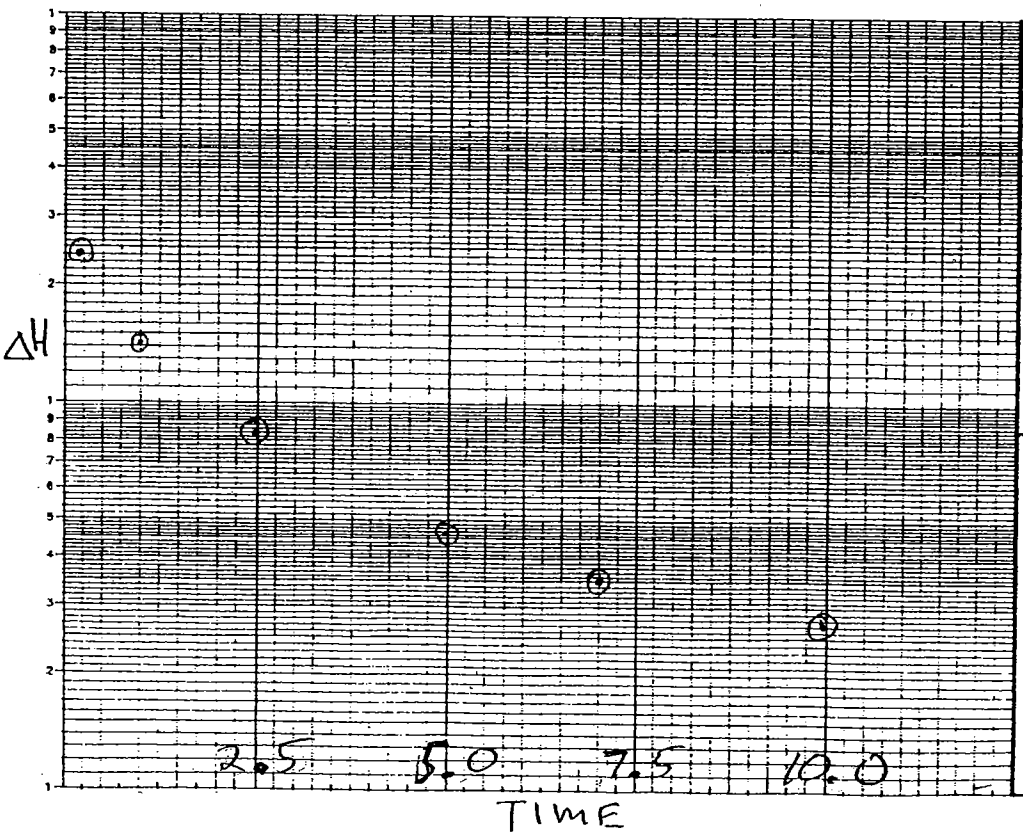
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.00		0.00	9.9497		0.275
0.1490		2.931	15.7913		0.222
0.2102		2.486			
0.3333		2.185			
0.5247		1.903			
0.7380		1.670			
1.0413		1.431			
1.7530		1.066			
2.4813		0.838			
3.1297		0.699			
4.9730		0.470			
7.0347		0.353			

WELL SCHEMATIC

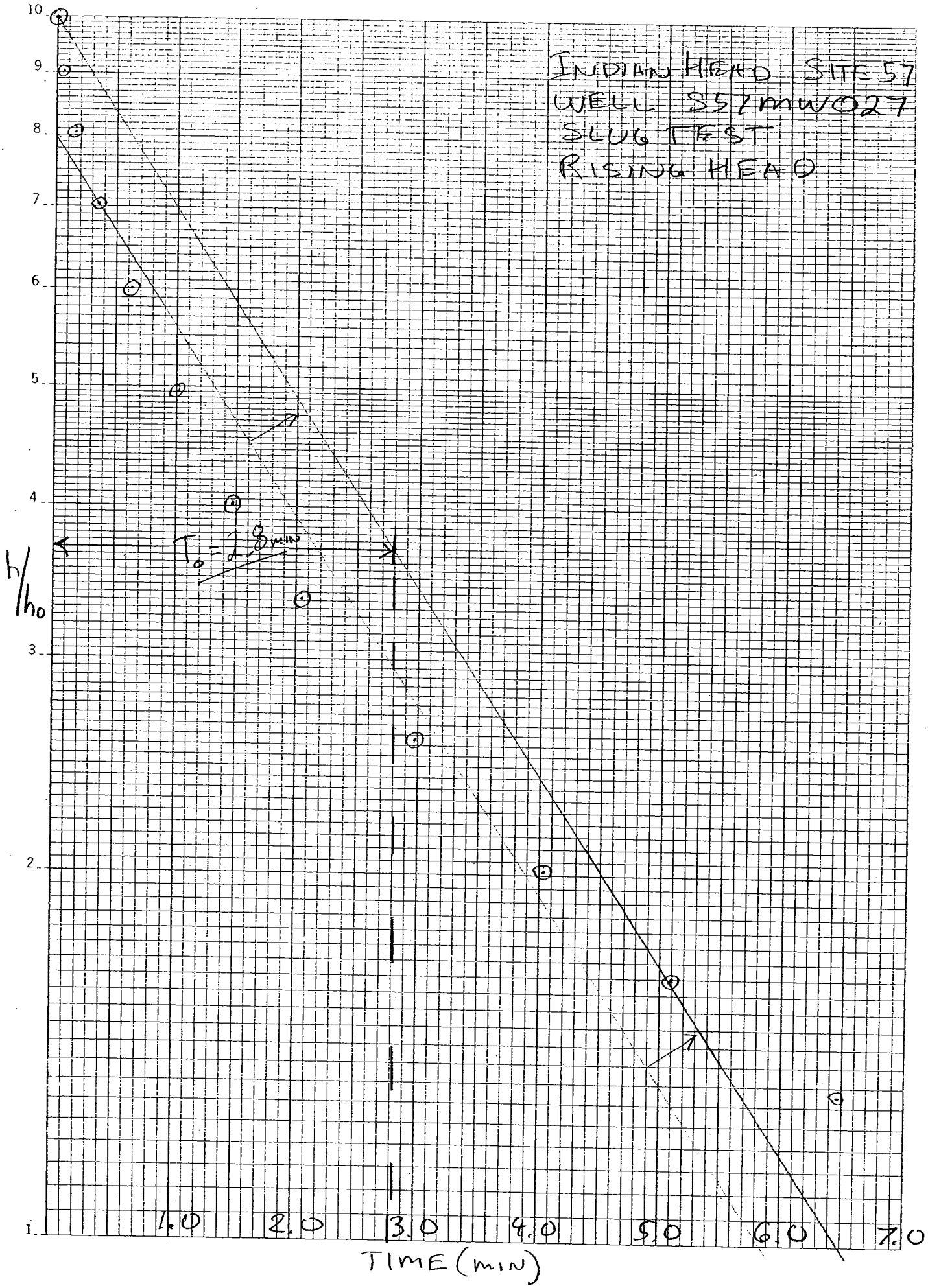


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW028
Project No.:	N2194	**Aquifer Type:**	Silt, clay, and sand.
Test Type:	Slug test, rising head.	**Test Date:**	12-Oct-05

Done By:
Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	3 = R
Length of Well Screen (ft.) :	12 = L
Time for 37% head change (min.) :	84.00 = To

Hydraulic Conductivity (K) : 1.32

1.33E-05	ft./min.
2.22E-07	ft./sec.
1.92E-02	ft./day
6.77E-06	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

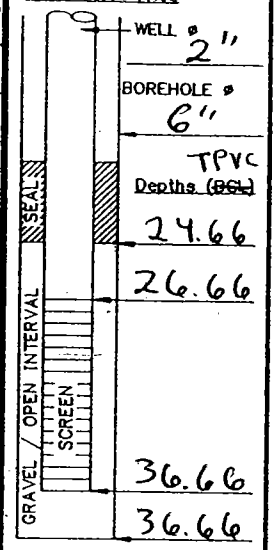
******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

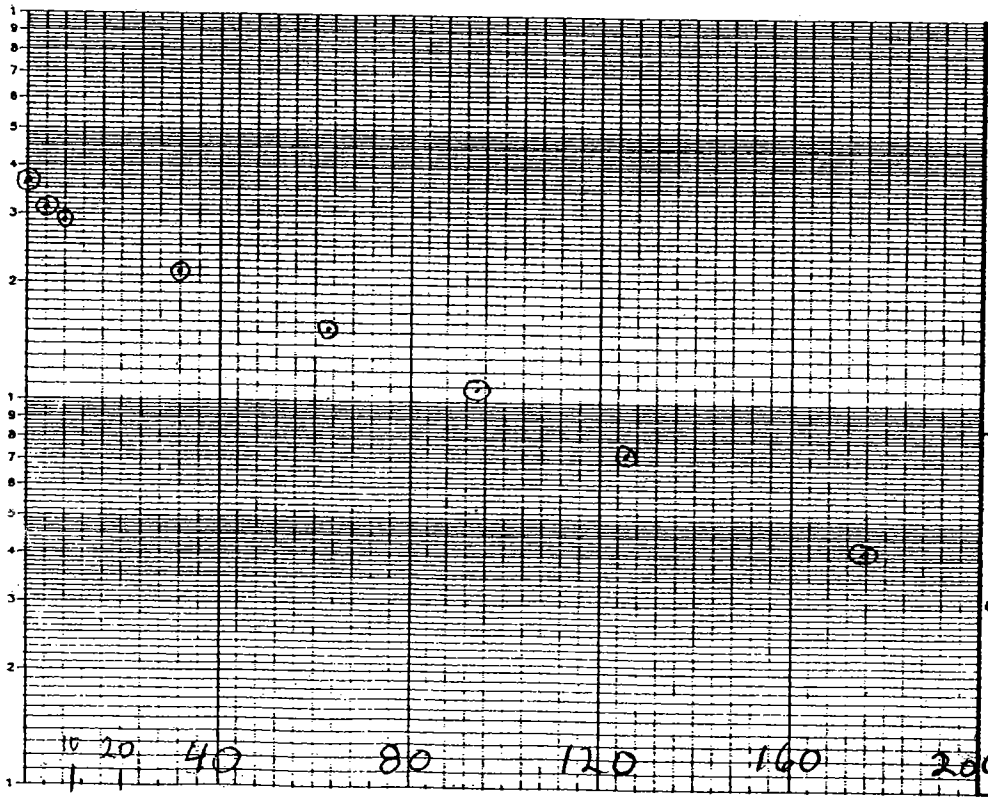
PROJECT NAME: SITE 57, INDIAN HEAD WELL/BORING NO.: 557MW028
PROJECT NO.: 2194 GEOLOGIST: FRED W RAMSER
WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10 / 36.66 TEST NO.:
STATIC WATER LEVEL (Depth/Elevation): 4.95 TPVC DATE: 10/12/05
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:
METHOD OF INDUCING WATER LEVEL CHANGE: BAILERS x 2 PAGE 1 OF 1
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000			
0.100		3.750			
4.1813		3.113			
8.3663		2.949			
18.7763		2.599			
33.428		2.184			
63.0197		1.539			
94.3263		1.061			
125.81		0.733			
177.738		0.418			
207.738		0.316			
287.738		0.192			

WELL SCHEMATIC

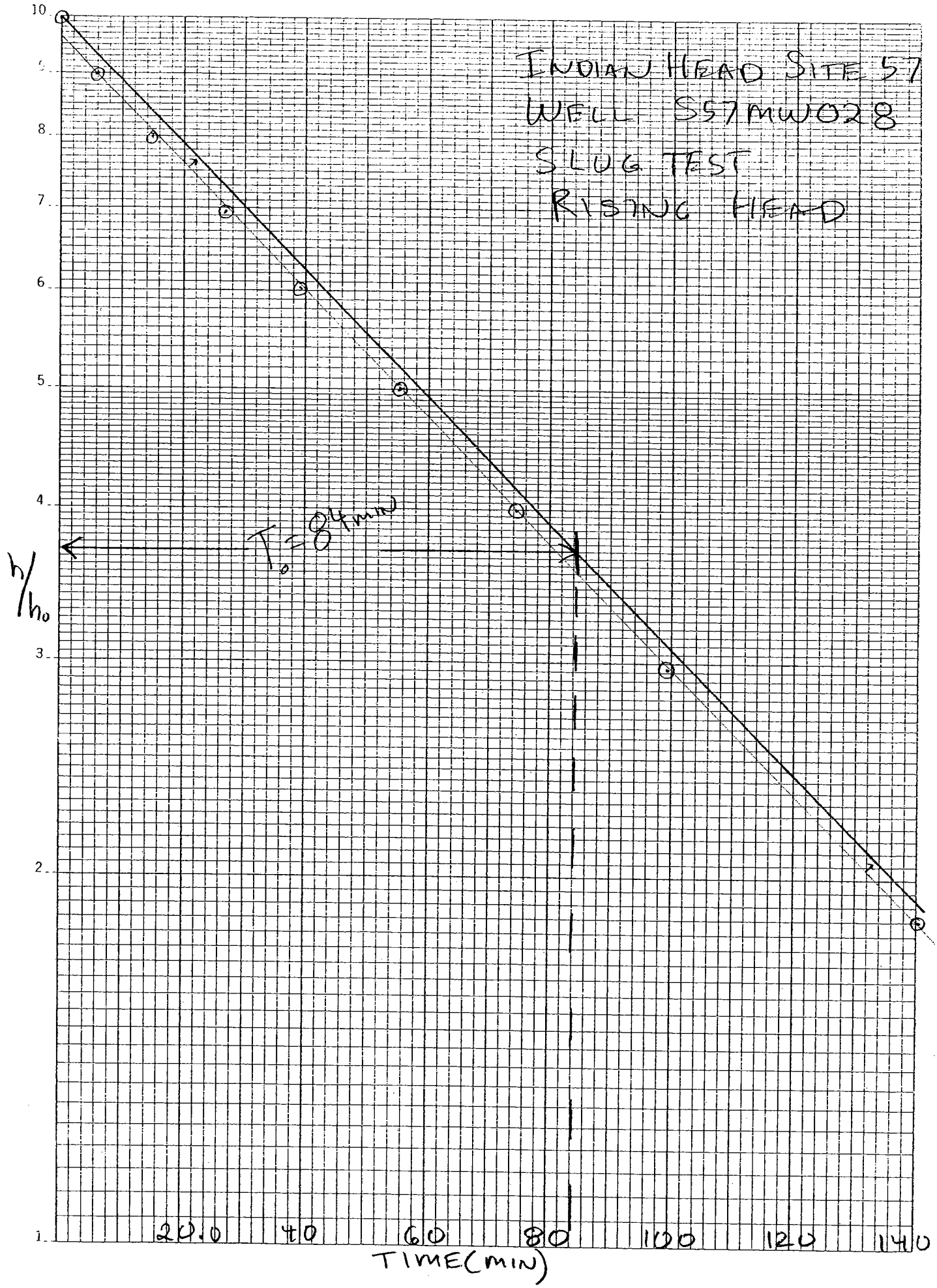


▽ Indicate SWL Depth on Drawing



REMARKS:
WATER COLUMN: 12.67'
STOP TEST 10/13/05
800 HRS

CALCS, SKETCH MAPS, ETC.:



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/20/2005 13:57:02
Report from file: ...\SN11059 2005-10-12 163807 S57MW028R.bin
Wir-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW028R

Test defined on: 10/12/2005 15:42:04
Test started on: 10/12/2005 16:38:07
Test stopped on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between d Minutes.
Number of data samples: 226

TOTAL DATA SAMPLES 226

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at referenc 12.631 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho
10/12/2005	16:38:07	0	65.14	0		
10/12/2005	16:38:08	0.005	65.16	0.006		
10/12/2005	16:38:08	0.01	65.18	0.009		
10/12/2005	16:38:08	0.015	65.18	0.01		
10/12/2005	16:38:09	0.02	65.21	0.011		
10/12/2005	16:38:09	0.025	65.21	0.011		
10/12/2005	16:38:09	0.03	65.21	-0.088		
10/12/2005	16:38:09	0.035	65.21	-0.179		
10/12/2005	16:38:10	0.04	65.21	0.051		
10/12/2005	16:38:10	0.045	65.21	0.111		
10/12/2005	16:38:10	0.05	65.21	0.016		
10/12/2005	16:38:11	0.055	65.23	-1.108		
10/12/2005	16:38:11	0.06	65.23	-3.393		
10/12/2005	16:38:11	0.065	65.23	-7.238		
10/12/2005	16:38:12	0.07	65.21	-8.108		
10/12/2005	16:38:12	0.075	65.21	-3.57		
10/12/2005	16:38:12	0.08	65.23	-2.344		
10/12/2005	16:38:12	0.085	65.23	-4.454		
10/12/2005	16:38:13	0.09	65.23	-3.807		
10/12/2005	16:38:13	0.095	65.23	-2.592		
10/12/2005	16:38:13	0.1	65.23	-3.75		
10/12/2005	16:38:14	0.1058	65.23	-3.643		
10/12/2005	16:38:14	0.112	65.23	-3.009		
10/12/2005	16:38:15	0.1185	65.23	-3.766		
10/12/2005	16:38:15	0.1255	65.23	-3.111		

Plotted data

10/12/2005	16:38:15	0.1328	65.23	-3.567		
10/12/2005	16:38:16	0.1407	65.23	-3.206		
10/12/2005	16:38:16	0.149	65.23	-3.47		
10/12/2005	16:38:17	0.1578	65.23	-3.27		
10/12/2005	16:38:17	0.1672	65.21	-3.36		
10/12/2005	16:38:18	0.177	65.21	-3.361		
10/12/2005	16:38:19	0.1875	65.21	-3.304		
10/12/2005	16:38:19	0.1985	65.21	-3.325		
10/12/2005	16:38:20	0.2102	65.21	-3.336	0.0000	1.0000
10/12/2005	16:38:21	0.2227	65.18	-3.327	0.0125	0.9973
10/12/2005	16:38:22	0.2358	65.18	-3.318	0.0256	0.9946
10/12/2005	16:38:22	0.2498	65.18	-3.314	0.0396	0.9934
10/12/2005	16:38:23	0.2647	65.18	-3.313	0.0545	0.9931
10/12/2005	16:38:24	0.2803	65.18	-3.311	0.0701	0.9925
10/12/2005	16:38:25	0.297	65.18	-3.309	0.0868	0.9919
10/12/2005	16:38:26	0.3147	65.18	-3.307	0.1045	0.9913
10/12/2005	16:38:27	0.3333	65.18	-3.305	0.1231	0.9907
10/12/2005	16:38:29	0.3532	65.18	-3.302	0.1430	0.9898
10/12/2005	16:38:30	0.3742	65.16	-3.301	0.1640	0.9895
10/12/2005	16:38:31	0.3963	65.16	-3.298	0.1861	0.9886
10/12/2005	16:38:33	0.4198	65.16	-3.295	0.2096	0.9877
10/12/2005	16:38:34	0.4447	65.16	-3.294	0.2345	0.9874
10/12/2005	16:38:36	0.4697	65.16	-3.291	0.2595	0.9865
10/12/2005	16:38:37	0.4963	65.16	-3.29	0.2861	0.9862
10/12/2005	16:38:39	0.5247	65.16	-3.288	0.3145	0.9856
10/12/2005	16:38:41	0.5547	65.16	-3.286	0.3445	0.9850
10/12/2005	16:38:43	0.5863	65.16	-3.284	0.3761	0.9844
10/12/2005	16:38:45	0.6213	65.14	-3.281	0.4111	0.9835
10/12/2005	16:38:47	0.658	65.14	-3.279	0.4478	0.9829
10/12/2005	16:38:49	0.6963	65.14	-3.277	0.4861	0.9823
10/12/2005	16:38:52	0.738	65.14	-3.274	0.5278	0.9814
10/12/2005	16:38:54	0.7813	65.14	-3.272	0.5711	0.9808
10/12/2005	16:38:57	0.828	65.14	-3.269	0.6178	0.9799
10/12/2005	16:39:00	0.8763	65.12	-3.266	0.6661	0.9790
10/12/2005	16:39:03	0.928	65.12	-3.262	0.7178	0.9778
10/12/2005	16:39:06	0.983	65.12	-3.26	0.7728	0.9772
10/12/2005	16:39:10	1.0413	65.12	-3.257	0.8311	0.9763
10/12/2005	16:39:14	1.103	65.12	-3.254	0.8928	0.9754
10/12/2005	16:39:17	1.168	65.12	-3.249	0.9578	0.9739
10/12/2005	16:39:22	1.238	65.09	-3.246	1.0278	0.9730
10/12/2005	16:39:26	1.3113	65.09	-3.242	1.1011	0.9718
10/12/2005	16:39:31	1.3897	65.09	-3.238	1.1795	0.9706
10/12/2005	16:39:36	1.473	65.09	-3.235	1.2628	0.9697
10/12/2005	16:39:41	1.5613	65.09	-3.229	1.3511	0.9679
10/12/2005	16:39:47	1.6547	65.07	-3.225	1.4445	0.9667
10/12/2005	16:39:53	1.753	65.07	-3.22	1.5428	0.9652
10/12/2005	16:39:59	1.858	65.07	-3.216	1.6478	0.9640
10/12/2005	16:40:05	1.968	65.07	-3.211	1.7578	0.9625
10/12/2005	16:40:12	2.0847	65.07	-3.204	1.8745	0.9604
10/12/2005	16:40:20	2.2097	65.07	-3.199	1.9995	0.9589
10/12/2005	16:40:28	2.3413	65.05	-3.192	2.1311	0.9568
10/12/2005	16:40:36	2.4813	65.05	-3.187	2.2711	0.9553
10/12/2005	16:40:45	2.6297	65.05	-3.181	2.4195	0.9535
10/12/2005	16:40:55	2.7863	65.05	-3.174	2.5761	0.9514
10/12/2005	16:41:05	2.953	65.05	-3.166	2.7428	0.9490
10/12/2005	16:41:15	3.1297	65.05	-3.158	2.9195	0.9466
10/12/2005	16:41:26	3.3163	65.03	-3.15	3.1061	0.9442
10/12/2005	16:41:38	3.5147	65.03	-3.142	3.3045	0.9418
10/12/2005	16:41:51	3.7247	65.03	-3.133	3.5145	0.9391
10/12/2005	16:42:04	3.9463	65	-3.124	3.7361	0.9365
10/12/2005	16:42:18	4.1813	65	-3.113	3.9711	0.9332
10/12/2005	16:42:33	4.4297	65	-3.103	4.2195	0.9302
10/12/2005	16:42:49	4.693	65	-3.093	4.4828	0.9272
10/12/2005	16:43:06	4.973	64.98	-3.081	4.7628	0.9236
10/12/2005	16:43:24	5.2697	64.98	-3.069	5.0595	0.9200
10/12/2005	16:43:42	5.583	64.96	-3.057	5.3728	0.9164
10/12/2005	16:44:02	5.9147	64.96	-3.044	5.7045	0.9125
10/12/2005	16:44:23	6.2663	64.94	-3.029	6.0561	0.9080

10/12/2005	16:44:46	6.6397	64.94	-3.015	6.4295	0.9038
10/12/2005	16:45:09	7.0347	64.94	-3	6.8245	0.8993
10/12/2005	16:45:35	7.453	64.91	-2.985	7.2428	0.8948
10/12/2005	16:46:01	7.8963	64.91	-2.968	7.6861	0.8897
10/12/2005	16:46:29	8.3663	64.89	-2.949	8.1561	0.8840
10/12/2005	16:46:59	8.8647	64.89	-2.931	8.6545	0.8786
10/12/2005	16:47:31	9.3913	64.89	-2.913	9.1811	0.8732
10/12/2005	16:48:04	9.9497	64.87	-2.893	9.7395	0.8672
10/12/2005	16:48:40	10.5413	64.87	-2.872	10.3311	0.8609
10/12/2005	16:49:17	11.168	64.84	-2.848	10.9578	0.8537
10/12/2005	16:49:57	11.8313	64.84	-2.826	11.6211	0.8471
10/12/2005	16:50:39	12.5347	64.84	-2.801	12.3245	0.8396
10/12/2005	16:51:24	13.2797	64.82	-2.776	13.0695	0.8321
10/12/2005	16:52:12	14.0697	64.82	-2.75	13.8595	0.8243
10/12/2005	16:53:02	14.9063	64.8	-2.722	14.6961	0.8159
10/12/2005	16:53:55	15.7913	64.8	-2.694	15.5811	0.8076
10/12/2005	16:54:51	16.7297	64.78	-2.663	16.5195	0.7983
10/12/2005	16:55:51	17.723	64.78	-2.631	17.5128	0.7887
10/12/2005	16:56:54	18.7763	64.75	-2.599	18.5661	0.7791
10/12/2005	16:58:01	19.8913	64.73	-2.565	19.6811	0.7689
10/12/2005	16:59:12	21.073	64.73	-2.529	20.8628	0.7581
10/12/2005	17:00:27	22.3247	64.73	-2.492	22.1145	0.7470
10/12/2005	17:01:46	23.6497	64.71	-2.453	23.4395	0.7353
10/12/2005	17:03:11	25.0547	64.69	-2.412	24.8445	0.7230
10/12/2005	17:04:40	26.543	64.66	-2.37	26.3328	0.7104
10/12/2005	17:06:14	28.118	64.66	-2.327	27.9078	0.6975
10/12/2005	17:07:55	29.7863	64.64	-2.281	29.5761	0.6838
10/12/2005	17:09:41	31.5547	64.64	-2.234	31.3445	0.6697
10/12/2005	17:11:33	33.428	64.62	-2.184	33.2178	0.6547
10/12/2005	17:13:32	35.4113	64.62	-2.133	35.2011	0.6394
10/12/2005	17:15:38	37.513	64.6	-2.081	37.3028	0.6238
10/12/2005	17:17:52	39.7397	64.6	-2.026	39.5295	0.6073
10/12/2005	17:20:13	42.098	64.57	-1.971	41.8878	0.5908
10/12/2005	17:22:43	44.5963	64.57	-1.914	44.3861	0.5737
10/12/2005	17:25:22	47.243	64.55	-1.855	47.0328	0.5561
10/12/2005	17:28:10	50.0463	64.55	-1.795	49.8361	0.5381
10/12/2005	17:31:08	53.0147	64.53	-1.732	52.8045	0.5192
10/12/2005	17:34:17	56.1597	64.53	-1.669	55.9495	0.5003
10/12/2005	17:37:37	59.4913	64.53	-1.604	59.2811	0.4808
10/12/2005	17:41:09	63.0197	64.51	-1.539	62.8095	0.4613
10/12/2005	17:44:53	66.758	64.51	-1.472	66.5478	0.4412
10/12/2005	17:48:50	70.718	64.51	-1.404	70.5078	0.4209
10/12/2005	17:53:02	74.9113	64.51	-1.335	74.7011	0.4002
10/12/2005	17:57:29	79.3547	64.51	-1.266	79.1445	0.3795
10/12/2005	18:02:11	84.0613	64.51	-1.198	83.8511	0.3591
10/12/2005	18:07:10	89.0463	64.51	-1.129	88.8361	0.3384
10/12/2005	18:12:27	94.3263	64.51	-1.061	94.1161	0.3180
10/12/2005	18:18:03	99.9197	64.51	-0.992	99.7095	0.2974
10/12/2005	18:23:58	105.8447	64.53	-0.926	105.6345	0.2776
10/12/2005	18:30:15	112.1197	64.53	-0.861	111.9095	0.2581
10/12/2005	18:36:53	118.768	64.55	-0.797	118.5578	0.2389
10/12/2005	18:43:56	125.8097	64.55	-0.733	125.5995	0.2197
10/12/2005	18:51:23	133.268	64.57	-0.674	133.0578	0.2020
10/12/2005	18:59:17	141.168	64.6	-0.617	140.9578	0.1850
10/12/2005	19:07:40	149.5363	64.62	-0.562	149.3261	0.1685
10/12/2005	19:16:31	158.4013	64.62	-0.51	158.1911	0.1529
10/12/2005	19:25:55	167.7913	64.64	-0.462	167.5811	0.1385
10/12/2005	19:35:52	177.738	64.66	-0.418	177.5278	0.1253
10/12/2005	19:45:52	187.738	64.69	-0.378	187.5278	0.1133
10/12/2005	19:55:52	197.738	64.71	-0.344	197.5278	0.1031
10/12/2005	20:05:52	207.738	64.73	-0.316	207.5278	0.0947
10/12/2005	20:15:52	217.738	64.75	-0.291	217.5278	0.0872
10/12/2005	20:25:52	227.738	64.75	-0.27	227.5278	0.0809
10/12/2005	20:35:52	237.738	64.78	-0.252	237.5278	0.0755
10/12/2005	20:45:52	247.738	64.8	-0.236	247.5278	0.0707
10/12/2005	20:55:52	257.738	64.8	-0.223	257.5278	0.0668
10/12/2005	21:05:52	267.738	64.82	-0.211	267.5278	0.0632
10/12/2005	21:15:52	277.738	64.82	-0.201	277.5278	0.0603

10/12/2005	21:25:52	287.738	64.84	-0.192	287.5278	0.0576
10/12/2005	21:35:52	297.738	64.84	-0.184	297.5278	0.0552
10/12/2005	21:45:52	307.738	64.87	-0.179	307.5278	0.0537
10/12/2005	21:55:52	317.738	64.87	-0.173	317.5278	0.0519
10/12/2005	22:05:52	327.738	64.89	-0.168	327.5278	0.0504
10/12/2005	22:15:52	337.738	64.89	-0.161	337.5278	0.0483
10/12/2005	22:25:52	347.738	64.89	-0.157	347.5278	0.0471
10/12/2005	22:35:52	357.738	64.91	-0.152	357.5278	0.0456
10/12/2005	22:45:52	367.738	64.91	-0.15	367.5278	0.0450
10/12/2005	22:55:52	377.738	64.91	-0.146	377.5278	0.0438
10/12/2005	23:05:52	387.738	64.91	-0.142	387.5278	0.0426
10/12/2005	23:15:52	397.738	64.94	-0.141	397.5278	0.0423
10/12/2005	23:25:52	407.738	64.94	-0.136	407.5278	0.0408
10/12/2005	23:35:52	417.738	64.94	-0.133	417.5278	0.0399
10/12/2005	23:45:52	427.738	64.94	-0.131	427.5278	0.0393
10/12/2005	23:55:52	437.738	64.94	-0.127	437.5278	0.0381
10/13/2005	0:05:52	447.738	64.94	-0.124	447.5278	0.0372
10/13/2005	0:15:52	457.738	64.96	-0.122	457.5278	0.0366
10/13/2005	0:25:52	467.738	64.96	-0.118	467.5278	0.0354
10/13/2005	0:35:52	477.738	64.96	-0.115	477.5278	0.0345
10/13/2005	0:45:52	487.738	64.96	-0.115	487.5278	0.0345
10/13/2005	0:55:52	497.738	64.96	-0.111	497.5278	0.0333
10/13/2005	1:05:52	507.738	64.96	-0.109	507.5278	0.0327
10/13/2005	1:15:52	517.738	64.96	-0.106	517.5278	0.0318
10/13/2005	1:25:52	527.738	64.96	-0.105	527.5278	0.0315
10/13/2005	1:35:52	537.738	64.96	-0.103	537.5278	0.0309
10/13/2005	1:45:52	547.738	64.96	-0.101	547.5278	0.0303
10/13/2005	1:55:52	557.738	64.96	-0.099	557.5278	0.0297
10/13/2005	2:05:52	567.738	64.98	-0.098	567.5278	0.0294
10/13/2005	2:15:52	577.738	64.96	-0.097	577.5278	0.0291
10/13/2005	2:25:52	587.738	64.98	-0.096	587.5278	0.0288
10/13/2005	2:35:52	597.738	64.98	-0.093	597.5278	0.0279
10/13/2005	2:45:52	607.738	64.98	-0.092	607.5278	0.0276
10/13/2005	2:55:52	617.738	64.98	-0.091	617.5278	0.0273
10/13/2005	3:05:52	627.738	64.98	-0.089	627.5278	0.0267
10/13/2005	3:15:52	637.738	64.98	-0.088	637.5278	0.0264
10/13/2005	3:25:52	647.738	64.98	-0.088	647.5278	0.0264
10/13/2005	3:35:52	657.738	64.98	-0.085	657.5278	0.0255
10/13/2005	3:45:52	667.738	64.98	-0.085	667.5278	0.0255
10/13/2005	3:55:52	677.738	64.98	-0.085	677.5278	0.0255
10/13/2005	4:05:52	687.738	64.98	-0.084	687.5278	0.0252
10/13/2005	4:15:52	697.738	64.98	-0.084	697.5278	0.0252
10/13/2005	4:25:52	707.738	64.98	-0.083	707.5278	0.0249
10/13/2005	4:35:52	717.738	64.98	-0.084	717.5278	0.0252
10/13/2005	4:45:52	727.738	64.98	-0.083	727.5278	0.0249
10/13/2005	4:55:52	737.738	65	-0.083	737.5278	0.0249
10/13/2005	5:05:52	747.738	65	-0.084	747.5278	0.0252
10/13/2005	5:15:52	757.738	64.98	-0.084	757.5278	0.0252
10/13/2005	5:25:52	767.738	65	-0.084	767.5278	0.0252
10/13/2005	5:35:52	777.738	65	-0.084	777.5278	0.0252
10/13/2005	5:45:52	787.738	65	-0.086	787.5278	0.0258
10/13/2005	5:55:52	797.738	65	-0.087	797.5278	0.0261
10/13/2005	6:05:52	807.738	65	-0.087	807.5278	0.0261
10/13/2005	6:15:52	817.738	65	-0.087	817.5278	0.0261
10/13/2005	6:25:52	827.738	65	-0.088	827.5278	0.0264
10/13/2005	6:35:52	837.738	65	-0.09	837.5278	0.0270
10/13/2005	6:45:52	847.738	65	-0.09	847.5278	0.0270
10/13/2005	6:55:52	857.738	65	-0.091	857.5278	0.0273
10/13/2005	7:05:52	867.738	65	-0.094	867.5278	0.0282
10/13/2005	7:15:52	877.738	65	-0.094	877.5278	0.0282
10/13/2005	7:25:52	887.738	65	-0.094	887.5278	0.0282
10/13/2005	7:35:52	897.738	65	-0.095	897.5278	0.0285
10/13/2005	7:45:52	907.738	65	-0.095	907.5278	0.0285
10/13/2005	7:55:52	917.738	65	-0.095	917.5278	0.0285
10/13/2005	8:05:52	927.738	65	-0.095	927.5278	0.0285

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW030
Project No.:	N2194	**Aquifer Type:**	Silty sand.
Test Type:	Slug test, rising head.	**Test Date:**	13-Oct-05

Done By:
Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	6.30 = To

Hydraulic Conductivity (K) : 2.61

2.64E-04	ft./min.
4.40E-06	ft./sec.
3.80E-01	ft./day
1.34E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: S57 INDIAN HEAD WELL/BORING NO.: S57MW030

PROJECT NO.: 2194 GEOLOGIST: FRED W RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10 / 36.74 TPVC TEST NO.: 10-13-05

STATIC WATER LEVEL (Depth/Elevation): 5.25 TPVC DATE: 10-13-05

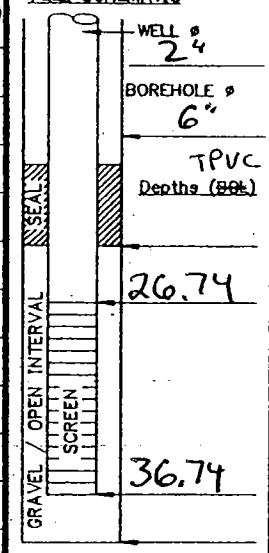
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

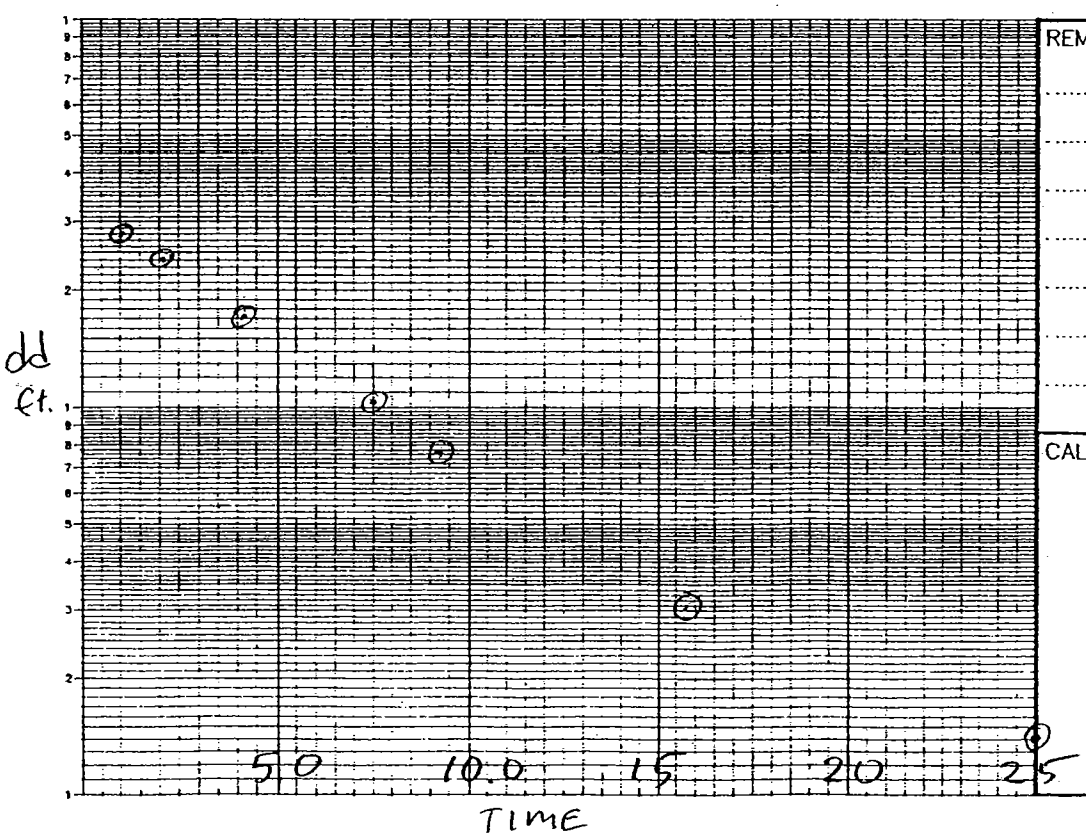
METHOD OF INDUCING WATER LEVEL CHANGE: BAILER x2 PAGE 1 OF 1

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000			
0.2498		3.265			
1.0413		2.830			
2.0847		2.400			
3.1297		2.039			
4.1813		1.727			
7.4530		1.028			
9.3913		0.757			
11.16		0.576			
15.79		0.304			
25.0547		0.142			
35.4113		0.103			

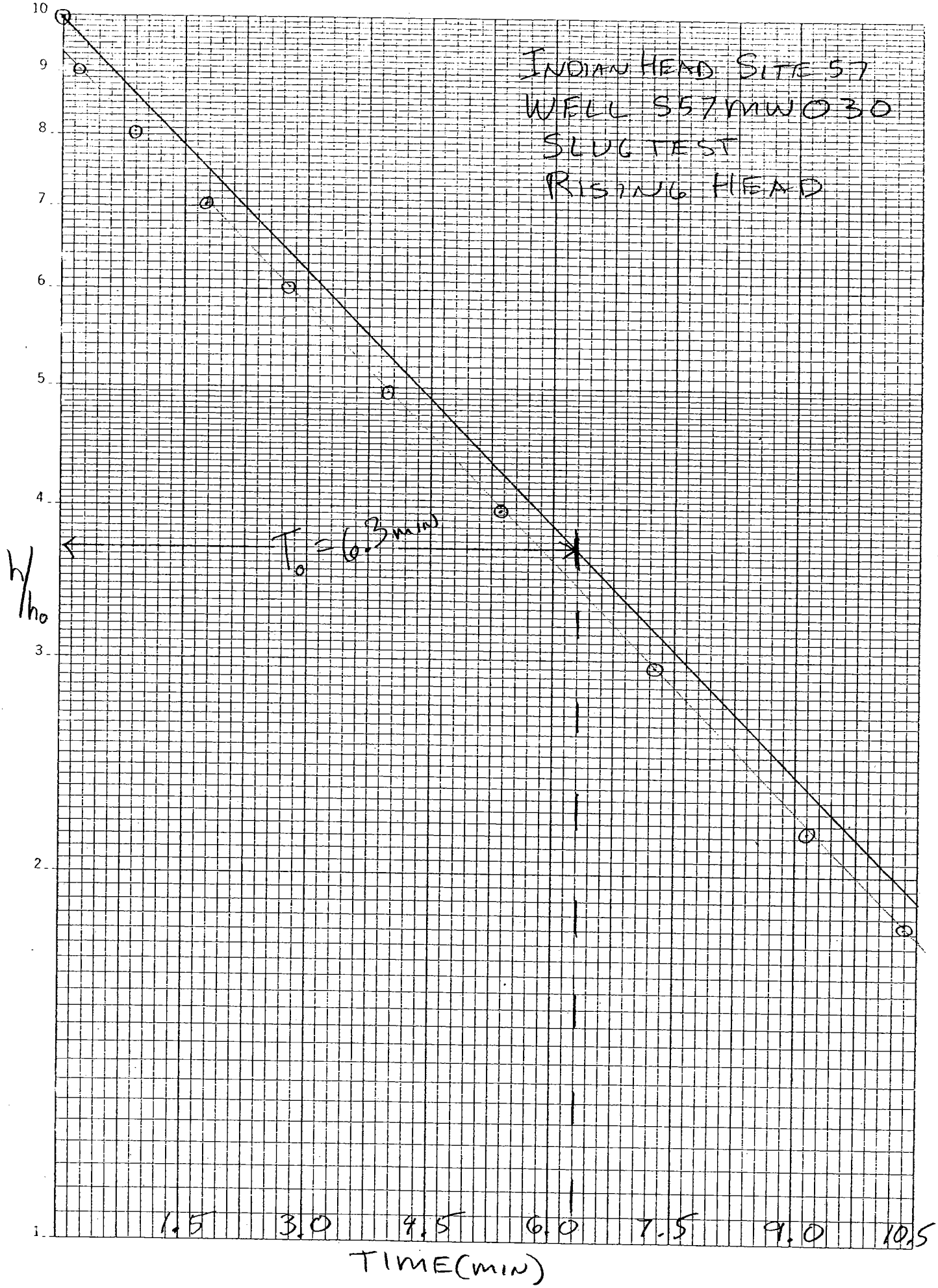
WELL SCHEMATIC





REMARKS:

CALCS, SKETCH MAPS, ETC.:



46 4550
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/20/2005 15:31:58
Report from file: ...\SN11059 2005-10-13 122019 S57MW030.bin
Win-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW030

Test defined on: 10/13/2005 11:12:40
Test started on: 10/13/2005 12:20:19
Test stopped on: 10/13/2005 13:12:10

Data gathered using Logarithmic testing
Maximum time between data p Minutes.
Number of data samples: 129

TOTAL DATA SAMPLES 129

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 12.827 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho
10/13/2005	12:20:19	0	67	0		
10/13/2005	12:20:19	0.005	67.04	0.006		
10/13/2005	12:20:20	0.01	67.04	0.009		
10/13/2005	12:20:20	0.015	67.06	0.01		
10/13/2005	12:20:20	0.02	67.06	0.01		
10/13/2005	12:20:20	0.025	67.06	0.01		
10/13/2005	12:20:21	0.03	67.06	0.011		
10/13/2005	12:20:21	0.035	67.06	0.011		
10/13/2005	12:20:21	0.04	67.09	0.009		
10/13/2005	12:20:22	0.045	67.09	0.011		
10/13/2005	12:20:22	0.05	67.09	0.012		
10/13/2005	12:20:22	0.055	67.09	0.012		
10/13/2005	12:20:23	0.06	67.09	0.012		
10/13/2005	12:20:23	0.065	67.09	0.013		
10/13/2005	12:20:23	0.07	67.09	0.013		
10/13/2005	12:20:23	0.075	67.09	0.012		
10/13/2005	12:20:24	0.08	67.09	0.012		

Plotted data

10/13/2005	12:22:57	2.6297	66.59	-2.203	2.4312	0.6341
10/13/2005	12:23:06	2.7863	66.54	-2.151	2.5878	0.6192
10/13/2005	12:23:16	2.953	66.48	-2.095	2.7545	0.6031
10/13/2005	12:23:27	3.1297	66.43	-2.039	2.9312	0.5869
10/13/2005	12:23:38	3.3163	66.39	-1.978	3.1178	0.5694
10/13/2005	12:23:50	3.5147	66.32	-1.919	3.3162	0.5524
10/13/2005	12:24:02	3.7247	66.25	-1.855	3.5262	0.5340
10/13/2005	12:24:16	3.9463	66.18	-1.792	3.7478	0.5158
10/13/2005	12:24:30	4.1813	66.11	-1.727	3.9828	0.4971
10/13/2005	12:24:45	4.4297	66.05	-1.661	4.2312	0.4781
10/13/2005	12:25:01	4.693	65.98	-1.594	4.4945	0.4588
10/13/2005	12:25:17	4.973	65.91	-1.525	4.7745	0.4390
10/13/2005	12:25:35	5.2697	65.84	-1.455	5.0712	0.4188
10/13/2005	12:25:54	5.583	65.77	-1.385	5.3845	0.3987
10/13/2005	12:26:14	5.9147	65.71	-1.314	5.7162	0.3782
10/13/2005	12:26:35	6.2663	65.64	-1.243	6.0678	0.3578
10/13/2005	12:26:57	6.6397	65.57	-1.172	6.4412	0.3374
10/13/2005	12:27:21	7.0347	65.5	-1.1	6.8362	0.3166
10/13/2005	12:27:46	7.453	65.43	-1.028	7.2545	0.2959
10/13/2005	12:28:13	7.8963	65.37	-0.959	7.6978	0.2761
10/13/2005	12:28:41	8.3663	65.32	-0.89	8.1678	0.2562
10/13/2005	12:29:11	8.8647	65.25	-0.822	8.6662	0.2366
10/13/2005	12:29:42	9.3913	65.21	-0.757	9.1928	0.2179
10/13/2005	12:30:16	9.9497	65.16	-0.693	9.7512	0.1995
10/13/2005	12:30:51	10.5413	65.12	-0.633	10.3428	0.1822
10/13/2005	12:31:29	11.168	65.07	-0.576	10.9695	0.1658
10/13/2005	12:32:09	11.8313	65.05	-0.521	11.6328	0.1500
10/13/2005	12:32:51	12.5347	65.03	-0.47	12.3362	0.1353
10/13/2005	12:33:36	13.2797	65	-0.422	13.0812	0.1215
10/13/2005	12:34:23	14.0697	64.98	-0.378	13.8712	0.1088
10/13/2005	12:35:13	14.9063	64.98	-0.339	14.7078	0.0976
10/13/2005	12:36:06	15.7913	64.98	-0.304	15.5928	0.0875
10/13/2005	12:37:03	16.7297	64.98	-0.273	16.5312	0.0786
10/13/2005	12:38:02	17.723	64.98	-0.244	17.5245	0.0702
10/13/2005	12:39:06	18.7763	65	-0.22	18.5778	0.0633
10/13/2005	12:40:12	19.8913	65.03	-0.199	19.6928	0.0573
10/13/2005	12:41:23	21.073	65.07	-0.181	20.8745	0.0521
10/13/2005	12:42:38	22.3247	65.09	-0.167	22.1262	0.0481
10/13/2005	12:43:58	23.6497	65.14	-0.153	23.4512	0.0440
10/13/2005	12:45:22	25.0547	65.18	-0.142	24.8562	0.0409
10/13/2005	12:46:52	26.543	65.23	-0.134	26.3445	0.0386
10/13/2005	12:48:26	28.118	65.28	-0.125	27.9195	0.0360
10/13/2005	12:50:06	29.7863	65.32	-0.118	29.5878	0.0340
10/13/2005	12:51:52	31.5547	65.39	-0.112	31.3562	0.0322
10/13/2005	12:53:45	33.428	65.43	-0.106	33.2295	0.0305
10/13/2005	12:55:44	35.4113	65.48	-0.103	35.2128	0.0296
10/13/2005	12:57:50	37.513	65.55	-0.098	37.3145	0.0282
10/13/2005	13:00:03	39.7397	65.59	-0.092	39.5412	0.0265
10/13/2005	13:02:25	42.098	65.66	-0.089	41.8995	0.0256
10/13/2005	13:04:55	44.5963	65.71	-0.086	44.3978	0.0248
10/13/2005	13:07:34	47.243	65.75	-0.077	47.0445	0.0222
10/13/2005	13:10:22	50.0463	65.8	-0.074	49.8478	0.0213

10/13/2005	12:20:24	0.085	67.09	0.013		
10/13/2005	12:20:24	0.09	67.09	0.012		
10/13/2005	12:20:25	0.095	67.09	0.012		
10/13/2005	12:20:25	0.1	67.09	0.012		
10/13/2005	12:20:25	0.1058	67.09	0.012		
10/13/2005	12:20:26	0.112	67.09	0.013		
10/13/2005	12:20:26	0.1185	67.11	0.013		
10/13/2005	12:20:26	0.1255	67.11	0.013		
10/13/2005	12:20:27	0.1328	67.11	-0.16		
10/13/2005	12:20:27	0.1407	67.11	-5.899		
10/13/2005	12:20:28	0.149	67.09	-2.83		
10/13/2005	12:20:28	0.1578	67.11	-4.415		
10/13/2005	12:20:29	0.1672	67.09	-3.255		
10/13/2005	12:20:30	0.177	67.06	-3.085		
10/13/2005	12:20:30	0.1875	67.06	-3.417		
10/13/2005	12:20:31	0.1985	67.06	-3.474	0.0000	1.0000
10/13/2005	12:20:32	0.2102	67.06	-3.415	0.0117	0.9830
10/13/2005	12:20:32	0.2227	67.06	-3.349	0.0242	0.9640
10/13/2005	12:20:33	0.2358	67.06	-3.301	0.0373	0.9502
10/13/2005	12:20:34	0.2498	67.06	-3.265	0.0513	0.9398
10/13/2005	12:20:35	0.2647	67.06	-3.241	0.0662	0.9329
10/13/2005	12:20:36	0.2803	67.06	-3.226	0.0818	0.9286
10/13/2005	12:20:37	0.297	67.06	-3.217	0.0985	0.9260
10/13/2005	12:20:38	0.3147	67.04	-3.201	0.1162	0.9214
10/13/2005	12:20:39	0.3333	67.04	-3.189	0.1348	0.9180
10/13/2005	12:20:40	0.3532	67.04	-3.176	0.1547	0.9142
10/13/2005	12:20:41	0.3742	67.04	-3.163	0.1757	0.9105
10/13/2005	12:20:43	0.3963	67.04	-3.149	0.1978	0.9064
10/13/2005	12:20:44	0.4198	67.04	-3.136	0.2213	0.9027
10/13/2005	12:20:46	0.4447	67.04	-3.122	0.2462	0.8987
10/13/2005	12:20:47	0.4697	67.04	-3.109	0.2712	0.8949
10/13/2005	12:20:49	0.4963	67.04	-3.094	0.2978	0.8906
10/13/2005	12:20:50	0.5247	67.04	-3.079	0.3262	0.8863
10/13/2005	12:20:52	0.5547	67.04	-3.063	0.3562	0.8817
10/13/2005	12:20:54	0.5863	67.02	-3.047	0.3878	0.8771
10/13/2005	12:20:56	0.6213	67.02	-3.029	0.4228	0.8719
10/13/2005	12:20:58	0.658	67.02	-3.011	0.4595	0.8667
10/13/2005	12:21:01	0.6963	67.02	-2.992	0.4978	0.8613
10/13/2005	12:21:03	0.738	67.02	-2.971	0.5395	0.8552
10/13/2005	12:21:06	0.7813	67	-2.95	0.5828	0.8492
10/13/2005	12:21:09	0.828	67	-2.928	0.6295	0.8428
10/13/2005	12:21:12	0.8763	67	-2.906	0.6778	0.8365
10/13/2005	12:21:15	0.928	67	-2.881	0.7295	0.8293
10/13/2005	12:21:18	0.983	66.97	-2.856	0.7845	0.8221
10/13/2005	12:21:21	1.0413	66.97	-2.83	0.8428	0.8146
10/13/2005	12:21:25	1.103	66.95	-2.802	0.9045	0.8066
10/13/2005	12:21:29	1.168	66.95	-2.774	0.9695	0.7985
10/13/2005	12:21:33	1.238	66.93	-2.742	1.0395	0.7893
10/13/2005	12:21:38	1.3113	66.93	-2.712	1.1128	0.7807
10/13/2005	12:21:42	1.3897	66.91	-2.677	1.1912	0.7706
10/13/2005	12:21:47	1.473	66.88	-2.643	1.2745	0.7608
10/13/2005	12:21:53	1.5613	66.88	-2.606	1.3628	0.7501
10/13/2005	12:21:58	1.6547	66.86	-2.568	1.4562	0.7392
10/13/2005	12:22:04	1.753	66.82	-2.528	1.5545	0.7277
10/13/2005	12:22:10	1.858	66.82	-2.487	1.6595	0.7159
10/13/2005	12:22:17	1.968	66.77	-2.444	1.7695	0.7035
10/13/2005	12:22:24	2.0847	66.75	-2.4	1.8862	0.6908
10/13/2005	12:22:32	2.2097	66.7	-2.353	2.0112	0.6773
10/13/2005	12:22:39	2.3413	66.68	-2.305	2.1428	0.6635
10/13/2005	12:22:48	2.4813	66.63	-2.256	2.2828	0.6494

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW031
Project No.:	N2194	**Aquifer Type:**	Silty sand.
Test Type:	Slug test, rising head.	**Test Date:**	13-Oct-05

Done By:

Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	1.53 = To

Hydraulic Conductivity (K) : 1.07

1.09E-03	ft./min.
1.82E-05	ft./sec.
1.57E+00	ft./day
5.54E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: SITE 57, INDIAN HEAD WELL/BORING NO.: S57MW031

PROJECT NO.: 2194 GEOLOGIST: FRED W. RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 2 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 6.14 DATE: 10-13-05

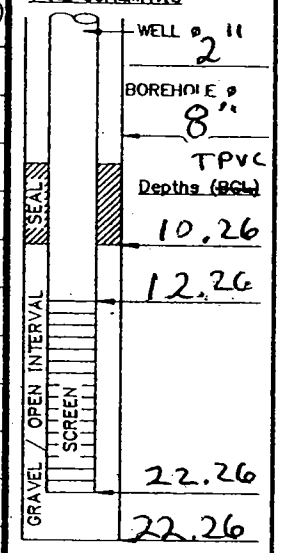
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER X2 (1 LITER) PAGE 1 OF 1

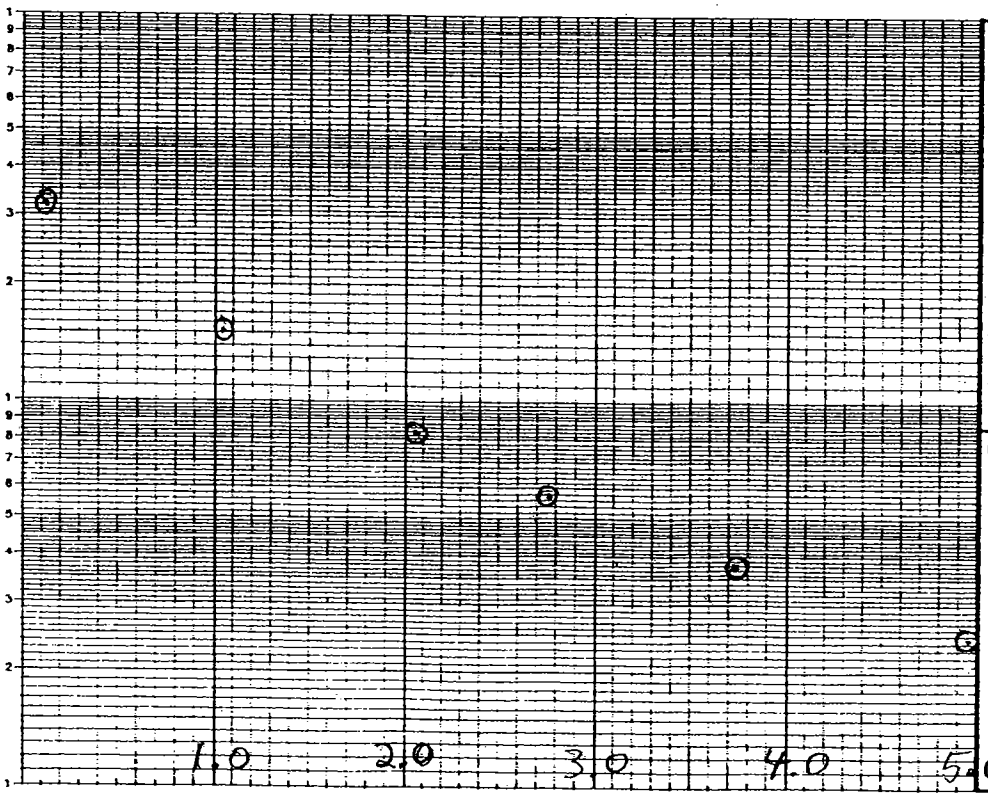
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000	7.4530		0.125
0.1120		3.242			
0.2647		2.673			
0.4963		2.202			
0.7380		1.842			
1.0413		1.501			
1.5613		1.091			
2.0847		0.818			
2.7863		0.580			
3.7247		0.386			
4.9730		0.245			
6.2663		0.166			

WELL SCHEMATIC



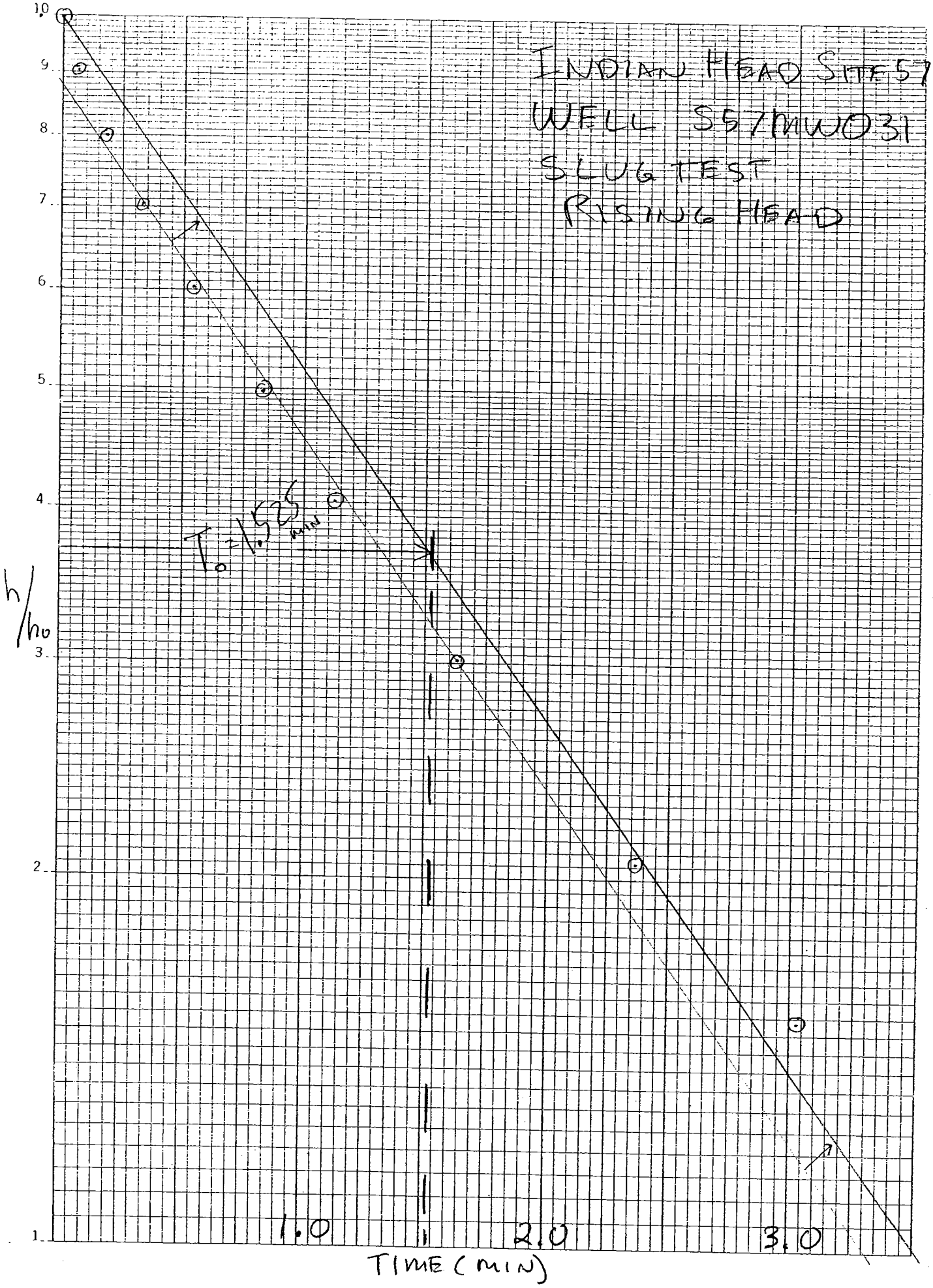
▽ Indicate SWL Depth on Drawing



REMARKS:

WATER COLUMN ABOVE X-D = 11.027

CALCS, SKETCH MAPS, ETC.:



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/20/2005 14:25:01
Report from file: ...\SN11059 2005-10-13 084423 S57MW031R.bin
Win-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW031R

Test defined on: 10/13/2005 8:29:25
Test started on: 10/13/2005 8:44:23
Test stopped on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between dat Minutes.
Number of data samples: 108

TOTAL DATA SAMPLES 108

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference: 11.024 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatur Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho	
10/13/2005	8:44:23	0	67.59	0			Plotted data
10/13/2005	8:44:24	0.005	67.63	0.006			
10/13/2005	8:44:24	0.01	67.63	0.007			
10/13/2005	8:44:24	0.015	67.65	0.008			
10/13/2005	8:44:24	0.02	67.65	0.01			
10/13/2005	8:44:25	0.025	67.65	0.01			
10/13/2005	8:44:25	0.03	67.65	0.01			
10/13/2005	8:44:25	0.035	67.65	0.01			
10/13/2005	8:44:26	0.04	67.68	0.011			
10/13/2005	8:44:26	0.045	67.68	0.011			
10/13/2005	8:44:26	0.05	67.68	0.011			
10/13/2005	8:44:27	0.055	67.68	0.011			
10/13/2005	8:44:27	0.06	67.68	0.013			
10/13/2005	8:44:27	0.065	67.68	0.012			
10/13/2005	8:44:27	0.07	67.68	0.012			
10/13/2005	8:44:28	0.075	67.68	0.012			
10/13/2005	8:44:28	0.08	67.68	-2.571			

10/13/2005	8:44:28	0.085	67.68	-6.691		
10/13/2005	8:44:29	0.09	67.68	-4.78		
10/13/2005	8:44:29	0.095	67.68	-4.772		
10/13/2005	8:44:29	0.1	67.68	-3.29		
10/13/2005	8:44:30	0.1058	67.68	-3.342		
10/13/2005	8:44:30	0.112	67.68	-3.242	0.0000	1.0000
10/13/2005	8:44:30	0.1185	67.68	-3.213	0.0065	0.9911
10/13/2005	8:44:31	0.1255	67.68	-3.165	0.0135	0.9762
10/13/2005	8:44:31	0.1328	67.68	-3.116	0.0208	0.9611
10/13/2005	8:44:32	0.1407	67.68	-3.08	0.0287	0.9500
10/13/2005	8:44:32	0.149	67.68	-3.038	0.0370	0.9371
10/13/2005	8:44:33	0.1578	67.68	-2.998	0.0458	0.9247
10/13/2005	8:44:33	0.1672	67.68	-2.966	0.0552	0.9149
10/13/2005	8:44:34	0.177	67.65	-2.928	0.0650	0.9031
10/13/2005	8:44:34	0.1875	67.65	-2.89	0.0755	0.8914
10/13/2005	8:44:35	0.1985	67.65	-2.854	0.0865	0.8803
10/13/2005	8:44:36	0.2102	67.65	-2.82	0.0982	0.8698
10/13/2005	8:44:37	0.2227	67.65	-2.783	0.1107	0.8584
10/13/2005	8:44:37	0.2358	67.65	-2.747	0.1238	0.8473
10/13/2005	8:44:38	0.2498	67.65	-2.71	0.1378	0.8359
10/13/2005	8:44:39	0.2647	67.65	-2.673	0.1527	0.8245
10/13/2005	8:44:40	0.2803	67.65	-2.634	0.1683	0.8125
10/13/2005	8:44:41	0.297	67.63	-2.594	0.1850	0.8001
10/13/2005	8:44:42	0.3147	67.63	-2.554	0.2027	0.7878
10/13/2005	8:44:43	0.3333	67.63	-2.513	0.2213	0.7751
10/13/2005	8:44:44	0.3532	67.63	-2.47	0.2412	0.7619
10/13/2005	8:44:46	0.3742	67.63	-2.427	0.2622	0.7486
10/13/2005	8:44:47	0.3963	67.63	-2.384	0.2843	0.7353
10/13/2005	8:44:48	0.4198	67.63	-2.338	0.3078	0.7212
10/13/2005	8:44:50	0.4447	67.63	-2.293	0.3327	0.7073
10/13/2005	8:44:51	0.4697	67.63	-2.248	0.3577	0.6934
10/13/2005	8:44:53	0.4963	67.63	-2.202	0.3843	0.6792
10/13/2005	8:44:55	0.5247	67.63	-2.155	0.4127	0.6647
10/13/2005	8:44:57	0.5547	67.63	-2.106	0.4427	0.6496
10/13/2005	8:44:58	0.5863	67.63	-2.057	0.4743	0.6345
10/13/2005	8:45:01	0.6213	67.63	-2.003	0.5093	0.6178
10/13/2005	8:45:03	0.658	67.63	-1.951	0.5460	0.6018
10/13/2005	8:45:05	0.6963	67.63	-1.898	0.5843	0.5854
10/13/2005	8:45:08	0.738	67.63	-1.842	0.6260	0.5682
10/13/2005	8:45:10	0.7813	67.63	-1.787	0.6693	0.5512
10/13/2005	8:45:13	0.828	67.63	-1.731	0.7160	0.5339
10/13/2005	8:45:16	0.8763	67.63	-1.673	0.7643	0.5160
10/13/2005	8:45:19	0.928	67.61	-1.617	0.8160	0.4988
10/13/2005	8:45:22	0.983	67.61	-1.558	0.8710	0.4806
10/13/2005	8:45:26	1.0413	67.61	-1.501	0.9293	0.4630
10/13/2005	8:45:29	1.103	67.61	-1.441	0.9910	0.4445
10/13/2005	8:45:33	1.168	67.61	-1.384	1.0560	0.4269
10/13/2005	8:45:38	1.238	67.61	-1.324	1.1260	0.4084
10/13/2005	8:45:42	1.3113	67.59	-1.266	1.1993	0.3905
10/13/2005	8:45:47	1.3897	67.59	-1.207	1.2777	0.3723
10/13/2005	8:45:52	1.473	67.56	-1.148	1.3610	0.3541
10/13/2005	8:45:57	1.5613	67.56	-1.091	1.4493	0.3365
10/13/2005	8:46:03	1.6547	67.56	-1.035	1.5427	0.3192
10/13/2005	8:46:08	1.753	67.54	-0.979	1.6410	0.3020
10/13/2005	8:46:15	1.858	67.54	-0.924	1.7460	0.2850
10/13/2005	8:46:21	1.968	67.52	-0.87	1.8560	0.2684
10/13/2005	8:46:28	2.0847	67.52	-0.818	1.9727	0.2523
10/13/2005	8:46:36	2.2097	67.49	-0.767	2.0977	0.2366
10/13/2005	8:46:44	2.3413	67.49	-0.717	2.2293	0.2212
10/13/2005	8:46:52	2.4813	67.47	-0.67	2.3693	0.2067

10/13/2005	8:47:01	2.6297	67.47	-0.623	2.5177	0.1922
10/13/2005	8:47:10	2.7863	67.45	-0.58	2.6743	0.1789
10/13/2005	8:47:20	2.953	67.43	-0.537	2.8410	0.1656
10/13/2005	8:47:31	3.1297	67.43	-0.496	3.0177	0.1530
10/13/2005	8:47:42	3.3163	67.4	-0.458	3.2043	0.1413
10/13/2005	8:47:54	3.5147	67.4	-0.422	3.4027	0.1302
10/13/2005	8:48:07	3.7247	67.38	-0.386	3.6127	0.1191
10/13/2005	8:48:20	3.9463	67.38	-0.355	3.8343	0.1095
10/13/2005	8:48:34	4.1813	67.36	-0.323	4.0693	0.0996
10/13/2005	8:48:49	4.4297	67.36	-0.296	4.3177	0.0913
10/13/2005	8:49:05	4.693	67.36	-0.27	4.5810	0.0833
10/13/2005	8:49:22	4.973	67.36	-0.245	4.8610	0.0756
10/13/2005	8:49:39	5.2697	67.34	-0.223	5.1577	0.0688
10/13/2005	8:49:58	5.583	67.34	-0.202	5.4710	0.0623
10/13/2005	8:50:18	5.9147	67.34	-0.183	5.8027	0.0564
10/13/2005	8:50:39	6.2663	67.34	-0.166	6.1543	0.0512
10/13/2005	8:51:02	6.6397	67.34	-0.151	6.5277	0.0466
10/13/2005	8:51:25	7.0347	67.36	-0.137	6.9227	0.0423
10/13/2005	8:51:50	7.453	67.36	-0.125	7.3410	0.0386
10/13/2005	8:52:17	7.8963	67.36	-0.113	7.7843	0.0349
10/13/2005	8:52:45	8.3663	67.38	-0.102	8.2543	0.0315
10/13/2005	8:53:15	8.8647	67.38	-0.094	8.7527	0.0290
10/13/2005	8:53:47	9.3913	67.4	-0.086	9.2793	0.0265
10/13/2005	8:54:20	9.9497	67.38	-0.078	9.8377	0.0241
10/13/2005	8:54:56	10.5413	67.4	-0.072	10.4293	0.0222
10/13/2005	8:55:33	11.168	67.47	-0.065	11.0560	0.0200
10/13/2005	8:56:13	11.8313	67.54	-0.061	11.7193	0.0188
10/13/2005	8:56:55	12.5347	67.59	-0.057	12.4227	0.0176
10/13/2005	8:57:40	13.2797	67.63	-0.054	13.1677	0.0167
10/13/2005	8:58:27	14.0697	67.59	-0.051	13.9577	0.0157
10/13/2005	8:59:18	14.9063	67.56	-0.048	14.7943	0.0148

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW032
Project No.:	N2194	**Aquifer Type:**	Sand and gravel.
Test Type:	Slug test, rising head.	**Test Date:**	12-Oct-05

Done By:
Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	0.255 = To

Hydraulic Conductivity (K) : 6.47

6.52E-03	ft./min.
1.09E-04	ft./sec.
9.39E+00	ft./day
3.31E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: SITE 57, INDIAN HEAD WELL/BORING NO.: S57MW032

PROJECT NO.: 2194 GEOLOGIST: FRED W RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 17.95 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 5.20 / DATE: 10-12-05

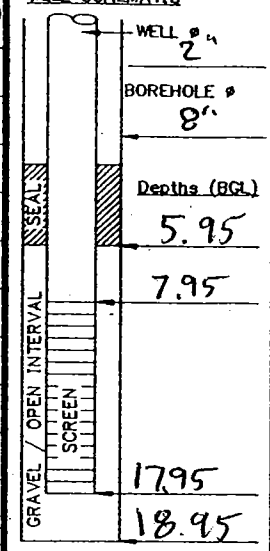
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: S.S. BAILER x 2 PAGE 1 OF 1

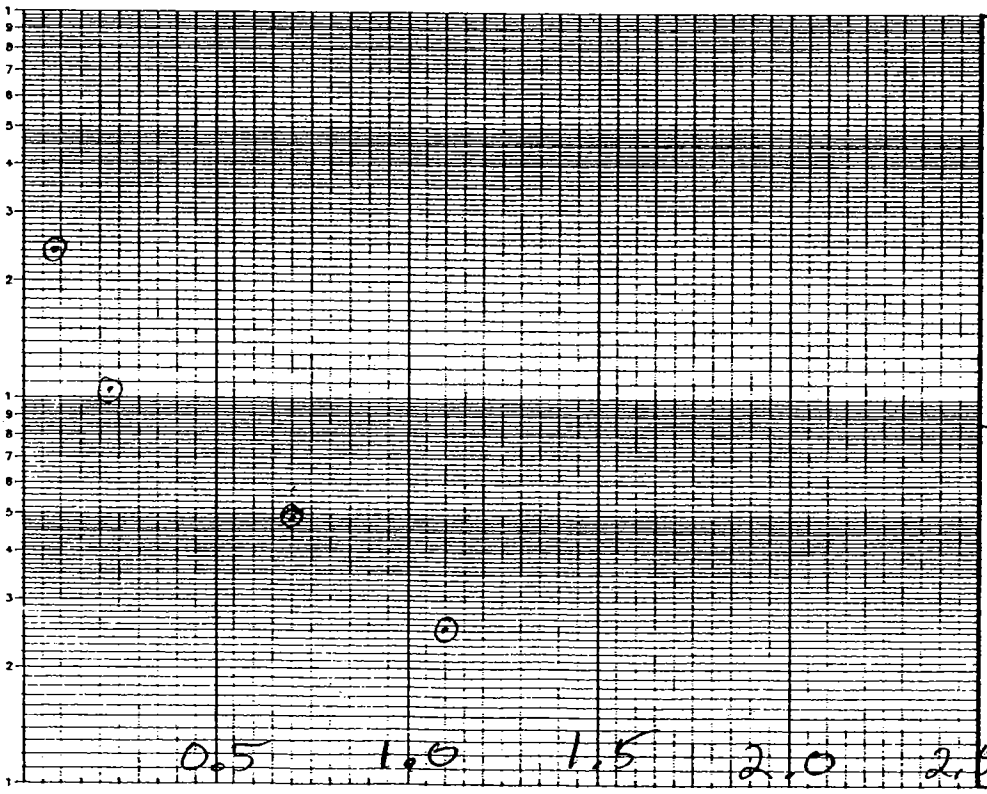
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE WATER

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.013			
0.09		2.482			
0.1490		1.514			
0.2227		1.050			
0.3532		0.697			
0.5247		0.486			
0.7813		0.340			
1.1030		0.253			
1.5613		0.208			
2.2097		0.171			
3.3163		0.133			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

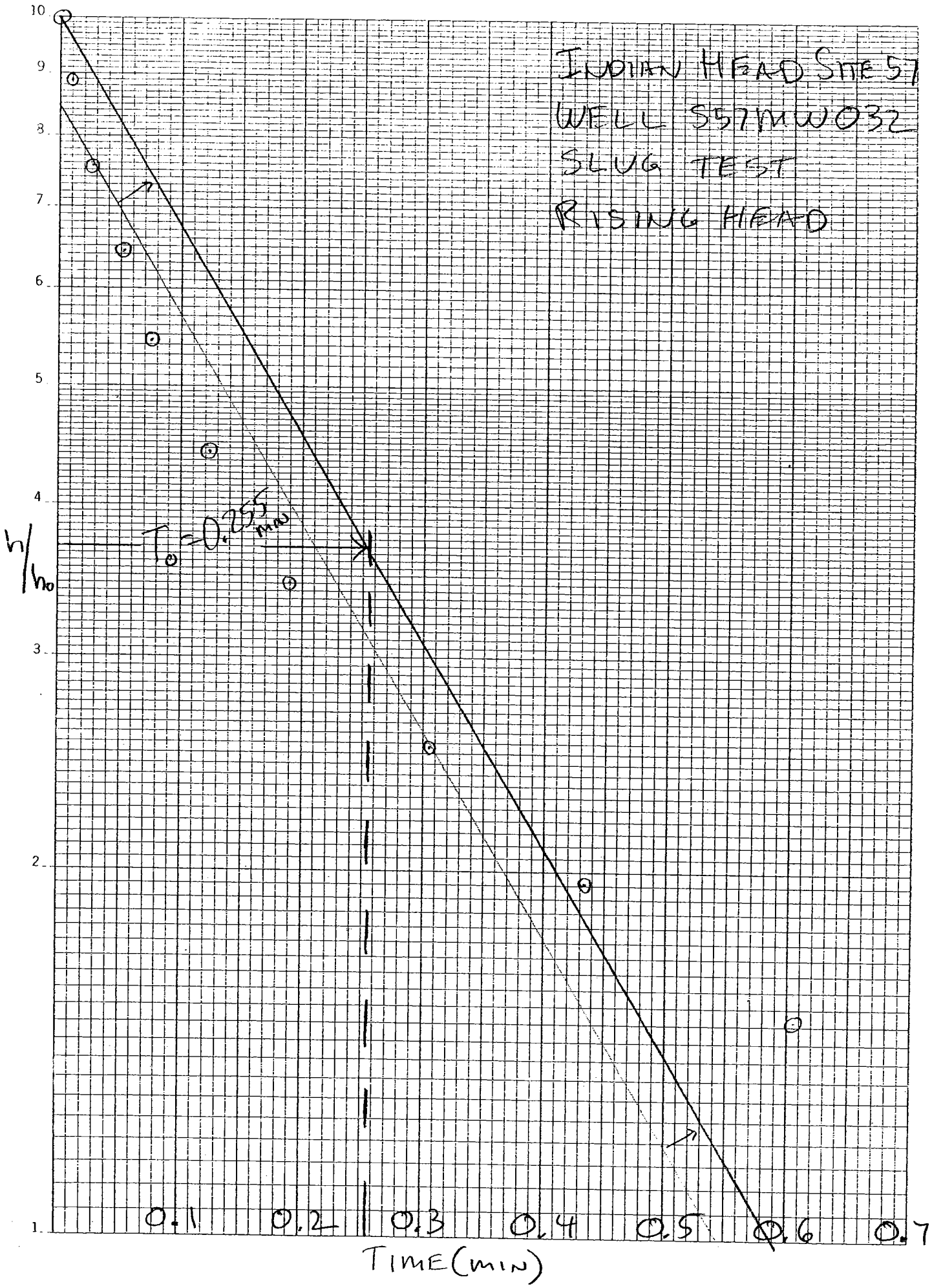


REMARKS:

WATER COL 12.219

INSERTED BAILERS 1425

CALCS, SKETCH MAPS, ETC.:



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/20/2005 13:41:51
Report from file: ...\SN11059 2005-10-12 144109 S57MW032R.bin
Win-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW032R

Test defined on: 10/12/2005 14:27:34
Test started on: 10/12/2005 14:41:09
Test stopped on: 10/12/2005 14:51:47

Data gathered using Logarithmic testing
Maximum time betw Minutes.
Number of data san 102

TOTAL DATA SAMPL 102

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined referer 0 Feet H2O
Referenced on: test start
Pressure head at ref 12.233 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho	
10/12/2005	14:41:09	0	68.08	0			Plotted data
10/12/2005	14:41:10	0.005	68.13	0.007			
10/12/2005	14:41:10	0.01	68.15	0.01			
10/12/2005	14:41:10	0.015	68.15	0.01			
10/12/2005	14:41:10	0.02	68.15	0.011			
10/12/2005	14:41:11	0.025	68.17	0.012			
10/12/2005	14:41:11	0.03	68.17	0.012			
10/12/2005	14:41:11	0.035	68.17	0.013			
10/12/2005	14:41:12	0.04	68.17	0.013			
10/12/2005	14:41:12	0.045	68.17	0.013			
10/12/2005	14:41:12	0.05	68.17	0.013			
10/12/2005	14:41:13	0.055	68.17	0.015			
10/12/2005	14:41:13	0.06	68.17	0.013			
10/12/2005	14:41:13	0.065	68.17	0.013			
10/12/2005	14:41:13	0.07	68.17	-0.215			
10/12/2005	14:41:14	0.075	68.17	-4.679			
10/12/2005	14:41:14	0.08	68.17	-4.125			

10/12/2005	14:41:14	0.085	68.17	-2.409		
10/12/2005	14:41:15	0.09	68.17	-2.482	0	1.0000
10/12/2005	14:41:15	0.095	68.17	-2.348	0.005	0.9460
10/12/2005	14:41:15	0.1	68.17	-2.195	0.01	0.8844
10/12/2005	14:41:16	0.1058	68.17	-2.093	0.0158	0.8433
10/12/2005	14:41:16	0.112	68.17	-1.994	0.022	0.8034
10/12/2005	14:41:16	0.1185	68.2	-1.879	0.0285	0.7571
10/12/2005	14:41:17	0.1255	68.17	-1.779	0.0355	0.7168
10/12/2005	14:41:17	0.1328	68.17	-1.684	0.0428	0.6785
10/12/2005	14:41:18	0.1407	68.17	-1.601	0.0507	0.6450
10/12/2005	14:41:18	0.149	68.2	-1.514	0.059	0.6100
10/12/2005	14:41:19	0.1578	68.2	-1.434	0.0678	0.5778
10/12/2005	14:41:19	0.1672	68.17	-1.362	0.0772	0.5488
10/12/2005	14:41:20	0.177	68.15	-1.293	0.087	0.5210
10/12/2005	14:41:21	0.1875	68.15	-1.227	0.0975	0.4944
10/12/2005	14:41:21	0.1985	68.15	-1.164	0.1085	0.4690
10/12/2005	14:41:22	0.2102	68.15	-1.106	0.1202	0.4456
10/12/2005	14:41:23	0.2227	68.15	-1.05	0.1327	0.4230
10/12/2005	14:41:23	0.2358	68.15	-0.998	0.1458	0.4021
10/12/2005	14:41:24	0.2498	68.15	-0.948	0.1598	0.3820
10/12/2005	14:41:25	0.2647	68.15	-0.902	0.1747	0.3634
10/12/2005	14:41:26	0.2803	68.15	-0.857	0.1903	0.3453
10/12/2005	14:41:27	0.297	68.15	-0.814	0.207	0.3280
10/12/2005	14:41:28	0.3147	68.15	-0.773	0.2247	0.3114
10/12/2005	14:41:29	0.3333	68.15	-0.735	0.2433	0.2961
10/12/2005	14:41:30	0.3532	68.15	-0.697	0.2632	0.2808
10/12/2005	14:41:32	0.3742	68.15	-0.662	0.2842	0.2667
10/12/2005	14:41:33	0.3963	68.15	-0.629	0.3063	0.2534
10/12/2005	14:41:34	0.4198	68.15	-0.597	0.3298	0.2405
10/12/2005	14:41:36	0.4447	68.15	-0.567	0.3547	0.2284
10/12/2005	14:41:37	0.4697	68.15	-0.539	0.3797	0.2172
10/12/2005	14:41:39	0.4963	68.13	-0.512	0.4063	0.2063
10/12/2005	14:41:41	0.5247	68.15	-0.486	0.4347	0.1958
10/12/2005	14:41:43	0.5547	68.15	-0.462	0.4647	0.1861
10/12/2005	14:41:44	0.5863	68.13	-0.439	0.4963	0.1769
10/12/2005	14:41:47	0.6213	68.15	-0.417	0.5313	0.1680
10/12/2005	14:41:49	0.658	68.15	-0.396	0.568	0.1595
10/12/2005	14:41:51	0.6963	68.15	-0.378	0.6063	0.1523
10/12/2005	14:41:54	0.738	68.15	-0.358	0.648	0.1442
10/12/2005	14:41:56	0.7813	68.15	-0.34	0.6913	0.1370
10/12/2005	14:41:59	0.828	68.15	-0.323	0.738	0.1301
10/12/2005	14:42:02	0.8763	68.15	-0.307	0.7863	0.1237
10/12/2005	14:42:05	0.928	68.15	-0.293	0.838	0.1180
10/12/2005	14:42:08	0.983	68.15	-0.278	0.893	0.1120
10/12/2005	14:42:12	1.0413	68.17	-0.264	0.9513	0.1064
10/12/2005	14:42:15	1.103	68.17	-0.253	1.013	0.1019
10/12/2005	14:42:19	1.168	68.17	-0.241	1.078	0.0971
10/12/2005	14:42:24	1.238	68.17	-0.231	1.148	0.0931
10/12/2005	14:42:28	1.3113	68.17	-0.225	1.2213	0.0907
10/12/2005	14:42:33	1.3897	68.17	-0.223	1.2997	0.0898
10/12/2005	14:42:38	1.473	68.17	-0.215	1.383	0.0866
10/12/2005	14:42:43	1.5613	68.17	-0.208	1.4713	0.0838
10/12/2005	14:42:49	1.6547	68.17	-0.201	1.5647	0.0810
10/12/2005	14:42:54	1.753	68.17	-0.195	1.663	0.0786
10/12/2005	14:43:01	1.858	68.17	-0.189	1.768	0.0761
10/12/2005	14:43:07	1.968	68.17	-0.182	1.878	0.0733
10/12/2005	14:43:14	2.0847	68.17	-0.176	1.9947	0.0709
10/12/2005	14:43:22	2.2097	68.17	-0.171	2.1197	0.0689
10/12/2005	14:43:30	2.3413	68.2	-0.164	2.2513	0.0661
10/12/2005	14:43:38	2.4813	68.2	-0.158	2.3913	0.0637

10/12/2005	14:43:47	2.6297	68.22	-0.154	2.5397	0.0620
10/12/2005	14:43:56	2.7863	68.22	-0.155	2.6963	0.0624
10/12/2005	14:44:06	2.953	68.24	-0.149	2.863	0.0600
10/12/2005	14:44:17	3.1297	68.29	-0.141	3.0397	0.0568
10/12/2005	14:44:28	3.3163	68.33	-0.133	3.2263	0.0536
10/12/2005	14:44:40	3.5147	68.4	-0.124	3.4247	0.0500
10/12/2005	14:44:53	3.7247	68.45	-0.119	3.6347	0.0479
10/12/2005	14:45:06	3.9463	68.51	-0.113	3.8563	0.0455
10/12/2005	14:45:20	4.1813	68.58	-0.109	4.0913	0.0439
10/12/2005	14:45:35	4.4297	68.63	-0.104	4.3397	0.0419
10/12/2005	14:45:51	4.693	68.67	-0.101	4.603	0.0407
10/12/2005	14:46:08	4.973	68.69	-0.099	4.883	0.0399
10/12/2005	14:46:25	5.2697	68.72	-0.095	5.1797	0.0383
10/12/2005	14:46:44	5.583	68.74	-0.091	5.493	0.0367
10/12/2005	14:47:04	5.9147	68.74	-0.089	5.8247	0.0359
10/12/2005	14:47:25	6.2663	68.76	-0.086	6.1763	0.0346
10/12/2005	14:47:48	6.6397	68.74	-0.085	6.5497	0.0342
10/12/2005	14:48:11	7.0347	68.74	-0.082	6.9447	0.0330
10/12/2005	14:48:36	7.453	68.76	-0.08	7.363	0.0322
10/12/2005	14:49:03	7.8963	68.76	-0.079	7.8063	0.0318
10/12/2005	14:49:31	8.3663	68.81	-0.077	8.2763	0.0310
10/12/2005	14:50:01	8.8647	68.85	-0.074	8.7747	0.0298
10/12/2005	14:50:33	9.3913	68.85	-0.072	9.3013	0.0290
10/12/2005	14:51:06	9.9497	68.88	-0.071	9.8597	0.0286
10/12/2005	14:51:42	10.5413	68.9	-0.07	10.4513	0.0282

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW033
Project No.:	N2194	**Aquifer Type:**	Sand and gravel.
Test Type:	Slug test, rising head.	**Test Date:**	13-Oct-05

Done By:
Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	0.525 = To

Hydraulic Conductivity (K) : 3.14

3.17E-03	ft./min.
5.28E-05	ft./sec.
4.56E+00	ft./day
1.61E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: SITE 57, INDIAN HEAD WELL/BORING NO.: 557MW033

PROJECT NO.: 2194 GEOLOGIST: FREDWRAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10 / 18.72 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 5.89 DATE: 10-13-05

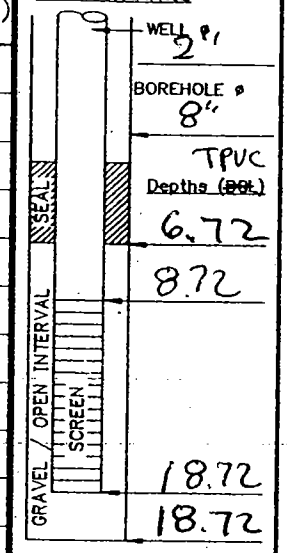
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER (1 l) x 2 PAGE 1 OF 1

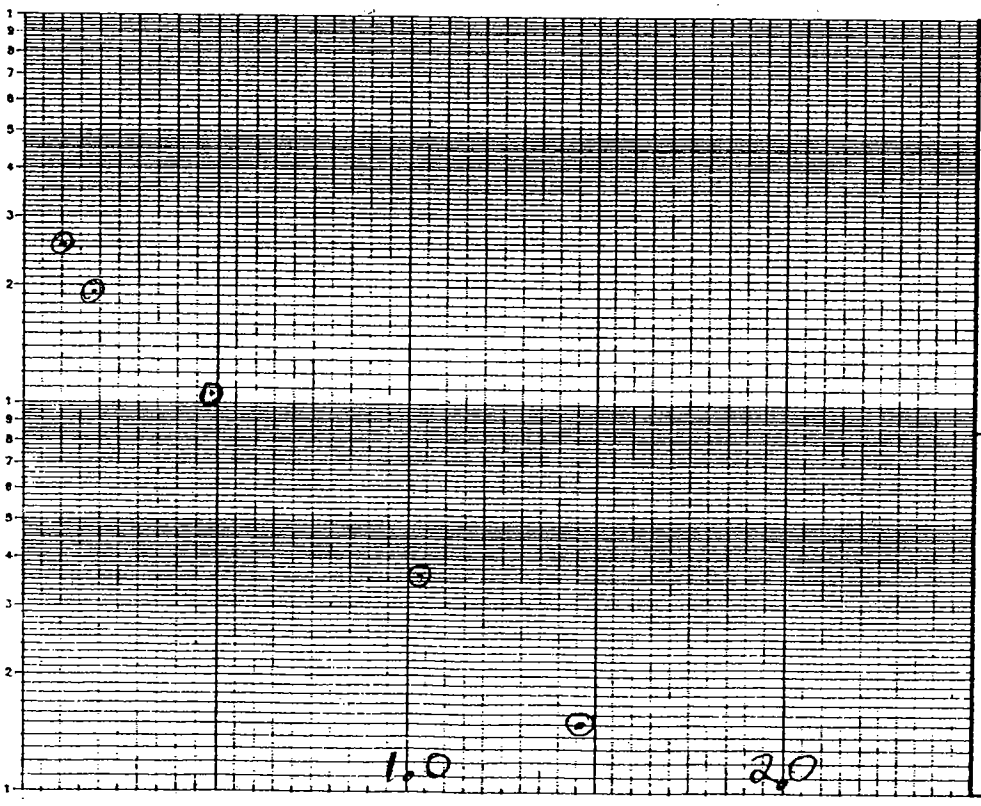
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE (GW)

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000			
0.1058		2.588			
0.1875		1.912			
0.3532		1.389			
0.4963		1.059			
0.7380		0.667			
1.0413		0.367			
1.4730		0.152			

WELL SCHEMATIC



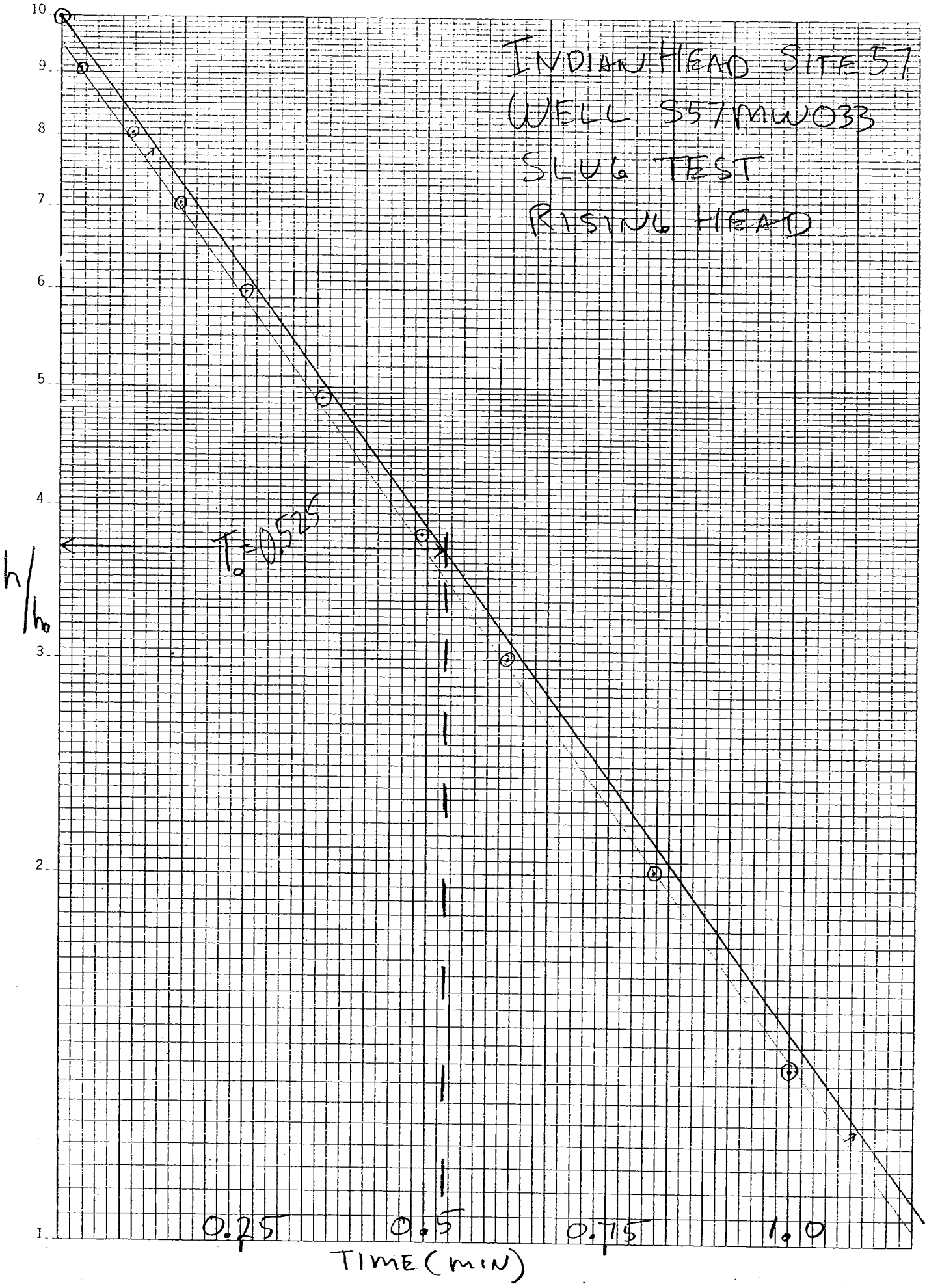
▽ Indicate SWL Depth on Drawing



REMARKS:

WATER COLUMN XD = 11.75'

CALCS, SKETCH MAPS, ETC.:


INDIAN HEAD SITE 57
WELL S57MW033
SLUG TEST
RISING HEAD
$T_0 = 0.525$
h/h₀
10
9
8
7
6
5
4
3
2
1
0.25
0.5
0.75
1.0
TIME (MIN)
46 4050
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/20/2005 14:37:10
Report from file: ...\SN11059 2005-10-13 094334 S57MW33R.bin
Win-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW33R

Test defined on: 10/13/2005 9:24:52
Test started on: 10/13/2005 9:43:34
Test stopped on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between Minutes.
Number of data samples 111

TOTAL DATA SAMPLES 111

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at referen 11.762 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho	
10/13/2005	9:43:34	0	65.93	0			Plotted data
10/13/2005	9:43:34	0.005	65.98	0.007			
10/13/2005	9:43:34	0.01	66	0.008			
10/13/2005	9:43:35	0.015	66	0.01			
10/13/2005	9:43:35	0.02	66	0.011			
10/13/2005	9:43:35	0.025	66.02	0.011			
10/13/2005	9:43:36	0.03	66.02	0.011			
10/13/2005	9:43:36	0.035	66.02	0.012			
10/13/2005	9:43:36	0.04	66.02	0.012			
10/13/2005	9:43:37	0.045	66.02	0.012			
10/13/2005	9:43:37	0.05	66.02	0.012			
10/13/2005	9:43:37	0.055	66.02	0.013			
10/13/2005	9:43:37	0.06	66.02	0.012			
10/13/2005	9:43:38	0.065	66.02	0.013			
10/13/2005	9:43:38	0.07	66.02	0.012			
10/13/2005	9:43:38	0.075	66.02	-0.287			
10/13/2005	9:43:39	0.08	66.02	-3.42			

10/13/2005	9:43:39	0.085	66.02	-4.546		
10/13/2005	9:43:39	0.09	66.02	-3.904		
10/13/2005	9:43:40	0.095	66.02	-1.506		
10/13/2005	9:43:40	0.1	66.02	-2.42		
10/13/2005	9:43:40	0.1058	66.02	-2.588		
10/13/2005	9:43:41	0.112	66.02	-2.201		
10/13/2005	9:43:41	0.1185	66.05	-2.321		
10/13/2005	9:43:41	0.1255	66.05	-2.337		
10/13/2005	9:43:42	0.1328	66.02	-2.043		
10/13/2005	9:43:42	0.1407	66.02	-2.314		
10/13/2005	9:43:43	0.149	66.05	-2.078		
10/13/2005	9:43:43	0.1578	66.05	-1.998		
10/13/2005	9:43:44	0.1672	66.02	-2.043	0.0000	1.0000
10/13/2005	9:43:44	0.177	66.02	-1.991	0.0098	0.9745
10/13/2005	9:43:45	0.1875	66	-1.912	0.0203	0.9359
10/13/2005	9:43:46	0.1985	66	-1.858	0.0313	0.9094
10/13/2005	9:43:46	0.2102	66	-1.817	0.0430	0.8894
10/13/2005	9:43:47	0.2227	66	-1.775	0.0555	0.8688
10/13/2005	9:43:48	0.2358	66	-1.734	0.0686	0.8488
10/13/2005	9:43:49	0.2498	66	-1.687	0.0826	0.8257
10/13/2005	9:43:50	0.2647	66	-1.64	0.0975	0.8027
10/13/2005	9:43:51	0.2803	66	-1.592	0.1131	0.7792
10/13/2005	9:43:52	0.297	65.98	-1.542	0.1298	0.7548
10/13/2005	9:43:53	0.3147	65.98	-1.49	0.1475	0.7293
10/13/2005	9:43:54	0.3333	65.98	-1.441	0.1661	0.7053
10/13/2005	9:43:55	0.3532	66	-1.389	0.1860	0.6799
10/13/2005	9:43:56	0.3742	65.98	-1.334	0.2070	0.6530
10/13/2005	9:43:58	0.3963	65.98	-1.28	0.2291	0.6265
10/13/2005	9:43:59	0.4198	65.98	-1.225	0.2526	0.5996
10/13/2005	9:44:01	0.4447	65.98	-1.169	0.2775	0.5722
10/13/2005	9:44:02	0.4697	65.98	-1.114	0.3025	0.5453
10/13/2005	9:44:04	0.4963	65.98	-1.059	0.3291	0.5184
10/13/2005	9:44:05	0.5247	66	-1.003	0.3575	0.4909
10/13/2005	9:44:07	0.5547	66	-0.947	0.3875	0.4635
10/13/2005	9:44:09	0.5863	66	-0.891	0.4191	0.4361
10/13/2005	9:44:11	0.6213	66	-0.833	0.4541	0.4077
10/13/2005	9:44:13	0.658	66	-0.777	0.4908	0.3803
10/13/2005	9:44:16	0.6963	66	-0.722	0.5291	0.3534
10/13/2005	9:44:18	0.738	66	-0.667	0.5708	0.3265
10/13/2005	9:44:21	0.7813	66.02	-0.613	0.6141	0.3000
10/13/2005	9:44:24	0.828	66.02	-0.559	0.6608	0.2736
10/13/2005	9:44:26	0.8763	66.02	-0.508	0.7091	0.2487
10/13/2005	9:44:30	0.928	66.02	-0.46	0.7608	0.2252
10/13/2005	9:44:33	0.983	66.02	-0.413	0.8158	0.2022
10/13/2005	9:44:36	1.0413	66.02	-0.367	0.8741	0.1796
10/13/2005	9:44:40	1.103	66.02	-0.323	0.9358	0.1581
10/13/2005	9:44:44	1.168	66.02	-0.284	1.0008	0.1390
10/13/2005	9:44:48	1.238	66.02	-0.246	1.0708	0.1204
10/13/2005	9:44:53	1.3113	66.02	-0.211	1.1441	0.1033
10/13/2005	9:44:57	1.3897	66.02	-0.181	1.2225	0.0886
10/13/2005	9:45:02	1.473	66.02	-0.152	1.3058	0.0744
10/13/2005	9:45:08	1.5613	66.02	-0.128	1.3941	0.0627
10/13/2005	9:45:13	1.6547	66.02	-0.107	1.4875	0.0524
10/13/2005	9:45:19	1.753	66.02	-0.088	1.5858	0.0431
10/13/2005	9:45:25	1.858	66.02	-0.071	1.6908	0.0348
10/13/2005	9:45:32	1.968	66.02	-0.06	1.8008	0.0294
10/13/2005	9:45:39	2.0847	66	-0.048	1.9175	0.0235
10/13/2005	9:45:46	2.2097	66	-0.04	2.0425	0.0196
10/13/2005	9:45:54	2.3413	66	-0.032	2.1741	0.0157
10/13/2005	9:46:03	2.4813	66	-0.027	2.3141	0.0132

10/13/2005	9:46:12	2.6297	65.98	-0.023	2.4625	0.0113
10/13/2005	9:46:21	2.7863	65.98	-0.02	2.6191	0.0098
10/13/2005	9:46:31	2.953	65.98	-0.019	2.7858	0.0093
10/13/2005	9:46:42	3.1297	65.98	-0.017	2.9625	0.0083
10/13/2005	9:46:53	3.3163	65.98	-0.016	3.1491	0.0078
10/13/2005	9:47:05	3.5147	65.98	-0.014	3.3475	0.0069
10/13/2005	9:47:17	3.7247	65.98	-0.014	3.5575	0.0069
10/13/2005	9:47:31	3.9463	66	-0.011	3.7791	0.0054
10/13/2005	9:47:45	4.1813	66	-0.011	4.0141	0.0054
10/13/2005	9:48:00	4.4297	66.02	-0.01	4.2625	0.0049
10/13/2005	9:48:15	4.693	66.05	-0.01	4.5258	0.0049
10/13/2005	9:48:32	4.973	66.09	-0.011	4.8058	0.0054
10/13/2005	9:48:50	5.2697	66.11	-0.01	5.1025	0.0049
10/13/2005	9:49:09	5.583	66.14	-0.01	5.4158	0.0049
10/13/2005	9:49:29	5.9147	66.16	-0.011	5.7475	0.0054
10/13/2005	9:49:50	6.2663	66.18	-0.011	6.0991	0.0054
10/13/2005	9:50:12	6.6397	66.2	-0.01	6.4725	0.0049
10/13/2005	9:50:36	7.0347	66.23	-0.01	6.8675	0.0049
10/13/2005	9:51:01	7.453	66.27	-0.009	7.2858	0.0044
10/13/2005	9:51:28	7.8963	66.29	-0.01	7.7291	0.0049
10/13/2005	9:51:56	8.3663	66.32	-0.01	8.1991	0.0049
10/13/2005	9:52:26	8.8647	66.36	-0.009	8.6975	0.0044
10/13/2005	9:52:57	9.3913	66.39	-0.009	9.2241	0.0044
10/13/2005	9:53:31	9.9497	66.41	-0.011	9.7825	0.0054
10/13/2005	9:54:06	10.5413	66.43	0.001	10.3741	-0.0005
10/13/2005	9:54:44	11.168	66.45	0	11.0008	0.0000
10/13/2005	9:55:24	11.8313	66.48	0	11.6641	0.0000
10/13/2005	9:56:06	12.5347	66.52	0.001	12.3675	-0.0005
10/13/2005	9:56:51	13.2797	66.57	0	13.1125	0.0000
10/13/2005	9:57:38	14.0697	66.61	0	13.9025	0.0000
10/13/2005	9:58:28	14.9063	66.66	0	14.7391	0.0000
10/13/2005	9:59:21	15.7913	66.72	-0.002	15.6241	0.0010
10/13/2005	10:00:18	16.7297	66.75	-0.001	16.5625	0.0005
10/13/2005	10:01:17	17.723	66.61	-0.012	17.5558	0.0059

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW034
Project No.:	N2194	**Aquifer Type:**	Sand and gravel.
Test Type:	Slug test, rising head.	**Test Date:**	13-Oct-05

Done By:
Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	1.270 = To

Hydraulic Conductivity (K) : 1.29

1.31E-03	ft./min.
2.18E-05	ft./sec.
1.88E+00	ft./day
6.65E-04	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: SITE 57, INDIAN HEAD WELL/BORING NO.: S57MW034

PROJECT NO.: 2194 GEOLOGIST: FRED WRAMBER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10' / 17.37 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 5.08 DATE: 10-12-05

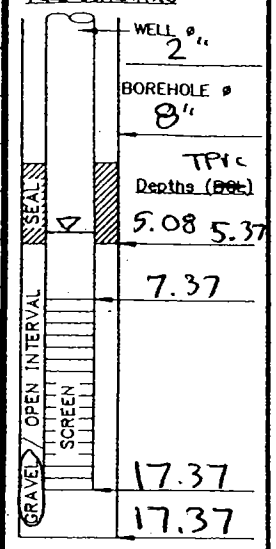
TEST TYPE (Rising/Falling/Constant Head): RISING HEAD CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER X2 PAGE 1 OF 1

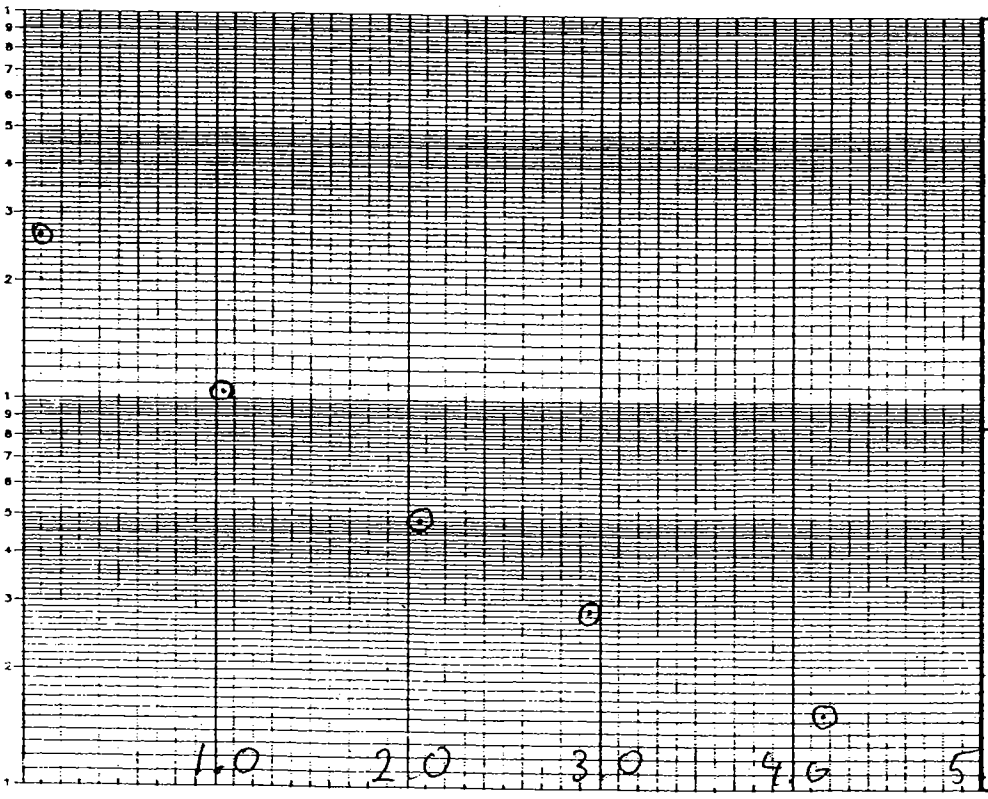
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.00		0.00			
0.10		2.674			
0.25		2.045			
0.4963		1.641			
0.6580		1.427			
1.0413		1.046			
1.3897		0.802			
2.0847		0.489			
2.9530		0.286			
4.1813		0.157			
5.2697		0.105			

WELL SCHEMATIC

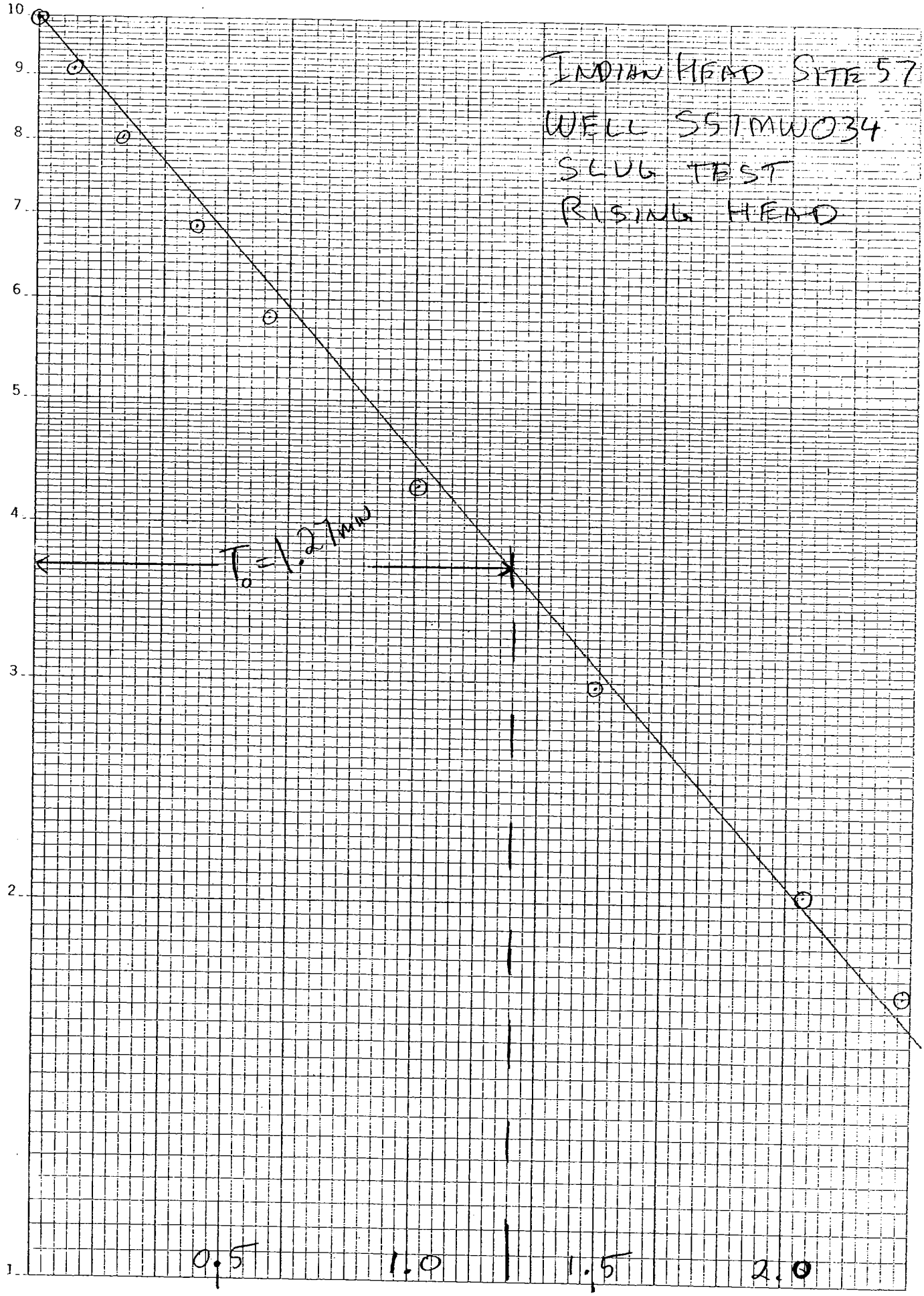


▽ Indicate SWL Depth on Drawing



REMARKS:
INSITU MINI-TROLL #11059
WL = 11.767 @ 1342
START TEST @ 1349
WL = 11.768 ft
STOP @ 1359

CALCS, SKETCH MAPS, ETC.:



46 4650
K&E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated 10/20/2005 13:15:43
Report from file: ...\SN11059 2005-10-12 134855 S57MW034R.bin
Win-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW034R

Test defined on: 10/12/2005 13:22:47
Test started on: 10/12/2005 13:48:55
Test stopped on: N/A N/A

Data gathered using Logarithmic testing
Maximum time I Minutes.
Number of data 99

TOTAL DATA SA 99

Channel number [1]
Measurement ty Temperature
Channel name:

Channel number [2]
Measurement ty Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined ref 0 Feet H2O
Referenced on: test start
Pressure head a 11.765 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho	
10/12/2005	13:48:55	0	65.46	0			Plotted data
10/12/2005	13:48:56	0.005	65.5	0.006			
10/12/2005	13:48:56	0.01	65.5	0.009			
10/12/2005	13:48:56	0.015	65.52	0.01			
10/12/2005	13:48:56	0.02	65.52	0.006			
10/12/2005	13:48:57	0.025	65.52	-4.924			
10/12/2005	13:48:57	0.03	65.52	-6.01			
10/12/2005	13:48:57	0.035	65.52	-0.771			
10/12/2005	13:48:58	0.04	65.52	-3.839			
10/12/2005	13:48:58	0.045	65.52	-2.477			
10/12/2005	13:48:58	0.05	65.52	-2.272			
10/12/2005	13:48:59	0.055	65.55	-3.328			
10/12/2005	13:48:59	0.06	65.55	-1.727			
10/12/2005	13:48:59	0.065	65.55	-3.343			
10/12/2005	13:48:59	0.07	65.55	-1.918			
10/12/2005	13:49:00	0.075	65.55	-2.87			
10/12/2005	13:49:00	0.08	65.55	-2.348			

10/12/2005	13:49:00	0.085	65.55	-2.416		
10/12/2005	13:49:01	0.09	65.55	-2.636		
10/12/2005	13:49:01	0.095	65.55	-2.19		
10/12/2005	13:49:01	0.1	65.55	-2.674		
10/12/2005	13:49:02	0.1058	65.55	-2.198		
10/12/2005	13:49:02	0.112	65.55	-2.545		
10/12/2005	13:49:02	0.1185	65.55	-2.252		
10/12/2005	13:49:03	0.1255	65.55	-2.377		
10/12/2005	13:49:03	0.1328	65.55	-2.357		
10/12/2005	13:49:04	0.1407	65.55	-2.214		
10/12/2005	13:49:04	0.149	65.55	-2.291		
10/12/2005	13:49:05	0.1578	65.57	-2.286		
10/12/2005	13:49:05	0.1672	65.55	-2.213	0	1.0000
10/12/2005	13:49:06	0.177	65.52	-2.175	0.0098	0.9828
10/12/2005	13:49:06	0.1875	65.52	-2.159	0.0203	0.9756
10/12/2005	13:49:07	0.1985	65.52	-2.143	0.0313	0.9684
10/12/2005	13:49:08	0.2102	65.52	-2.124	0.043	0.9598
10/12/2005	13:49:09	0.2227	65.52	-2.098	0.0555	0.9480
10/12/2005	13:49:09	0.2358	65.52	-2.069	0.0686	0.9349
10/12/2005	13:49:10	0.2498	65.52	-2.045	0.0826	0.9241
10/12/2005	13:49:11	0.2647	65.52	-2.021	0.0975	0.9132
10/12/2005	13:49:12	0.2803	65.5	-1.989	0.1131	0.8988
10/12/2005	13:49:13	0.297	65.5	-1.959	0.1298	0.8852
10/12/2005	13:49:14	0.3147	65.5	-1.928	0.1475	0.8712
10/12/2005	13:49:15	0.3333	65.52	-1.897	0.1661	0.8572
10/12/2005	13:49:16	0.3532	65.5	-1.863	0.186	0.8418
10/12/2005	13:49:18	0.3742	65.5	-1.829	0.207	0.8265
10/12/2005	13:49:19	0.3963	65.5	-1.791	0.2291	0.8093
10/12/2005	13:49:20	0.4198	65.5	-1.754	0.2526	0.7926
10/12/2005	13:49:22	0.4447	65.5	-1.718	0.2775	0.7763
10/12/2005	13:49:23	0.4697	65.5	-1.68	0.3025	0.7592
10/12/2005	13:49:25	0.4963	65.5	-1.641	0.3291	0.7415
10/12/2005	13:49:27	0.5247	65.5	-1.6	0.3575	0.7230
10/12/2005	13:49:29	0.5547	65.5	-1.56	0.3875	0.7049
10/12/2005	13:49:30	0.5863	65.5	-1.517	0.4191	0.6855
10/12/2005	13:49:33	0.6213	65.48	-1.472	0.4541	0.6652
10/12/2005	13:49:35	0.658	65.48	-1.427	0.4908	0.6448
10/12/2005	13:49:37	0.6963	65.48	-1.381	0.5291	0.6240
10/12/2005	13:49:40	0.738	65.48	-1.334	0.5708	0.6028
10/12/2005	13:49:42	0.7813	65.48	-1.286	0.6141	0.5811
10/12/2005	13:49:45	0.828	65.48	-1.236	0.6608	0.5585
10/12/2005	13:49:48	0.8763	65.48	-1.188	0.7091	0.5368
10/12/2005	13:49:51	0.928	65.46	-1.138	0.7608	0.5142
10/12/2005	13:49:54	0.983	65.48	-1.093	0.8158	0.4939
10/12/2005	13:49:58	1.0413	65.46	-1.046	0.8741	0.4727
10/12/2005	13:50:01	1.103	65.46	-0.997	0.9358	0.4505
10/12/2005	13:50:05	1.168	65.48	-0.948	1.0008	0.4284
10/12/2005	13:50:10	1.238	65.48	-0.9	1.0708	0.4067
10/12/2005	13:50:14	1.3113	65.46	-0.853	1.1441	0.3854
10/12/2005	13:50:19	1.3897	65.48	-0.802	1.2225	0.3624
10/12/2005	13:50:24	1.473	65.48	-0.754	1.3058	0.3407
10/12/2005	13:50:29	1.5613	65.5	-0.707	1.3941	0.3195
10/12/2005	13:50:35	1.6547	65.5	-0.659	1.4875	0.2978
10/12/2005	13:50:40	1.753	65.52	-0.615	1.5858	0.2779
10/12/2005	13:50:47	1.858	65.52	-0.572	1.6908	0.2585
10/12/2005	13:50:53	1.968	65.55	-0.529	1.8008	0.2390
10/12/2005	13:51:00	2.0847	65.55	-0.489	1.9175	0.2210
10/12/2005	13:51:08	2.2097	65.55	-0.45	2.0425	0.2033
10/12/2005	13:51:16	2.3413	65.55	-0.413	2.1741	0.1866
10/12/2005	13:51:24	2.4813	65.55	-0.378	2.3141	0.1708

10/12/2005	13:51:33	2.6297	65.55	-0.344	2.4625	0.1554
10/12/2005	13:51:42	2.7863	65.55	-0.315	2.6191	0.1423
10/12/2005	13:51:52	2.953	65.52	-0.286	2.7858	0.1292
10/12/2005	13:52:03	3.1297	65.52	-0.259	2.9625	0.1170
10/12/2005	13:52:14	3.3163	65.52	-0.236	3.1491	0.1066
10/12/2005	13:52:26	3.5147	65.52	-0.212	3.3475	0.0958
10/12/2005	13:52:39	3.7247	65.52	-0.194	3.5575	0.0877
10/12/2005	13:52:52	3.9463	65.52	-0.174	3.7791	0.0786
10/12/2005	13:53:06	4.1813	65.52	-0.157	4.0141	0.0709
10/12/2005	13:53:21	4.4297	65.52	-0.143	4.2625	0.0646
10/12/2005	13:53:37	4.693	65.52	-0.129	4.5258	0.0583
10/12/2005	13:53:54	4.973	65.52	-0.116	4.8058	0.0524
10/12/2005	13:54:11	5.2697	65.52	-0.105	5.1025	0.0474
10/12/2005	13:54:30	5.583	65.52	-0.095	5.4158	0.0429
10/12/2005	13:54:50	5.9147	65.52	-0.086	5.7475	0.0389
10/12/2005	13:55:11	6.2663	65.52	-0.078	6.0991	0.0352
10/12/2005	13:55:34	6.6397	65.52	-0.07	6.4725	0.0316
10/12/2005	13:55:57	7.0347	65.52	-0.063	6.8675	0.0285
10/12/2005	13:56:22	7.453	65.55	-0.058	7.2858	0.0262
10/12/2005	13:56:49	7.8963	65.57	-0.054	7.7291	0.0244
10/12/2005	13:57:17	8.3663	65.57	-0.047	8.1991	0.0212
10/12/2005	13:57:47	8.8647	65.59	-0.045	8.6975	0.0203

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW035
Project No.:	N2194	**Aquifer Type:**	Sand.
Test Type:	Slug test, rising head.	**Test Date:**	13-Oct-05

Done By:
Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	10 = L
Time for 37% head change (min.) :	0.300 = To

Hydraulic Conductivity (K) : 5.50

5.54E-03	ft./min.
9.24E-05	ft./sec.
7.98E+00	ft./day
2.81E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: SITE 57, INDIAN HEAD WELL/BORING NO.: S57MW035

PROJECT NO.: 2194 GEOLOGIST: FRED W RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10, 35.16' TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 20.70 DATE: 10-13-05

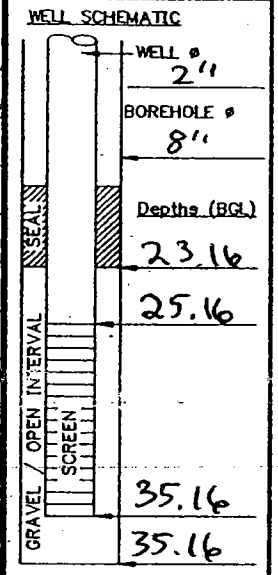
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER x 1 PAGE 1 OF 1

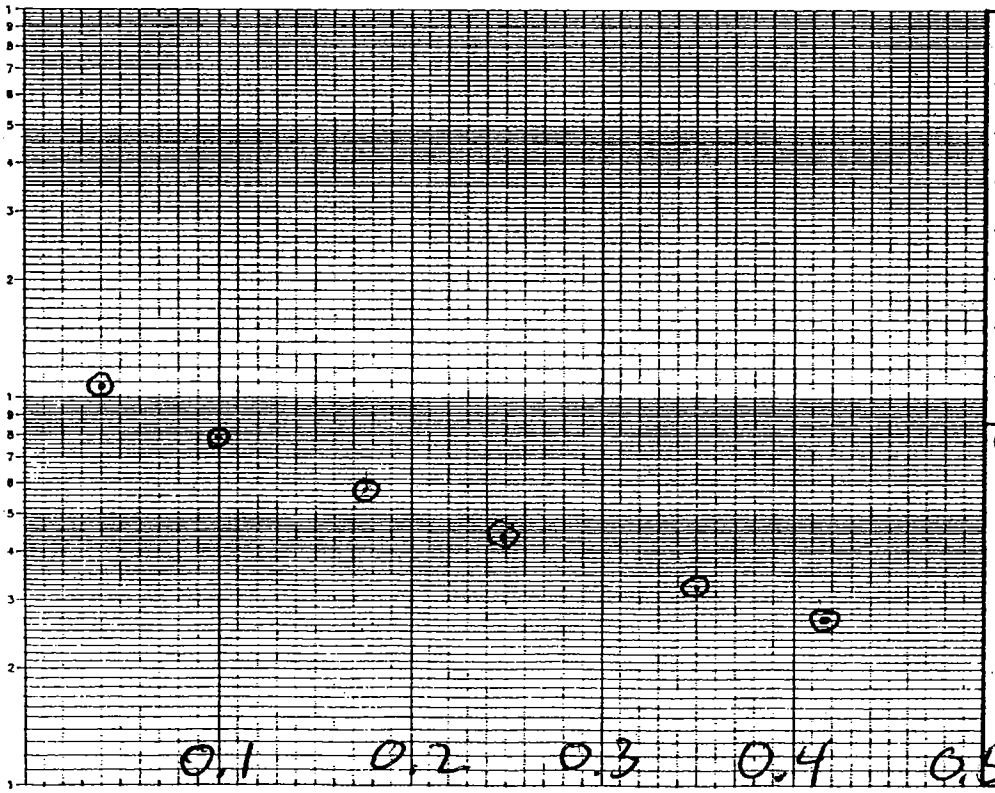
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.00		0.00			
0.04		1.088			
0.05		1.014			
0.075		0.902			
0.100		0.794			
0.177		0.588			
0.2498		0.458	0.3532		0.333
0.4198		0.274			
0.6580		0.156			
1.04		0.081			

WELL SCHEMATIC

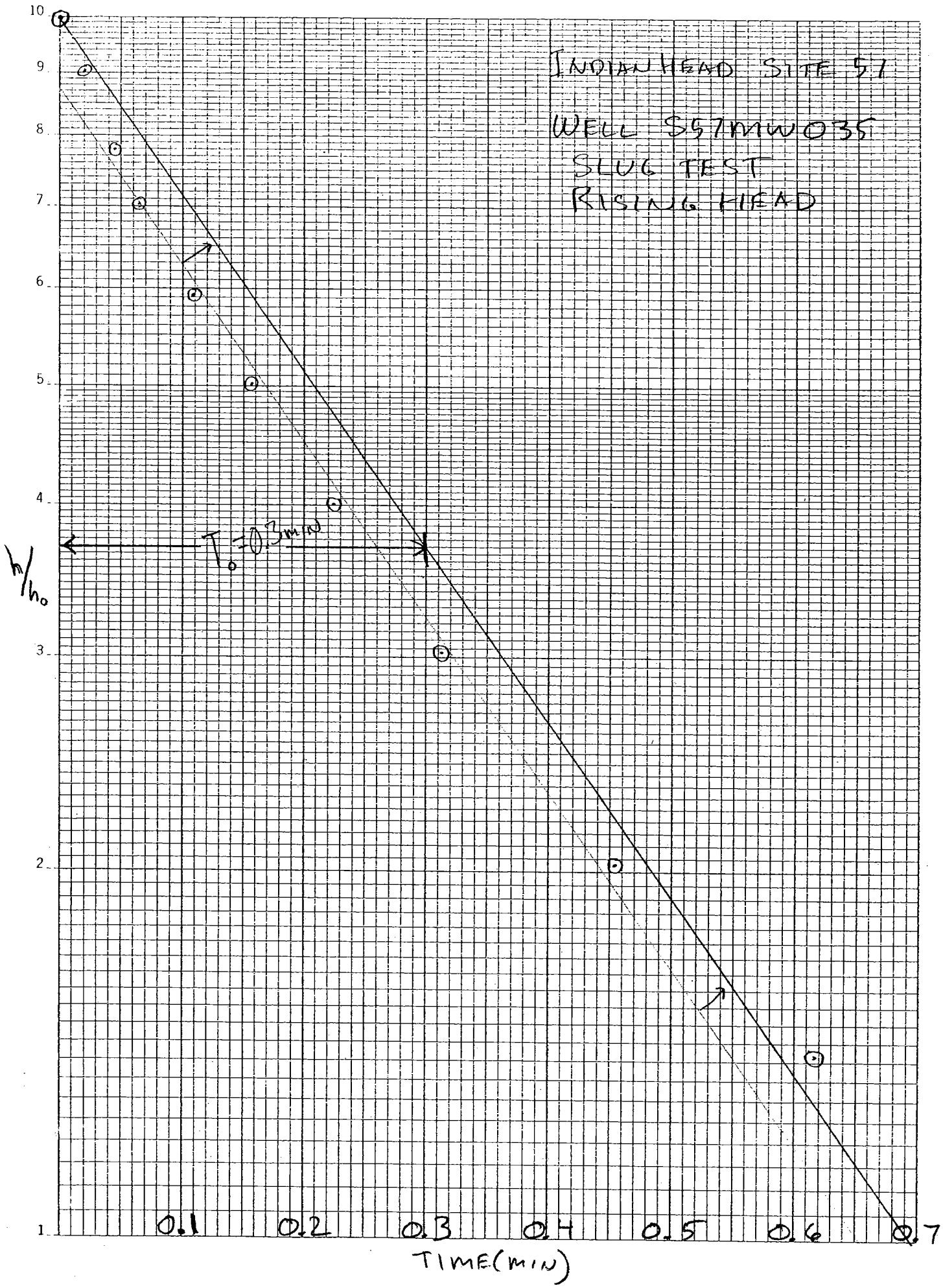


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:



K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.
46 4650

In-Situ Inc. MiniTroll Pro

Report generated: 10/20/2005 15:48:43
Report from file: ...\SN11059 2005-10-13 134830 S57MW035.bin
Win-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW035

Test defined on: 10/13/2005 13:45:18
Test started on: 10/13/2005 13:48:30
Test stopped on: 10/13/2005 13:53:21

Data gathered using Logarithmic testing
Maximum time between Minutes.
Number of data samples 88

TOTAL DATA SAMPLES 88

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at referen 14.516 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho
10/13/2005	13:48:30	0	57.86	0		
10/13/2005	13:48:30	0.005	57.91	0.009		
10/13/2005	13:48:30	0.01	57.91	0.012		
10/13/2005	13:48:30	0.015	57.93	0.014		
10/13/2005	13:48:31	0.02	57.93	0.015		
10/13/2005	13:48:31	0.025	57.93	-0.541		
10/13/2005	13:48:31	0.03	57.93	-0.614		
10/13/2005	13:48:32	0.035	57.93	-1.025		
10/13/2005	13:48:32	0.04	57.95	-1.088	0.0000	1.0000
10/13/2005	13:48:32	0.045	57.95	-1.064	0.0050	0.9779
10/13/2005	13:48:33	0.05	57.93	-1.014	0.0100	0.9320
10/13/2005	13:48:33	0.055	57.95	-0.969	0.0150	0.8906
10/13/2005	13:48:33	0.06	57.95	-0.981	0.0200	0.9017
10/13/2005	13:48:33	0.065	57.95	-0.951	0.0250	0.8741
10/13/2005	13:48:34	0.07	57.95	-0.917	0.0300	0.8428
10/13/2005	13:48:34	0.075	57.95	-0.902	0.0350	0.8290
10/13/2005	13:48:34	0.08	57.95	-0.901	0.0400	0.8281

Plotted data

10/13/2005	13:48:35	0.085	57.95	-0.85	0.0450	0.7813
10/13/2005	13:48:35	0.09	57.95	-0.84	0.0500	0.7721
10/13/2005	13:48:35	0.095	57.95	-0.794	0.0550	0.7298
10/13/2005	13:48:36	0.1	57.95	-0.794	0.0600	0.7298
10/13/2005	13:48:36	0.1058	57.95	-0.763	0.0658	0.7013
10/13/2005	13:48:36	0.112	57.95	-0.748	0.0720	0.6875
10/13/2005	13:48:37	0.1185	57.95	-0.728	0.0785	0.6691
10/13/2005	13:48:37	0.1255	57.95	-0.707	0.0855	0.6498
10/13/2005	13:48:37	0.1328	57.95	-0.687	0.0928	0.6314
10/13/2005	13:48:38	0.1407	57.95	-0.666	0.1007	0.6121
10/13/2005	13:48:38	0.149	57.95	-0.645	0.1090	0.5928
10/13/2005	13:48:39	0.1578	57.98	-0.625	0.1178	0.5744
10/13/2005	13:48:40	0.1672	57.93	-0.609	0.1272	0.5597
10/13/2005	13:48:40	0.177	57.93	-0.588	0.1370	0.5404
10/13/2005	13:48:41	0.1875	57.93	-0.568	0.1475	0.5221
10/13/2005	13:48:41	0.1985	57.93	-0.546	0.1585	0.5018
10/13/2005	13:48:42	0.2102	57.93	-0.524	0.1702	0.4816
10/13/2005	13:48:43	0.2227	57.91	-0.501	0.1827	0.4605
10/13/2005	13:48:44	0.2358	57.91	-0.481	0.1958	0.4421
10/13/2005	13:48:44	0.2498	57.91	-0.458	0.2098	0.4210
10/13/2005	13:48:45	0.2647	57.91	-0.437	0.2247	0.4017
10/13/2005	13:48:46	0.2803	57.91	-0.415	0.2403	0.3814
10/13/2005	13:48:47	0.297	57.91	-0.394	0.2570	0.3621
10/13/2005	13:48:48	0.3147	57.91	-0.374	0.2747	0.3438
10/13/2005	13:48:50	0.3333	57.91	-0.354	0.2933	0.3254
10/13/2005	13:48:51	0.3532	57.91	-0.333	0.3132	0.3061
10/13/2005	13:48:52	0.3742	57.91	-0.312	0.3342	0.2868
10/13/2005	13:48:53	0.3963	57.91	-0.294	0.3563	0.2702
10/13/2005	13:48:55	0.4198	57.91	-0.274	0.3798	0.2518
10/13/2005	13:48:56	0.4447	57.91	-0.257	0.4047	0.2362
10/13/2005	13:48:58	0.4697	57.91	-0.241	0.4297	0.2215
10/13/2005	13:48:59	0.4963	57.91	-0.225	0.4563	0.2068
10/13/2005	13:49:01	0.5247	57.91	-0.211	0.4847	0.1939
10/13/2005	13:49:03	0.5547	57.89	-0.195	0.5147	0.1792
10/13/2005	13:49:05	0.5863	57.89	-0.182	0.5463	0.1673
10/13/2005	13:49:07	0.6213	57.89	-0.167	0.5813	0.1535
10/13/2005	13:49:09	0.658	57.91	-0.156	0.6180	0.1434
10/13/2005	13:49:11	0.6963	57.89	-0.145	0.6563	0.1333
10/13/2005	13:49:14	0.738	57.89	-0.133	0.6980	0.1222
10/13/2005	13:49:16	0.7813	57.89	-0.122	0.7413	0.1121
10/13/2005	13:49:19	0.828	57.89	-0.112	0.7880	0.1029
10/13/2005	13:49:22	0.8763	57.89	-0.105	0.8363	0.0965
10/13/2005	13:49:25	0.928	57.89	-0.097	0.8880	0.0892
10/13/2005	13:49:28	0.983	57.89	-0.089	0.9430	0.0818
10/13/2005	13:49:32	1.0413	57.89	-0.081	1.0013	0.0744
10/13/2005	13:49:36	1.103	57.89	-0.076	1.0630	0.0699
10/13/2005	13:49:40	1.168	57.89	-0.071	1.1280	0.0653
10/13/2005	13:49:44	1.238	57.89	-0.065	1.1980	0.0597
10/13/2005	13:49:48	1.3113	57.89	-0.06	1.2713	0.0551
10/13/2005	13:49:53	1.3897	57.86	-0.056	1.3497	0.0515
10/13/2005	13:49:58	1.473	57.86	-0.052	1.4330	0.0478
10/13/2005	13:50:03	1.5613	57.86	-0.05	1.5213	0.0460
10/13/2005	13:50:09	1.6547	57.86	-0.047	1.6147	0.0432
10/13/2005	13:50:15	1.753	57.86	-0.043	1.7130	0.0395
10/13/2005	13:50:21	1.858	57.86	-0.04	1.8180	0.0368
10/13/2005	13:50:28	1.968	57.86	-0.039	1.9280	0.0358
10/13/2005	13:50:35	2.0847	57.86	-0.038	2.0447	0.0349
10/13/2005	13:50:42	2.2097	57.86	-0.034	2.1697	0.0313
10/13/2005	13:50:50	2.3413	57.86	-0.033	2.3013	0.0303
10/13/2005	13:50:58	2.4813	57.86	-0.031	2.4413	0.0285

10/13/2005	13:51:07	2.6297	57.86	-0.03	2.5897	0.0276
10/13/2005	13:51:17	2.7863	57.86	-0.027	2.7463	0.0248
10/13/2005	13:51:27	2.953	57.86	-0.026	2.9130	0.0239
10/13/2005	13:51:37	3.1297	57.86	-0.025	3.0897	0.0230
10/13/2005	13:51:48	3.3163	57.84	-0.023	3.2763	0.0211
10/13/2005	13:52:00	3.5147	57.84	-0.022	3.4747	0.0202
10/13/2005	13:52:13	3.7247	57.84	-0.021	3.6847	0.0193
10/13/2005	13:52:26	3.9463	57.84	-0.021	3.9063	0.0193
10/13/2005	13:52:40	4.1813	57.84	-0.019	4.1413	0.0175
10/13/2005	13:52:55	4.4297	57.84	-0.018	4.3897	0.0165
10/13/2005	13:53:11	4.693	57.84	-0.018	4.6530	0.0165

TETRA-TECH NUS

HYDRAULIC CONDUCTIVITY TEST DATA EVALUATION SHEET
Hvorslev Method

Project Name:	INDIAN HEAD SITE 57	**Well/Boring No.:**	S57MW036
Project No.:	N2194	**Aquifer Type:**	Sand.
Test Type:	Slug test, rising head.	**Test Date:**	13-Oct-05

Done By:
Checked By: MLM 10/26/05

Radius of Well Casing (in.) :	1 = r
Effective Radius of Well Screen (in.) :	1 = R
Length of Well Screen (ft.) :	5 = L
Time for 37% head change (min.) :	0.190 = To

Hydraulic Conductivity (K) : .014

1.50E-02	ft./min.
2.49E-04	ft./sec.
2.15E+01	ft./day
7.60E-03	cm./sec.

Equation:

$$K = \frac{r^2 \times Ln(L/R)}{2 \times L \times To}$$

******SEE ADJUSTED SLUG TEST DATA PLOT ON ATTACHED SHEETS******

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: SITE 57, INDIAN HEAD WELL/BORING NO.: S57MW36

PROJECT NO.: 2194 GEOLOGIST: FRED W RAMSER

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 5' / 12.71 TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 7.26 DATE: 10-13-05

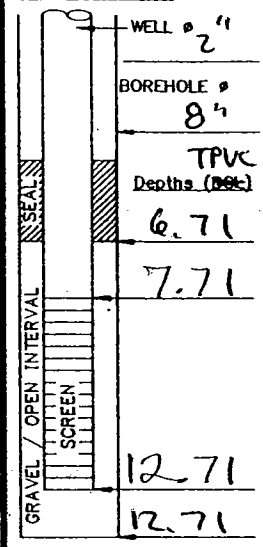
TEST TYPE (Rising/Falling/Constant Head): RISING CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: BAILER X 1 PAGE 1 OF 1

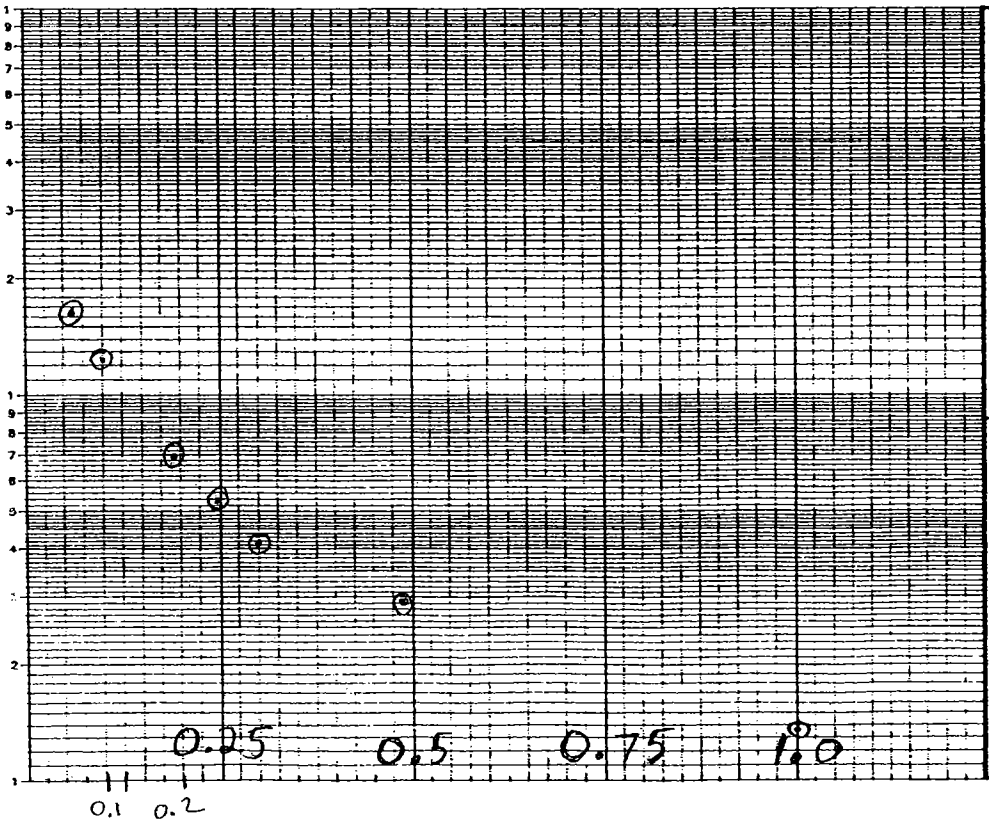
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): SURFACE

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0.000		0.000			
0.07		1.626			
0.10		1.227			
0.149		0.806			
0.1875		0.669			
0.2498		0.539			
0.3333		0.419			
0.4963		0.280			
0.6213		0.216			
1.0413		0.135			

WELL SCHEMATIC

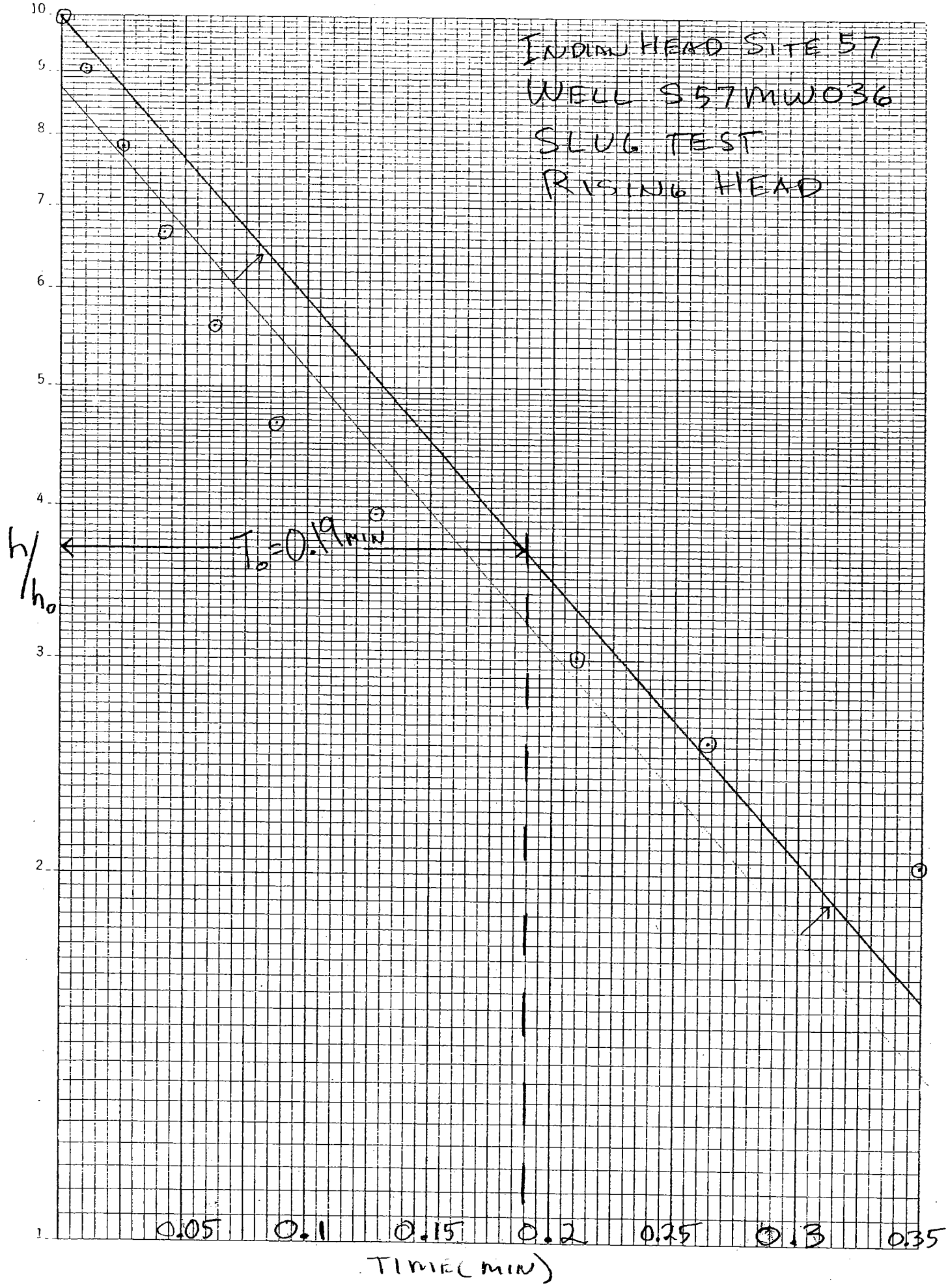


▽ Indicate SWL Depth on Drawing



REMARKS:
WATER COLUMN = 5.577' ABOVE X D.

CALCS, SKETCH MAPS, ETC.:
0.025



46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

In-Situ Inc. MiniTroll Pro

Report generated: 10/20/2005 14:51:11
Report from file: ...\SN11059 2005-10-13 103305 S57MW36R.bin
Win-Situ Version 4.523

Serial number: 11059
Firmware Version 3.09
Unit name:

Test name: S57MW36R

Test defined on: 10/13/2005 10:24:53
Test started on: 10/13/2005 10:33:05
Test stopped on: N/A N/A

Data gathered using Logarithmic testing
Maximum time between da Minutes.
Number of data samples: 103

TOTAL DATA SAMPLES 103

Channel number [1]
Measurement type: Temperature
Channel name:

Channel number [2]
Measurement type: Pressure
Channel name: water level
Sensor Range: 15 PSIG.
Specific gravity: 1
Mode: Surface
User-defined reference: 0 Feet H2O
Referenced on: test start
Pressure head at reference 5.581 Feet H2O

Date	Time	ET (min)	Chan[1] Temperatu Fahrenheit	Chan[2] Pressure Feet H2O	Adjust ET min	h/ho	
10/13/2005	10:33:05	0	68.17	0			Plotted data
10/13/2005	10:33:05	0.005	68.2	0.004			
10/13/2005	10:33:05	0.01	68.22	0.006			
10/13/2005	10:33:06	0.015	68.22	0.007			
10/13/2005	10:33:06	0.02	68.24	0.007			
10/13/2005	10:33:06	0.025	68.24	0.007			
10/13/2005	10:33:06	0.03	68.24	0.007			
10/13/2005	10:33:07	0.035	68.24	0.007			
10/13/2005	10:33:07	0.04	68.24	-0.204			
10/13/2005	10:33:07	0.045	68.24	-0.031			
10/13/2005	10:33:08	0.05	68.24	-0.103			
10/13/2005	10:33:08	0.055	68.26	-1.073			
10/13/2005	10:33:08	0.06	68.24	-3.448			
10/13/2005	10:33:09	0.065	68.26	-1.806			
10/13/2005	10:33:09	0.07	68.26	-1.626	0.0000	1.0000	
10/13/2005	10:33:09	0.075	68.26	-1.552	0.0050	0.9545	
10/13/2005	10:33:09	0.08	68.26	-1.475	0.0100	0.9071	

10/13/2005	10:33:10	0.085	68.26	-1.4	0.0150	0.8610
10/13/2005	10:33:10	0.09	68.26	-1.348	0.0200	0.8290
10/13/2005	10:33:10	0.095	68.26	-1.271	0.0250	0.7817
10/13/2005	10:33:11	0.1	68.26	-1.227	0.0300	0.7546
10/13/2005	10:33:11	0.1058	68.26	-1.152	0.0358	0.7085
10/13/2005	10:33:11	0.112	68.26	-1.088	0.0420	0.6691
10/13/2005	10:33:12	0.1185	68.26	-1.03	0.0485	0.6335
10/13/2005	10:33:12	0.1255	68.26	-0.971	0.0555	0.5972
10/13/2005	10:33:13	0.1328	68.26	-0.911	0.0628	0.5603
10/13/2005	10:33:13	0.1407	68.26	-0.855	0.0707	0.5258
10/13/2005	10:33:14	0.149	68.26	-0.806	0.0790	0.4957
10/13/2005	10:33:14	0.1578	68.26	-0.762	0.0878	0.4686
10/13/2005	10:33:15	0.1672	68.26	-0.728	0.0972	0.4477
10/13/2005	10:33:15	0.177	68.24	-0.698	0.1070	0.4293
10/13/2005	10:33:16	0.1875	68.24	-0.669	0.1175	0.4114
10/13/2005	10:33:17	0.1985	68.24	-0.643	0.1285	0.3954
10/13/2005	10:33:17	0.2102	68.24	-0.617	0.1402	0.3795
10/13/2005	10:33:18	0.2227	68.24	-0.591	0.1527	0.3635
10/13/2005	10:33:19	0.2358	68.24	-0.565	0.1658	0.3475
10/13/2005	10:33:20	0.2498	68.24	-0.539	0.1798	0.3315
10/13/2005	10:33:21	0.2647	68.24	-0.514	0.1947	0.3161
10/13/2005	10:33:21	0.2803	68.22	-0.49	0.2103	0.3014
10/13/2005	10:33:22	0.297	68.22	-0.465	0.2270	0.2860
10/13/2005	10:33:24	0.3147	68.22	-0.443	0.2447	0.2724
10/13/2005	10:33:25	0.3333	68.22	-0.419	0.2633	0.2577
10/13/2005	10:33:26	0.3532	68.22	-0.397	0.2832	0.2442
10/13/2005	10:33:27	0.3742	68.22	-0.375	0.3042	0.2306
10/13/2005	10:33:28	0.3963	68.22	-0.354	0.3263	0.2177
10/13/2005	10:33:30	0.4198	68.22	-0.333	0.3498	0.2048
10/13/2005	10:33:31	0.4447	68.22	-0.312	0.3747	0.1919
10/13/2005	10:33:33	0.4697	68.22	-0.295	0.3997	0.1814
10/13/2005	10:33:34	0.4963	68.22	-0.28	0.4263	0.1722
10/13/2005	10:33:36	0.5247	68.22	-0.262	0.4547	0.1611
10/13/2005	10:33:38	0.5547	68.22	-0.246	0.4847	0.1513
10/13/2005	10:33:40	0.5863	68.22	-0.23	0.5163	0.1415
10/13/2005	10:33:42	0.6213	68.22	-0.216	0.5513	0.1328
10/13/2005	10:33:44	0.658	68.2	-0.203	0.5880	0.1248
10/13/2005	10:33:46	0.6963	68.2	-0.19	0.6263	0.1169
10/13/2005	10:33:49	0.738	68.2	-0.179	0.6680	0.1101
10/13/2005	10:33:52	0.7813	68.2	-0.169	0.7113	0.1039
10/13/2005	10:33:54	0.828	68.2	-0.159	0.7580	0.0978
10/13/2005	10:33:57	0.8763	68.2	-0.152	0.8063	0.0935
10/13/2005	10:34:00	0.928	68.2	-0.148	0.8580	0.0910
10/13/2005	10:34:04	0.983	68.2	-0.141	0.9130	0.0867
10/13/2005	10:34:07	1.0413	68.2	-0.135	0.9713	0.0830
10/13/2005	10:34:11	1.103	68.2	-0.128	1.0330	0.0787
10/13/2005	10:34:15	1.168	68.2	-0.122	1.0980	0.0750
10/13/2005	10:34:19	1.238	68.2	-0.113	1.1680	0.0695
10/13/2005	10:34:23	1.3113	68.2	-0.105	1.2413	0.0646
10/13/2005	10:34:28	1.3897	68.17	-0.099	1.3197	0.0609
10/13/2005	10:34:33	1.473	68.17	-0.093	1.4030	0.0572
10/13/2005	10:34:38	1.5613	68.17	-0.086	1.4913	0.0529
10/13/2005	10:34:44	1.6547	68.17	-0.076	1.5847	0.0467
10/13/2005	10:34:50	1.753	68.17	-0.065	1.6830	0.0400
10/13/2005	10:34:56	1.858	68.17	-0.064	1.7880	0.0394
10/13/2005	10:35:03	1.968	68.17	-0.056	1.8980	0.0344
10/13/2005	10:35:10	2.0847	68.17	-0.05	2.0147	0.0308
10/13/2005	10:35:17	2.2097	68.17	-0.044	2.1397	0.0271
10/13/2005	10:35:25	2.3413	68.17	-0.039	2.2713	0.0240
10/13/2005	10:35:34	2.4813	68.17	-0.033	2.4113	0.0203

10/13/2005	10:35:42	2.6297	68.17	-0.026	2.5597	0.0160
10/13/2005	10:35:52	2.7863	68.17	-0.023	2.7163	0.0141
10/13/2005	10:36:02	2.953	68.17	-0.021	2.8830	0.0129
10/13/2005	10:36:12	3.1297	68.17	-0.02	3.0597	0.0123
10/13/2005	10:36:24	3.3163	68.17	-0.017	3.2463	0.0105
10/13/2005	10:36:36	3.5147	68.17	-0.016	3.4447	0.0098
10/13/2005	10:36:48	3.7247	68.17	-0.013	3.6547	0.0080
10/13/2005	10:37:01	3.9463	68.17	-0.014	3.8763	0.0086
10/13/2005	10:37:16	4.1813	68.2	-0.012	4.1113	0.0074
10/13/2005	10:37:30	4.4297	68.22	-0.011	4.3597	0.0068
10/13/2005	10:37:46	4.693	68.24	-0.01	4.6230	0.0062
10/13/2005	10:38:03	4.973	68.26	-0.01	4.9030	0.0062
10/13/2005	10:38:21	5.2697	68.29	-0.009	5.1997	0.0055
10/13/2005	10:38:40	5.583	68.31	-0.009	5.5130	0.0055
10/13/2005	10:39:00	5.9147	68.33	-0.008	5.8447	0.0049
10/13/2005	10:39:21	6.2663	68.33	-0.007	6.1963	0.0043
10/13/2005	10:39:43	6.6397	68.38	-0.008	6.5697	0.0049
10/13/2005	10:40:07	7.0347	68.38	-0.008	6.9647	0.0049
10/13/2005	10:40:32	7.453	68.38	-0.006	7.3830	0.0037
10/13/2005	10:40:58	7.8963	68.4	-0.007	7.8263	0.0043
10/13/2005	10:41:27	8.3663	68.42	-0.007	8.2963	0.0043
10/13/2005	10:41:57	8.8647	68.42	-0.006	8.7947	0.0037
10/13/2005	10:42:28	9.3913	68.45	-0.006	9.3213	0.0037
10/13/2005	10:43:02	9.9497	68.45	-0.006	9.8797	0.0037
10/13/2005	10:43:37	10.5413	68.45	-0.004	10.4713	0.0025
10/13/2005	10:44:15	11.168	68.45	-0.006	11.0980	0.0037

APPENDIX E

CONE PENETROMETER TESTING REPORT

CONE PENETRATION TESTING
AT THE
NAVAL SURFACE WARFARE CENTER
INDIAN HEAD, MARYLAND

Draft Report

Prepared for:

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ARA Report No. 0740

November 16, 2001

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SECTION 1

OVERVIEW OF CONE PENETROMETER TESTING AT THE NAVAL SURFACE WARFARE CENTER INDIAN HEAD, MARYLAND

1.1 INTRODUCTION

Applied Research Associates, Inc. (ARA) under contract to Tetra Tech NUS, Inc., (TTNUS), conducted Piezo-Electric Cone Penetration Tests (P-CPT) at the Naval Surface Warfare Center-Indian Head, Indian Head, Maryland (NSWC Indian Head), Figure 1. This report documents ARA's site investigation efforts, field testing methods, data analysis techniques, and a brief discussion of results for fieldwork conducted August 27 through August 31, 2001.

1.2 TEST LOCATIONS

Cone penetrometer tests were conducted at ten locations on the NSWC Indian Head project. All penetrations measured tip stress, sleeve stress, and penetration pore pressure. Multiple attempts were made at locations where the CPT met early refusal. A total of 406.8 feet of CPT soundings were completed. Regardless of final depth, data is reported for all locations.

Table 1 is a chronological listing of the penetrations conducted and relevant information for each location. All locations were grouted upon retraction of the rod string or using a standard tremie grout method.

1.3 REPORT OUTLINE

This report is organized into four sections and three appendices. Section 2 discusses the CPT equipment, field procedures, and daily calibrations. Section 3 describes the methods used to interpret the CPT results and discusses the correlation of a boring log to typical CPT results obtained from the NSWC Indian Head project. Section 4 lists references. Appendix A presents the piezocone profiles. Plots of pore pressure dissipation tests are presented in Appendix B. Appendix C contains calibration certifications for the reference load cell and reference pressure transducer used to calibrate the cone penetrometer on this investigation.

P:\GIS\INDIAN HEAD\7129_SITE57_APR\PROPOSED GW LOCATIONS 2 MGS 6/20/01

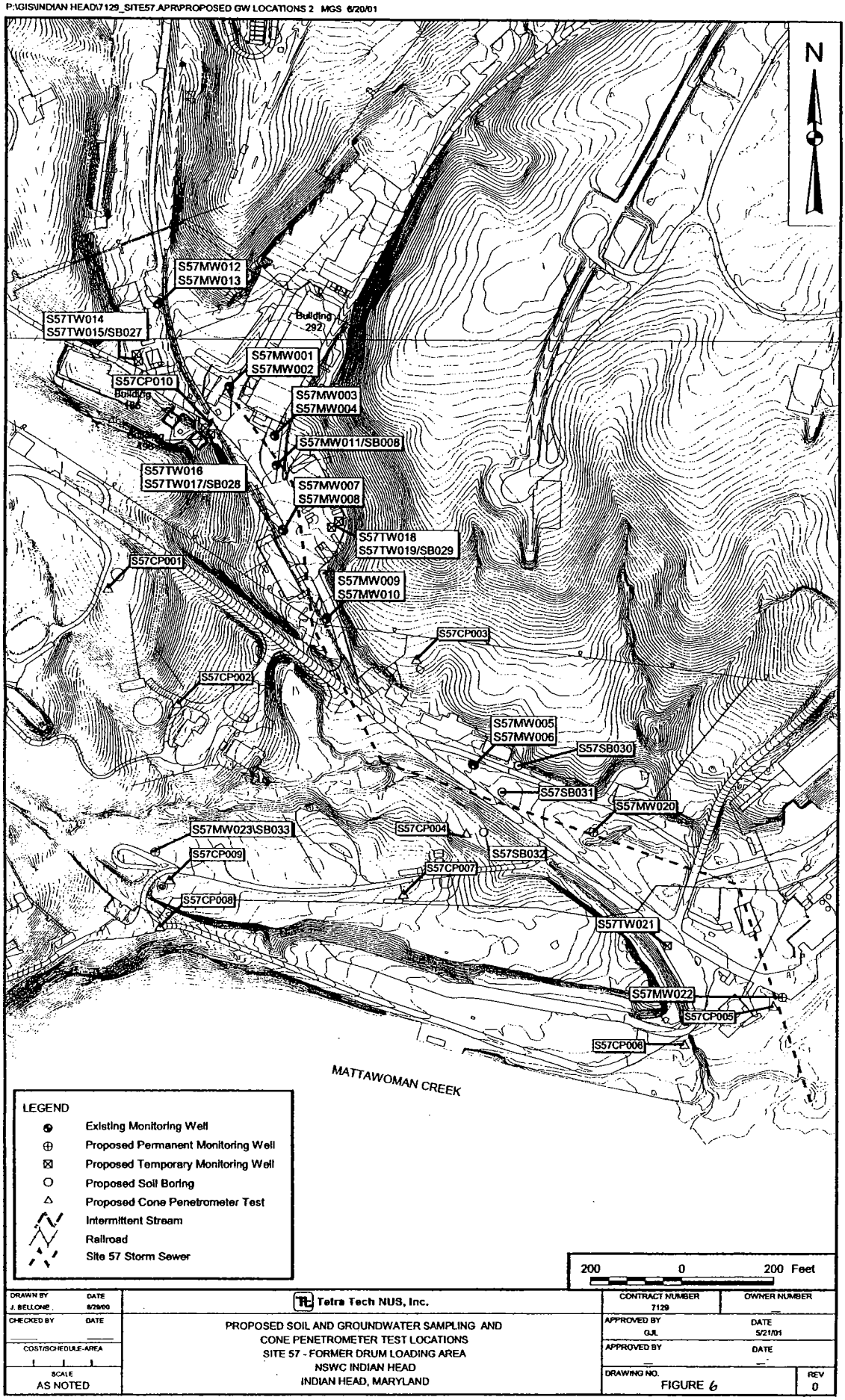


Figure 1.1 NSWC Indian Head site map

Table 1.1 Summary of CPT borings at the NSWC Indian Head

Test ID	ARA Filename	Type of Test	Date of Test	Final Depth (ft)	Northing (ft)	Easting (ft)	Surface Elevation (ft)	G.W.T. Depth (ft)
CPT-01	430G106	P-CPT	8/30/01	16.5				5
CPT-01B	430G107	P-CPT	8/30/01	16.4				5
CPT-01	--	WS	8/30/01	43.2	--	--	--	--
CPT-02	430G104	P-CPT	8/30/01	53.3				2
CPT-03	429G114	P-CPT	8/29/01	52.7				9.5
CPT-03	--	WS	8/30/01	45.0*	--	--	--	--
CPT-04	428G104	P-CPT	8/28/01	21.7				3
CPT-04	--	WS	8/28/01	23.0	--	--	--	--
CPT-05	429G101	P-CPT	8/29/01	20.5				6
CPT-05B	429G103	P-CPT	8/29/01	14.0				6
CPT-05	--	WS	8/29/01	19.0	--	--	--	--
CPT-06	429G105	P-CPT	8/29/01	31.5				6
CPT-06	--	WS	8/29/01	27.0	--	--	--	--
CPT-07	430G102	P-CPT	8/30/01	43.0				5
CPT-08	429G108	P-CPT	8/29/01	32.7				5
CPT-08	--	WS	8/29/01	29.0*	--	--	--	--
CPT-09	429G112	P-CPT	8/29/01	55.3				12
CPT-10	428G101	P-CPT	8/28/01	49.2				7
CPT-10	--	WS	8/28/01	39.5	--	--	--	--

* No Water

SECTION 2
TESTING EQUIPMENT AND PROCEDURES

2.1 INTRODUCTION

The CPT was originally developed for use in soft soil. Over the years, cone and push system designs have evolved to the point where they can now be used in strong cemented soils and even soft rock. ARA's penetrometer consists of an instrumented probe that is forced into the ground using a hydraulic load frame mounted on a heavy truck with the weight of the truck providing the necessary reaction mass. The probe has a conical tip and a friction sleeve that independently measures vertical resistance beneath the tip as well as frictional resistance on the side of the probe as a function of depth. Figure 2.1 presents ARA's piezo-cone penetrometer. A pressure transducer in the cone is used to measure the pore water pressure as the probe is pushed into the ground (P-CPT). A schematic of the piezo-cone penetrometer with dimensions is found in Figure 2.2.

2.2 PIEZO-ELECTRIC CONE PENETROMETER EQUIPMENT

2.2.1 Equipment

The P-CPT's were conducted using the ARA penetrometer truck. The penetrometer equipment is mounted inside a van body attached to a ten-wheel truck chassis with a diesel engine. Ballast in the form of weights can be added to the truck to achieve an overall push capacity of 60,000 lbs. Penetration force is supplied by a pair of large hydraulic cylinders bolted to the truck frame.

A 15-cm^2 penetrometer probe (which has 1.73-inch diameter, 60° conical tip, and a 1.73-inch diameter by 6.5-inch long friction sleeve) was used on this project (Figure 2.1 and 2.2). This probe size is in conformance with ASTM D 5778 (Ref. 1). The shoulder between the base of the tip and the porous filter measures 0.185 inches. The penetrometer is advanced vertically into the soil at a constant rate of 48 inches/minute (2 cm/second), although this rate must sometimes be reduced as hard layers are encountered.

The piezo-electric cone penetrometer test (P-CPT) was conducted in accordance with ASTM D 5778 (Ref. 1). As shown in Figure 2.1, the piezo-cone probe senses the pore pressure

immediately behind the tip. ARA chose to locate the sensing element behind the tip since the filter is protected from the direct thrust of the penetrometer and the measured pore pressure can be used to correct the tip resistance data, as recommended by Robertson and Campanella (Ref. 2). Furthermore, this is the standard location as specified by ASTM 5778-95.

Inside the probe, two load cells independently measure the vertical resistance against the conical tip and the side friction along the sleeve. Each load cell is a cylinder of uniform cross section instrumented with four strain gages in a full-bridge circuit. The forces are sensed by the load cells and the data are transmitted from the probe assembly via a cable running through the push rods. The analog data are digitized, recorded, and plotted by computer in the penetrometer truck. A set of data is normally recorded each second, for a minimum resolution of about one data point every 0.8 inch of cone advance. The depth of penetration is measured using a string potentiometer mounted on the push frame.

Electronic data acquisition equipment for the cone penetrometer consists of a computer and signal conditioners. Analog signals are transmitted from the probe to the signal conditioners where the CPT data are amplified and filtered at 1 Hz. Once amplified, the analog signals are transmitted to a high-speed analog-to-digital converter board, where the signals are digitized; usually at the rate of one sample per second for the penetration data. The digital data are then read into memory and written to the internal hard disk for future processing. Upon completion of the test the penetration data are plotted. The digital data are sent to ARA's New England Division in South Royalton, Vermont, for analysis and preparation of report plots.

2.2.2 Saturation of the Piezo-Cone

Penetration pore pressures are measured with a pressure transducer located behind the tip in the lower end of the probe. Water pressures in the soil are sensed through a 250 micro-inch porous polyethylene filter that is 0.25-inch high and 0.202-inch thick. The pressure transducer is connected to the porous filter through a pressure port as shown in Figure 2.1. The pressure port and the filter are filled with de-aired high viscosity silicone oil.

In order for the pressure transducer to respond rapidly and correctly to changing pore pressures during the penetration, the filter and pressure port must be saturated with oil upon

assembly of the probe. A vacuum pump is used to de-air the silicone oil before use and also to saturate the porous filters with oil. The probe is assembled with the pressure transducer facing upwards. The cavity above the pressure transducer is then filled with de-aired oil. A previously saturated filter is then placed on a tip and oil is poured over the threads of the tip. When the cone tip is screwed into place, excess oil is ejected through the pressure port and filter, thereby forcing out any trapped air. The high viscosity of the silicone oil coupled with the small pore space in the filter prevents the loss of saturation as the cone is pushed through dry soils. Saturation of the cone can be verified with a calibration check at the completion of the penetration. Extensive field experience has proven the reliability of this technique.

2.2.3 Field Calibrations

Many factors can effectively change the calibration factors used to convert the raw instrument readouts, measured in volts, to units of force or pressure. As a quality control measure, as well as a check for instrument damage, the load cells and the pressure transducer are routinely calibrated. Calibrations are completed with the probe ready to insert into the ground so that any factor affecting any component of the instrumentation system will be included and detected during the calibration.

The tip and sleeve load cells are calibrated with the conical tip and friction sleeve in place on the probe. For each calibration, the probe is placed in the push frame and loaded onto a precision reference load cell. The reference load cell is calibrated annually in ARA's laboratory against instruments traceable to NIST standards. To calibrate the pore pressure transducer, the saturated probe is inserted into a pressure chamber with air pressure supplied by the compressor on the truck. The reference transducer in the pressure chamber is also calibrated annually against an NIST traceable instrument. Additionally, the linear displacement transducer used to measure the depth of penetration, is periodically checked against a tape measure. All records of device and load cell calibrations are located at ARA's New England Division.

Each instrument is calibrated using a specially developed computer code that displays the output from the reference device and the probe instrument in graphical form. During the calibration procedure, the operator checks for linearity and repeatability in the instrument output. At the completion of each calibration, this code computes the needed calibration factors using a

linear regression algorithm. At a minimum, each probe instrument is calibrated at the beginning of each day of field-testing. Furthermore, the pressure transducer is recalibrated each time the porous filter is changed and the cone re-saturated with silicone oil. Calibrations are also performed to verify the operation of any instrument if damage is suspected.

2.2.4 Numerical Editing of the Penetration Data

Any time that the cone penetrometer is stopped or pulled back during a test, misleading data can result. For instance, when the probe is stopped to add the next push rod section, or when a pore pressure dissipation test is run, excess pore pressure will dissipate towards the hydrostatic pore pressure. When the penetration is resumed, the pore pressure rises very quickly to the pressure experienced prior to the pause in the test. In addition, the probe is sometimes pulled back and cycled up and down at intervals in deep holes to reduce soil friction on the push rods. This results in erroneous tip stress data when the cone is advanced in the previously penetrated hole.

To eliminate this misleading data from the penetration profile, the data is numerically edited before it is plotted or used in further analysis. Each time the penetration is paused or retracted, as apparent from the depth data, the penetration data is not plotted. Plotting of successive data is resumed only after the tip is fully re-engaged in the soil by one tip length of new penetration. In addition, each time the probe stops, the previous 0.5 inch of penetration data is filtered out. This filter is required to remove data that was recorded while the operator was in the process of stopping the probe. This algorithm also eliminates any data acquired at the ground surface before the tip has been completely inserted into the ground. The sleeve data is treated in a similar manner, resulting in the first data point occurring below the ground surface, as can be seen in the sleeve profile presented in Figure 2.3. These procedures ensure that all of the penetration data that is plotted and used for analysis was acquired with the probe advancing fully into undisturbed soil.

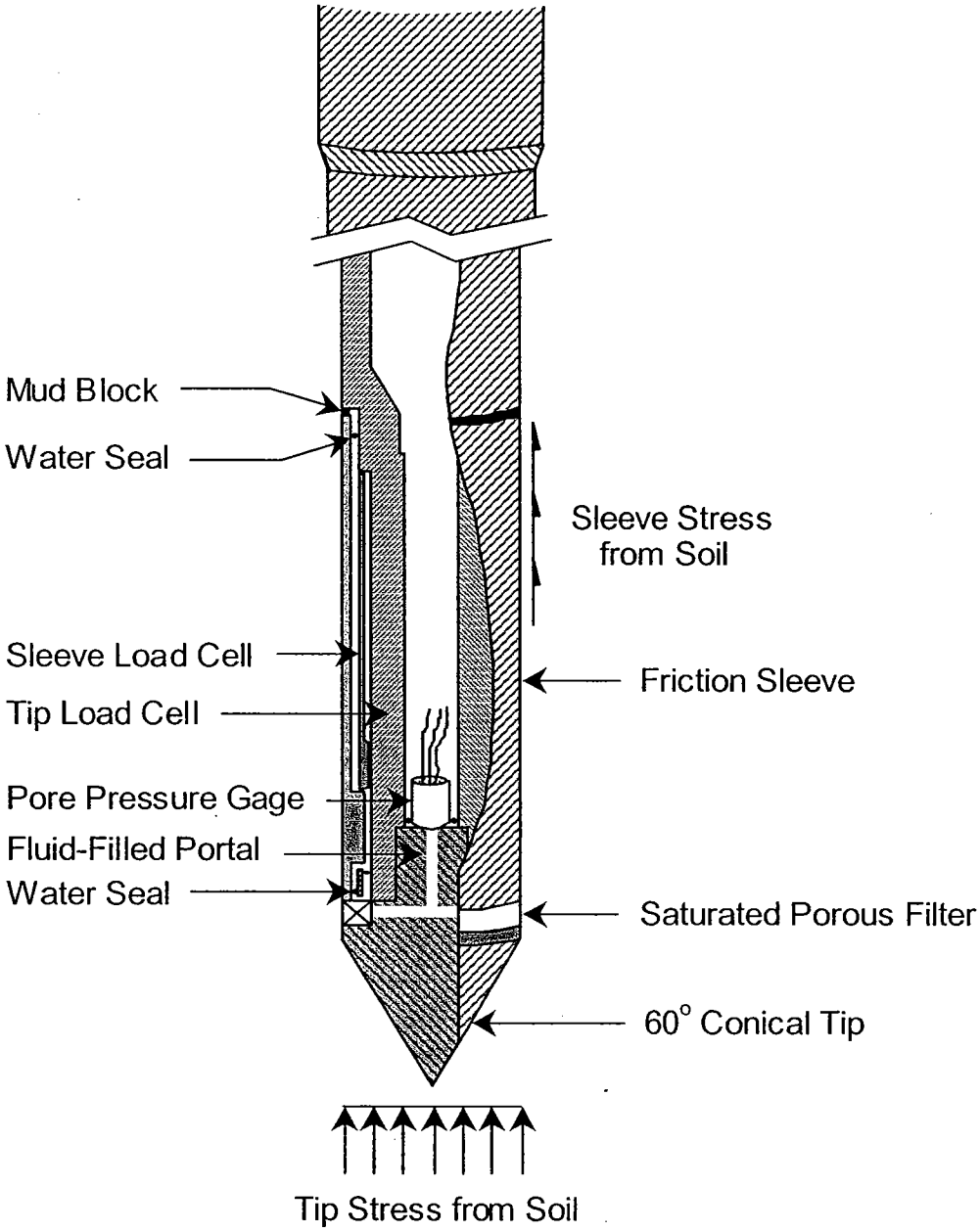


Figure 2.1 ARA's cone penetrometer

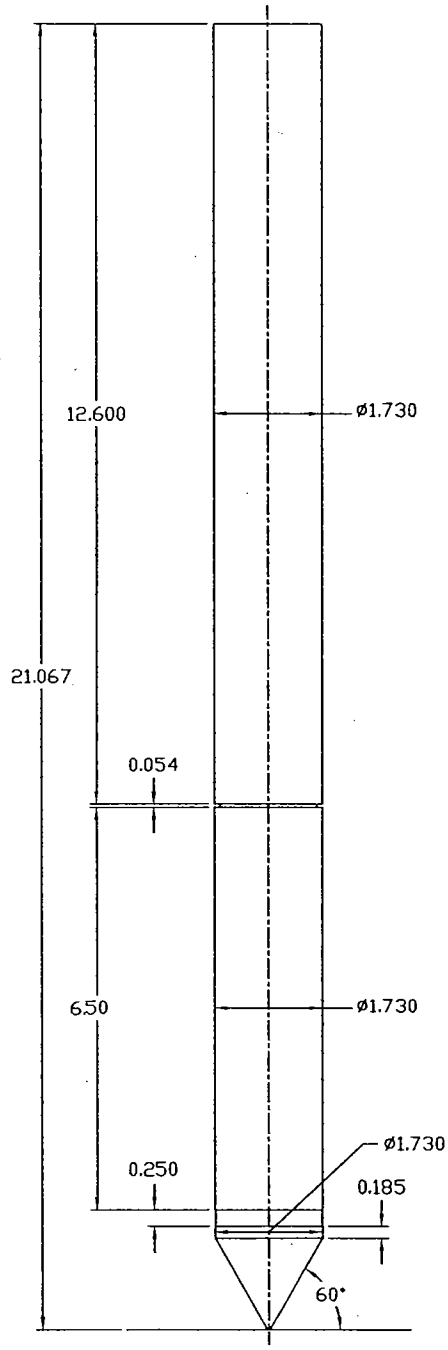


Figure 2.2 Schematic of cone penetrometer with dimensions

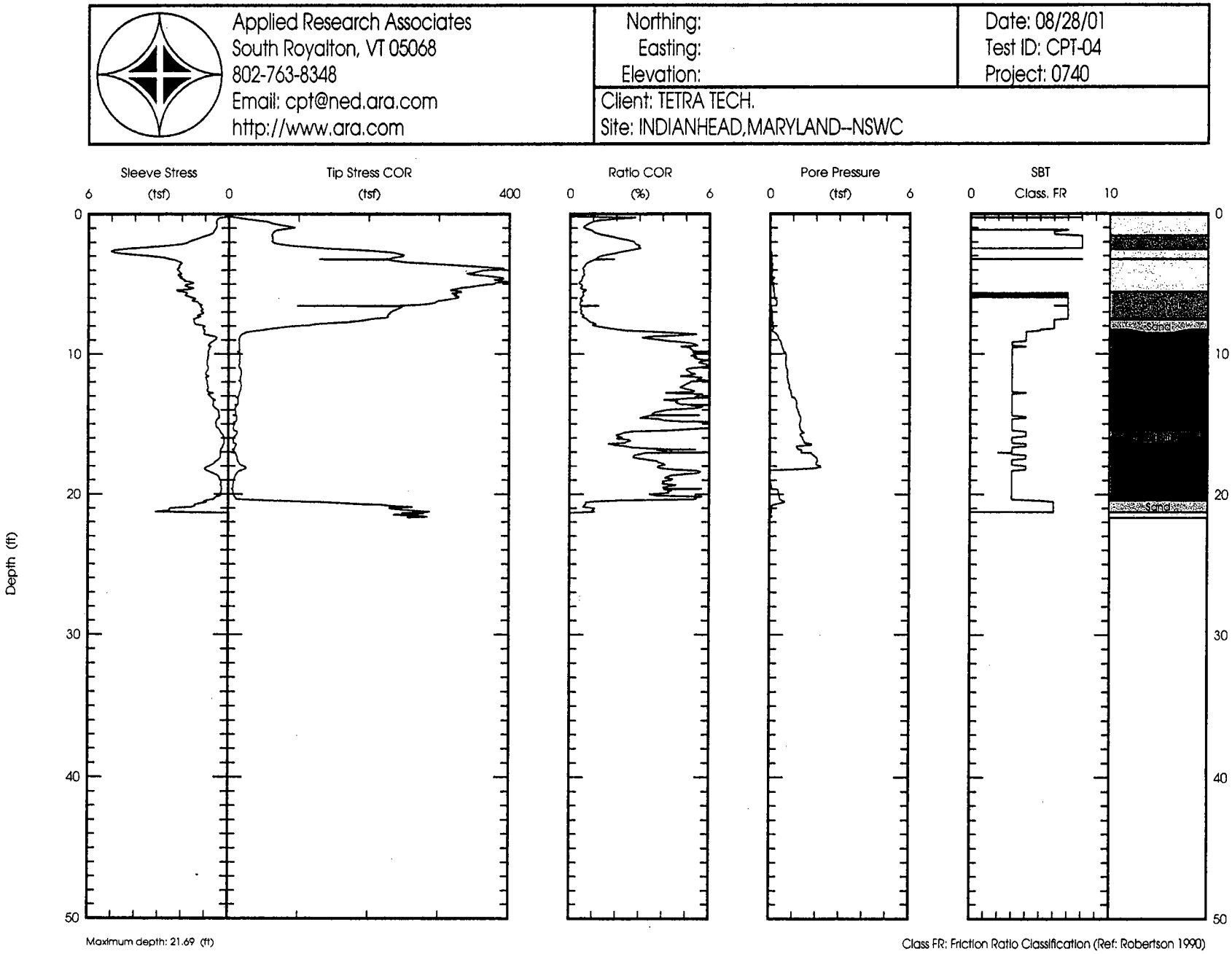


Figure 2.3 Example CPT profile from the NSWC Indian Head project

Test ID: CPT-04
File: 428G104.ECP

SECTION 3
DATA ANALYSIS TECHNIQUES

3.1 OVERVIEW

Presented in this section is a description of analysis techniques used to determine engineering parameters. The methods used to determine the soil type information from the CPT data are also discussed.

3.2 LOCATION OF THE SITE WATER TABLE

Generally, the static water table at a given site can be identified from the penetration pore pressures, since it will be equal to the hydrostatic pore pressure in freely draining soil layers. When no such layers are present, pore pressure dissipation tests can be performed to determine hydrostatic pressures. This information was used in the soil classification routines for the calculation of effective stress of the soil materials. A saturated unit weight of 120 pounds per cubic foot was assumed for all calculations. For the NSWC Indian Head site, depth to groundwater was determined from nearby monitoring wells. Table 1 lists depth to groundwater at most locations.

3.3 PORE PRESSURE CORRECTION OF TIP STRESS

Cone penetrometers, by necessity, must have a joint between the tip and sleeve. Pore pressure acting behind the tip decreases the total tip resistance that would be measured if the penetrometer was without joints. The influence of pore pressure in these joints is compensated for by using the net area concept (Ref. 2). The corrected tip resistance is given by:

$$q_T = q_c + u\left[1 - \frac{A_n}{A_T}\right] \tag{3.1}$$

where:
- q_T = corrected tip resistance (psi)
- q_c = measured tip resistance (psi)
- u = penetration pore pressure measured behind the tip (psi)
- A_n = net area behind the tip not subjected to the pore pressure (1.95 in^2)
- A_T = projected area of the tip (2.405 in^2).

Hence, for the ARA cone design, the tip resistance is corrected as:

$$q_T = q_c + u(0.189) \tag{3.2}$$

Laboratory calibrations have verified Equation 3.2 for ARA's piezo-cone design.

A joint also exists behind the top of the sleeve (see Figure 2.1). However, since the sleeve is designed to have the same cross sectional area on both ends, the pore pressures acting on the sleeve cancel out. Laboratory tests have verified that the sleeve is not subjected to unequal end area effects. Thus, no correction for pore pressure is needed for the sleeve friction data. The net effect of applying the pore pressure correction is to increase the tip resistance. Generally, this correction is only significant when the measured tip resistance is very low.

3.4 SOIL BEHAVIOR TYPE

The tip resistance, friction ratio, and pore pressure values from CPT profiles can be used to determine a soil stratigraphy profile. Plots of normalized tip resistance versus friction ratio and normalized tip resistance versus penetration pore pressure can be used to determine Soil Behavior Type, SBT, as a function of depth. Both methods of soil description are based on empirical charts developed by Robertson and Campanella (Ref. 2). The friction ratio based routines were selected for initial layering for this project, due to the variability in soil. All locations were processed using this routine to compare to the boring logs provided. The friction ratio SBT is determined from the chart in Figure 3.1 using the normalized corrected tip stress, q_{NT}, and the normalized friction ratio, f_{SN}.

The normalized tip resistance is defined as:

$$q_{NT} = \frac{q_T - \sigma_{vo}}{\sigma'_{vo}} \tag{3.3}$$

The normalized friction ratio is defined as:

$$f_{SN} = \frac{f_s}{q_T - \sigma_{vo}} x\ 100 \tag{3.4}$$

where: f_s = sleeve friction
q_T = corrected tip resistance
σ_{vo} = total overburden stress
σ'_{vo} = effective overburden stress

The intersection point of the q_{NT} and f_{SN} values normally falls in a classification zone. The zone number corresponds to a soil behavior type (SBT) as shown in Figure 3.1. At some depths, the CPT data will fall outside of the range of the chart. When this occurs, no data is plotted and a break is seen in the SBT profile. This occasionally occurs at the top of a penetration as the

effective vertical stress is very small and produces normalized cone resistances greater than 1000.

The classification profiles can be very detailed due to the high spatial resolution afforded by collecting one sample every 2 cm (0.8 in) for CPT profiles. Frequently significant variability in soil types over small changes in elevation can be observed in the profiles. To provide a simplified soil stratigraphy for comparison to standard boring logs, a layering and generalized classification system was implemented. Layer thicknesses are determined based on the variability of the SBT profile. The layer sequence begins at the ground surface and layer thicknesses are determined based upon changes in the standard deviation of the SBT number. Whenever an additional 6-inch increment deviates from the previous increment, a new layer is started, otherwise, this material is added to the layer above and the next 6-inch section is evaluated. The soil type for the layer is determined by the mean value for the complete layer.

The soil classification chart and SBT descriptors were compared to the respective boring logs. Initial comparisons indicated that the empirical correlations could accurately delineate the underlying soils. Table 3.1 lists CPT locations and the correlating boring logs used in the comparison.

Table 3.1 CPT Locations and Corresponding Boring Locations

Date of CPT Sounding	CPT Location	Maximum Depth of Penetration (ft)	Corresponding Boring Log I.D.
28 Aug 01	CPT-04	21.7	S57SB32
29 Aug 01	CPT-05	20.5	S57MW022
29 Aug 01	CPT-09	55.3	S57SB033/MW023

3.5 CORRELATION OF CPT-04 TO BORING LOG S57SB32

Test location CPT-04 was located approximately 40 feet from boring location S57SB32 as indicated on Figure 1.1. The soil classification correlation described in section 3.4 and illustrated on Figure 3.1 was used to generate the soil classification profile presented on Figure 2.3 and all locations completed at this site.

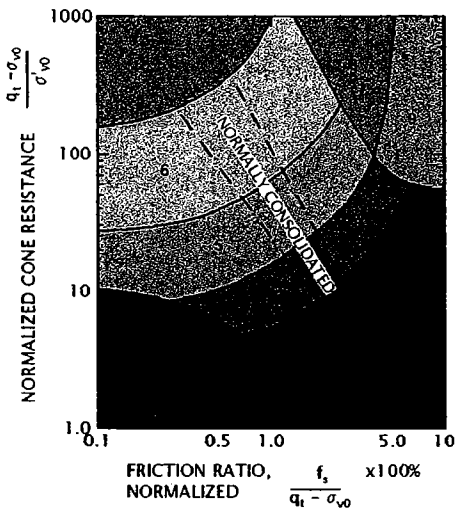
Beneath the top soil, the cone penetrometer encountered very stiff over consolidated material in the first 6 to 7 feet of penetration followed by a 2 foot layer of gravely sand as evident by the extremely high tip stresses and friction ratio values of 1%. Accordingly, at boring location S57SB32, sand and gravel was observed from the ground surface to a depth of 6.5 feet below ground surface (bgs). Below 6.5 feet bgs at this boing location, finer silts and clays, and clay with trace silts were observed that extended to a final boring depth of 20 feet bgs. Similarly, the cone penetrometer identified the soils as predominantly clay from 8 feet to 20 feet bgs as indicated by the significant decrease in tip stress and increase in pore pressure. The increase in friction ratio also confirms the presences of finer, less permeable material. A clayey silt lens (less than 1 ft thick) is encountered at 16.5 feet bgs as evident by the very low tip stress and sleeve friction. Sounding refusal occurred as the probe encountered a more resistant sand layer.

CPT Soil Classification Legend

Zone	Q_t/N	Description
1	2	Sensitive, Fine Grained
2	1	Organic Soils-Peats
3	1.5	Clays-Clay to Silty Clay
4	2	Silt Mixtures-Clayey Silt to Silty Clay
5	3	Sand Mixtures-Silty Sand to Sandy Silt
6	4.5	Sands-Clean Sand to Silty Sand
7	6	Gravelly Sand to Sand
8	1	Very Stiff Sand to Clayey Sand *
9	2	Very Stiff, Fine Grained *

(*) *Heavily Overconsolidated or Cemented*

Normalized Friction Ratio Classification Chart



(Ref. Robertson, 1990)

Coefficient of Permeability (cm/s)

Zone	Description	Permeability
1	Sensitive Fines	10^{-5}
2	Organic Soils-Peats	10^{-5}
3	Clays	10^{-7}
4	Silt Mixtures	10^{-6}
5	Sand Mixtures	10^{-4}
6	Sands	10^{-2}
7	Gravelly Sands	10^{-1}
8	Very Stiff Sands	10^{-5}
9	Very Stiff Fines	10^{-6}

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(802) 763-8348, cpt@ara.com, http://www.ara.com

Figure 3.1 Soil classification chart

SECTION 4

LIST OF REFERENCES

1. American Society for Testing Materials, "Standard Test Method for Performing Electric Friction Cone and Piezocone Penetration Testing of Soil," ASTM Designation: D5778, 1995.
2. Robertson, P. K. and R. G. Campanella, Guidelines for Using the CPT, CPTU and Marchetti DMT for Geotechnical Design, Vol. II, University of British Columbia, Vancouver, BC, Canada, March 1988.
3. Schmertmann, J. H., Guidelines for Using the CPT, CPTU, and Marchetti DMT for Geotechnical Design, Volume III, University of British Columbia, Vancouver, BC, Canada, March 1988.
4. Use of In Situ Test in Geotechnical Engineering, S. P. Clemence, ed., Geotechnical Special Publications No. 6, proceedings of In Situ '86 Conference, sponsored by Geotechnical Engineering Division of the American Society of Civil Engineers, Blacksburg, VA, June 1986.
5. Raligh, M. M. and J. N. Levadoux, Pore Pressure Dissipation After Cone Penetration, Massachusetts Institute of Technology, Cambridge, MA, April 1980.

APPENDIX A

PIEZOCONE PROFILES

Applied Research Associates
South Royalton, VT 05068
802-763-8348
Email: cpt@ned.ara.com
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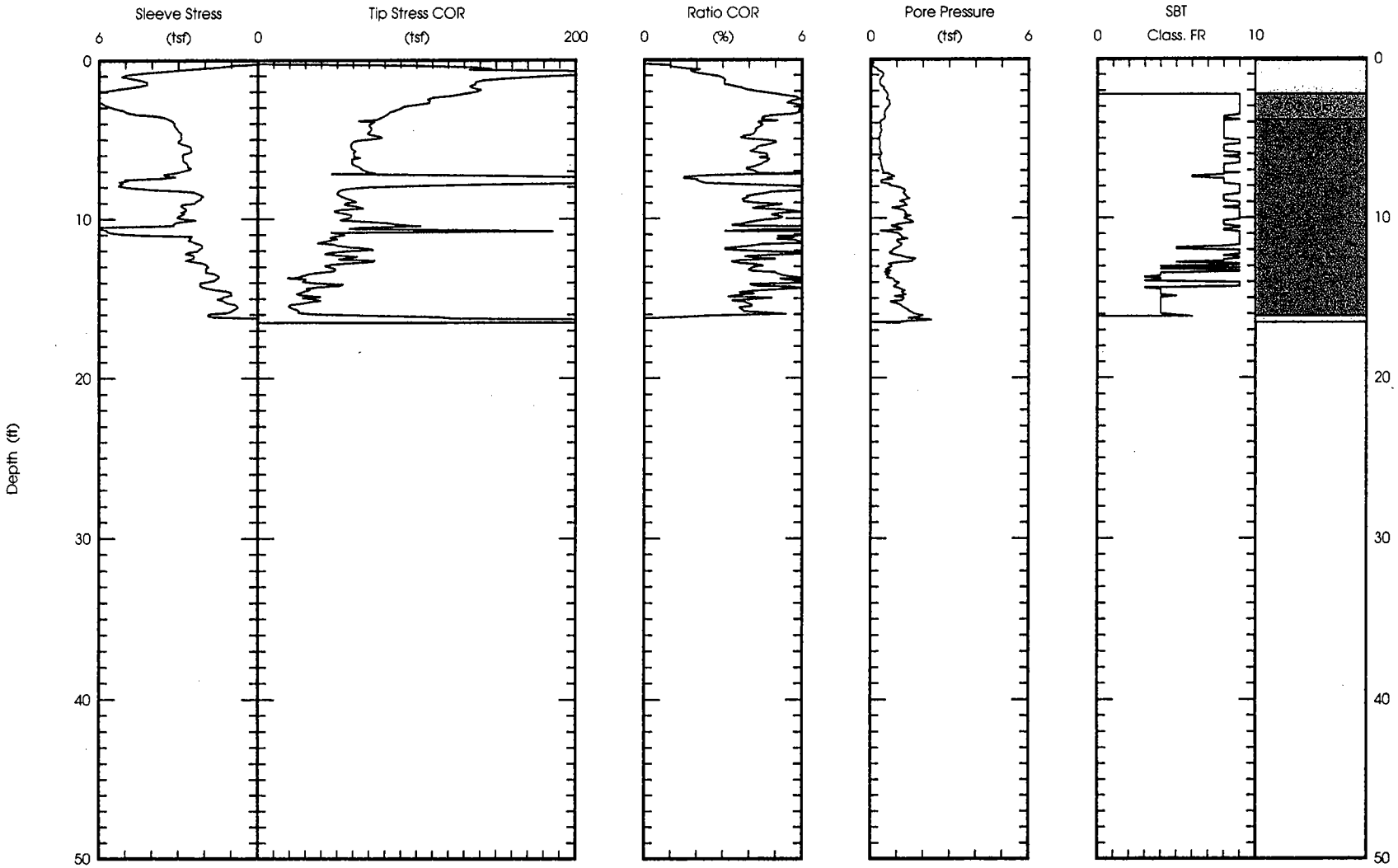
Northing:
Easting:
Elevation:

Date: 08/30/01
Test ID: CPT-01
Project: 0740

Client: TETRA TECH.
Site: INDIANHEAD,MARYLAND–NSWC



Maximum depth: 16.56 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-01
File: 430G106.ECP

Applied Research Associates
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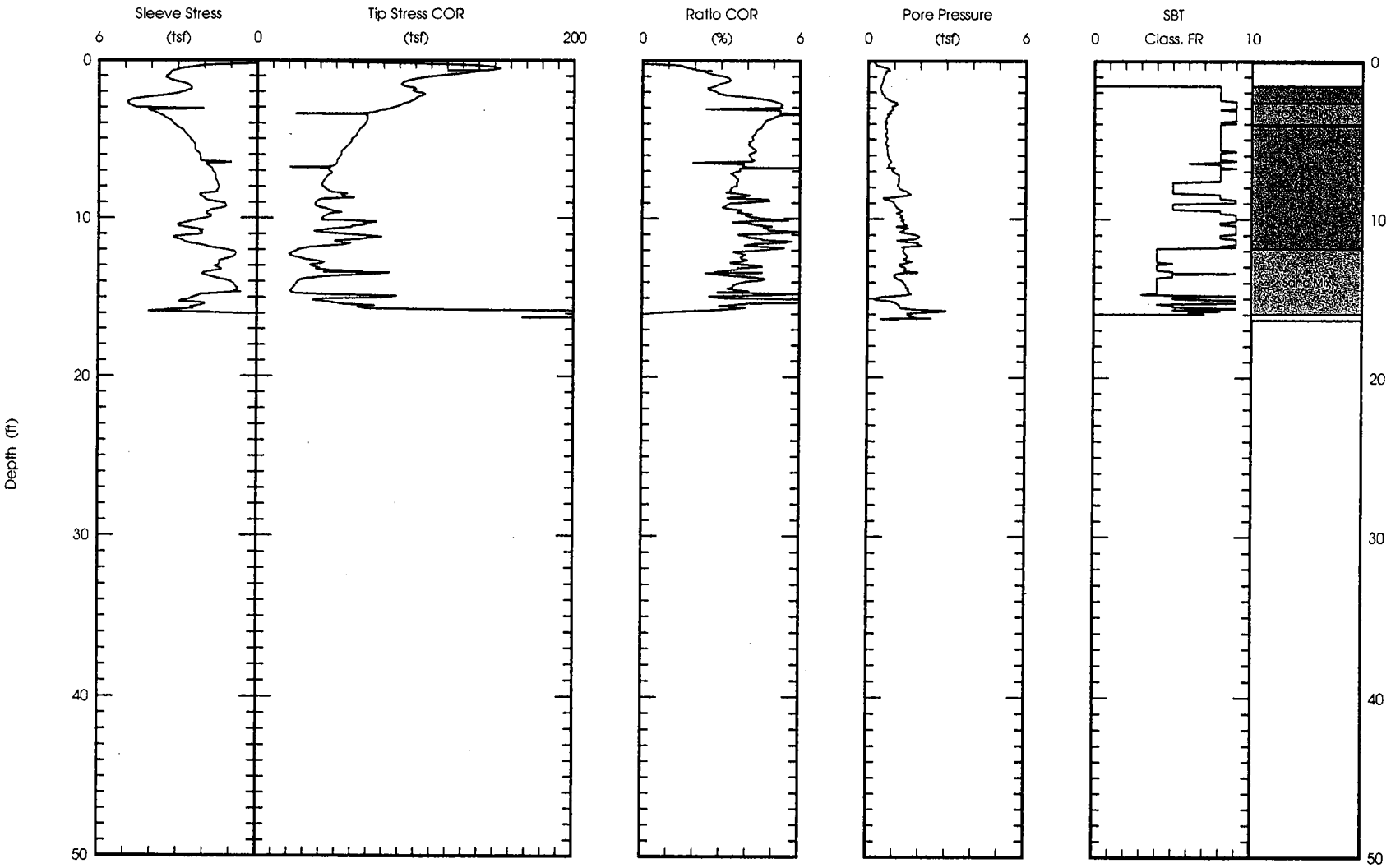
http://www.ara.com

Northing:
Easting:
Elevation:

Date: 08/30/01
Test ID: CPT-01B
Project: 0740

Client: TETRA TECH.
Site: INDIANHEAD,MARYLAND–NSWC



Maximum depth: 16.35 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-01B
File: 430G107.ECP

Applied Research Associates South Royalton, VT 05068 802-763-8348 Email: cpt@ned.ara.com http://www.ara.com	Northing: Easting: Elevation:	Date: 08/30/01 Test ID: CPT-02 Project: 0740
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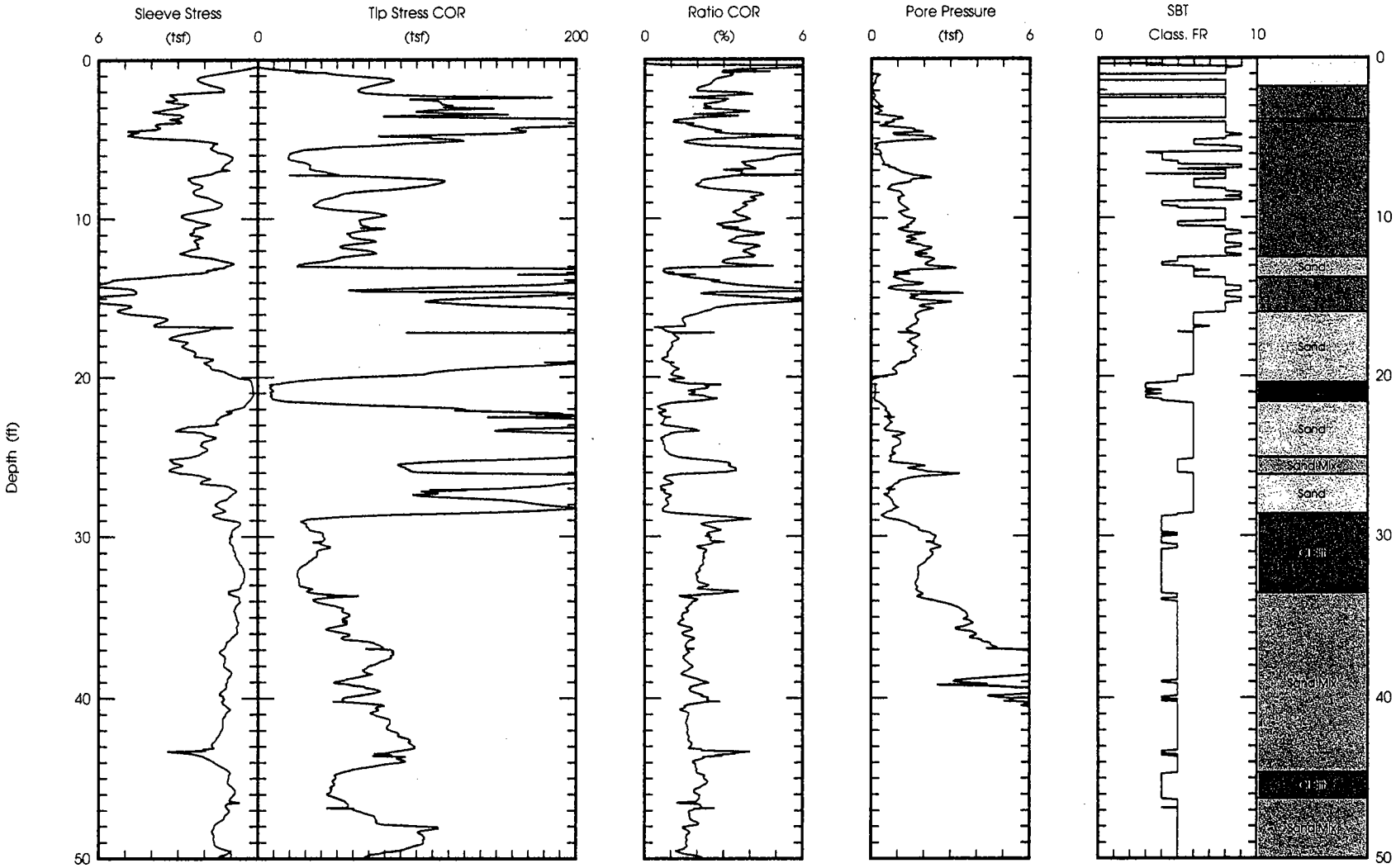

Maximum depth: 53.37 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-02
File: 430G104.ECP

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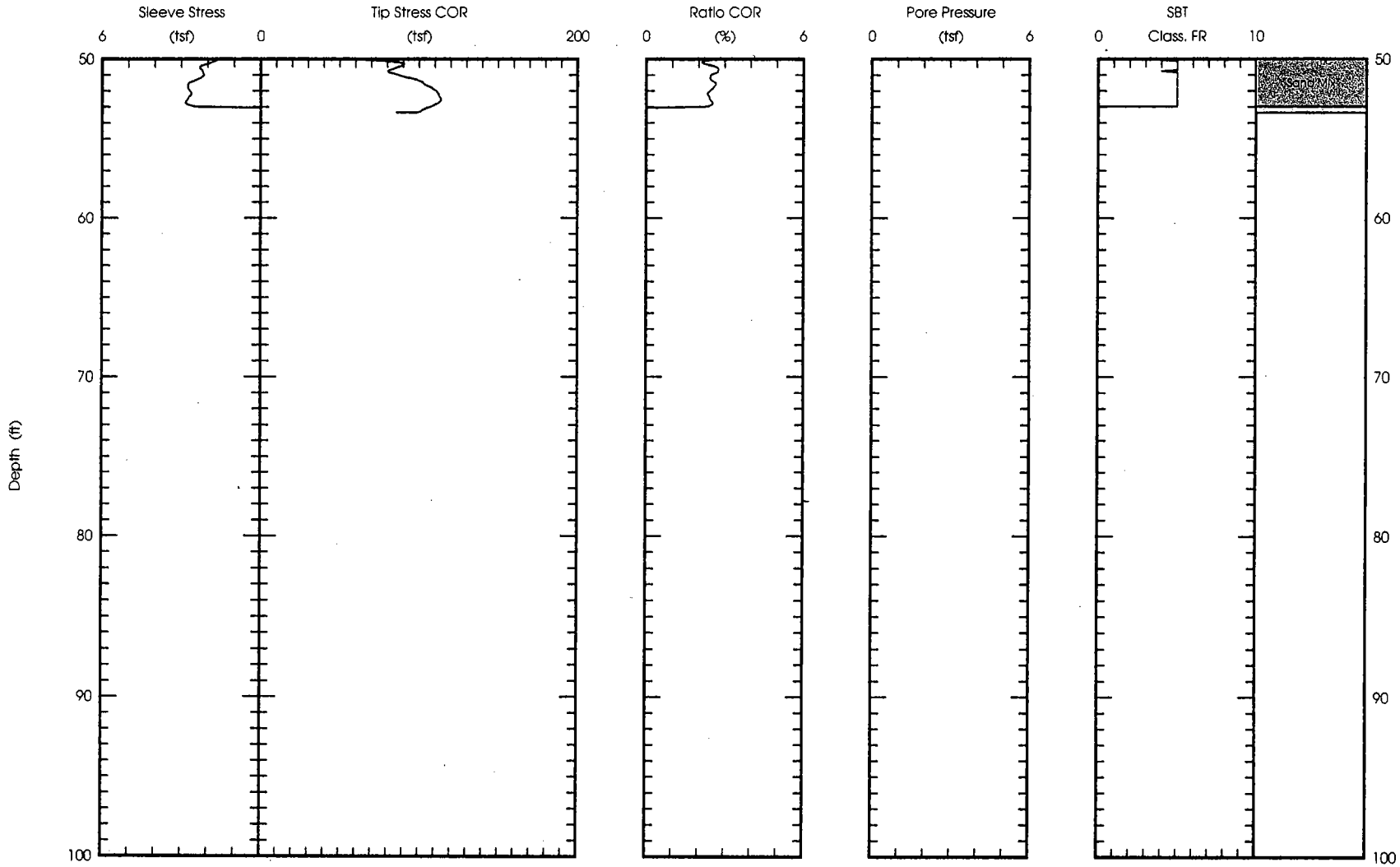
802-763-8348
Email: cpt@ned.ara.com
http://www.ara.com

Northing:	Date: 08/30/01
Easting:	Test ID: CPT-02
Elevation:	Project: 0740
Client: TETRA TECH.	
Site: INDIANHEAD,MARYLAND–NSWC	



Maximum depth: 53.37 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-02
File: 430G104.ECP

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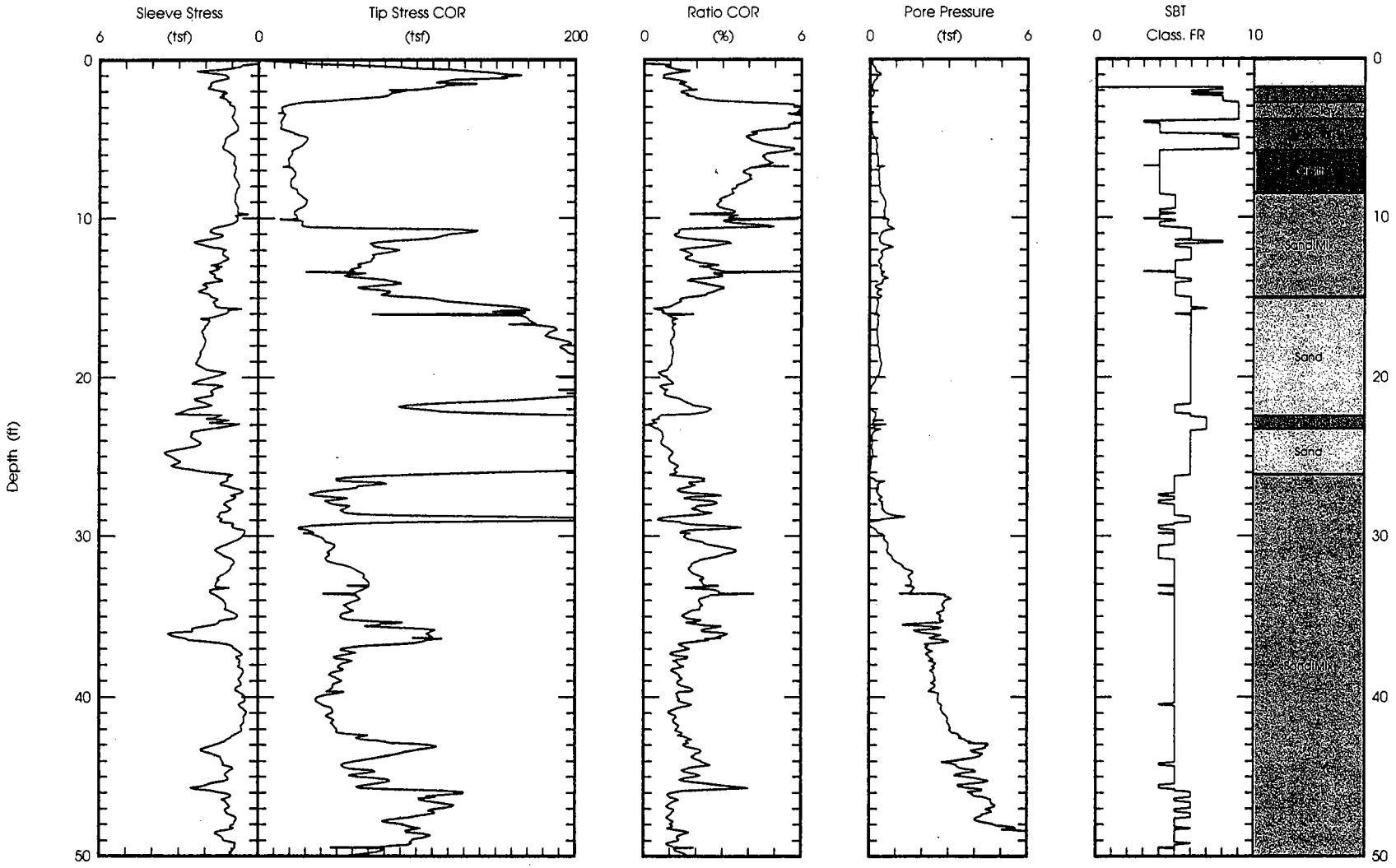
Northing:
Easting:
Elevation:

Date: 08/29/01
Test ID: CPT-03
Project: 0740

Client: TETRA TECH.
Site: INDIANHEAD,MARYLAND--NSWC



Maximum depth: 52.74 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-03
File: 429G114.ECP

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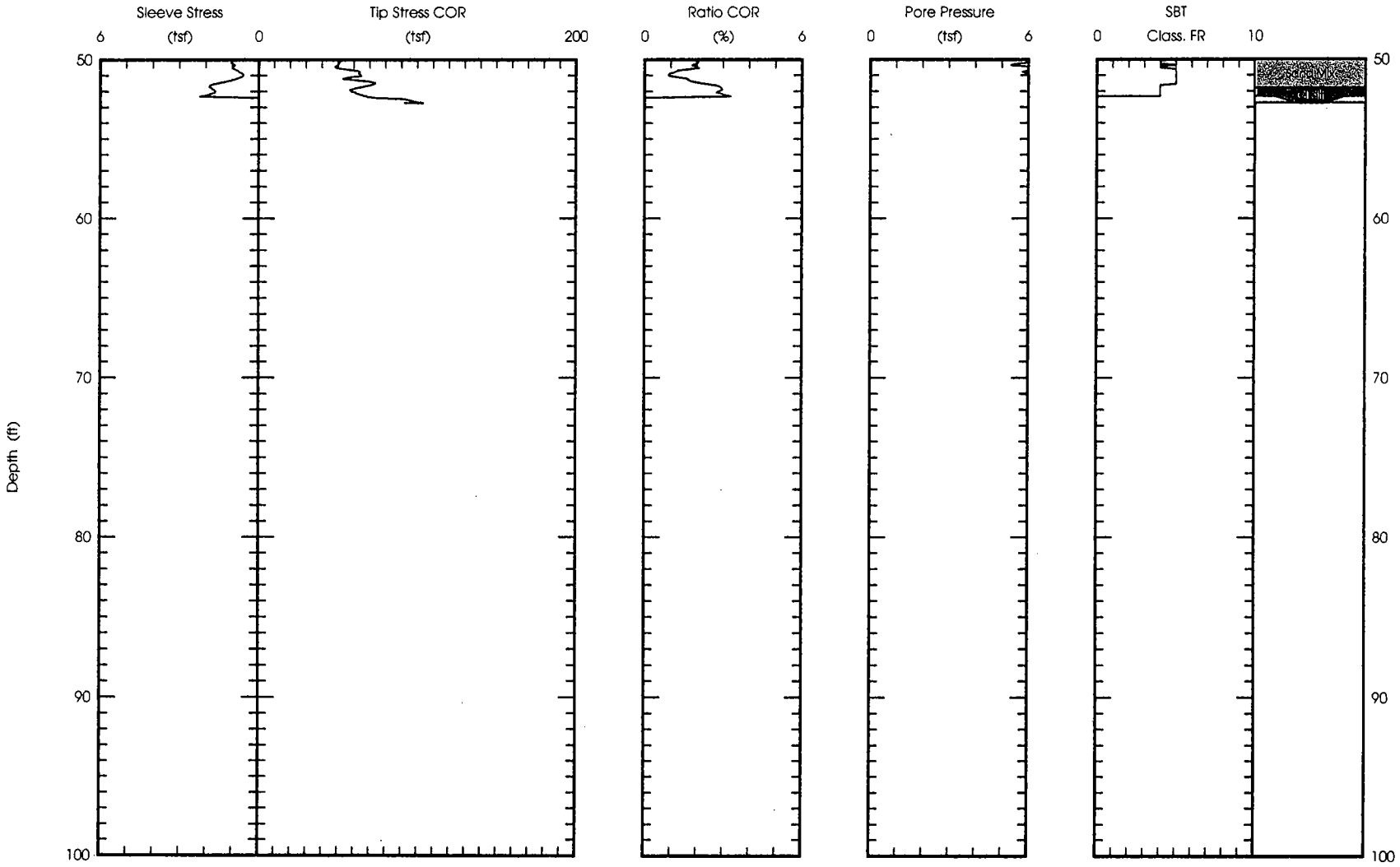
Northing:	Date: 08/29/01
Easting:	Test ID: CPT-03
Elevation:	Project: 0740
Client: TETRA TECH.	
Site: INDIANHEAD,MARYLAND--NSWC	



Maximum depth: 52.74 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-03
File: 429G114.ECP

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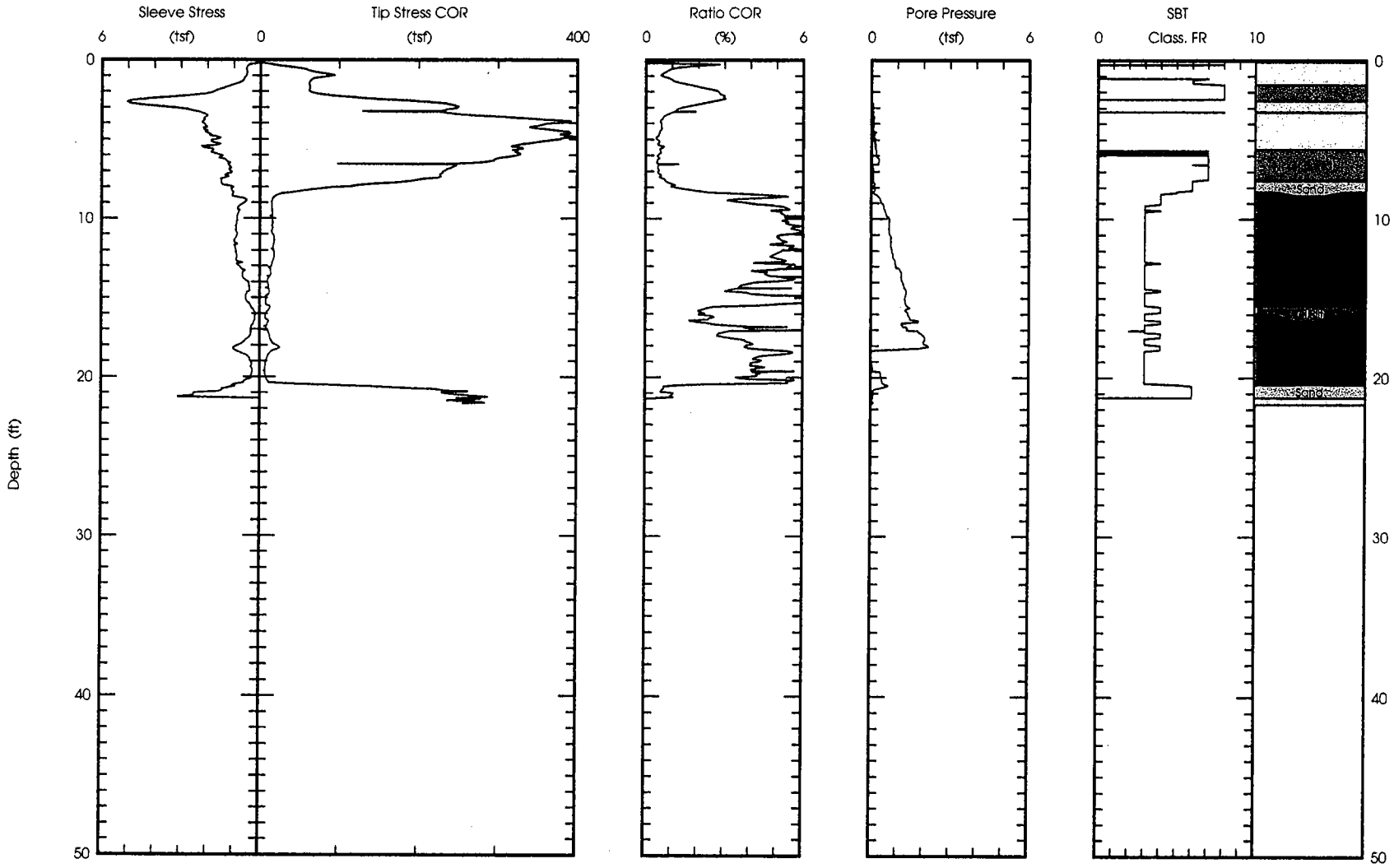
Northing:
Easting:
Elevation:

Date: 08/28/01
Test ID: CPT-04
Project: 0740

Client: TETRA TECH.
Site: INDIANHEAD,MARYLAND--NSWC

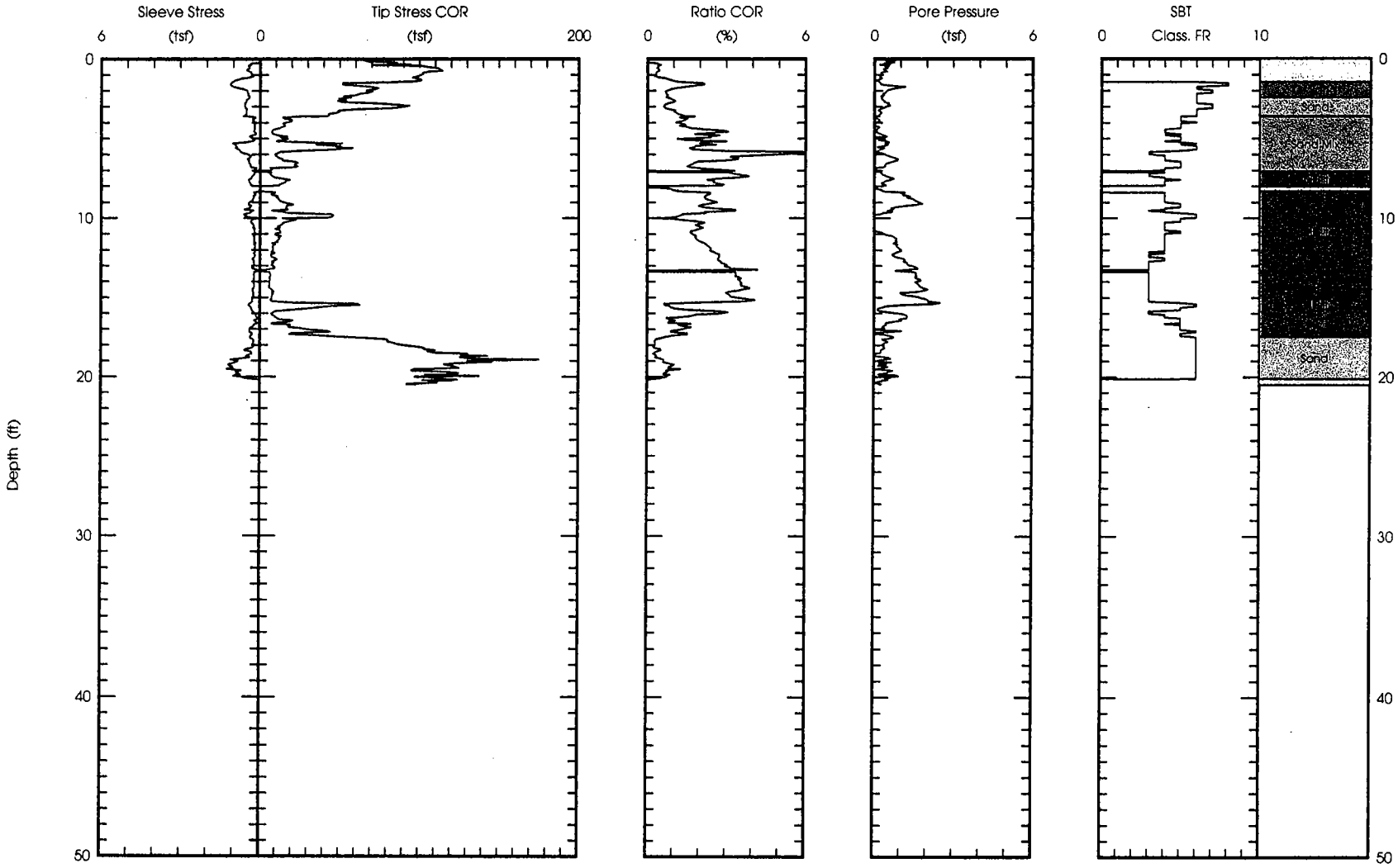


Maximum depth: 21.69 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-04
File: 428G104.ECP

Applied Research Associates South Royalton, VT 05068 802-763-8348 Email: cpt@ned.ara.com http://www.ara.com	Northing: Easting: Elevation:	Date: 08/29/01 Test ID: CPT-05 Project: 0740
	Client: TETRA TECH. Site: INDIANHEAD,MARYLAND--NSWC	



Maximum depth: 20.49 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-05
File: 429G101.ECP

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Northing:
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Elevation:

Date: 08/29/01
Test ID: CPT-05B
Project: 0740

Client: TETRA TECH.
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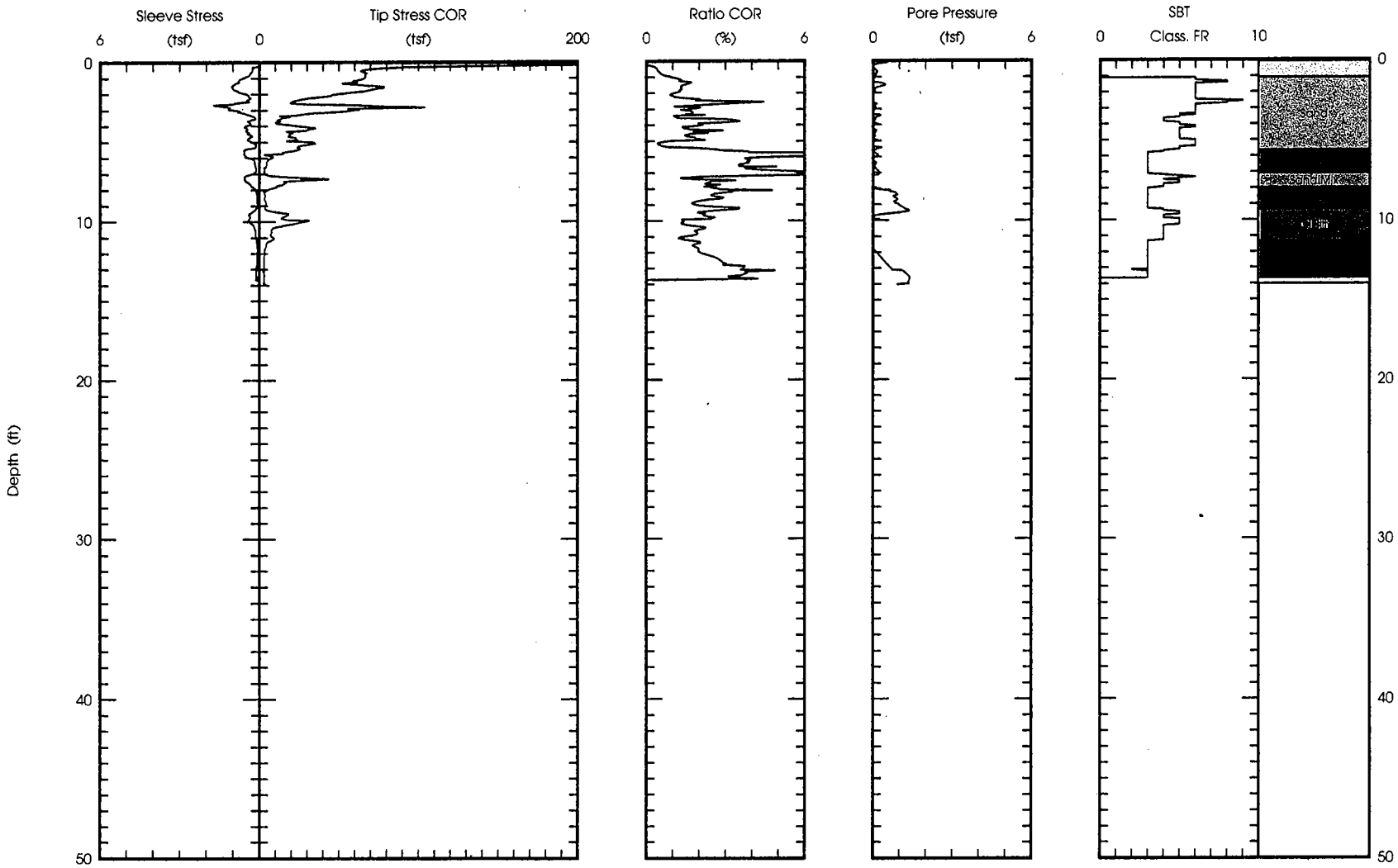

Maximum depth: 14.02 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

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Email: cpt@ned.ara.com
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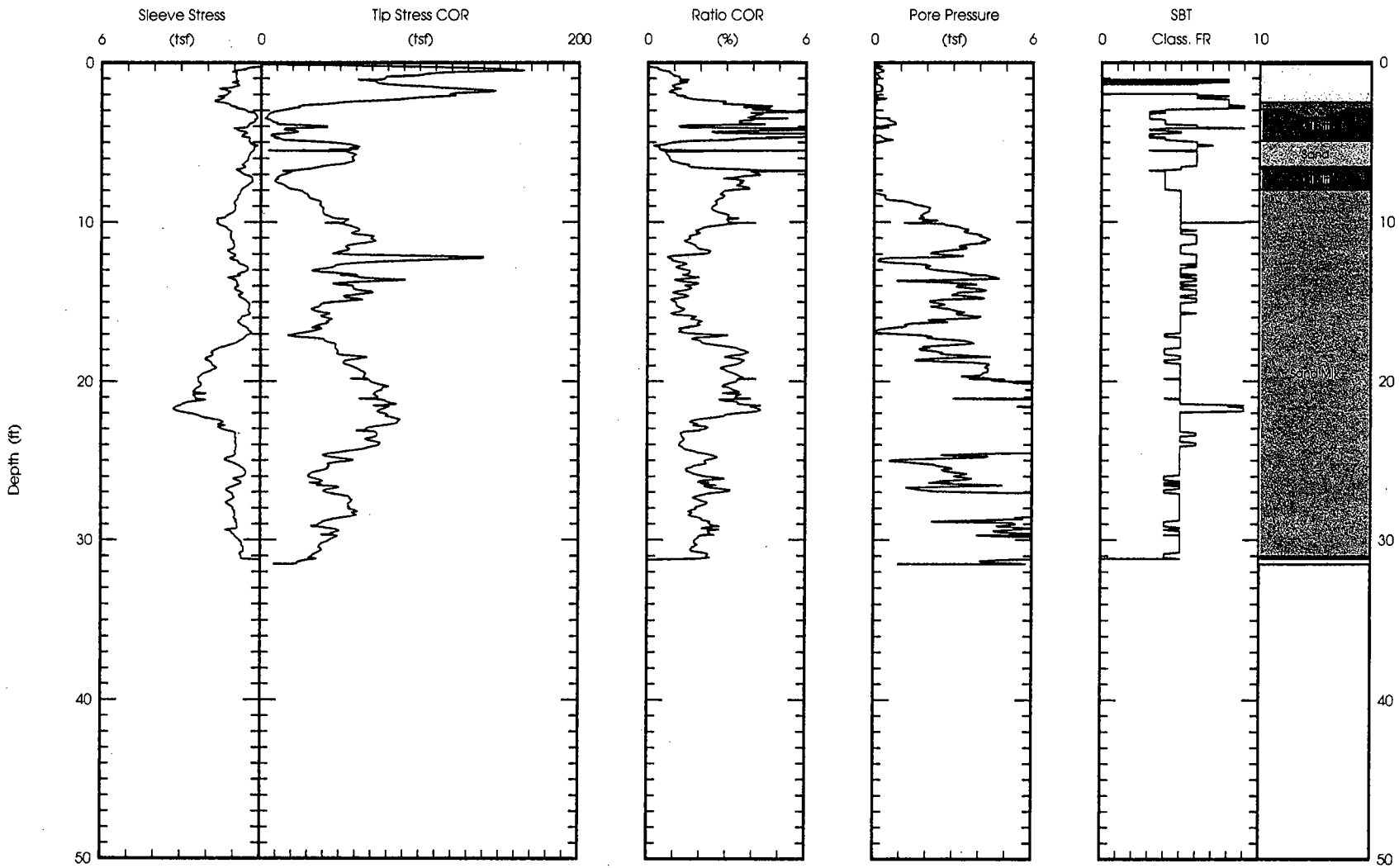
Northing:	Date: 08/29/01
Easting:	Test ID: CPT-06
Elevation:	Project: 0740
Client: TETRA TECH.	
Site: INDIANHEAD,MARYLAND--NSWC	



Maximum depth: 31.52 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-06
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Applied Research Associates South Royalton, VT 05068 802-763-8348 Email: cpt@ned.ara.com http://www.ara.com	Northing: Easting: Elevation:	Date: 08/30/01 Test ID: CPT-07 Project: 0740
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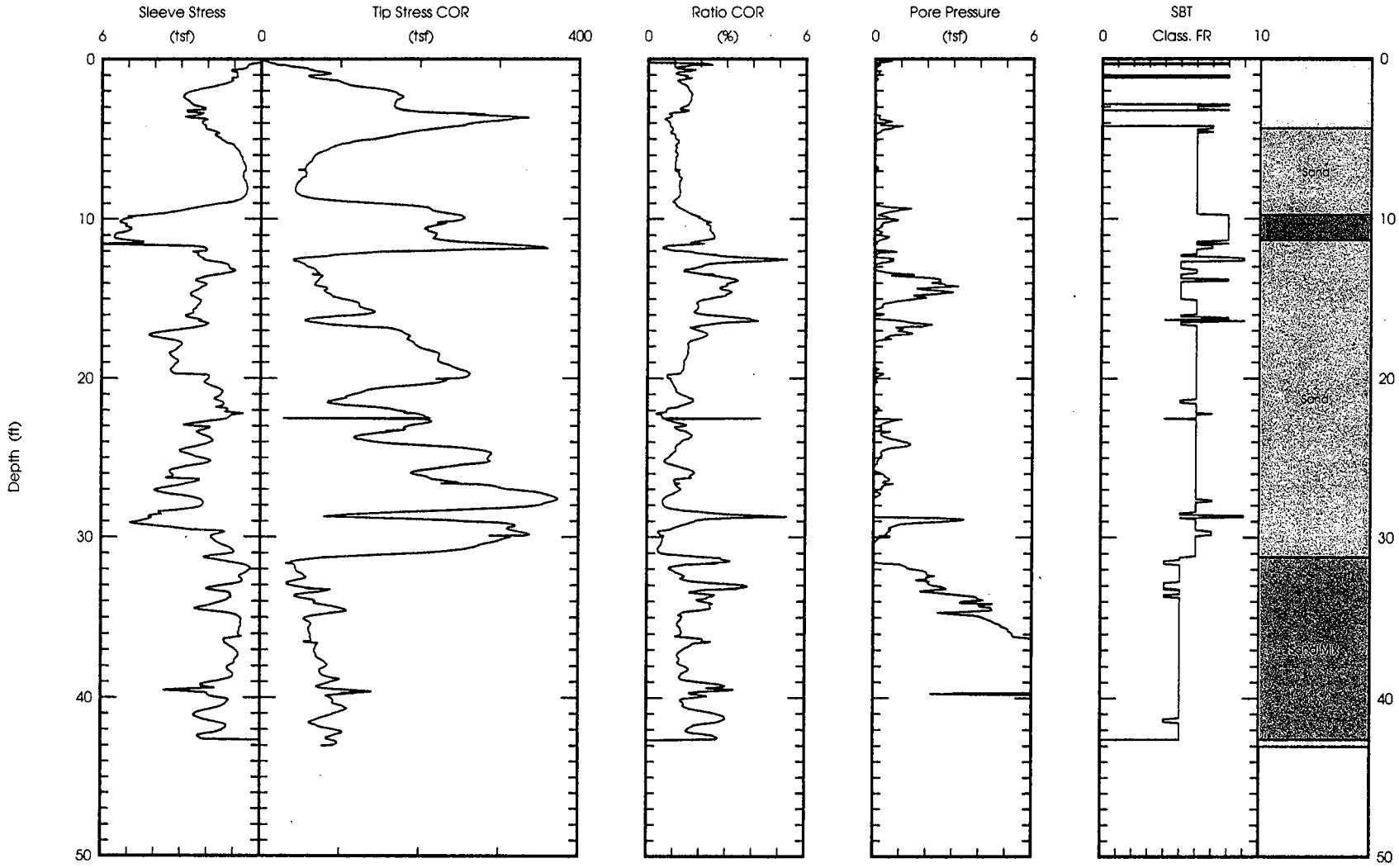

Maximum depth: 43.02 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

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802-763-8348
Email: cpt@ned.ara.com
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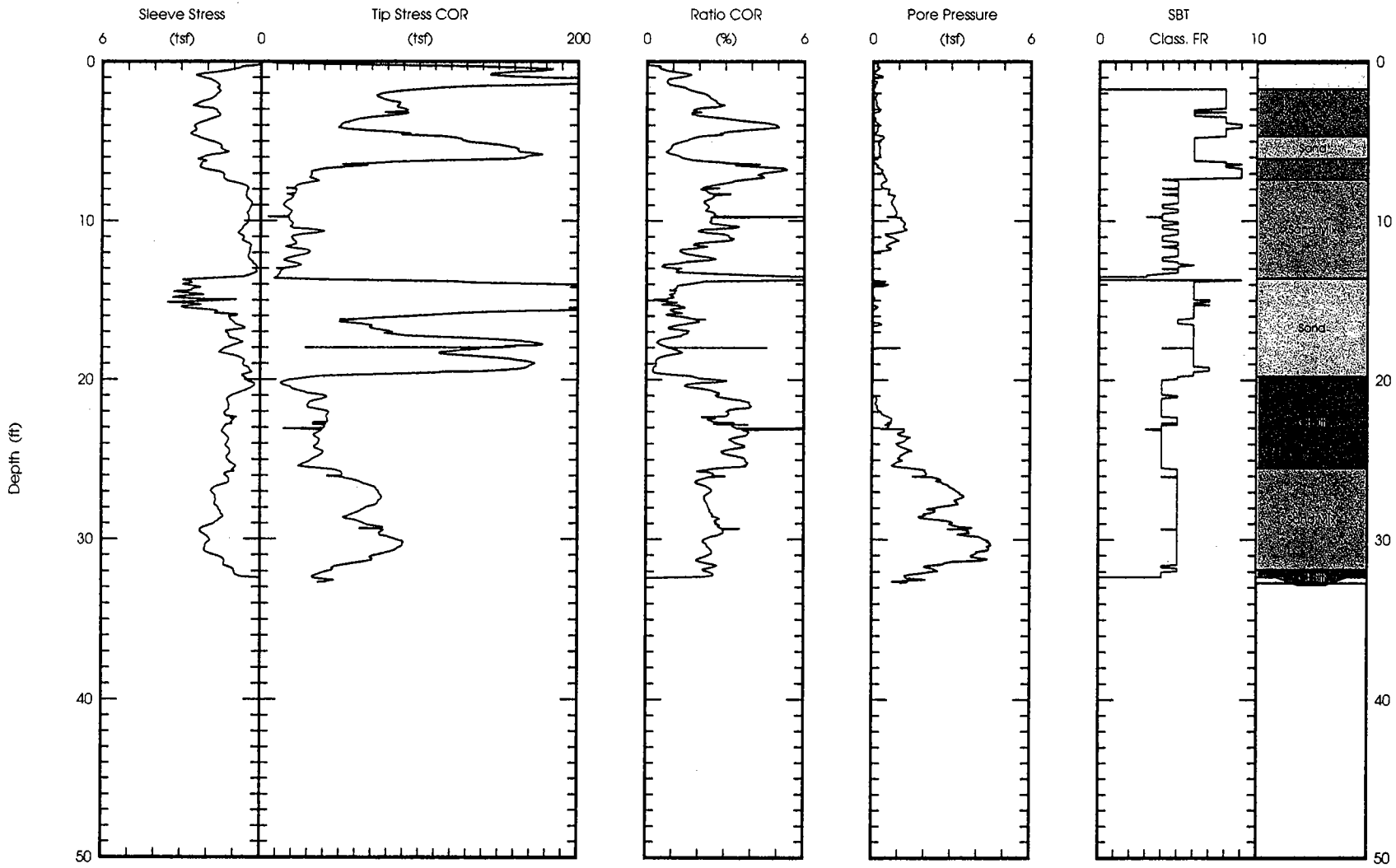
Northing:	Date: 08/29/01
Easting:	Test ID: CPT-08
Elevation:	Project: 0740
Client: TETRA TECH.	
Site: INDIANHEAD,MARYLAND--NSWC	



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Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-08
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Applied Research Associates South Royalton, VT 05068 802-763-8348 Email: cpt@ned.ara.com http://www.ara.com	Northing: Easting: Elevation:	Date: 08/29/01 Test ID: CPT-09 Project: 0740
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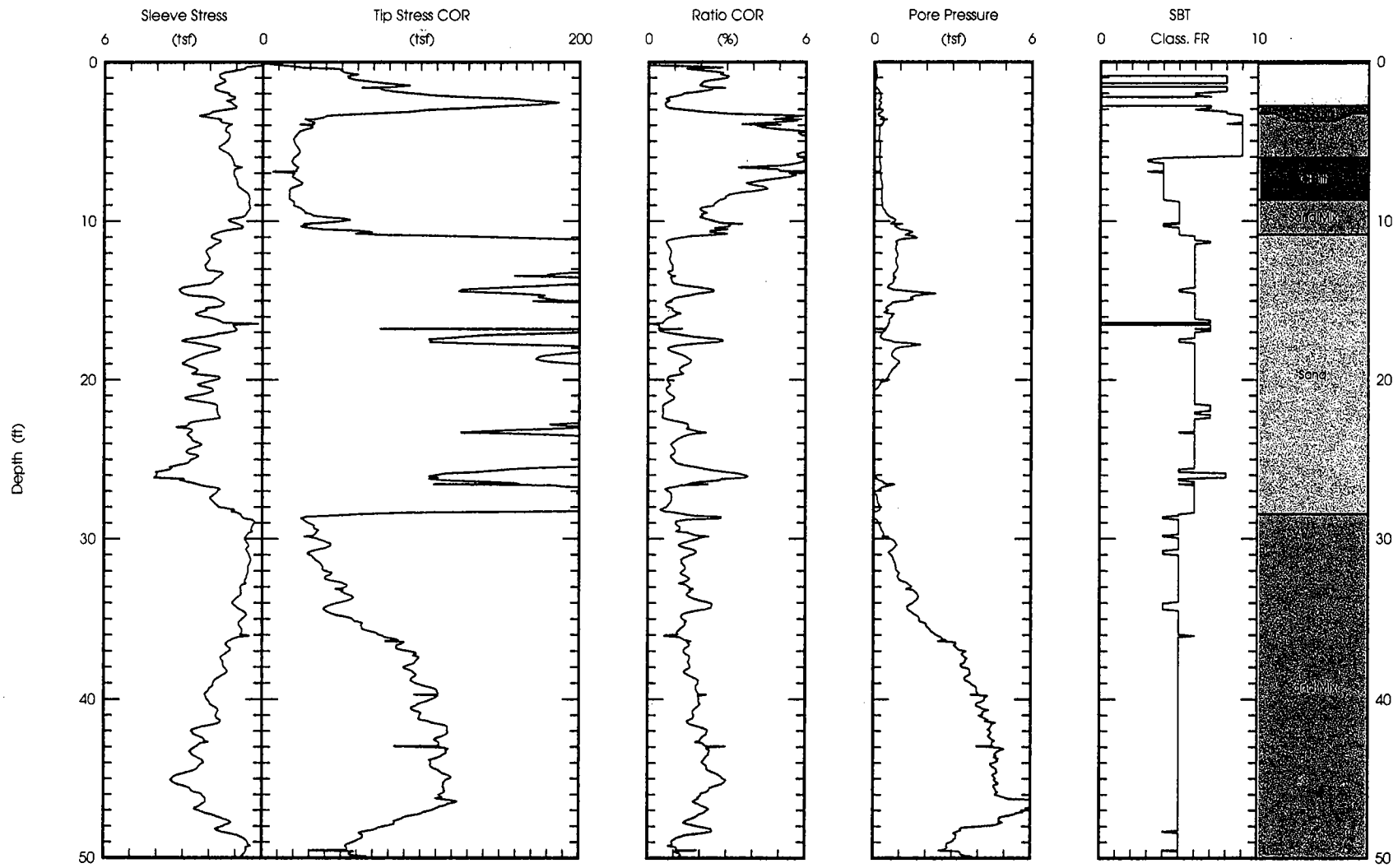

Maximum depth: 55.36 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: CPT-09
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Applied Research Associates South Royalton, VT 05068 802-763-8348 Email: cpt@ned.ara.com http://www.ara.com	Northing: Easting: Elevation:	Date: 08/29/01 Test ID: CPT-09 Project: 0740
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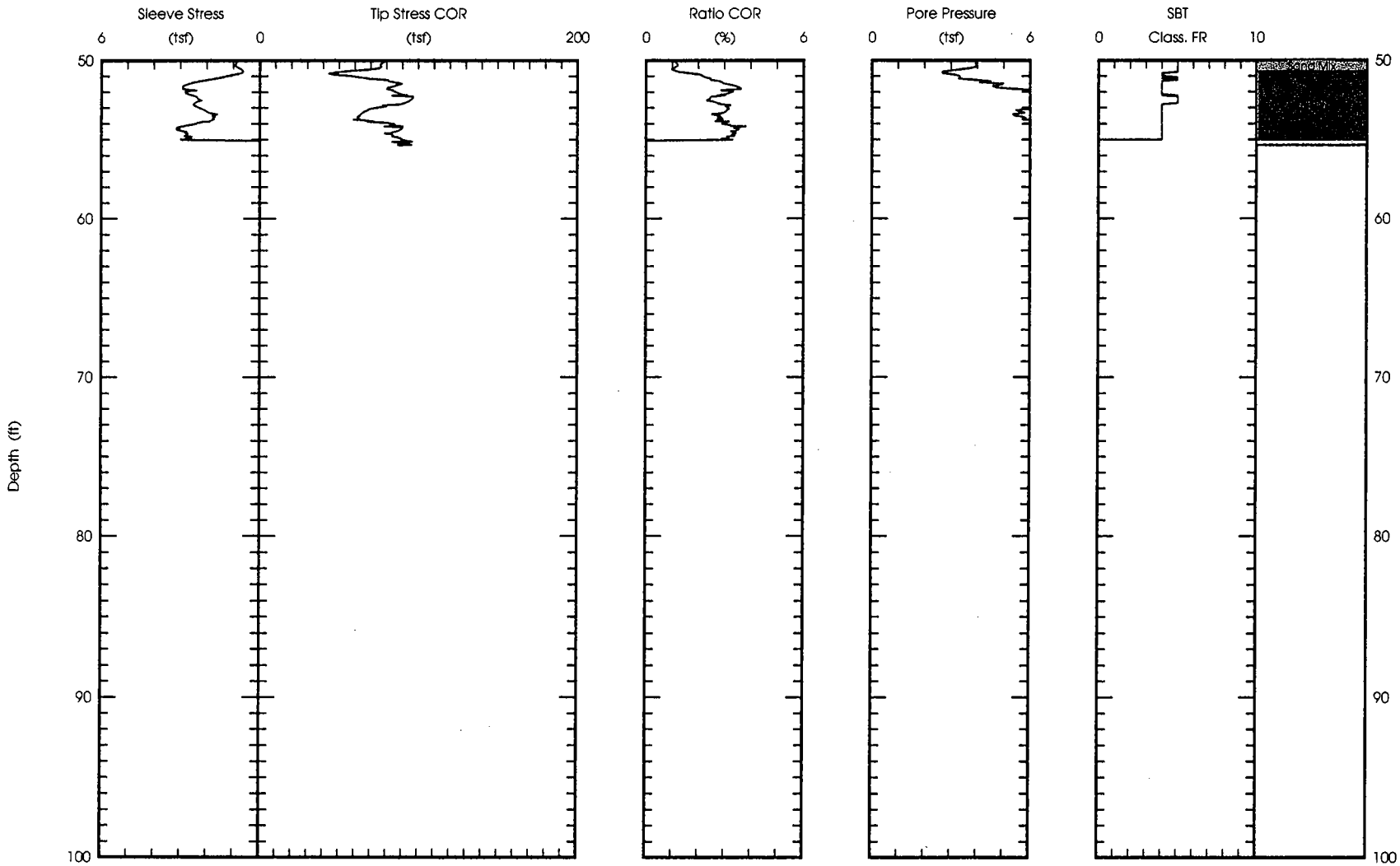

Maximum depth: 55.36 (ft)
Page 2 of 2

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

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File: 429G112.ECP

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Northing:
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Elevation:

Date: 08/28/01
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Project: 0740

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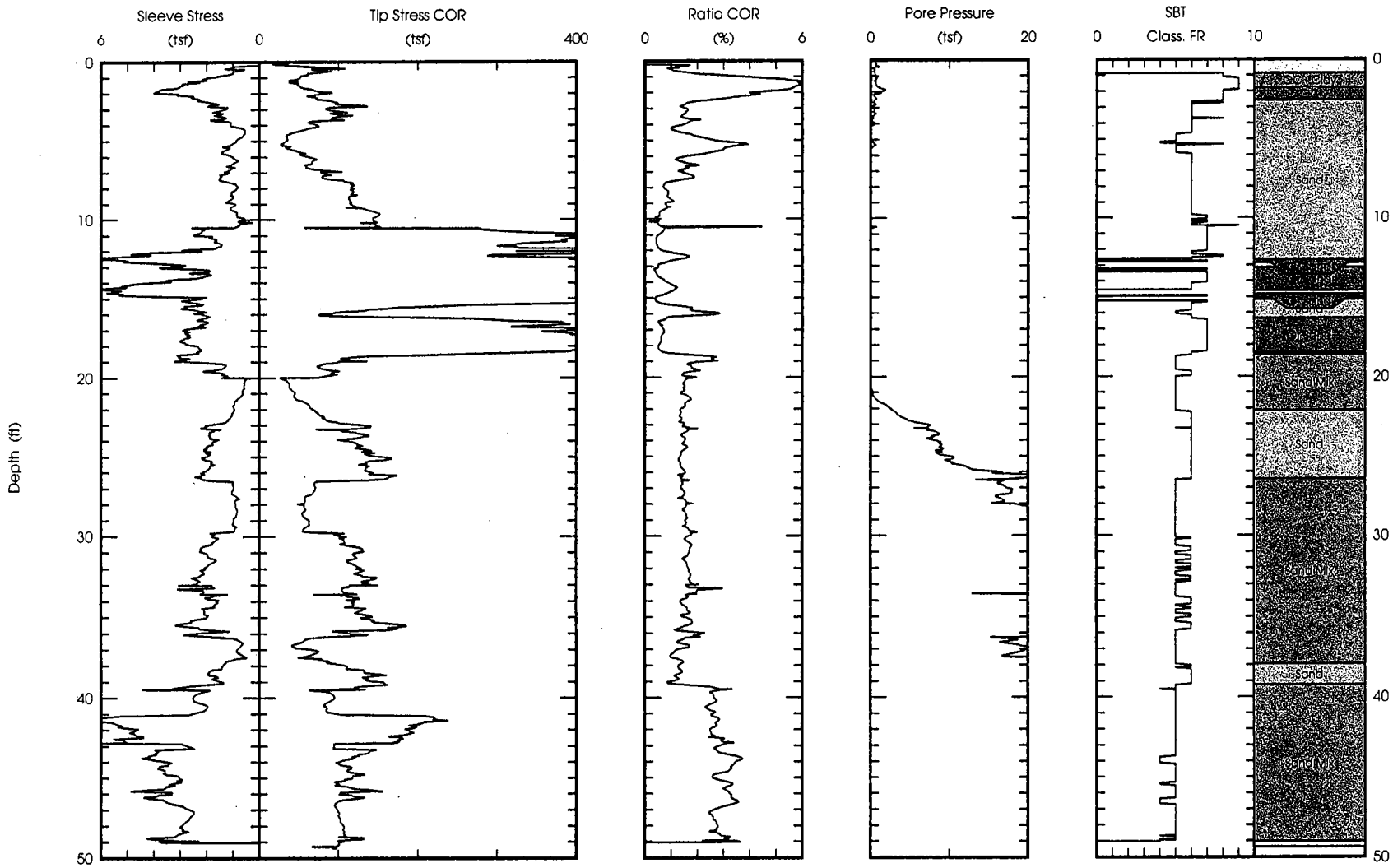
Site: INDIANHEAD,MARYLAND--NSWC



Maximum depth: 49.39 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

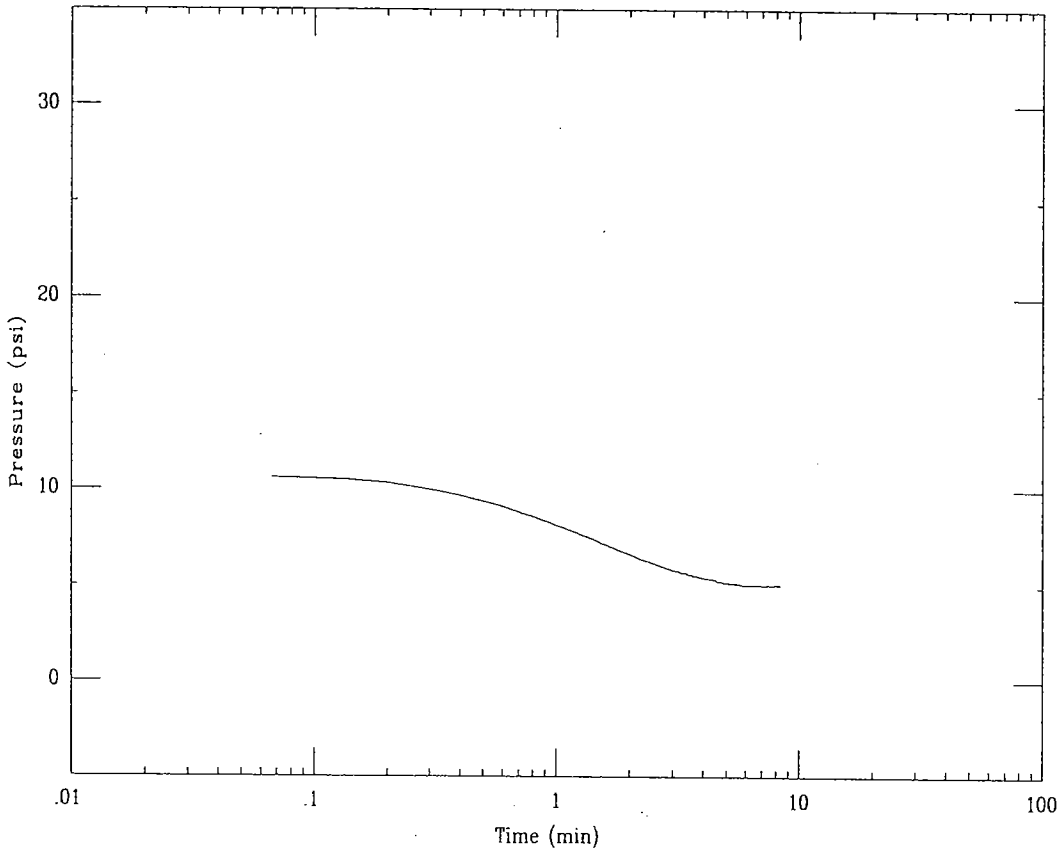
Test ID: CPT-10
File: 428G101.ECP

APPENDIX B

PORE PRESSURE DISSIPATION TESTS

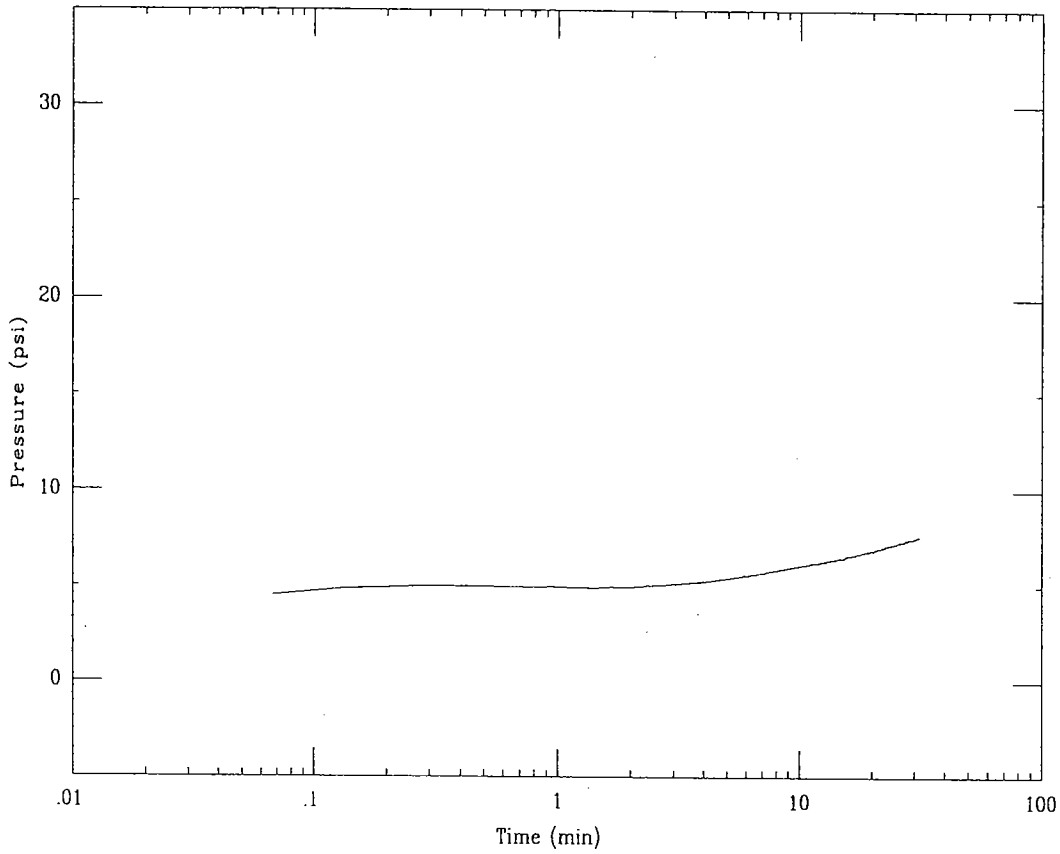
CPT-02 Applied Research Associates 08/30/01

Depth = 13.5 ft Max Pressure = 10.61 psi Pn = 5.06 psi



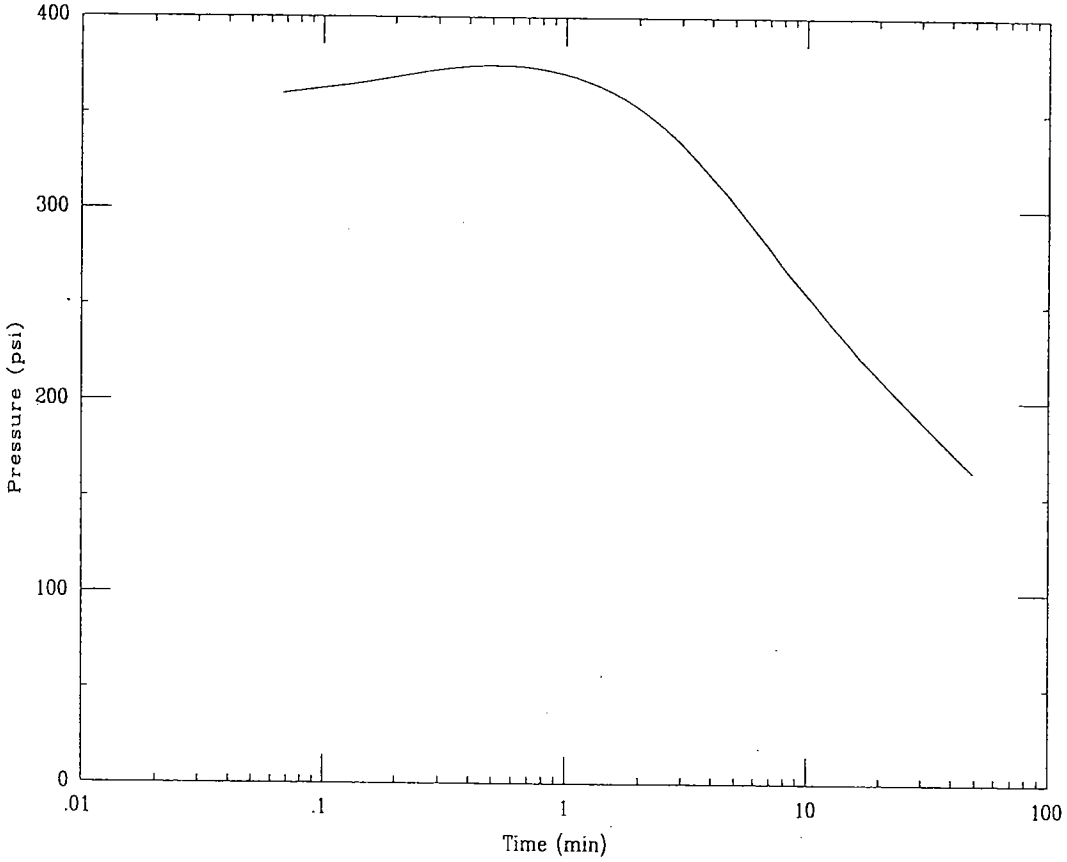
CPT-02 Applied Research Associates 08/30/01

Depth = 22.5 ft Max Pressure = 7.66 psi Pn = 7.62 psi



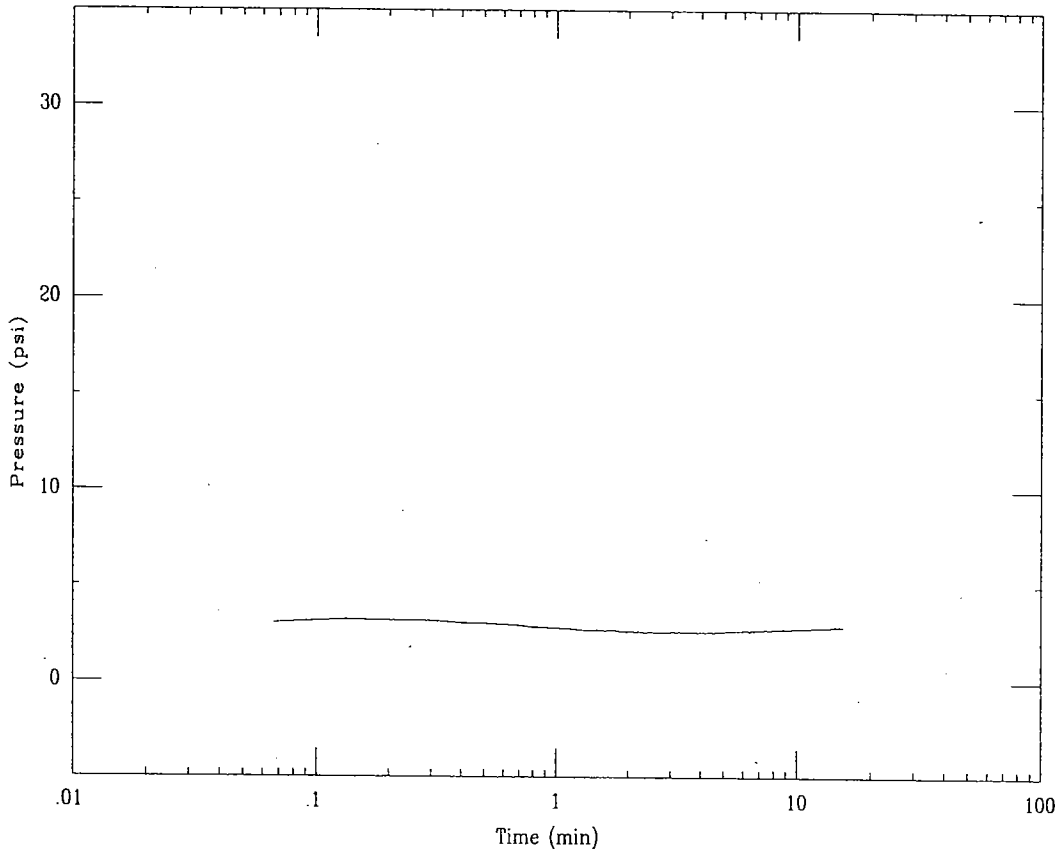
CPT-02 Applied Research Associates 08/30/01

Depth = 43.6 ft Max Pressure = 374.72 psi Pn = 163.69 psi



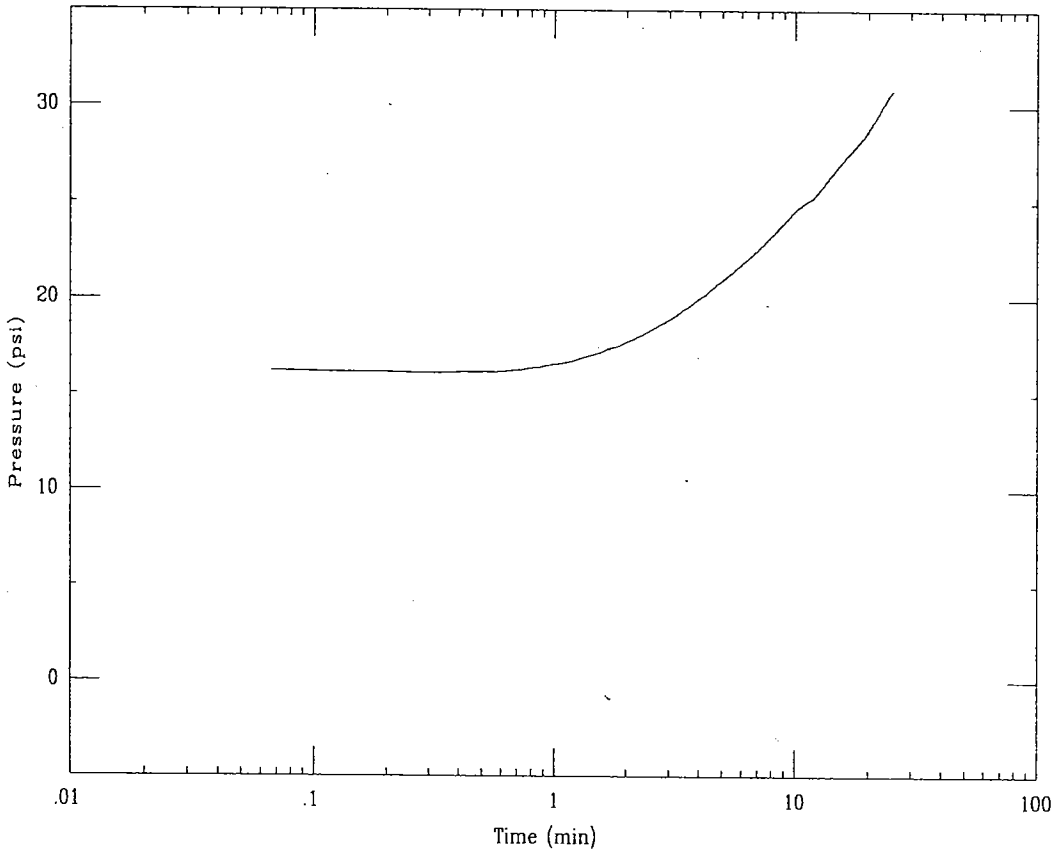
CPT-03 Applied Research Associates 08/29/01

Depth = 16.0 ft Max Pressure = 3.20 psi Pn = 2.86 psi



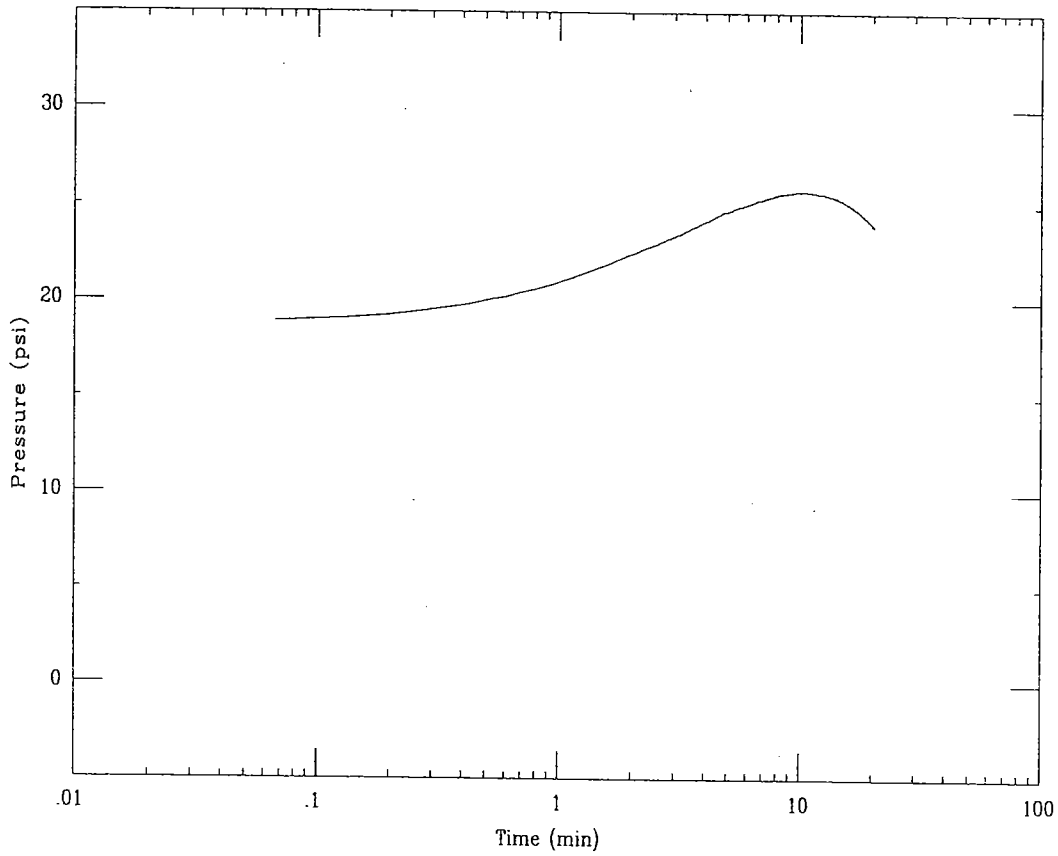
CPT-03 Applied Research Associates 08/29/01

Depth = 33.6 ft Max Pressure = 30.89 psi Pn = 30.81 psi



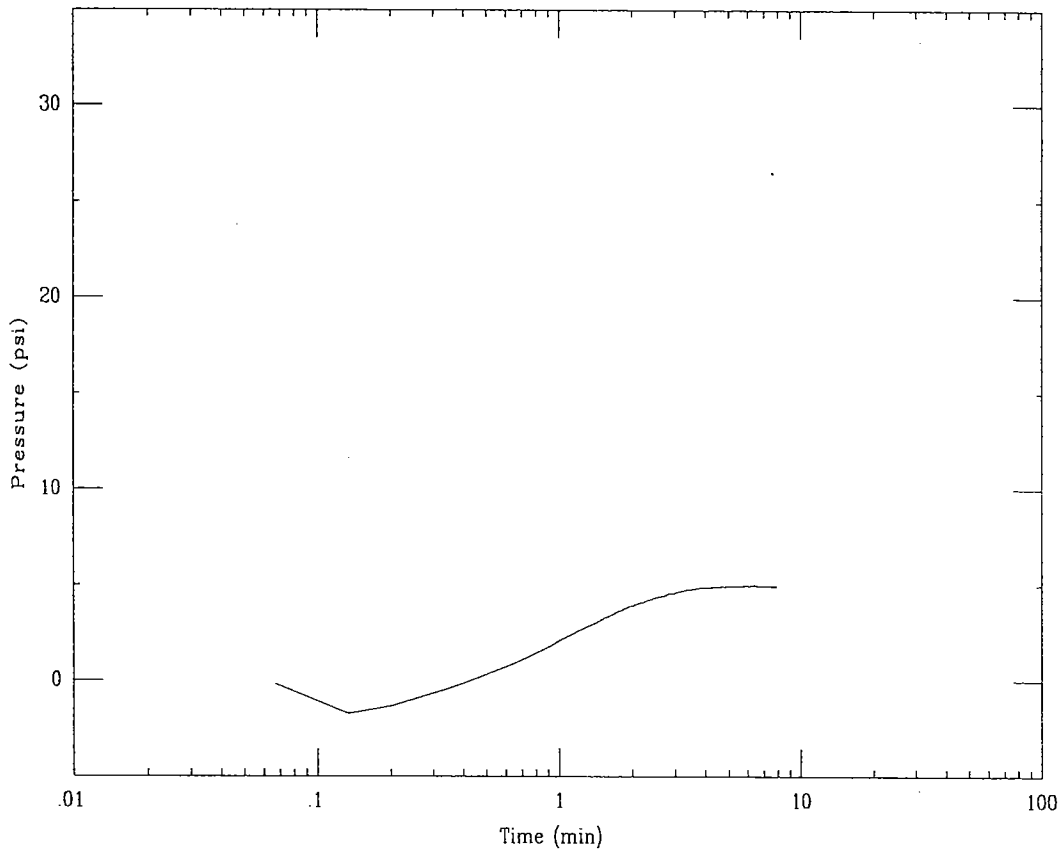
CPT-04 Applied Research Associates 08/28/01

Depth = 17.0 ft Max Pressure = 25.79 psi Pn = 24.03 psi



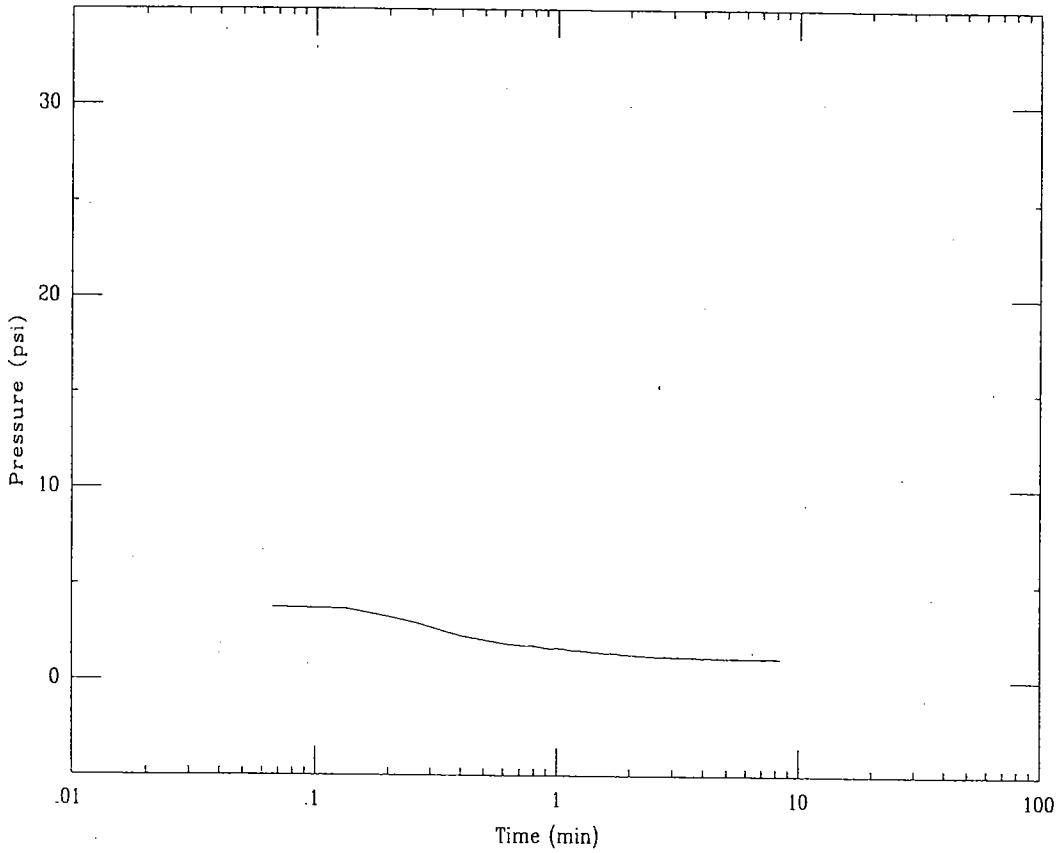
CPT-04 Applied Research Associates 08/28/01

Depth = 21.7 ft Max Pressure = 5.02 psi Pn = 4.95 psi



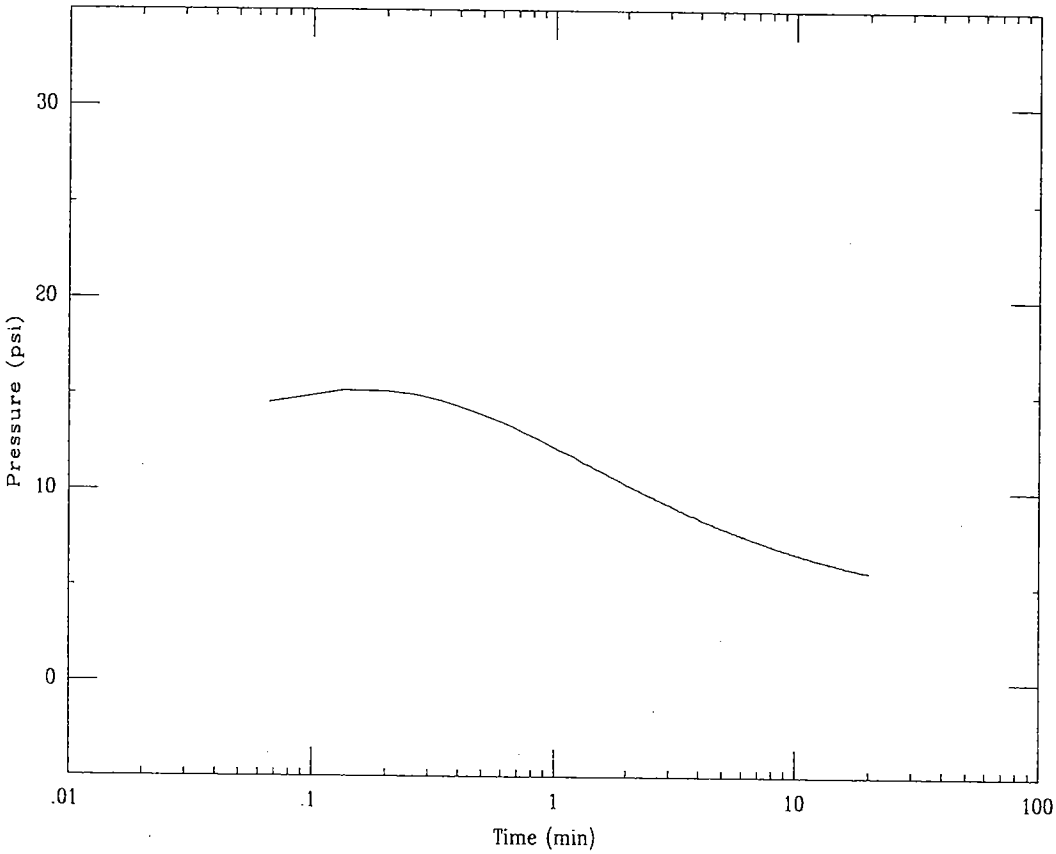
CPT-05 Applied Research Associates 08/29/01

Depth = 8.0 ft Max Pressure = 3.78 psi Pn = 1.15 psi



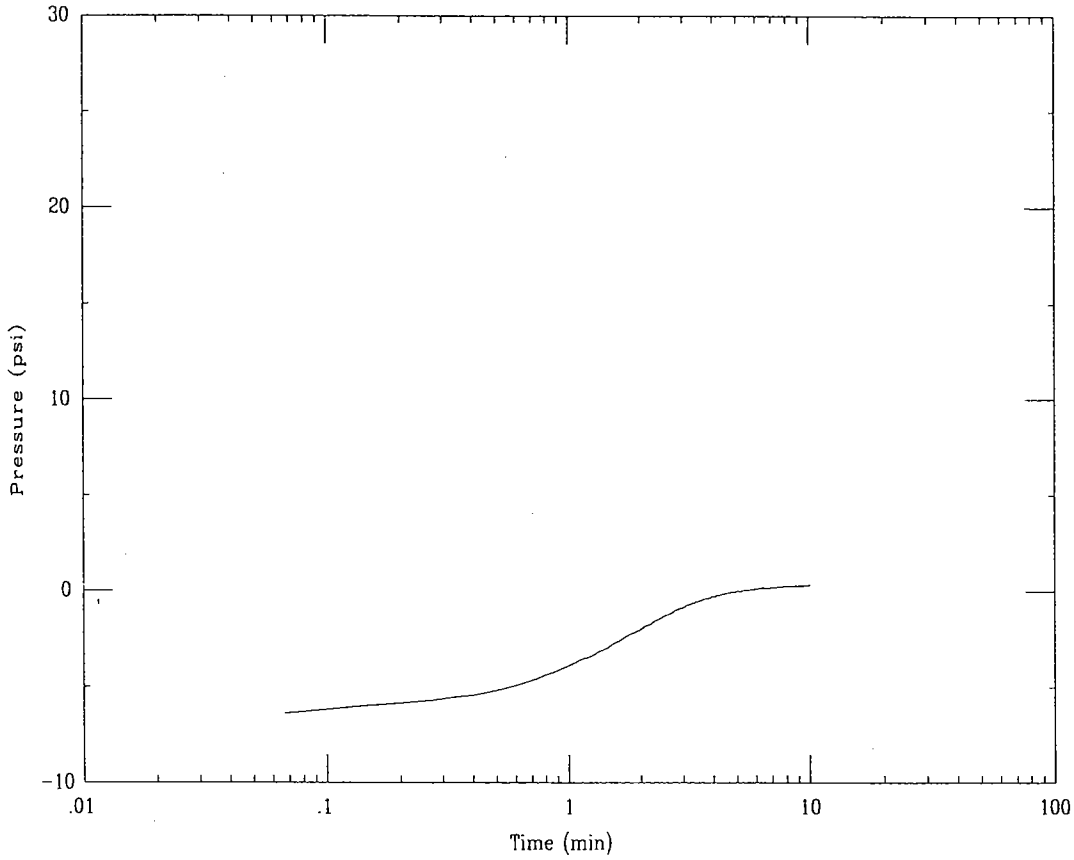
CPT-05B Applied Research Associates 08/29/01

Depth = 14.0 ft Max Pressure = 15.19 psi Pn = 5.81 psi



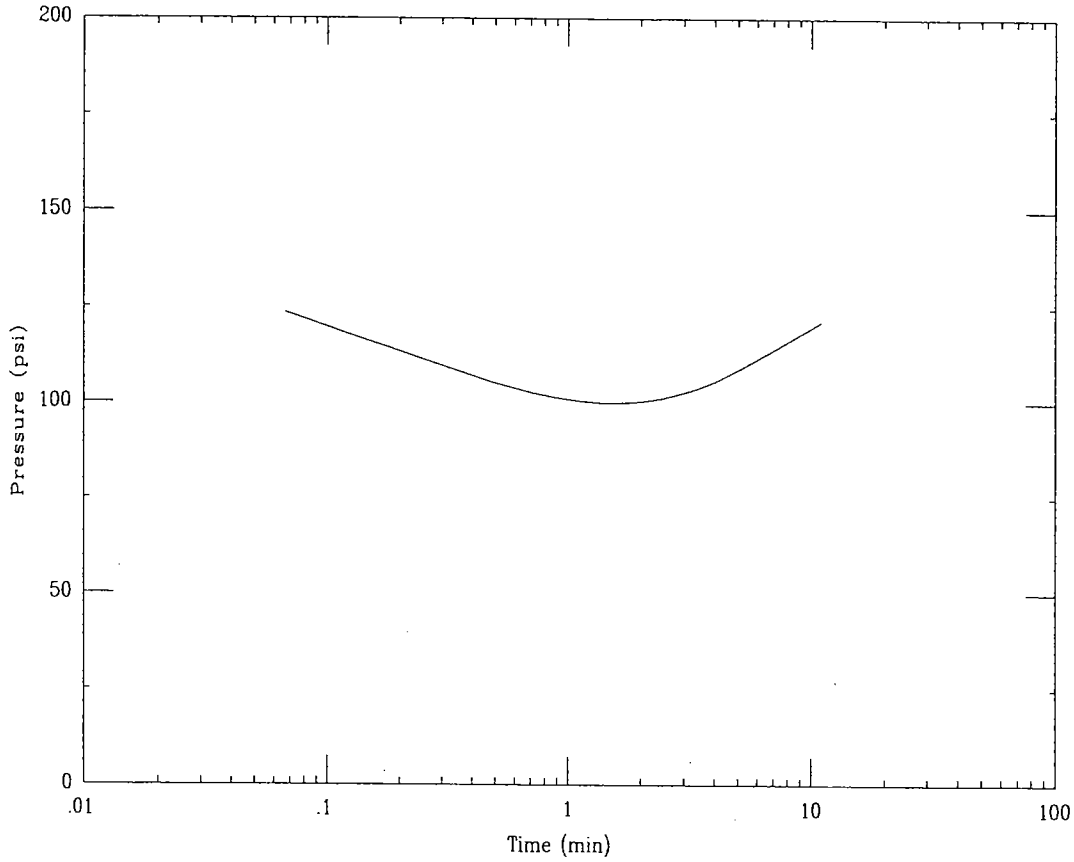
CPT-06 Applied Research Associates 08/29/01

Depth = 5.5 ft Max Pressure = 0.34 psi Pn = 0.30 psi



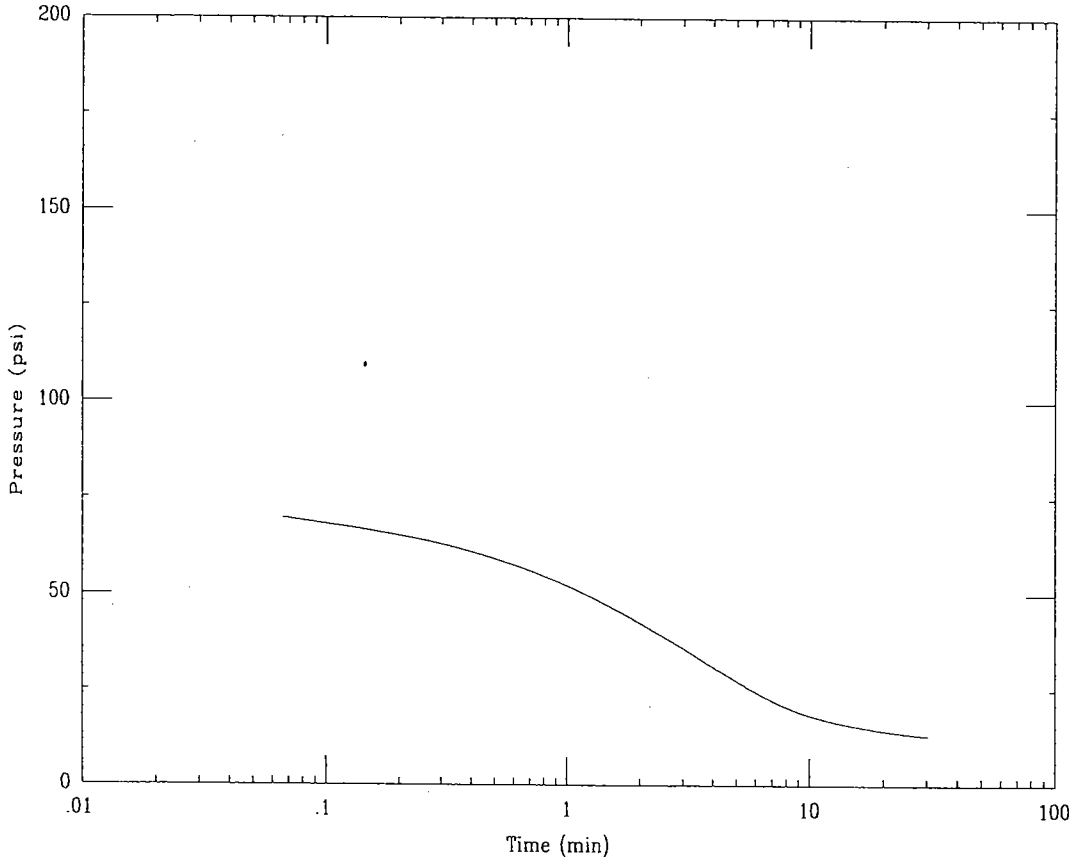
CPT-06 Applied Research Associates 08/29/01

Depth = 21.5 ft Max Pressure = 123.59 psi Pn = 120.94 psi



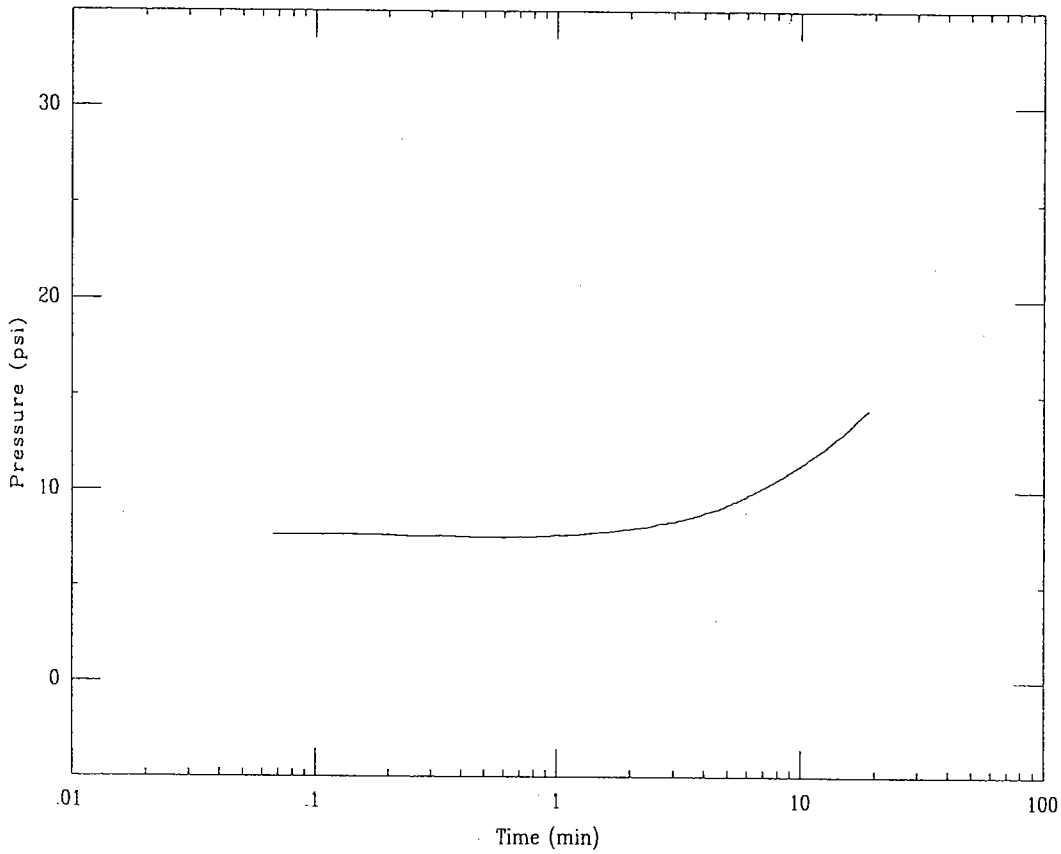
CPT-06 Applied Research Associates 08/29/01

Depth = 31.5 ft Max Pressure = 69.68 psi Pn = 13.09 psi



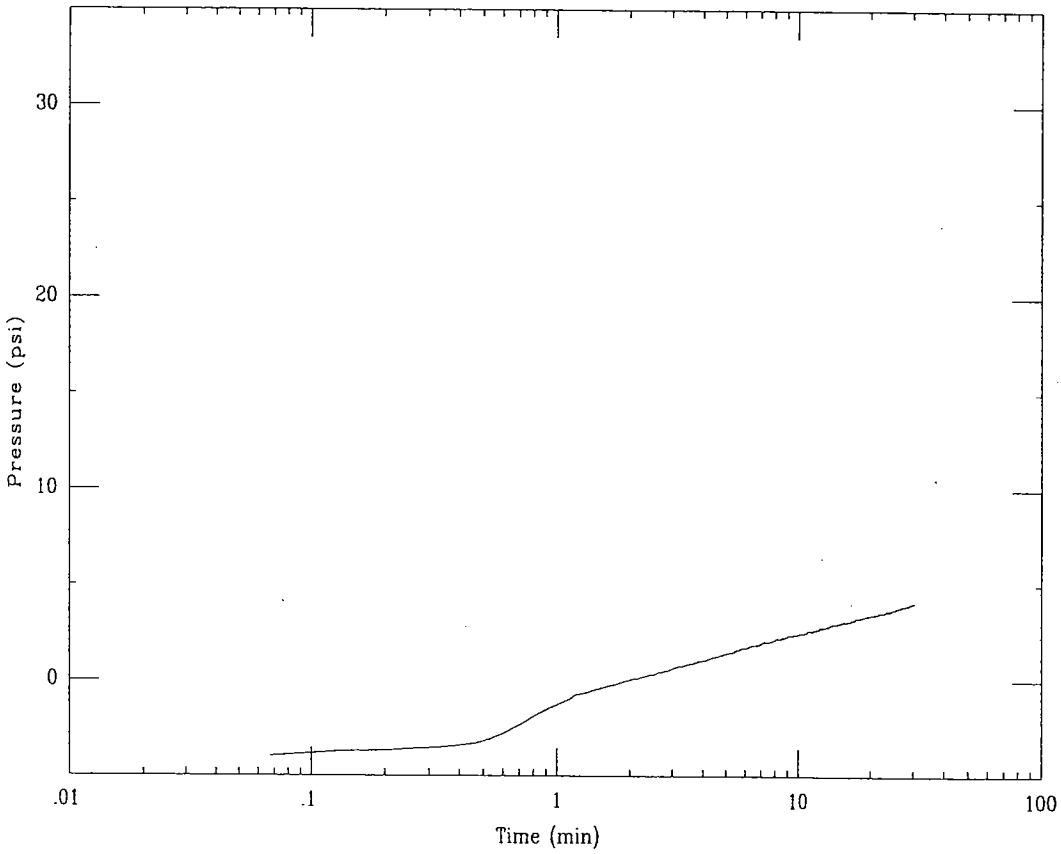
CPT-08 Applied Research Associates 08/29/01

Depth = 23.1 ft Max Pressure = 14.29 psi Pn = 14.21 psi



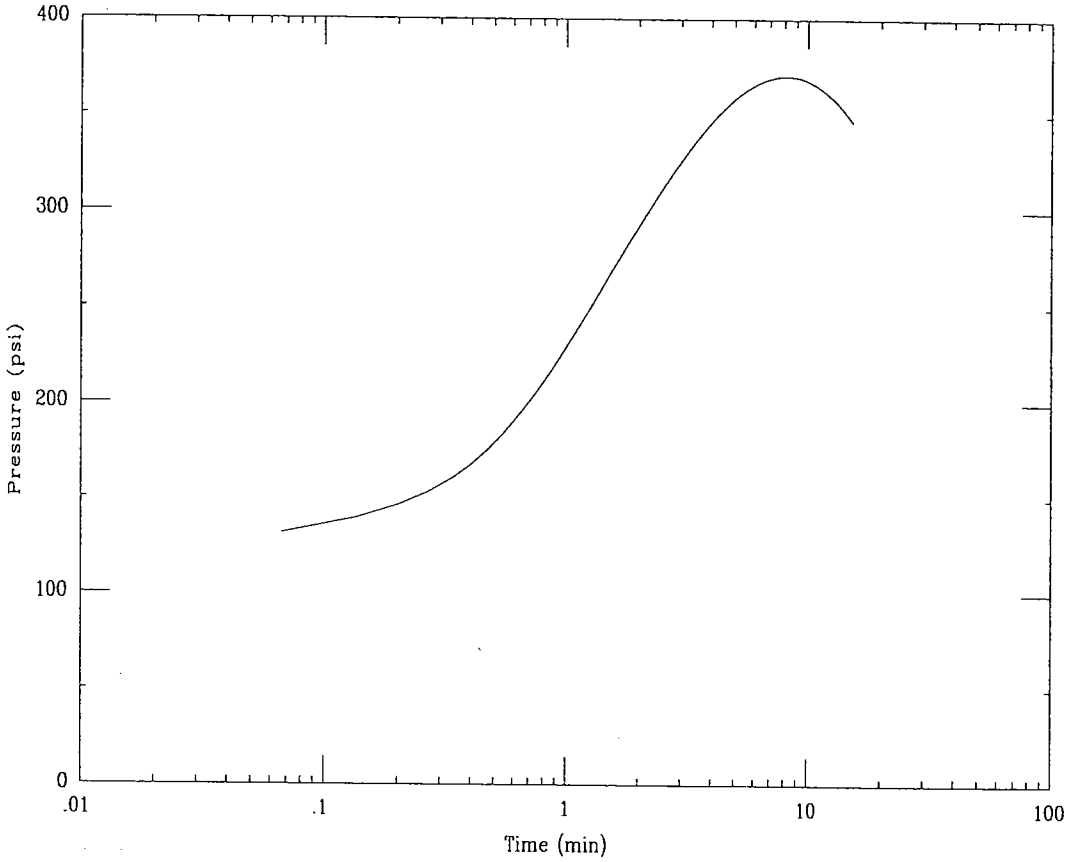
CPT-07 Applied Research Associates 08/30/01

Depth = 22.5 ft Max Pressure = 4.12 psi Pn = 4.08 psi



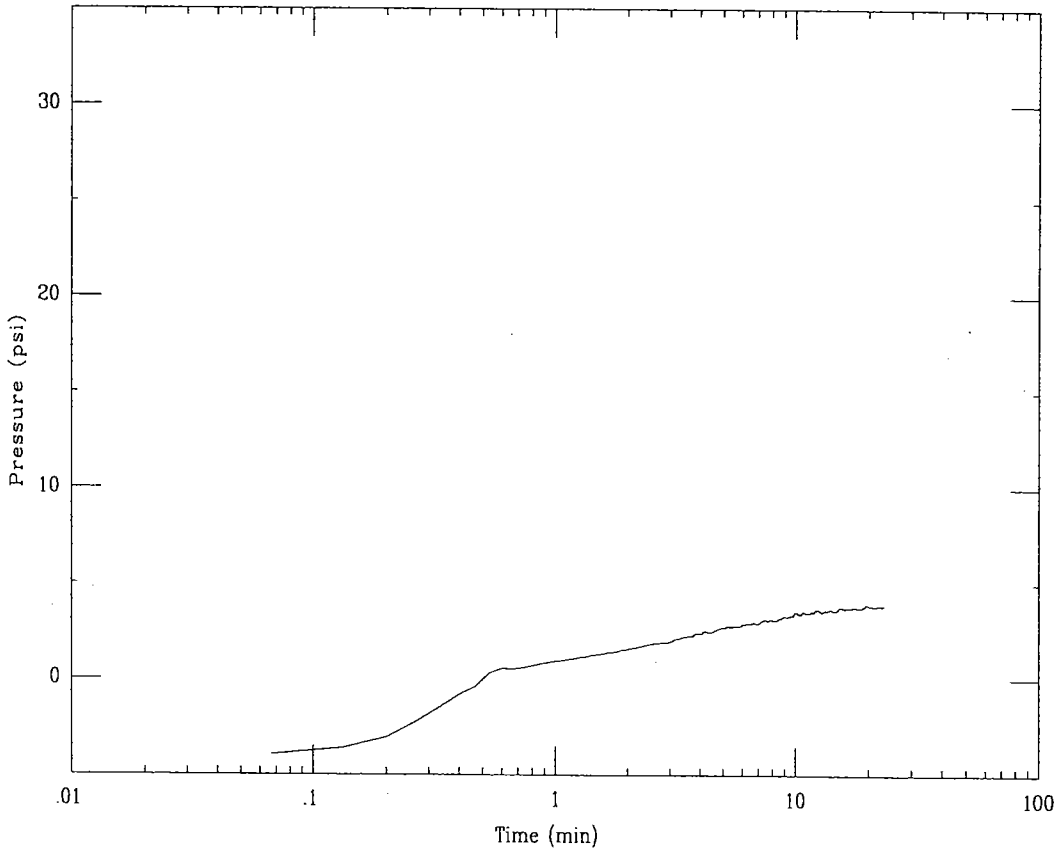
CPT-07 Applied Research Associates 08/30/01

Depth = 36.5 ft Max Pressure = 370.36 psi Pn = 347.97 psi



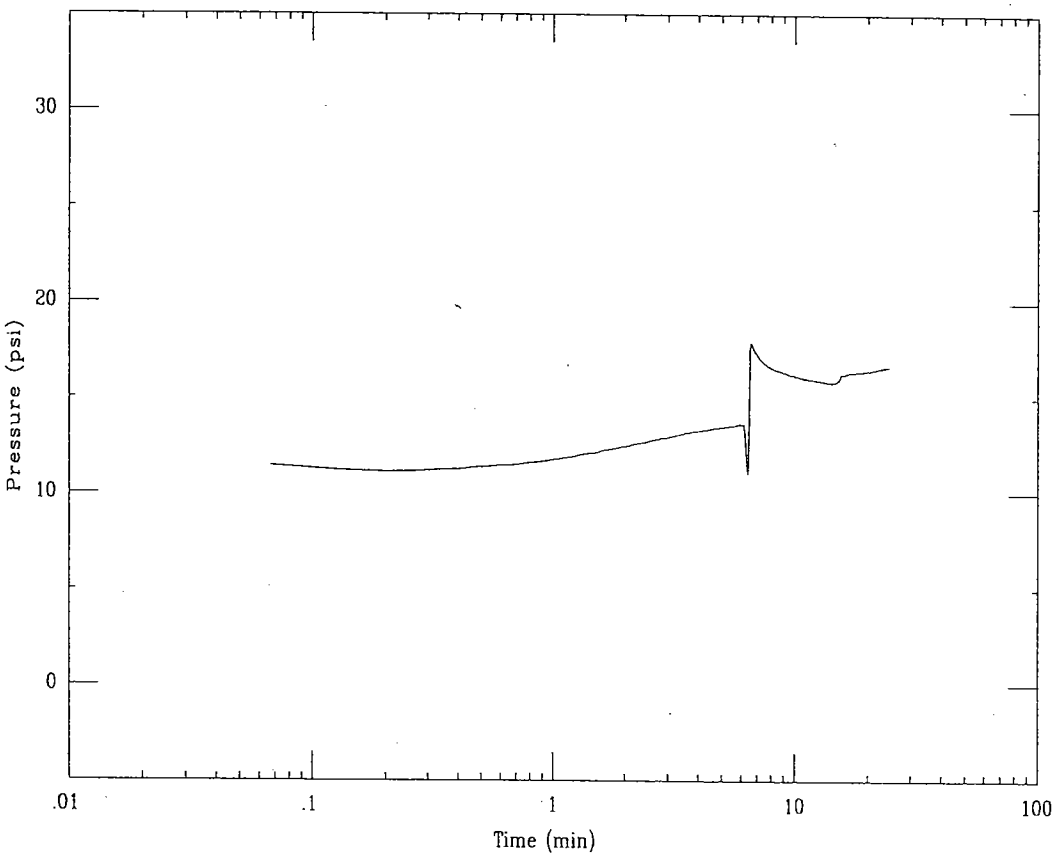
CPT-08 Applied Research Associates 08/29/01

Depth = 18.0 ft Max Pressure = 3.95 psi Pn = 3.84 psi



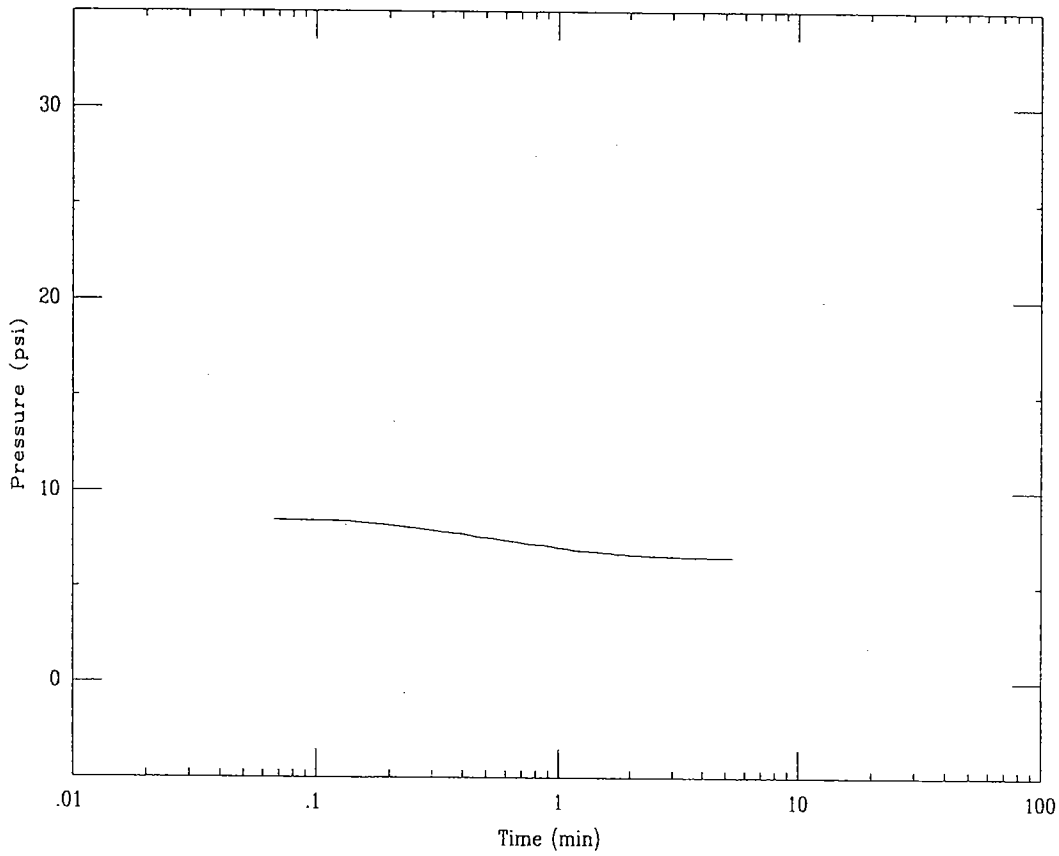
CPT-08 Applied Research Associates 08/29/01

Depth = 32.7 ft Max Pressure = 17.94 psi Pn = 16.67 psi



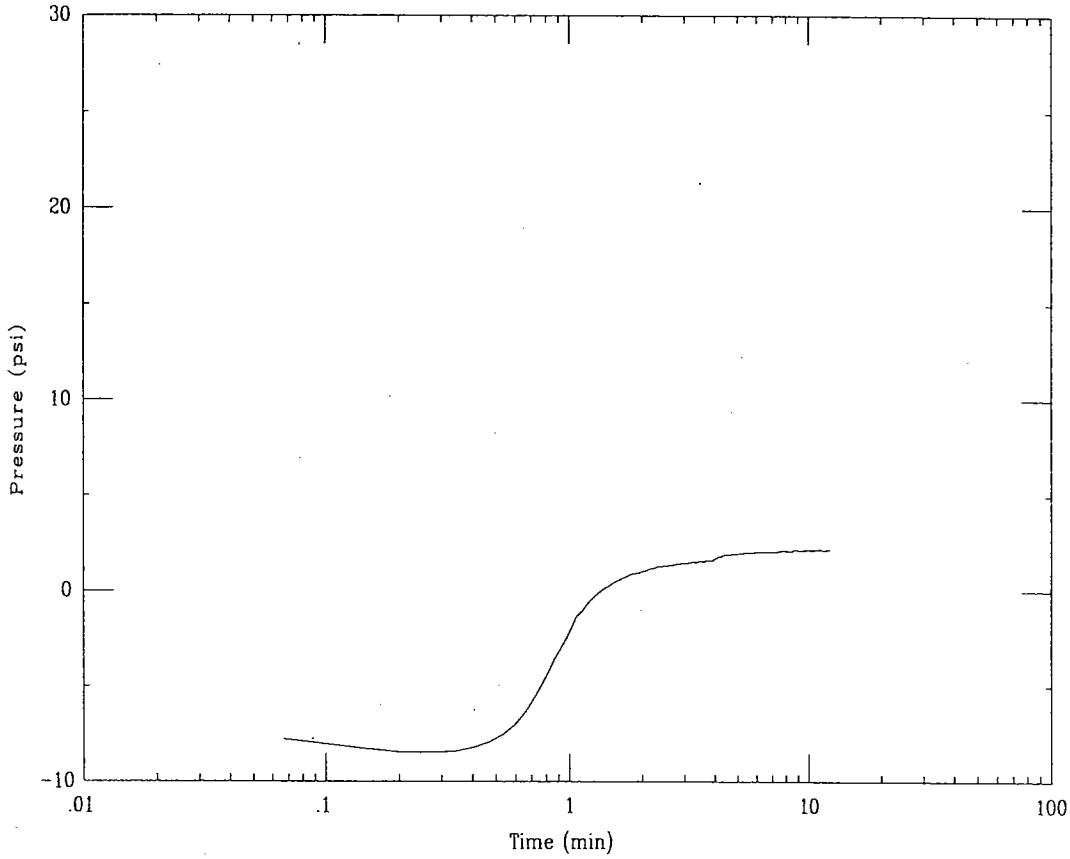
CPT-09 Applied Research Associates 08/29/01

Depth = 15.1 ft Max Pressure = 8.49 psi Pn = 6.52 psi



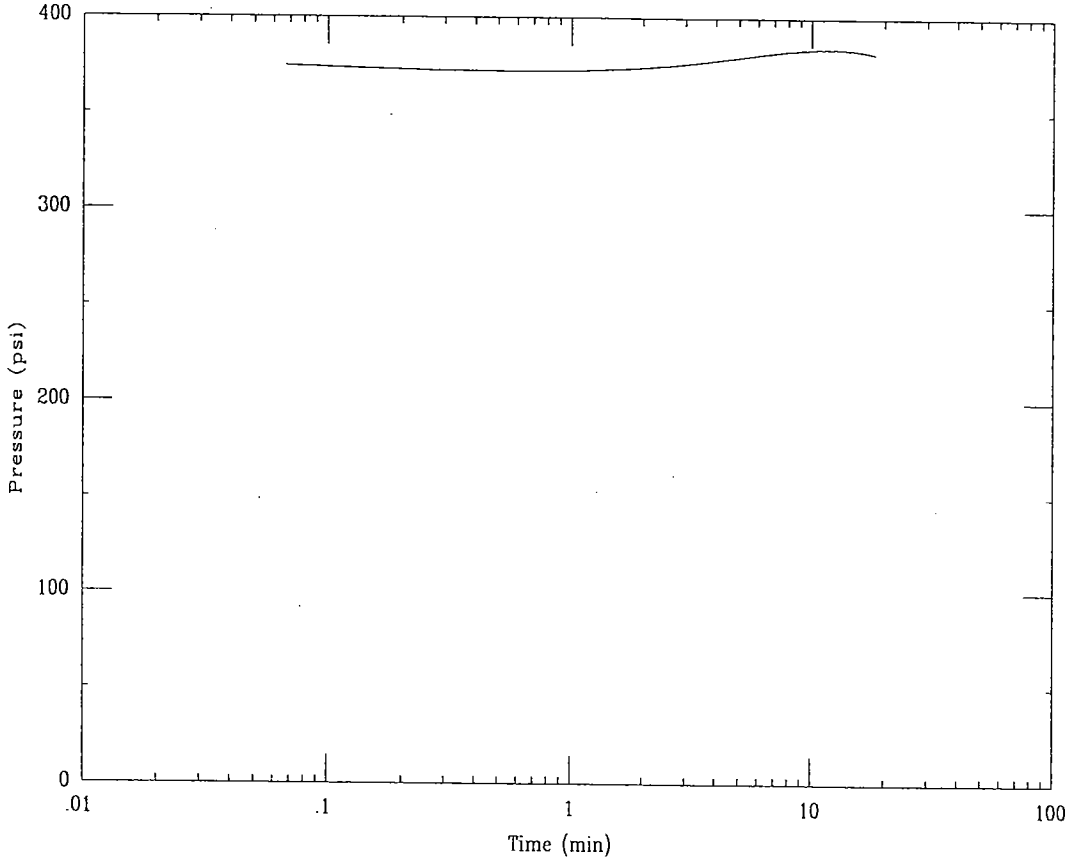
CPT-10 Applied Research Associates 08/28/01

Depth = 10.5 ft Max Pressure = 2.24 psi Pn = 2.18 psi



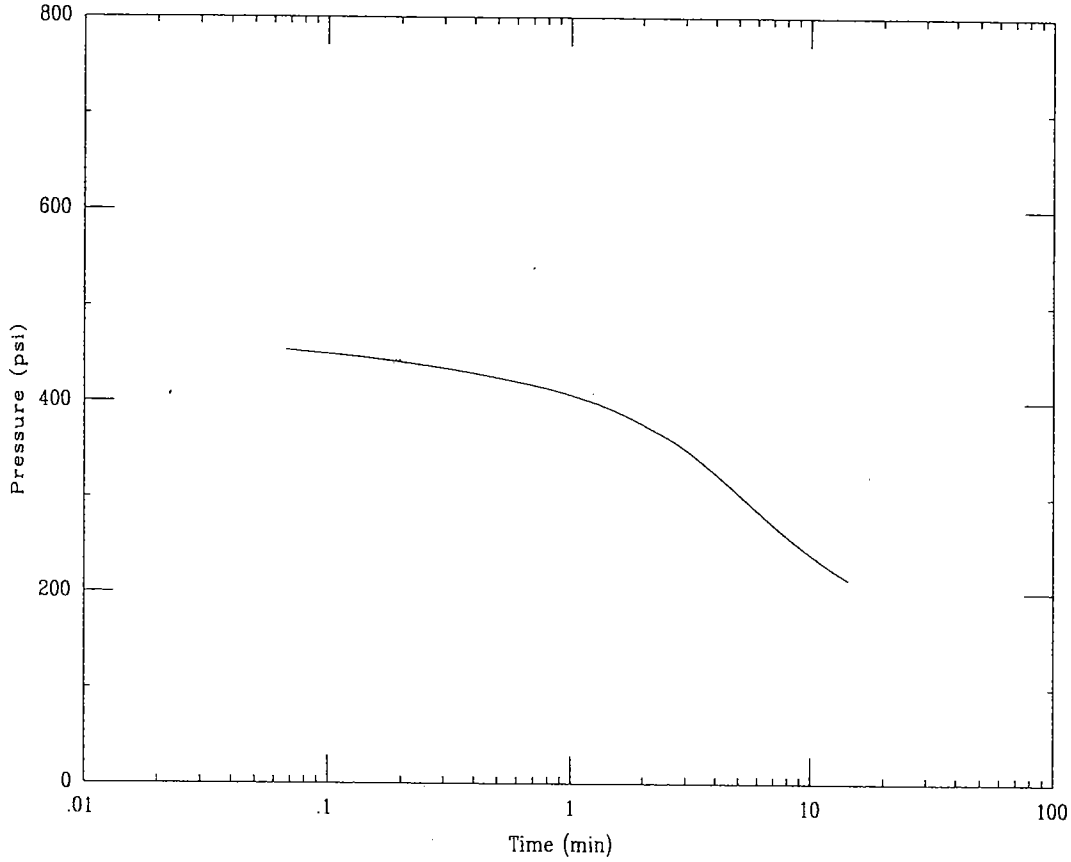
CPT-10 Applied Research Associates 08/28/01

Depth = 49.4 ft Max Pressure = 384.25 psi Pn = 381.81 psi



CPT-10 Applied Research Associates 08/28/01

Depth = 33.6 ft Max Pressure = 453.65 psi Pn = 215.16 psi



APPENDIX C

CALIBRATION CERTIFICATIONS

VERTEK
RR 1, Box 120A, Waterman Road
South Royalton, Vermont 05068
phone: (800) 639-6315 fax: (802) 763-8283

Reference Load Cell Calibration

Manufacturer	Interface
Model	1211NE-10KB
Load Cell S/N	72685A .REF
Rated Range	10000 lb
Calibrated with:	
Excitation	4.00012 Volt DC
Amplification	1.0000
Load Reference:	Interface S/N69351A

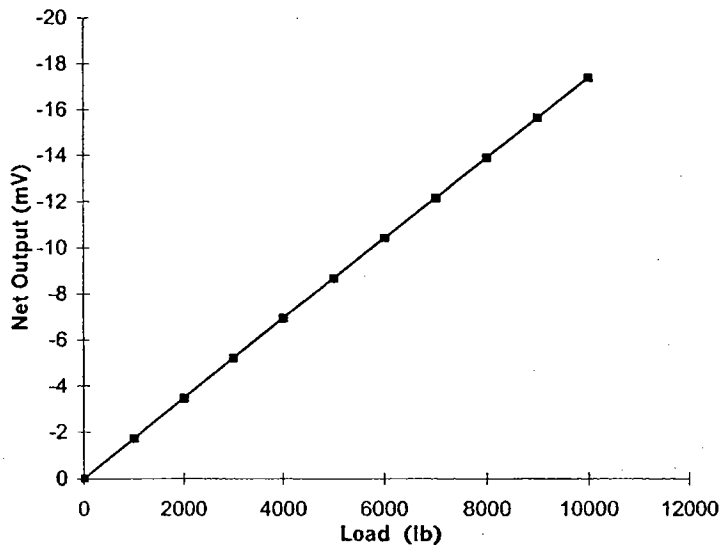
Date: 18-Jun-01

Calibrated by:

Approved by:

Date Due: 18-Dec-01

Load (lb)	Net Output (mV)
0	0.0000
1000	-1.7347
2000	-3.4709
3000	-5.2094
4000	-6.9470
5000	-8.6845
6000	-10.4227
7000	-12.1623
8000	-13.9004
9000	-15.6413
10000	-17.3804
9000	-15.6414
8000	-13.9027
7000	-12.1648
6000	-10.4268
5000	-8.6896
4000	-6.9518
3000	-5.2141
2000	-3.4751
1000	-1.7388
-1	-0.0011



Sensitivity	-4.345E-04 mV / V / lb
Cal. Factor	-0.4390 lb/A-D with 2^{16} A-D counts for 10.0 V span; 4.000 V excitation; 200 gain
r^2	1.000000
Nonlinearity	-0.03% calibrated range
Zero Load Output	3.9985 mV/V

CALCO METROLOGY SYSTEMS
18 HAWKVIEW ROAD HUDSON, NH 03051-4408 (603) 883-6557

****
* CALIBRATION REPORT *
****

OWNER: APPLIED RESEARCH ASSOCIATES
DESCRIPTION: PRESSURE GAGE
MANUFACTURER: DATA INSTRUMENTS
MODEL: AB HP 500 9222503
CALIBRATION ID NUMBER: 95082-427
SERIAL NUMBER: 95082-427
P.O. NUMBER: VT974
STD USED: JF164
NIST #: 822/260205-98 822/25870397
NOTES:

FOUND IN TOLERANCE: YES
CALIBRATION DATE DONE: 01/31/2001
CALIBRATION DATE DUE: 01/31/2002
PROCEDURE: 02-00034.A
CALIBRATION TECHNICIAN: JF
ENVIRONMENT: 68°F
REPORT NUMBER: 20710

==========

THIS CERTIFIES THAT THE ABOVE NAMED EQUIPMENT WAS TESTED AND FOUND TO BE IN COMPLIANCE WITH THE CALIBRATION PROCEDURE INDICATED AND THE MANUFACTURER'S DESIGN SPECIFICATIONS UNLESS OTHERWISE NOTED.

THIS CERTIFIES THAT THE ABOVE TESTS ARE IN COMPLIANCE WITH ISO 10012-1, ANSI/NCSL Z540-1, ISO GUIDE 25, FDA CODE SECTION 820.72, NRC-10CFR-21 AND ISO 9002 AS APPROPRIATE. THIS REPORT MAY NOT BE DUPLICATED EXCEPT IN FULL WITHOUT THE WRITTEN APPROVAL OF CALCO METROLOGY SYSTEMS.

TRANSDUCER TEST 13101

MFR	MODEL	IDNUMBER
DATA INSTRUMENTS	9222503	95082-427

LO PRESSURE	HIGH PRESSURE	SPAN
0 PSI	500 PSI	500 PSI

NOMINAL LO MV	NOMINAL HI MV	NOMINAL SPAN
0 MV	100 MV	100 MV

ZERO TOL	SPAN TOL	LINEAR TOL
5 MV	1 MV	.25 % SPAN WHICH = .249165 MV

ZERO OFFSET	HIGH VALUE MV	SPAN
1.53 MV	101.2 MV	99.67 MV

FOR AN EXCITATION VOLTAGE OF 5 VDC THE SENSITIVITY = .199332 MV/PSI

ZERO OFFSET TEST: PASS

SPAN ERROR TEST: PASS

APPLIED PSI	OUTPUT MV	ZERO CORRECTED	STRAIGHT LINE	DEVIATION
0	1.53	0	0	0
100	21.27	19.73	19.93	.2
200	41.14	39.61	39.87	.26
300	61.12	59.59	59.8	.21
400	81.16001	79.63	79.73001	.11
500	101.2	99.67	99.67	0
300	61.14	59.6	59.8	.2
100	21.27	19.74	19.93	.2
0	1.53	0	0	0

APPENDIX F

VIDEO SEWER INSPECTION REPORT

VIDEO PIPE SERVICES, INC.
1566 Harding Highway
Newfield, NJ 08344

A Carylon Company

Tetra Tech NUS, Inc.
661 Anderson Drive
Pittsburg, PA 15220

Inspection reports
for
Naval District Washington, Indian Head

Prepared for
Bob Mertz

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT 40)
NEWFIELD,NJ 08344
Tel: 856.697.1900, Fax: 856.697.0757

Defect Grade Description

Project name:	Project number:	Inspector:	Date: 20051126

1: Failure unlikely in the forseeable future.

EXCELLENT: MINOR DEFECTS.

2: Pipe unlikely to fail for at least 20 years.

GOOD: DEFECTS THAT HAVE NOT BEGUN TO DETERIORATE.

3: Pipe [illegible] years.

FAIR: MODERATE DEFECTS THAT WILL CONTINUE TO DETERIORATE.

4: Pipe will probably fail in 5 to 10 years.

POOR: SEVERE DEFECTS THAT WILL BECOME GRADE 5 DEFECTS WITHIN THE FORSEEABLE FUTRE.

5: Pipe has failed or will likely fail within the next 5 years.

IMMEDIATE ATTENTION: DEFECTS REQUIRING IMMEDIATE ATTENTION.

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel: 856.697.1900 Fax: 856.697.0757

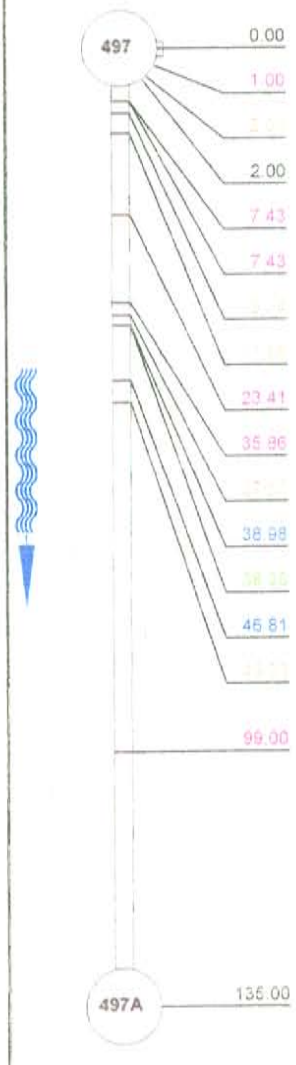
Inspection report

Date:	P.O.#:	Weather:	Surveyed By:	section number:	PSR:
11/30/2005	TETRAT-1	1 Dry	U-1202-454	1	
Total Pipe Length:	Survey Customer:	System Owner:	Clean Date:	Pre-Cleaned:	Map Grid #:
	TECHRA TECH	U.S. NAVY		N No Pre-Cleaning	

Street:	HERSEY RD	Flow Control:		Start MH:	497
City:	INDIAN HEAD, MD	Year Renewed		End MH:	497A
Location Code:	H Alley	Tape/Media #:	CD-1	pipe length:	135 ft

Reason for inspection:	A Maintenance Related	Dia/Height:	C Circular 42"
Use of Sewer:	SW Stormwater	Material:	VCP Vitrified Clay Pipe Pipe Length: 3ft
Drain. Area:		Lining Method:	
		Category:	

Remark::



1:325	position	code	observation	counter	photo	grade
497	0.00	AMH	Manhole	00:00:00		
	1.00	FM	Fracture Multiple, from 09 to 03 o'clock, within 8 inch: YES	00:01:51	2a, b	S 4
	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
	2.00	TFA	Tap Factory Made Active, at 10 o'clock, 8", within 8 inch: YES	00:03:50	3a, b	
	7.43	IR	Infiltration Runner, from 08 to 09 o'clock, within 8 inch: NO	00:05:53	5a	M 4
	7.43	B	Broken, from 08 to 10 o'clock, within 8 inch: YES	00:06:44	6a, b	S 4
	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
	23.41	B	Broken, from 08 to 10 o'clock, within 8 inch: YES	00:09:01	10a	S 4
	35.96	B	Broken, from 08 to 10 o'clock, within 8 inch: YES	00:10:21	11a, b	S 4
	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
	38.98	FC	Fracture Circumferential, from 02 to 04 o'clock, within 8 inch: YES	00:12:03		S 2
	38.25	CC	Crack Circumferential, from 12 to 10 o'clock, within 8 inch: YES	00:12:32		S 1
	46.81	IW	Infiltration Weeper, at 08 o'clock, within 8 inch: YES	00:14:56	15a, b	M 2
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	99.00	IR	Infiltration Runner, from 04 to 06 o'clock, within 8 inch: YES	00:29:28	26a, b	M 4
497A	135.00	AMH	Manhole	00:19:11		

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
4435	4221	34	10	44	3.09	3.33	3.14

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT 40)
NEWFIELD,NJ 08344
Tel 856.697.1900, Fax: 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	1	

Photo: 2a, Tape/Media No.: CD-1, 00:01:51
1FT, Fracture Multiple, from 09 to 03 o´clock, within 8 inch: YES

Photo: 2b, Tape/Media No.: CD-1, 00:01:51
1FT, Fracture Multiple, from 09 to 03 o´clock, within 8 inch: YES

The Environmental Protection Specialists

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1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel: 856.697.1900, Fax: 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	1	

Photo: 3a, Tape/Media No.: CD-1, 00:03:50
2FT, Tap Factory Made Active, at 10 o´clock, 8", within 8 inch: YES

Photo: 3b, Tape/Media No.: CD-1, 00:03:50
2FT, Tap Factory Made Active, at 10 o´clock, 8", within 8 inch: YES

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel. 856.697.1900, Fax: 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	1	

Photo: 5a, Tape/Media No.: CD-1, 00:05:53
7.43FT, Infiltration Runner, from 08 to 09 o´clock, within 8 inch: NO

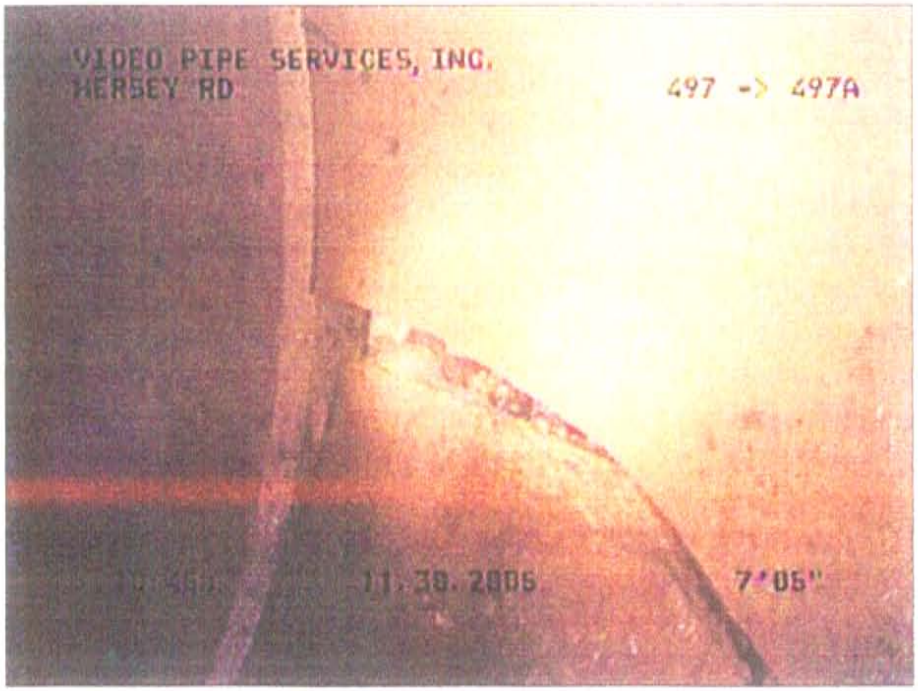

Photo: 6a, Tape/Media No.: CD-1, 00:06:44
7.43FT, Broken, from 08 to 10 o´clock, within 8 inch: YES

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
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Tel: 856.697.1900, Fax: 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	1	

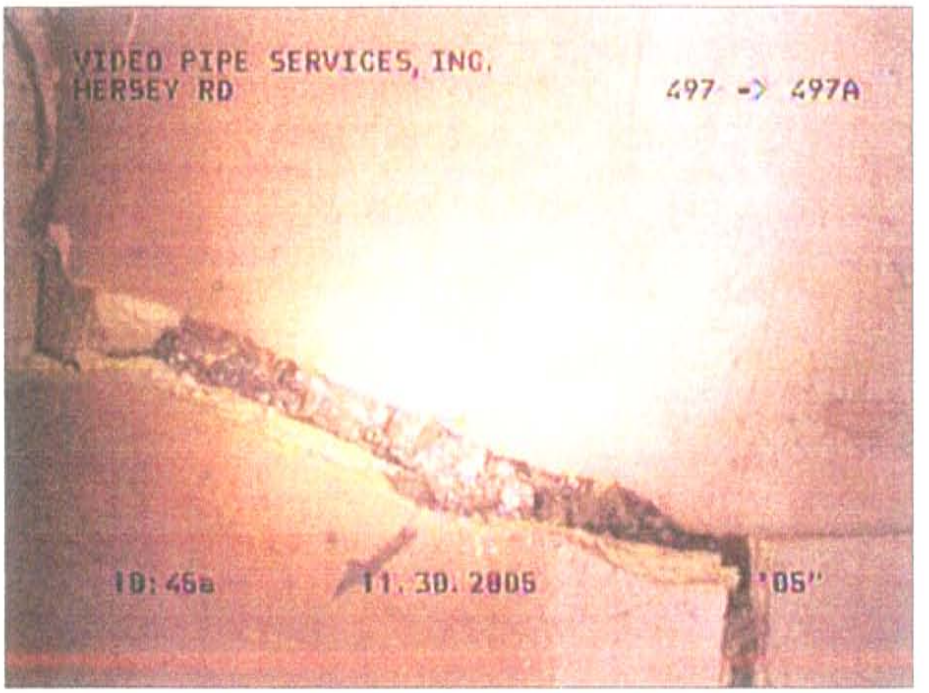

Photo: 6b, Tape/Media No.: CD-1, 00:06:44
7.43FT, Broken, from 08 to 10 o´clock, within 8 inch: YES

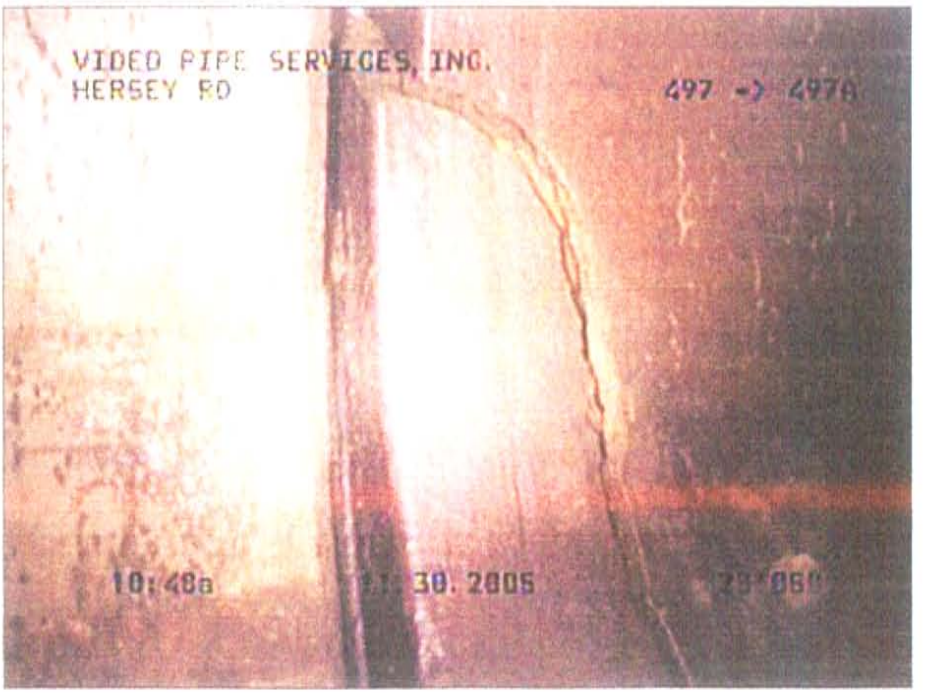

Photo: 10a, Tape/Media No.: CD-1, 00:09:01
23.41FT, Broken, from 08 to 10 o´clock, within 8 inch: YES

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel: 856.697.1900, Fax: 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	1	

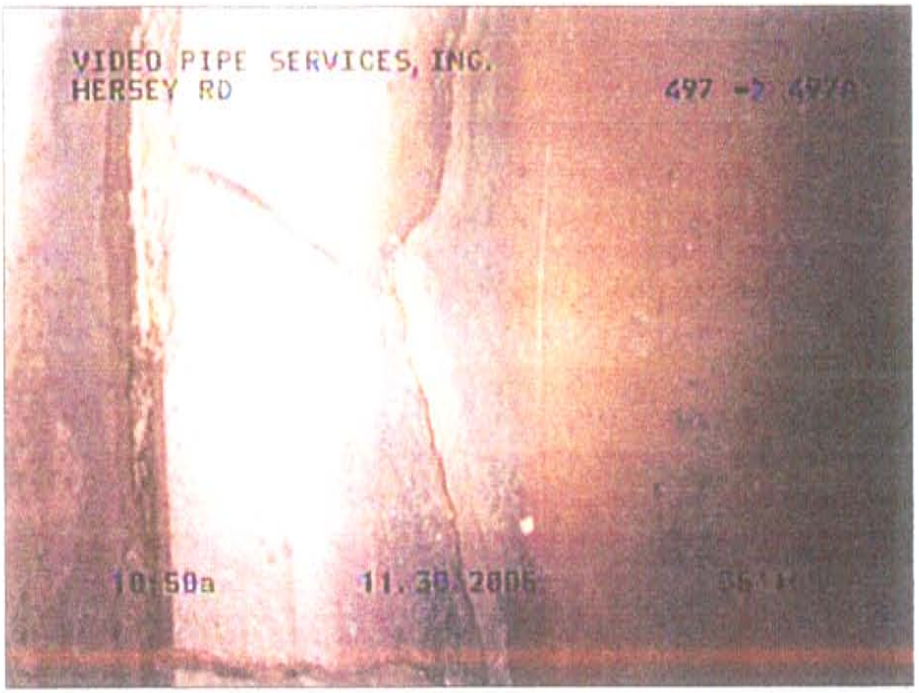

Photo: 11a, Tape/Media No.: CD-1, 00:10:21
35.86FT, Broken, from 08 to 10 o´clock, within 8 inch: YES

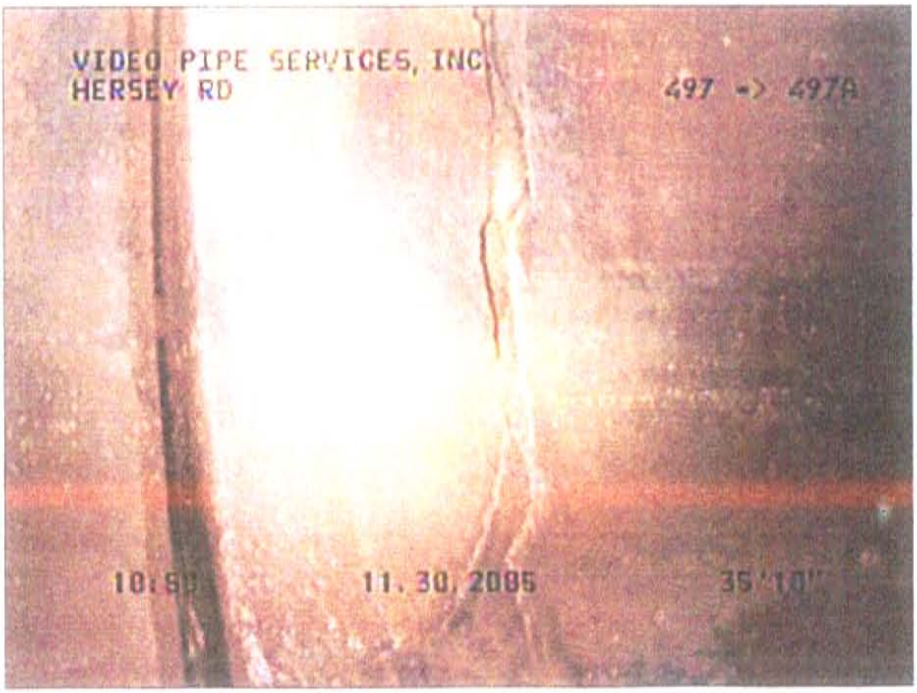

Photo: 11b, Tape/Media No.: CD-1, 00:10:21
35.86FT, Broken, from 08 to 10 o´clock, within 8 inch: YES

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel: 856.697.1900. Fax: 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	1	

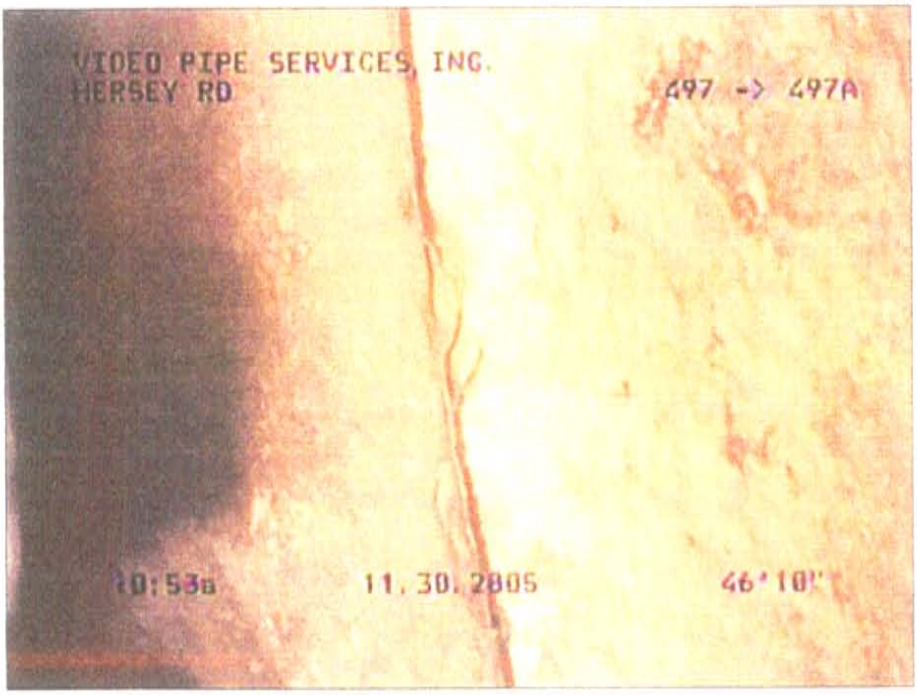

Photo: 15a, Tape/Media No.: CD-1, 00:14:56
46.81FT, Infiltration Weeper, at 08 o´clock, within 8 inch: YES

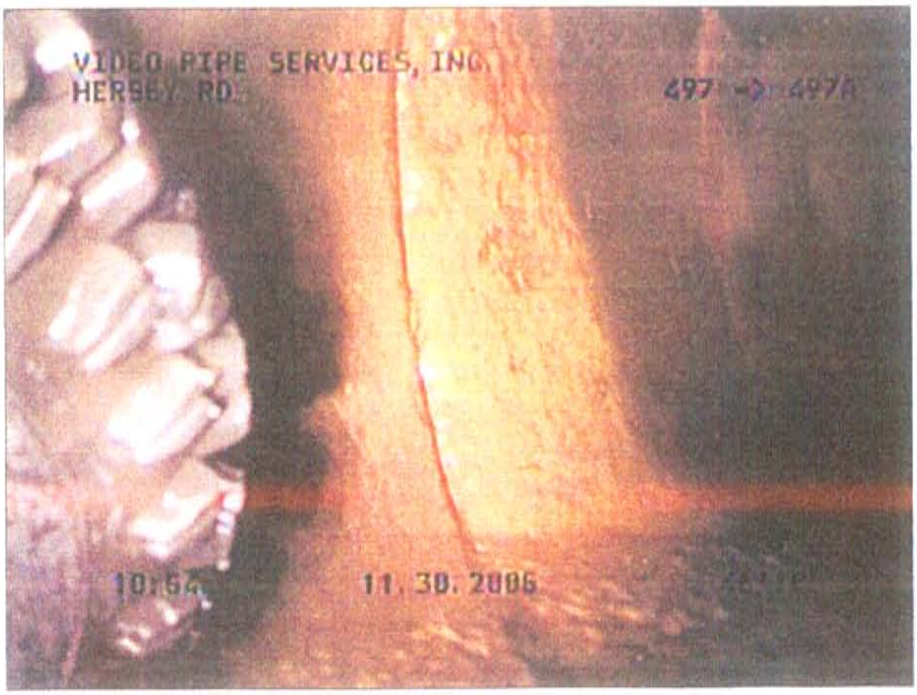

Photo: 15b, Tape/Media No.: CD-1, 00:14:56
46.81FT, Infiltration Weeper, at 08 o´clock, within 8 inch: YES

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Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	1	

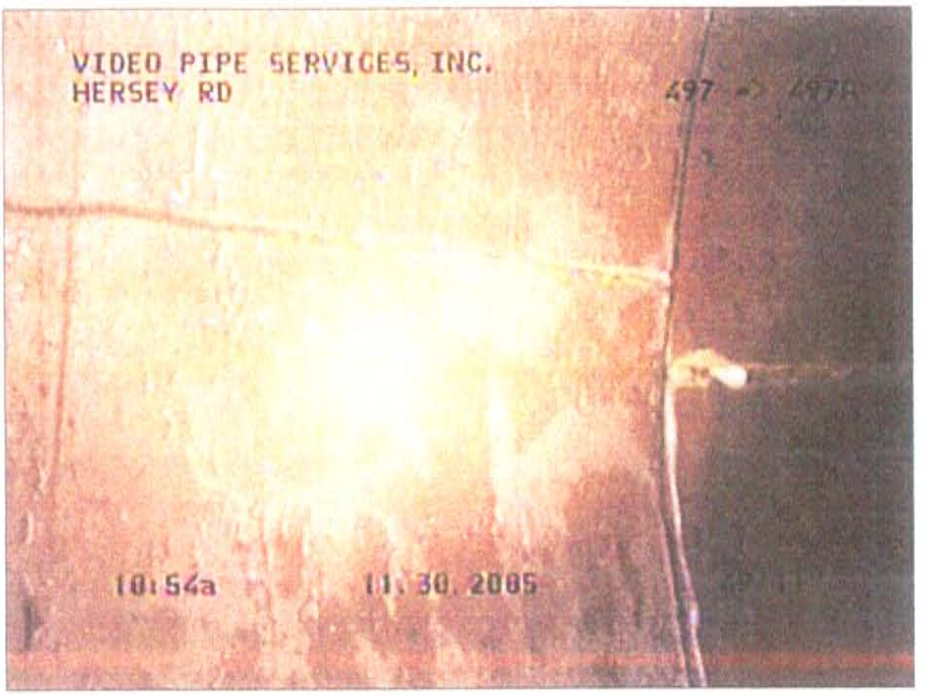


Photo: 16a, Tape/Media No.: CD-1, 00:15:54
49.93FT, Fracture Longitudinal, at 12 o´clock, within 8 inch: YES,
Remark: CONTINUOUS

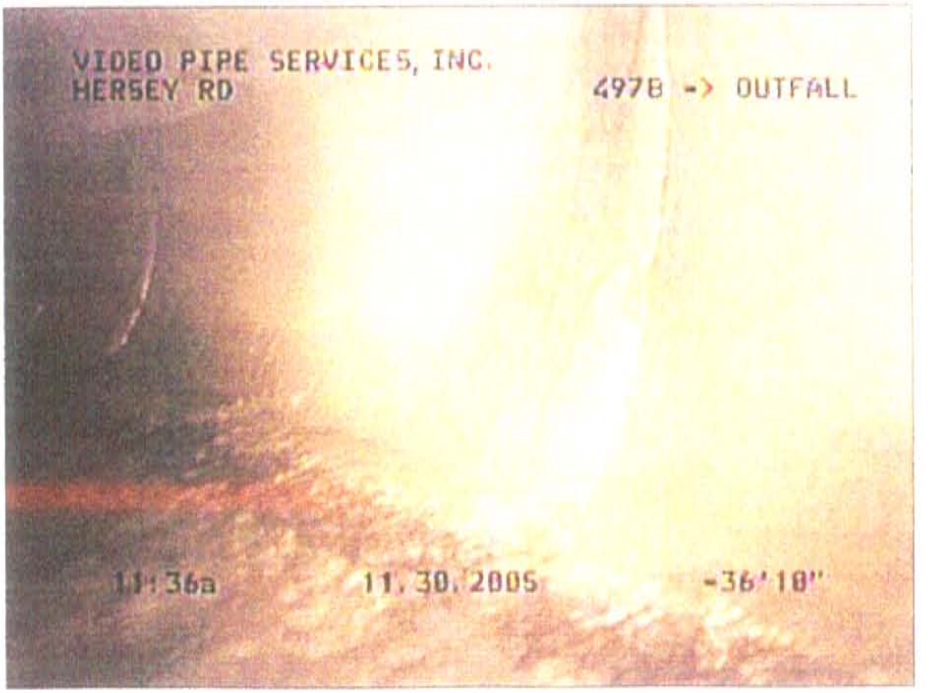


Photo: 26a, Tape/Media No.: CD-1, 00:29:28
99FT, Infiltration Runner, from 04 to 06 o´clock, within 8 inch: YES

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel: 856.697.1900, Fax: 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	1	

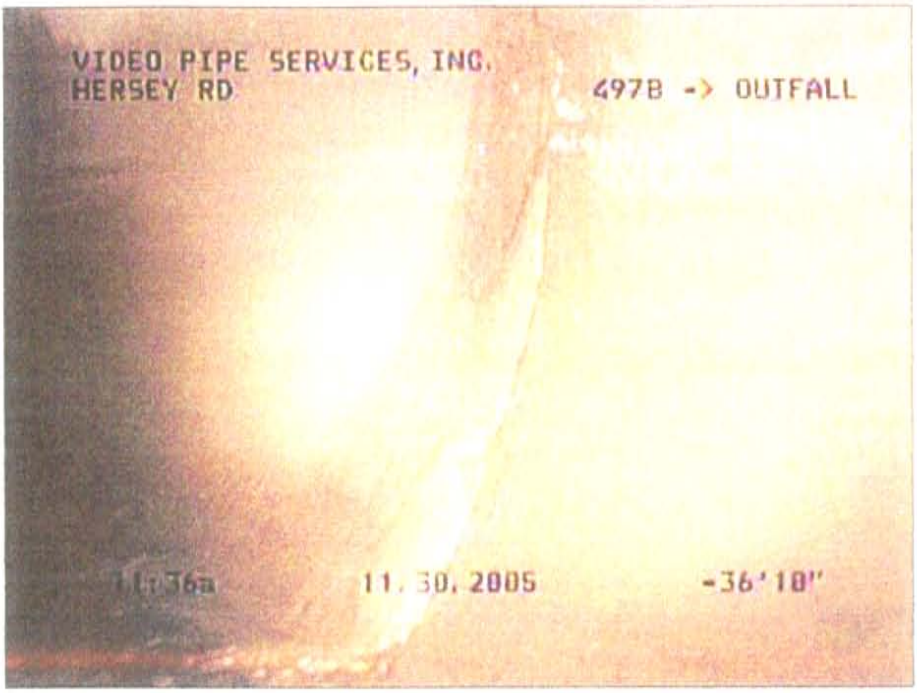


Photo: 26b, Tape/Media No.: CD-1, 00:29:28
99FT, Infiltration Runner, from 04 to 06 o´clock, within 8 inch: YES

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel: 856.697.1900, Fax: 856.697.0757

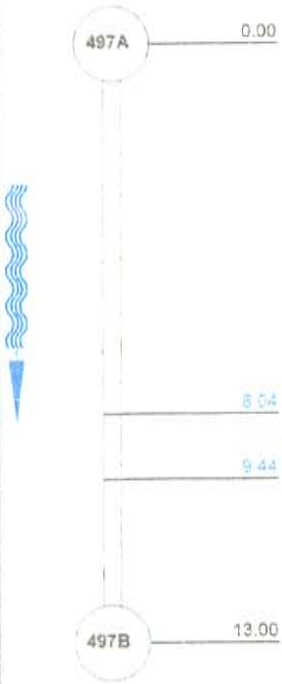
Inspection report

Date:	P.O.#:	Weather:	Surveyed By:	section number:	PSR:
11/30/2005	TETRAT-1	1 Dry	U-1202-454	2	
Total Pipe Length:	Survey Customer:	System Owner:	Clean Date:	Pre-Cleaned:	Map Grid #:
	TECHRA TECH	U.S. NAVY		N No Pre-Cleaning	

Street:	HERSEY RD	Flow Control:		Start MH:	497A
City:	INDIAN HEAD, MD	Year Renewed		End MH:	497B
Location Code:	H Alley	Tape/Media #:	CD-1	pipe length:	13 ft

Reason for inspection:	A Maintenance Related	Dia/Height:	C Circular 42"		
Use of Sewer:	SW Stormwater	Material:	VCP Vitrified Clay Pipe	Pipe Length:	3ft
Drain. Area:		Lining Method:			
		Category:			

Remark::



1:50	position	code	observation	counter	photo	grade
497A	0.00	AMH	Manhole	00:19:11		
	8.04	CL	Crack Longitudinal, at 08 o clock, within 8 inch: YES	00:20:27		S 2
	9.44	CL	Crack Longitudinal, at 12 o clock, within 8 inch: YES	00:21:01		S 2
497B	13.00	AJB	Junction Box, Remark: INLET	00:21:52		

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
2200	0000	4	0	4	2	0	2

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel: 856.697.1900, Fax: 856.697.0757

Inspection report

Date:	P.O.#:	Weather:	Surveyed By:	section number:	PSR:
11/30/2005	TETRAT-1	1 Dry	U-1202-454	3	
Total Pipe Length:	Survey Customer:	System Owner:	Clean Date:	Pre-Cleaned:	Map Grid #:
	TECHRA TECH	U.S. NAVY		N No Pre-Cleaning	

Street:	HERSEY RD	Flow Control:		Start MH:	497B
City:	INDIAN HEAD, MD	Year Renewed		End MH:	OUTFALL
Location Code:	H Alley	Tape/Media #:	CD-1	pipe length:	23 ft

Reason for inspection:	A Maintenance Related	Dia/Height:	C Circular 42"
Use of Sewer:	SW Stormwater	Material:	VCP Vitrified Clay Pipe Pipe Length: 3ft
Drain. Area:		Lining Method:	
		Category:	

Remark::

1:75	position	code	observation	counter	photo	grade
497B	0.00	AJB	Junction Box. Remark: INLET	00:21:52		
	20.39	MSA	Survey Abandoned, Remark: CRAWLER WONT MOVE FORWARD AT JOINT.	00:29:28	25a	

QSR	QMR	SPR	MPR	OPR	SPRI	MPRI	OPRI
5131	0000	8	0	8	4	0	4

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT 40)
NEWFIELD,NJ 08344
Tel: 856.697.1900, Fax: 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	3	

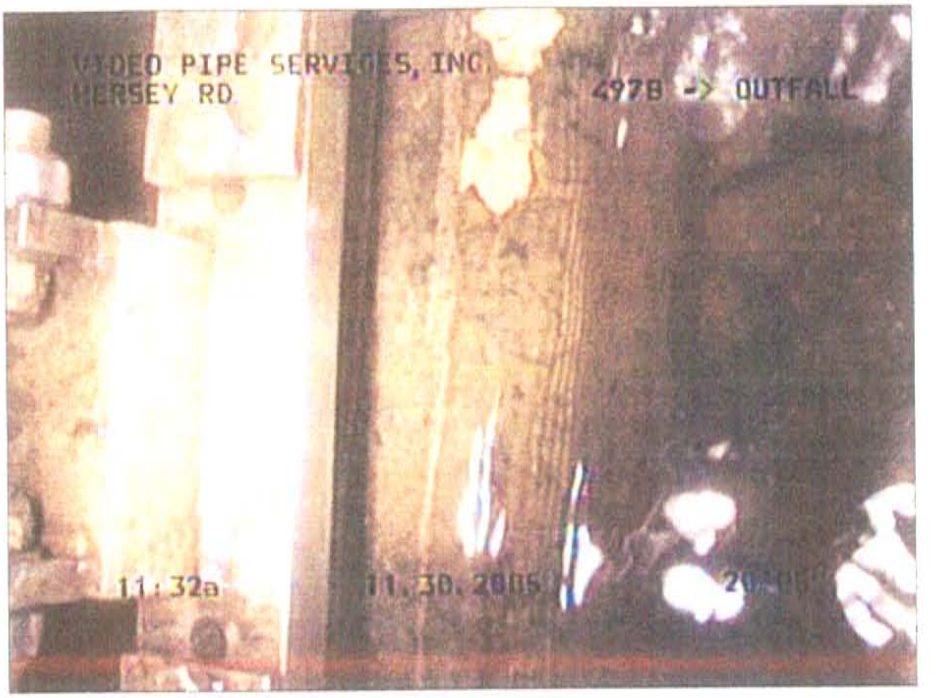


Photo: 25a, Tape/Media No.: CD-1, 00:29:28
20.39FT, Survey Abandoned, Remark: CRAWLER WONT MOVE FORWARD AT JOINT.

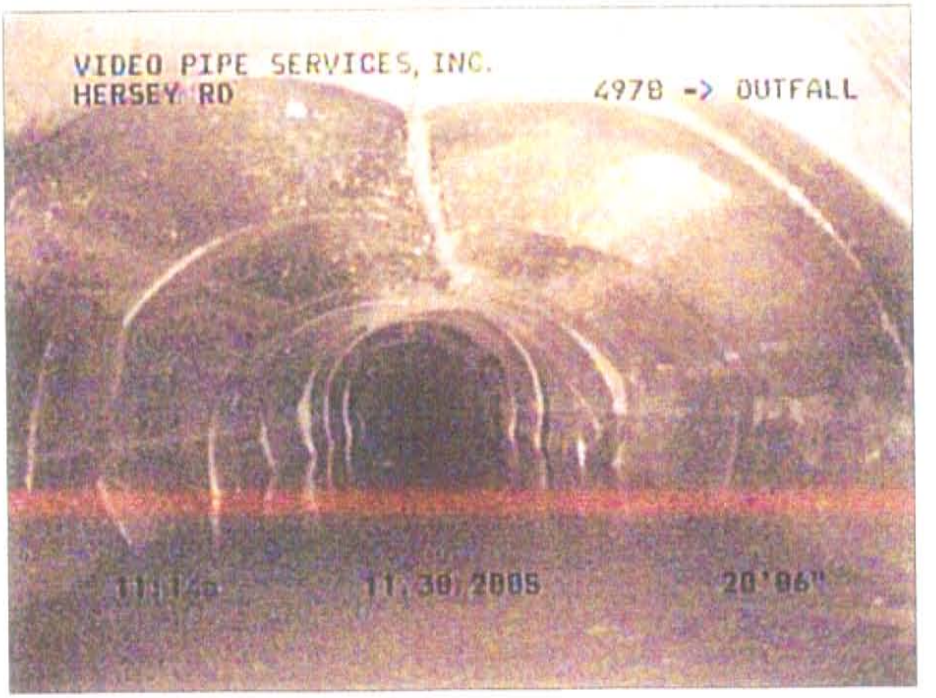


Photo: 24a, Tape/Media No.: CD-1, 00:26:30
23FT, Broken, at 12 o´clock, within 8 inch: YES

The Environmental Protection Specialists

VIDEO PIPE SERVICES,INC.
1566 HARDING HWY (RT.40)
NEWFIELD,NJ 08344
Tel. 856.697.1900, Fax. 856.697.0757

Inspection photos

City:	Street:	Date:	section number:	PSR:
INDIAN HEAD, MD	HERSEY RD	11/30/2005	3	

Photo: 24b, Tape/Media No.: CD-1, 00:26:30
23FT, Broken, at 12 o´clock, within 8 inch: YES

APPENDIX G

PRELIMINARY REMEDIATION GOALS

PRELIMINARY REMEDIATION GOAL FOR CHILD RESIDENT – ETHYL ETHER IN GROUNDWATER

The PRGs for COCs other than ether ethyl are based on MCLs. There is no MCL for ethyl ether; therefore, a risk-based value needs to be calculated. The HI contribution based on the MCLs is calculated first. The PRG for ethyl ether is then calculated based on the remaining available HI, assuming a target HI of 1.0 for all COCs, including ethyl ether.

The HI contribution from the PRGs (i.e., MCLs) for COCs other than ethyl ether is calculated as follows:

$$\text{PRG HI} = \frac{\text{EPC HI} \times \text{PRG}}{\text{EPC}}$$

EPC = Exposure Point Concentration (RI Report Table 9-13)
EPC HI = HI for child resident from EPC (RI Report Table 9.13 in Appendix K)
PRG = Preliminary Remediation Goal (FS Report Table 2-4)

COC	EPC HI	EPC (µg/L)	PRG (µg/L)	PRG HI
cis-1,2-Dichloroethene	3.6	528	70	0.48
1,1-Dichloroethene	0.22	29	7	0.05
Trichloroethene	7.3	612	5	0.06
Vinyl chloride	NC	85	2	NC
Total				**0.59**
Ethyl ether	1.3	3,950		0.41

The PRG HI was not calculated for chloroform because the maximum concentration (1.3 µg/L) is less than the MCL (80 µg/L), and the EPC HI was negligible (0.0088). The PRG HI was not calculated for vinyl chloride in the RI because there is no toxicity data available.

During the RI risk assessment, tetrachloroethene was identified as a COC because the EPC based on RI data (5.41 µg/L) was greater than the MCL (5 µg/L); however, there was no unacceptable risk based on the RI human health risk assessment. The maximum concentration of tetrachloroethene was 3 µg/L based on the 2005 data. Therefore, tetrachloroethene is no longer a COC.

Trans-1,2-dichloroethene was not identified as a COPC during the RI human health risk assessment because the EPC (3.9 µg/L) was less than the screening level (11 µg/L), which was based on one-tenth of the EPA Region 3 tap water RBC and would result in a small HI (estimated at 0.04 based on direct comparison to the RBC). However, based on the 2005 data, the maximum concentration (160 µg/L) was

greater than the screening level and the MCL (100 µg/L). Trans-1,2-dichloroethene was not included in this evaluation because it was only detected at two locations at concentrations of 6 and 160 µg/L

For a Target HI = 0.41 for ethyl ether:

$$PRG = \frac{EPC \times PRG\ HI}{EPC\ HI} = \frac{3{,}950 \times 0.41}{1.3} = 1{,}246\ \mu g/L$$

CHECK INCREMENTAL CANCER RISK (ICR) FOR GROUNDWATER PRGs

The ICR contribution from each PRG is calculated as follows:

$$\text{PRG ICR} = \frac{\text{EPC ICR x PRG}}{\text{EPC}}$$

EPC = Exposure Point Concentration (RI Report Table 9-13)

EPC ICR = ICR for Child Resident at EPC (RI Report Table 9.13 in Appendix K)

PRG = Preliminary Remediation Goal (FS Report Table 2-4)

COC	EPC ICR	EPC (µg/L)	PRG (µg/L)	PRG ICR
cis-1,2-Dichloroethene	NC	528	70	NC
1,1-Dichloroethene	1.2E-04	29	7	2.9E-05
Ethyl ether	NC	3,950	1.094	NC
trans-1,2-Dichloroethene	NC	NC	100	NC
Trichloroethene	4.8E-05	612	5	3.9E-07
Vinyl chloride	1.1E-03	85	2	2.6E-05
Total				**5.5E-05**

The ICR was not calculated for cis-1,2-dichloroethene, trans-1,2-dichloroethene or ethyl ether because no cancer toxicity data are available.

The total ICR for the groundwater COCs (5.5E-05) is within the EPA target risk range. Therefore, the PRGs are protective of human health.

APPENDIX H

TECHNOLOGY EVALUATIONS

H.1 MONITORED NATURAL ATTENUATION

H.2 IN SITU BIOLOGICAL TREATMENT

H.3 GROUNDWATER MODELING

H.1 MONITORED NATURAL ATTENUATION

APPENDIX H.1

SCREENING FOR NATURAL ATTENUATION OF CHLORINATED VOLATILE ORGANIC COMPOUNDS

Groundwater samples were analyzed for the parameters listed on Table H-1. In accordance to a United States Environmental Protection Agency (EPA) protocol summarized on that table (EPA, 1998), analytical results for these parameters can provide an indication of how favorable, or unfavorable, conditions are in the contaminated groundwater for the natural attenuation of chlorinated volatile organic compounds (VOCs), particularly tetrachloroethene (PCE) and trichloroethene (TCE) that are the main chemicals of concern (COCs) for the Site 57 groundwater.

Table H-2 provides a summary of the natural attenuation parameters analytical results measured during the August 2001 sampling for a total of 23 Site 57 wells, including 4 upgradient/background wells (MW012, MW013, TW014, and TW015), 11 source areas wells (MW001 to MW004, MW007, MW008, MW011, and TW017 to TW019), 5 mid-plume wells (MW005, MW006, MW009, MW010, and MW023), and 3 downgradient wells (MW020, TW021, and MW022).

Table H-3 provides a summary of the natural attenuation scoring. In this table, each analytical result listed in Table H-2 for the source areas, mid-plume, and downgradient wells was assigned a positive, negative, or neutral (0) numerical score in accordance with the previously-mentioned EPA protocol to denote if it represents conditions which are favorable, unfavorable, or indifferent to the degradation of chlorinated VOCs through natural attenuation. As can be seen from Table H-3, total scores for each sampling location ranged from 0 in one mid-plume well (MW023) to 21 in one downgradient well (MW022). The site-wide average score for the 19 contaminated wells was 7.3, with average area scores of 7.3 for the source area wells, 5.6 for the mid-plume wells, and 9.0 for the downgradient wells.

It should be noted that the scoring was relatively liberal because most of the points were consistently awarded for such parameters as the absence (<20 mg/L) of sulfates, the presence (>1 mg/L) of sulfides, and the mild (>20°C) groundwater temperature. While these three parameters are indeed favorable to the natural attenuation of chlorinated VOCs, they are generally not considered as significant as the absence of dissolved oxygen (DO), the presence of ferrous iron, a negative oxidation/reduction potential (ORP), or the presence of gases such as methane, ethane or ethene. In particular, the DO concentration was relatively high at all but one of the sampling locations, averaging 4.06 mg/L through the entire site. This should fairly much impede anaerobic dechlorination that is typically the most important pathway for natural attenuation of chlorinated VOCs

Total scores for each sampling location were then interpreted in accordance with the following table (EPA, 1998) to determine whether or not overall groundwater conditions in the vicinity of that location are favorable to natural attenuation of chlorinated VOCs:

Total Score	Interpretation
0 to 5	Conditions unfavorable to natural attenuation of chlorinated VOCs
6 to 14	Limited possibilities of natural attenuation of chlorinated VOCs
15 to 20	Conditions favorable to natural attenuation of chlorinated VOCs
20 or more	Conditions very favorable to natural attenuation of chlorinated VOCs

Accordingly, it can be concluded that, with the exception of one downgradient location (MW022), conditions in the Site 57 groundwater are not favorable to the natural attenuation of chlorinated VOCs.

However, this does not necessarily mean that conditions are unfavorable to the natural attenuation of other site COCs which do not depend on a reductive dechlorination pathway. In particular, the presence of significant DO concentrations which is unfavorable to the natural attenuation of chlorinated VOCs could be quite favorable to the natural attenuation of organic compounds amenable to aerobic biodegradation, such as ethyl ether, which is another of the Site 57 groundwater COCs.

REFERENCE

EPA (United States Environmental protection Agency), 1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. 600/R-998/128, Office of Research and Development, Washington, DC.

TABLE H-1

NATURAL ATTENUATION PARAMETERS AND SCORING PROTOCOL
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	Maximum Detected Concentration	Interpretation	Score
Dissolved Oxygen (DO) (O_2)*	<0.5 mg/L >5 mg/L	Tolerated, suppresses the reductive pathway at higher concentrations Not tolerated; however, VC may be oxidized aerobically	3 -3
Nitrate (NO_3^-) / Nitrite (NO_2^-)*	<1 mg/L	At higher concentrations may compete with reductive pathway	2
Ferrous Iron (Fe^{2+})*	>1 mg/L	Reductive pathway possible; VC may be oxidized under ferric iron reducing conditions	3
Sulfate (SO_4^{2-})*	<20 mg/L	At higher concentrations may compete with reductive pathway	2
Sulfide (S^{2-})*	>1 mg/L	Reductive pathway possible	3
Methane (CH_4)*	<0.5 mg/L >0.5 mg/L	VC oxidizes Ultimate reductive daughter product, VC accumulates	0 3
Oxidation Reduction Potential* (ORP)	<50 millivolts (mV) < -100mV	Reductive pathway possible Reductive pathway likely	1 2
pH*	5 < pH <9 5 > pH >9	Optimal range for reductive pathway Outside optimal range for reductive pathway	0 -2
Total Organic Carbon (TOC)	>20 mg/L	Carbon and energy source; drives dechlorination; can be natural or anthropogenic	2
Temperature*	>20°C	At T>20°C biochemical process is accelerated	1
Carbon Dioxide (CO_2)	>2x background	Ultimate oxidative daughter product	1
Alkalinity (as $CaCO_3$)	>2x background	Results from interaction between CO_2 and aquifer minerals	1
Chloride (Cl^-)*	>2x background	Daughter product of organic chlorine	2
Tetrachloroethene (PCE) (C_2Cl_4)*		Material released	0
Trichloroethene (TCE) (C_2HCl_3)*		Material released Daughter product of PCE	0 2[a/]
Dichloroethene (DCE) ($C_2H_2Cl_2$)*		Material released Daughter product of TCE If cis is > 80% of total DCE it is likely a daughter product 1,1-DCE can be chemical reaction product of TCA	0 2[a/]
Vinyl Chloride (VC) (C_2H_3Cl)*		Material released Daughter product of DCE	0 2[a/]
Chloroethane (C_2H_5Cl)*		Daughter product of VC under reducing conditions	2

TABLE H-1

NATURAL ATTENUATION PARAMETERS AND SCORING PROTOCOL
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	Maximum Detected Concentration	Interpretation	Score
Ethene (C_2H_2) / Ethane (C_2H_4)	>0.01 mg/L >0.1 mg/L	Daughter product of VC/ethene	2 3
Chloroform ($CHCl_3$)		Material released Daughter product of Carbon Tetrachloride	0 2
Dichloromethane (CH_2Cl_2)		Material released Daughter product of Chloroform	0 2

NOTES:

* Required analysis
a/ Points awarded only if it can be shown that the compound is a daughter product

TABLE H-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NATURAL ATTENUATION PARAMETERS
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	Units	Upgradient/Background Wells				Source Areas Wells			
		MW012	MW013	TW014	TW015	MW001	MW002	MW003	MW004
Dissolved Oxygen (DO) (O_2)	mg/L	3.92	0	2.29	4.53	3.2	3.26	3.43	3.26
Nitrate (NO_3^-) / Nitrites (NO_2^-)	mg/L	1 U/1 U	1 U/1 U	9.8/1 U	2.1/1 U	4.1/1.2	3.6/1.2	4.8/1 U	4.9/1 U
Ferrous Iron (Fe^{2+})	mg/L	0.1 U	0.1 U	15	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Sulfate (SO_4^{2-})	mg/L	1 U	1 U	1 U	1 U	1.3	1 U	1.3	1 U
Sulfide (S^{2-})	mg/L	1.6	1 U	8	2.8	4	4	2.4	4
Methane (CH_4)	µg/L	2 U	2 U	2 U	2 U	2 UL	2 UL	2 UL	0. L
Oxidation/Reduction Potential (ORP)	MV	167	306	114	-21	155	53	258	168
PH	S.U.	5.59	4.25	5.25	5.46	5.78	6.56	5.29	6.49
Total Organic Carbon (TOC)	mg/L	1 U	1 U	9.7	1	6.8	2.8	1.1	1.4
Temperature	°C	18.04	19.2	26.06	18.06	21.8	24.4	20.7	22.5
Carbon Dioxide (CO_2)	mg/L	120	94	130	92	110	160	150	83
Alkalinity (as $CaCO_3$)	mg/L	10	4.5	6	9	12	56	3.25	50
Chloride (Cl^-)	mg/L	7.2	8.6	1 U	4.8	6.2	9.8	6.7	4.8
Tetrachloroethene (PCE) (C_2Cl_4)	µg/L	5 U	5 U	5 U	7.1	5 U	5 U	5 U	6.3
Trichloroethene (TCE) (C_2HCl_3)	µg/L	1.6 J	5 U	5 U	2.3 J	2.6 J	43	365 J	12,000
1,1-Dichloroethene (DCE) ($C_2H_2Cl_2$)	µg/L	2 J	74	5 U	5 U	2 J	5 U	2.75 J	6.5
Cis-1,2-DCE	µg/L	1.9	5 U	5 U	5 U	5 U	2.6 J	30.5 J	620
Trans-1,2-DCE	µg/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U	3.7 J
Total DCE	µg/L	1.9	5 U	5 U	5 U	5 U	2.6 J	33.3 J	630
Vinyl Chloride (VC) (C_2H_3Cl)	µg/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U	26
Chloroethane (C_2H_5Cl)	µg/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Ethane (C_2H_6)	µg/L	4 U	4 U	4 U	4 U	4 UL	4 UL	4 UL	4 UL
Ethene (C_2H_4)	µg/L	4 U	4 U	2 U	4 U	4 UL	4 UL	4 UL	4 UL
Dichloromethane (CH_2Cl_2)	µg/L	5 U	1.2 B	5 U	1.5 B	5 U	5 U	5 U	5 U
Chloroform ($CHCl_3$)	µg/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U

TABLE H-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NATURAL ATTENUATION PARAMETERS
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	Units	Source Areas Wells						
		MW007	MW008	MW011	TW016	TW017	TW018	TW019
Dissolved Oxygen (DO) (O_2)	mg/L	4.06	2.48	3.3	7.91	4.05	4.35	4.62
Nitrate (NO_3^-) / Nitrite (NO_2^-)	mg/L	3.05/1 U	6.8/1U	1.6/1 U	5.6/1 U	1.2/1 U	8.4/1 U	3.8/1 U
Ferrous Iron (Fe^{2+})	mg/L	0.1 U	0.1 U	0.14	0.1 U	0.1 U	4.1	0.3
Sulfate (SO_4^{2-})	mg/L	1 U	1 U	1.3	1 U	1 U	1 U	1 U
Sulfide (S^{2-})	mg/L	2.8	2.8	4	4	1.2	1.8	2
Methane (CH_4)	µg/L	0.07	2 U	2 UL	2 U	2 UL	0.19	2 U
Oxidation/Reduction Potential (ORP)	mV	22	46	135	145	177	185	64
pH	S.U.	5.28	6.45	5.79	6.53	5.35	4.87	6.01
Total Organic Carbon (TOC)	mg/L	1 U	1.9	NA	1.4	1.3	4.6	1.5
Temperature	°C	19.4	26.48	21.34	20.83	18.4	19.47	17.4
Carbon Dioxide (CO_2)	mg/L	115	150	130	61	110	100	2.5
Alkalinity (as $CaCO_3$)	mg/L	20	42	19	27	8.5	7.3	14
Chloride (Cl^-)	mg/L	6.8	60	3.2	9.2	4.8	2.7	3
Tetrachloroethene (PCE) (C_2Cl_4)	µg/L	5 U	5 U	5 U	5 U	1.6 J	5 U	5 U
Trichloroethene (TCE) (C_2HCl_3)	µg/L	140	5 U	94	5 U	1.1 J	210	62
1,1-Dichloroethene (DCE) ($C_2H_2Cl_2$)	µg/L	6.75	5 U	5 U	5 U	5 U	3.1 J	5 U
cis-1,2-DCE	µg/L	25	5 U	30	5 U	5 U	5 U	5 U
trans-1,2-DCE	µg/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Total DCE	µg/L	32	5 U	30	5 U	5 U	5 U	5.5
Vinyl Chloride (VC) (C_2H_3Cl)	µg/L	5 U	5 U	5 U	5 U	5 U	5 U	5.5
Chloroethane (C_2H_5Cl)	µg/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Ethane (C_2H_6)	µg/L	4 U	4 U	4 UL	4 U	4 UL	4 U	4 U
Ethene (C_2H_4)	µg/L	4 U	4 U	4 UL	4 U	4 UL	4 U	4 U
Dichloromethane (CH_2Cl_2)	µg/L	5 U	0.7 B	5 U	1.8 B	5 U	1.3 J	1.9 J
Chloroform ($CHCl_3$)	µg/L	5 U	5 U	5 U	5 U	5 U	5 U	5 U

TABLE H-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NATURAL ATTENUATION PARAMETERS
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	Units	Mid-Plume Wells				Downgradient Wells		
		MW005	MW006	MW009	MW010	MW020	TW021	MW022
Dissolved Oxygen (DO) (O_2)	mg/L	4.3	4.34	3.14	3.97	2.84	7.09	4.45
Nitrate (NO_3^-) / Nitrite (NO_2^-)	mg/L	1 U/1 U	3.9/1 U	1 U/1 U	6.8/1 U	2.1/1 U	30/1 U	6.3/1 U
Ferrous Iron (Fe^{2+})	mg/L	0.1 U	0.1 U	0.1 U	6.3	0.99	5.7	4.8
Sulfate (SO_4^{2-})	mg/L	1 U	1.8	1 U	1 U	1 U	1 U	1 U
Sulfide (S^{2-})	mg/L	1.6	5.2	1 U	2	1 U	1 U	8
Methane (CH_4)	µg/L	2 U	2 U	2 U	0.07	2 U	2 U	740
Oxidation/Reduction Potential (ORP)	mV	315	288	261	57	104	-256	-11
PH	S.U.	4.24	4.88	5	5.55	5.62	4.83	6.82
Total Organic Carbon (TOC)	mg/L	1 U	1 U	1 U	1.9	1 U	3.6	13
Temperature	°C	20.5	20.59	22.3	23.1	21.02	20.7	18.52
Carbon Dioxide (CO_2)	mg/L	2 U	73	54	100	81	120	1,300
Alkalinity (as $CaCO_3$)	mg/L	2 U	2 U	2	19	2	5	440
Chloride (Cl^-)	mg/L	3.1	15	1 U	1 U	4.3	8.9	9.8
Tetrachloroethene (PCE) (C_2Cl_4)	µg/L	5 U	10 U	5 U	5 U	5 U	5 U	50 U
Trichloroethene (TCE) (C_2HCl_3)	µg/L	5 U	250	480	330	5 U	5 U	50 U
1,1-Dichloroethene (DCE) ($C_2H_2Cl_2$)	µg/L	5 U	6.7 J	28	13	5 U	5 U	50 U
Cis-1,2-DCE	µg/L	5 U	46	85	150	5 U	5 U	1,400
Trans-1,2-DCE	µg/L	5 U	10 U	5 U	5 U	5 U	5 U	50 U
Total DCE	µg/L	5 U	46	85	150	5 U	5 U	1,400
Vinyl Chloride (VC) (C_2H_3Cl)	µg/L	5 U	10 U	5 U	5.5	5 U	5 U	1,500
Chloroethane (C_2H_5Cl)	µg/L	5 U	10 U	5 U	5 U	5 U	5 U	50 U
Ethane (C_2H_6)	µg/L	4 UL	4 U	4 U	4 U	4 U	4 U	280 J
Ethene (C_2H_4)	µg/L	4 UL	4 U	4 U	4 U	4 U	4 U	150 J
Dichloromethane (CH_2Cl_2)	µg/L	5 U	10 U	5 U	5 U	5 U	0.7 B	50 U
Chloroform ($CHCl_3$)	µg/L	5 U	10 U	5 U	5 U	5 U	5 U	50 U

TABLE H-2

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
NATURAL ATTENUATION PARAMETERS
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

NOTES:

B	False positive because of blank contamination
J	Estimated value
NA	Not analyzed
U	Undetected at the indicated detection limit
UL	Undetected at the indicated detection limit. Biased low.

TABLE H-3

SUMMARY OF NATURAL ATTENUATION PARAMETERS SCORINGS
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameters	Available Points[1]	Source Areas Wells				
		MW001	MW002	MW003	MW004	MW007
Dissolved Oxygen (DO) (O_2)	-3 to +3	0	0	0	0	0
Nitrate (NO_3^-) / Nitrites (NO_2^-)	0 to 2	0	0	0	0	0
Ferrous Iron (Fe^{2+})	0 to 3	0	0	0	0	0
Sulfate (SO_4^{2-})	0 to 2	2	2	2	2	2
Sulfide (S^{2-})	0 to 3	3	3	3	3	3
Methane (CH_4)	0 to 3	0	0	0	0	0
Oxidation/Reduction Potential (ORP)	1 to 2	0	0	0	0	1
pH	-2 to 0	0	0	0	0	0
Total Organic Carbon (TOC)	0 to 2	0	0	0	0	0
Temperature	0 to 1	1	1	1	1	0
Carbon Dioxide (CO_2)	0 to 1	0	0	0	0	0
Alkalinity (as $CaCO_3$)	0 to 1	0	1	0	1	1
Chloride (Cl^-)	0 to 2	0	0	0	0	0
Tetrachloroethene (PCE) (C_2Cl_4)	0	0	0	0	0	0
Trichloroethene (TCE) (C_2HCl_3)	0 to 2	0	0	0	0	0
Dichloroethene (DCE) ($C_2H_2Cl_2$)	0 to 2	0	2	2	2	2
Vinyl Chloride (VC) (C_2H_3Cl)	0 to 2	0	0	0	2	0
Chloroethane (C_2H_5Cl)	0 to 2	0	0	0	0	0
Ethane (C_2H_6) / Ethene (C_2H_4)	0 to 3	0	0	0	0	0
Dichloromethane (CH_2Cl_2)	0 to 2	0	0	0	0	0
Chloroform ($CHCl_3$)	0 to 2	0	0	0	0	0
Totals[2]	**40**	**6**	**9**	**8**	**11**	**9**

TABLE H-3

SUMMARY OF NATURAL ATTENUATION PARAMETERS SCORINGS
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameters	Available Points[1]	Source Areas Wells (continued)					
		MW008	MW011	TW016	TW017	TW018	TW019
Dissolved Oxygen (DO) (O_2)	-3 to +3	0	0	-3	0	0	0
Nitrate (NO_3^-) / Nitrite (NO_2^-)	0 to 2	0	0	0	0	0	0
Ferrous Iron (Fe^{2+})	0 to 3	0	0	0	0	3	0
Sulfate (SO_4^{2-})	0 to 2	2	2	2	2	2	2
Sulfide (S^{2-})	0 to 3	3	3	3	3	3	3
Methane (CH_4)	0 to 3	0	0	0	0	0	0
Oxidation/Reduction Potential (ORP)	1 to 2	1	0	0	0	0	0
pH	-2 to 0	0	0	0	0	-2	0
Total Organic Carbon (TOC)	0 to 2	0	0	0	0	0	0
Temperature	0 to 1	1	1	1	0	0	0
Carbon Dioxide (CO_2)	0 to 1	0	0	0	0	0	0
Alkalinity (as $CaCO_3$)	0 to 1	1	1	1	0	0	1
Chloride (Cl^-)	0 to 2	2	0	0	0	0	0
Tetrachloroethene (PCE) (C_2Cl_4)	0	0	0	0	0	0	0
Trichloroethene (TCE) (C_2HCl_3)	0 to 2	0	0	0	0	0	0
Dichloroethene (DCE) ($C_2H_2Cl_2$)	0 to 2	0	2	0	0	0	2
Vinyl Chloride (VC) (C_2H_3Cl)	0 to 2	0	0	0	0	0	0
Chloroethane (C_2H_5Cl)	0 to 2	0	0	0	0	0	0
Ethane (C_2H_6) / Ethene (C_2H_4)	0 to 3	0	0	0	0	0	0
Dichloromethane (CH_2Cl_2)	0 to 2	0	0	0	0	2	2
Chloroform ($CHCl_3$)	0 to 2	0	0	0	0	0	0
Totals[2]	**43**	**10**	**9**	**4**	**5**	**8**	**10**

TABLE H-3

SUMMARY OF NATURAL ATTENUATION PARAMETERS SCORINGS
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	Available Points[1]	Mid-Plume Wells				Downgradient Wells		
		MW005	MW006	MW009	MW010	MW020	TW021	MW022
Dissolved Oxygen (DO) (O_2)	-3 to +3	0	0	0	0	0	-3	0
Nitrate (NO_3^-) / Nitrite (NO_2^-)	0 to 2	0	0	0	0	0	0	0
Ferrous Iron (Fe^{2+})	0 to 3	0	0	0	3	2	3	3
Sulfate (SO_4^{2-})	0 to 2	2	2	2	2	2	2	2
Sulfide (S^{2-})	0 to 3	3	3	0	3	0	0	3
Methane (CH_4)	0 to 3	0	0	0	0	0	0	3
Oxidation/Reduction Potential (ORP)	1 to 2	0	0	0	0	0	2	1
pH	-2 to 0	-2	-2	0	0	0	-2	0
Total Organic Carbon (TOC)	0 to 2	0	0	0	0	0	0	0
Temperature	0 to 1	1	1	1	1	1	1	0
Carbon Dioxide (CO_2)	0 to 1	0	0	0	0	0	0	1
Alkalinity (as $CaCO_3$)	0 to 1	0	0	0	1	0	0	1
Chloride (Cl^-)	0 to 2	0	2	0	0	0	0	0
Tetrachloroethene (PCE) (C_2Cl_4)	0	0	0	0	0	0	0	0
Trichloroethene (TCE) (C_2HCl_3)	0	0	0	0	0	0	0	0
Dichloroethene (DCE) ($C_2H_2Cl_2$)	0 to 2	0	2	2	2	0	0	2
Vinyl Chloride (VC) (C_2H_3Cl)	0 to 2	0	0	0	2	0	0	2
Chloroethane (C_2H_5Cl)	0 to 2	0	0	0	0	0	0	0
Ethane (C_2H_6) / Ethene (C_2H_4)	0 to 3	0	0	0	0	0	0	3
Dichloromethane (CH_2Cl_2)	0 to 2	0	0	0	0	0	0	0
Chloroform ($CHCl_3$)	0 to 2	0	0	0	0	0	0	0
Totals[2]	**40**	**4**	**8**	**5**	**14**	**3**	**3**	**21**

TABLE H-3

SUMMARY OF NATURAL ATTENUATION PARAMETERS SCORINGS
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

NOTES:

(1) According to Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater, EPA Publication 600/R-998/128, September 1998

(2) 0-5 pt: conditions unfavorable to natural attenuation, 6-14 pt: limited possibility of natural attenuation, 15-20pt: conditions favorable to natural attenuation, 20+ pt: conditions very favorable to natural attenuation

H.2 IN SITU BIOLOGICAL TREATMENT

APPENDIX H.2

SCREENING FOR IN-SITU BIOLOGICAL TREATMENT

The screening presented in Appendix H.1 concluded that conditions in the Site 57 groundwater are not favorable to the natural attenuation of chlorinated volatile organic compounds (VOCs). The purpose of the screening in this appendix was to determine whether biological activity could be enhanced to degrade such compounds through reductive anaerobic degradation. The screening was conducted following the 2001 sampling event in accordance with a draft technical protocol titled "A Treatability Test for Evaluating the Potential Applicability of the Reductive Anaerobic Biological In Situ Treatment Technology (RABITT) to Remediate Chloroethenes" (ESTCP, 1998). The geologic setting in which a RABITT system is installed governs its successful operation. RABITT systems rely on the delivery of dissolved amendments throughout the contaminant plume. Administering these amendments requires careful engineering and knowledge of the geologic parameters affecting groundwater flow and transport.

The draft technical protocol uses a rating system that includes three independent categories. There are the contaminant profile, hydrogeological profile, and geochemical profile. Each profile contains a category scoring profile table that lists a set of possible site conditions followed by an assigned score. The sum of the scores is compared with the site potential analysis.

The contaminant profile is based on the chemicals detected in the groundwater, including the presence of vinyl chloride (VC), dichloroethene (DCE), tetrachloroethene (PCE), trichloroethene (TCE), dissolved oxygen, and nitrate (see Table H-2 in Appendix H.1 for concentrations in each monitoring well). The scoring for contaminant profile is as follows:

Evidence of Daughter Product Formation	Score
Ethene detected above background levels in or immediately downgradient of a VC daughter plume.	25
VC daughter plume associated with or immediately downgradient from a DCE daughter plume.	15
DCE daughter plume associated with or immediately downgradient from the parent plume (PCE or TCE).	5
No daughter products present and greater than 1 mg/L dissolved oxygen.	0
No daughter products, dissolved oxygen less than 0.5 mg/l, and nitrate less than 1 mg/L.	-6

The hydrogeological profile is based on the hydraulic conductivity values measured in each monitoring well (2001 data). The scoring for hydraulic conductivity (K) is as follows:

- 25 $K \geq 1.0E\text{-}03$ cm/sec
- 0 $1.0E\text{-}04 < K < 1.0E\text{-}03$ cm/sec
- -50 $K \leq 1.0E\text{-}05$ cm/sec

The geochemical profile is based on measurements of dissolved oxygen, nitrate, hydrogen sulfide, sulfate, redox potential, temperature, dissolved organic carbon, bicarbonate alkalinity, pH, and methane. The scoring for geochemical profile is as follows:

Dissolved Oxygen	Score
< 0.5 mg/L	3
0.5 – 1.0 mg/L	1
1.0 – 3.0 mg/L	0
> 3.0 mg/L	-3

Nitrate	Score
< 1 mg/L	3
1 – 2 mg/L	1
2 – 5 mg/L	0
> 5 mg/L	-3

Hydrogen Sulfide	Score
> 0.1 mg/L	3
≤ 0.1 mg/L	0

Sulfate	Score
< 20 mg/L	2
> 20 mg/L	0

Redox Potential	Score
< -200 mV	1
-200 mV – 200 mV	0
> 200 mV	-1

Temperature	Score
> 15° C	3
10° C – 15° C	0
< 10° C	-3

Dissolved Organic Carbon	Score
> 20 mg/L	3
10 – 20 mg/L	1
< 10 mg/L	0

Bicarbonate Alkalinity	Score
> 5,000 mg/L	1
1,000 – 5,000 mg/L	0
< 1,000 mg/L	-1

pH	Score
6.5 – 7.5	3
6.0 – 6.5 or 7.5 – 8.0	0
5.0 – 6.0 or 8.0 – 9.0	-1
< 5.0 or > 9.0	-5

Methane	Score
> 0.1 mg/L	3
≤ 0.1 mg/L	0

Based on the contaminant profile, hydrogeological profile, and geochemical profile scores listed above, a total point value was calculated for each monitoring well. The results are presented in Table 1. The wells are presented in approximately upgradient to downgradient in the source area, mid-plume area, and downgradient area of the site. The scores in Table 1 are evaluated below.

Score from 36 to 55: Satisfactory

Some level of dechlorination is probably occurring and hydrogeological and geochemical conditions are favorable. Under these conditions, accelerating RABITT is likely, but care needs to be taken to ensure that DCE does not accumulate. Proceed to microcosm testing and evaluate the microbiological potential for complete dechlorination to ethene. If results are congruent with project goals, proceed with in situ treatability testing to determine the extent of chloroethene degradation and to assess electron donor demand. The three wells in the category include S57MW004, S57MW010, and S57MW022.

Score from 16 to 35: Marginal

Although scores in this range are not strong indicators of success, they do indicate that it is worthwhile to conduct the RABITT treatability test. Sites in this range exhibiting dechlorination and favorable geochemistry often have hydraulic conductivity in the 1.0E-04 cm/sec range. If groundwater manipulation is plausible (i.e., $K \geq 5.0E\text{-}04$ cm/sec), such a site should be considered favorably. Microcosm and treatability testing will provide insight into the extent of dechlorination and electron donor demand that may be expected in situ. Based on the results from these studies, a cost benefit analysis should be used to see if full-scale RABITT implementation is likely to meet project goals at acceptable costs. The five wells in this category include S57MW008, S57TW017, S57TW019, S57MW005, and S57MW006. The hydraulic conductivity at these wells is greater than 5.0E-04 cm/sec.

Score from –5 to 15: Questionable

Scores falling in this range require a closer look. Although stimulating dechlorination at this site may be possible, it will probably be more expensive and time consuming than sites with higher rankings. To be worthy of further consideration, this site must allow the effective distribution of electron donor and nutrients. Therefore, the site's hydraulic conductivity is the key. If substantial groundwater manipulation is plausible (i.e., $K \geq 5.0E\text{-}04$ cm/sec), microcosm testing to evaluate in situ electron donor demand and the microbiological potential for dechlorination should be undertaken. If difficulties are anticipated with groundwater manipulation, the site should be excluded from further consideration. The eight wells in this category include S57MW001, S57MW002, S57MW003, S57MW007, S57MW011, S57TW016, S57MW009, and S57MW020. The hydraulic conductivity at wells S57MW003, S57MW009, and S57MW020 are greater than 5.0E-04 cm/sec. The hydraulic conductivities for the other wells range from 1.7E-04 to 3.9E-04 cm/sec. No COCs were detected above PRGs for wells S57MW001 and S57TW016.

Score from –6 to –15: Unfavorable

The combination of unfavorable geochemical conditions and questionable low hydraulic conductivity make the implementation of RABITT at this site extremely unlikely. Stimulating dechlorination will probably require considerable effort to modify existing geochemical conditions, including the exhaustion

of several electron-accepting species. Questionable hydraulic conductivities in the range of 1.0E-04 cm/sec may significantly increase the difficulty and expense of distributing electron donor and nutrients throughout the system. The two wells in the category are S57TW018 and S57TW021. No COCs were detected above PRGs at well S57TW021.

Conclusion

The scoring indicated that in situ biological treatment is worthy of further evaluation in the FS; however, treatability studies are recommended before this technology is implemented.

Reference

ESTCP (Environmental Security Technology Certification Program), 1998. Draft Technical Protocol, A Treatability Test for Evaluating the Potential Applicability of the Reductive Anaerobic Biological In Situ Treatment Technology (RABITT) to Remediation Chloroethenes. Prepared by Batelle Memorial Institute, Columbus, Ohio.

TABLE 1

SUMMARY OF RABITT PARAMETERS SCORING
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	MW001	MW002	MW003	MW004	MW007	MW008	MW011	TW016	TW017	TW018
Daughter Product Formation	0	5	5	15	5	0	5	0	0	0
Hydrogeologic Profile	0	0	0	25	0	25	0	0	25	0
Dissolved Oxygen	-3	-3	-3	-3	-3	0	-3	-3	-3	-3
Nitrate	0	0	0	0	0	-3	1	-3	1	-3
Hydrogen Sulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	2	2	2	2	2	2	2	2	2	2
Redox Potential	0	0	-1	0	0	0	0	0	0	0
Temperature	3	3	3	3	3	3	3	3	3	3
Dissolved Organic Carbon	0	0	0	0	0	0	NA	0	0	0
Bicarbonate Alkalinity	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
pH	-1	3	-1	0	-1	0	-1	3	-1	-5
Methane	0	0	0	0	0	0	0	0	0	0
Total Point Value	**0**	**9**	**4**	**41**	**5**	**26**	**6**	**1**	**26**	**-7**
Rating	**Q**	**Q**	**Q**	**S**	**Q**	**M**	**Q**	**Q**	**M**	**U**

S - Satisfactory
M - Marginal
Q - Questionable
U - Unfavorable

TABLE 1

SUMMARY OF RABITT PARAMETERS SCORING
SITE 57 - BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Parameter	TW019	MW005	MW006	MW009	MW010	MW020	TW021	MW022
Daughter Product Formation	15	0	5	5	15	0	0	25
Hydrogeologic Profile	0	25	25	0	25	0	0	25
Dissolved Oxygen	-3	-3	-3	-3	-3	0	-3	-3
Nitrate	0	3	0	3	-3	0	-3	-3
Hydrogen Sulfide	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	2	2	2	2	2	2	2	2
Redox Potential	0	-1	-1	-1	0	0	1	0
Temperature	3	3	3	3	3	3	3	3
Dissolved Organic Carbon	0	0	0	0	0	0	0	1
Bicarbonate Alkalinity	-1	-1	-1	-1	-1	-1	-1	-1
pH	0	-5	-5	-1	-1	-1	-5	3
Methane	0	0	0	0	0	0	0	3
Total Point Value	**16**	**23**	**25**	**7**	**37**	**3**	**-6**	**55**
Rating	**M**	**M**	**M**	**Q**	**S**	**Q**	**U**	**S**

S - Satisfactory
M - Marginal
Q - Questionable
U - Unfavorable

H.3 GROUNDWATER MODELING

APPENDIX H.3
GROUNDWATER MODELING REPORT

1.0 INTRODUCTION

As part of the feasibility study (FS) process, Tetra Tech NUS, Inc. (TtNUS) estimated the time frame required for reducing trichloroethene (TCE) below the federal Maximum Contaminant Level (MCL) based on the 2001 analytical results. The chlorinated solvents in groundwater reportedly originated from drum storage sources near the southeastern corner of Building 292 (FS Figure 1-4). Free product or non-aqueous phase liquid (NAPL) has not been noted in borings or in subsurface structures or drains. However, a known source area is present. A key assumption in the modeling is that the source area contaminant concentrations will not drop with time and will be continuously emitting TCE contamination into groundwater if a source removal is not undertaken. The Navy is expected to use the groundwater modeling results to assist in the selection of the remedy for the plume.

The property in question is a former drum storage area. Future land use for this property is expected to remain as it currently is. TtNUS performed a site investigation of the sites and determine the concentrations of the volatile organic compound (VOC) contamination in the shallow, intermediate, and deep portions of the surficial aquifer along an unnamed tributary of Mattawoman Creek. The distribution of chlorinated solvents showed the natural degradation of TCE to daughter products cis-1-2-dichloroethene (DCE) and vinyl chloride (VC) has been minor.

2.0 OBJECTIVES AND TECHNICAL APPROACH

The goals of the modeling were to:

- Create a groundwater flow field that represents current site conditions.
- Assess fate and transport of TCE.
- Estimate the clean-up times for TCE under natural attenuation and source removal scenarios.
- Estimate the clean-up times for TCE under a groundwater extraction scenario.

The technical approach used in this study involved the use of a groundwater flow model (MODFLOW) and a groundwater solute transport model (MT3D for TCE) to assess the Site 57 plume remediation. The computer codes were implemented within the graphical pre/post processor program called Groundwater Modeling System (GMS). Initially, an evaluation of the existing data was conducted. Based on the available data, the site was conceptualized in terms of groundwater flow and solute transport characteristics. The computer codes used in the study are described in Section 4. Construction of the

numerical flow and solute transport models are described in Section 5. The flow model was manually calibrated using the hydrologic and analytical site data (Sections 5 and 6). Based on the analytical data, it was decided to limit the solute transport evaluation to TCE. Unfortunately, there is little information available concerning long-term contaminant concentration data through time to assist in the formulation of half-lives and decay constants for each contaminant. Chlorinated solvents undergo degradation through dechlorination most effectively under reducing conditions. Literature values for partitioning coefficient and decay constants were used in the modeling.

3.0 EVALUATION OF EXISTING DATA AND SITE CONCEPTUAL MODEL

Geology

As part of the site investigations that were conducted in Site 57, numerous borings, monitoring wells, and cone penetrometer technology (CPT) wells were sampled. Geological cross sections that show the geological characteristics observed beneath the site are shown in FS Figures 1-6 to 1-10. Generally the site consists of approximately 15 to 35 feet of saturated sand above a silt, clay, and sand confining unit. The top of the clay unit was represented as an impermeable base of the model.

Hydrogeology

Outside of a narrow band of monitoring wells along the unnamed tributary of Mattawoman Creek, there are no wells to provide hydrogeologic information. The general groundwater flow direction across Site 57 is from northwest to southeast (FS Figure 1-5).

The hydraulic conductivity of the shallow geologic materials in the valley have been quantified by slug tests performed for 22 monitoring wells during the remedial investigation (RI) (TtNUS, 2000).

An annual average recharge rate (based on the HELP model) was previously estimated for a site at NAS Dahlgren. This value is approximately 5 inches per year. Slight adjustments to this value were used to assist in the Site 57 model calibration.

The primary surface water discharge point for groundwater at Site 57 is Mattawoman Creek, located south of the site.

Contaminant Sources

During the field investigation, there were no reports of free product occurring in any of the soil or groundwater samples collected in this area. An elevated concentration of TCE (12,000 µg/L in 2001) and lower concentrations of other chlorinated solvents were detected in monitoring well S57MW004, which is

located near the southeastern corner of Building 292. The source of these detections is reported to be storage of drums containing spent TCE. This occurrence appears to be isolated, since none of the adjacent sampling points had concentrations comparable to this 12,000 µg/L value.

The most prominent chlorinated solvent in this area is TCE with considerably lower detections of DCE and VC. This observation, along with dissolved oxygen analysis, suggests that aerobic conditions, not conducive to dechlorination, occur at Site 57. The lack of biodegradation products suggests that the use of relatively long half-lives for chlorinated solvent modeling may be warranted. The concentrations of chlorinated solvents appear to be larger and more concentrated near the suspected source where TCE concentrations in excess of 12,000 µg/L were detected in 2001.

Extent of Groundwater Contamination

The "plume" extends from the suspected source area at Building 292 along an unnamed tributary of Mattawoman Creek to Mattawoman Creek. The data do not show continuity in TCE concentrations from the source to Mattawoman Creek. This discontinuity in the plume could imply that there is more than one source, or that there is one source but contaminants are moving down-valley through the sewer and/or creek and entering the groundwater system at one or more locations.

4.0 MODEL CODES

MODFLOW

Groundwater flow was modeled for Site 57 using MODFLOW (McDonald and Harbaugh, 1984). MODFLOW is a finite-difference groundwater model that can simulate two-dimensional (areal or cross-sectional) three-dimensional, transient flow in anisotropic, heterogeneous, layered aquifer systems. The model is based on a block-centered finite-difference approach, using variable grid spacing in x-, y-, and z-directions. Layers may be simulated as (semi-) confined, unconfined, or convertible between conditions. The model can simulate stratigraphic layers that pinch out (representing aquifers, aquitards, or layers within an aquifer). The model allows for analysis of external influences, such as constant or time-varying pumping wells, areal recharge, drains, evapotranspiration, and streams.

MT3D

TCE transport at Site 57 was modeled using the computer code MT3D (Zheng, 1992). MT3D, developed by the United States Environmental Protection Agency (EPA), is intended for use with MODFLOW. MT3D retrieves the hydraulic heads and the various flow and sink/source terms saved by the flow model, automatically incorporating the specified hydrologic boundary conditions.

MT3D can be used to simulate changes in concentration of single-species miscible contaminants in groundwater considering advection, dispersion, and some simple chemical reactions. The chemical reactions included in the model-controlled linear or non-linear sorption and first-order, irreversible decay or biodegradation.

GMS

GMS software was used as the pre/post processor for MODFLOW, MODPATH, and MT3D. GMS was developed under the direction of the U.S. Army Corps of Engineers and involves support from the Department of Defense, Department of Energy, and EPA. GMS provides a comprehensive graphical (Windows) environment for numerical modeling, tools for site characterization, model conceptualization, mesh and grid generation, geostatistics, and sophisticated tools for graphical visualization.

5.0 MODEL DESIGN AND DEVELOPMENT

One model grid was used to simulate both groundwater flow and solute transport within the study area. The model grid and the layer boundary conditions are shown on Figure 1. The active model area was aligned with its long dimension parallel to the tributary valley and groundwater flow direction. The model area was divided into 80 columns (aligned north-south), 98 rows (aligned east-west), and one layer. The active model area extends southeast to Mattawoman Creek in the event that the contaminant plume actually migrates the full distance to the creek over time.

Model Assumptions

Groundwater

- Steady-state, 3-dimensional flow
- Aquifer properties vary horizontally
- Precipitation recharge is approximately 5 inches per year

The groundwater flow data suggests that a drain boundary condition is a good representation of the intermittent unnamed tributary to Mattawoman Creek. A single layer was used in the model because the shallow contaminated alluvial sand unit is relatively thin (necessitating only one layer), and this unit is underlain by relatively impermeable silty clay.

Recharge was estimated at a rate of approximately 5 inches per year based on HELP modeling at the Dahlgren site (TtNUS, 2001).

The hydraulic conductivity data obtained from slug tests shows that that hydraulic conductivity in the unconsolidated surficial aquifer is consistent across the site. Field-estimated hydraulic conductivity values throughout the model area are quite consistent, ranging from 1 to less than 20 feet per day. As a result, a limited understanding of this flow parameter exists and a narrow range of hydraulic conductivity values was chosen for the model calibration.

Boundary Conditions

- Boundary conditions are shown in Figure 1.
- Upper boundary of Layer 1 is the water table.
- The bottom of Layer 1 is modeled as being impermeable.
- The drain cells in the model represent the tributary stream and have an elevation of 0.5 to 17 ft above mean seal level (msl).
- The general head boundary cells range in elevation from 2 to 28 ft msl.

The boundary conditions that surround the model constrain the solution more than is typically desired. This constraint is due to the distribution of site data being concentrated along the banks of the unnamed tributary of Mattawoman Creek. Data from the uplands that surround the creek bed are very limited and consist of only cone penetrometer data point. The lack of water elevation data in the upland areas of the site is problematic when constructing the model because an "artificial" boundary condition (a general head in the valley walls) must be defined along the edges of the valley.

Transport

- Changes in the concentration field do not affect the flow field.
- Chemical partitioning of TCE between the groundwater and aquifer material is instantaneous and linear, and reversible.
- TCE degradation is a first-order process.
- Significant quantities of daughter products are not being produced or are not accumulating in the aquifer (i.e., daughter products are degrading or volatilizing).
- Sources of TCE may still exist and have reached steady state in terms of dissolved phase rate of release.

Model Input

- Layer 1 Bottom Elevation ranges from –5 to 5 feet above msl.
- First Sorption Coefficient: TCE: 1.3.
- Bulk Density: 1.6 gm/cm^3.

- Effective Porosity: 0.25 (Estimate).
- Starting Concentrations: Based on 2001 data.
- Longitudinal Dispersivity: 20 feet (estimate).
- Decay Constant for TCE: 0.0007 $days^{-1}$.

None of the transport parameters listed above was varied between remedial alternatives.

Groundwater Flow and Solute Transport Solvers

- MODFLOW: Strongly Implicit Procedure
- MT3D: Upstream Finite Difference

6.0 MODEL CALIBRATION

Groundwater elevation measurements from on-site monitoring wells were used as a data set to calibrate the steady-state flow model. The current site conditions under which the model was calibrated did account for the groundwater sink that caused the depression of the shallow water table. Adjustments in the hydraulic conductivity were performed in order to reduce the error (residuals) in the observed versus measured groundwater elevation measurements in monitoring wells. Figure 2 shows the differences between the observed versus the measured heads for the final calibrated model containing drain cells. The further the point is away from the standard line the larger the residual for that measuring point. Calibration was performed using manual techniques. After the residuals were reduced to a reasonable level, calibration efforts were terminated. The mean residual error was 0.34 feet, while the mean absolute error and root mean square errors were 0.9 and 1.15 feet, respectively. A summary of the residuals is included in Table 1. Figure 3 shows the simulated groundwater elevations. MODPATH was used to determine whether the flow model correctly predicted flow directions.

The contaminant distribution data do not show the full extent of the TCE plume. Also, information is not available as to when the release(s) occurred. This limitation on the temporal distribution of groundwater analytical data prevents a thorough understanding of the rates at which physical and biological activities are diluting and attenuating the concentrations of contaminants with time. These limitations prevented calibrating the transport model.

7.0 PREDICTIVE SIMULATIONS

The purpose of the predictive simulations was to determine approximate timeframes for natural attenuation and to assess potential future impacts to Mattawoman Creek. Average literature values for decay constants, bulk density, porosity, and partitioning coefficients were combined with site-specific

organic carbon concentrations. Based on this information, an interpretation of the current distribution of contamination is simulated on Figure 4.

Source Removal, Dissolved Phase Natural Attenuation, Institutional Controls, and Monitoring

The model shows that the TCE plume reaches Mattawoman Creek in the future. The amount of time necessary to attain MCLs under a source removal followed by natural attenuation scenario was estimated at approximately 72 years. A plot showing the time frame for the reduction of TCE to below the MCLs is presented in Figure 5.

Source Removal, Pump and Treat, Institutional Controls, and Monitoring

If six pumping wells (pumping a total of approximately 75 gpm) are added along the length of the unnamed tributary to Mattawoman Creek, the time period necessary to attain MCLs for TCE is estimated at 19 years (Figure 6). A figure showing the well configuration of the system is shown on Figure 7.

8.0 MODEL LIMITATIONS

The models used in this study are theoretical representations of the site conditions. Therefore, results from these simulations should be used with a degree of caution. Deterministic models require specific input data at each cell location. The input data are subject to large uncertainties because of the complexity of the natural subsurface system and lack of detailed historical information about the site. Specific data/information lacking for the site include the following:

- Contaminant source loading history
- Geochemical data, which may vary spatially and temporally
- Temporal groundwater elevation data
- Precise distribution of hydraulic conductivity
- Precise estimates of groundwater velocities
- Effective porosity
- Good estimates of recharge rates over the area
- Contaminant biodegradation rates and partitioning coefficients

In addition to the factors contributing to the uncertainty described above, several assumptions needed to be made, which may affect the direct application of the model results. These assumptions include:

- Very limited horizontal control on hydrogeology and TCE contamination distribution.

Data input in the flow model were based on site-specific data. These flow model data were considered best estimates and, therefore, do not represent overly conservative or non-conservative values. To better understand the uncertainty in the model results, a sensitivity analysis should be performed.

9.0 SUMMARY AND CONCLUSIONS

A TCE transport model was developed using MT3D for the purpose of determining the effects of natural attenuation and groundwater pumping.

It is recommended that a pre-design investigation be conducted prior to the implementation of natural attenuation or any aquifer remediation. The data collected for the investigation include the following:

- Pumping test information from highly-contaminated portions of the plumes,
- Geochemical data from as many monitoring points within the "heart of the plume" should be resampled so that the half-lives of the TCE can be better estimated for modeling.
- Lateral groundwater contamination data outside of the valley of the unnamed tributary to Mattawoman Creek.

The clean-up times for the site appear to be lengthy (72 years for source removal and MNA and 19 years for source removal and pump and treat) because significant concentrations of TCE have migrated beyond the source area. Unless these downgradient sources are eliminated, the sorbed TCE downgradient of the source area will continue to leach TCE into the groundwater system. Pumping only addresses the TCE in the dissolved phase. The leaching rate from the sorbed phase is expected to be the limiting factor in aquifer clean-up time.

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TABLE 1

SUMMARY OF SIMULATED VERSUS OBSERVED POTENTIOMETRIC HEADS
GROUNDWATER MODELING REPORT
SITE 57 – BUILDING 292 TCE CONTAMINATION
NSF-IH, INDIAN HEAD, MARYLAND

Well	Observed	Computed	Residual
S57MW001/SB001	29.57	31.77	2.20
S57MW002	29.41	31.93	2.52
S57MW003/SB002	26.85	26.96	0.11
S57MW004	26.54	27.06	0.52
S57MW005/SB015	12.58	10.99	-1.59
S57MW006	12.54	10.94	-1.60
S57MW007/SB004	21.31	21.59	0.28
S57MW008	21.71	21.66	-0.05
S57MW009/SB005	16.82	17.12	0.30
S57MW010	16.89	17.06	0.17
S57MW011/SB008	24.18	24.97	0.79
S57MW012/SB013	37.79	37.40	-0.39
S57MW013	38.10	37.38	-0.72
S57TW014	37.16	37.81	0.65
S57TW015/SB027	36.93	37.89	0.96
S57TW016	27.76	26.93	-0.83
S57TW017/SB028	27.35	26.86	-0.49
S57MW020	6.79	7.57	0.78
S57TW021	3.68	4.69	1.01
S57MW022	1.85	3.94	2.09

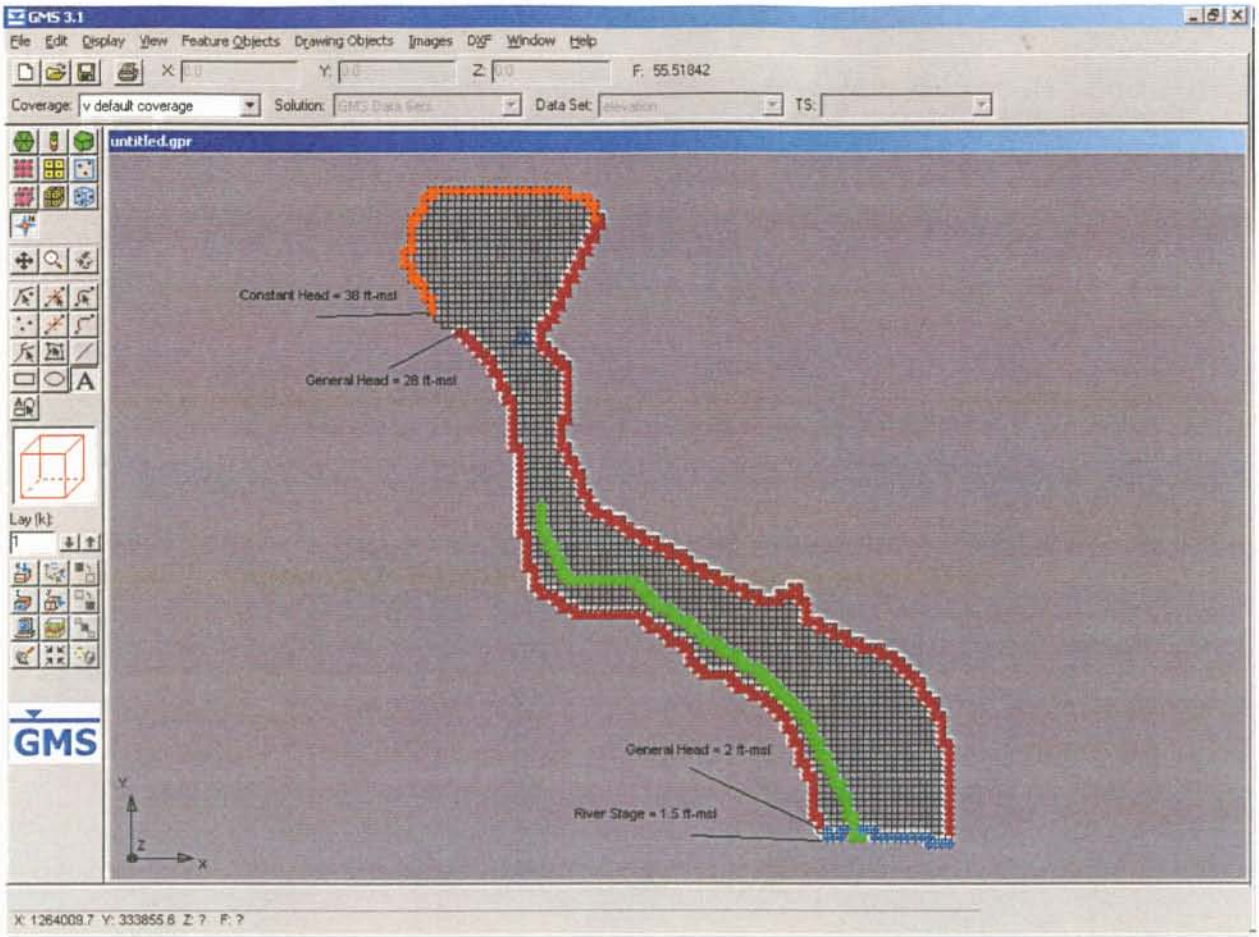

Figure 1 – Boundary Conditions. Boundary conditions for flow model include river cells, general head cells, constant head cells, and stream cells.

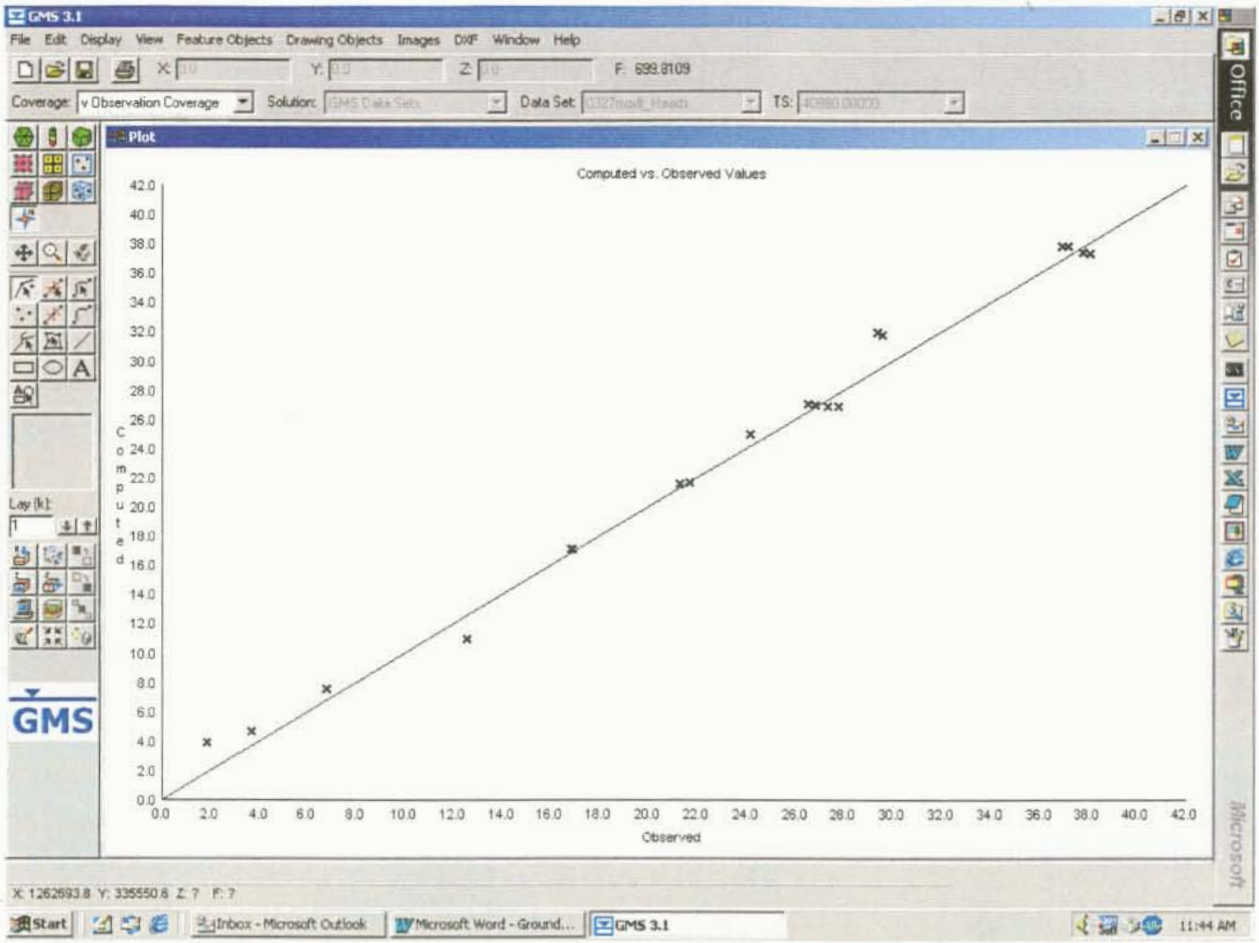

Figure 2 – Computed versus Observed Potentiometric Head Contours. Distribution shows that the model does not overestimate or underestimate the simulated heads throughout the model domain.

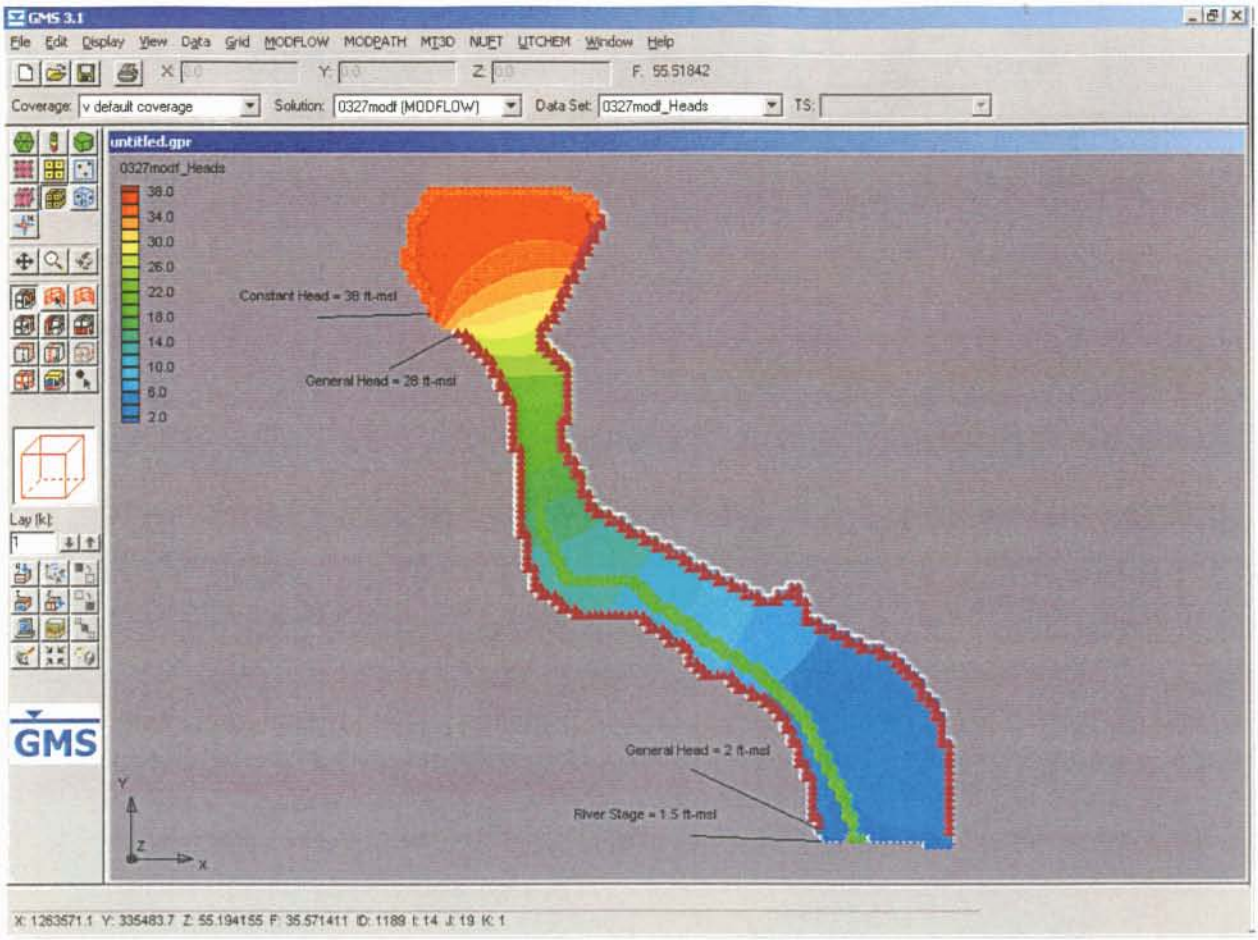

Figure 3 – Simulated Groundwater Flow Field. The density of monitoring points along the unnamed tributary of Mattawoman Creek causes a model result that is highly constrained by boundary conditions and thus is nonunique.

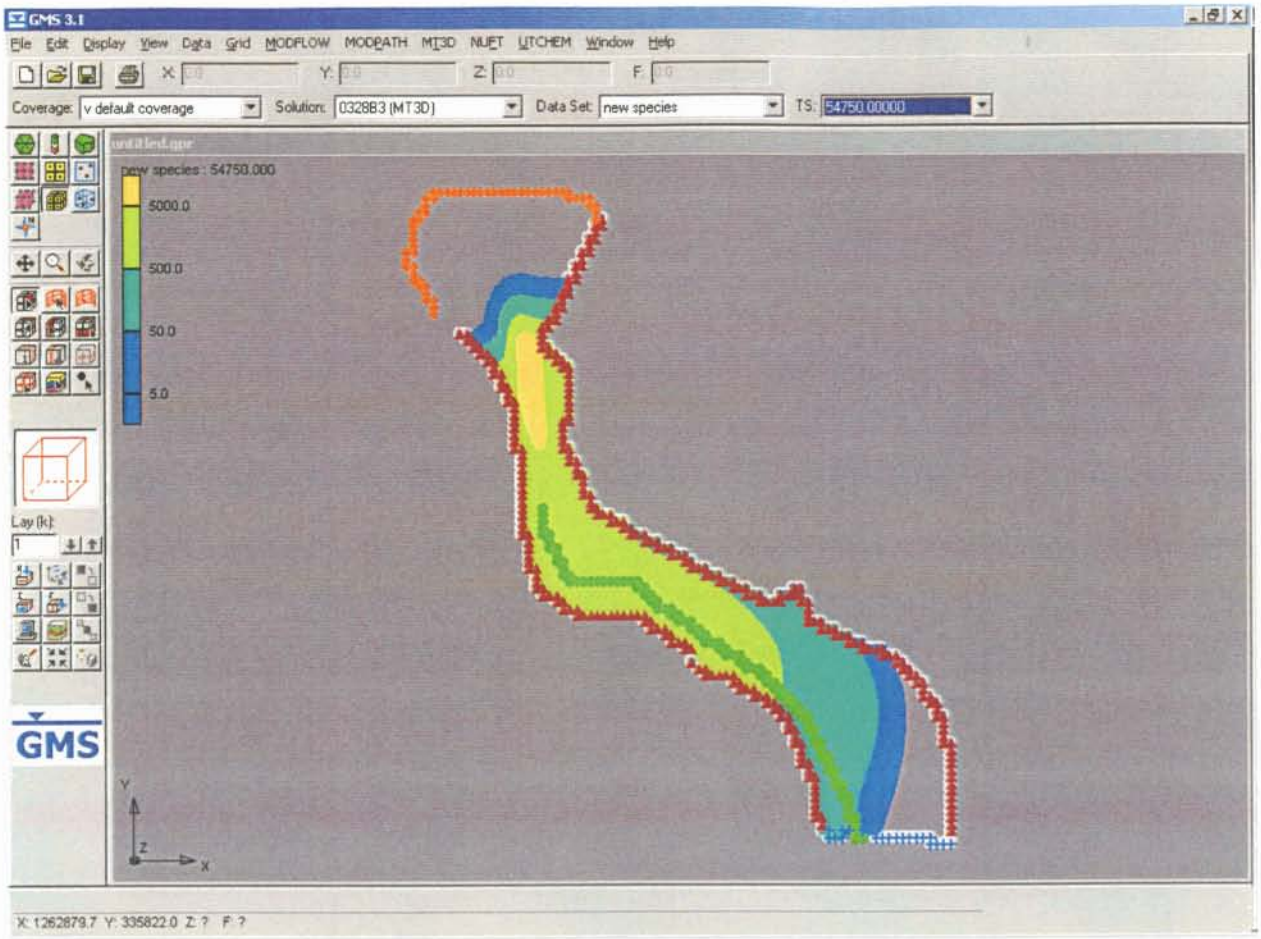

Figure 4 – Steady state distribution of TCE. This distribution assumes that a steady state source is present at monitoring well S57MW004 at a concentration of 12,000 ug/L (the detected concentration in the 2001 sampling event).

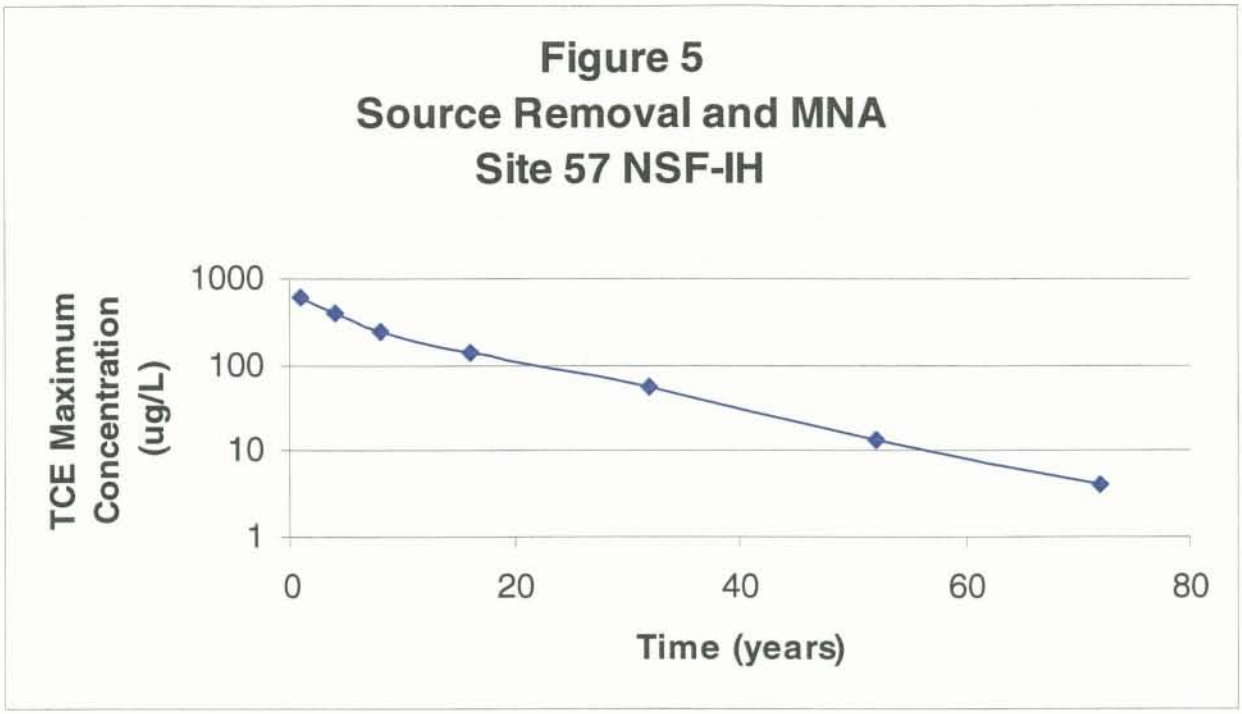
Figure 5
Source Removal and MNA
Site 57 NSF-IH
TCE Maximum Concentration (ug/L)
1000
100
10
1
0
20
40
60
80
Time (years)

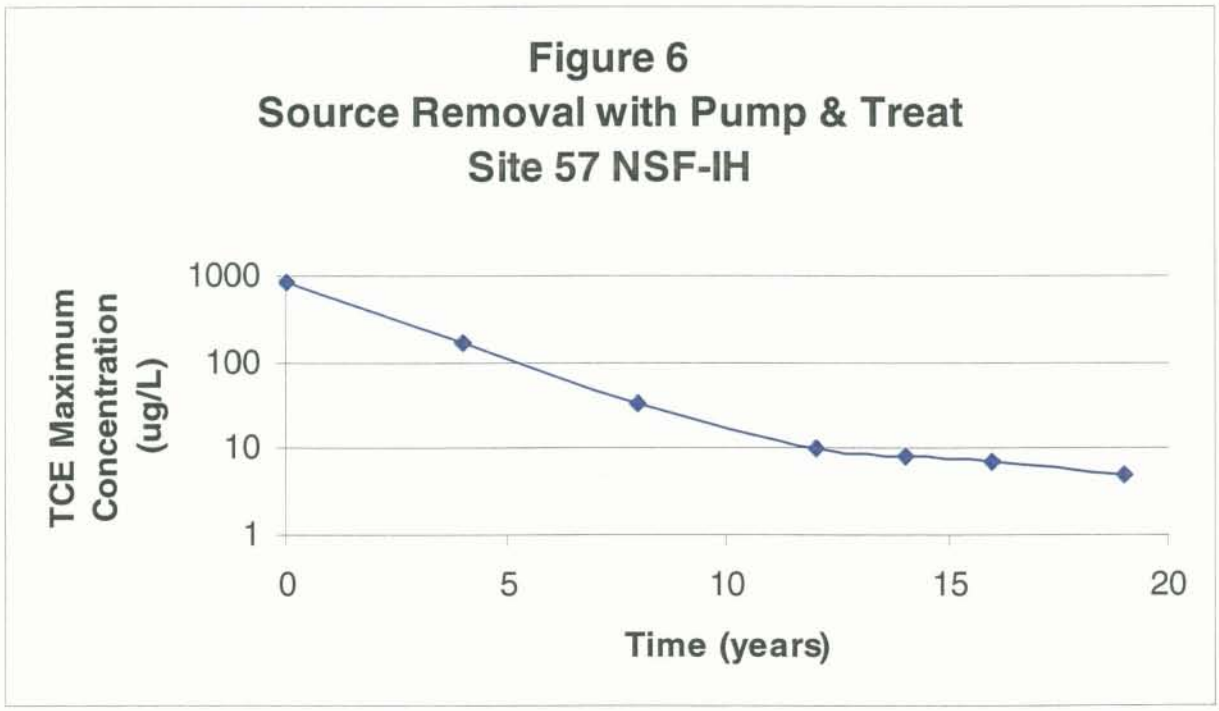
Figure 6
Source Removal with Pump & Treat
Site 57 NSF-IH
TCE Maximum Concentration (ug/L)
1000
100
10
1
0
5
10
15
20
Time (years)

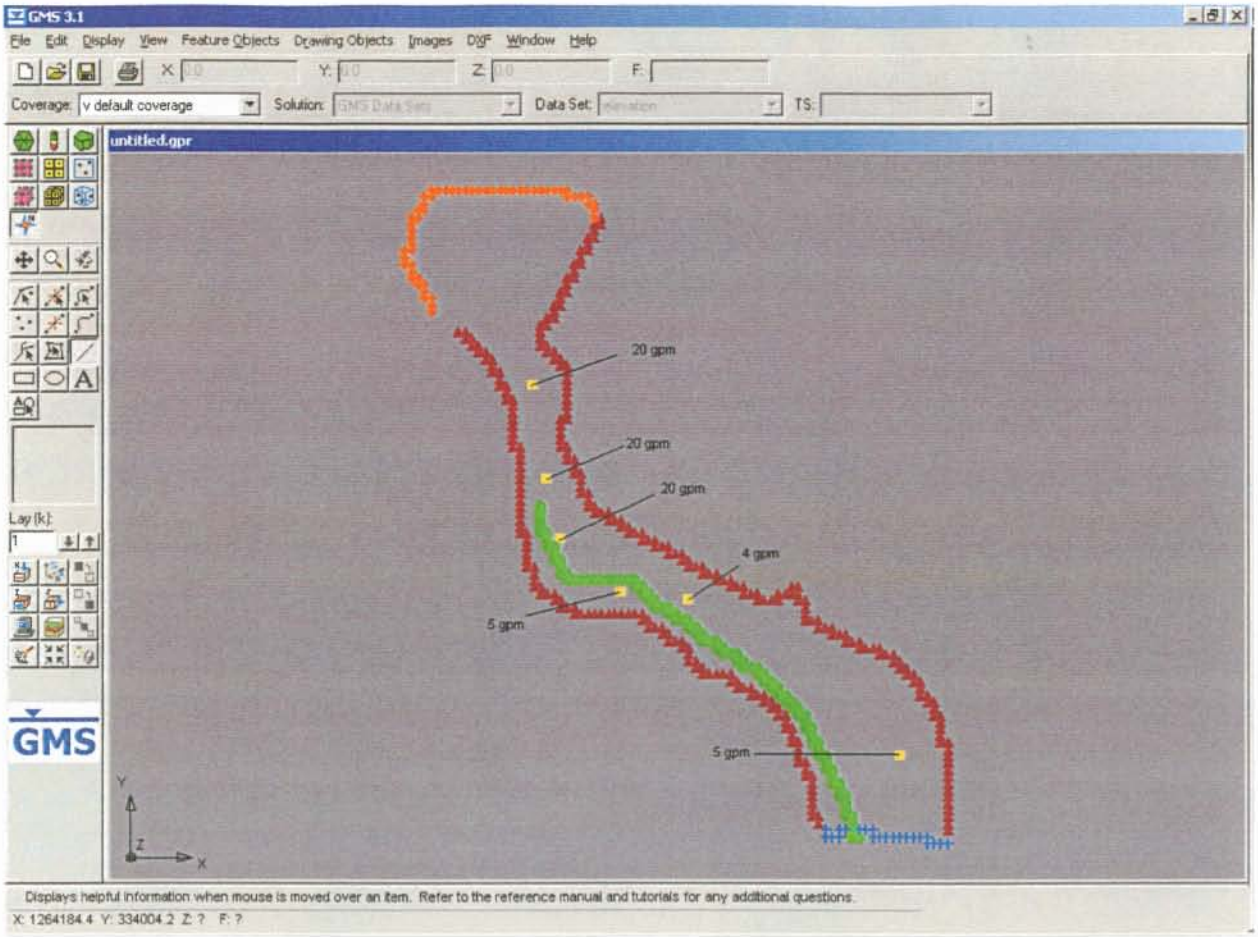

Figure 7 – Pumping Scenario. Six extraction wells are pumping a combined total of 75 gallons per minute (gpm).

APPENDIX I

CONCEPTUAL DESIGN CALCULATIONS

CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN2194.1110	
SUBJECT: GROUNDWATER ALTERNATIVE 2 - NATURAL ATTENUATION			
BASED ON:		DRAWING NUMBER:	
BY: KCT Date: 2/27/06	CHECKED BY: Date:	APPROVED BY:	DATE:

There are no capital costs associated with this alternative.

Annual costs would include annual sampling of groundwater from 28 existing permanent wells for 30 years (S57MW001 to S57MW013, S57MW020, S57MW022, S57MW024 to S57MW034, S57MW036, and S57MW037).

Groundwater samples would be analyzed for TCL VOCs (including diethyl ether) and natural attenuation parameters ($515/sample).

Assume 35 samples per sampling period (including blanks and duplicates).

CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN2194-0000.1110	
SUBJECT: GROUNDWATER ALTERNATIVE 3 - IN SITU BIOREMEDIATION			
BASED ON:		DRAWING NUMBER:	
BY: KCT Date: 6/13/06	CHECKED BY: Date:	APPROVED BY:	DATE:

Evaluate 3 area of the plume based on chemical concentrations and hydrogeology.

Area 1 (Source Area) includes (from upgradient to downgradient) S57MW001, MW002, SB035, MS003, MW004, SB033, MW024, MW025, MW011, and SB036. No COCs were detected above PRGs at S57MW007/MW008, the next downgradient cluster. The main chlorinated VOCs in this area are cis-1,2-dichloroethene, trichloroethene, and vinyl chloride. This area has higher contaminant concentrations, a greater aquifer thickness, and a steeper hydraulic gradient.

Area 2 (Mid-Plume Area) includes (from upgradient to downgradient) S57MW009, MW010, MW005, MW006, MW026, and MW027. No COCs were detected above PRGs at S57MW028/MW029 and S57MW020/MW030, the next downgradient clusters. The chlorinated VOC in this area is trichloroethene. This area has lower contaminant concentrations, a smaller aquifer thickness, and a shallower hydraulic gradient.

Area 3 (Downgradient Area) includes MW022. The main chlorinated VOCs in this area are cis-1,2-dichloroethene and vinyl chloride. This area is separated from Area 2 by an uncontaminated zone of the aquifer.

Assume that HRC barriers will be used for Area 1. Each barrier will be installed perpendicular to the groundwater flow direction (i.e., across the valley). The spacing between each barrier will be based on one year groundwater travel time. Injection spacing and HRC dose will be based on Regenesis HRC Design Software for Barrier Treatment.

Assume that Area 2 will be allowed to naturally attenuate. No new wells are proposed. Existing wells can be used for long-term monitoring.

Assume that an ORC grid will be used for Area 3. Injection spacing and ORC Dose will be based on Regenesis ORC Design Software for Grid Applications using Slurry Injection.

<u>Input Parameters for Area 1 (see page 5 of 6)</u>

Assume the length of the barrier intersection groundwater flow direction is 160 ft. This is the approximate width of the valley or the area between the valley and a structure (e.g., Building 292). HRC barriers will not be installed beneath structures.

Assume depth to contaminated zone is 6 ft. based on the depth to the water table on cross-section A-A' (see Fig. 1-6).

Assume thickness of saturated zone is 25 ft. based on cross-section A-A' (ranges from 20 to 30 ft.)

Assume effective porosity of 0.25.

Assume hydraulic conductivity of 3.16 ft/day based on 2001 and 2005 slug test results for wells in area.

Assume hydraulic gradient of 0.036 ft/ft based on 2005 water level measurements.

CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN2194-0000.1110	
SUBJECT: GROUNDWATER ALTERNATIVE 3 - IN SITU BIOREMEDIATION			
BASED ON:		DRAWING NUMBER:	
BY: KCT Date: 6/13/06	CHECKED BY: Date:	APPROVED BY:	DATE:

Average chemical concentrations based on most recent groundwater sample analyzed for a particular parameter (see page 4 of 6).

cis-1,2-dichloroethene - 5.389 mg/L
trichloroethene - 3.589 mg/L
vinyl chloride - 2.792 mg/L
DO - 0.82 mg/L
nitrate - 1.44 mg/L
iron - 23.91 mg/L
manganese - 0.544 mg/L
sulfate - 2.61 mg/L

Based on an estimated plume length of 300 ft., a seepage velocity of 166.1 ft/yr, and a 1 yr lifespan for one application, 2 barrier walls would be needed. Each barrier would have 2 rows of injection points on 10-ft

Install new wells upgradient and downgradient of each barrier. Total of 3 wells (approx. 30 ft. deep).

Assume that HRC will be reinjected at the same locations in Year 3.

Input Parameters for Area 3

Assume width of plume is 100 ft. and assume length of plume is 100 ft. Actual dimensions may vary because there is only one permanent well (MW022) in this area where COC concentrations are greater than PRGs. Well MW033, which is the closest, was installed approximately 100 ft. from MW022.

Assume depth to contaminated zone is 6 ft. based on the depth to the water table on cross-section B-B' (see Fig. 1-7).

Assume thickness of saturated zone is 8 ft. based on cross-section B-B". Although the clayey sand unit at this location is a poor aquitard based on field observations, the concentrations of chlorinated VOCs were much lower in a groundwater sample from CP005, which is deeper than MW022.

Assume effective porosity is 0.25.

Assume hydraulic conductivity of 3.3 ft/day based on 2001 slug test data for MW022.

Assume hydraulic gradient of 0.125 based on 2005 water level measurements.

Chemical concentrations based on the most recent sample analyzed for a particular parameter (see page 4 of 6).

cis-1,2-dichloroethene - 0.21 mg/L
vinyl chloride - 0.4 mg/L
COD - 29 mg/L
ferrous iron - 31.2 mg/L

Based on the ORC spreadsheet, the ORC requirements for COD are greater than the requirements for the individual chemicals.

Install wells upgradient of area. Total of 1 well (approx. 15 ft. deep).

CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN2194-0000.1110	
SUBJECT: GROUNDWATER ALTERNATIVE 3 - IN SITU BIOREMEDIATION			
BASED ON:		DRAWING NUMBER:	
BY: KCT Date: 6/13/06	CHECKED BY: Date:	APPROVED BY:	DATE:

Other Capital Costs

Collect groundwater samples from new wells (4) and existing wells (28) one month after treatment.
Added 25% additional samples for QC blanks and duplicates.
Assume 5 samples for HRC parameters @ $515.
Assume 30 samples for MNA parameters @ $515.
Assume 5 samples for ORC parameters @ $205.

Annual Costs

Assume annual groundwater sampling for same parameters as above.
ORC monitoring - 5 samples @ $205 Years 1 and 2
HRC monitoring - 5 samples @ $515 Years 1 to 6.
MNA monitoring - 30 samples @ $515 Years 1 to 30.

Average Groundwater Concentrations for COCs and other HRC/ORC parameters
2005 data for TCL VOCs and DO; conductivity FS Table 1-2; previous data used for other parameters not analyzed in 2005.

Source Area

Analyte	MW001	MW002	SB035	MW003	MW004	SB033	MW024	MW025	MW011	SB036	Average
1,1,1-Trichloroethane	0	0	0	0	2	0	0	0	0	0	0.2
1,1-Dichloroethane	2	0	20	0	0	0	1	5.5	0	0	2.9
1,1-Dichloroethene	0	0	115	1	4	0	4	12	0	0	14
cis-1,2-Dichloroethene	0	0	43500	7	72	27	820	9450	18	0	5389
Diethyl ether	100	1600	0	150	120	0	58	24	2000	4200	825
Tetrachloroethene	0	0	3	0	0	0	0	0	0	0	0.3
trans-1,2-Dichloroethene	0	0	0	0	0	0	6	160	0	0	17
Trichloroethene	3	5	34000	175	950	78	580	71.5	27	0	3589
Vinyl chloride	0	0	4150	0	13	4	250	23500	0	0	2792
DO (mg/L)	0.73	0.68	NA	0.66	0.47	NA	0.55	2.05	0.61	NA	0.82
Nitrate (mg/L)	4.1	3.6	NA	1.8	0.5	NA	0	0.03	0.05	NA	1.44
Iron	168	293	NA	0	0	NA	46100	120500	307	NA	23910
Manganese	248	13.1	NA	73	97	NA	1780	1300	297	NA	544
Sulfate (mg/L)	1.3	0	NA	1.1	6.6	NA	2.6	2.05	4.6	NA	2.61
Hydaulic conductivity*	0.74	1.1	NA	3.18	15.2	NA	12.8	12.6	0.5	NA	3.16

*geometric mean ft/day
Nitrate, iron, manganese, and sulfate - 2004 data, except nitrate and sulfate in MW001 and MW002 - 2001 data.

Mid-Plume

Analyte	MW009	MW010	MW005	MW006	MW026	MW027	Average
1,1,1-Trichloroethane	3	2	2	3	0	0	1.7
1,1-Dichloroethane	3	2	1	1	0	1	1.3
1,1-Dichloroethene	20	9	6	7	0	0.5	7.1
cis-1,2-Dichloroethene	50	59	36	38	0	5	31.3
Diethyl ether	1	0	0	0	0	0	0.2
Tetrachloroethene	0	0	0	0	0	0	0.0
trans-1,2-Dichloroethene	0	0	0	0	0	0	0.0
Trichloroethene	330	160	230	230	0	30.5	163
Vinyl chloride	0	2	0	6	0	0	1.3
DO (mg/L)	1.04	0.59	2.05	2.16	2.37	1.17	1.6
Nitrate (mg/L)	0	6.8	0	3.9	NA	NA	2.7
Iron	0	2230	0	0	NA	NA	558
Manganese	37.5	171	36.4	27.7	NA	NA	68
Sulfate (mg/L)	0	1	0	1.8	NA	NA	0.7
Hydaulic conductivity*	1.5	2.95	18.4	14.9	NA	0.86	4.01

*geometric mean ft/day
Nitrate and sulfate - 2001 data; iron and manganese - 2004 data.

Downgradient

Analyte	MW022
1,1-Dichloroethene	0
cis-1,2-Dichloroethene	210
Diethyl ether	160
trans-1,2-Dichloroethene	0
Trichloroethene	0
Vinyl chloride	400
Iron (+2)	31200
COD (mg/L)	29
Hydaulic conductivity*	3.3

*geometric mean ft/day
Iron - 2004 data; COD - 2001 data.

HRC Design Software for Barrier Treatment

US Version 3.1

Regenesis Technical Support: USA (949) 366-8000, www.regenesis.com

5 OF 6

Site Name: Indian Head Site 57
Location: Area 1
Consultant:

Site Conceptual Model/Extent of Plume Requiring Remediation

Length of Barrier (intersecting gw flow direction)	160	ft			
Depth to contaminated zone	6	ft			
Thickness of contaminated saturated zone	25	ft			
Aquifer soil type	silty sand				
Effective porosity	0.25				
Hydraulic conductivity	3.16	ft/day	=	1.1E-03	cm/sec
Hydraulic gradient	0.036	ft/ft			
Seepage velocity	166.1	ft/yr	=	0.455	ft/day,

Dissolved Phase Electron Donor Demand

	Contaminant Loading Conc (mg/L)	Contaminant Loading Mass (lb)	Stoich. (wt/wt) contam/H_2
Tetrachloroethene (PCE)	0.00	0.00	20.7
Trichloroethene (TCE)	3.59	37.18	21.9
cis-1,2-dichloroethene (DCE)	5.39	55.83	24.2
Vinyl Chloride (VC)	2.79	28.93	31.2
Carbon tetrachloride	0.00	0.00	19.2
Chloroform	0.00	0.00	19.9
1,1,1-Trichloroethane (TCA)	0.00	0.00	22.2
1,1-Dichlorochloroethane (DCA)	0.00	0.03	24.7
Hexavalent Chromium	0.00	0.00	17.3
User added, also add stoichiometric demand	0.00	0.00	0.0
User added, also add stoichiometric demand	0.00	0.00	0.0

Competing Electron Acceptors:

	Electron Acceptor Loading Conc (mg/L)	Electron Acceptor Loading Mass (lb)	Stoich. (wt/wt) contam/H_2
Oxygen	0.82	8.50	8.0
Nitrate	1.44	14.92	12.4
Est. Mn reduction demand (potential amt of Mn2+ formed)	0.54	5.64	27.5
Est. Fe reduction demand (potential amt of Fe2+ formed)	23.91	247.72	55.9
Estimated sulfate reduction demand	2.61	27.04	12.0

Microbial Demand Factor	3	Recommend 1-4x
Safety Factor	2	Recommend 1-4x
Lifespan for one application	1	Year(s)

Injection Spacing and Dose:

Number of rows in barrier	2	rows
Spacing within rows	10	ft on center spacing within rows
Effective spacing perpendicular to flow (ft)	5.0	
Total number of HRC injection locations	32	points
Minimum required HRC dose per foot (lb/ft)	4.0	<- Minimum Dose Override

Project Summary			
Number of HRC delivery points (adjust as nec. for site)		32	
HRC Dose in lb/foot (adjust as nec. for site)		4.0	<- Minimum Dose Override
Corresponding amount of HRC per point (lb)		100	
Number of 30 lb HRC Buckets per injection point		3.3	
Total Number of 30 lb Buckets		107	
Total Amt of HRC (lb)		3,210	
HRC Cost	$	6.00	
Total Material Cost	**$**	**19,260**	
Shipping and Tax Estimates in US Dollars			
Sales Tax	rate: 0%	$ -	
Total Matl. Cost w/Tax	$	19,260	
Shipping of HRC (call for amount)	$	-	
Total Regenesis Material Cost	**$**	**19,260**	

HRC Installation Cost Est. (responsibility of customer to contract work)			**Other Project Costs**		
Footage for each inj. point = uncontaminated + HRC inj. interval (ft)		31	Design and Regulatory Issues	$	-
Total length for direct push for project (ft)		992	Groundwater monitoring and reporting	$	-
Estimated daily installation rate (ft per day: 500 for push, 200 for drilling)		400	Other	$	-
Estimated points per day (10 to 20 is typical for direct push)		12.9	Other	$	-
Required number of days		3	Other	$	-
Mob/demob cost for injection subcontractor	$	1,000	Other	$	-
Daily rate for inj. Sub. ($1-2K for push $3-4K for drill rig)	$	1,500	Other	$	-
Total injection subcontrator cost for application	$	5,500	Other	$	-
Total Install Cost(not inc. consultant, lab, etc.)	**$**	**24,760**	**Total Project Cost**	**$**	**24,760**

ORC Design Software for Grid Applications Using Slurry Injection

US Version 3.1

Regenesis Technical Support: USA (949) 366-8000, www.regenesis.com

Site Name:
Location:
Consultant:

Site Conceptual Model/Extent of Plume Requiring Remediation

Width of plume (intersecting gw flow direction)	100	ft			
Length of plume (parallel to gw flow direction)	100	ft	=	10,000	sq. ft.
Depth to contaminated zone	6	ft			
Thickness of contaminated saturated zone	8	ft			
Nominal aquifer soil (gravel, sand, silty sand, silt, clay)	silty sand				
Total porosity	0.3		Eff. porosity	0.25	
Hydraulic conductivity	3.3	ft/day	=	1.2E-03	cm/sec
Hydraulic gradient	0.0125	ft/ft			
Seepage velocity	60.2	ft/yr	=	0.165	ft/day
Treatment Zone Pore Volume	24,000	ft^3	=	179,544	gallons

Dissolved Phase Oxygen Demand:

Individual species that represent oxygen demand:	Contaminant Conc (mg/L)	Contaminant Mass (lb)	Stoich. (wt/wt) O_2/contam.	ORC (lb) (10% O_2)
benzene	0.00	0.0	3.1	0
toluene	0.00	0.0	3.1	0
ethylbenzene	0.00	0.0	3.2	0
xylenes	0.00	0.0	3.2	0
MTBE	0.00	0.0	2.7	0
dichloroethene	0.21	0.3	0.7	2
vinyl chloride	0.40	0.6	1.3	8
User added, also add stoichiometric demand	0.00	0.0	0.0	0
User added, also add stoichiometric demand	0.00	0.0	0.0	0
reduced metals: Fe (+2) and Mn(+2)	31.20	46.7	0.10	47
Measures of total oxygen demand				
Total Petroleum Hydrocarbons	0.00	0.0	3.1	0
Biological Oxygen Demand (BOD)	0.00	0.0	1	0
Chemical Oxygen Demand (COD)	29.00	43.4	1	434

Estimates for Sorbed Phase Oxygen Demand:

Soil bulk density	1.76	g/cm^3	=	110 lb/cf
Fraction of organic carbon: foc	0.005	range: 0 to 0.01		

(Estimated using Soil Conc=foc*Koc*Cgw)
(Adjust Koc as nec. to provide realistic est.)

Individual species that represent oxygen demand:	Koc (L/kg)	Contaminant Conc (mg/kg)	Contaminant Mass (lb)	Stoich. O_2/contam.	ORC (lb) (10% O_2)
benzene	83	0.00	0.0	3.1	0
toluene	135	0.00	0.0	3.1	0
ethylbenzene	95	0.00	0.0	3.2	0
xylenes	240	0.00	0.0	3.2	0
MTBE	12	0.00	0.0	2.7	0
dichloroethene	80	0.08	0.7	0.7	5
vinyl chloride	2.5	0.01	0.0	1.3	1
User added, also add stoichiometric demand	0.0	0.00	0.0	0.0	0
User added, also add stoichiometric demand	0.0	0.00	0.0	0.0	0
Measures of total oxygen demand					
Total Petroleum Hydrocarbons	178	0.00	0.0	3.1	0
Biological Oxygen Demand (BOD): Use a multiple of dissolved phase ->	1.00		0.0	1	0
Chemical Oxygen Demand (COD): Use a multiple of dissolved phase ->	1.00		43.4	1	434

Summary of Estimated ORC Requirements

	ORC for Dissolved Phase (lbs)	ORC for Sorbed Phase (lbs)	Add Dem Factor (1 to 10x)	ORC Total w/ Add Dem Factor	ORC Cost at $ 10.00
Individual Species: Total BTEX, MTBE	57	6	5	312	$ 3,122
Total Petroleum Hydrocarbons	-	-	2	-	$ -
Biological Oxygen Demand (BOD)	-	-	2	-	$ -
Chemical Oxygen Demand (COD)	434	434	1	868	$ 8,683 <-

Select above measure (button) to specify required ORC quantity (in 30 lb increments) ——> 870 **pounds ORC**

Delivery Design for ORC Slurry

Spacing within rows (ft)		10.0	feet
# points per row		10	points/row
Spacing between rows (ft)		10.0	ft
# of rows		10	rows
Advective travel time bet. rows (days)		61	days
Number of points in grid		100	points
Required ORC per foot	Minimum Dose Override->	3.0	lbs/foot
Total ORC	Minimum Dose Override->	2,400	lbs of ORC

Slurry Mixing Volume for Injections

Pounds per location	24
Buckets per location	0.8
Design solids content (20-40% by wt. for injections)	30%
Volume of water required per hole (gal)	7
Total water for mixing all holes (gal)	671
Simple ORC Backfilling: min hole dia. for 67% slurry	2.9
Feasibility for slurry injection in sand: ok up to 15 lb/ft	(ok)
Feasibility for slurry injection in silt: ok up to 10 lb/ft	(ok)
Feasibility for slurry injection in clay: ok up to 5 lb/ft	(ok)

Project Summary		
ORC bulk material for slurry injection (lbs)		2,400
Number of 30 lb ORC buckets		80.0
ORC bulk material cost	$	9.50
Cost for bulk ORC material	$	22,800
Shipping and Tax Estimates in US Dollars		
Sales Tax rate: 0%	$	-
Total Matl. Cost	$	22,800
Shipping (call for amount)	$	-
Total Regenesis Material Cost	$	22,800

ORC Slurry Injection Cost Est. (responsibility of customer to contract work)		
Footage for each inj. point = uncontaminated + HRC inj. interval (ft)		14
Total length for direct push for project (ft)		1,400
Estimated daily installation rate (ft per day: 400 for push, 150 for drilling)		400
Estimated points per day (15 to 30 is possible for direct push)		28.6
Required number of days		4
Mob/demob cost for injection subcontractor	$	1,000
Daily rate for inj. Sub. ($1-2K for push $3-4K for drill rig)	$	1,500
Total injection subcontrator cost for application	$	7,000
Total Install Cost (not including consultant, lab, etc.)	$	29,800

Other Project Cost Estimates		
Design	$	-
Permitting and reporting	$	-
Construction management	$	-
Groundwater monitoring and rpts	$	-
Other	$	-
Other	$	-
Other	$	-
Other	$	-
Total Project Cost	$	29,800

CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN4020-0000.1110	
SUBJECT: GROUNDWATER ALTERNATIVE 4 - PERMEABLE REACTIVE BARRIER			
BASED ON:		DRAWING NUMBER:	
BY: KCT Date: 2/27/06	CHECKED BY: Date:	APPROVED BY:	DATE:

All calculations and assumptions are very preliminary. A treatability study and additional groundwater modeling would be needed to confirm and refine assumptions.

The 2001 pre-FS investigation assumed a permeable reactive barrier (PRB), using iron as the reactive medium, would be installed in the area where borings S57SB030 through S57SB032 were installed (see Figs. 1-4 and 1-5). This area is near the downgradient portion of the TCE plume.

The depth to the confining unit at these borings (cross-section D-D' on Fig. 1-9) is as follows: SB030 - 20 ft; SB031 - 19 ft; SB032 - 6 ft. The average depth is approximately 15 ft. The depth to groundwater in this area (cross-section B-B') is approximately 4 ft. Therefore, the height of the PRB (aquifer thickness) would be 15 ft - 4 ft = 11 ft.

The PRB would extent across the valley from SB030 to SB032, which is approximately 210 ft. This would include the PRB gate (70 ft) and the slurry wall funnel on each side of the reactive zone (70 ft. each).

The thickness of the PRB equals the groundwater velocity multiplied by the residence time required. The groundwater velocity can be estimated using slug test data from wells MW005/MW006 located upgradient of the proposed location and well MW020 located downgradient of the proposed location. Based on slug test data, there is a wide variation in the hydraulic conductivity values for these wells. The average hydraulic conductivity for well cluster MW005/MW006 is 16.65 ft/day, and the hydraulic conductivity for well MW020 is 2.25 ft/day (Table 1-2). Therefore, the average hydraulic conductivity in the area is 9.45 ft/day.

Groundwater velocity = (hydraulic conductivity)*(hydraulic gradient/effective porosity)

The hydraulic gradient between locations MW005/MW006 and MW020 is approx. 0.02 ft/ft (Figure 1-5). The effective porosity is 0.25. Therefore, the groundwater velocity is 9.45*(0.02/0.25) = 0.76 ft/day.

The residence time can be estimated using literature-based half-life values for TCE. The half-life values contained in the Design Guidance for Application of Permeable Reactive Barriers for Groundwater Remediation (Batelle, 2000) vary widely and range from 0.67 hr to 9.7 hr (see page 3 of 3). According to this guidance the actual half-life may vary depending on the iron source and site-specific groundwater chemistry. A treatability study would be required to determine the half-life for design. A lower half-life value would correspond to a faster degradation rate. The average half-life based on values provided in this guidance is approximately 3.5 hr. The TCE concentration at shallow upgradient well MW006 and intermediate upgradient well MW005 is 230 µg/L. TCE was not detected in well MW020. Assuming a starting TCE value of 230 µg/L, the required residence time to attain the PRG for TCE (5 µg/L) would be approximately 21 hr, as shown below:

TCE (µg/L)	Time (hr)
230	0
115	3.5
57.5	7
28.75	10.5
14.375	14
7.1875	17.5
3.59375	21

CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN4020-0000.1110	
SUBJECT: GROUNDWATER ALTERNATIVE 4 - PERMEABLE REACTIVE BARRIER			
BASED ON:		DRAWING NUMBER:	
BY: KCT Date: 2/27/06	CHECKED BY: Date:	APPROVED BY:	DATE:

The required PRB thickness equals velocity x residence time

Thickness = (0.76 ft/day*21 hr) / (24 hr/day) = 0.665 ft.

The design guidance (Batelle, 2000) recommends applying a correction (safety) factor to account for changes in bulk density of the reactive medium between the laboratory and the field, seasonal variations in groundwater flow, potential loss of reactivity of the iron over time, and any other field uncertainties.

Assuming a safety factor of 5, the PRB thickness would be approximately 3.5 ft.

Following is a summary of the PRB gate and slurry wall funnel dimensions:

Length = 210 ft (70 ft PRB gate and 70 ft slurry wall on each side of gate)
Height = 11 ft
Thickness = 3.5 ft

These calculations and assumptions are for FS cost estimating purposes only. The required dimensions could vary based on the results of treatability studies and additional hydrogeologic modeling. These additional studies would also be needed to optimize the final design.

Annual Costs

Assume annual sampling of existing permanent wells (28) for 30 years (MW001 to MW013, MW020, MW022, MW024 to MW034, MW036, and MW037). Samples would be analyzed for TCL VOCs (including diethyl ether).

Assume 35 samples per sampling period (incl. blanks and duplicates) @ $120.

References

Batelle, 2000. Design Guidance for Application of Permeable Reactive Barriers for Groundwater Remediation. Prepared for Air Force Research Laboratory, Tyndall Air Force Base, Florida. Sponsored by DOD Strategic Environmental Research and Development Program (SERDI).

Table 2-1. Compounds Tested and Half-Lives Normalized to 1 m^2 Iron Surface per mL Solution (Adapted from Gillham, 1996 and other sources listed in the footnotes)

Organic Compounds	Pure Iron[m] $t_{1/2}$ (hr)	Commercial Iron[m] $t_{1/2}$ (hr)
Methanes		
Carbon tetrachloride	0.02[a], 0.003[g], 0.023[i]	0.31-0.85[b]
Chloroform	1.49[a], 0.73[g]	4.8[b]
Bromoform	0.041[a]	
Ethanes		
Hexachloroethane	0.013[a]	NA
1,1,2,2-Tetrachloroethane	0.053[a]	NA
1,1,1,2-Tetrachloroethane	0.049[a]	NA
1,1,1-Trichloroethane	0.065[a], 1.4[h]	1.7-4.1[b]
1,1-Dichloroethane	NA	NA
Ethenes		
Tetrachloroethene	0.28[a], 5.2[h]	2.1-10.8[b],3.2[e]
Trichloroethene	0.67[a], 7.3-9.7[g], 0.68[j]	1.1-4.6[b], 2.4[e], 2.8[f]
1,1-Dichloroethene	5.5[a], 2.8[h]	37.4[e], 15.2[f]
trans-1,2-Dichloroethene	6.4[a]	4.9[b], 6.9[e], 7.6[f]
cis-1,2-Dichloroethene	19.7[a]	10.8-33.9[b], 47.6[e]
Vinyl chloride	12.6[a]	10.8-12.3[b], 4.7[e]
Other Organics		
1,1,2-Trichlorotrifluoroethane (Freon 113)	1.02[b]	NA
1,2,3-Trichloropropane	NA	24.0[c]
1,2-Dichloropropane	NA	4.5[c]
1,3-Dichloropropane	NA	2.2[c]
1,2-Dibromo-3-chloropropane	NA	0.72[b]
1,2-Dibromoethane	NA	1.5-6.5[b]
n-Nitrosodimethylamine (NDMA)	1.83[b]	NA
Nitrobenzene	0.008[d]	NA
Inorganics		
Chromium[k][l], nickel[l]	NA	NA
Uranium[l]	NA	NA
Nitrate [l]	NA	NA
No Apparent Degradation		
Dichloromethane[a][g][h]	NA	NA
1,4-Dichlorobenzene[h]	NA	NA
1,2-Dichloroethane[b]	NA	NA
Chloromethane[b]	NA	NA

(a) Gillham and O'Hannesin (1994)
(b) ETI (1997)
(c) Focht (1994)
(d) Agrawal and Tratnyek (1994)
(e) Sivavec and Horney (1995)
(f) Mackenzie et al. (1995)
(g) Matheson and Tratnyek (1994)
(h) Schreier and Reinhard (1994)
NA = Not available.

(i) Lipczynska-Kochany et al. (1994)
(j) Orth and Gillham (1995)
(k) Blowes et al. (1997)
(l) WSRC (1999)
(m) The half-lives reported in this table are for illustration purposes only. Contaminant half-lives may vary depending on the iron source and site-specific groundwater chemistry.

CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN2194-0000.0110	
SUBJECT: GROUNDWATER ALTERNATIVE 5 - EXTRACTION AND TREATMENT			
BASED ON:		DRAWING NUMBER:	
BY: KCT Date: 2/27/06	CHECKED BY: Date:	APPROVED BY:	DATE:

The groundwater model (App. H.3) was used to estimate the number of extraction wells and flow rate for each well. The model predicted that five wells would be needed in the TCE plume area and one well would be needed in the area near MW022 where only cis-1,2-dichloroethene and vinyl chloride were detected at concentrations above PRGs.

Wells 1 and 2 would be installed between locations MW003/MW004 and MW009/MW010. Wells 3, 4, and 5 would be installed between locations MW009/MW010 and MW005/MW006. Well 6 would be installed near MW022.

Following is a summary of the approximate depth and flow rate of each well:

Well	Depth	Flow (gpm)
1	30	20
2	20	20
3	20	20
4	20	5
5	20	5
6	15	5
Total	125	75

Six wells at a total depth of 125 ft to be installed.

This would require approx. 125 of in-well piping.

Assuming the treatment facility (air stripping tower) would be installed near MW022, the total length of header piping would be approximately 1900 ft. This location is above the 100-yr flood elevation (8 ft).

It is assumed that the treated groundwater would be discharged to Mattawoman Creek. The length of discharge piping would be approximately 250 ft.

The contaminants that exceed PRGs are 1,1-dichloroethene (11DCE), cis-1,2-dichloroethene (c12DCE), diethyl ether (ether), trans-1,2-dichloroethene (t12DCE), trichloroethene (TCE), and vinyl chloride (VC).

The average concentrations (µg/L) (page 3 of 5) and flow rates (gpm) for each area are as follows:

Well	Flow	11DCE	c12DCE	ether	t12DCE	TCE	VC
Well 1	20	15	5988	450	18	3988	3102
Wells 2-5	50	6	26	704	0	136	1.1
Well 6	5	0	210	160	0	0	400

CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN2194-0000.0110	
SUBJECT: GROUNDWATER ALTERNATIVE 5 - EXTRACTION AND TREATMENT			
BASED ON:		DRAWING NUMBER:	
BY: KCT Date: 2/27/06	CHECKED BY: Date:	APPROVED BY:	DATE:

Flow weighted average (influent) concentrations are as follows:

11DCE	8	µg/L
c12DCE	1628	µg/L
ether	600	µg/L
t12DCE	4.8	µg/L
TCE	1154	µg/L
VC	855	µg/L

The assumed effluent limits for discharge to Mattawoman Creek are assumed to be the PRGs:

11DCE	7	µg/L
c12DCE	70	µg/L
ether	1246	µg/L
t12DCE	100	µg/L
TCE	5	µg/L
VC	2	µg/L

Note that treatment would not be required for ether or t12DCE to attain the assumed discharge limits.

Assume that treatment would include flow equalization tank and air stripping.

Size equalization tank for 30-min retention time

Vol = flow (gpm)*retention time (min) = 75 gpm*30 min = 2250 gal

See pages 4 of 5 and 5 of 5 for air stripper sizing. Based on the conceptual air stripper design, the air emissions rate is 0.16 lb/hr total VOCs. Therefore, it is assumed that off-gas treatment would not be required.

Annual Costs

Annual costs include O&M costs for extraction system and treatment plant for 19 years.

Assume annual sampling of existing permanent monitoring wells (28) for 19 years (MW001 to MW013, MW020, MW022, MW024 to MW034, MW036, and MW037). Samples would be analyzed for TCL VOCs (including diethyl ether). Assume 35 samples per sampling period (incl. blanks and duplicates) @ $120.

Assume monthly sampling of treatment plant influent and effluent for 19 years. Assume 4 samples per sampling period (incl. Blanks and duplicates) @ $120.

ALTERNATIVE 5 - ESTIMATED CONCENTRATIONS BY EXTRACTION WELL

Extraction Well 1

Analyte	MW001	MW002	SB035	MW003	MW004	SB033	MW024	MW025	MW011	Average
1,1-Dichloroethene	0	0	115	1	4	0	4	12	0	15
cis-1,2-Dichloroethene	0	0	43500	7	72	27	820	9450	18	5988
Diethyl ether	100	1600	0	150	120	0	58	24	2000	450
trans-1,2-Dichloroethene	0	0	0	0	0	0	6	160	0	18
Trichloroethene	3	5	34000	175	950	78	580	71.5	27	3988
Vinyl chloride	0	0	4150	0	13	4	250	23500	0	3102

Extraction Wells 2 to 5

Analyte	SB036	MW007	MW008	MW009	MW010	MW005	MW006	Average
1,1-Dichloroethene	0	0	0	20	9	6	7	6.0
cis-1,2-Dichloroethene	0	0	0	50	59	36	38	26
Diethyl ether	4200	410	320	1	0	0	0	704
trans-1,2-Dichloroethene	0	0	0	0	0	0	0	0.0
Trichloroethene	0	0	0	330	160	230	230	136
Vinyl chloride	0	0	0	0	2	0	6	1.1

Extraction Well 6

Analyte	MW022
1,1-Dichloroethene	0
cis-1,2-Dichloroethene	210
Diethyl ether	160
trans-1,2-Dichloroethene	0
Trichloroethene	0
Vinyl chloride	400

QED Air Stripper Model ver. c1.10

2/28/2006

Site Data

Name: K Turnbull
e-mail: turnbullk@ttnus.com
Project: Indian Head Site 57 FS
Units: English
Altitude: 0 ft
Air Temp: 55 F
Flow: 75 gpm
Water Temp: 55 F
Stripper: EZ-Tray 12.x - Click for details
Stripper Air Flow: 600 cfm
Stripper Max Flow: 100 gpm

Water Results

Contaminant	Influent (ppb)	Target (ppb)	4-Tray Results (ppb)	4-Tray % Removal	6-Tray Results (ppb)	6-Tray % Removal
1,1-dichloroethylene	8	7	< 1	100.000	< 1	100.000
c-1,2-dichloroethylene	1628	70	2.5	99.846	< 1	100.000
diethyl ether	600	1246	27.9	95.350	6.7	98.883
t-1,2-dichloroethylene	4.8	100	< 1	100.000	< 1	100.000
trichloroethylene (TCE)	1154	5	< 1	100.000	< 1	100.000
vinyl chloride (chloroethylene)	855	2	< 1	100.000	< 1	100.000

Air Results

Contaminant	4-Tray (ppmV)	4-Tray (lb/hr)	6-Tray (ppmV)	6-Tray (lb/hr)
1,1-dichloroethylene	0.0323	0.00030	0.0323	0.00030
c-1,2-dichloroethylene	6.5741	0.06104	6.5841	0.06113
diethyl ether	3.0265	0.02148	3.1385	0.02228
t-1,2-dichloroethylene	0.0194	0.00018	0.0194	0.00018
trichloroethylene (TCE)	3.4427	0.04332	3.4436	0.04333
vinyl chloride (chloroethylene)	5.3636	0.03211	5.3636	0.03211

0.16

Notes

4 of 5

ENGINEERING DATA SHEET 1
AIR STRIPPER (REMOVABLE TRAY)

GENERAL PRODUCT DATA

Model No.	Max. Flow (GPM)	Dry Weight (lbs)	Oper. Weight (lbs)	Shell Dimension ("LxWxH)	Trays per tier (no x lbs)	Active Area (sq ft)	Nom. air flow (cfm)	*Required Clearance (inches)
4.4	1-25	480	985	29 x 27 x 82	4 x 29	2.8	210	4 x <27
4.6	1-25	680	1,219	29 x 27 x 102	6 x 29	2.8	210	4 x <27
6.4	1-60	580	1,285	37 x 27 x 82	4 x 40	3.8	320	4 x <35
6.6	1-60	978	1,591	37 x 27 x 102	6 x 40	3.8	320	4 x <35
8.4	1-60	955	1,580	49 x 27 x 82	4 x 50	5.6	420	4 x <47
8.6	1-60	1,182	1,956	49 x 27 x 102	6 x 50	5.6	420	4 x <47
→ 12.4	1-100	1,165	2,105	73 x 27 x 82	4 x 74	8.8	600	4 x <71
12.6	1-100	1,400	2,606	73 x 27 x 102	6 x 74	8.8	600	4 x <71
16.4	1-120	1,625	2,870	49 x 52 x 84	8 x 50	11.1	850	4 x <47
16.6	1-120	1,680	3,553	49 x 52 x 104	12 x 50	11.1	850	4 x <47
24.4	1-250	1,760	3,980	73 x 52 x 84	8 x 74	17.5	1300	4 x <72
24.6	1-250	2,599	4,926	73 x 52 x 104	12 x 74	17.5	1300	4 x <72

*Required clearances (back/sides by front, installed on standard skid)

INSTALLATION DATA

Model No.	Water Inlet (" FNPT)	Water Outlet (" FNPT)	Blower Inlet (" flange)	Exhaust Outlet (" O.D. pipe)	Water drain (" FNPT)	+Exhaust Stack size (inches)	*Max. back pressure ("H_2O)
4.4	2	3	4.5	4.5	1	4	10
4.6	2	3	4.5	4.5	1	4	5
6.4	3	3	4.5	6.63	1	6	10
6.6	3	3	4.5	6.63	1	6	5
8.4	3	4	4.5	6.63	1	6	10
8.6	3	4	4.5	6.63	1	6	5
→ 12.4	4	4	6.63	6.56	1	6	10
12.6	4	4	6.63	6.56	1	6	5
16.4	4	4	6.63	8.62	1	8	10
16.6	4	4	6.63	8.62	1	8	5
24.4	4	4	8.63	8.63	1	8	10
24.6	4	4	8.63	8.63	1	8	5

+ Minimum recommended nominal diameter of exhaust stack, if added
* Maximum clean-tray exhaust back-pressure allowed without auxiliary blower

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CLIENT: INDIAN HEAD SITE 57 FS		JOB NUMBER: 112GN2194.1110	
SUBJECT: ANALYTICAL COSTS			
BASED ON: PREVIOUS INVESTIGATIONS		DRAWING NUMBER:	
BY: Date:	CHECKED BY: Date:	APPROVED BY:	DATE:

Groundwater Alterantive 2 (based on MNA scoring protocol)

VOCs	120	
Fe (+2)	25	
TOC	30	
Alkalinity	15	
Misc (1)	75	nitrate, nitrite, sulfate, sulfide, chloride
Gases (2)	250	methane, carbon dioxide, ethane, ethene, hydrogen sulfide
	$515	

Groundwater Alternative 3 (HRC monitoring)

VOCs	120	
Fe(+2)	25	
Fe (diss)	25	
Mn (diss)	25	
TOC	30	
Alkalinity	15	
Misc (1)	75	nitrate, nitrite, sulfate, sulfide, chloride
Gases (2)	200	carbon dioxide, methane, ethane, ethene
	$515	

Groundwater Alternative 3 (ORC monitoring)

VOCs	120
Fe(+2)	25
BOD	30
COD	30
	$205

APPENDIX J

REMEDIAL ALTERNATIVE COST ESTIMATES

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 2: Monitored Natural Attenuation
Capital Cost

7/19/2006 1:21 PM

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Documents	200	hr			$35.00		$0	$0	$7,000	$0	$7,000
Subtotal							$0	$0	$7,000	$0	$7,000
Local Area Adjustments							100.0%	102.8%	89.7%	89.7%	
							$0	$0	$6,279	$0	$6,279
Overhead on Labor Cost @ 30%									$1,884		$1,884
G & A on Labor Cost @ 10%									$628		$628
G & A on Material Cost @ 10%								$0			$0
G & A on Subcontract Cost @ 10%							$0				$0
Total Direct Cost							$0	$0	$8,791	$0	$8,791
Indirects on Total Direct Cost @ 0%											$0
Profit on Total Direct Cost @ 10%											$879
Subtotal											$9,670
Health & Safety Monitoring @ 0%											$0
Total Field Cost											$9,670
Contingency on Total Field Costs @ 0%											$0
Engineering on Total Field Cost @ 0%											$0
TOTAL COST											**$9,670**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 2: Monitored Natural Attenuation
Annual Cost

Item	Item Cost per round	Item Cost every 5 years	Notes
Sampling	$17,300		Labor, Field Supplies
Analysis/Water(1)	$18,025		Analyze 35 groundwater samples for TCL VOCs and natural attenuation including blanks and duplicates. Monitor for 30 years.
Report	$10,000		Document sampling events and results
Site Review		$15,000	Five Year Site Reviews
TOTALS	$45,325	$15,000	

(1) Sampling rounds would occur annually for years 1 through 30.

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 2: Monitored Natural Attenuation
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$9,670		$9,670	1.000	$9,670
1		$45,325	$45,325	0.935	$42,379
2		$45,325	$45,325	0.873	$39,569
3		$45,325	$45,325	0.816	$36,985
4		$45,325	$45,325	0.763	$34,583
5		$60,325	$60,325	0.713	$43,012
6		$45,325	$45,325	0.666	$30,186
7		$45,325	$45,325	0.623	$28,237
8		$45,325	$45,325	0.582	$26,379
9		$45,325	$45,325	0.544	$24,657
10		$60,325	$60,325	0.508	$30,645
11		$45,325	$45,325	0.475	$21,529
12		$45,325	$45,325	0.444	$20,124
13		$45,325	$45,325	0.415	$18,810
14		$45,325	$45,325	0.388	$17,586
15		$60,325	$60,325	0.362	$21,838
16		$45,325	$45,325	0.339	$15,365
17		$45,325	$45,325	0.317	$14,368
18		$45,325	$45,325	0.296	$13,416
19		$45,325	$45,325	0.277	$12,555
20		$60,325	$60,325	0.258	$15,564
21		$45,325	$45,325	0.242	$10,969
22		$45,325	$45,325	0.226	$10,243
23		$45,325	$45,325	0.211	$9,564
24		$45,325	$45,325	0.197	$8,929
25		$60,325	$60,325	0.184	$11,100
26		$45,325	$45,325	0.172	$7,796
27		$45,325	$45,325	0.161	$7,297
28		$45,325	$45,325	0.150	$6,799
29		$45,325	$45,325	0.141	$6,391
30		$60,325	$60,325	0.131	$7,903
				TOTAL PRESENT WORTH	**$604,448**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 3: In-situ Biological Treatment
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Documents & Plans including Permits	500	hr			$35.00		$0	$0	$17,500	$0	$17,500
2 MOBILIZATION/DEMOBILIZATION & SITE SUPPORT											
2.1 Office Trailer	2	mo				$340.00	$0	$0	$0	$680	$680
2.2 Field Office Support	2	mo		$145.00			$0	$290	$0	$0	$290
2.3 Storage Trailer (1)	2	mo				$109.00	$0	$0	$0	$218	$218
2.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500
2.5 Construction Survey	2.5	ac	$2,000.00				$5,000	$0	$0	$0	$5,000
2.6 Equipment Mobilization/Demobilization	2	ea			$151.00	$350.00	$0	$0	$302	$700	$1,002
2.7 Site Utilities	2	mo	$150.00				$300	$0	$0	$0	$300
2.8 Field Construction Mgt. (5p * 5 days/week)	8	mwk			$6,250.00		$0	$0	$50,000	$0	$50,000
3 DECONTAMINATION											
3.1 Decontamination Services	2	mo		$1,100.00	$1,850.00	$1,200.00	$0	$2,200	$3,700	$2,400	$8,300
3.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$200	$3,700
3.3 Decon Water	2,000	gal		$0.20			$0	$400	$0	$0	$400
3.4 Decon Water Storage Tank, 6,000 gallon	2	mo				$645.00	$0	$0	$0	$1,290	$1,290
3.5 Clean Water Storage Tank, 4,000 gallon	2	mo				$580.00	$0	$0	$0	$1,160	$1,160
3.6 Disposal of Decon Waste (liquid & solid)	2	mo	$950.00				$1,900	$0	$0	$0	$1,900
4 IN-SITU BIOLOGICAL TREATMENT											
4.1 Subcontractor's Mobilization & Demobilization	1	ea	$4,000.00				$4,000	$0	$0	$0	$4,000
4.2 Area 1 Probe/Pump/Injection Subcontractor	3	day	$3,070.00				$9,210	$0	$0	$0	$9,210
4.3 Area 1 Core & Repair Injection Points	64	ea		$14.51	$50.50	$14.75	$0	$929	$3,232	$944	$5,105
4.4 Area 1 HRC Cost (6,420 lb. + 10%)	7,062	lb		$5.86			$0	$41,383	$0	$0	$41,383
4.5 Area 3 Probe/Pump/Injection Subcontractor	1	day	$3,070.00				$3,070	$0	$0	$0	$3,070
4.6 Area 3 Core & Repair Injection Points	100	ea		$14.51	$50.50	$14.75	$0	$1,451	$5,050	$1,475	$7,976
4.7 Area 3 ORC Cost (2,400 lb. + 10%)	2,640	lb		$7.90			$0	$20,856	$0	$0	$20,856
5 MONITORING WELLS											
5.1 Install Monitoring Wells (4 wells)	105	lf	$65.00				$6,825	$0	$0	$0	$6,825
5.2 Well Development (4 hr/well)	16	hr	$35.00				$560	$0	$0	$0	$560
5.3 Collect/Containerize IDW	9	drum	$55.00				$495	$0	$0	$0	$495
5.4 Transport/Dispose IDW	9	drum	$170.00				$1,530	$0	$0	$0	$1,530
6 GROUNDWATER SAMPLING											
6.1 Collection (labor)	1	ls			$16,000.00		$0	$0	$16,000	$0	$16,000
6.2 Equipment/Supplies	1	ls		$500.00		$1,600.00	$0	$500	$0	$1,600	$2,100
6.3 Analytical Cost	1	ls	$19,050.00				$19,050	$0	$0	$0	$19,050
Subtotal							$53,440	$69,509	$97,784	$10,667	$231,400
Local Area Adjustments							100.0%	102.8%	89.7%	89.7%	
							$53,440	$71,455	$87,712	$9,568	$222,176

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Overhead on Labor Cost @ 30%									$26,314		$26,314
G & A on Labor Cost @ 10%									$8,771		$8,771
G & A on Material Cost @ 10%								$7,146			$7,146
G & A on Equipment Cost @ 10%										$957	$957
G & A on Subcontract Cost @ 10%							$5,344				$5,344
Total Direct Cost							$58,784	$78,601	$122,797	$10,525	$270,707
Indirects on Total Direct Cost @ 35%											$94,747
Profit on Total Direct Cost @ 10%											$27,071
Subtotal											$392,525
Health & Safety Monitoring @ 2%											$7,851
Total Field Cost											$400,376
Contingency on Total Field Costs @ 25%											$100,094
Engineering on Total Field Cost @ 10%											$40,038
TOTAL COST											**$540,507**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 3: In-situ Biological Treatment
Capital Cost Year 3

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Documents & Plans including Permits	500	hr			$35.00		$0	$0	$17,500	$0	$17,500
2 DECONTAMINATION											
2.1 Decontamination Services	1	mo		$1,100.00	$1,850.00	$1,200.00	$0	$1,100	$1,850	$1,200	$4,150
2.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$200	$3,700
2.3 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
2.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$645.00	$0	$0	$0	$645	$645
2.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$580.00	$0	$0	$0	$580	$580
2.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
3 IN-SITU BIOLOGICAL TREATMENT											
3.1 Field Construction Mgt. (1p * 5 days/week)	1	mwk			$1,250.00		$0	$0	$1,250	$0	$1,250
3.2 Subcontractor's Mobilization & Demobilization	1	ea	$4,000.00				$4,000	$0	$0	$0	$4,000
3.3 Area 1 Probe/Pump/Injection Subcontractor	3	day	$3,070.00				$9,210	$0	$0	$0	$9,210
3.4 Area 1 Core & Repair Injection Points	64	ea		$14.51	$50.50	$14.75	$0	$929	$3,232	$944	$5,105
3.5 Area 1 HRC Cost (6,420 lb. + 10%)	7,062	lb		$5.86			$0	$41,383	$0	$0	$41,383
Subtotal							$14,160	$45,112	$25,832	$3,569	$88,673
Local Area Adjustments							100.0%	102.8%	89.7%	89.7%	
							$14,160	$46,375	$23,171	$3,201	$86,908
Overhead on Labor Cost @ 30%									$6,951		$6,951
G & A on Labor Cost @ 10%									$2,317		$2,317
G & A on Material Cost @ 10%								$4,638			$4,638
G & A on Equipment Cost @ 10%										$320	$320
G & A on Subcontract Cost @ 10%							$1,416				$1,416
Total Direct Cost							$15,576	$51,013	$32,440	$3,522	$102,550
Indirects on Total Direct Cost @ 35%											$35,892
Profit on Total Direct Cost @ 10%											$10,255
Subtotal											$148,697
Health & Safety Monitoring @ 2%											$2,974
Total Field Cost											$151,671
Contingency on Total Field Costs @ 10%											$15,167
Engineering on Total Field Cost @ 10%											$15,167
TOTAL COST											**$182,006**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 3: In-situ Biological Treatment
Annual Cost

Item	Item Cost Years 1 & 2	Item Cost Years 3 thru 6	Item Cost Years 7 thru 30	Item Cost every 5 years	Notes
Sampling	$24,700	$24,700	$24,700		Labor, Field Supplies per sampling round
Analysis/Water ORC Monitoring	$1,025				Analyze groundwater samples for ORC evaluation parameters including blanks and duplicates.
Analysis/Water HRC Monitoring	$2,575	$2,575			Analyze groundwater samples for HRC evaluation parameters including blanks and duplicates.
Analysis/Water MNA Monitoring	$15,450	$15,450	$15,450		Analyze groundwater samples for MNA evaluation parameters including blanks and duplicates.
Report	$10,000	$10,000	$10,000		Document sampling events and results
Site Review				$15,000	Five Year Site Reviews
TOTALS	$53,750	$52,725	$50,150	$15,000	

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 3: In-situ Biological Treatment
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$540,507		$540,507	1.000	$540,507
1		$53,750	$53,750	0.935	$50,256
2		$53,750	$53,750	0.873	$46,924
3	$182,006	$52,725	$234,731	0.816	$191,540
4		$52,725	$52,725	0.763	$40,229
5		$67,725	$67,725	0.713	$48,288
6		$52,725	$52,725	0.666	$35,115
7		$50,150	$50,150	0.623	$31,243
8		$50,150	$50,150	0.582	$29,187
9		$50,150	$50,150	0.544	$27,282
10		$65,150	$65,150	0.508	$33,096
11		$50,150	$50,150	0.475	$23,821
12		$50,150	$50,150	0.444	$22,267
13		$50,150	$50,150	0.415	$20,812
14		$50,150	$50,150	0.388	$19,458
15		$65,150	$65,150	0.362	$23,584
16		$50,150	$50,150	0.339	$17,001
17		$50,150	$50,150	0.317	$15,898
18		$50,150	$50,150	0.296	$14,844
19		$50,150	$50,150	0.277	$13,892
20		$65,150	$65,150	0.258	$16,809
21		$50,150	$50,150	0.242	$12,136
22		$50,150	$50,150	0.226	$11,334
23		$50,150	$50,150	0.211	$10,582
24		$50,150	$50,150	0.197	$9,880
25		$65,150	$65,150	0.184	$11,988
26		$50,150	$50,150	0.172	$8,626
27		$50,150	$50,150	0.161	$8,074
28		$50,150	$50,150	0.150	$7,523
29		$50,150	$50,150	0.141	$7,071
30		$65,150	$65,150	0.131	$8,535
				TOTAL PRESENT WORTH	**$1,357,801**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 4: Permeable Reactive Barrier
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Documents & Plans including Permits	500	hr			$35.00		$0	$0	$17,500	$0	$17,500
2 MOBILIZATION/DEMOBILIZATION & SITE SUPPORT											
2.1 Office Trailer	3	mo				$340.00	$0	$0	$0	$1,020	$1,020
2.2 Field Office Support	3	mo		$145.00			$0	$435	$0	$0	$435
2.3 Storage Trailer (1)	3	mo				$109.00	$0	$0	$0	$327	$327
2.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500
2.5 Construction Survey	0.5	ac	$2,000.00				$1,000	$0	$0	$0	$1,000
2.6 Equipment Mobilization/Demobilization	4	ea			$151.00	$350.00	$0	$0	$604	$1,400	$2,004
2.7 Site Utilities	3	mo	$150.00				$450	$0	$0	$0	$450
2.8 Field Construction Mgt. (5p * 5 days/week)	12	mwk			$6,250.00		$0	$0	$75,000	$0	$75,000
3 DECONTAMINATION											
3.1 Decontamination Services	3	mo		$1,100.00	$1,850.00	$1,200.00	$0	$3,300	$5,550	$3,600	$12,450
3.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$200	$3,700
3.3 Decon Water	3,000	gal		$0.20			$0	$600	$0	$0	$600
3.4 Decon Water Storage Tank, 6,000 gallon	3	mo				$645.00	$0	$0	$0	$1,935	$1,935
3.5 Clean Water Storage Tank, 4,000 gallon	3	mo				$580.00	$0	$0	$0	$1,740	$1,740
3.6 Disposal of Decon Waste (liquid & solid)	3	mo	$950.00				$2,850	$0	$0	$0	$2,850
4 PERMEABLE REACTIVE BARRIER											
4.1 Treatability Study	1	ls	$50,000.00				$50,000	$0	$0	$0	$50,000
4.2 Cut & Chip Trees	0.5	ac			$2,000.00	$1,475.00	$0	$0	$1,000	$738	$1,738
4.3 Grub Stumps & Remove	0.5	ac			$745.00	$1,675.00	$0	$0	$373	$838	$1,210
4.4 Slurry Wall (2' thick)	1,540	sf	$12.00				$18,480	$0	$0	$0	$18,480
4.5 Sheet Piling, temporary (70' by 3.5' box)	2,205	sf	$19.39				$42,755	$0	$0	$0	$42,755
4.6 Excavate in Box with Clamshell	100	cy			$8.75	$15.40	$0	$0	$875	$1,540	$2,415
4.7 Iron Filings	100	cy		$438.73			$0	$43,873	$0	$0	$43,873
4.8 Place Iron Filings	2	day			$524.00	$923.40	$0	$0	$1,048	$1,847	$2,895
4.9 Construct/Remove Dewatering Pad (25' * 80')	2,000	sf		$4.04	$2.93	$0.86	$0	$8,080	$5,860	$1,720	$15,660
4.10 Mix/Spread/Load Soil on Pad	10	day			$403.20	$241.40	$0	$0	$4,032	$2,414	$6,446
4.11 Haul/Disposal of Excavated Soil	320	ton	$55.00				$17,600	$0	$0	$0	$17,600
4.12 Backfill/Compact Excavation, top 4'	80	cy			$1.43	$0.98	$0	$0	$114	$78	$193
4.13 Disposal Testing	1	ea	$470.00	$50.00	$100.00	$10.00	$470	$50	$100	$10	$630
5 SITE RESTORATION											
5.1 Top Dress Soil, 1 cy for 600.sf (21,780 sf)	36	cy		$21.50	$19.50		$0	$774	$702	$0	$1,476
5.2 Fine Grading & Seeding	2420	sy		$0.36	$1.39	$0.23	$0	$871	$3,364	$557	$4,792
5.3 Asphalt Repair (30' by 50')	170	sy	$40.98				$6,967	$0	$0	$0	$6,967
Subtotal							$142,072	$59,483	$118,122	$19,963	$339,639
Local Area Adjustments							100.0%	102.8%	89.7%	89.7%	
							$142,072	$61,149	$105,955	$17,907	$327,082

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 4: Permeable Reactive Barrier
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Overhead on Labor Cost @ 30%									$31,787		$31,787
G & A on Labor Cost @ 10%									$10,596		$10,596
G & A on Material Cost @ 10%								$6,115			$6,115
G & A on Equipment Cost @ 10%										$1,791	$1,791
G & A on Subcontract Cost @ 10%							$14,207				$14,207
Total Direct Cost							$156,279	$67,264	$148,337	$19,697	$391,577
Indirects on Total Direct Cost @ 35%											$137,052
Profit on Total Direct Cost @ 10%											$39,158
Subtotal											$567,786
Health & Safety Monitoring @ 2%											$11,356
Total Field Cost											$579,142
Contingency on Total Field Costs @ 25%											$144,786
Engineering on Total Field Cost @ 10%											$57,914
TOTAL COST											**$781,842**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 4: Permeable Reactive Barrier
Capital Cost - Year 15 Iron Replacement

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Documents & Plans including Permits	200	hr			$35.00		$0	$0	$7,000	$0	$7,000
2 MOBILIZATION/DEMOBILIZATION & SITE SUPPORT											
2.1 Office Trailer	1	mo				$340.00	$0	$0	$0	$340	$340
2.2 Field Office Support	1	mo		$145.00			$0	$145	$0	$0	$145
2.3 Storage Trailer (1)	1	mo				$109.00	$0	$0	$0	$109	$109
2.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500
2.5 Equipment Mobilization/Demobilization	3	ea			$151.00	$350.00	$0	$0	$453	$1,050	$1,503
2.6 Site Utilities	1	mo	$150.00				$150	$0	$0	$0	$150
2.7 Field Construction Mgt. (5p * 5 days/week)	4	mwk			$6,250.00		$0	$0	$25,000	$0	$25,000
3 DECONTAMINATION											
3.1 Decontamination Services	1	mo		$1,100.00	$1,850.00	$1,200.00	$0	$1,100	$1,850	$1,200	$4,150
3.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$200	$3,700
3.3 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
3.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$645.00	$0	$0	$0	$645	$645
3.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$580.00	$0	$0	$0	$580	$580
3.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
4 PERMEABLE REACTIVE BARRIER											
4.1 Sheet Piling, temporary (70' by 3.5' box)	2,205	sf	$19.39				$42,755	$0	$0	$0	$42,755
4.2 Excavate Iron in Box with Clamshell	100	cy			$8.75	$15.40	$0	$0	$875	$1,540	$2,415
4.3 Iron Filings	100	cy		$438.73			$0	$43,873	$0	$0	$43,873
4.4 Place Iron Filings	2	day			$524.00	$923.40	$0	$0	$1,048	$1,847	$2,895
4.5 Construct/Remove Dewatering Pad (25' * 55')	1,375	sf		$4.04	$2.93	$0.86	$0	$5,555	$4,029	$1,183	$10,766
4.6 Mix/Spread/Load Iron on Pad	5	day			$403.20	$241.40	$0	$0	$2,016	$1,207	$3,223
4.7 Haul/Disposal of Excavated Iron	150	ton	$55.00				$8,250	$0	$0	$0	$8,250
4.8 Backfill/Compact Excavation, top 4'	36	cy			$1.43	$0.98	$0	$0	$51	$35	$87
4.9 Disposal Testing	1	ea	$470.00	$50.00	$100.00	$10.00	$470	$50	$100	$10	$630
5 SITE RESTORATION											
5.1 Top Dress Soil, 1 cy for 600 sf 10,890 sf)	18	cy		$21.50	$19.50		$0	$387	$351	$0	$738
5.2 Fine Grading & Seeding	1210	sy		$0.36	$1.39	$0.23	$0	$436	$1,682	$278	$2,396
Subtotal							$54,075	$53,246	$46,455	$10,224	$164,000
Local Area Adjustments							100.0%	102.8%	89.7%	89.7%	
							$54,075	$54,736	$41,670	$9,171	$159,652
Overhead on Labor Cost @ 30%									$12,501		$12,501
G & A on Labor Cost @ 10%									$4,167		$4,167
G & A on Material Cost @ 10%								$5,474			$5,474
G & A on Equipment Cost @ 10%										$917	$917
G & A on Subcontract Cost @ 10%							$5,407				$5,407
Total Direct Cost							$59,482	$60,210	$58,338	$10,088	$188,119
Indirects on Total Direct Cost @ 35%											$65,842
Profit on Total Direct Cost @ 10%											$18,812

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 4: Permeable Reactive Barrier
Capital Cost - Year 15 Iron Replacement

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Subtotal											$272,772
Health & Safety Monitoring @ 2%											$5,455
Total Field Cost											$278,228
Contingency on Total Field Costs @ 10%											$27,823
Engineering on Total Field Cost @ 10%											$27,823
TOTAL COST											**$333,873**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 4: Permeable Reactive Barrier
Annual Cost

Item	Item Cost per round	Item Cost every 5 years	Notes
Sampling	$17,300		Labor, Field Supplies
Analysis/Water(1)	$4,200		Analyze 35 groundwater samples for TCL VOCs including blanks and duplicates. Monitor for 30 years.
Report	$10,000		Document sampling events and results
Site Review		$15,000	Five Year Site Reviews
TOTALS	$31,500	$15,000	

(1) Sampling rounds would occur annually for years 1 through 30.

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 4: Permeable Reactive Barrier
Present Worth Analysis

Year	Capital Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$781,842		$781,842	1.000	$781,842
1		$31,500	$31,500	0.935	$29,453
2		$31,500	$31,500	0.873	$27,500
3		$31,500	$31,500	0.816	$25,704
4		$31,500	$31,500	0.763	$24,035
5		$46,500	$46,500	0.713	$33,155
6		$31,500	$31,500	0.666	$20,979
7		$31,500	$31,500	0.623	$19,625
8		$31,500	$31,500	0.582	$18,333
9		$31,500	$31,500	0.544	$17,136
10		$46,500	$46,500	0.508	$23,622
11		$31,500	$31,500	0.475	$14,963
12		$31,500	$31,500	0.444	$13,986
13		$31,500	$31,500	0.415	$13,073
14		$31,500	$31,500	0.388	$12,222
15	$333,873	$46,500	$380,373	0.362	$137,695
16		$31,500	$31,500	0.339	$10,679
17		$31,500	$31,500	0.317	$9,986
18		$31,500	$31,500	0.296	$9,324
19		$31,500	$31,500	0.277	$8,726
20		$46,500	$46,500	0.258	$11,997
21		$31,500	$31,500	0.242	$7,623
22		$31,500	$31,500	0.226	$7,119
23		$31,500	$31,500	0.211	$6,647
24		$31,500	$31,500	0.197	$6,206
25		$46,500	$46,500	0.184	$8,556
26		$31,500	$31,500	0.172	$5,418
27		$31,500	$31,500	0.161	$5,072
28		$31,500	$31,500	0.150	$4,725
29		$31,500	$31,500	0.141	$4,442
30		$46,500	$46,500	0.131	$6,092
				TOTAL PRESENT WORTH	**$1,325,928**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 5: Extraction and Treatment
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
1 PROJECT PLANNING & DOCUMENTS											
1.1 Prepare Documents & Plans including Permits	500	hr			$35.00		$0	$0	$17,500	$0	$17,500
2 MOBILIZATION/DEMOBILIZATION & SITE SUPPORT											
2.1 Office Trailer	5	mo				$340.00	$0	$0	$0	$1,700	$1,700
2.2 Field Office Support	5	mo		$145.00			$0	$725	$0	$0	$725
2.3 Storage Trailer (1)	5	mo				$109.00	$0	$0	$0	$545	$545
2.4 Utility Connection/Disconnection (phone/electric)	1	ls	$1,500.00				$1,500	$0	$0	$0	$1,500
2.5 Construction Survey	0.5	ac	$2,000.00				$1,000	$0	$0	$0	$1,000
2.6 Equipment Mobilization/Demobilization	5	ea			$151.00	$350.00	$0	$0	$755	$1,750	$2,505
2.7 Site Utilities	5	mo	$150.00				$750	$0	$0	$0	$750
2.8 Field Construction Mgt. (5p * 5 days/week)	21	mwk			$6,250.00		$0	$0	$131,250	$0	$131,250
3 DECONTAMINATION											
3.1 Decontamination Services	1	mo		$1,100.00	$1,850.00	$1,200.00	$0	$1,100	$1,850	$1,200	$4,150
3.2 Temporary Equipment Decon Pad	1	ls		$1,500.00	$2,000.00	$300.00	$0	$1,500	$2,000	$300	$3,800
3.3 Decon Water	1,000	gal		$0.20			$0	$200	$0	$0	$200
3.4 Decon Water Storage Tank, 6,000 gallon	1	mo				$645.00	$0	$0	$0	$645	$645
3.5 Clean Water Storage Tank, 4,000 gallon	1	mo				$580.00	$0	$0	$0	$580	$580
3.6 Disposal of Decon Waste (liquid & solid)	1	mo	$950.00				$950	$0	$0	$0	$950
4 EXTRACTION SYSTEM											
4.1 Install Wells (6 wells)	125	lf	$65.00				$8,125	$0	$0	$0	$8,125
4.2 Well Covers	6	ea	$97.50				$585	$0	$0	$0	$585
4.3 Well Development (4 hours per well)	24	ea	$35.00				$840	$0	$0	$0	$840
4.4 Collect/Containerize IDW	12	drum	$55.00				$660	$0	$0	$0	$660
4.5 Transport/Dispose IDW	12	drum	$170.00				$2,040	$0	$0	$0	$2,040
4.6 Asphalt Removal/Replacement for 4" pipe	550	lf		$3.85	$10.01	$4.60	$0	$2,118	$5,506	$2,530	$10,153
4.7 Excavate/Backfill Pipe Trench for 4" pipe	1,900	lf			$0.35	$0.27	$0	$0	$665	$513	$1,178
4.8 Header Pipe, PVC 4" w/fittings	2,025	lf		$2.81	$6.60		$0	$5,690	$13,365	$0	$19,055
4.9 Extraction Pump, 5 gpm, 1/3 HP w/controls	3	ea		$1,841.00	$191.00		$0	$5,523	$573	$0	$6,096
4.10 Extraction Pump, 20 gpm, 1/2 HP w/controls	3	ea		$1,644.00	$191.00		$0	$4,932	$573	$0	$5,505
4.11 Vault Boxes and Misc. Piping/Valves at Well Head	6	ea		$439.45	$359.56		$0	$2,637	$2,157	$0	$4,794
5 TREATMENT SYSTEM											
5.1 Building Foundation	500	sf	$5.03				$2,515	$0	$0	$0	$2,515
5.2 Treatment Building	500	sf	$14.34				$7,170	$0	$0	$0	$7,170
5.3 Building Misc. (doors/vent/insulation/lighting/misc.)	1	ls	$7,443.00				$7,443	$0	$0	$0	$7,443
5.4 Electrical Service, 1000 A, 480 V	1	ea	$18,500.00				$18,500	$0	$0	$0	$18,500
5.5 Equalization Tank (2,250 gal)	1	ea		$2,575.00	$1,010.39	$141.69	$0	$2,575	$1,010	$142	$3,727
5.6 Top Mounted Mixer (1 hp)	1	ea		$6,295.00	$102.48		$0	$6,295	$102	$0	$6,397
5.7 Centrifugal Transfer Pump, 75 gpm (3 hp)	2	ea		$3,739.00	$1,166.00		$0	$7,478	$2,332	$0	$9,810
5.8 Air Stripper, 4 tray, 600 cfm	1	ea		$29,500.00	$8,050.00	$2,700.00	$0	$29,500	$8,050	$2,700	$40,250
5.9 Asphalt Removal/Replacement for 4" pipe	50	lf		$3.85	$10.01	$4.60	$0	$193	$501	$230	$923
5.10 Excavate/Backfill Pipe Trench for 4" pipe	250	lf			$0.35	$0.27	$0	$0	$88	$68	$155
5.11 Discharge Pipe,PVC 4" w/fittings	250	lf		$2.81	$6.60		$0	$703	$1,650	$0	$2,353
5.12 Instruments and Controls	1	ls		$16,200.00	$9,755.00		$0	$16,200	$9,755	$0	$25,955
5.13 Plumb/Electrify System	1	ls		$4,000.00	$3,500.00		$0	$4,000	$3,500	$0	$7,500
5.14 System Start-Up and Testing	1	ls		$1,000.00	$2,000.00		$0	$1,000	$2,000	$0	$3,000
6 SITE RESTORATION											
6.1 Top Dress Soil, 1 cy for 600 sf	14	cy		$21.50	$19.50		$0	$301	$273	$0	$574
6.2 Fine Grading & Seeding	930	sy		$0.36	$1.39	$0.23	$0	$335	$1,293	$214	$1,841

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 5: Extraction and Treatment
Capital Cost

Item	Quantity	Unit	Unit Cost Subcontract	Unit Cost Material	Unit Cost Labor	Unit Cost Equipment	Extended Cost Subcontract	Extended Cost Material	Extended Cost Labor	Extended Cost Equipment	Subtotal
Subtotal							$47,878	$89,478	$53,392	$6,396	$197,145
Local Area Adjustments							100.0%	102.8%	89.7%	89.7%	
							$47,878	$91,984	$47,893	$5,737	$193,492
Overhead on Labor Cost @ 30%									$14,368		$14,368
G & A on Labor Cost @ 10%									$4,789		$4,789
G & A on Material Cost @ 10%								$9,198			$9,198
G & A on Equipment Cost @ 10%										$574	$574
G & A on Subcontract Cost @ 10%							$4,788				$4,788
Total Direct Cost							$52,666	$101,182	$67,050	$6,311	$227,209
Indirects on Total Direct Cost @ 35%											$79,523
Profit on Total Direct Cost @ 10%											$22,721
Subtotal											$329,453
Health & Safety Monitoring @ 2%											$6,589
Total Field Cost											$336,042
Contingency on Total Field Costs @ 20%											$67,208
Engineering on Total Field Cost @ 20%											$67,208
TOTAL CAPITAL COST											**$470,459**

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 5: Extraction and Treatment
Operation and Maintenance Cost

	Item	Quantity	Unit	Unit Cost	Subtotal	Notes
Treatment System (for 19 years)						
1	Energy - Electric	61,200	kWh	$0.08	$4,896	
2	System Maintenance	1	ls	$14,244	$14,244	10% of Installation Cost
3	Sampling labor, travel & living, supplies	12	ea	$540	$6,480	1 person/1 day per month
4	Analysis of influent and effluent water	12	ea	$138	$1,656	TCL VOC, two per month
5	Quarterly Reports	4	ea	$5,000	$20,000	
				Subtotal	**$47,276**	

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 5: Extraction and Treatment
Annual Cost

Item	Item Cost per round	Item Cost every 5 years	Notes
Sampling	$17,300		Labor, Field Supplies
Analysis/Water[1]	$4,200		Analyze 35 groundwater samples for TCL VOCs including blanks and duplicates. Monitor for 19 years.
Report	$10,000		Document sampling events and results
Site Review		$15,000	Five Year Site Reviews
TOTALS	$31,500	$15,000	

(1) Sampling rounds would occur annually for years 1 through 19.

NAVAL SUPPORT FACILITY, INDIAN HEAD
Indian Head, Maryland
Site 57 - Building 292 TCE Contamination
Groundwater Alternative 5: Extraction and Treatment
Present Worth Analysis

Year	Capital Cost	Operation & Maintenance Cost	Annual Cost	Total Year Cost	Annual Discount Rate at 7%	Present Worth
0	$470,459			$470,459	1.000	$470,459
1		$47,276	$31,500	$78,776	0.935	$73,656
2		$47,276	$31,500	$78,776	0.873	$68,772
3		$47,276	$31,500	$78,776	0.816	$64,281
4		$47,276	$31,500	$78,776	0.763	$60,106
5		$47,276	$46,500	$93,776	0.713	$66,862
6		$47,276	$31,500	$78,776	0.666	$52,465
7		$47,276	$31,500	$78,776	0.623	$49,078
8		$47,276	$31,500	$78,776	0.582	$45,848
9		$47,276	$31,500	$78,776	0.544	$42,854
10		$47,276	$46,500	$93,776	0.508	$47,638
11		$47,276	$31,500	$78,776	0.475	$37,419
12		$47,276	$31,500	$78,776	0.444	$34,977
13		$47,276	$31,500	$78,776	0.415	$32,692
14		$47,276	$31,500	$78,776	0.388	$30,565
15		$47,276	$46,500	$93,776	0.362	$33,947
16		$47,276	$31,500	$78,776	0.339	$26,705
17		$47,276	$31,500	$78,776	0.317	$24,972
18		$47,276	$31,500	$78,776	0.296	$23,318
19		$47,276	$31,500	$78,776	0.277	$21,821
					TOTAL PRESENT WORTH	**$1,308,435**