APPENDIX A

Historical Monitoring Well Logs – Reevaluated Monitoring Zones

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RVAAP-04 OPEN DEMOLITION AREA #2

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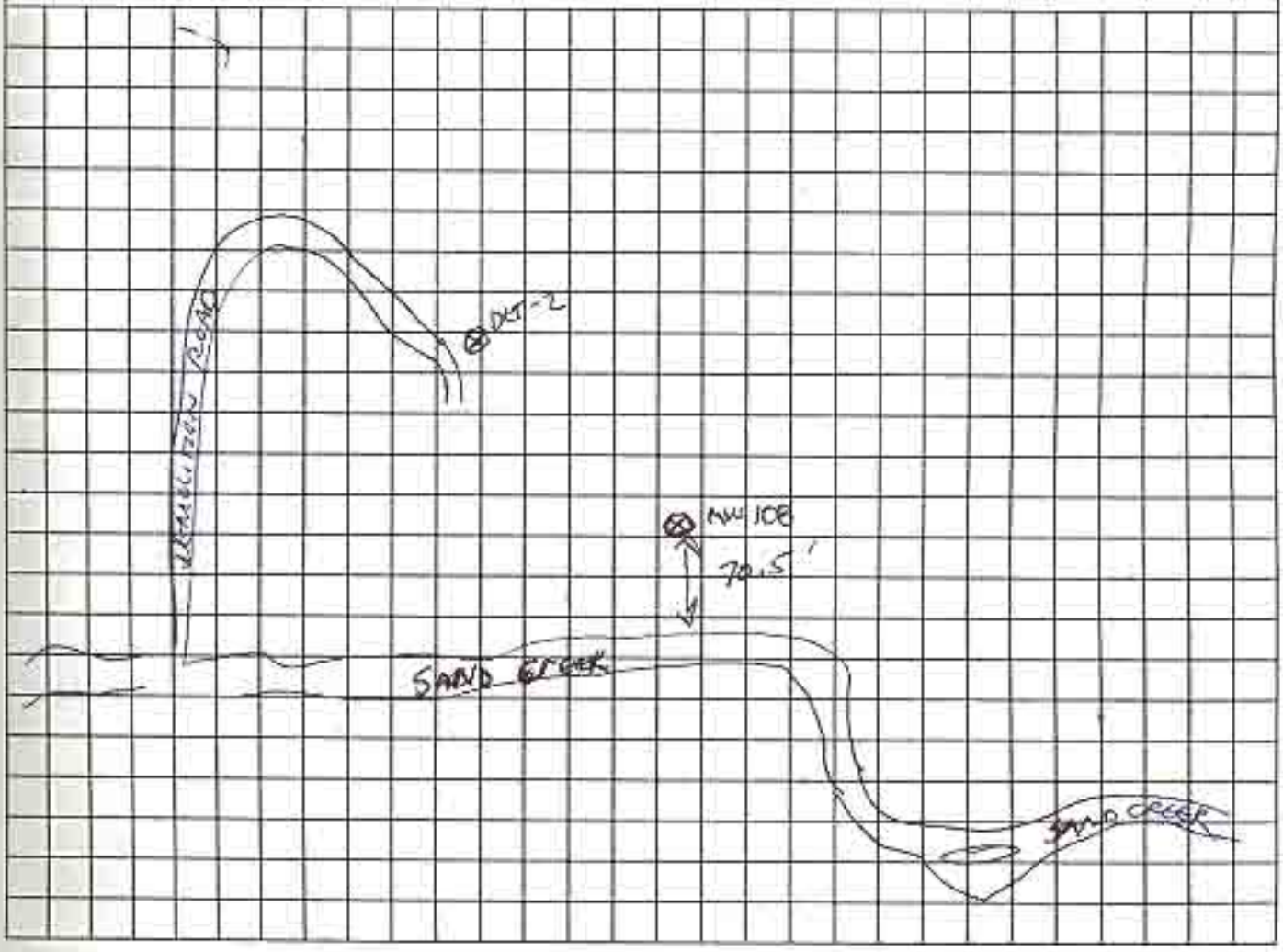
HTRW DRILLING LOG

1. COMPANY NAME: Spec Pro Inc.	2. DRILL SUBCONTRACTOR: Taltest	DISTRICT: Louisville; HOLE NUMBER: MW108; SHEET 1 of 3
3. PROJECT: Demo Area 2 - Phase II RI	4. LOCATION: DA2 - MW108	
5. NAME OF DRILLER: Bob Gobhine Taltest Inc	6. MANUFACTURER'S DESIGNATION OF DRILL: CME 75	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 75 using 4 1/4" HSAugers; 2' 2" id. Split Spoon Samplers; 3"x3" id. Shelby Tube	8. HOLE LOCATION	
	9. SURFACE ELEVATION: 1029.92	
	10. DATE STARTED: 07-16-02	11. DATE COMPLETED: 07-16-02
12. OVERBURDEN THICKNESS: 3.5'	15. DEPTH GROUNDWATER ENCOUNTERED: 6.5'	
13. DEPTH DRILLED INTO ROCK: Augered hole to 15' - 11.5' into shale	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 6.15 24 hours 7am	
14. TOTAL DEPTH OF HOLE: 15'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES: None	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
20. SAMPLES FOR CHEMICAL ANALYSIS: 0-2', 2-4'	VOC	METALS ✓	OTHER (SPECIFY): Explosives	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL ✓	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: S. Nichols		

LOCATION SKETCH/COMMENTS — SCALE: NOT TO SCALE



HTRW DRILLING LOG

DAL | HOLE NUMBER MW 08

PROJECT: Solid 2 PHASE II RI RVAAP | INSPECTOR: S Mc Cauley | SHEET 2 OF 3

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	Brown 10YR 3/3 Silty clay with trace organics, very soft, grading to a light brown 10YR 5/6 silty clay, Med Stiff, moist, non plastic ML	FID 4.29		0-2' sample @0842 #823	Blow Counts 55, 8, 12 Recovery 2/2
	1					
	2	Yellowish brown 10YR5/8 Silt with clay, trace gravel and some sand, soft, moist SC				
		Gray 10YR 4/1 clay, med stiff with brown mottling, moist, non-plastic CL			2-4' Sample @0850 #824	Blow Counts 16, 29, 50/4 Recovery 5/2
	3	As above, grading to weathered gray shale with iron staining, 10YR 4/1 stiff, dry, some gravel, dry				
		Refusal at 3.5' Gray shale bedrock				Crew augered to 4'
	4					
		As above, hard, dry	FID 3.99	No shelby tubes taken- into weathered bedrock		Blow counts 25, 36, 50/4 Recovery 1/5
	5					
	6					
		Refusal at 6.5', wet				50/4 wet at 6.5' attempt to auger down to advance hole to 8'
	7					
		Weathered dark gray shale, as above, moist, grading to dry, soft.				22, 50/4 Recovery 1/2
	8					
	9					
	10					

HTRW DRILLING LOG — DAZ — HOLE NUMBER 108

PROJECT: DAZ PAZ RI RVAAP — INSPECTOR: [illegible] — SHEET 3 OF 3

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	10	OS above, wet at 10.5ft SATURATED-				50/5 recovery .5 Hole advanced with auger to 12' time 0925 WATER @ 10.5'
	12					recovery 0 Auger to advance hole to 14' 0940
	14					NO SPLIT SPOON Sample taken Augered to 15'
	15	Bottom of Hole [illegible]				
	16					
	17					
	18					
	19					
	20					

MONITORING WELL INSTALLATION LOG

PROJECT NAME: Ravenna Demolition Area 2 Phase II RI **DELIVERY ORDER:** 0003

MONITORING WELL ID: DA2 MW-108

INSTALLATION START: DATE: 07-16-02 TIME: 1100

INSTALLATION FINISH: DATE: 07-16-02 TIME: 1124

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #7 SAND QUANTITY: 3-50Lb BAGS

BENTONITE SEAL: TYPE: Volclay 3/8" pellets QUANTITY: 1-50Lb Tub

GROUT: TYPE: Cement/Bentonite QUANTITY: 49 Lbs

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): .010 SLOT CONFIGURATION: Machine cut

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.0"

SCHEDULE/THICKNESS: SCH 40 COMPOSITION: PVC

MANUFACTURER: Johnson

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: Global #7 SAND

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.0"

SCHEDULE/THICKNESS: SCH 40 COMPOSITION: PVC

MANUFACTURER: Johnson

JOINT DESIGN AND COMPOSITION: Threaded

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 5.0" COMPOSITION: STEEL

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

NONE

Was all well screen and casing material used for construction free of foreign matter (e.g. adhesive tape, labels, soil, grease, etc.)? YES [X] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [X] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the complete well? YES [X] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: N/A

RECORDED BY: [signature] 07-16-02
(Signature and Date)

QA CHECK BY: _____
(Signature and Date)

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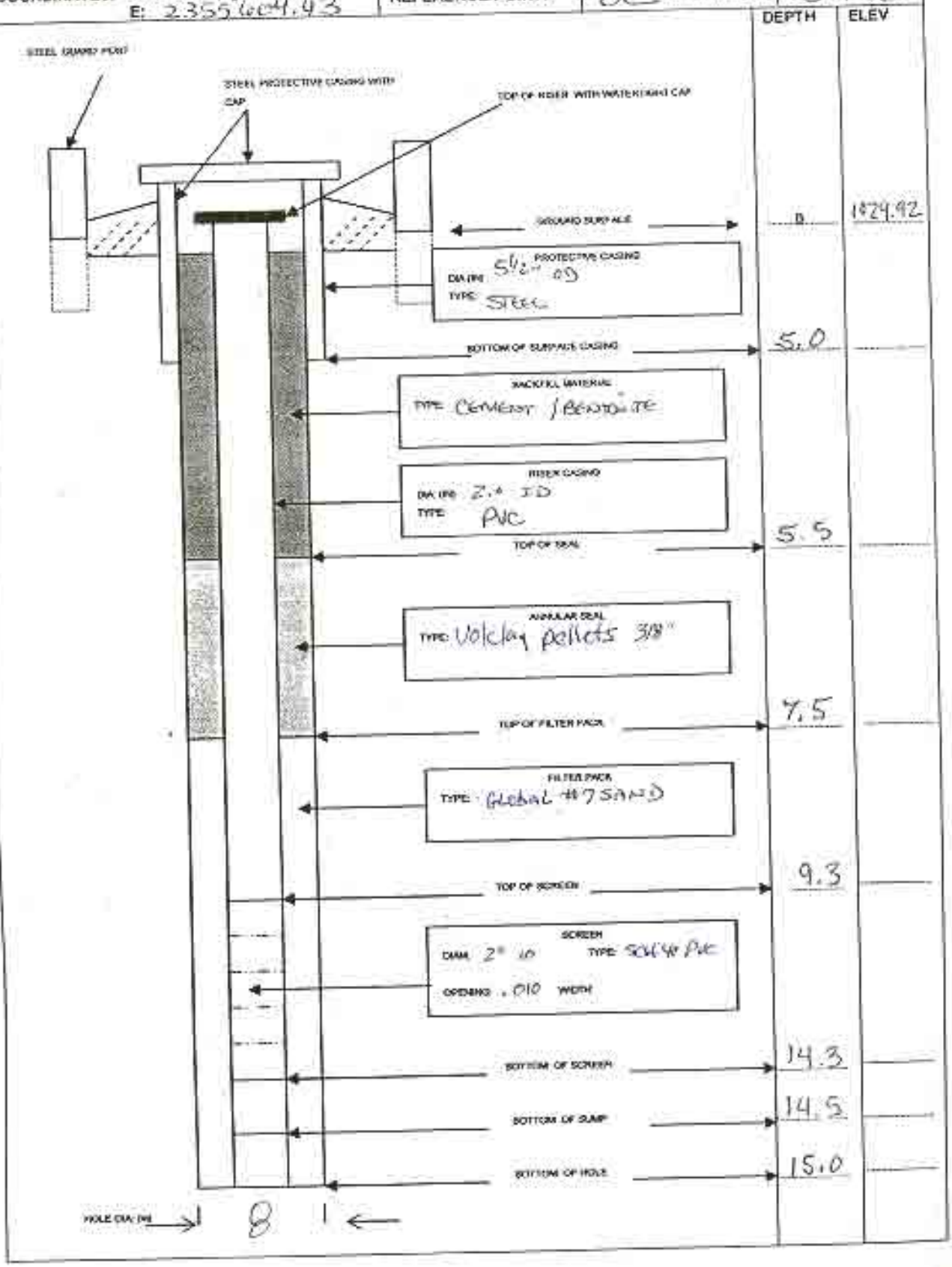
MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: Ravenna Demolition Area 2 Phase II RI DELIVERY ORDER NO: 0003

WELL NUMBER: DA2 MW 109 BEGIN: 07-16-02 END: 07-16-02

COORDINATES: N: 560181.77 E: 2355604.43 REFERENCE POINT: TOC ELEVATION: 1032.36



HTRW DRILLING LOG

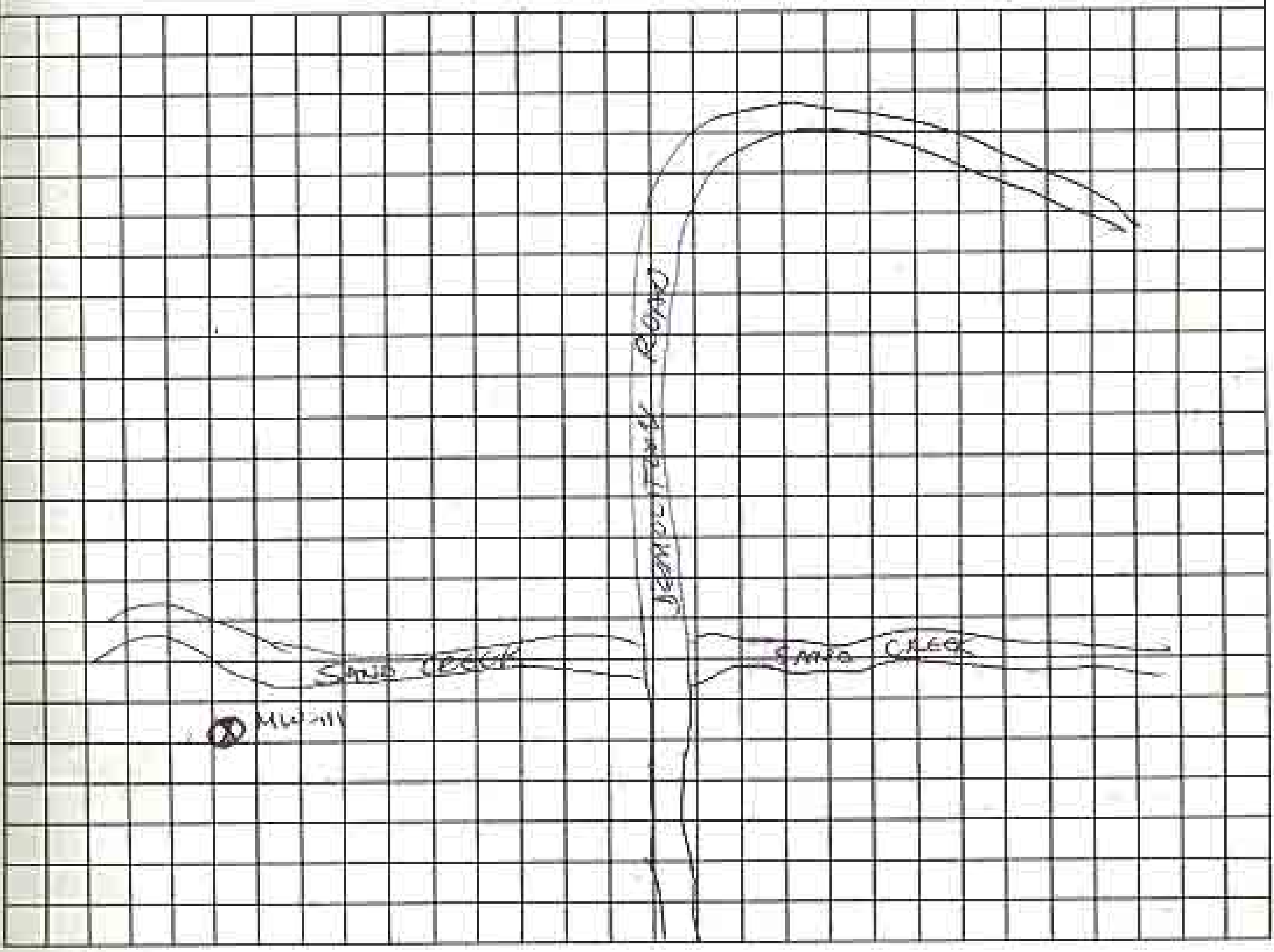
HTRW DRILLING LOG	DISTRICT: Louisville	HOLE NUMBER: MW-111
1. COMPANY NAME: SpecPRO, INC	2. DRILL SUBCONTRACTOR: TOLTEST, INC	SHEET 1 of 3

3. PROJECT: DEMO AREA 2 PHASE II RI	4. LOCATION: DEMO AREA 2
5. NAME OF DRILLER: Bob Gollihue	6. MANUFACTURERS DESIGNATION OF DRILL: CME 75
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME MODEL 75, using 4-1/4" Hollow Stem augers; 2" x 2' Split Spoons; 3" x 2' Shelby Tubes	8. HOLE LOCATION: SEE MAP BELOW
	9. SURFACE ELEVATION: 1039.63
	10. DATE STARTED: 07-18-02 / 11. DATE COMPLETED: 07-19-02
12. OVERBURDEN THICKNESS: 8.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 5.0
13. DEPTH DRILLED INTO ROCK: collected split spoons and augered in weathered shale to 16'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 5.0' 24 hours BGS
14. TOTAL DEPTH OF HOLE: 16'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES 6-8'	DISTURBED	UNDISTURBED (circled)	19. TOTAL NUMBER OF CORE BOXES			
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
0-2', 2-4'		✓	explosives			
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: SMcCabe		
		✓				

LOCATION SKETCH/COMMENTS

SCALE: NOT TO SCALE



HTRW DRILLING LOG

HOLE NUMBER 111

PROJECT: DAZ PH2 RI RVAAP | INSPECTOR: [illegible] | SHEET 2 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	DK Brown 10YR 3/3 clay with organics, soft	BZ FID 3.58		0-2' 0835	B.C. 2,2,2,3 Recovery 1.7/2 1350
	1	Brown 10YR4/3 med grained sand w/ 5% fine gravel, moist to wet	SW			
	2	Brown 10YR4/3 silty clay with fine gravel, moist CL				
	3	As above, weathered shale fragments at 3' to end of interval CL	FID 3.81		2-4' 0830	B.C. 3,3,3,3 Recovery 1.4/2 1355
	4	As above with gray mottling CL				B.C. 2,2,2,2 Recovery 1.4/2 water in hole up to 2'
	5	Dark gray 10YR 4/1 Clay with fine gravel and weathered shale fragments, moist to wet, soft CL	wet,			Time 1402
	6			Shelby Tube		
	7					time 1420
	8	DK gray 10YR4/1 Weathered shale, moist, firm, finely laminated				B.C. 8,8,16,19 Recovery 1.9/2
	9					time 1434
	10					

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HTRW DRILLING LOG

PROJECT: DAZ PA2 RI RUPP	INSPECTOR [signature]	HOLE NUMBER 111	SHEET 3 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (E)	REMARKS (G)
		As above weathered shale, darkgray, finely laminated, stiff, moist	FID BZ 3.38			BC 8,12,13,15 Recovery 1.5/2
	11					time 1440
	12	As above				BC 10,8,15,30 Recovery 1.6/2
	13					1445 time
	14	As above	FID BZ 1.42			BC 18,30,40,46 Recovery
	15		FID BORE HOLE .29			time 1449
	16	Bottom of Hole		[signature]		
	17					
	18					
	19					
	20					

MONITORING WELL INSTALLATION LOG

PROJECT NAME: Ravenna Demolition Area 2 Phase II RI DELIVERY ORDER: 0003

MONITORING WELL ID: DA2 MW-111

INSTALLATION START: DATE: 07-19-02 TIME: 0940

INSTALLATION FINISH: DATE: 07-19-02 TIME: 1010

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #7 SAND QUANTITY: 4 - 50 lb bags

BENTONITE SEAL: TYPE: Volclay 3/8" pellets QUANTITY: 1 - 50 Lb Bucket

GROUT: TYPE: Cement/Bentonite QUANTITY: 49 Lbs

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): .010 SLOT CONFIGURATION: Machine cut

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.0"

SCHEDULE/THICKNESS: Sch 40 COMPOSITION: PVC

MANUFACTURER: Johnson

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: Global #7 SAND

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.0"

SCHEDULE/THICKNESS: Sch 40 COMPOSITION: PVC

MANUFACTURER: Johnson

JOINT DESIGN AND COMPOSITION: Threaded PVC

CENTRALIZERS DESIGN AND COMPOSITION: None used

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 5.0" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

Was all well screen and casing material used for construction free of foreign matter (e.g. adhesive tape, labels, soil, grease, etc.)? YES [X] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [X] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the complete well? YES [X] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: N/A

RECORDED BY: [signature] 7/19/02 QA CHECK BY: _____

(Signature and Date) (Signature and Date)

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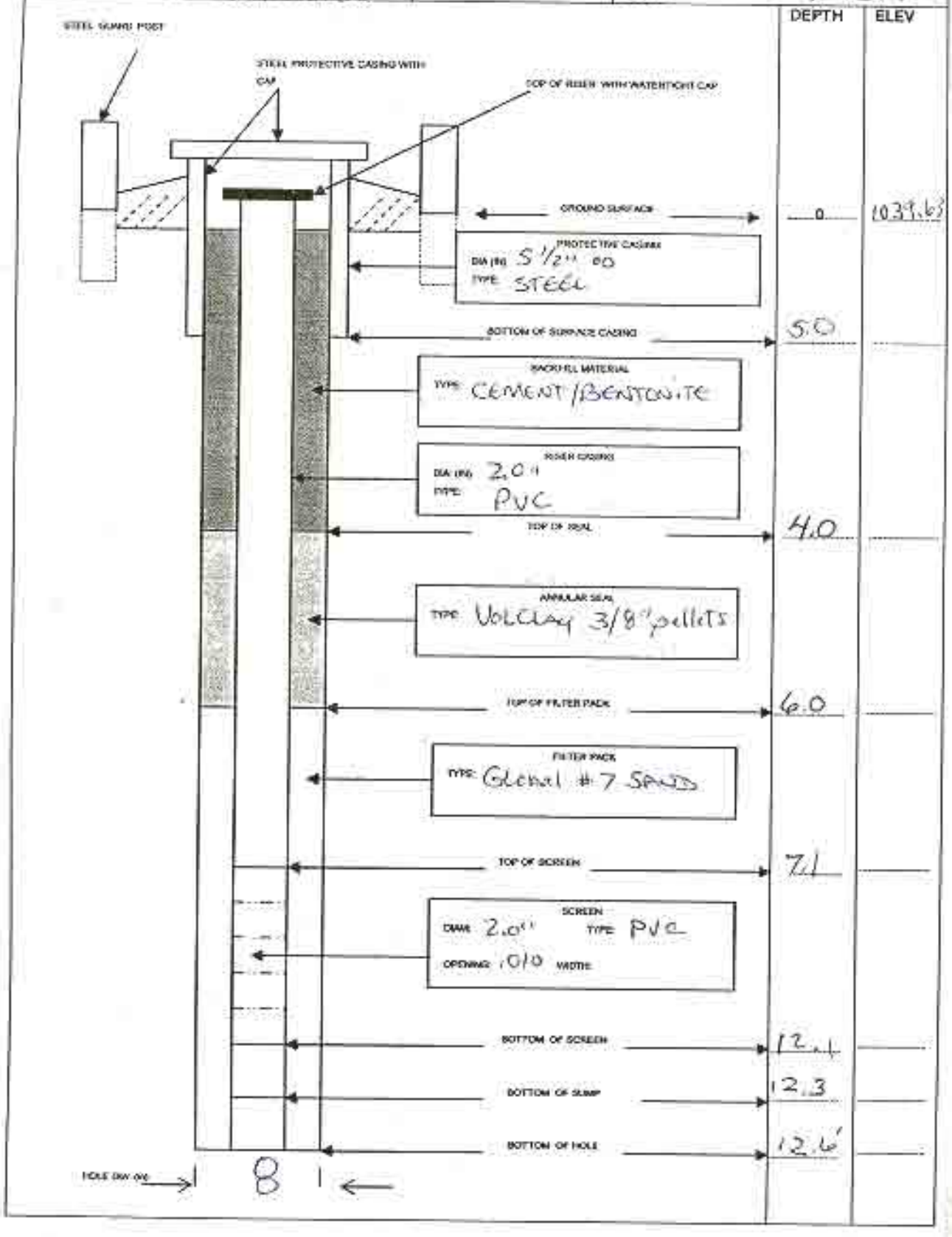
MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: Ravenna Demolition Area 2 Phase II RI **DELIVERY ORDER NO:** 0003

WELL NUMBER: DA2 MW111	**BEGIN:** 7-19-02	**END:** 7-19-02
COORDINATES: N: 660222.94 E: 2354729.33	**REFERENCE POINT:** TOC	**ELEVATION:** 1042.12



RVAAP-08 LOAD LINE 1

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HTRW DRILLING LOG

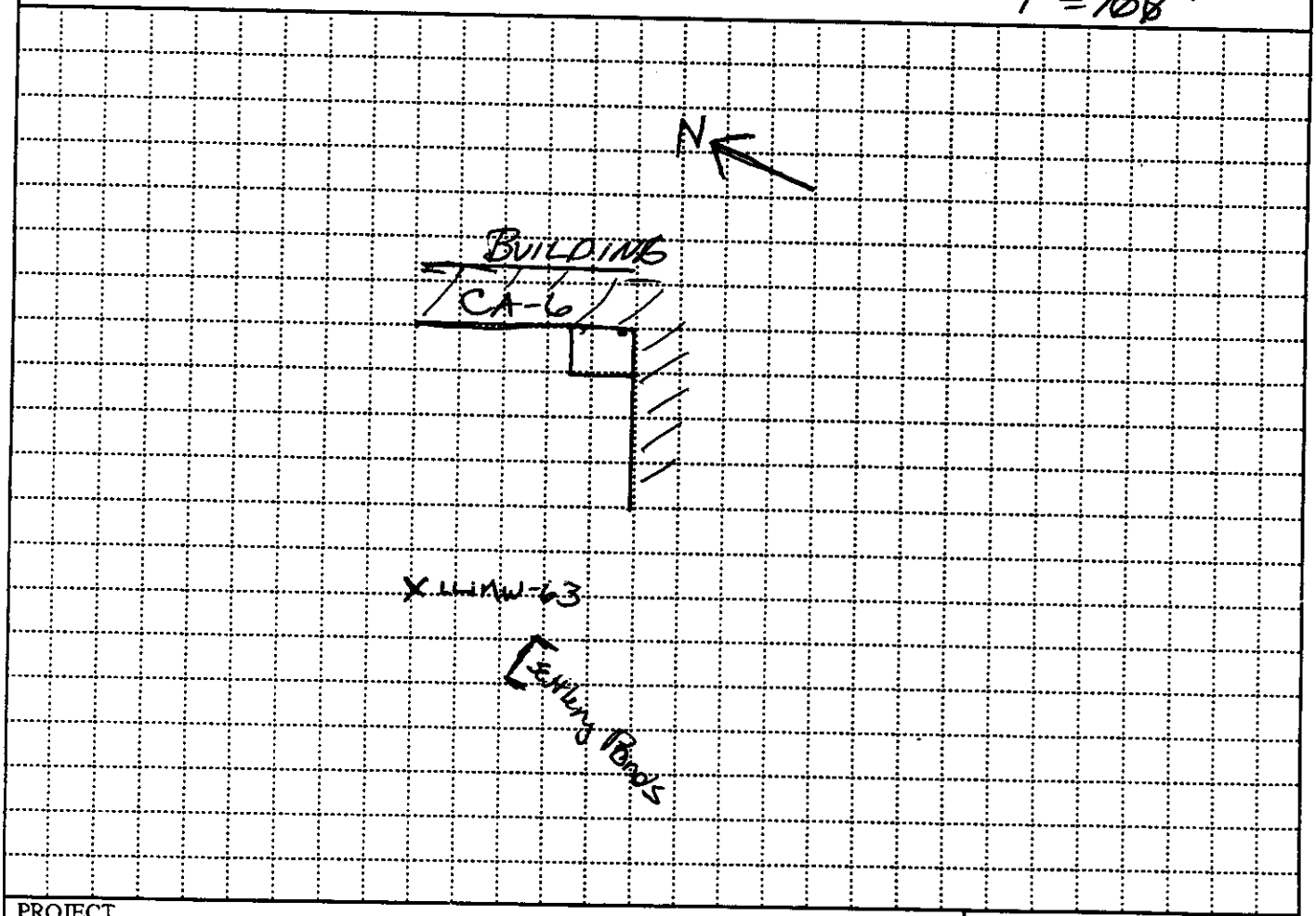
1. COMPANY NAME: SAIC	DISTRICT: Nashville	HOLE NUMBER: LL1MW-63
3. PROJECT: RVAAP	2. DRILL SUBCONTRACTOR: Alliance Environmental	SHEET 1 OF 4
5. NAME OF DRILLER: Dave Newman	4. LOCATION: Load Line 1 - RVAAP	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 55 ATV 6 5/8 in ID Hollow stem augers w/ 2 ft long 2 in diameter split spoon — 6 7/8 in diameter tricone bit for air rotary using an Ingersol Rand 375 air compressor	6. MANUFACTURERS DESIGNATION OF DRILL: CME-55	
	8. HOLE LOCATION: SEE SKETCH BELOW	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 7/27/96	11. DATE COMPLETED: 7/30/96
12. OVERBURDEN THICKNESS: 3.1 ft BGS	15. DEPTH GROUNDWATER ENCOUNTERED: 19 ft	
13. DEPTH DRILLED INTO ROCK: 27.4 ft BGS	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 19.88 ft BGS on 7/31/96 @ 1000	
14. TOTAL DEPTH OF HOLE: 27.4 ft BGS	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	NA	NA	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
NA	NA	NA	NA	NA	NA	NA

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring well	NO	LL1MW-63	NO	Susan J Weston

LOCATION SKETCH/COMMENTS — SCALE: 1" = 10ft'



PROJECT	HOLE NO.
RVAAP 00 #0022	LL1MW-63

ENG FORM 5056-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG

HOLE NUMBER	SHEET
LLIMW-63	2 of 4

PROJECT: RVAAP DO# ØØ22 | INSPECTOR: S.L. Abston

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D) OVM	~~GEOTECH SAMPLE OR CORE BOX NO~~ BLOW COUNTS (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)	
	Ø.3	CL, sandy silty clay, med plastic, soft, dry, 2.5Y 4/2 dark grayish brown topsoil		3		Recovery @ 1633 1.Ø ft / 2.Ø ft	0
	Ø.5	SW, sand, loose, dry, 10YR 6/4 light yellowish brown w/ sandstone frag					
		SW, Sand w/ rock frag & gravel, loose, dry, 7.5YR 3/1 very dark grey, Rocks consist of sandstone and slag frag. Poss. slag loss	Ø.Ø	14 13 7	12/1/98 SLA NA		
		CL, silty (~30%) clay med. plastic, very stiff 10YR 6/1, grey mottled with 10YR 4/4 dark yellowish brown, dry		5 11		Split Spoon Refusal at 3.1 ft BGS	2
		Weathered fine-tomed grain sandstone, SW 7.5YR 6/2 pinkish grey to 10YR 6/4 light yellowish brown	Ø.Ø ppm	5Ø/2		Recovery @ ~~1515~~ 1517 1.1 ft / 1.1 ft Augering w/ center stem, no split spoon	
				NA	NA	Augering through weathered sandstone	4
				↓	↓	Auger Refusal at 4.5 ft BGS. Adding 6¼ in tricone bit to air rotary sandstone	
		Fine grain, well graded sand SW, dry, softer than above					
		Fine grain, ~~SW~~ SP sand (similarly) dry, 10YR 6/4 light yellowish brown mottled w/ 10YR 6/6 brownish yellow, Not uniform sizes - may be weathered or fractured	Ø.Ø ppm			Add another rod	7.Ø

PROJECT: RVAAP | HOLE NO. LLIMW-63

HTRW DRILLING LOG

PROJECT RVAAP | INSPECTOR S. Labston | HOLE NUMBER LLiMW-63 | SHEET 3 of 4

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D) OVA	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
			0.0 ppm	NA	NA	
	1		0.0 ppm			Add another rod
	15	SW, fine grain, some sl slightly damp, 10YR/5/6 yellowish brown with some larger rock fragments Prob weathered fractured sand				Ratty drilling
	16	Returned to c SP, fine grain sand, dry 10YR 6/4 light yellowish brown	0.0 ppm			
	17.2	SW, fine grain sand, slightly damp, 10YR 6/8 brownish yellow with weathered, angular sandstone frag.				Auger/Cuttings rod Resist layer
	17.9	SP, fine grain sand, 10YR 6/4 light yellowish brown				Less resistant drilling
						Water stabilized at 19 ft BGS

PROJECT RVAAP | HOLE NO. LLiMW-63

HTRW DRILLING LOG

PROJECT: RVAAP DO #0022 | INSPECTOR: S.L. Alger | HOLE NUMBER: LL1MW-63 | SHEET: 4 of 4

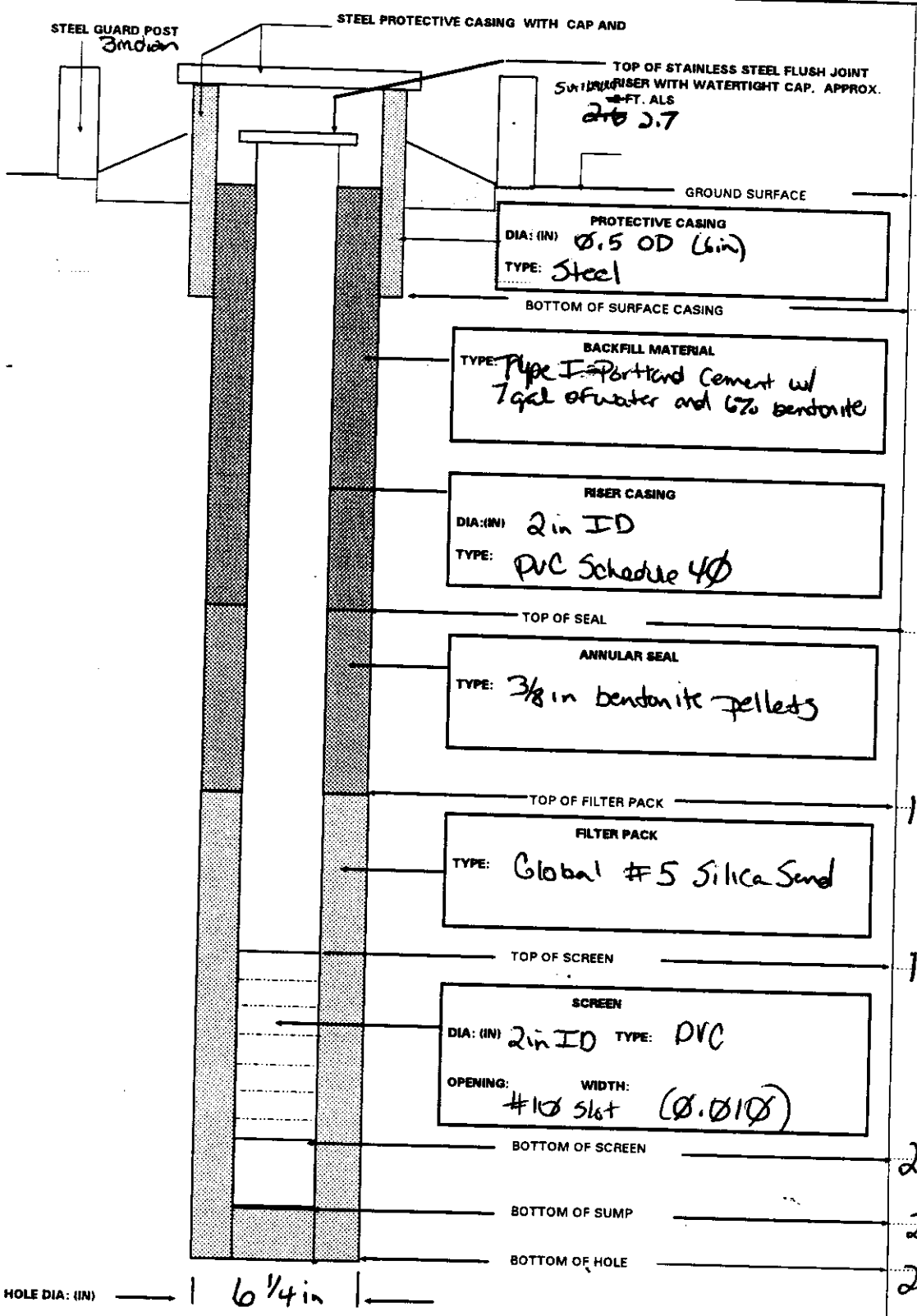
ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D) OVA	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		same as above	0.0 ppm		NA	Adding rod at 22 ft BGS. * pulling up to let borehole set open to check for water (241)
	22	Fine to med. grained sandstone, moist, 10YR 7/4 very pale brown w/ increasing fragments of 2.7/1 light brown grey sandy weathered	0.0 ppm			At 0639 7/29/96 3.17 ft of water in borehole. Drilling an additional 5 ft Rotty drilling
	25	same as above w/ less larger fragment				
	20	Increase in larger fragments	0.0 ppm			Rotty drilling
						Stop drilling @ 27.4 ft BGS to set well. Field Reading with Mini Rae # 00 0617 and MX 251 LEL/ O2 meter #2336 CHazco

PROJECT: RVAAP | HOLE NO.: LL1MW-63

MONITORING WELL

PROJECT NAME: RVAAP | **DELIVERY ORDER NO: 0022**

WELL NUMBER: LLMW-63	**BEGIN:** 7/29/96	**END:** 7/29/96
COORDINATES: N: E:	**REFERENCE POINT:** MSL	**ELEVATION:**



DEPTH	ELEV
0	
5.Ø	
8.9	
12.9	
17.1	
27.1	
27.4	
27.4	

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RVAAP-09 LOAD LINE 2

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HTRW DRILLING LOG

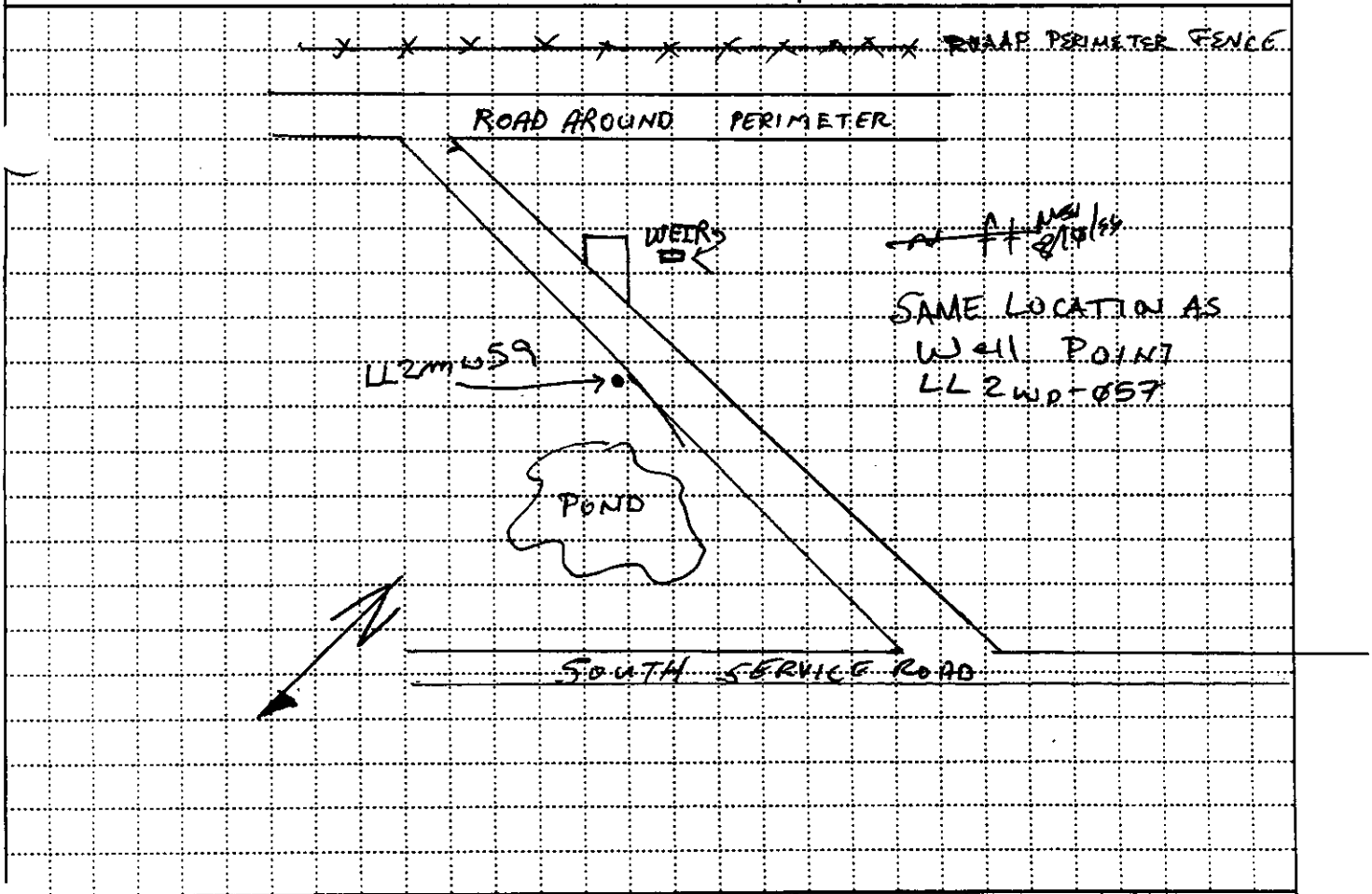
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: ALLIANCE ENVIRONMENTAL, INC	DISTRICT: NASHVILLE; HOLE NUMBER: LL2mw59; SHEET 1 OF 4
3. PROJECT: RVAAP	4. LOCATION: LL2 Area @ RVAAP, Ravenna, OH.	
5. NAME OF DRILLER: ~~ED ALLGER~~ 8/10/94 DAVE NEWMAN	6. MANUFACTURER'S DESIGNATION OF DRILL: MOBILE B-61 HDX	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 6 5/8 in HSA, Wilco 6 B-61 HDX, 5 7/8 in Tri-Cone roller bit, air compressor; 2" steel split spoons, & safety driving hammer.	8. HOLE LOCATION: S. of KELLY'S POND along rd. @ well Pt. location LL2wp-057.	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10 AUG 96	11. DATE COMPLETED: 11 AUG 96
12. OVERBURDEN THICKNESS: 7.7 FT BGS	15. DEPTH GROUNDWATER ENCOUNTERED: 14.5 FT BGS.	
13. DEPTH DRILLED INTO ROCK: 15.2 FT BGS.	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 1hr 80mn later W.L. @ 10.2 FT BGS	
14. TOTAL DEPTH OF HOLE: 22.9 FT BGS	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	NA	NA	~~NA~~

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
NA	NA	NA	NA	NA	NA	NA

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
M.W. Installed.	NA	INSTALLED	NA	Matthew B. Vest

LOCATION SKETCH/COMMENTS: SAME LOCATION AS WELL PT., LL2 wp-057 SCALE: NOT TO SCALE



PROJECT	HOLE NO.
RVAAP	LL2mw59

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG

PROJECT RVAAP | INSPECTOR Matthew B Vest | HOLE NO. LL2MW59 | SHEET 2 of 4

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH STRATA OR BLOW COUNTS	ANALYTICAL SAMPLE NO.	REMARKS
		TOPSOIL W/ ROOTS 0.4	0 0 ppm	4	NA	REC 1.4' out of 2.0'
		ML, SANDY SILT, low plasticity, loose, sl. damp, 10YR 5/4 yellowish brown.		6		Breathing zone (bz) 0.0 ppm. Borehole 0.0 ppm
				9		USING MINIRAE MODEL PGM-75 SERIAL #000167 & O_2 LEL 111X251 Serial # 92060830-160.
	2.0	probable loss of 0.6'		4		2.0
		SM, SILTY SAND, low plas., loose, moist, 10YR 5/4 yellowish brown, w/ small rock fragments & sand grains up to 1/10 in. dia.	0.0 ppm	2	NA	REC 1.5' out of 2.0'
				3		Breathing zone (bz) 0.0 ppm
				4		Borehole 0.0 ppm.
	4.0	PROBABLE LOSS of 0.5'		11		4.0
			0.0 ppm	4	NA	REC 1.5' out of 2.0'
		4.9		11		BZ 0.0 ppm
		ML, CLAYEY SILT W/ SAND, low plas., medium density, sl. damp, 10YR 5/2		20		Borehole 0.0 ppm
	6.0	grayish brown, w specs of black organic material throughout. 6.3		23		6.0
		SAME AS ABOVE, BUT NO BLACK ORGANIC SPECS.	0.0 ppm	6	NA	REC 1.7' out of 1.7'
		7.2		12		BZ 0.0 ppm
		fine to med. grained SANDSTONE, 10YR 6/2 lt. brownish gray, sl. damp, fractured. 7.7		30		Borehole 0.0 ppm
				42/0.2'		SPLITSPOON REFUSAL @ 7.7FT BGS.
	8.0	No Recovery / Spoon Refusal @ 7.7 FT BGS 0.0				8.0
		TOP OF ROCK @ 7.7 FT BGS.	NA	NA	NA	TRIED ANOTHER SPOON @ 10 FT BGS BUT REFUSAL @ 8.7FT BGS. Mini Rae 0 ABOVE BACKGND.
		fine to med. gr. SANDSTONE, 10 YR 6/4 brownish yellow, sl. damp.				AUGER WITHOUT SPOONS TO 10.0 FT BGS. VERY HARD & SLOW DRILLING. DRILLER THINKS WE ARE ON BEDROCK.
		END AUGERING @ 10.0 FT				
	10.0	SWITCHING TO ROLLER BIT BGS.				10.0

PROJECT RVAAP | HOLE NO. LL2MW59

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HTRW DRILLING LOG

LL2 mw 59

PROJECT RVAAP | INSPECTOR MATTHEW J. WEST | SHEET 3 of 4

DEPTH IN FEET	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECHNICAL SAMPLE NO. OR WATER LEVEL MEASUREMENTS	ANALYTICAL SAMPLE NO.	REMARKS
10.0	fine to med. gr. SANDSTONE, 10YR 6/1 Brownish yellow, sl. damp.	0.0 ppm	NA	NA	BEGIN DRILLING W/ TRI-CONE ROLLER BIT & AIR COMPRESSOR (AIR ROTARY) @ 10.0 FT BGS. BZ & HOLE @ 0.0 ppm
14.5	14.3				14.5
	fine to med. gr. SANDSTONE 10YR 6/1 brownish yellow, wet.	0.0 ppm	NA	NA	HIT SOME WATER @ 14.5 FT BGS. Not large amount of water. BZ & HOLE @ 0.0 ppm
					Below 19.3 ft BGS DRILLING IS SLOWER, POSSIBLY HARDER ROCK BZ & HOLE @ 0.0 ppm
					19.3
					Water ~~SEEP~~ more prevelant @ 19.3 FT BGS Good water @ this depth.
29.0					29.0

PROJECT RVAAP | HOLE NO. LL2 mw 59

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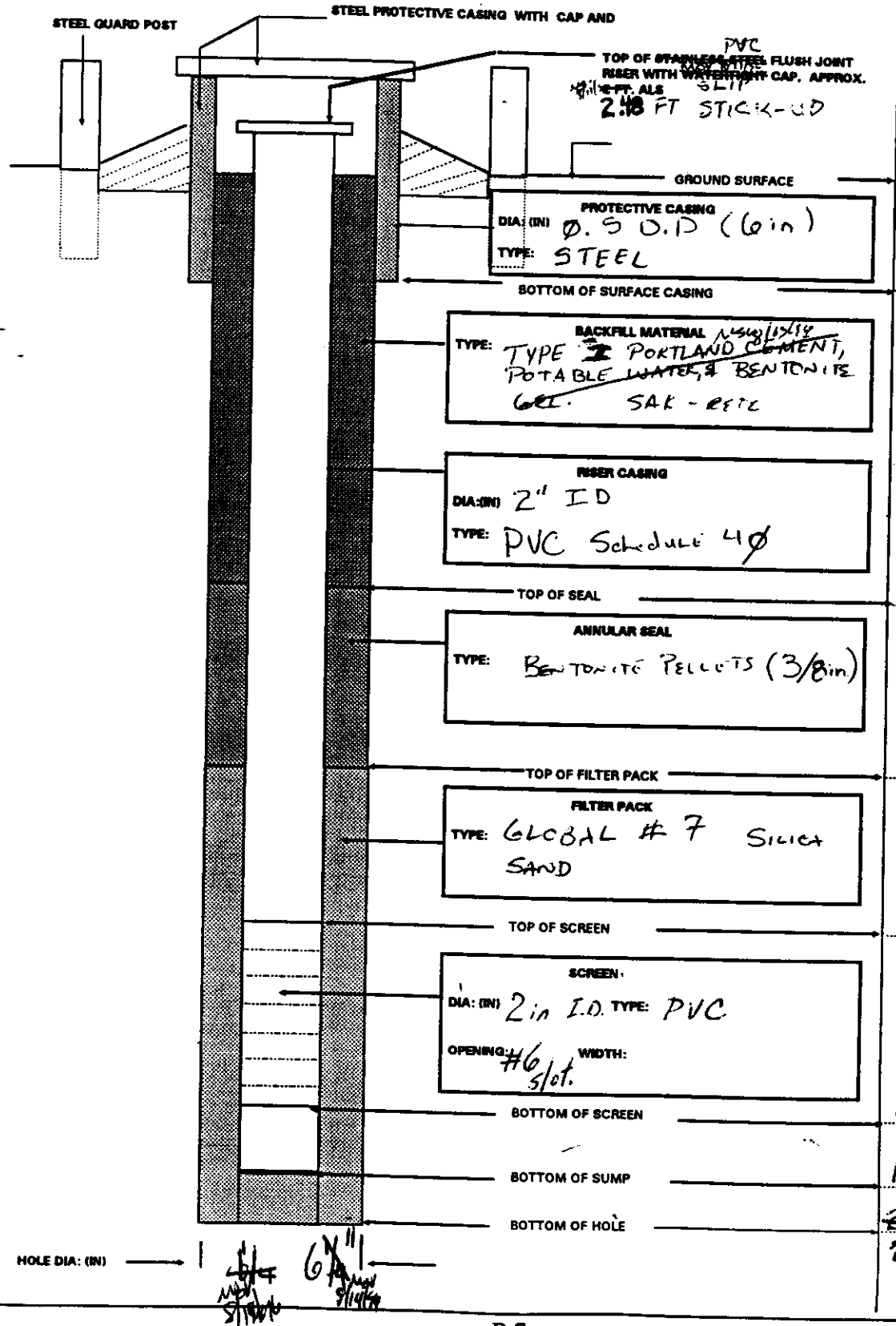
MONITORING WELL

PROJECT NAME: RVAAP — DELIVERY ORDER NO. 0022

WELL NUMBER: LL2mw59	BEGIN: 10 AUG. 96	END: 11 AUG. 96
COORDINATES: N: E:	REFERENCE POINT: MSL	ELEVATION:



HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: LL2-269

1. COMPANY NAME: SAIC

2. DRILL SUBCONTRACTOR: Tol-Test

SHEET 1 OF 4

3. PROJECT: RVAAP, Load Line 2 Phase II RI

4. LOCATION: SE end of Bldg DB-802

5. NAME OF DRILLER: BoB Gollihue

6. MANUFACTURERS DESIGNATION OF DRILL: CME ~~75~~ 550 MSM

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 550 Auger Rig; 6 1/4" ID Augers; 140 lb Hammer – 2" x 2' Split Spoon Samplers; 3" OD Core Bit; 5 7/8" OD Roller Bit MSM 7-29-01

8. HOLE LOCATION: LL2-269, SE end of Bldg DB-802 @ edge of drainage ditch – see map below

9. SURFACE ELEVATION: 1011.62 TOC; 559483.40; 2374756.74

10. DATE STARTED: 7/28/01

11. DATE COMPLETED: 8/14/01

12. OVERBURDEN THICKNESS: ~18.6'

13. DEPTH DRILLED INTO ROCK: ~9.4'

14. TOTAL DEPTH OF HOLE: 28.0' bgs

15. DEPTH GROUNDWATER ENCOUNTERED: ~18.3 bgs

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 18.59' bgs @ 8/13/01 1630

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	—	—	1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A	—	—	—	—	—	70 %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		Molly M…

LOCATION SKETCH/COMMENTS: LL2MW-269 (Moved from original planned location by John Jent (USACE)) SCALE: NTS

PROJECT: RVAAP, Load Line 2 Phase II RI

HOLE NUMBER: LL2-269

HTRW DRILLING LOG

HOLE NUMBER LL4 MW-269

PROJECT: RVAAP, Load Line 2 Phase II RI

INSPECTOR Todd A. Eddy

SHEET 2 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	BROWN (10YR 5/3) SILT, HARD, DRY 25% SUB-ANGULAR GRAVEL, ML	Ø.Ø ppm	N/A	N/A	SPLIT SPOON Ø-2' 3/8/10/11 1.0/2.0'
	1					
	2	LIGHT BROWNISH GRAY (10YR 6/2) FINE GRAINED SAND STONE COBBLE IN SPOON - NO SOIL RECOVERY	Ø.Ø ppm			SPLIT SPOON 2-4' 5/9/7/8 REC 0.1/2.0 - COBBLE IN SPOON, NO SOIL RECOVERY
	3					
	4	GREENISH GRAY (5GY 5/1) AND YELLOWISH BROWN (10YR 5/6) SILTY CLAY W/ ANGULAR (~10%) TO SUB-ANGULAR GRAVEL, HARD, DRY, LOW TO MED. PLASTICITY, CL	Ø.Ø ppm			SPLIT SPOON 4-6' 2/3/5/6 1.7/2.0'
	5	GREENISH GRAY (5GY 5/1) MOTTLED SILTY CLAY, HARD, DRY, MEDIUM PLASTICITY, ~10% ANGULAR SHALE FRAGMENTS, CL				
	6	BROWN (10YR 5/3) CLAYEY SILT, DRY, CRUMBLY, ML	Ø.Ø ppm			SPLIT SPOON 6-8' 5/9/13/33 ~~1.4/2.0~~ TDE 1.2/2.0
	7	GREENISH GRAY (5GY 5/1) AND YELLOWISH BROWN (10YR 5/6) SILTY CLAY W/ ~15% ANGULAR TO SUB-ANGULAR GRAVEL, HARD, DRY, CL				
	8	LT. BROWNISH GRAY (10YR 6/2) FINE GRAINED SAND W/ 20-30% GRAVEL - FINEGRAINED SANDSTONE, DRY	Ø.Ø ppm			SPLIT SPOON 8-10' 2/3/4/5 REC. 1.5/2.0'
	9	LT. OLIVE BROWN (2.5Y 5/4) MOTTLED SILT, DRY CRUMBLY, ~5% SUB-ROUNDED GRAVEL, ML OLIVE BROWN, MOTTLED, CLAY (2.5Y 4/4), SLIGHTLY MOIST, MEDIUM PLASTICITY, MEDIUM TO LOW ~~PLASTICITY~~ COHESIVENESS, OCCASIONAL TRACE ORGANIC MATERIAL, ROOTS, CL (8.4 - 12.8')				
	10					

HTRW DRILLING LOG

PROJECT: RVAAP. Load Line 2 Phase II RI | INSPECTOR [illegible] | HOLE NUMBER LL2-MW-269 | SHEET 3 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	11		0.0 ppm	N/A	N/A	SPLIT SPOON 10-12' 6/7/6/5 REC 0.6/2.0
	12		0.0 ppm			Split Spoon 12-14 2/2/3/4 REC 1.6/2.0'
	13	GREENISH GRAY (5GY 5/1) CLAY, MEDIUM PLASTICITY, SLIGHTLY MOIST, SOFT, OCCASSIONAL ROCK FRAGMENT CL				
	14	YELLOWISH BROWN (10YR 5/4) CLAYEY SILT, DRY, HARD, CRUMBLY ~5% SUB-ANGULAR TO ANGULAR GRAVEL AND VERY COARSE SAND SIZE FRAGMENTS	0.0 ppm			SPLIT SPOON 14-16' 3/7/10/14 1.3/2.0
	15					
	16	INCREASED GRAVEL ~10%	0.0 ppm			SPLITSPOON 16-18' 11/12/35/50-2" 1.7/2.0
	17					
	18		0.0 ppm			SPLIT SPOON 18-20' 8/25/50⅜-5" 1.3/2.0
	19	GRAY (10YR 6/1) SHALE, DRY, WEATHERED, CRUMBLY (18.6 - 22.0')				

PROJECT: RVAAP. Load Line 2 Phase II RI | HOLE NUMBER LL2-MW-269

HTRW DRILLING LOG

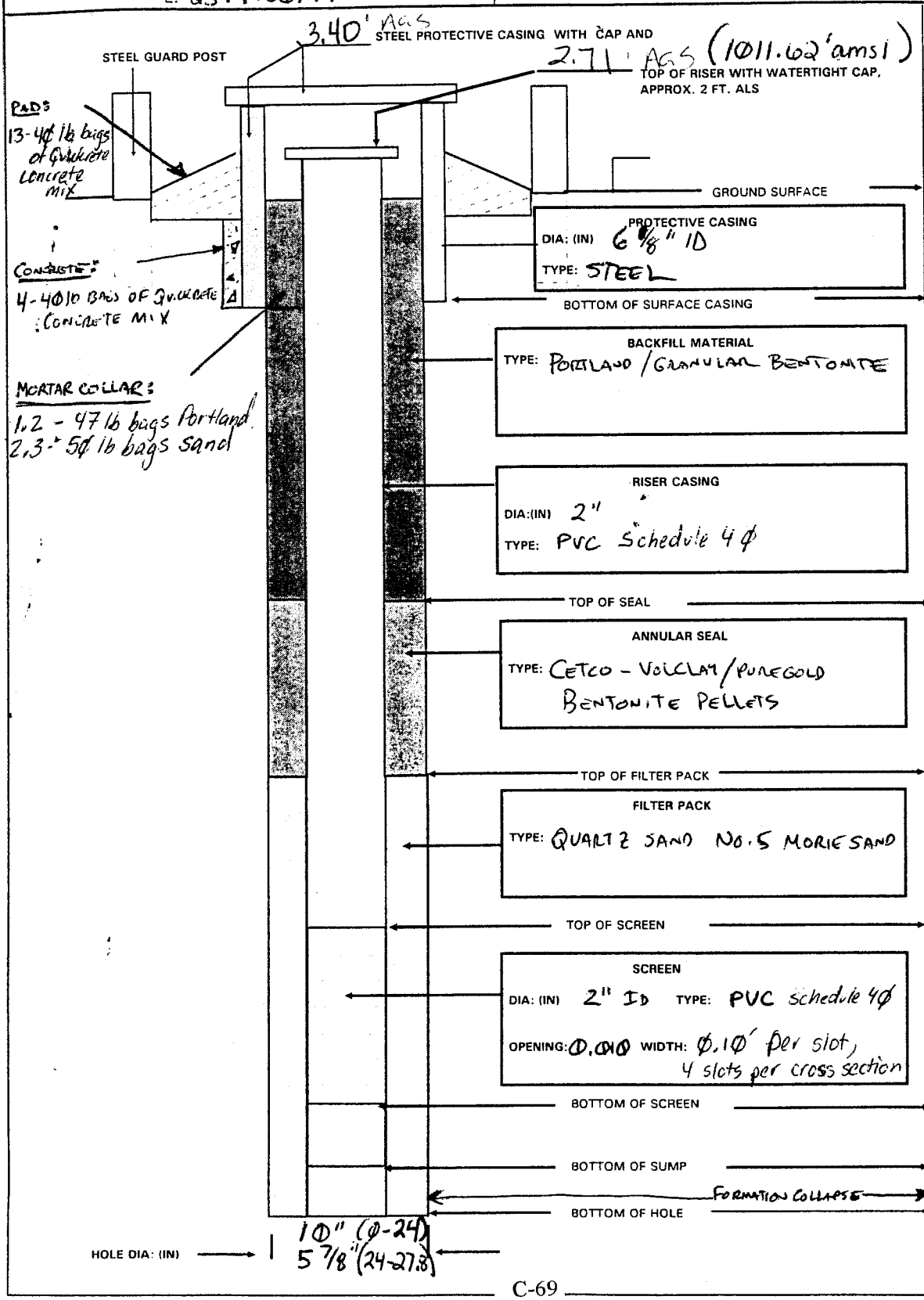
PROJECT: RVAAP, Load Line 2 Phase II RI	INSPECTOR: [illegible signature]	HOLE NUMBER: LL2 MW-269
		SHEET 4 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	20–22	SAME AS ABOVE	0.4 ppm	N/A	N/A	SPLIT SPOON ~~20-24~~ 20-22' TDE 20/49/50-3" 1.4/2.0
	21					
	22	MEDIUM DARK GRAY (N4) SHALE, WEATHERED, CRUMBLY	0.0 ppm			SPLIT SPOON 22-24' 53-5" 0.4/5"
	23					
	24	↓ INCREASED WEATHERING, VERY CRUMBLY, WEATHERED (SPLITSPOON) MEDIUM DARK GRAY (N4) SHALE, FRACTURED, THINLY LAMINATED	0.0 ppm	BOX 1		SPLIT SPOON 24-26' 25/50-3" REC 1.1/2.0 1320 DTW 20.50 BGL PD = 28' CD = 27.7 RUN = 4' LOSS = ~~0.3~~ TDE 1.2' GAIN = N/A RQD = 0/~~2.8~~ 4' = 0 RUN START = 1427 RUN STOP = 1439
	25	– Fe STAINED FRACTURE				
	26	– Fe STAINED OBLIQUE FRACTURE AND SUBVERTICAL FRAC. – Fe STAINED FRAC.				
	27	ACCUMULATED LOST CORE				
	28	TD = 28.0'				
	29					
	30					

MONITORING WELL

PROJECT NAME: Load Line 2 Phase II RI **DELIVERY ORDER NO:** ECAS 186

WELL NUMBER: LL2 MW-269	**BEGIN:** 7/28/01 1615	**END:** 8/14/01 0830
COORDINATES: N: 559483.90 E: 2374756.74	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1011.62



Well volume calculation sheet

Date 08/25/01 Time 0840
Well ID Num LL2MW-269
Well Location LOAD LINE 2 NEAR BLDG DB-E02

Total depth of well (ft BTOC) 30.35' BTOC
Depth to water (ft BTOC) 21.55
Height of water column (ft) (Hc) 8.80

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc .19 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= .924 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 8.3 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .083 (ft)
Hc = height of water column 8.8' (ft)
Rf = radius of filter pack .344 (ft)
Rc = radius of inside casing .083 (ft)

5C

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 3 Phase II RI DELIVERY ORDER NO.: CY01

Date: 8/25/01 Time: 0835

Well Number and Location: LL2mw-269, Near Bldg DB-802

Development Crew: Molly McCann, Kate McCormick, Bob Gollihue

BW 09-13-01

Driller (if applicable): Bob Gollihue - Toltest MSM 8/25/01

Water Levels / Time: Initial: 21.55' / 0839 Pumping: 21.7' / 1350

Final: 28.0' / 1750

Total Well Depth: Initial: 30.35' FT BTOC Final: 30.35' FT BTOC

Date and Time: Begin: 8/25/01 / 0837 Completed: 8/25/01 / 1750

Development Method(S): pumping with Whale© pump

MSM 8/26/01

Total Quantity of Water Removed: 41.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	HORIBA 14652	8/25/01
Specific Conductivity	↓	↓
pH		
Turbidity		

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 3 Phase II RI **DELIVERY ORDER NO.:** CY01

PAGE 1 OF 1

WELL NUMBER AND LOCATION: LL2MW-269 NEAR BLDG NB-802

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/25/01	0845	0	14.1°	481	6.72	>999	0	0	Initial Reading
	1355	8.3	15.4°	385	6.55	>999	8.3	1	
	1438	8.3	21.0°	345	6.25	>999	16.6	2	
	1531	8.3	20.1°	333	6.30	342	24.9	3	BW 09-13-01
	1637	8.3	17.9°	326	6.21	470	33.2	4	
	1745	8.3	19.5°	323	6.21	212	41.5	5	Final Reading

RECORDED BY: Kathy C McCormick 8/25/01
(Signature and Date)

QA CHECK BY: [signature] 8/26/01
(Signature and Date)

B. Williams 09-13-01

C-76

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RVAAP-12 LOAD LINE 12

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HTRW DRILLING LOG

1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: MILLER	DISTRICT: Louisville LL12- / HOLE NUMBER: MW-113
		SHEET 1 OF 4

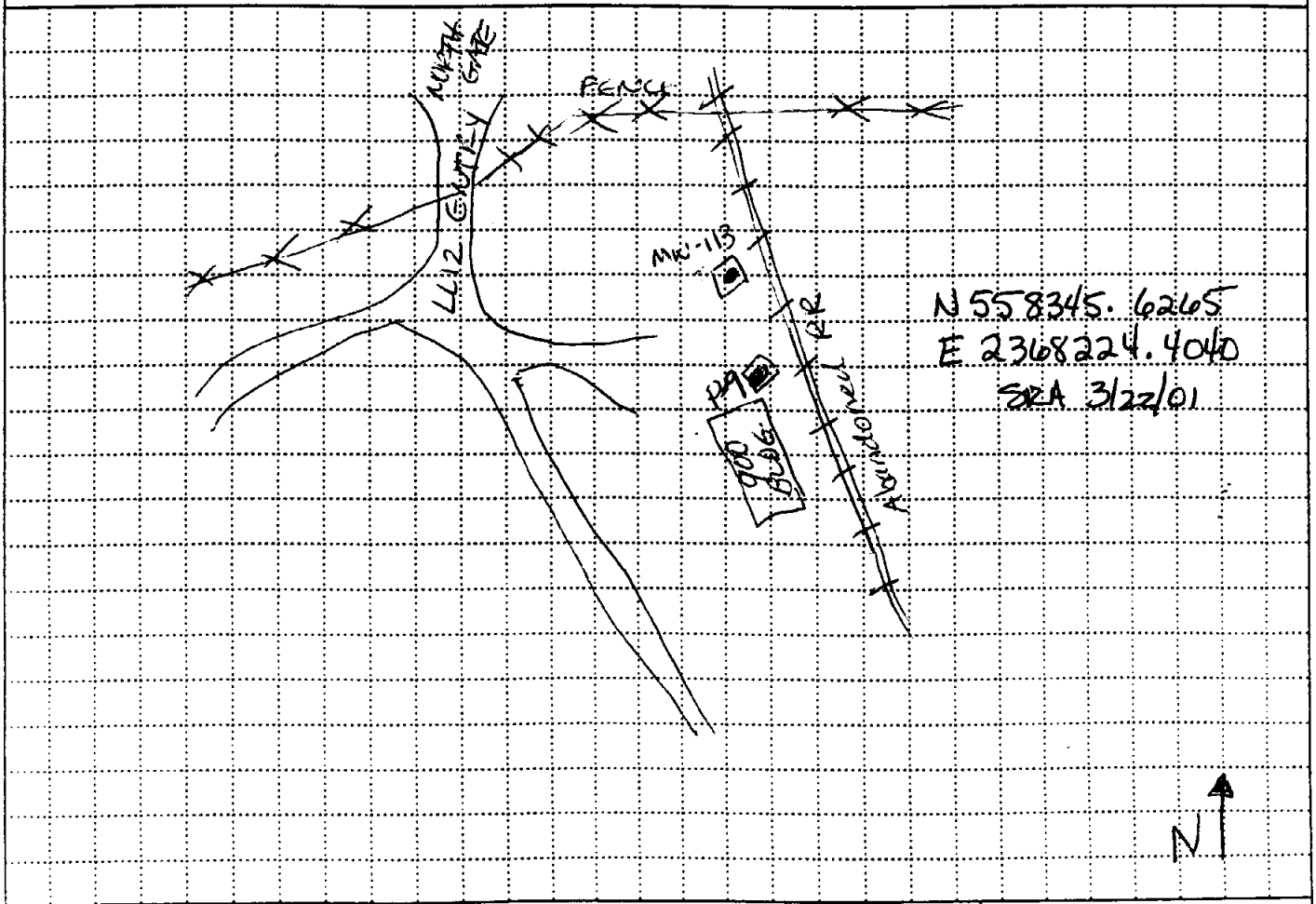
3. PROJECT: RVAAP LL12 PH II RI	4. LOCATION: RVAAP
5. NAME OF DRILLER: BRUCE GOODRICH/MILLER DRILLING	6. MANUFACTURERS DESIGNATION OF DRILL: Mobile B61
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" ID HSA; 3" x 5' SPLIT BARREL; 3" SHELBY TUBE	8. HOLE LOCATION: LL12
	9. SURFACE ELEVATION: 977.67 ~~980.180~~ SRA 3/22/01
10. DATE STARTED: 10-10-00	11. DATE COMPLETED: 10-10-00
12. OVERBURDEN THICKNESS: ≈22'	15. DEPTH GROUNDWATER ENCOUNTERED: ≈12.5
13. DEPTH DRILLED INTO ROCK: 1'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 7.46' TOC 10/15 7.46 RLO 1539
14. TOTAL DEPTH OF HOLE: 23'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
SHELBY TUBES		18.5-20.5	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
TOC GRAB			TOC 18.5-20.5			NA

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
MONITORING WELL		LL12-MW113		

LOCATION SKETCH/COMMENTS — SCALE: NOT TO SCALE



PROJECT	HOLE NO.
RVAAP LL12 PH II RI	MW-113

ENG FORM 5056-R, AUG 94 (Proponent CECW-EG)

DRILLING LOG

PROJECT: RUAAD LL12 PIT II RI | INSPECTOR: Rick L Darr | HOLE NUMBER: MW-113 | SHEET: 2/4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	1.0					Recovery 2.5/5 3-8' Split Barrel
	2.0					
	3.0	wet sand w/ Sandstone fragments (fill)				
	4.0					
	5.0	Silty Clay fill				
	6.0					
	7.0					
	8.0	Dk Yell. Brown 10YR 4/4 grading to gray 10YR 6/1 Silty clay fill w/ gravel, stiff, oxidized & leached	CL			Recovery 4.0/5.5
	9.0					
	10.0					

PROJECT: RUAAD Pit 2 RI LL12 | HOLE NO: LL12-MW-113

DRILLING LOG

HOLE NUMBER MW 113

PROJECT RUAAP LL12 PH II RI | INSPECTOR Rick L Darr | SHEET 3/4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	11.0	Gray 10YR 6/1 silt, moist to very moist blocky, non-plastic, rapid dilatency	ML			
	12.0					
	13.0					
		As above, moist	ML			Recovery 2/5
	14.0					
	15.0					
	16.0					
	17.0					
	18.0					
		SHELBY TUBE silt on top, silty clay till on bottom	ML CL	LL12-113-0410-50		Recovery 1.7/2
	19.0					
	20.0					

D-24

PROJECT RUAAP LL12 Pit 2 RI | HOLE NO LL12-MW-113

DRILLING LOG

PROJECT: RUAAP LL12 PH II RI | INSPECTOR: Rick Darr | HOLE NUMBER: LL12-MW-113 | SHEET: 4/4

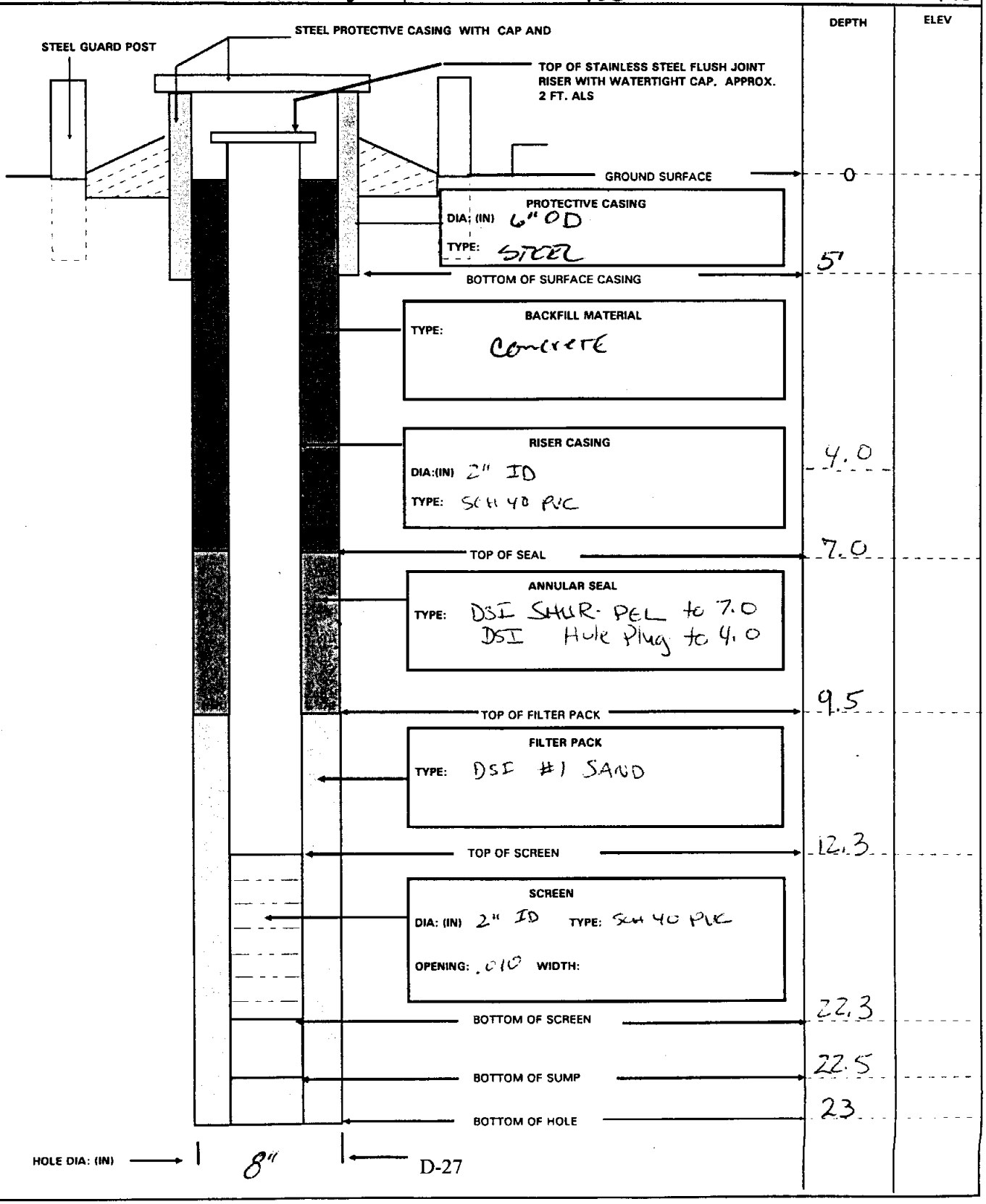
ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	21.0	DK grayish Brown 2.5Y 4/2 silty clay till	CL			Recovery 2.0/5
		Sharp contact with very dark gray 2.5Y 3/1 SILTY CLAY TILL AND weathered shale	CL			Auger Refusal @ 23'
		MODERATELY STIFF TO STIFF, with Large shale fragments	CL Bedrock			TD
	23.0					
	24.0					
	25.0					
	26.0					
	27.0					
	28.0					
	29.0					
	30.0					

PROJECT: RUAAP LL12 PH2 RI | HOLE NO: LL12-MW-113

MONITORING WELL

PROJECT NAME: Ravenna Load Line 12 Phase II RI | DELIVERY ORDER NO: CY06

WELL NUMBER: LL12-MW-113	BEGIN: 10-10-00 1045	END: 10-10-00 1215
COORDINATES: N: 558345.6265 E: 2368224.4040 SURV 3-22-01	REFERENCE POINT: brass cap TOC	ELEVATION: 977.67 980.180



MONITORING WELL INSTALLATION LOG

PROJECT NAME: Ravenna Load Line 12 Phase II RI **DELIVERY ORDER:** CY06

MONITORING WELL ID: MW-113

INSTALLATION START: DATE: 10-10-00 TIME: 1045

INSTALLATION FINISH: DATE: 10-10-00 TIME: 1215

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: DSI #1 SAND QUANTITY: 7.5 x 50# BAGS

BENTONITE SEAL: TYPE: DSI SHUR-PEL QUANTITY: 1 x 5 GAL BUCKET

GROUT: TYPE: NA QUANTITY: NA

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): 0.010 SLOT CONFIGURATION: Machine Cut

TOTAL OPEN AREA PER FOOT OF SCREEN: _____

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.00"

SCHEDULE/THICKNESS: SCH 40 COMPOSITION: PVC

MANUFACTURER: DSI

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: DSI #1 SAND

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.00"

SCHEDULE/THICKNESS: SCH 40 COMPOSITION: PVC

MANUFACTURER: DSI

JOINT DESIGN AND COMPOSITION: Threaded PVC

CENTRALIZERS DESIGN AND COMPOSITION: NA

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 5.75" COMPOSITION: STEEL

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

NONE

Was all well screen and casing material used for construction free of foreign matter (e.g., adhesive tape, labels, soil, grease, etc.)? YES [X] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [X] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the completed well? YES [ ] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK ENPLACEMENT: NA

RECORDED BY: [signature] 10/10/00 (Signature & Date)

QA CHECK BY: [signature] (Signature & Date)

HTRW DRILLING LOG

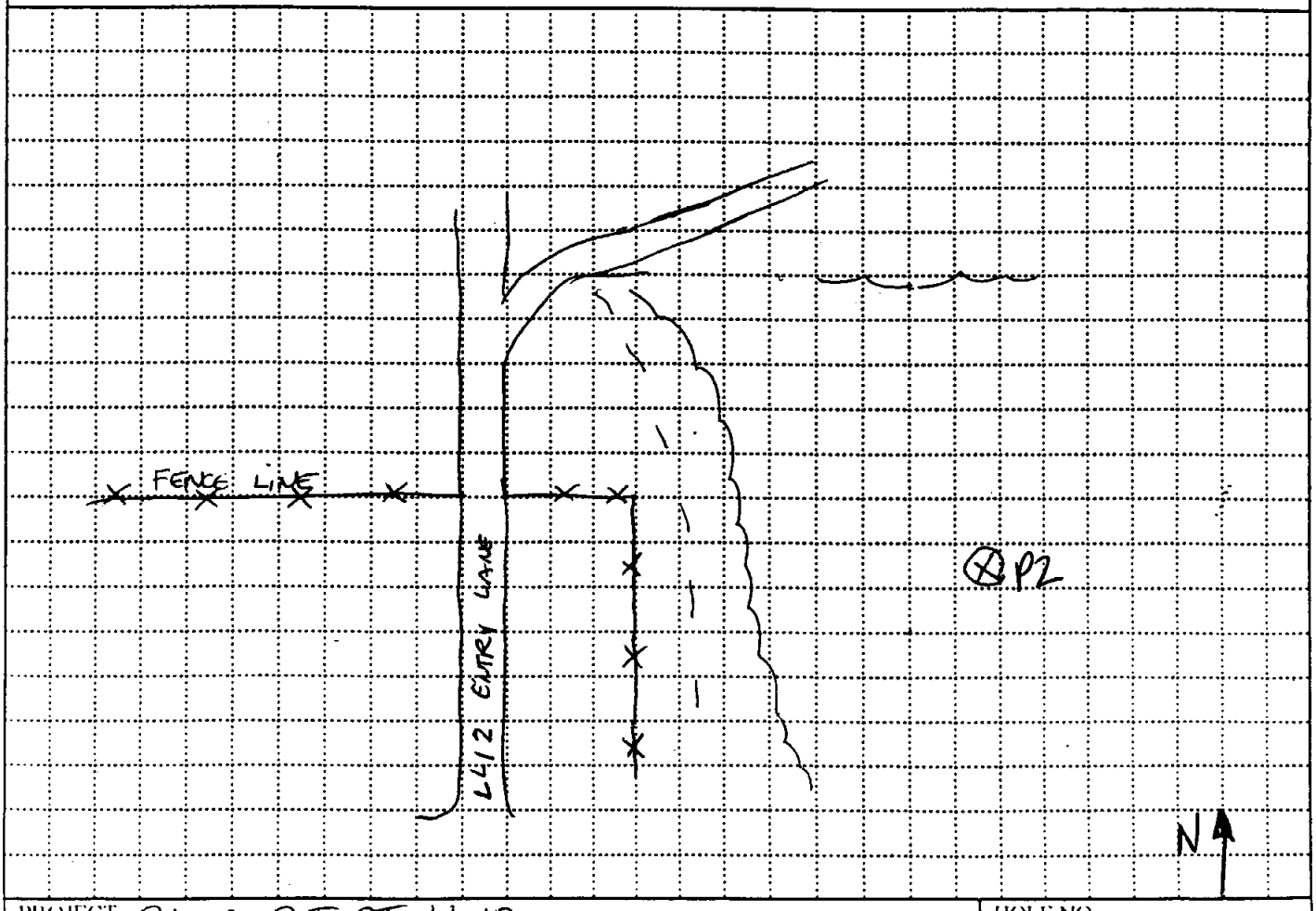
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Miller	HOLE NUMBER: P2
		SHEET 1 OF 5 SHEETS
3. PROJECT: RVAAP PHII RI LL12	4. LOCATION: LL12 RVAAP	
5. NAME OF DRILLER: Bruce Goodrich	6. MANUFACTURERS DESIGNATION OF DRILL: Mobile B61	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" ID HSA; 2' Split Spoon Sampler; 3" Shelby TUBE	8. HOLE LOCATION: LL12	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 09/28/00	11. DATE COMPLETED: 09/28/00 1406
12. OVERBURDEN THICKNESS: 34'	15. DEPTH GROUNDWATER ENCOUNTERED: 7.6'	
13. DEPTH DRILLED INTO ROCK: 2.0	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 15.55 TOC 09/29/00 0758	
14. TOTAL DEPTH OF HOLE: 36.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES (FROM OFFSET)	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
SHELBY TUBES		0-2.5 23.5-25.5	N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
TOC GRAB Samples				TOC 0-2.5 23.5-25.5		N/A

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitor well		LL2MW-183		

LOCATION SKETCH/COMMENTS — SCALE: NOT TO SCALE



PROJECT: RVAAP PHII RI LL12 — HOLE NO.: P2

ENG FORM 5056-R, AUG 94 (Proponent CECW-EG)

DRILLING LOG

PROJECT: RVAAP LL12 RI PH II | INSPECTOR: Rick L Darr | HOLE NUMBER: P2/MW183 | SHEET 2/5

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
		7.5YR 3/2 Dk Brown Clay loam, root struc. Moist, Non plastic, blocky		0-2.5' SHELBY From Offset L12SS-183-0619-SO		ST spoon pushed. Recovery 2/2 Penetrometer: 2.25 to 0.5' >4.5 remaining
	1.0	2.5Y 4/3 Olive Brown Silty clay, orange & gray mottling 10YR5/8 & 10YR6/1, pebbles to 1/4" (fine gravel) oxidized & leached, blocky, moist	CL			
	2.0	2.5Y 4/4 Olive Brown Some gray mottling to 2.5', as above.	CL			Spoon pushed Recovery 1.9/2 Penetrometer >4.5
	3.0					
	4.0	As above; gravel to 1.5" size, oxidized & leached, Some gray Mottling	CL			Spoon pushed Recovery 1.7/2 Penetrometer >4.5
	5.0					
	6.0	As above, some orange mottling 7.5YR 5/6 (strong brown)	CL			Spoon pushed Recovery 1.7/2 Penetrometer >4.5
	7.0					
		Clay silt, blocky, moist, color as above	MH			Penetrometer 2.5
	8.0	Fine clayey sand, wet SC	SC			
		Fine sand trace clay, olive Brown 2.5Y 4/4	SP-SC			Spoon pushed Recovery 2/2
		Silty clay small sand seam at 8.7' (1/2") wet	CL			
	9.0	2.5Y 4/4 Olive Brown Silty clay, trace oxidized gravel, trace orange mottling	CL			
	10.0					

PROJECT: RVAAP LL12 RI PH II | HOLE NO: P2/MW183

DRILLING LOG

PROJECT: RVAAP LL12 RI PH II | INSPECTOR: Rick L Dager | HOLE NUMBER: P2/mw183 | SHEET: 3/5

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	11.0	Silty clay 2.5Y 4/4 olive Brown with gray mottling 2.5Y 5/1 Gravel oxidized & leached (to 1.5" size) Blocky, Non-plastic	CL			Spoon pushed Recovery 2/2 Penetrometer >4.5
	12.0	As above				
		5Y5/1 Gray silty Clay, firm, non Plastic, some gravel, trace of leaching	CL			Spoon pushed Recovery 2/2 Penetrometer >4.5, grading to slightly over 2 at 14'
	13.0					
	14.0	Clay silt 5Y5/1 and 2.5Y 4/3 Very moist olive brown	MH			
		As Above	MH			Spoon pushed Recovery 1.8/2 Penetrometer - 3 grading to <1 at 16'
		Gray 2.5Y 5/1 slightly Moist, grading to Saturated at 15' ~~Clay~~ Silt ~~MH~~ RQD 0-3	~~MH~~ RQD 0-3 ML			
	15.4					
	16.0	Gray ~~Clay~~ silt as above RQD	~~MH~~ RQD 0-3 ML			Spoon pushed Recovery 2/2 Penetrometer 1.25
	17.0					
	18.0	As Above	~~MH~~ RQD 0-3 ML			Spoon pushed Recovery 2/2 Penetrometer 1.25
	19.0					
	20.0					

PROJECT RVAAP LL12 RI PH II | HOLE NO P2/mw183

DRILLING LOG

PROJECT: RVAAP LL12 PH II RI | INSPECTOR: Rick L Darr | HOLE NUMBER: P2/mw183 | SHEET: 4/5

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	21.0	As Above, slightly less moist	~~MH~~ ML RUD 10-3			Spoon pushed Recovery 2/2 Penetrometer: .75
	22.0					
	23.0	As Above, more Clay Plastic, 5Y 4/2 olive color at 24'	MH			Spoon pushed Recovery 2/2 Penetrometer .5-1.5 22'-23' - 1 23'-24' - .5
	24.0	5Y 4/2 olive, wet sandy clay silt	MH			
		As Above				
	25.0	2.5Y 4/2 Dk grayish brown clay silt grading to silty clay at 25', blocky, moist. sand parting at 24.9 and 25.1; gravel to 1/2" in silty clay	MH ML RUD 4/3 CL	SHELBY TUBE 23.5-25.5' FROM OFFSET L1250-183-0620-SD		Spoon pushed Recovery 1.0/2 Penetrometer range: 1 at 24.5 2.75 at 25 4.5 at 25.5
	26.0					
	27.0	silty clay; sand parting at 26.3'; color grading from 2.5Y 4/2 to 2.5Y 4/1 gray, gravel (some) to 3/16" size, some leaching	CL			Spoon pushed Recovery 2/2 Penetrometer 2.5 Sand parting very moist
	28.0					
	29.0	2.5Y 4/2 silty clay grading to 2.5Y 4/1 dark gray. Slightly plastic, blocky, moist, some gravel.	CL			Spoon pushed Recovery 2/2 Penetrometer ranging from 1.25 to 1.75 with depth
	30.0	~~As Above, 2.5Y 4/1 moist, soft~~	CL			
	31.0	Black 5Y 2.5/1 clay silt, very stiff, dry, crumbles.	MH			Spoon pushed Recovery 2/2 Penetrometer > 4.5
	32.0					
	33.0	Black silty clay with Shale fragments increasing with depth, NON Plastic	CL			Spoon pushed Recovery 1.7/2 Penetrometer > 4.5
	34.0					

DRILLING LOG

PROJECT: RVAAP LL12 PHII RI | BORING/WELL NO: P2 | SHEET: 5/5

KEY (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
		Black 5Y 2.5/1 shale, Weathered, dry. Tip of shoe wet				Spoon pushed. Recovery 1.25/2 Penetrometer >4.5
	35.0					
	36.0	T.D 36'				

MONITORING WELL INSTALLATION LOG

PROJECT NAME: Ravenna Load Line 12 Phase II RI **DELIVERY ORDER:** CY06

MONITORING WELL ID: P2

INSTALLATION START: DATE: 09/28/00 TIME: 1710

INSTALLATION FINISH: DATE: 09/28/00 TIME: 1906

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: DSI #1 QUANTITY: 7 x 50# BAGS

BENTONITE SEAL: TYPE: DRI-PLUG 3/8" QUANTITY: 1 x 50# BAGS

GROUT: TYPE: ~~HAND~~ PORTLAND/BENTONITE QUANTITY: 35 gal

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): 0.010 SLOT CONFIGURATION: MACHINE CUT

TOTAL OPEN AREA PER FOOT OF SCREEN: _____

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.00"

SCHEDULE/THICKNESS: 40 COMPOSITION: PVC

MANUFACTURER: DSI

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: #1 SAND

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.00

SCHEDULE/THICKNESS: 40 COMPOSITION: PVC

MANUFACTURER: DSI

JOINT DESIGN AND COMPOSITION: THREADED PVC

CENTRALIZERS DESIGN AND COMPOSITION: NA

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: ~~5"~~ 5.75" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

_____

_____

_____

Was all well screen and casing material used for construction free of foreign matter (e.g., adhesive tape, labels, soil, grease, etc.)? YES [✓] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [✓] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the completed well? YES [ ] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK ENPLACEMENT: 5 GAL DI POURED ON PELLETS

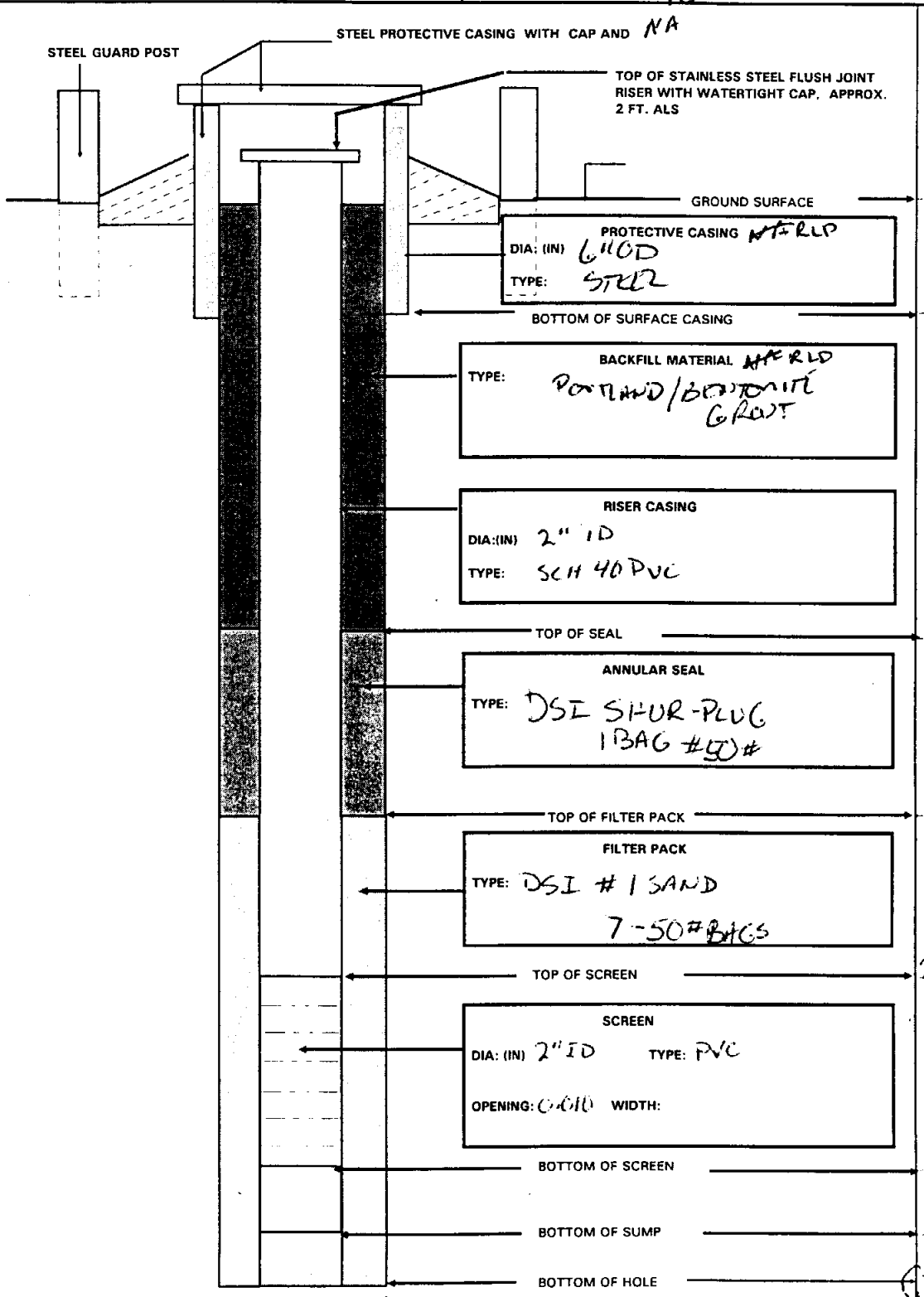
RECORDED BY: _____ 09/28/00
(Signature & Date)

QA CHECK BY: _____ 10-18-00
(Signature & Date)

MONITORING WELL

PROJECT NAME: Ravenna Load Line 1-2 Phase II RI | DELIVERY ORDER NO: CY06

WELL NUMBER: P 2 (LL2-MW-183)	BEGIN: 09/28/00 1710	END: 09/28/00 1906
COORDINATES: N: 556067.67 SRA 3/22/01 E: 2369225	REFERENCE POINT: brass cap TOC	ELEVATION: 983.04 980.59



X/

HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT: Louisville	HOLE NUMBER: LL12-MW 186
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Miller	SHEET 1 OF 6 SHEETS

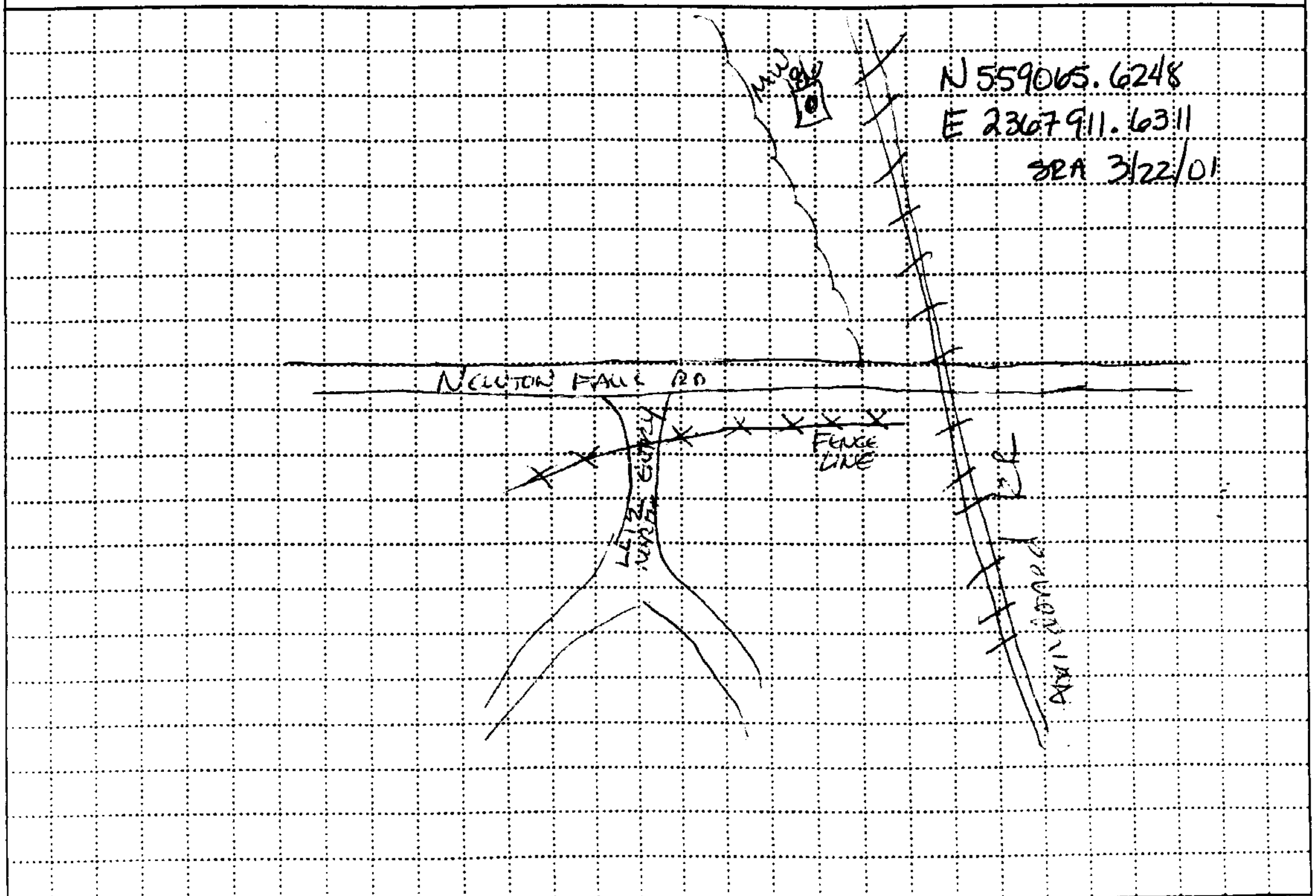
3. PROJECT: RVAAP LL12 PH II RI	4. LOCATION: RVAAP
5. NAME OF DRILLER: BRUCE GOODRICH	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B-61
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4 1/4" ID HSA; 3" x 5' Split Barrel; 3" SHELBY TUBE	8. HOLE LOCATION: LL12
	9. SURFACE ELEVATION: 976.34 ~~978.310~~ SRA 3/22/01
	10. DATE STARTED: 10-10-00 / 11. DATE COMPLETED: 10-11-2000 1315
12. OVERBURDEN THICKNESS: 22'	15. DEPTH GROUNDWATER ENCOUNTERED: ~~9.5'~~ RLD 10-11-00 11.1'
13. DEPTH DRILLED INTO ROCK: 1'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 7.58' TOC 10/15/00 1709
14. TOTAL DEPTH OF HOLE: 23'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
SHELBY TUBES		3.5-~~5~~ NOT SUBMITTED; 8.5-10.5	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
TOC GRAB			TOC 8.5-10.5			NA

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
MONITORING WELL		MW-186		[signature]

LOCATION SKETCH/COMMENTS SCALE: NOT TO SCALE



PROJECT	HOLE NO.
RVAAP LL12 PH II RI	MW 186

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

DRILLING LOG

PROJECT: RVAAP LL12 PH II | INSPECTOR: Rick L Darr | HOLE NUMBER: MW-186 | SHEET: 2/6

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	1.0	SANDY FILL MATERIAL DK YELLOWISH BROWN IN COLOR 10YR 4/4				
	2.0					
	3.0					
	4.0	SHELBY TUBE SAND AT TOP HIGHLY MOTTLED CLAY AT BOTTOM DK YELLOWISH BROWN 10YR 4/4 W/ GRAY MOTTLES	CL	NOT SUBMITTED		Recovery 1.2/2
	5.0					
	6.0	DK YELLOWISH BROWN 10YR 4/6 WITH GRAY 10YR 6/1 MOTTLING SILTY CLAY MOIST HARD <4.5 TSF/FT2 MOIST NO GRAVEL	CL			Recovery 3.5/3.5 WATER IN HOLE
	7.0					
	8.0					
	9.0	SHELBY TUBE AM ON TOP SILT ON BOTTOM SATURATED, RAPID DILATANCY BLOCKY 2.5Y 6/1	LL→ ML D-73	LL250-186-062350		RECOVERY 1.9/2.5
	10.0					

PROJECT: RVAAP LL12 PH II RI | HOLE NO: LL12-MW-186

DRILLING LOG

PROJECT: RVAAP LL12 PHII RI | INSPECTOR: Rick Lowry | HOLE NUMBER: LL12-MW186 | SHEET: 3/16

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	11.0					
	12.0	SILT A/A ML				REC 2-2
	13.0	Small amount of gray 2.5Y 6/1 silt in shoe of barrel.				No Recovery
	14.0					
	15.0					
	16.0					
	17.0					
	18.0					
	19.0					No recovery. Abandon boring & start new one in near proximity. Description on following log sheets.
	20.0		D-74			

DRILLING LOG

PROJECT: RUARP PHII RI LL12 | INSPECTOR: RICK LOWRY | HOLE NUMBER: MW 186 (Relocated) | SHEET: 4/6

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	10					Auger/Casing first 8'. Description follows from 8' to bottom of borehole. ORIGINAL BORING ≈ 20' SOUTH
	20					
	30					
	40					
	50					
	60					
	70					
	80	Yellowish Brown 10YR 5/4 silty clay till w/ gravel, oxidized & leached, some gray 10YR 5/1, mottling, moist, non-plastic	CL	D-75		Recovery 4.2/5 Penetrometer > 4.5
	90					
	100					

PROJECT: RUARP LL12 PHII RI | HOLE NO: LL12-MW186

DRILLING LOG

PROJECT: RUARP LL12 PH II RI | INSPECTOR: Rick L Dayer | HOLE NUMBER: LL12 MW186 | SHEET: 5/6

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
		See previous sheet	CL			
	11.0	Yellowish brown silt saturated, rapid dilatency, blocky	ML			
		Gray 10YR5/1 silty clay till, some leaching, some gravel, sheath, plastic	CL			
	12.0					
		Gray 10YR5/1 silt, saturated, rapid dilatency, blocky	ML			
	13.0	As above				Recovery 4/5
	14.0	ML				
	15.0					
	16.0					
	17.0					
	18.0	silt, Gray, 10YR5/1 saturated ML				Recovery 4/5
		Gray 10YR5/1 clay silt, grading to a fat clay @ 20.3'	MH→CH			
	19.8					
	20.0		D-76			

PROJECT: RUARP LL12 PH II RI | HOLE NO: LL12 MW-186

DRILLING LOG

PROJECT: RVAAP LL12 PH II RI | INSPECTOR: Rick L Dark | HOLE NUMBER: LL12-MW186 | SHEET: 6/6

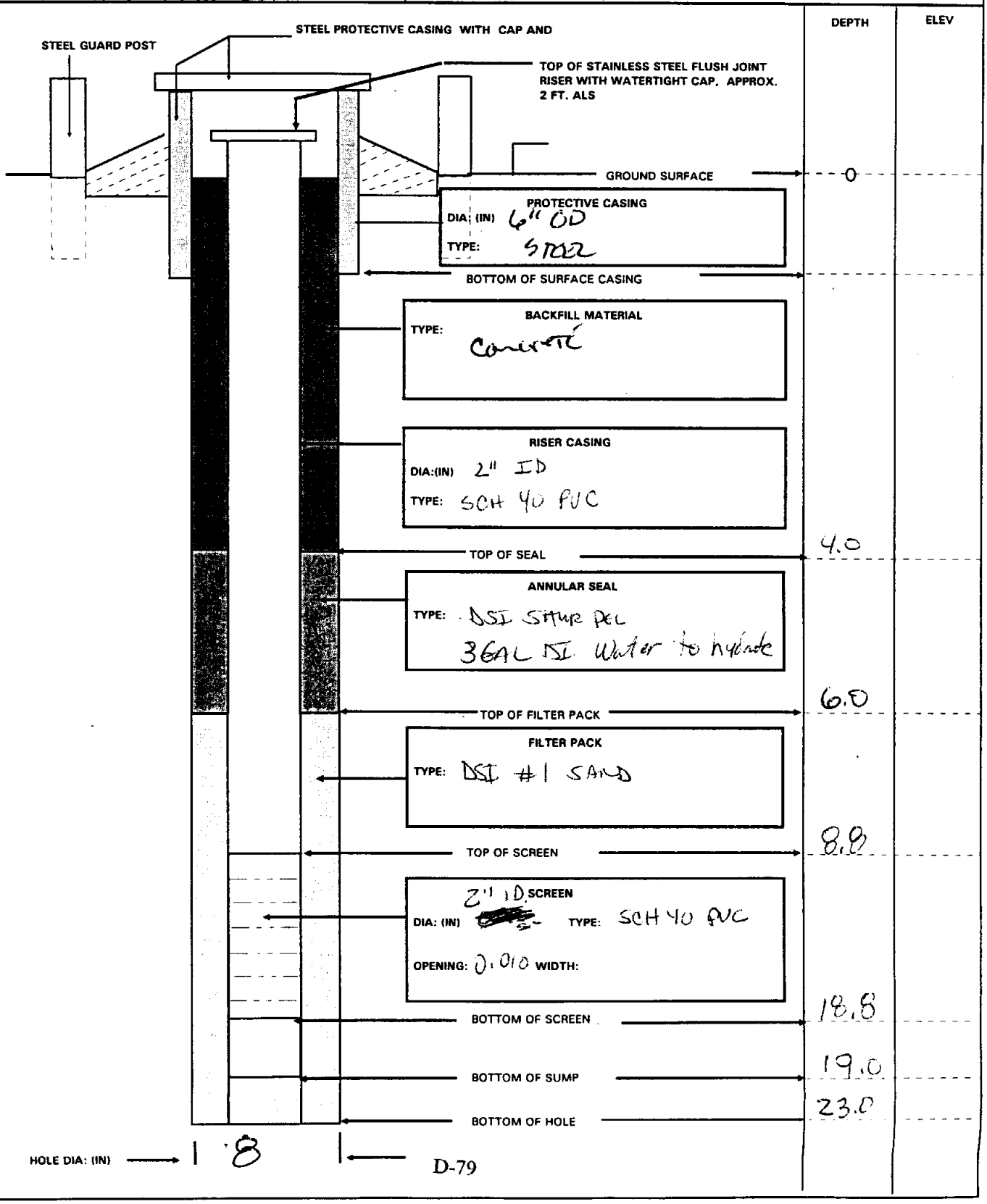
ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
		SAND PARTING, FINE to MED, well-sorted, saturated (< SW				Penetrometer: 1.5
	20	Dark grayish brown 10YR 4/2 clay till blocky, moist, some oxidizing & leaching, slightly plastic	CL			
	22.0	Black shale fragments				TD
	23.0					
	24.0					

PROJECT: RVAAP LL12 PH II RI | HOLE NO: LL12-MW 186

MONITORING WELL

PROJECT NAME: Ravenna Load Line 12 Phase II RI | DELIVERY ORDER NO.: GY06

WELL NUMBER: LL12-MW-106	BEGIN: 10-11-2000 1130	END: 10-11-2000 1315
COORDINATES: N: 559065.6248 E: 2367911.6311 SRA 3-22-01	REFERENCE POINT: brass cap TOC	ELEVATION: 976.34 978.30



MONITORING WELL INSTALLATION LOG

PROJECT NAME: Ravenna Load Line 12 Phase II RI **DELIVERY ORDER:** CY06

MONITORING WELL ID: MW-12D

INSTALLATION START: DATE: 10-11-2000 TIME: 1130

INSTALLATION FINISH: DATE: 10-11-2000 TIME: 1315

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: DSI #1 SAND QUANTITY: 10 x 50# BAG

BENTONITE SEAL: TYPE: DSI Shur Pel QUANTITY: 1 X 5 GAL Bucket

GROUT: TYPE: NA QUANTITY: N/A

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): 0.010 SLOT CONFIGURATION: MACHINE CUT

TOTAL OPEN AREA PER FOOT OF SCREEN: _____

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.0"

SCHEDULE/THICKNESS: SCH 40 COMPOSITION: PVC

MANUFACTURER: DSI

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: DSI #1 SAND

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.0"

SCHEDULE/THICKNESS: SCH 40 COMPOSITION: PVC

MANUFACTURER: DSI

JOINT DESIGN AND COMPOSITION: Threaded

CENTRALIZERS DESIGN AND COMPOSITION: NA

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 5.75" COMPOSITION: STEEL

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

NONE

Was all well screen and casing material used for construction free of foreign matter (e.g., adhesive tape, labels, soil, grease, etc.)? YES [X] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [X] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the completed well? YES [ ] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK ENPLACEMENT: NA

RECORDED BY: _____ 10/11/00 QA CHECK BY: _____

(Signature & Date) (Signature & Date)

HTRW DRILLING LOG

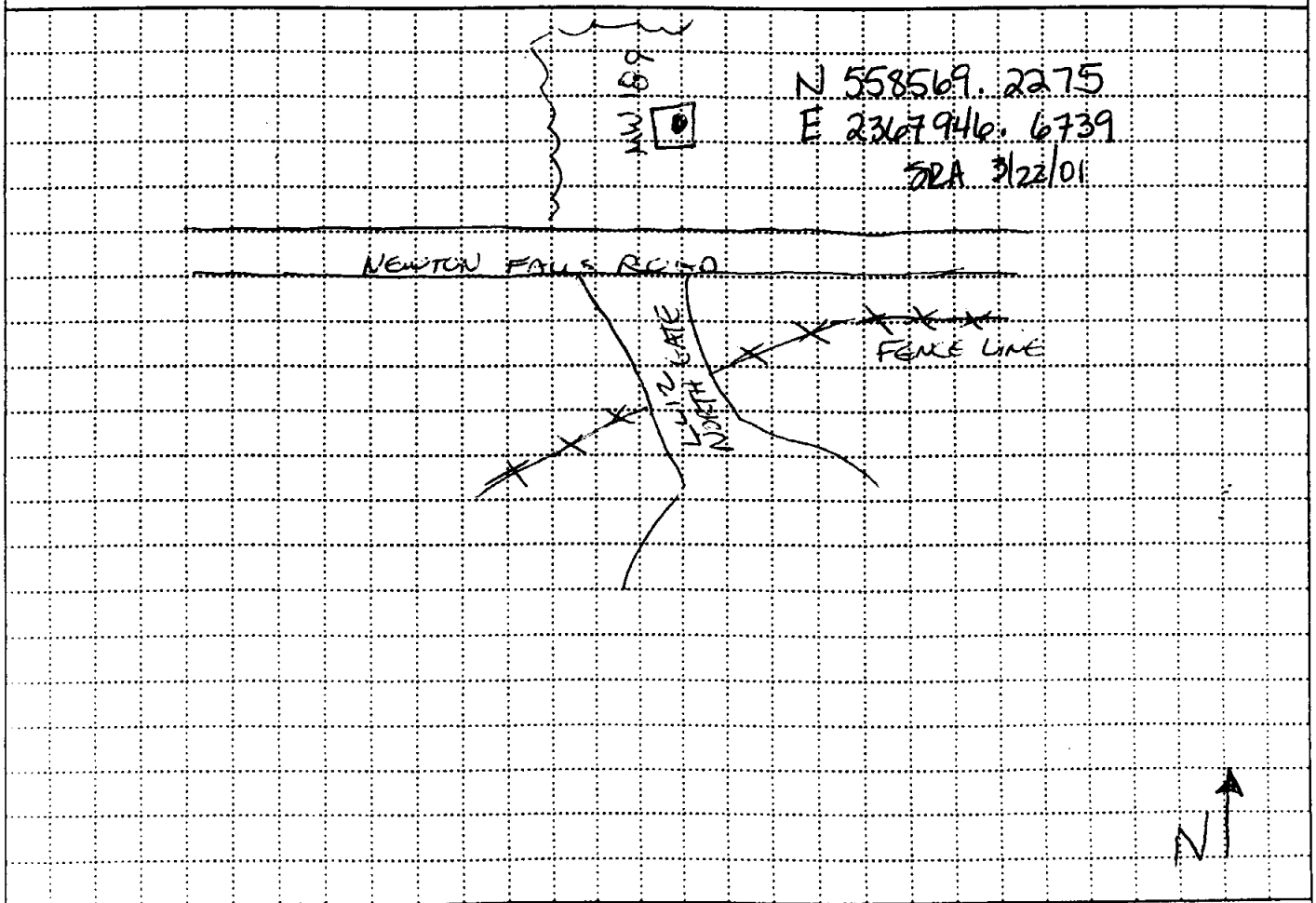
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Miller	HOLE NUMBER: LL12-MW-189
3. PROJECT: RVAAP LL12 PH II RI	4. LOCATION: RVAAP	SHEET 1 OF 3
5. NAME OF DRILLER: BRUCE COOPER MILLER DRILLING	6. MANUFACTURERS DESIGNATION OF DRILL: Mobile B-61	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4 1/4" ID HSA; 3" x 5' Split Barrel; 3" Shelby Tube	8. HOLE LOCATION: LL12	
	9. SURFACE ELEVATION: 976.17 ~~978.040~~ SRA 3/22/01	
	10. DATE STARTED: 10-10-00	11. DATE COMPLETED: 10/10/00
12. OVERBURDEN THICKNESS: 17'	15. DEPTH GROUNDWATER ENCOUNTERED: 8.2'	
13. DEPTH DRILLED INTO ROCK: 1.5'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 6.18' TOC 10/15/00 1707	
14. TOTAL DEPTH OF HOLE: 18.5	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
SHELBY TUBES	NA	2-4.5, 13.5-15.5	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
TOC GRAB			TOC 2-4.5 13.5-15.5			NA

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
MONITORING WELL		LL12-MW189		

LOCATION SKETCH/COMMENTS — SCALE: NOT TO SCALE



PROJECT	HOLE NO.
RVAAP LL12 PH II RI	MW 189

ENG FORM 5056-R, AUG 94 (Proponent CECW-EG)

DRILLING LOG

HOLE NUMBER MW 189
PROJECT RVAAP LL12 PHII RI
INSPECTOR RICK L DURR
SHEET 2/3

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	1.0	Shelby Tube				Recovery: ZERO SANDSTONE Blocking Tube
	2.0	Shelby Tube Yellowish Brown 10YR 5/6 clay silt w/ gray 10YR 6/1 Mottling on bottom of tube	MH	NOT SUBMITTED		Recovery 2.3/2.5
	3.0					
	4.0					
	5.0	Lt Olive Brown 2.5Y 5/4 Silty Clay w/ gravel, oxidized & leached w/ some gray Mottling, moist, blocky, firm	CL			Recovery 4/4
	6.0					
	7.0					
	8.0	Lt olive Brown 2.5Y 5/4 Silt w/ laminar bedding moist, blocky, firm Gray 2.5Y 5/1 silt, WET - SATURATED	ML			
	9.0	Silt, gray 2.5Y 6/1, very moist, blocky color change to Lt Olive Brown 2.5Y 5/4 from 9.5 to 9.8 ft	ML D-93			Recovery 4.6/5
	10.0					

PROJECT RVAAP LL12 PHII RI
HOLE NO LL12-MW189

DRILLING LOG

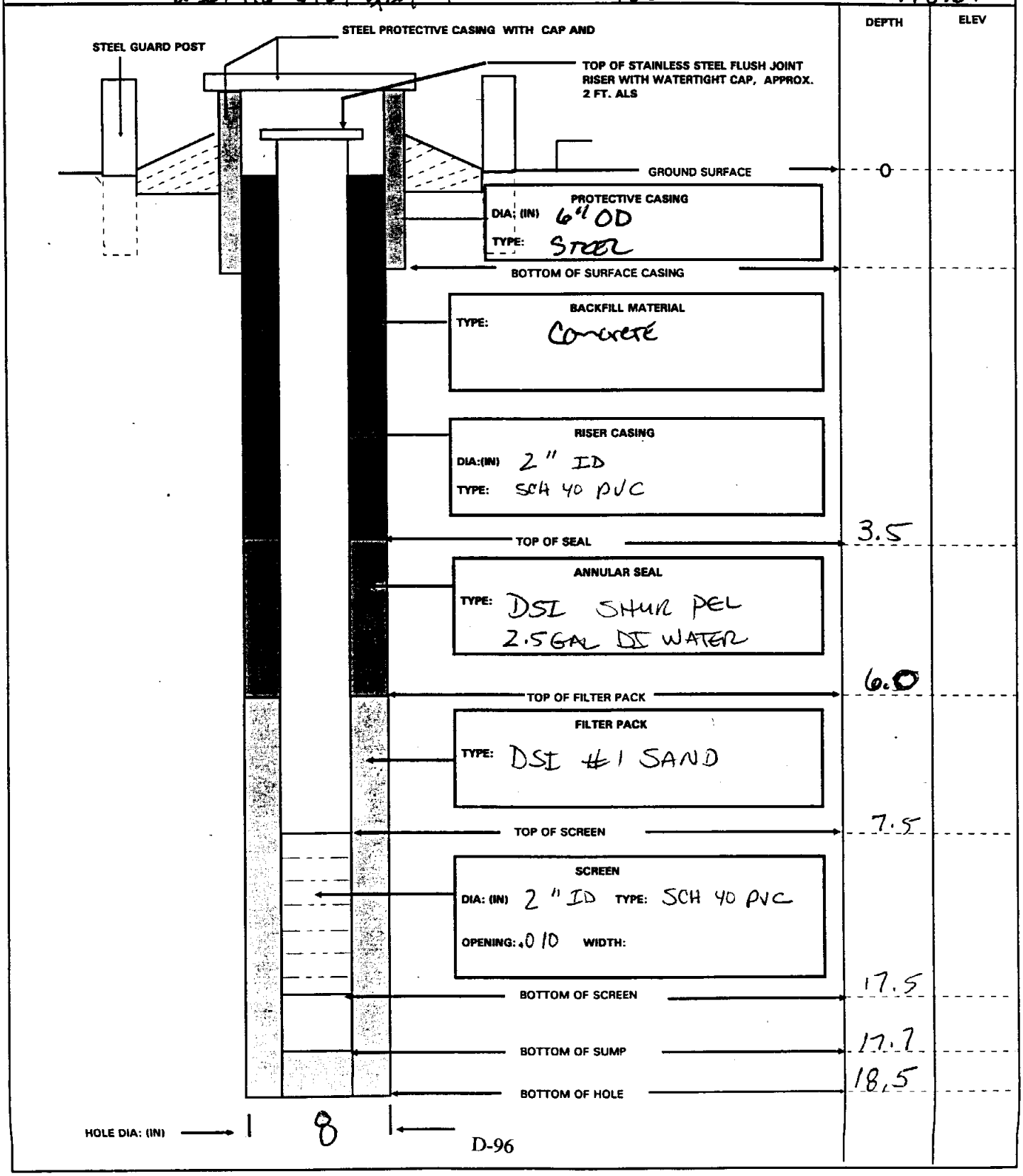
PROJECT	INSPECTOR	SHEET	HOLE NUMBER
RVAAP PH II RI LL12	Rick L Dave	3/3	LL12-MW189

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO (E)	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
		Gray silt, as previous page, moist to very moist ML				
	11.0					
	12.0					
	13.0					
	14.0	Shelby Tube ML Gray silt on top; weathered shale on bottom		L1250-189-0626-SO		Recovery - 2/2
	15.0					
	16.0	BLACK 5Y 2.5/2.5 till w/ shale CL fragments, weathered shale				Recovery 2/3
	17.0					
	18.0					TD
	19.0					
	20.0					

PROJECT RVAAP PH II RI LL12 HOLE NO LL12-MW189

[redacted]

WELL NUMBER: MW-189	**BEGIN:** 10-10-00 1515	**END:** 10-10-00 1600
COORDINATES: N: 558569.2275 SRA E: 2367946.6739 3/22/01	**REFERENCE POINT:** Brass Cap TOC	**ELEVATION:** 976.17 978.04



MONITORING WELL INSTALLATION LOG

PROJECT NAME: Ravenna Load Line 12 Phase II RI **DELIVERY ORDER:** CY06

MONITORING WELL ID: MW 189

INSTALLATION START: DATE: 10-10-00 TIME: 1515

INSTALLATION FINISH: DATE: 10-10-00 TIME: [illegible]

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: DSI #1 SAND QUANTITY: 6 x 50 lb bag

BENTONITE SEAL: TYPE: DSI SHUR PEL QUANTITY: 1 x 5 Gal Bucket

GROUT: TYPE: N/A QUANTITY: N/A

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): 0.010 SLOT CONFIGURATION: Machine cut

TOTAL OPEN AREA PER FOOT OF SCREEN: _____

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.0"

SCHEDULE/THICKNESS: SCH 40 COMPOSITION: PVC

MANUFACTURER: DSI

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: DSI #1 SAND

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2.375" NOMINAL INSIDE DIAMETER: 2.0"

SCHEDULE/THICKNESS: SCH 40 COMPOSITION: PVC

MANUFACTURER: DSI

JOINT DESIGN AND COMPOSITION: MACHINE CUT THREADED

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 5.75" COMPOSITION: STEEL

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

NONE

Was all well screen and casing material used for construction free of foreign matter (e.g., adhesive tape, labels, soil, grease, etc.)? YES [X] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [X] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the completed well? YES [ ] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK ENPLACEMENT: N/A

RECORDED BY: [signature] 10/10/00 (Signature & Date)

QA CHECK BY: [signature] (Signature & Date)

RVAAP-16 FUZE AND BOOSTER QUARRY LANDFILL/PONDS

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HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: FBQ-168

1. COMPANY NAME: SpecPro, Inc.

2. DRILL SUBCONTRACTOR: Tol Test

SHEET 1 OF 1

3. PROJECT: Fuze & Booster/RVAAP

4. LOCATION: Fuze & Booster Quarry Landfill/Pond

5. NAME OF DRILLER: Neil ~~Witkof~~ Wiktor

6. MANUFACTURERS DESIGNATION OF DRILL: CME-75

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-75 Auger Rig 6.25" ID/ 10.25" OD

8. HOLE LOCATION: FBQ-168

9. SURFACE ELEVATION:

10. DATE STARTED: 10/7/03

11. DATE COMPLETED: 10/7/03

12. OVERBURDEN THICKNESS: 17'

15. DEPTH GROUNDWATER ENCOUNTERED: ≈12' bgs (from SS) (10/7/03)

13. DEPTH DRILLED INTO ROCK: + 2.5' MH

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: ~~8'2"~~ (GS) 8.2' MH / 20 hr 30 min

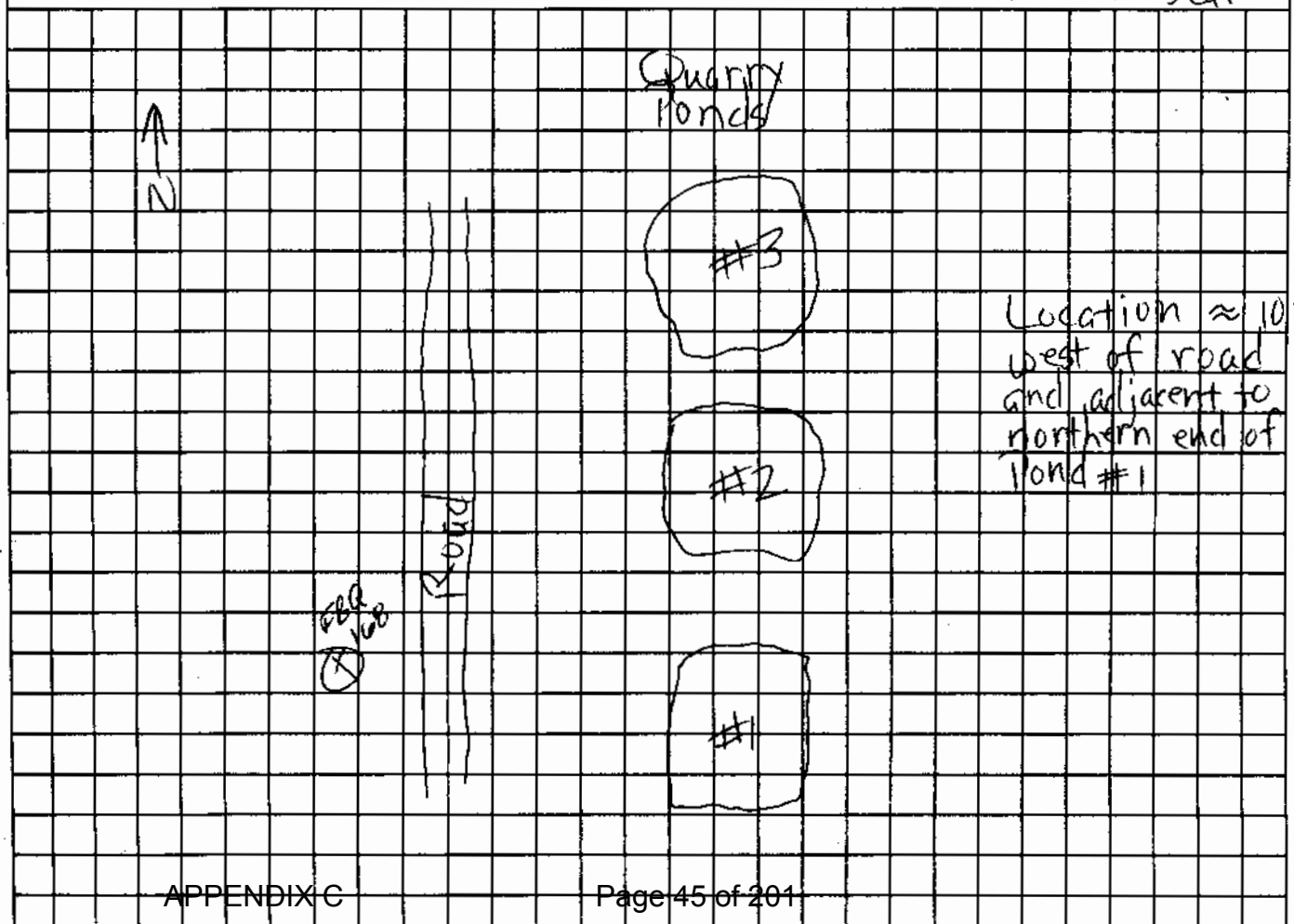
14. TOTAL DEPTH OF HOLE: 19.5' bgs

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES: N/A			
20. SAMPLES FOR CHEMICAL ANALYSIS: N/A	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
22. DISPOSITION OF HOLE: Construction of monwell	BACKFILLED ✓	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: M.F. Delving		

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-168

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 1 OF 2

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Med brn silty, Topsoil, damp, change @ (est.) 6" bgs to Yel brn clayey Silt (ML) lt fn-~~med~~ csd grv, 1" dry-damp, dense	0 PPM			Push Shelby tube 0-2' bgs Recov.: 12"
	2	Yel brn Silt A/A, damp (as above)	0			
	3					Push Shelby tube 2-4' bgs Recov.: 24"
	4	Yel brn Silt A/A, dry-damp	0			~~4-7-9-10~~
	5					
	6	Yel brn sdy Silt grading to yel brn v. fn.- ~~clayey~~ fn silty Sand, tr fn-~~med~~ csd grv, dry-damp	0			~~10-10-13~~ Blow Counts: 4-7-9-10 Recov.: 18"
	8	Yel brn silty Sand (SM) A/A	0			Blow Counts: 10-10-13-14 Recov.: 13"
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-168

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 2 OF 2

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	10	Yel brn med Sand (SW) ltl-some fn-cse grv, damp, loose	Ø PPM			Blow Counts: 1Ø-7-7-6 Recov.: 14"
	11					
	12	grading to dk red Yel brn, med Sand A/A, wet-sat (12'± bgs?)	Ø			Blow Counts: 1Ø-1Ø-13-15 Recov.: 13"
	13					
	14	(dk red) Sand A/A, grading back to yel brn, sat, loose grading to dense	Ø			Attempted Shelby tube @ 14' bgs -- crushed tube Blow Counts: None (due Shelby attempt, i.e., SS pushed)
	15					
	16	Yel brn, med Sand, sat, dense	Ø			Blow Counts: 17-5Ø/4 Recov.. 9"
	17					
	18	Sand A/A (Note: no SS sample -- description based on cuttings)	Ø			Blow Counts: 5Ø/Ø Recov.. Ø" (Poss. bdrk @ ± 17' bgs?)
	19					
	T.D.					
	20					

MONITORING WELL INSTALLATION LOG

PROJECT NAME: Phase I/II Fuze & Booster Quarry Landfill/Pond DELIVERY ORDER: 0012

MONITORING WELL ID: FBQ-168

INSTALLATION START: DATE: 10/7/03 TIME: 1530

INSTALLATION FINISH: DATE: 10/7/03 TIME: 16:45

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #5 QUANTITY: 8 bags

BENTONITE SEAL: TYPE: Getco Volclay/PureGold Bentonite Pellets QUANTITY: 2 1 bucket MFD

GROUT: TYPE: Portland/Bentonite QUANTITY: 2x92lb/1x50lb

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): 0.01" ("10") SLOT CONFIGURATION: Slotted

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: Gran. filt. pack (A/A)

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

JOINT DESIGN AND COMPOSITION: Flush joint (w/rubber "O" ring)

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 8 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

Was all well screen and casing material used for construction free of foreign matter (e.g. adhesive tape, labels, soil, grease, etc.)? YES [✓] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [✓] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the complete well? YES [✓] NO [ ]

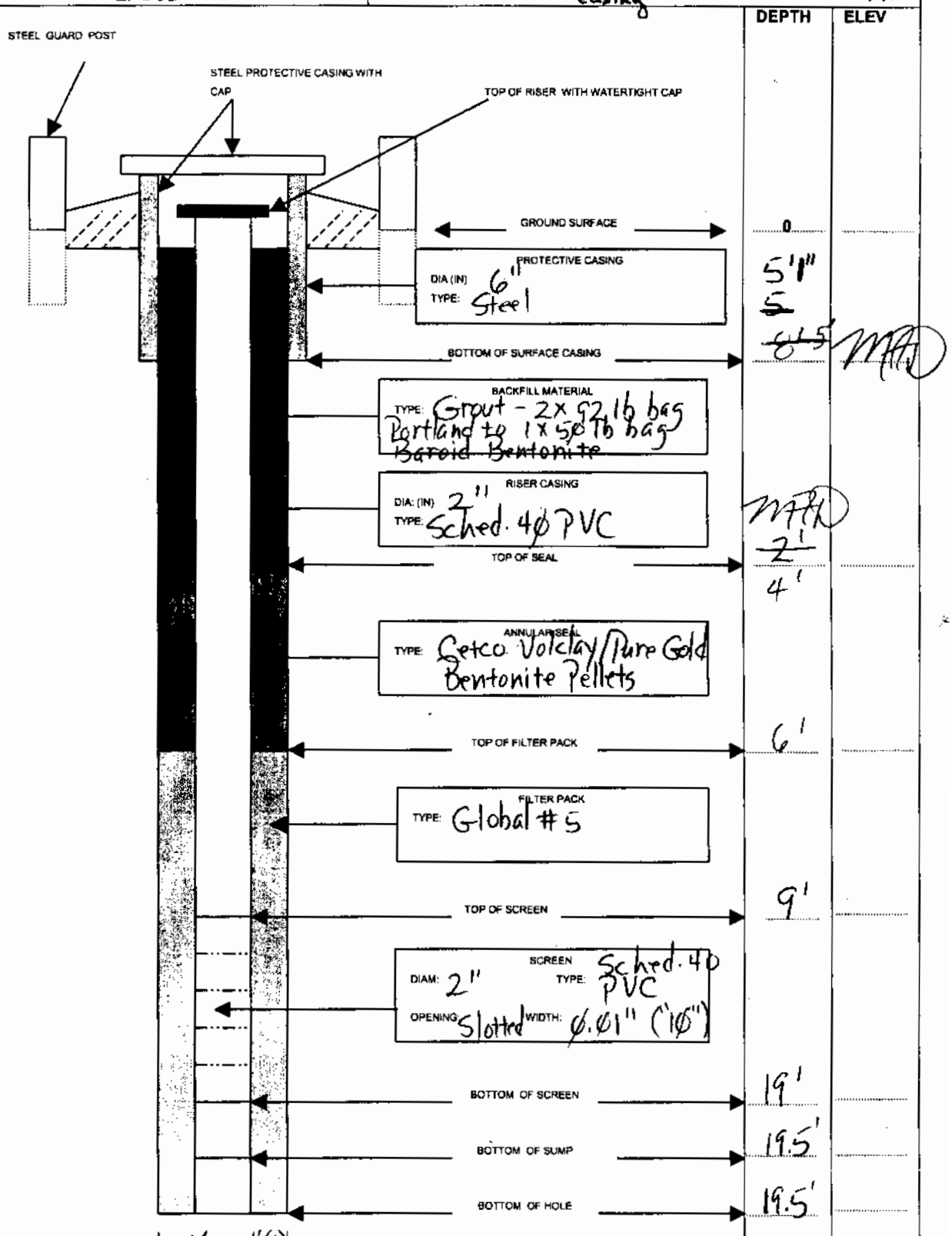
QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

RECORDED BY: M.F. Deering 10-7-03 (Signature and Date) QA CHECK BY: [signature] 12/30/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: Phase I/II Fuze & Booster Quary Landfill/Pond **DELIVERY ORDER NO:** 0012

WELL NUMBER: FBQ-168	**BEGIN:** 10/7/03 @ 15:30	**END:** 10/7/03 @ 16:45
COORDINATES: N: 553620.36 E: 2350068.61	**REFERENCE POINT:** top inner casing	**ELEVATION:** 1133.91 ft.



WELL VOLUME CALCULATION SHEET

Date: 10243 Time: 1545

Well ID: FBQ 168

Well Location: _____

Total Depth of Well (ft BTOC) 15.35
Depth to Water (ft BTOC) 8.475
Height of water column (ft) (Hc) 6.875

Well Volume Calculation:

Vc = $3.142(Rc^2)*Hc$ .148 cu. ft.

Vf = $3.142[(Rf^2)-(Ro^2)]*$(Hc or length of screen)*(0.30)
Note use length of screen if Hc>length of screen
= Correct .648 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.)
= 5.89 Correct gal. x 5 = 29.28 gal
~~5 = 44 gal~~

Where:

Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total Volume
Ro = Outside radius of casing (0.10 ft)
Hc = Height of water column 6.88 (ft)
Rf = Radius of filter pack (0.33 ft)
Rc = Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO:** 0012

Date: 10/24/03

Well Number and Location: FBQ 168

Development Crew: Andre Leon
Ronda Bailey

Driller (if applicable): _____

Water Levels/Time: Initial: 8.47 / 1600 Pumping: ____ / ____
Final: 11.3 / 1809

Total Well Depth: Initial: 15.35 Ft BTOC Final: 21.3' Ft BTOC

Date and Time: Begin: ____ / ____ Completed: ____ / ____

Development Method(s): Bailer & whale pump

Total Quantity of Water Removed: 53.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	10-30-03
Specific Conductivity	YSI 85	"
pH	pH tester 3+	"
Turbidity	Hach Pocket Turbidimeter	"

GROUNDWATER PURGE SHEET

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Lanfill/Pond **DELIVERY ORDER NO: 0012**

DATE (mm/dd/yy): 11/19/03 TIME: 14:15

WELL ID NUMBER: FBQ 168 WELL LOCATION: FBQ

DEPTH OF SCREENED INTERVAL (BTOC): _____ ft to _____ ft

INNER CASING: TYPE: _____ ID: _____ inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ .23

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2]$ (TD-S or H) (P) .94
NOTE: If S>H use S, if S<H use H

$Vt = (Vc + Vf)(7.48)$ 8.77

WHERE:

Vc = Volume of water in well casing, cu. ft.
Vt = Total volume, ga.
Vf = Volume of water in filter pack, cu. ft.
do = outside of diameter of well casing, ft.
di = inside diameter of well casing, ft.
P = estimated porosity of filter pack

dH = diameter of borehole, ft.
TD = total depth of well from top of well casing, ft. = 21.3 after purge
H = depth of water, ft., from top of well casing = 16.86 after purge
S = depth to base of seal, ft., from top of well casing

PURGE METHOD; [✓] Bailer [ ] Bladder Pump [ ] Pump Type _____

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 26.3 GAL.

SAMPLE METHOD: [✓] Bailer [ ] Bladder Pump [ ] Other (specify) _____

SITE CONDITIONS DURING PURGING: Overcast high 40s

FIELD OBSERVATIONS: _____

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY: _____

RECORDED BY: Randall Bailey 11/19/03 (Signature and Date) QA CHECK BY: Amy Leonard 12-05-03 (Signature and Date)

APPENDIX C

WELL PURGE RECORD

PROJECT NAME: Phase I/II Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO: 0012**

WELL NUMBER AND LOCATION: FBQ168 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/9	1415	Initial	13.1	185.2 = .185	6.81	65.7			DO 2.25
	1442	6							18.85' to H_2O
	1530	6	13.9	(.295) .295 ms/cm	7.03	> 99.9	12 gal		DO = 10.27
	1550	6	13.2	(.304) .304 ms/cm	7.02	> 99.9	18 gal		DO = 9.30
	1605	6	13.1	(.294) .294 ms/cm	6.92	> 99.9	24 gal		DO = 9.43
	1616	3	13.1	(.275) .279 ms/cm	6.81	> 99.9	27 gal		DO = 9.32

RECORDED BY: [signature] 11/9/03 (Signature and Date)

QA CHECK BY: Amy Greenawald 12-05-03 (Signature and Date)

APPENDIX C

SLUG TEST RECORD

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO:** 0012

WELL NO.:	168	DATE STARTED:	12-02-03	DATE COMPLETED:	12-02-03
LOCATION:	FBQ	RECORDED BY:	R. BAILEY		

EQUIPMENT INFORMATION SUMMARY

EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NO.	RANGE (PSI)	LAST CALIB.
DATA LOGGER	INSITU MINI	TROLL			
TRANSDUCER					
WATER LEVEL	HERON	DIPPER-T	01512		

PRETEST DATA

REFERENCE POINT TOC/BGS	REFERENCE POINT ELEVATION	RISER CASING I.D. (IN)
SCREEN OR OPEN HOLE I.D. (IN) 2	DIAMETER OF BOREHOLE (IF SCREENED) BGS 10.25"	

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	21.34		TOP OF FILTER PACK	6'	
DEPTH TO WATER	10.23		TOP OF SCREEN OR OPEN HOLE	9'	
HEIGHT OF WATER COLUMN	11.11		SCREEN LENGTH	10	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

TEST METHOD SLUG IN (FALLING HEAD) [✓] SLUG OUT (RISING HEAD) [✓]

SLUG DIMENSIONS	SLUG VOL(GAL)	SLUG DEPTH(FT)
3.1 x 1.25		

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
AS 12-02-03	SLUG IN	12/02/03	12/02/03	18:53	10:10	16.34	10.230	10.167	11.11	11.173
AS 12-02-03	SLUG OUT	12/02/03	12/02/03	10:12	12:52	16.34	10.230	10.356	11.11	10.984

STORAGE LOCATION OF DATA: 1) 2)

FILE STRUCTURES	DATA TYPE	FORMAT (1)	UNITS	TEST TIME INTERVAL: LOG SCALE	TEST TIME INTERVAL: ARITH. SCALE	COMMENTS
COLUMN B	TIME	CL	HHMMSS	✓		
COLUMN C	TIME	KT	MIN	✓		
COLUMN E	DEPTH	H	FT H2O			

(1) CK – 24 HR CLOCK TIME ET – ELAPSED TIME H – HEIGHT OF WATER ABOVE TRANSDUCER FT BRP – DEPTH TO WATER E – WATER LEVEL ELEVATION P – PRESSURE 0 – OTHER (EXPLAIN)

DATA CHECK RESULTS:

REMARKS:

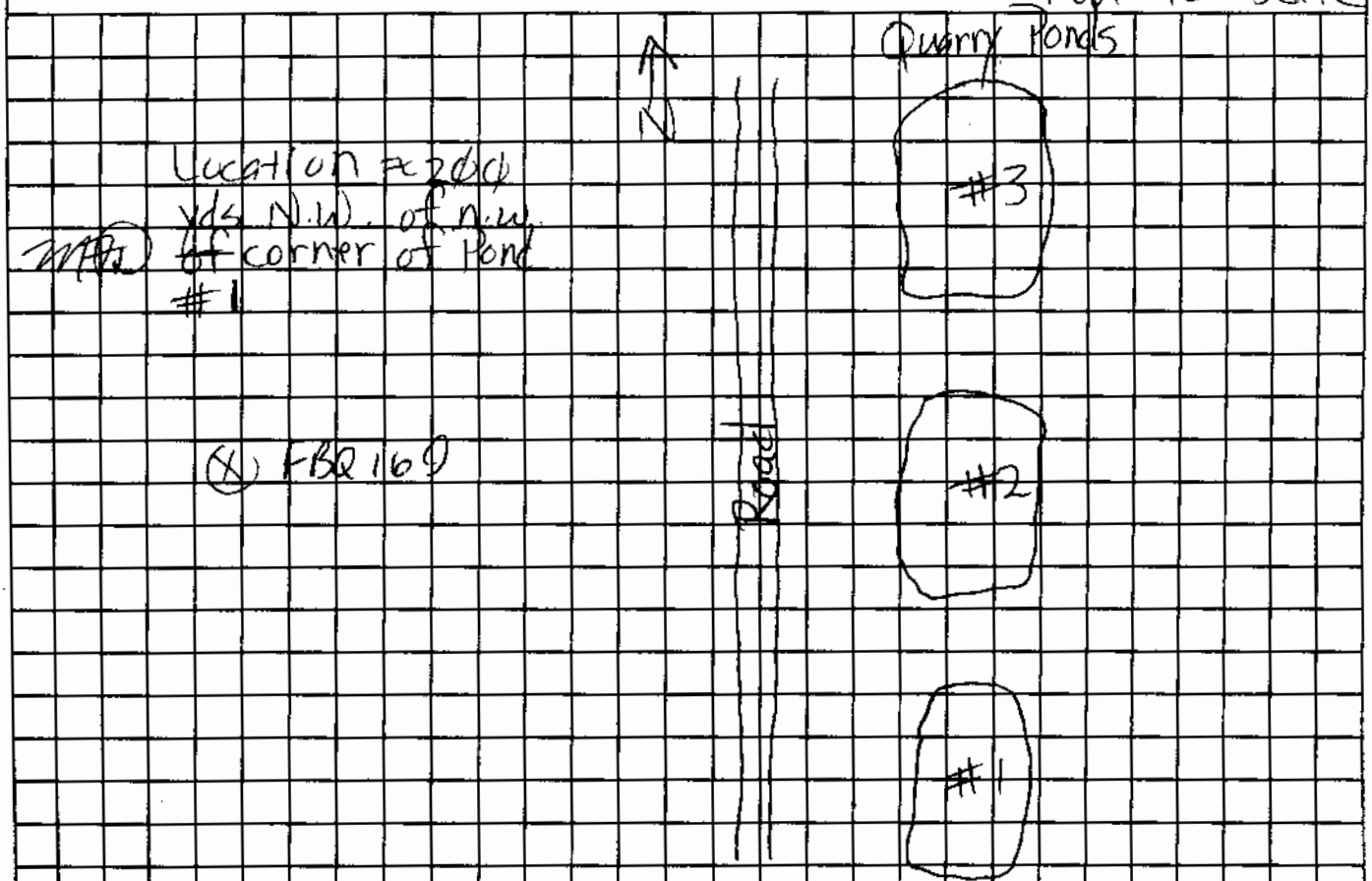
DATA RECORDED BY	DATE	QA CHECK BY	DATE

HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER: FBQ-169
1. COMPANY NAME: SpecPro, Inc.	2. DRILL SUBCONTRACTOR: Tol Test	SHEET 1 OF 1
3. PROJECT: Fuze & Booster/RVAAP	4. LOCATION: Fuze & Booster Quarry Landfill/Pond MRP	
5. NAME OF DRILLER: Tony Brister	6. MANUFACTURERS DESIGNATION OF DRILL: CME-75550	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-550 Auger Rig 10.25" ø (I.D.) / 6.25" (I.D.)	8. HOLE LOCATION: FBQ-169	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/13/03	11. DATE COMPLETED: 10/13/03
12. OVERBURDEN THICKNESS: 15'	15. DEPTH GROUNDWATER ENCOUNTERED: ≈5' bgs / SS. on 10-13-03 Per	
13. DEPTH DRILLED INTO ROCK: 1'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 1.9' bgs / 96 hr 45 min	
14. TOTAL DEPTH OF HOLE: 16' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
20. SAMPLES FOR CHEMICAL ANALYSIS: N/A	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
22. DISPOSITION OF HOLE: Mon. well constructed	BACKFILLED ✓	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: M. T. Herring		

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-169

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 1 OF 2

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Med-dk brn silty Topsoil, damp to ≈ 6" bgs; change to yel brn clayey Silt (ML) tr-1+ gr, dry-damp	0 PPM			Push Shelby tube: 0-2' bgs; 20" recov.
	1					
	2	↑	0			Blow Counts: 4-5-8-8 Recov.: 16"
	3	Olv brn clayey Silt, tr fn gr, damp, dense, dry (2-4' bgs)				
	4	↑	0			
	5					
	6	Med brn, v. fn clayey (SC) moist-wet Sand, to 7'; change	0			Blow Counts: 44-4-5 Recovery: 19" (4-6' bgs)
MPW	7	to med brn clayey Silt, tr gr, moist-wet, dense - V. dense (ML) (4-6' bgs)				
	8	(as above) MPW 7' Silt A/A to 7' bgs; then fn Sand, tr-1+ clay, tr gr, wet-sat. loose @ 7' bgs (6-8')	0			Blow Counts: 8-10-12-10 Recovery: 18" (6-8' bgs)
	9	MPW				

HTRW DRILLING LOG

HOLE NUMBER FBQ-169

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 2 OF 2

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11	Yel brn clay (CL-CH) silty Clay to Clay, saturated, soft, plastic (8-10' bgs)	0 PPM			Blow Counts 2-2-2-3 Recov.: 16" (8-10' bgs)
	12	Dk yel brn-med brn sdy (slightly) Clay (CL), sat., soft, plastic				Blow Counts: 2-2-3-3 Recov.: 20"
		Clay A/A grading to more sdy, stiff, fn grv	0			Push Shelby tube: 10-12' bgs; no recov. - saturated
	13					Blow Counts: 4-6-6-7 Recov.: 12" (12-14' bgs)
	14	Med-dk brn Grv (fn-cse), Ss frags, tr-ltl clay and sand (GP-GC) Si silt, saturated, loose to 15' bgs; change to tan Ss, weathered, med hard, saturated	0			Blow Counts: 2-4-10-12 Recovery: 12"
	16		0			
	T.D. 17					
	18					
	19					
	20					

12-05-03

MONITORING WELL INSTALLATION LOG

PROJECT NAME: Phase I/II Fuze & Booster Quarry Landfill/Pond DELIVERY ORDER: 0012

MONITORING WELL ID: FBQ-169

INSTALLATION START: DATE: 10/13/03 TIME: 12:45

INSTALLATION FINISH: DATE: 10/13/03 TIME: 1:45

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #5 QUANTITY: bags

BENTONITE SEAL: TYPE: Getco Volclay/PureGold Bentonite Pellets QUANTITY: 1 bucket

GROUT: TYPE: Portland/Baroid Benseal QUANTITY: 1 X 92 lb / ½ x 50 lb bags

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): .01" ("10") SLOT CONFIGURATION: Slotted

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: Gran. filt. pack A/A

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

JOINT DESIGN AND COMPOSITION: Flush joint (w/ rubber "O" ring)

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

Because water table is very shallow (≈5' bgs), like FBQ-166, will lessen amount of sand above screen (from 3' to 2') and bent. pellets above that (from 2' to 1') -- in accord. w/ 10-8-03 tc w/ C. McCambridge of OEPA

Was all well screen and casing material used for construction free of foreign matter (e.g. adhesive tape, labels, soil, grease, etc.)? YES [✓] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [✓] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the complete well? YES [✓] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: N/A

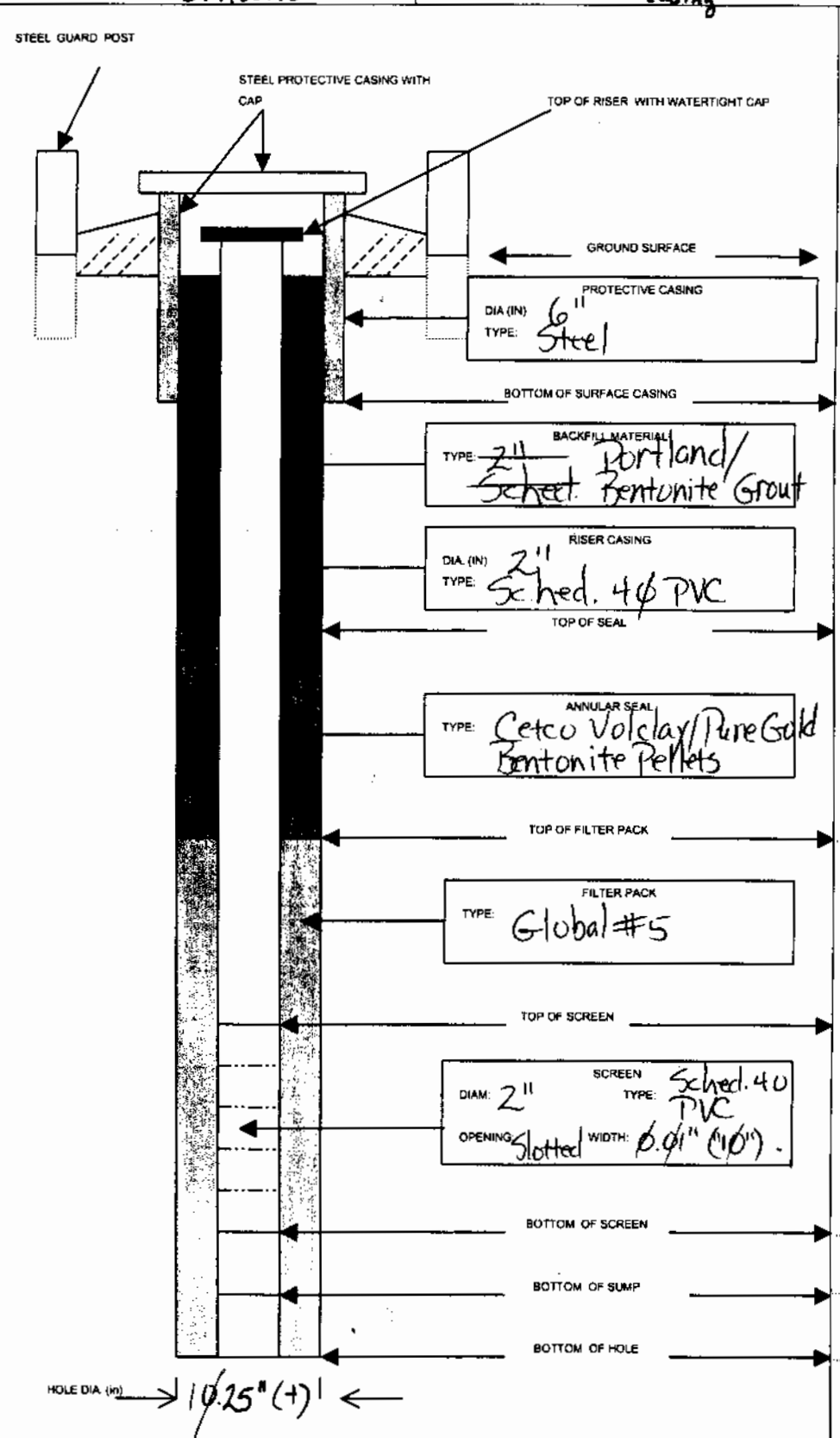
RECORDED BY: M. F. Duering 10-13-03 (Signature and Date)

QA CHECK BY: [signature] 12/03/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: Phase I/II Fuze & Booster Quary Landfill/Pond **DELIVERY ORDER NO:** 0012

WELL NUMBER: FBQ-169	**BEGIN:** 12:45 / 10-13-03 **END:** 1:45 / 10-13-03
COORDINATES: N: 553681.21 E: 2349730.90	**REFERENCE POINT:** top inner casing **ELEVATION:** 1120.58 feet



WELL VOLUME CALCULATION SHEET

Date: 10 Sept 13 Time: ~~1330~~ 1346

Well ID: FBQ 169

Well Location: _____

Total Depth of Well (ft BTOC) ~~18.95~~ 17.96
Depth to Water (ft BTOC) ~~2.94~~ 4.55
Height of water column (ft) (Hc) ~~16.01~~ 13.41

Well Volume Calculation:

.0668

Vc = 3.142(Rc^2)*Hc ~~34.29~~ cu. ft.

.1089 - .01

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
Note use length of screen if Hc>length of screen
= ~~1.49~~ .94 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.)
= ~~13.6~~ 9.2 gal. ~~*5 = 68 gal~~ 46 gal
~~*6 *7 = 95 gal~~ 55 gal

Where:

Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total Volume
Ro = Outside radius of casing (0.10 ft) 13.41
Hc = Height of water column ~~16.01~~ (ft)
Rf = Radius of filter pack (0.33 ft)
Rc = Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO:** 0012

Date: 10 / 30 / 03

Well Number and Location: FBQ 169

Development Crew: Chantelle Carroll

Driller (if applicable): _____

Water Levels/Time: Initial: 4.55 / 1340 Pumping: ____ / ____

Final: 17.1 / 1620

Total Well Depth: Initial: 17.95 Ft BTOC Final: 17.95 Ft BTOC

Date and Time: Begin: 10/30 / 1340 Completed: 10/30 / 1620

Development Method(s): Whale

Total Quantity of Water Removed: 58 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	10-30-03
Specific Conductivity	YSI 85	10-30-03
pH	pH Test 3+	10-30-03
Turbidity	LaMotte 2008	10-30-03

GROUNDWATER PURGE SHEET

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Lanfill/Pond **DELIVERY ORDER NO: 0012**

DATE (mm/dd/yy): 11/18/93 TIME: 09:35

WELL ID NUMBER: FBQ ~~MW~~ 169 WELL LOCATION: FBQ

DEPTH OF SCREENED INTERVAL (BTOC): _____ ft to _____ ft

INNER CASING: TYPE: _____ ID: _____ inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ ~~18.10~~ ~~MB~~ .29

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2]$ (TD-S or H) (P) .94
NOTE: If S>H use S, if S<H use H

$Vt = (Vc + Vf)$ (7.48) 9.2

WHERE:

Vc = Volume of water in well casing, cu. ft.
Vt = Total volume, ga.
Vf = Volume of water in filter pack, cu. ft.
do = outside of diameter of well casing, ft.
di = inside diameter of well casing, ft.
P = estimated porosity of filter pack
dH = diameter of borehole, ft.
TD = total depth of well from top of well casing, ft.
H = depth of water, ft., from top of well casing
S = depth to base of seal, ft., from top of well casing

PURGE METHOD; [✓] Bailer [ ] Bladder Pump [ ] Pump Type _____

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 27.6 GAL.

SAMPLE METHOD: [✓] Bailer [ ] Bladder Pump [ ] Other (specify) _____

SITE CONDITIONS DURING PURGING: Overcast, high 50s

FIELD OBSERVATIONS: _____

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY: _____

RECORDED BY: [signature] 111803 (Signature and Date)

QA CHECK BY: [signature] 12-05-93 (Signature and Date)

APPENDIX

WELL PURGE RECORD

PROJECT NAME: Phase I/II Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO: 0012**

WELL NUMBER AND LOCATION: FBQ 109

PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/18/03	0935	Initial	11.5	591	5.70	3.9			DO=.64
	1010	7	11.6	587	6.21	>99.9	7		DO=2.49
	1040	7	12.0	572	6.24	>99.9	14		DO=2.24
	1100	7	12.1	565	6.10	>99.9	21		DO=1.25
	1125	7	12.2	577	6.01	>99.9	28		DO=1.42

RECORDED BY: [signature] 111803
(Signature and Date)

QA CHECK BY: [signature] 12-05-03
(Signature and Date)

SLUG TEST RECORD

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO:** 0012

WELL NO.:	169	DATE STARTED:	12-05-03	DATE COMPLETED:	12-05-03
LOCATION:	FBQ	RECORDED BY:	R. BAILEY		

EQUIPMENT INFORMATION SUMMARY

EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NO.	RANGE (PSI)	LAST CALIB.
DATA LOGGER	INSITU MINI	TROLL			
TRANSDUCER					
WATER LEVEL	HERON	DIPPER-T	01512		

PRETEST DATA

REFERENCE POINT	TOC/BGS	REFERENCE POINT ELEVATION		RISER CASING I.D. (IN)	
SCREEN OR OPEN HOLE I.D. (IN)	2		DIAMETER OF BOREHOLE (IF SCREENED) BGS		10.25

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	17.95		TOP OF FILTER PACK	3'	
DEPTH TO WATER	4.74		TOP OF SCREEN OR OPEN HOLE	5'	
HEIGHT OF WATER COLUMN	13.21		SCREEN LENGTH	10'	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

TEST METHOD SLUG IN (FALLING HEAD) [✓] SLUG OUT (RISING HEAD) [✓]

SLUG DIMENSIONS	3.1 X 1.25	SLUG VOL(GAL)	SLUG DEPTH(FT)

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
~~12/05/03~~	SLUG-IN	12/5	12/05/03	10:47	13:07	12.95	4.800	5.280	13.15	12.67
FBQ 169	SLUG OUT	12/5	12/05/03	13:08	15:27	12.95	4.800	4.555	13.15	13.395

STORAGE LOCATION OF DATA: 1) 2)

FILE STRUCTURES	DATA TYPE	FORMAT (1)	UNITS	TEST TIME INTERVAL: LOG SCALE	TEST TIME INTERVAL: ARITH. SCALE	COMMENTS
COLUMN B	TIME	CL	HH:MM:SS	✓		
COLUMN C	TIME	ET	MIN	✓		
COLUMN A	DEPTH	H	FT H2O			

(1) CK – 24 HR CLOCK TIME; ET – ELAPSED TIME; H – HEIGHT OF WATER ABOVE TRANSDUCER; FT BRP – DEPTH TO WATER; E – WATER LEVEL ELEVATION; P – PRESSURE; 0 – OTHER (EXPLAIN)

DATA CHECK RESULTS:

REMARKS:

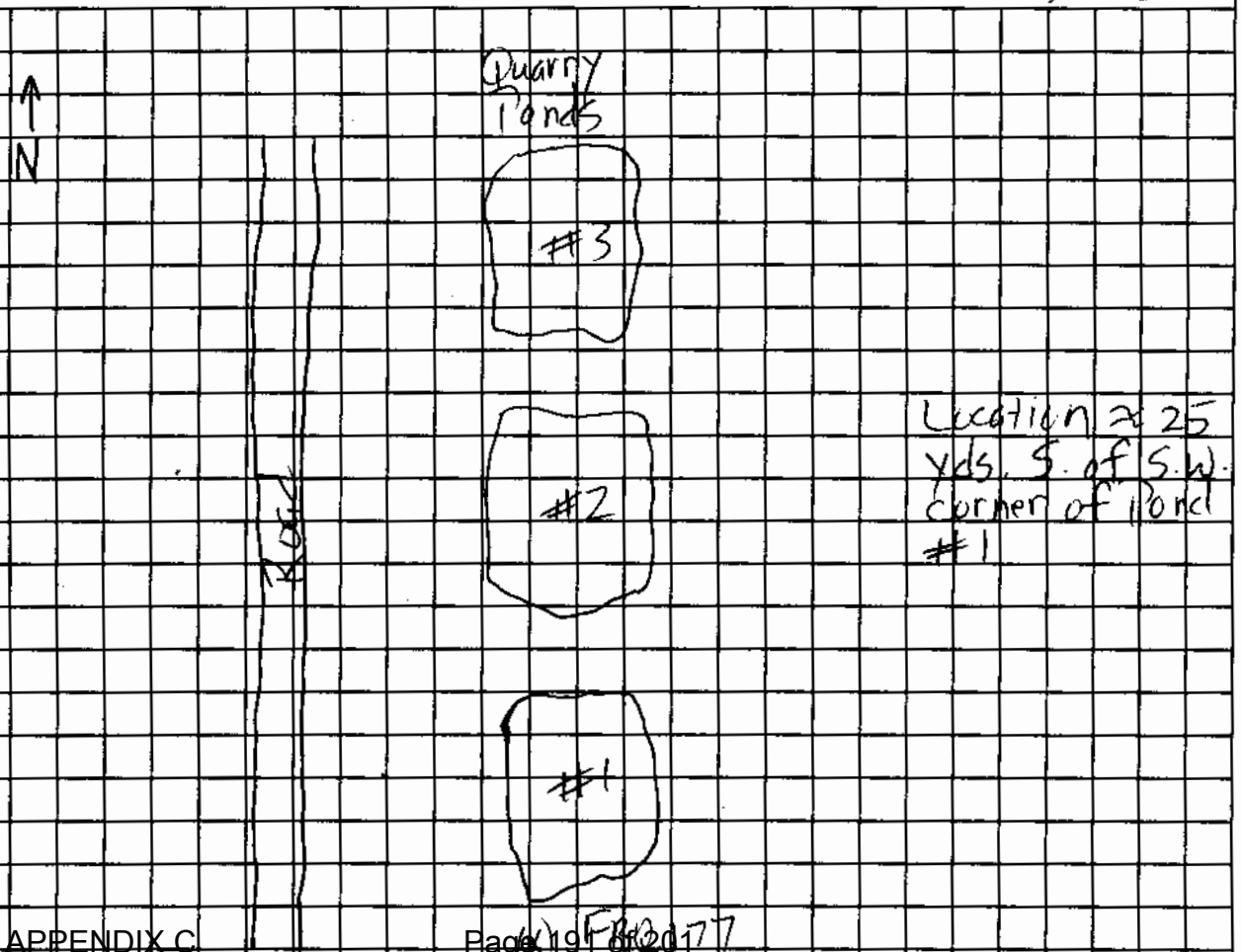
DATA RECORDED BY	DATE	QA CHECK BY	DATE

HTRW DRILLING LOG

1. COMPANY NAME: SpecPro, Inc.	2. DRILL SUBCONTRACTOR: Tol Test	DISTRICT: Louisville; HOLE NUMBER: FBQ-177; SHEET 1 OF 3
3. PROJECT: Fuze & Booster/RVAAP MFR Wiktor	4. LOCATION: Fuze & Booster Quarry Landfill/Pond	
5. NAME OF DRILLER: Neil Witkof	6. MANUFACTURERS DESIGNATION OF DRILL: CME-75	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-75 Auger (4.25" ID / 10.25" OD)	8. HOLE LOCATION: FBQ-177	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/6/03	11. DATE COMPLETED: 10/6/03
12. OVERBURDEN THICKNESS: 18' ~~bgs~~ MFR	15. DEPTH GROUNDWATER ENCOUNTERED: ≈12'2" (10/6/03)	
13. DEPTH DRILLED INTO ROCK: 4.5' ~~bgs~~ MFR	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: ~~9'1"~~ 9'11" bgs (21hr 24min) MFR	
14. TOTAL DEPTH OF HOLE: 22'5"	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES: N/A			
20. SAMPLES FOR CHEMICAL ANALYSIS: N/A	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
22. DISPOSITION OF HOLE: M.W. Constructed	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: ~~M.R. Deering~~ MFR		

LOCATION SKETCH/COMMENTS — SCALE: Not to scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-177

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 1 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Olv brn Silt, tr grv, ltl sd, damp, loose to 6" @ 6", change to Yel brn clayey Silt, tr fine sand, damp, dense (ML)	∅ PPM	FBQ-177 (ST-1)		Push Shelby suff. to 7.5' bgs; recv.: 24' 2∅ MFD
	1					
	2	Yel brn clayey Silt A/A	∅			
	3					Blow counts: 3-6-7-13; Recov.: 19"
	4	Yel brn Silt, tr sand, tr-fn-~~med~~ csd grv, dry, dense	∅			Blow counts: 6-8-13-15; Recov.: 2∅"
MFD	5					
	6	Yel brn Silt A/A; 7-8' slightly clayey	∅			Blow counts: 1∅-22-27-2∅; Recov.: 18"
	7					
	8	Yel brn sdy Silt; tr grv, damp-moist, loose	∅			Blowcounts: 4-4-4-4; Recov.: 22"
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-177

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 2 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11	Yel brn sdy Silt (ML) A/A to 11'8"; @ 11'8" change to Yel brn fn-med Sand, moist-wet, loose (SW)	0 PPM			Blow counts: 4-4-5-5; Recov. 24"
	12	Yel brn sand A/A, wet-sat. to 13'(?); change to fractured/weathered(?) red(dark), fn-med Ss bdrk, wet-sat. (GP) (Ss is not bdrk.) (Water table est. @ 12'2" bgs)	0			Blow counts: 7-7-9-10; Recov.: 11"
	14	Yel brn fn-med (SW) Sand, ft grv, ltl dk red Ss bedrock frags, wet-sat, loose	0			
	16	Yel brn fn-med Sand, ltl-some fn-cse grv, sat, loose	0			Blow counts: 8-10-20-22; Recov.: 24" (Note: 2nd Shelby tube not Doss. due to very likely lack of recov. &/or refusal)
	18	Lt-med brn, silty fn Ss, laminated, sat. layered (thin/fine)	0			Blow counts: refusal - 5#/3"; Recov: 3"
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER FBQ-177

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21	st. Silty Sand, A/a, v. f/m - fn., sat.	0 PPM			~~Blow counts, refusal~~ - 50/3 Recov.: 3"
	22	Silty Ss A/a	0			Auger only to 22'6"
	23	T.D.				
	24					
	25					
	26					
	27					
	28					
	29					
	30					

MONITORING WELL INSTALLATION LOG

PROJECT NAME: Phase I/II Fuze & Booster Quarry Landfill/Pond DELIVERY ORDER: 0012

MONITORING WELL ID: FBQ-177

INSTALLATION START: DATE: 10/6/03 TIME: 13:05

INSTALLATION FINISH: DATE: 10/6/03 TIME: 16:15

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #5 QUANTITY: 11 bags

BENTONITE SEAL: TYPE: Petro Lock/PureGold Bentonite Pellets QUANTITY: 1 bucket

GROUT: TYPE: Portland/Bentonite QUANTITY: 2X92lb./1X50lb.

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): 0.01 (10) SLOT CONFIGURATION: Slotted

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: Gran. filter pack (A/A)

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

JOINT DESIGN AND COMPOSITION: Flush joint/PVC (w/ rubber "O" rings)

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

Was all well screen and casing material used for construction free of foreign matter (e.g. adhesive tape, labels, soil, grease, etc.)? YES [✓] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [✓] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the complete well? YES [✓] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

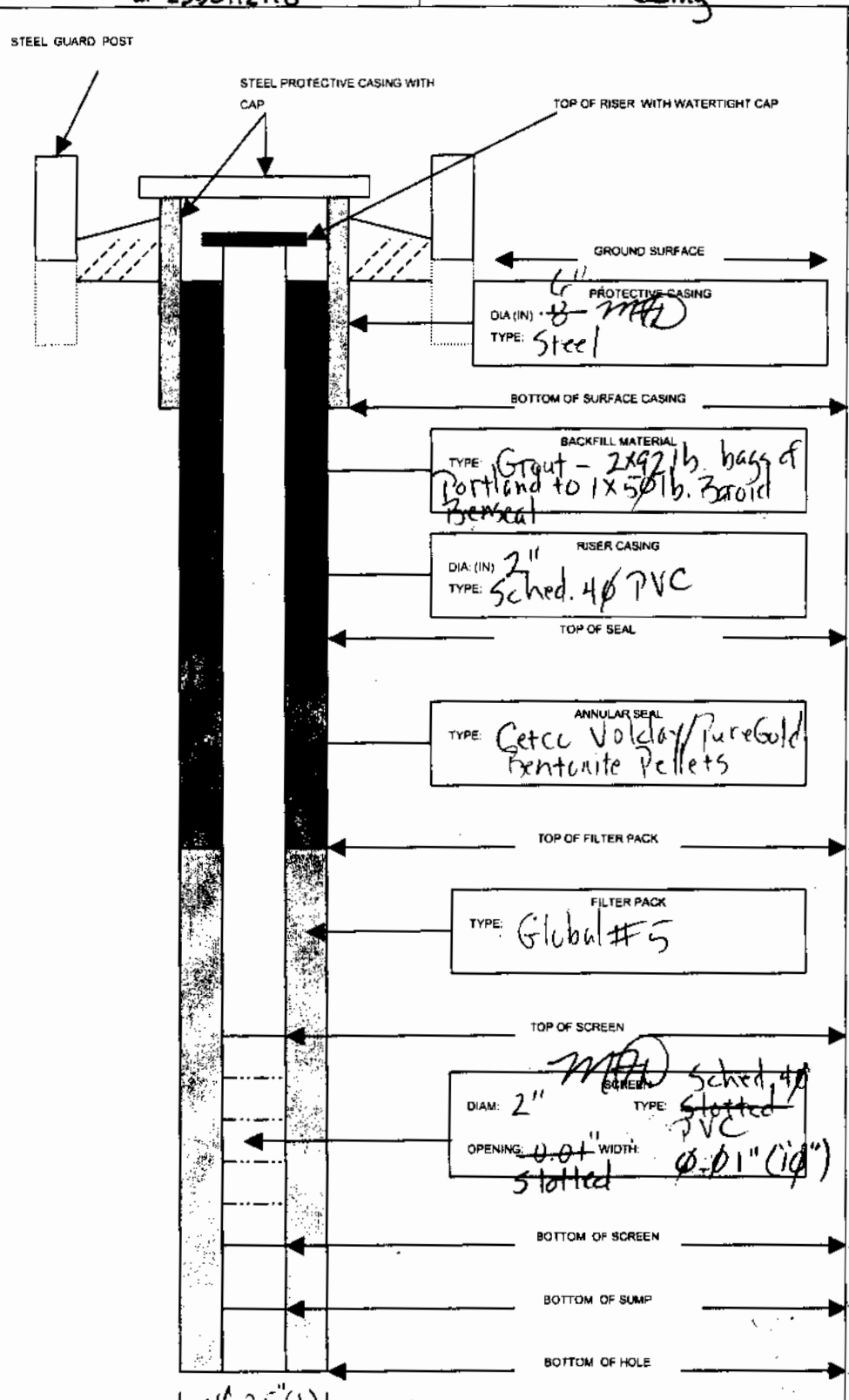
RECORDED BY: M. J. Deering (Signature and Date) 10-6-03

QA CHECK BY: (Signature and Date) 12/4/03

MONITORING WELL CONSTRUCTION DIAGRAM

PROJECT NAME: Phase I/II Fuze & Booster Quary Landfill/Pond **DELIVERY ORDER NO:** 0012

WELL NUMBER: FBQ-177	**BEGIN:** 10-6-03/13:05	**END:** 10-6-03/16:15
COORDINATES: N: 553321.94 E: 2350112.18	**REFERENCE POINT:** top inner casing	**ELEVATION:** 1128.57 ft.



WELL VOLUME CALCULATION SHEET

Date: 10-23-03 Time: 1500

Well ID: FBQ-177

Well Location: Fuze / Booster

Total Depth of Well (ft BTOC) 24.9
Depth to Water (ft BTOC) 11.75
Height of water column (ft) (Hc) 13.15

Well Volume Calculation: ~~.01~~ .022

Vc = $3.142(Rc^2)*Hc$ .29 cu. ft.

1ft - .01 = .3142

Vf = $3.142[(Rf^2)-(Ro^2)]*$(Hc or length of screen)$*(0.30)$
Note use length of screen if Hc>length of screen
= ~~.09~~ cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.) 2.8*5 = 14 gal
= 2.8 gal.

Where:

Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total Volume
Ro = Outside radius of casing (0.10 ft)
Hc = Height of water column 13.15 (ft)
Rf = Radius of filter pack (0.33 ft)
Rc = Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO:** 0012

Date: 10 / 23 / 03

Well Number and Location: FBQ-177

Development Crew: Chantelle Cotton

Driller (if applicable): n/a

Water Levels/Time: Initial: 11.75 / _____ Pumping: _____ / _____

Final: 12.18 / _____

Total Well Depth: Initial: 24.9 Ft BTOC Final: 25.9 Ft BTOC

Date and Time: Begin: 10/23 / 1500 Completed: _____ / _____

Development Method(s): whale pump and bailer

Total Quantity of Water Removed: 18 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85 98C0754	10-22-03 (in lab)
Specific Conductivity	"	"
pH	pH Testr 3+	"
Turbidity	LaMotte Model 2008	10-23-03

GROUNDWATER PURGE SHEET

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Lanfill/Pond **DELIVERY ORDER NO: 0012**

DATE (mm/dd/yy): 11/10/03 TIME: 09:15

WELL ID NUMBER: FBQ 177 WELL LOCATION: SW corner S. Pond FBQ

DEPTH OF SCREENED INTERVAL (BTOC): _____ ft to 24.9 ft

INNER CASING: TYPE: PVC ID: 2 inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ (.083)² (13) .28

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2] (TD-S \text{ or } H) (P)$ (.33)² - (.083)² (1) .31 .28 .84 .026

NOTE: If S>H use S, if S<H use H .0989

$Vt = (Vc + Vf) (7.48)$ 2.28 gal

WHERE:

Vc = Volume of water in well casing, cu. ft.
Vt = Total volume, ga.
Vf = Volume of water in filter pack, cu. ft.
do = outside of diameter of well casing, ft.
di = inside diameter of well casing, ft.
P = estimated porosity of filter pack

dH = diameter of borehole, ft.
TD = total depth of well from top of well casing, ft.
H = depth of water, ft., from top of well casing
S = depth to base of seal, ft., from top of well casing

PURGE METHOD; [✓] Bailer [ ] Bladder Pump [ ] Pump Type _____

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 6.86 GAL.

SAMPLE METHOD: [✓] Bailer [ ] Bladder Pump [ ] Other (specify) _____

SITE CONDITIONS DURING PURGING: _____

FIELD OBSERVATIONS: _____

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY: _____

RECORDED BY: [signature] 11/10/03 (Signature and Date)

QA CHECK BY: Amy Steenwarde 12-08-03 (Signature and Date)

APPENDIX C

WELL PURGE RECORD

PROJECT NAME: Phase I/II Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO: 0012**

WELL NUMBER AND LOCATION: FBQ 177 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/10/03	0936	Initial	13.5	250.0	7.32	140			DO= 2.23
	1000	~~2.83~~	14.3	330.6	7.05	>999	3		DO = 2.01
	1006	3	14.0	332.6	7.10	>999	6		DO = 1.53
	1020	3	13.9	328.0	7.05	>999	9		DO = 1.55

RECORDED BY: [signature] 11/10/03
(Signature and Date)

QA CHECK BY: Amy Steenwald 12-08-03
(Signature and Date)

SLUG TEST RECORD

PROJECT NAME: Phase I/II RI Fuze & Booster Quarry Landfill/Pond **DELIVERY ORDER NO:** 0012

WELL NO.: 177	DATE STARTED: 12-02-03	DATE COMPLETED: 12-03-03	
LOCATION: FBQ	RECORDED BY: R BAILEY		

EQUIPMENT INFORMATION SUMMARY

EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NO.	RANGE (PSI)	LAST CALIB.
DATA LOGGER	INSITU MINI	TROLL			
TRANSDUCER					
WATER LEVEL	HERON	DIPPER-T	01512		

PRETEST DATA

REFERENCE POINT TOC/BGS	REFERENCE POINT ELEVATION	RISER CASING I.D. (IN) 10.25"
SCREEN OR OPEN HOLE I.D. (IN) 2	DIAMETER OF BOREHOLE (IF SCREENED)	

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	24.9		TOP OF FILTER PACK	9'	
DEPTH TO WATER	10.72'		TOP OF SCREEN OR OPEN HOLE	12'	
HEIGHT OF WATER COLUMN	~~18.7~~ 14.18'		SCREEN LENGTH	~~10~~ 10'	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

TEST METHOD SLUG IN (FALLING HEAD) [✓] SLUG OUT (RISING HEAD) [✓]

SLUG DIMENSIONS		SLUG VOL(GAL)	SLUG DEPTH(FT)
	3.1 X 1.25		

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
FBQ 177	SLUG IN	12/02/03	12/02/03	1310	1600	19.9	10.72	12.813	14.18	12.087
FBQ 177	SLUG OUT	12/02/03	12/03/03	9:15 1600	12:00	19.9	10.72	9.676	14.18	15.324

STORAGE LOCATION OF DATA: 1) 2)

FILE STRUCTURES	DATA TYPE	FORMAT (1)	UNITS	TEST TIME INTERVAL: LOG SCALE	TEST TIME INTERVAL: ARITH. SCALE	COMMENTS
COLUMN B	TIME	CL	HHMMSS	✓		
COLUMN C	TIME	ET	MIN	✓		
COLUMN E	DEPTH	H	FT H_2O			

(1) CK – 24 HR CLOCK TIME; ET – ELAPSED TIME; H – HEIGHT OF WATER ABOVE TRANSDUCER; FT BRP – DEPTH TO WATER; E – WATER LEVEL ELEVATION; P – PRESSURE; 0 – OTHER (EXPLAIN)

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY	DATE	QA CHECK BY	DATE

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RVAAP-19 LANDFILL NORTH OF WINKLEPECK BURN GROUND

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HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT: LOUISVILLE		HOLE NUMBER: LNWmw-027
1. COMPANY NAME: MKM ENGINEERS	2. DRILL SUBCONTRACTOR: HAD		SHEET OF SHEETS
3. PROJECT: RVAAP-RI14		4. LOCATION: RAVENNA, OH LANDFILL	
5. NAME OF DRILLER: GREG		6. MANUFACTURER'S DESIGNATION OF DRILL: CME-LC60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4 1/4" ID HSA; 1 1/2" ID X 24" SPLIT SPOON		8. HOLE LOCATION: SOUTH OF LANDFILL	
		9. SURFACE ELEVATION: 1024.40 ASL	
		10. DATE STARTED: 12/13/04	11. DATE COMPLETED: 12/14/04
12. OVERBURDEN THICKNESS: 10		15. DEPTH GROUNDWATER ENCOUNTERED	
13. DEPTH DRILLED INTO ROCK: 15.5'		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 8.5' @ 1030 12/22/04	
14. TOTAL DEPTH OF HOLE: 25' BGS		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 12/15/04 ~17.5' BGS	

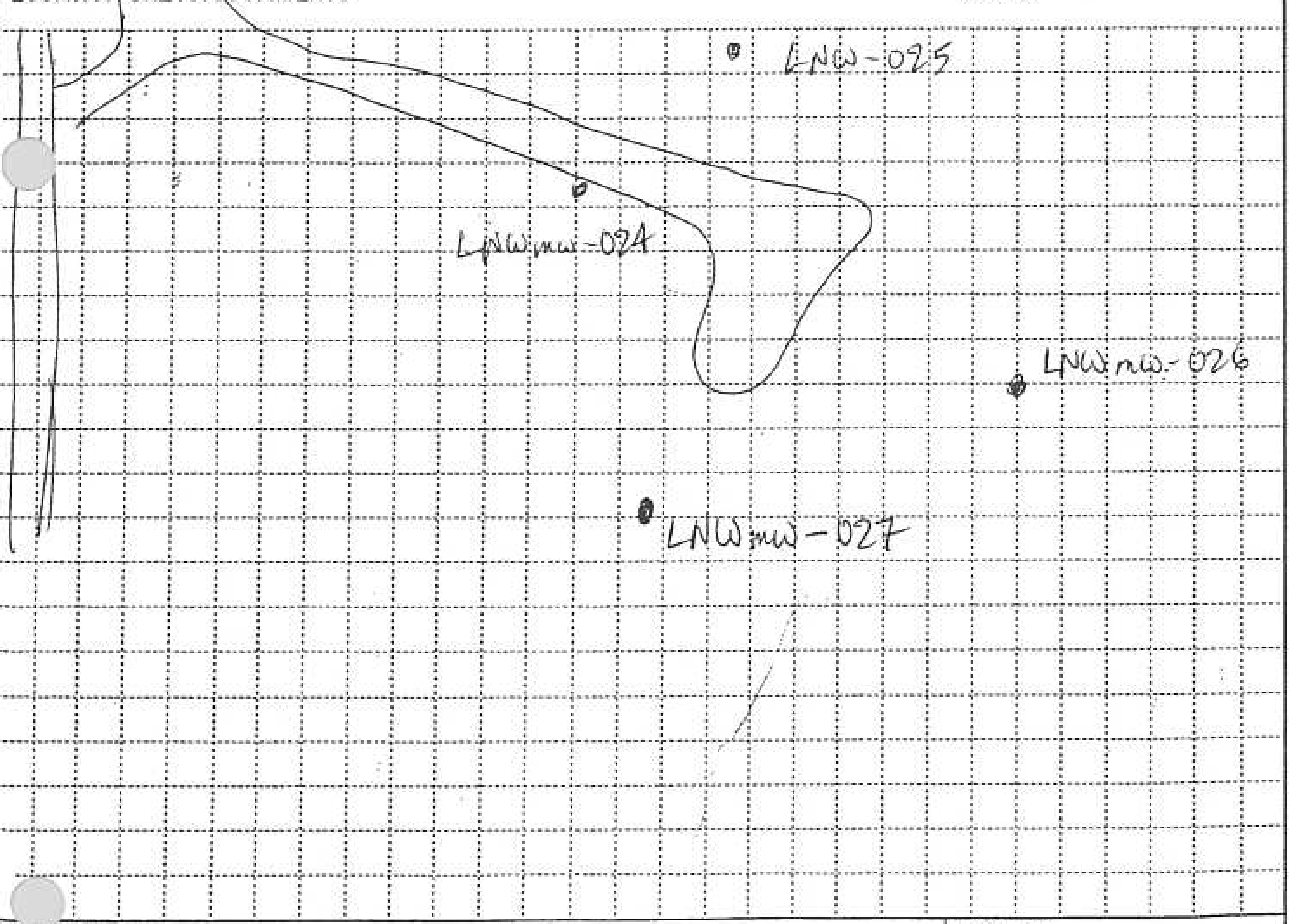
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
—	—	X	NA			

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	David B. [illegible]

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT	HOLE NO.
RVAAP-RI14	LNWmw-027

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LNW MW-027

PROJECT: RVAAP-R14 | INSPECTOR: DK EARNEST | SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. RECOVERY (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	2	SILT TOPSOIL DK GREY/BROWN SILT BROWN W/GREY SLOT SANDY SILT (40%) (50%) (50%) LOW PLASTIC SOME FINE TO MED GRAVEL LOOSE TO MED DENSE (10%)	0.0	RECOVERED 1.8	ML	PUSH	7.5YR 4/3
	4	SAA	0	1.2	ML	3/4 4/6	
	6	CLAYEY SILT TRACE SAND (40%) (60%) (10%) MED PLASTIC SOME GRAVEL (5%) BROWN MOTTLED W/GREY ROCK FRAGS MED DENSE	0	2.0	ML/CL	6/8 7/9	7.5YR 5/3
	8	SAA	0	1.9	ML/CL	9/7 15/13	
			0	1.0	ML/CL	7/31 SPT	SPOON REFUSAL 8-9.5'
	10	DK GREY SHALE WEATHERED SAA FISSILE NO ODOR SOFT	0	NR	SH	20/29 18/11	AUGER 10-11' 10YR 3/1 11-13
	12	DK GREY WEATHERED SHALE SAA	0	1.9	SH	8/14 20/18	DRY 13-15
	14	SAA	0	1.0	SH	10/13 13/15	15-17
	16	SAA	0	1.1	SH	23/SPT	SPOON REFUSAL 17-19
	18	SAA	0	1.5	SH	22/100 15/100	19-21
	20						

PROJECT: RVAAP-R14 | HOLE NO: LNW MW-027

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LNWMW-027

PROJECT: RVAAP-RI 14

INSPECTOR: DK EARNEST

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	22	DK GREY WEATHERED SAA SHALE	0	1,8	SH	10/22 50+	21-23
	24	SAA	0	1,8	SH	10/12 16/10	23-25
		~~BOH 25'~~					
	26	SAMPLED TO 24' DRILLED TO 25' SET 24' WELL					
	28	SET SCREEN AT 4-24' BGS SAND TO 11' BGS SEAL TO 8' BGS					
	30	7 BAGS SAND					

PROJECT: RVAAP-RI 14

HOLE NO. LNWMW-027

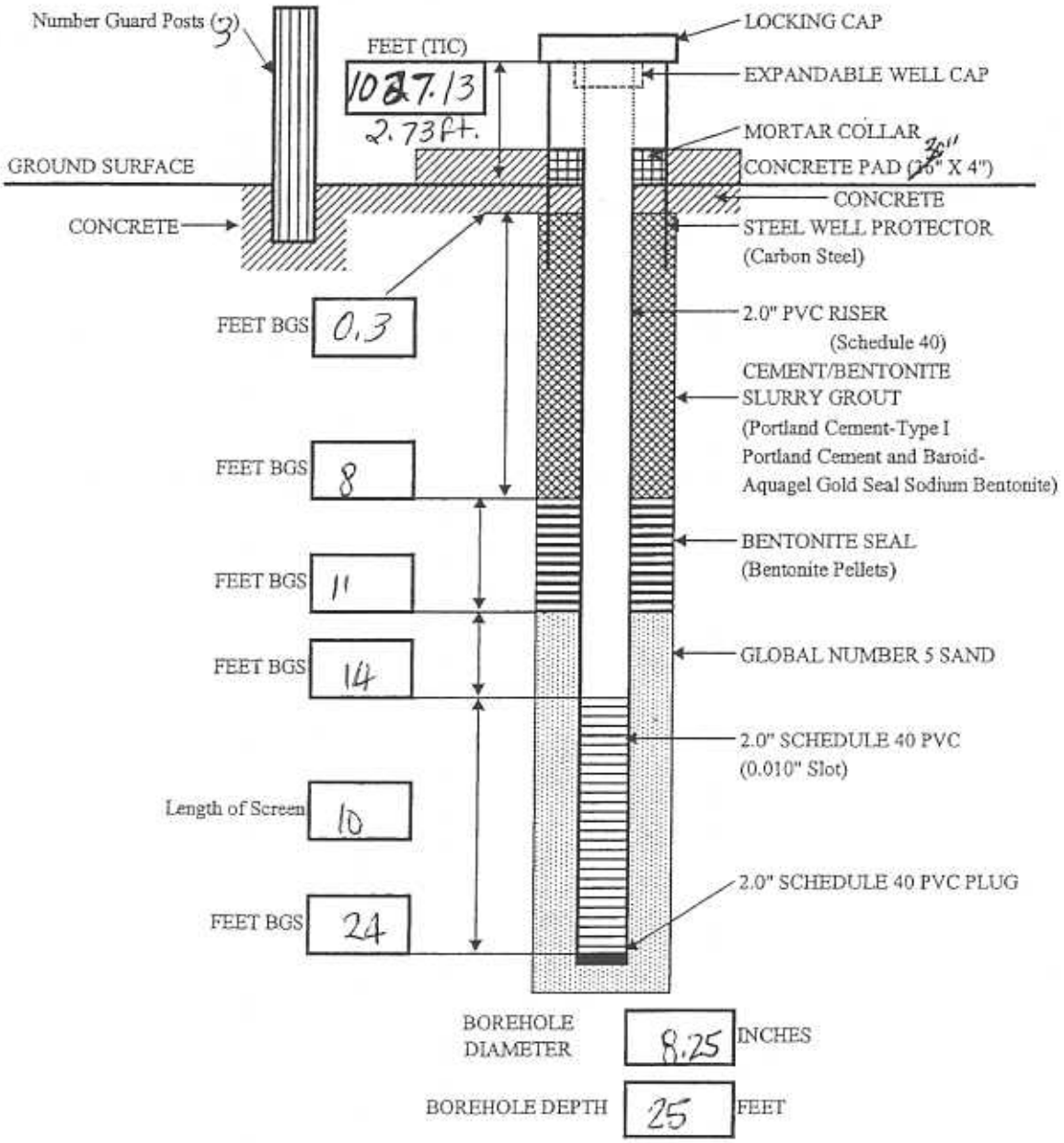
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: LNW MW -027	Begin: 12/13/04	End: 12/14/04
Coordinates: N: 564517.41 E: 2358628.75	Elevation: 1024.40	Reference Point:
Logged By: DK GARNETT		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

RVAAP-33 LOAD LINE 6

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HTRW DRILLING LOG

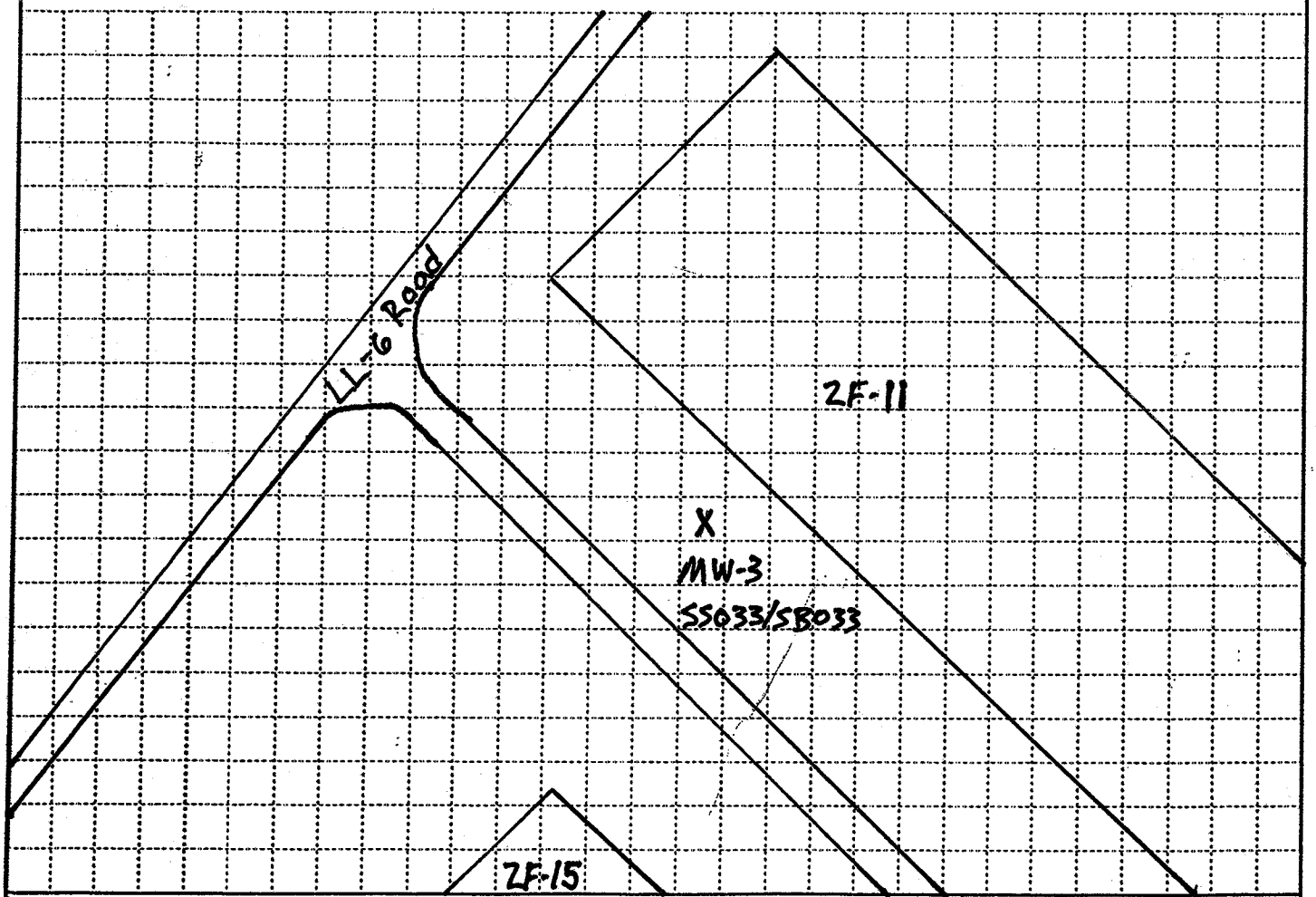
DISTRICT: Louisville		HOLE NUMBER: SB033 MW3
1. COMPANY NAME: MKM Engineers	2. DRILL SUBCONTRACTOR: HAD Rowling	SHEET 1 OF 3 SHEETS
3. PROJECT: LL-6 RI	4. LOCATION: LL-6 RVAAP	
5. NAME OF DRILLER: Sam Holler	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-LC60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 6.25 HSA; 2" Split Spoon	8. HOLE LOCATION	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 18 Nov 03	11. DATE COMPLETED: 18 Nov 03
12. OVERBURDEN THICKNESS: 20'	15. DEPTH GROUNDWATER ENCOUNTERED: 18.2	
13. DEPTH DRILLED INTO ROCK: 3.0 into Weathered Bedrock	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 23.4'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): Nk	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
Shelby Tube	X		0

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						N/A %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		M. Daly

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO.
LL-6 RI	SB033 MW-3

ENG FORM 5056-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SB03 MW3

PROJECT: LL-6 RI

INSPECTOR: Mark Dunlap

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. Recovery	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		6" Topsoil Brown SILT 70% w/Sand 30% No Odor No Staining No Plasticity Dry	0.0	1.2		1-5 7-9	10yr 4/6
	2	Shelby Tube					
	4						
		Brown SILT 60% w/Sand 30 No Odor No Staining No Plasticity Dry	0.0	1.0		1-2 3-5	10yr 4/4
	6	Sampled 6-8 Same As Above	0.0	1.5		1-1 4-4	Same As Above
	8	Same As Above	0.0	1.7		1-4 4-8	Same As Above
	10	Brown SILT 70% w/Sand 20% No Odor No Staining No Plasticity	4.5	2.0		4-7 8-10	Same As Above
	12	Angular Rock Fragments Present @12					
		Brown SAND 70% w/Silt 25 No odor No Staining No Plasticity	5.0	2.0		2-4 15-16	Same As Above
	14	Brown SILT 65% w/Sand No odor No Staining No Plasticity					
		Brown SILT 75% w/Sand 25% FG Dry No odor No Staining No Plasticity				2-8	
		Brown/Red SILT 60% w/Sand Dry No odor No Staining No Plasticity Angular Rock Fragments Present	6.1	2.0		16-24	10yr 5/6
	16	Grey/Brown SILT 70% w/Sand Dry No Odor No Staining No Plasticity	6.1	2.0		3-13 16-21	10yr 4/2
▽	18	Brown SILT 60% w/Sand 35 and Rounded Rock Fragments SATURATED				1-15	10yr 4/4
		@18.2 No odor No Staining Low Plasticity		1.4		30 5/4	
	20	Brown Platey SILT 80% w/ Sand Dry Refusal w/ Split Spoons @20.0					

PROJECT: LL-6 RI

HOLE NO.: SB03 MW3

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SB033 MW3

PROJECT: LL-6 RI

INSPECTOR: Mark Dunlevy

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20						
	22	Weathered Bedrock					
BOH		Refusal @ 23.4					
		BOH @ 23.4					
	24	6" Sand at Bottom Screen from 22.5 - 12.5 Sand up to 9.5 Bentonite up to 6.5 Grout up to 0.5					

PROJECT: LL-6 RI

HOLE NO.: SB033 / MW-3

ENG FORM 5056A-R, AUG 94

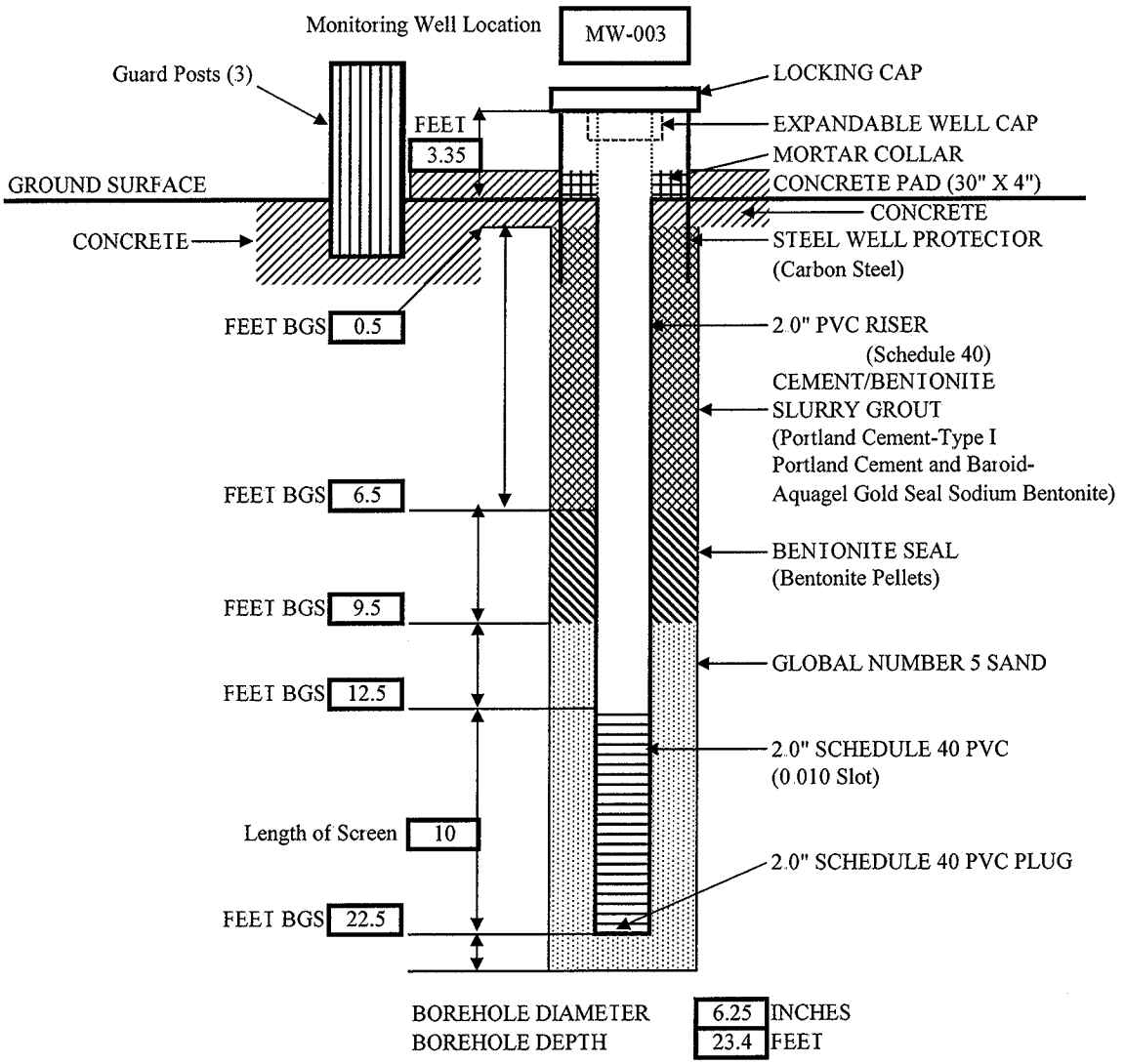
(Proponent: CECW-EG)

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: Load Line 6 RI

Well Number: MW-003	Begin: 11/18/03	End: 11/18/03
Coordinates: N: 553544.34 E: 2353048.68	Elevation: 1125.38	Reference Point:
Logged By: Mark Dunlevy		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard post set in square configuration about the concrete pad.

HTRW DRILLING LOG

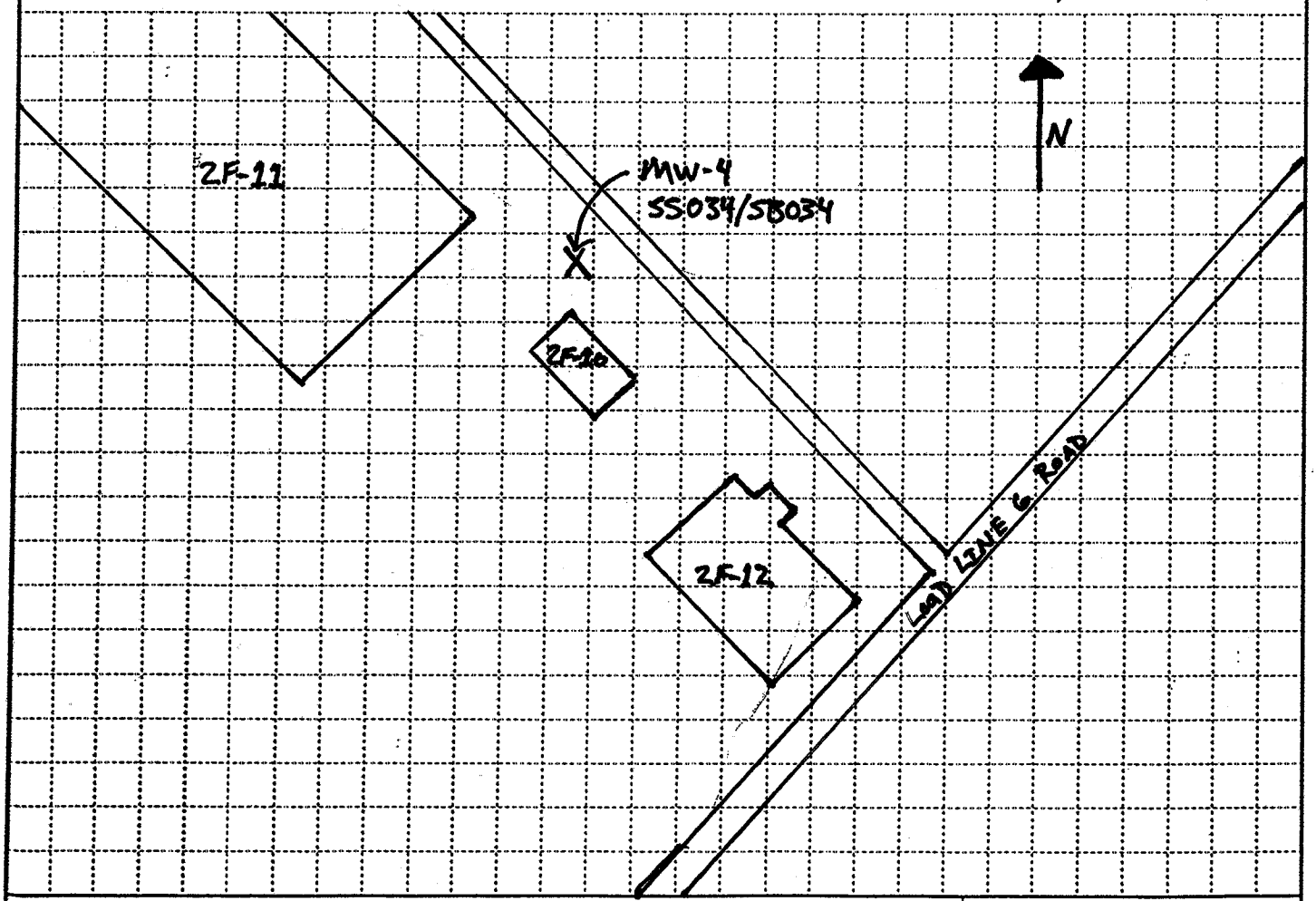
DISTRICT		HOLE NUMBER: SB034/MW4
1. COMPANY NAME: MKM Engineers	2. DRILL SUBCONTRACTOR: HAD Drilling	SHEET 1 OF 3
3. PROJECT: LL-6 RI	4. LOCATION: Load Line 6 RVAAP	
5. NAME OF DRILLER: Todd Bromley	6. MANUFACTURER'S DESIGNATION OF DRILL: CME LC-60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" Stainless Steel Split-Spoons; 6.25 OD HSA	8. HOLE LOCATION	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 14Nov03	11. DATE COMPLETED: 14Nov03
12. OVERBURDEN THICKNESS: 18.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 17.0 ft	
13. DEPTH DRILLED INTO ROCK: 5.0'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 23.0	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA			NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



PROJECT	HOLE NO.
LL-6 RI	SB034 MW4

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SB034 MW4

PROJECT: LL-6 RI

INSPECTOR: Mark Dunlevy

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS PID (d)	GEOTECH SAMPLE OR CORE BOX NO. Recovery	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	0	4" Topsoil Brown SILT 70 w/Sand 25 Moist No Odor No Staining Low Plasticity	0.0	1.7		1-1 6-7	10yr 4/4
	2	Dark Brown SILT 60 % w/Sand 35 Dry No Odor No Staining Low Plasticity					10yr 3/3
		Brown SILT 70 % w Sand 20 Moist No Odor No Staining Low Plasticity	0.0	0.6		1-2 6-10	10yr 5/6
	4						
		Same As Above / Changes to Dry	0.0	1.8		1-7 10-15	Same As Above
	6	Brown SILT 75% w/Sand 20 Dry No Odor No Staining No Plasticity	0.0	1.7		2-7 14-15	~~Sand~~ 10yr 4/4
	8						
		~~Sample A~~ Brown ~~SAND~~ Sand Layer @ 9' → 2"	0.0	2.0		2-6 12-14	
	10	Brown SILT 65 w/Sand 30 Moist No Odor No Staining					
		Grey Mottling Present @ 11-12	0.0	2.0		2-4 6-7	
	12						
		2" SAND 70 raw Silt WET No Odor No Staining	0.0	2.0		1-4 7-9	
	14	Brown SILT 60 w/Sand 25 Dry No Odor No Staining No Plasticity Angular & Rounded Rock Present					
		Grey SILT 75 w/ Clay Moist No Staining No Odor	0.0	2.0		1-3 4-6	
	16	Brown SILT 95% w Sand No Odor No Staining No Plasticity					
▽			0.0	1.7		1-4 5-15	
	18	Saturation @ 17ft. Fractured weathered Bedrock Present to 18ft					
				0.6		50/5	
	20						

PROJECT: LL-6 RI

HOLE NO.: SB034 MW4

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SB034 MW4

PROJECT: LL-6 RI

INSPECTOR: Mark Dawley

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20	Weathered Bedrock					10yr 7/4
	22	↓					
		BOH @ 23.0					
	24	Sampled 15'-17' @ 1010 14Nov03					
		BOH @ 23					
		Sand to 6" above Screen					
		Bottom of Screen @ 22.5'					
		Top of Sand to 9.5'					
		Bentonite 9.5' → 6.5'					
		Grout 6.5' → 1.0'					

PROJECT: LL-6 RI

HOLE NO.: SB034 MW4

ENG FORM 5056A-R, AUG 94

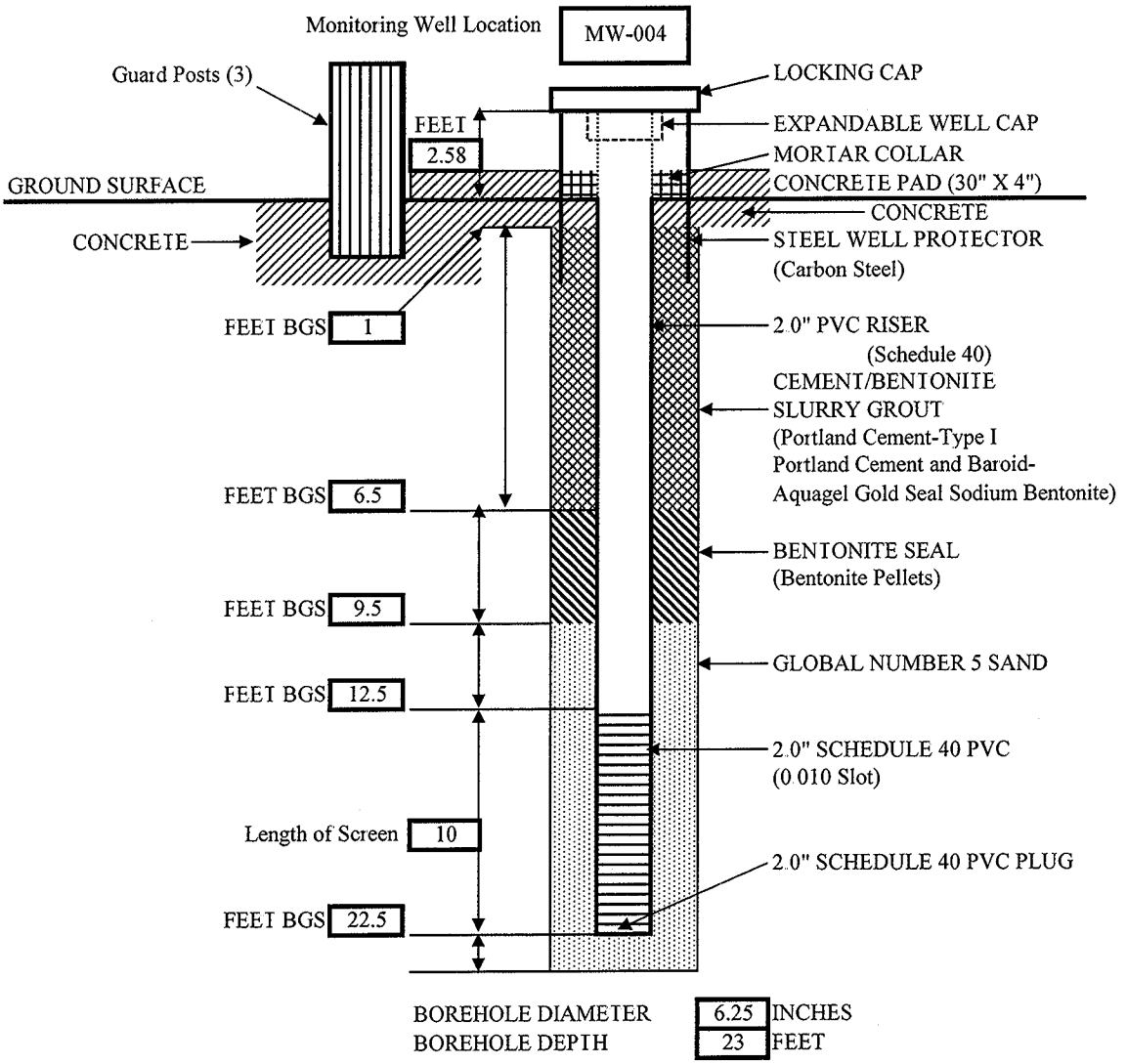
(Proponent: CECW-EG)

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: Load Line 6 RI

Well Number: MW-004	Begin: 11/14/03	End: 11/14/03
Coordinates: N: 553431.82 E: 2353368.79	Elevation: 1125.39	Reference Point:
Logged By: Mark Dunlevy		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard post set in square configuration about the concrete pad.

HTRW DRILLING LOG

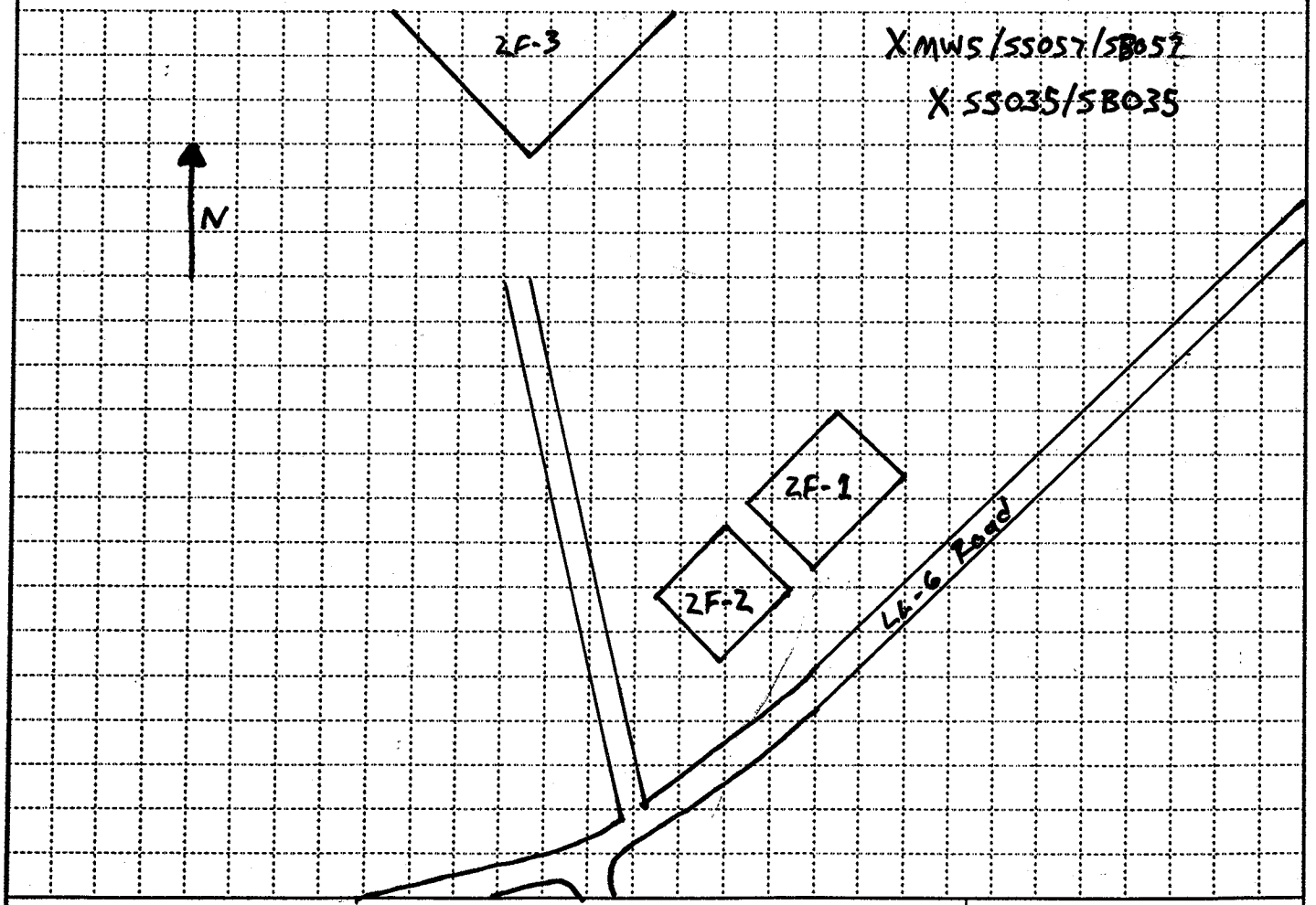
	DISTRICT: Louisville	HOLE NUMBER: SB057/MW5
1. COMPANY NAME: MKM Engineers	2. DRILL SUBCONTRACTOR: HAD Drilling	SHEET 1 OF SHEETS 2
3. PROJECT: LL-6 RI	4. LOCATION: Load Line 6 RVAAD	
5. NAME OF DRILLER: Todd Bromley	6. MANUFACTURER'S DESIGNATION OF DRILL: CME LC-60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" Stainless Steel Split Spoons 6.25" OD HSA	8. HOLE LOCATION	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 6 Jan 04	11. DATE COMPLETED: 6 Jan 04
12. OVERBURDEN THICKNESS: 12.9'	15. DEPTH GROUNDWATER ENCOUNTERED: 10.5'	
13. DEPTH DRILLED INTO ROCK: >7.0'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 19.9'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 10.2' During Development 12 Jan 04	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA			NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
NA						NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		D. Cinley

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



PROJECT	HOLE NO.
LL-6 RI	SB057/MW-5

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SB057/MW5

PROJECT: LL-6 RI

INSPECTOR: D. Denly

SHEET 2 OF 2 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS PID (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ Recovery	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	0	4" Topsoil Brown w/ Red Mottling SILT 65% w/ Sand Dry Stiff No Plasticity No Odor	3.5 4.5	1.1		2-2 3-2	7.5yr 5/6
	2	Same As Above	3.2	1.4		3-3 6-7	Same As Above
	4	Rounded Silica Rock @ 4.2 Brown SILT 65% w/ Grey Clay Dry Stiff No Plasticity No Odor	0.0	1.85		3-7 6-8	2.5yr 4/6
	6	Brown SILT 75% w/ Clay Stiff No Plasticity No Odor White Mottling	0.0	2.0		3-12 20-23	Same As Above
	8	Same As Above White Mottling Stops @ 9.1'	0.0	1.8		3-10 12-17	Same As Above
▽	10	Saturated @ 10.5' Rock Fragments Present Brown SILT 60% w/ Sand Dry No Odor No Staining No Plasticity	8.2	1.0		9-10 12-14	Same As Above
	12	1cm SAND Layer Saturated Split Spoon Refusal @ 12.9'	0.4	1.0		3 50/3	7.5yr 5/8
	14	Weathered Bedrock (SS)					
	16						BOH 19.9 Sand to 19.5 Screen from 19.5 to 9.5 Sand up to 7.5 Bentonite up to 5.5 Grout/Cement to Surface Completion Stick-up Completion
	18						
	20	BOH 19.9'					

PROJECT: LL-6 RI

HOLE NO.: SB057/MW-5

ENG FORM 5056A-R, AUG 94

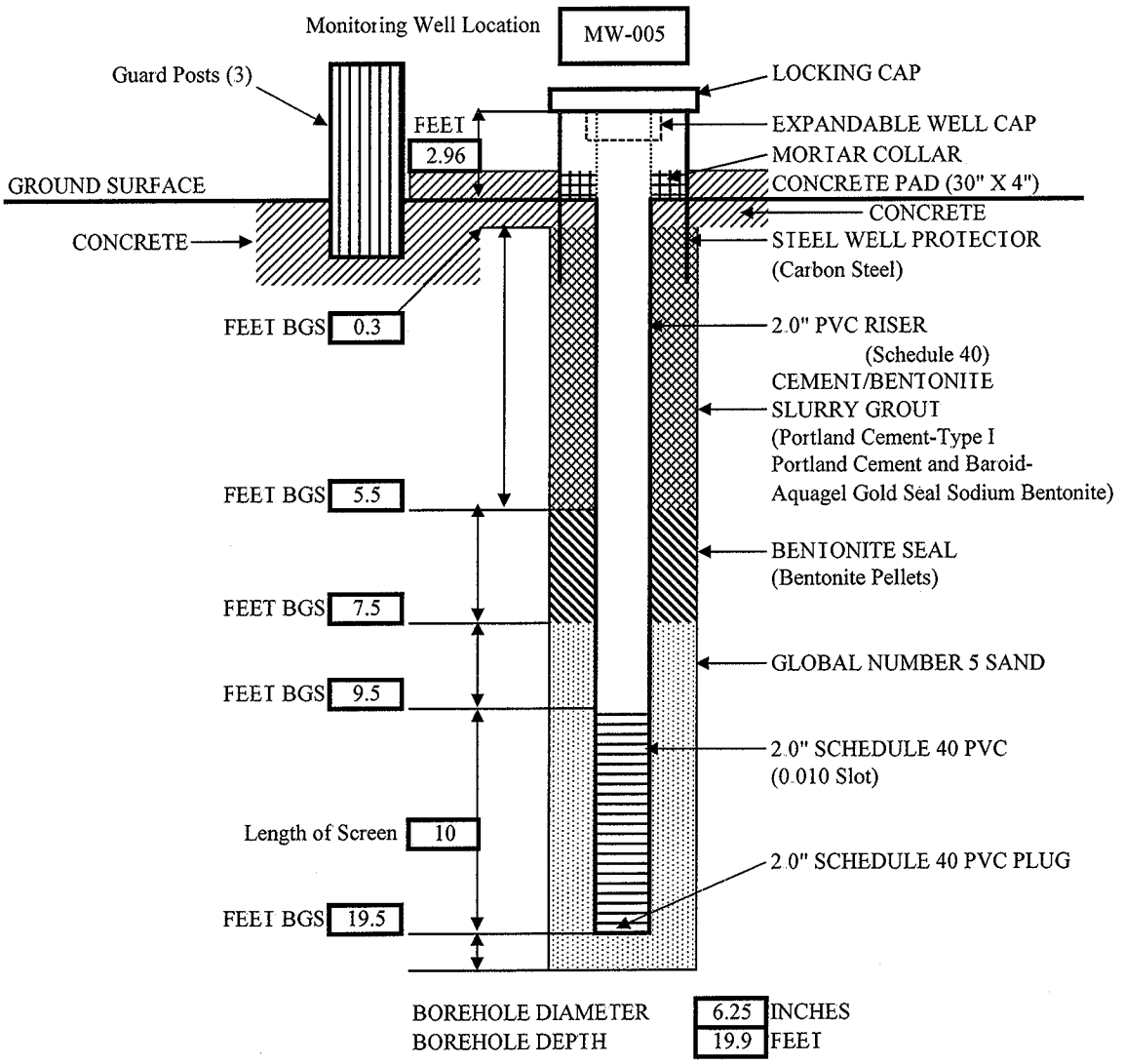
(Proponent: CECW-EG)

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: Load Line 6 RI

Well Number: MW-005	Begin: 01/06/04	End: 01/06/04
Coordinates: N: 553170.76 E: 2353194.52	Elevation: 1120.47	Reference Point:
Logged By: Mark Dunlevy		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard post set in square configuration about the concrete pad.

HTRW DRILLING LOG

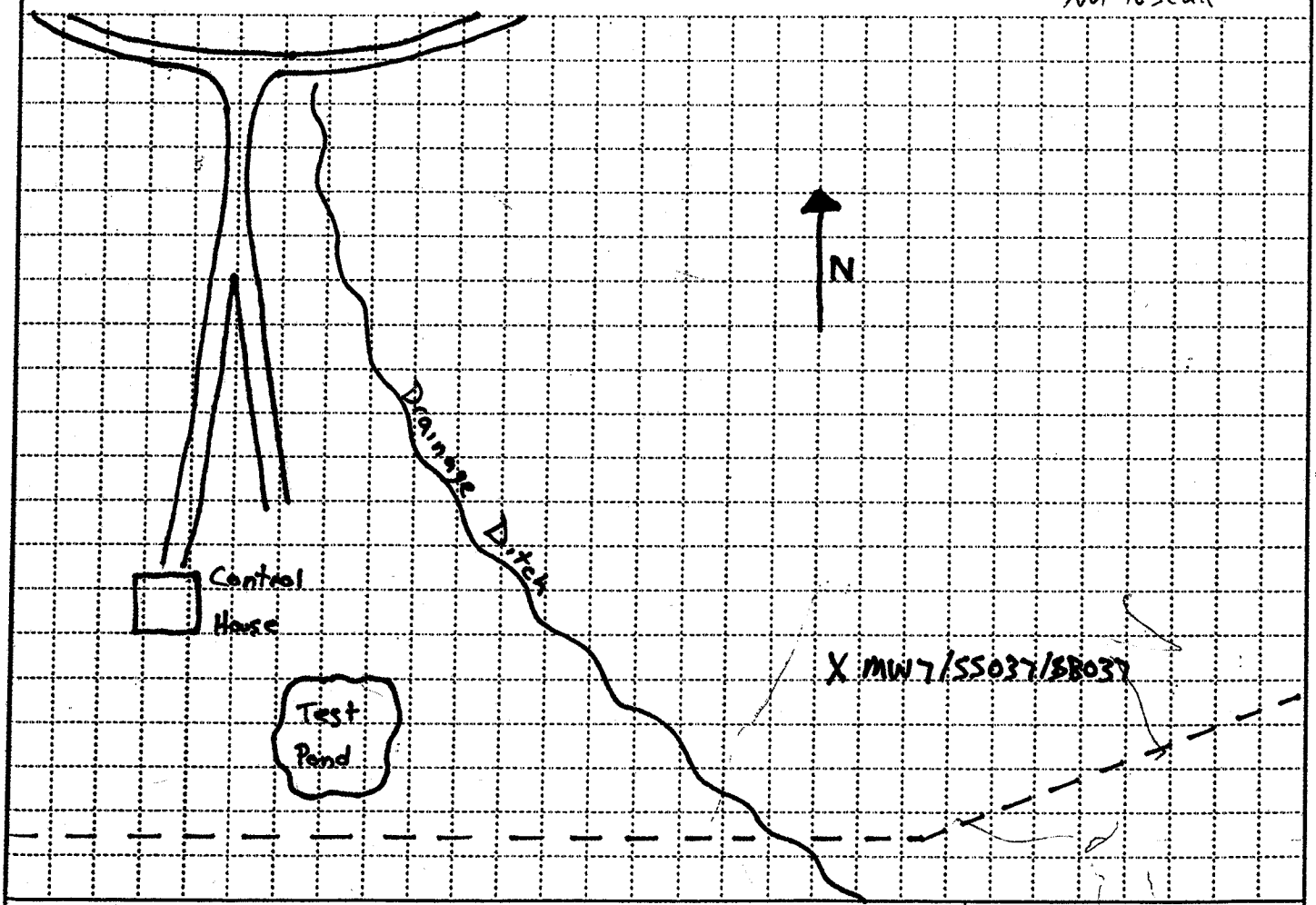
	DISTRICT: Louisville	HOLE NUMBER: SB037/MW7
1. COMPANY NAME: MKM Engineers	2. DRILL SUBCONTRACTOR: HAD Drilling	SHEET 1 OF 2 SHEETS
3. PROJECT: LL-6 RI	4. LOCATION: Load Line 6 RVAAP	
5. NAME OF DRILLER: Todd Bromley	6. MANUFACTURER'S DESIGNATION OF DRILL: CME LC60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" Split Spoon / Stainless Steel; 6.25" HSA	8. HOLE LOCATION	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 17 Nov 03	11. DATE COMPLETED: 17 Nov 03
12. OVERBURDEN THICKNESS: 18.2	15. DEPTH GROUNDWATER ENCOUNTERED: 14.5	
13. DEPTH DRILLED INTO ROCK: Weathered Bedrock - 2.0	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 20.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA			NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
		X				NA %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		M. O. Conley

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



PROJECT	HOLE NO.
LL-6 RI	SB037/MW7

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER 58037/MW7

PROJECT LL-G RI | INSPECTOR Mark Dunlay | SHEET 2 OF 2

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS PID (d)	GEOTECH SAMPLE OR CORE BOX NO. Recovery	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		6" Topsoil					
		Brown SILT 60% w/Clay 30 No Odor No Staining Med. Plasticity Grey Mottling Present Moist		1.3		1-1 3-3	7.5yr 5/6
	2	Brown SILT 65% w/ Sand No Odor No Staining No Plasticity Dry		2.0		1-5 5-12	10yr 4/6 10yr 4/4
		Brown SILT 70% w/ Sand 20% No Odor No Staining No Plasticity Dry					
	4			2.0		1-4 8.8	10yr 4/4
		1/2 Inch SAND Lens 90% SAND Silt Dry					
	6	Brown SILT 65% w/ Sand 30 No Odor No Staining No Plasticity Dry		2.0		2-5 6-10	10yr 4/4
		Changes to Moist @ 7.0					
	8	Brown SILT 65% w/ Sand 30 No odor No Staining No Plasticity Moist		2.0		1-2 3-4	10yr 4/4 10yr 4/1
		Changes to Grey Angular Rock Fragments Present					
	10	Grey SILT 60% w Sand 35 No odor No Staining No Plasticity Moist		1.7		1-2 2-3	10yr 4/1
	12						
		Ang Jar Rock Fragments Present		1.8		1-2 7-12	Same As Above
	14	~~Brown~~ Grey SILT 60 w/Sand 35 No odor No Staining No Plasticity Moist					
▽		Brown SAND 70% w SILT No odor No Staining				2-5	
		Saturation from 14.5-15.0					Same As Above
		Grey SILT 70% w/Sand 20% No odor No Staining No Plasticity Dry		2.0		4-7	
	16						
		Same As Above					
	18						
		Weathered Bedrock encountered @ 18.2					Sampled 12-14 @ 1040 12 Nov 03
BOH	20	BOH 20'					

PROJECT LL-G RI | HOLE NO. 58037 (MW7

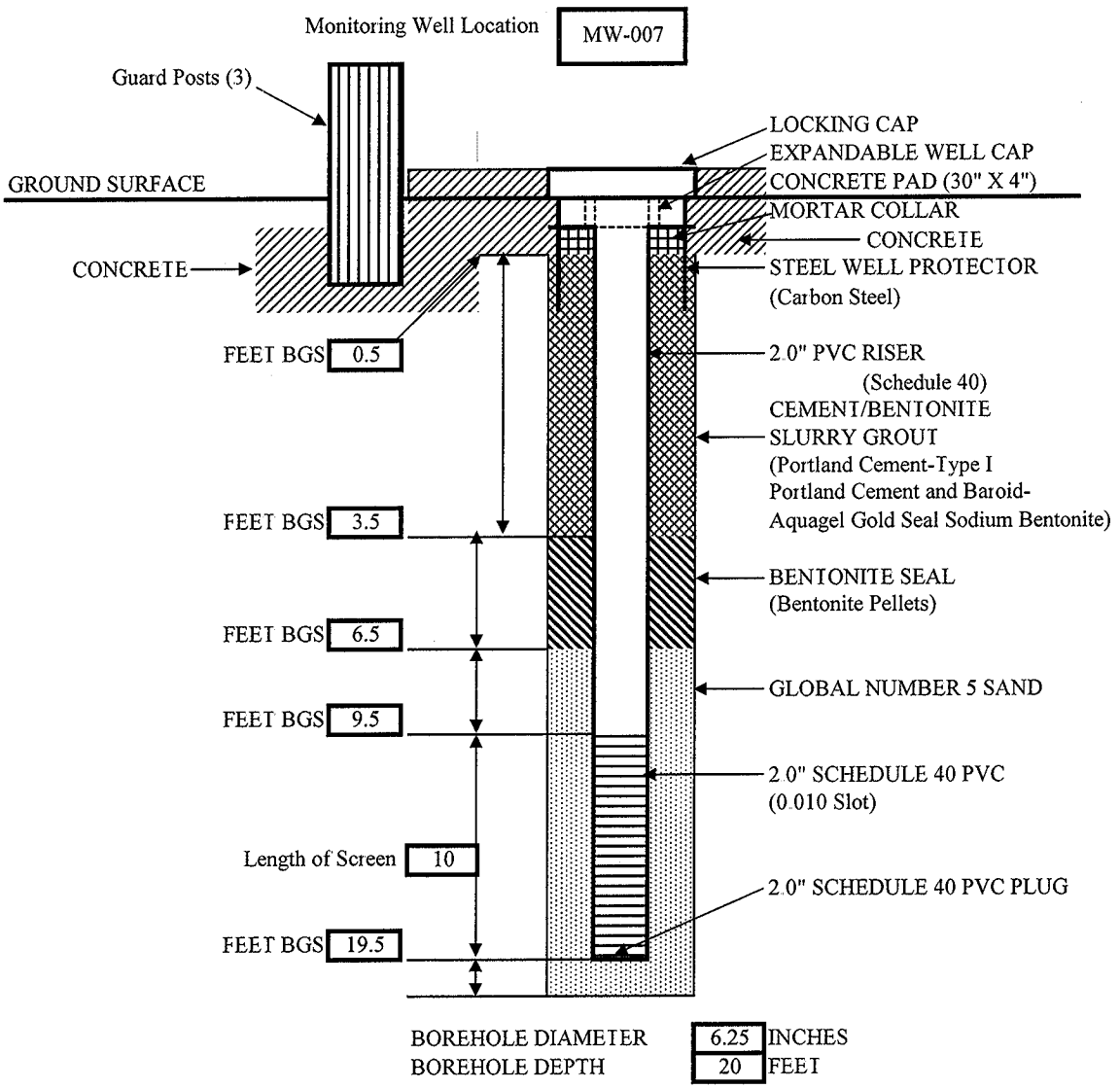
ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: Load Line 6 RI

Well Number: MW-007	Begin: 11/17/03	End: 11/17/03
Coordinates: N: 552677.17 E: 2353354.89	Elevation: 1115.62	Reference Point:
Logged By: Mark Dunlevy		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard post set in square configuration about the concrete pad.

RVAAP-39 LOAD LINE 5

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HTRW DRILLING LOG

1. COMPANY NAME: Main Engineers	2. DRILL SUBCONTRACTOR: H+D Drilling Contractors	HOLE NUMBER: LL5mw-001
		SHEET 1 OF 3 SHEETS

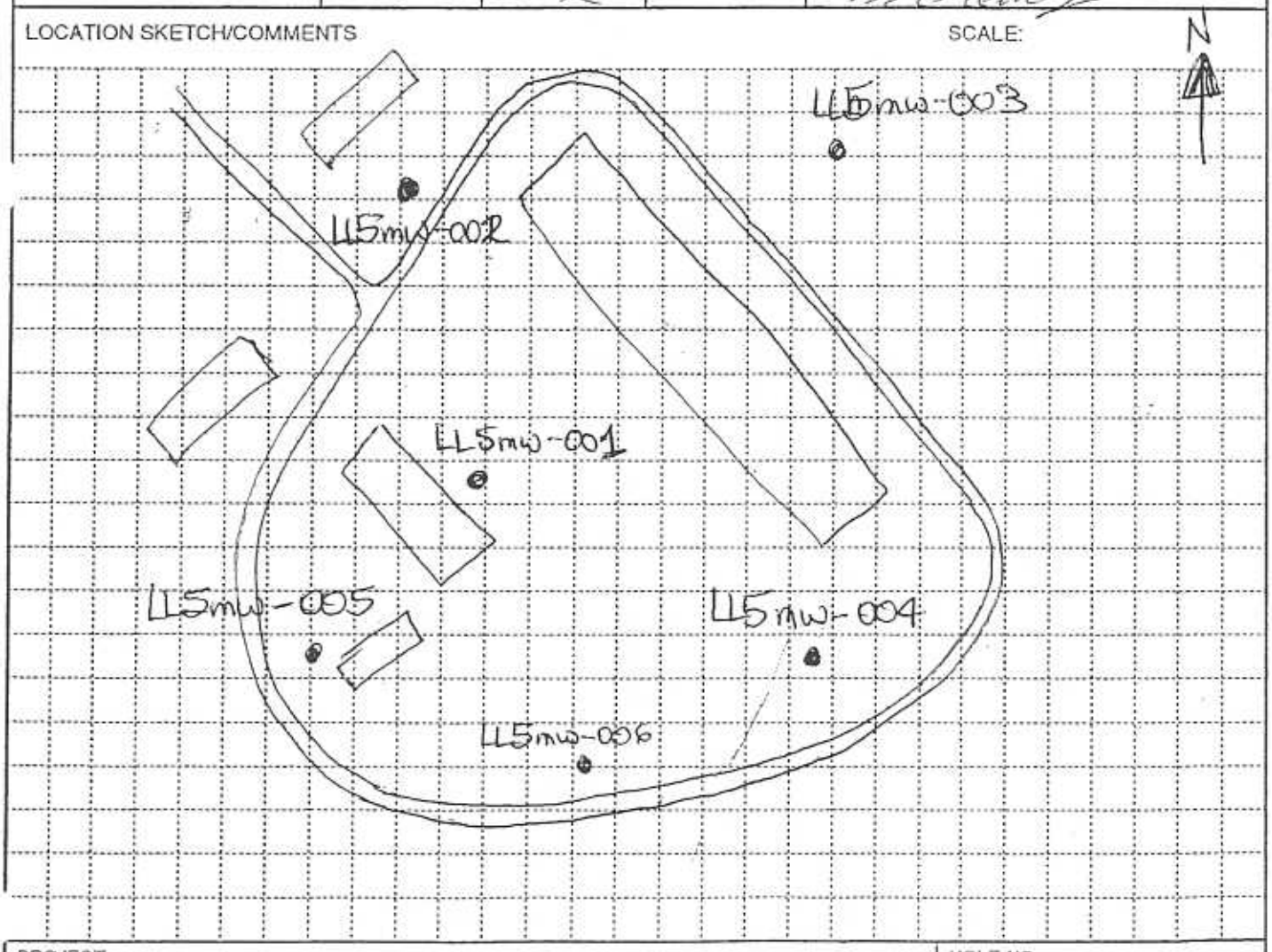
3. PROJECT: RVAAP RI 14	4. LOCATION: Load Line 5
5. NAME OF DRILLER: Sam Holler	6. MANUFACTURER'S DESIGNATION OF DRILL: CME 550
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 8.25 HSA; 2" Split Spoons	8. HOLE LOCATION: ADJACENT TO BLDG 1F-8
	9. SURFACE ELEVATION: 1125.00 ASL
	10. DATE STARTED: 08Dec04 — 11. DATE COMPLETED: 08Dec04
12. OVERBURDEN THICKNESS: 26	15. DEPTH GROUNDWATER ENCOUNTERED: ~15, 18
13. DEPTH DRILLED INTO ROCK: 0	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 17.74 @ 1055 12/17/04
14. TOTAL DEPTH OF HOLE: 26	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
SHELBY TUBE 6-8	—	X	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY — %
	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO.
RVAAP RI 14	LL5mw-001

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET / SHEETS
RVAAP RI M	Mark Dunkley	LL5mw-001	2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ Recovery (e)	~~ANALYTICAL SAMPLE NO.~~ USCS (f)	BLOW COUNT (g)	REMARKS (h)
1230	0–2	4" Topsoil Redish/Br. SILT 70% w Sand Damp No Odor No Plasticity Gray mottling	0.0	1.6	ML	1-2 4-5	7.5yr-5/6
	2–4	SAA	0.0	1.7	ML	1-4 8-8	SAA
	4–6	Dk Br. SILT 75% w Sand Dry SAA No Odor No Plasticity No Staining	0.0	1.7	ML	1-4 5-13	7.5yr-4/3
	6–8	1240 UBDALC01 Shelby Tube		~~1.5~~ MDD		~~1-3~~ MDD ~~6-6~~	
	8–10	Br. SILT 60% w Sand Dry No Odor No Staining No Plasticity	0.0	1.5	ML	1-3 6-6	7.5yr-4/6
	10–12	SAA	0.0	2.0	ML	2-4 6-14	SAA
	12–14	SAA	0.0	1.7	ML	1-2 8-6	SAA
▽	14–16	SAA Lt Br. Sand 85% w SILT Dry No Odor No Plasticity No Staining Possible weathered Rock Frag	0.0	1.5	ML SM	2-5 24-16	SAA 7.5yr-7/4
	16–18	Br. SILT 65% w Sand Damp/Moist No Odor No Staining	0.0	1.7	ML	5-5 5-5	
▽	18–20	Gray Sand 70% w Silt Damp No Odor No Staining No Plasticity	0.0	0.9	SM	1-1 2-1	7.5yr-5/2

PROJECT: RVAAP RI M — HOLE NO.: LL5mw-001

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: U5mw-001
PROJECT: RVAAP RI 14
INSPECTOR: [signature]
SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ Recovery (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	22	SAA Reddish B. SAND 70% w Silt Dry v.Cdu Nostaining No Plasticity weathered Bedrock	0.0	1.4	SM	2-10 10-3	SAA 7.5yr 5/6
	24	SAA	0.0	1.1	SM	2-13 13-8	SAA
	26	SAA	0.0	0.7	SM	1-4 2-8	SAA
	28						BOH 26 Screen from 24 to 14 Sand to 11 Bentonite to 8 Grout to surface 2.5 gallons hydration water used Stick-up Completion

PROJECT: RVAAP RI 14
HOLE NO.: U5mw-001

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

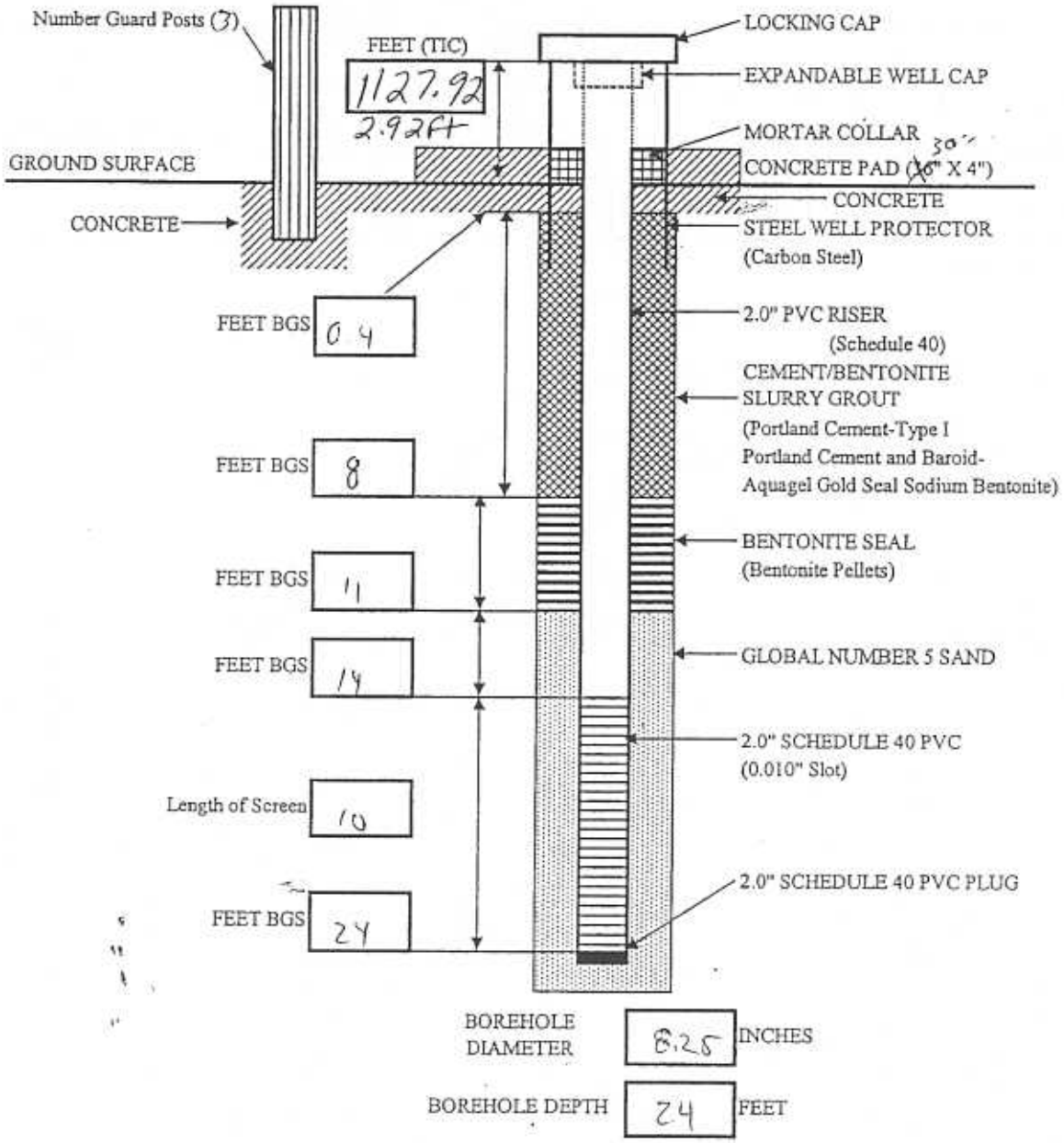
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: LI5mw-001	Begin: 08Dec04	End: 08Dec04
Coordinates: N: 554319.25 E: 2354625.07	Elevation: 1125.00	Reference Point:
Logged By:		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

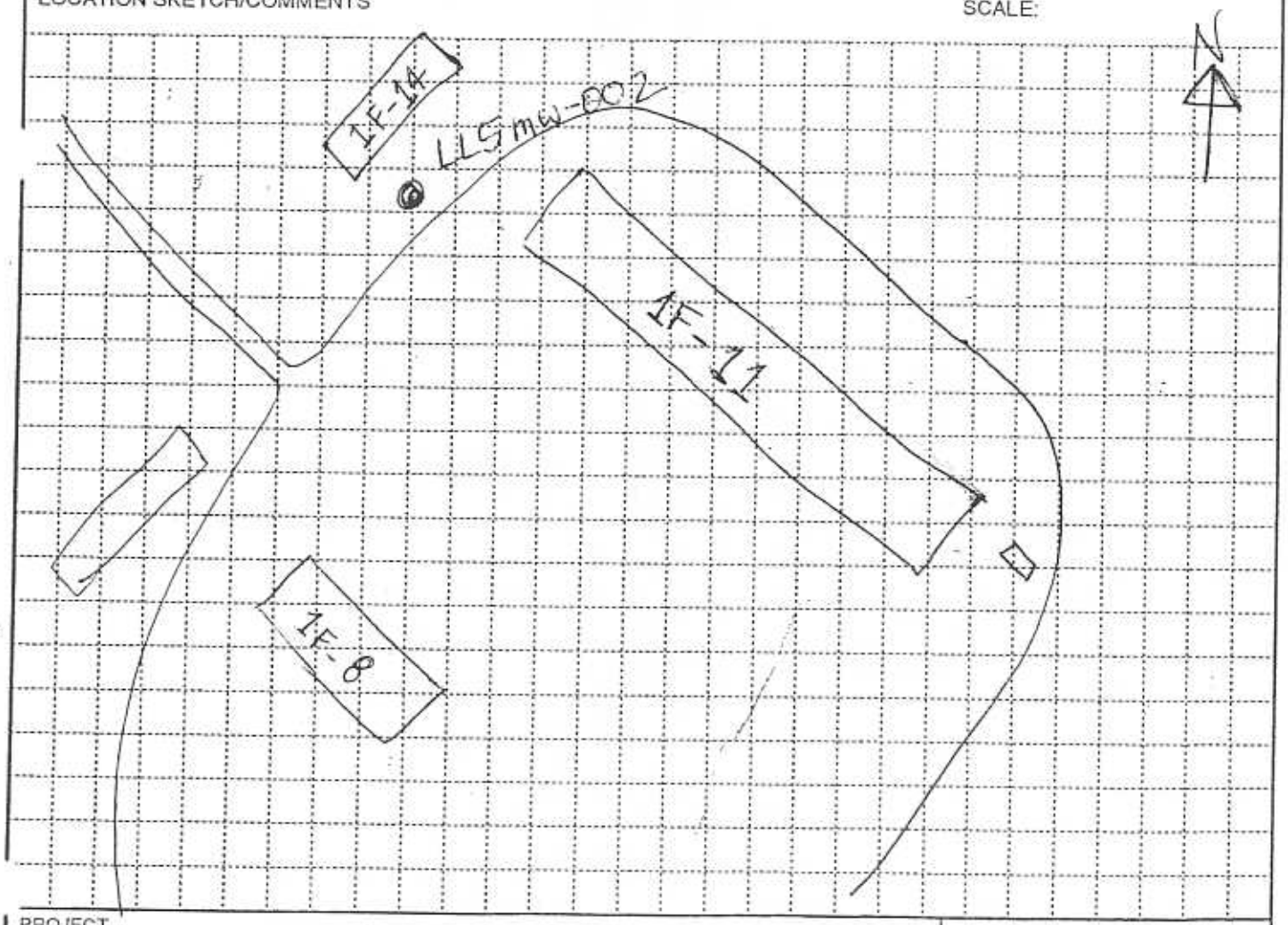
1. COMPANY NAME: MEM Engineers Inc	2. DRILL SUBCONTRACTOR: A&D Drilling Contractors	DISTRICT: Louisville; HOLE NUMBER: LLSMW-002; SHEET 1 OF 3
3. PROJECT: RVAAP RI 14	4. LOCATION: Load Line 5	
5. NAME OF DRILLER: Sam Holler	6. MANUFACTURER'S DESIGNATION OF DRILL: CME LC-60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 8.25" HSA-OD; 2" Split Spoons	8. HOLE LOCATION: North side of LL in front of Change House	
	9. SURFACE ELEVATION: 1125.80 ASL	
	10. DATE STARTED: 09Dec04	11. DATE COMPLETED: 09Dec04
12. OVERBURDEN THICKNESS: 24.6	15. DEPTH GROUNDWATER ENCOUNTERED: 1E, 24.5	
13. DEPTH DRILLED INTO ROCK: 0.4	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 15.6' @ 905 12/17/04	
14. TOTAL DEPTH OF HOLE: 25.0	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY — %
	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO.
RVAAP RI 14	LLSMW-002

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LLSMW-002

PROJECT: RIVERTON

INSPECTOR: Matt Dunlevy

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
0820	0	0.4' Topsoil					
		Lt. Br. SILT 65% w/ Sand Damp Mod. No Plasticity No Staining	0.3	1.4	ML	1-1 2-3	7.5Y-6/6
	2	DK Reddish/Brown Rock Frag 1/2"					
		DK Br. SILT 70% w/ Sand Dry Modder No staining w/ Plasticity	0.0	1.0	ML	2-7 9-8	7.5Y-5/4
	4	SAA	0.0	1.5	ML	4-7 9-3	SAA
	6	very stiff					
		Br. SILT 60% w Sand Damp No Odor No staining w/ Plasticity	0.0	1.5	ML	1-7 4-10	SAA
	8	SAA changes to Dry	0.0	1.6	ML	1-8 6-7	SAA
	10	SAA	0.0	1.5	ML	1-4 6-7	SAA
	12	SAA	0.0	1.4	ML	1-3 10-16	SAA
	14	SAA	0.0	0.7	ML	1-6 9-16	SAA
	16	Changes to Gray / Damp - Moist	0.0	1.6	ML	1-2 3-4	7.5Y-5/1
∇	18	Slightly Saturated / Sparse wet					
		SAA	0.0	0.8	ML	1-2 4-8	SAA
	20						

PROJECT: RIVERTON

HOLE NO.: LLSMW-002

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LL5mw-002

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlay

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO. USACS	BLOW COUNT (g)	REMARKS (h)
		SAA				4-10	SAA
		Gray Fine Grained SS Rock Frag 1" Grey SILT 70% w Sand and Gravel Dry no Odor No Plasticity No Staining	0.0	1.6	ML	10-13	
	22	4" SAND Gray 75% w/ Silt Moist No Odor No staining No Plasticity Gray SILT 70% Fine Sand and Gravel Damp Water No Staining	0.0	1.7	ML	2-2	
		Gray Weathered SS SAND 70% w/ Silt				2-4	
ST	24	Grey SAND 85% Saturated No Odor No Staining No Plasticity Gray Fine Grained SS slightly Weathered	0.0		SP/SM	2/50/3	
		TOH 25					BOH 25
	26						Screen from 25 to 15
							Sand up to 12
							Bentonite to 9
	28						Grout to Surface
							Stick-up completion
							Gallons used to hydrate

PROJECT: RVAAP RI 14

HOLE NO. LL5mw-002

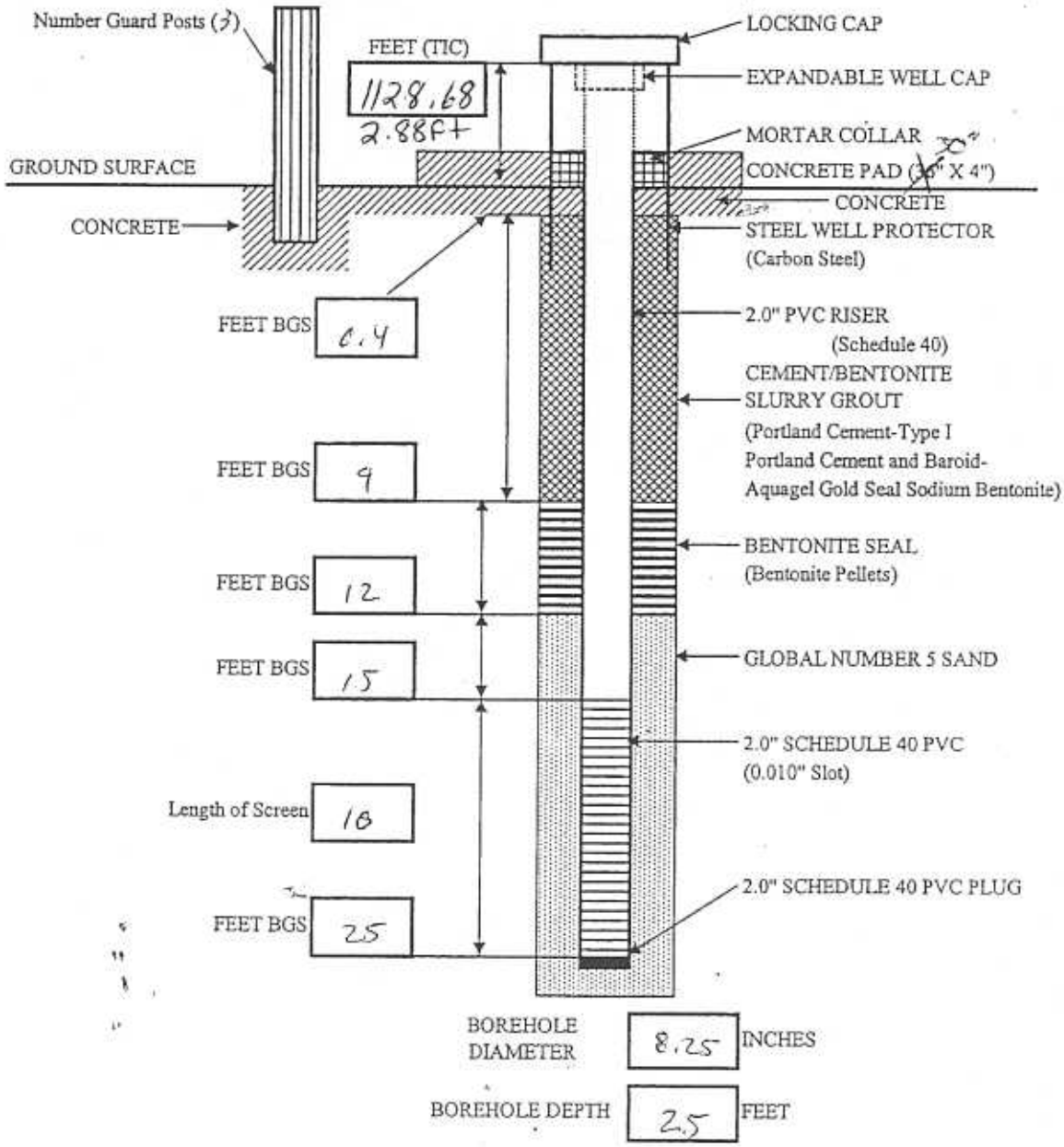
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: LLSMW-002	Begin: 09Dec04	End: 09Dec04
Coordinates: N: 554604.01 E: 2354571.52	Elevation: 1125.80	Reference Point:
Logged By:		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

1. COMPANY NAME: MKM Engineers Inc	DISTRICT: Louisville	HOLE NUMBER: LL5mw-004
	2. DRILL SUBCONTRACTOR: HAD Drilling Contractors	SHEET 1 OF 3 SHEETS

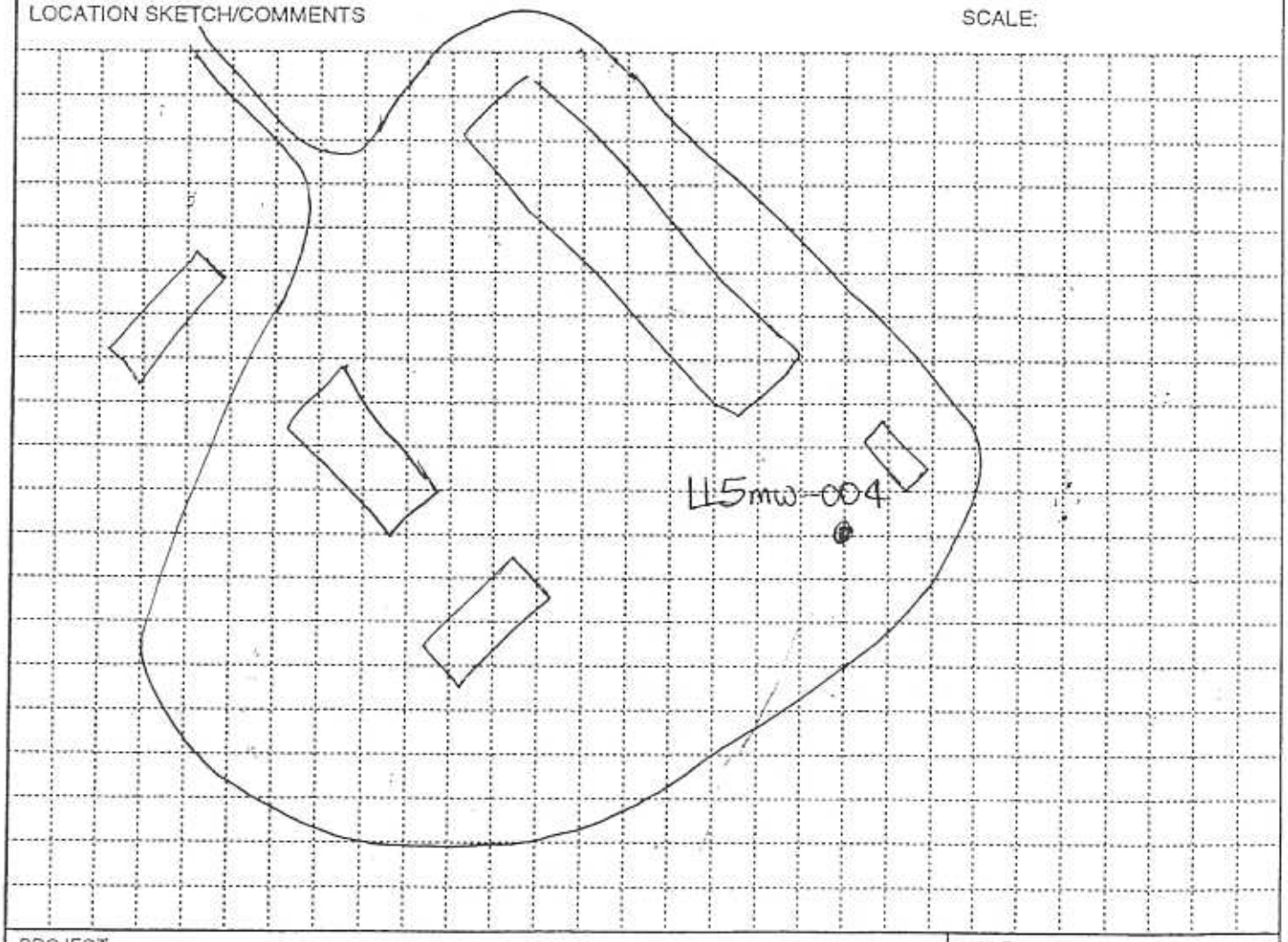
3. PROJECT: RVAAP RI 14	4. LOCATION: Load Line 5
5. NAME OF DRILLER: Sam Haller	6. MANUFACTURER'S DESIGNATION OF DRILL: CME LC-60
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 8.25 OD HSA; 2" Splitspoon	8. HOLE LOCATION: South side of LL
	9. SURFACE ELEVATION: 1122.90 ASL
10. DATE STARTED: 09Dec04	11. DATE COMPLETED: 09Dec04
12. OVERBURDEN THICKNESS: 21.8	15. DEPTH GROUNDWATER ENCOUNTERED: 17.5
13. DEPTH DRILLED INTO ROCK: 0.6	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 16.00 @ 0955 12/17/04
14. TOTAL DEPTH OF HOLE: 22.4	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	

LOCATION SKETCH/COMMENTS SCALE:



PROJECT	HOLE NO.
RVAAP RI 14	LL5mw-004

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LL5mw-004

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlavy

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	Recovery	USCS	BLOW COUNT (g)	REMARKS (h)
1330	0–2	0.6' Topsoil. Lt. Redish Br. SILT 65% w Sand Damp No Odor No Plasticity Gray Mottles	0.0	1.7	ML	1-1 1-2	7.5yr 5/6
	2–4	Dk. Br. SILT 75% w/ Sand Dry Stiff No Odor No Staining No Plasticity	0.0	1.6	ML	4-1 9-2	7.5yr 4/4
	4–6	white Mottles Begin	0.0	1.1	ML	4-8 11-13	SAA
	6–8	white Mottles Stop. Redish Br. SAND 65% w/ Silt wet No Odor No Staining No Plasticity	0.0	1.6	ML / SM	1-8 14-12	SAA
	8–10	Br. SILT 70% w/ Sand Damp No Odor No Staining No Plasticity	0.0	1.5	ML	2-6 5-8	SAA
	10–12	SAA	0.0	2.0	ML	1-4 7-7	SAA
	12–14	SAA	0.0	1.6	ML	1-4 7-9	SAA
	14–16	SAA	0.0	2.0	ML	5-5 6-13	SAA
	16–18	Br. SAND 85% w 15% silt Fine Grained wet No Odor No Staining No Plasticity. Saturated @ 17.5	0.0	1.7	SM	6-17 37-14	SAA
	18–20	Redish Br. weathered SS Rock Fragments. Br. SAND 85% w/ Silt Fine Grained Saturated No Odor No Staining	0.0	1.4	SM	8-8 6-4	7.5yr 6/6; 7.5yr 4/4

PROJECT: RVAAP RI 14

HOLE NO.: LL5mw-004

ENG FORM 5056A-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LLS mw 004

PROJECT: RI AAP RI 14

INSPECTOR: Mark Dunlay

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ Recovery	ANALYTICAL SAMPLE NO. USGS	BLOW COUNT (g)	REMARKS (h)
		SAA	0.0	1.6	SM	3-8 10-10	SAA
	22	Split Spoon Refusal @ 22 ft weathered SS Bedrock					
		Bott 22.4					Bott 22.4 Sand to 22 Screen from 22 to 12 Sand up to 7.5 Bentonite to 5 Grout to Surface Stick-up Completion Sgallons of water to hydration
	24						
	26						

PROJECT: RI AAP RI 14

HOLE NO.: LLS mw 004

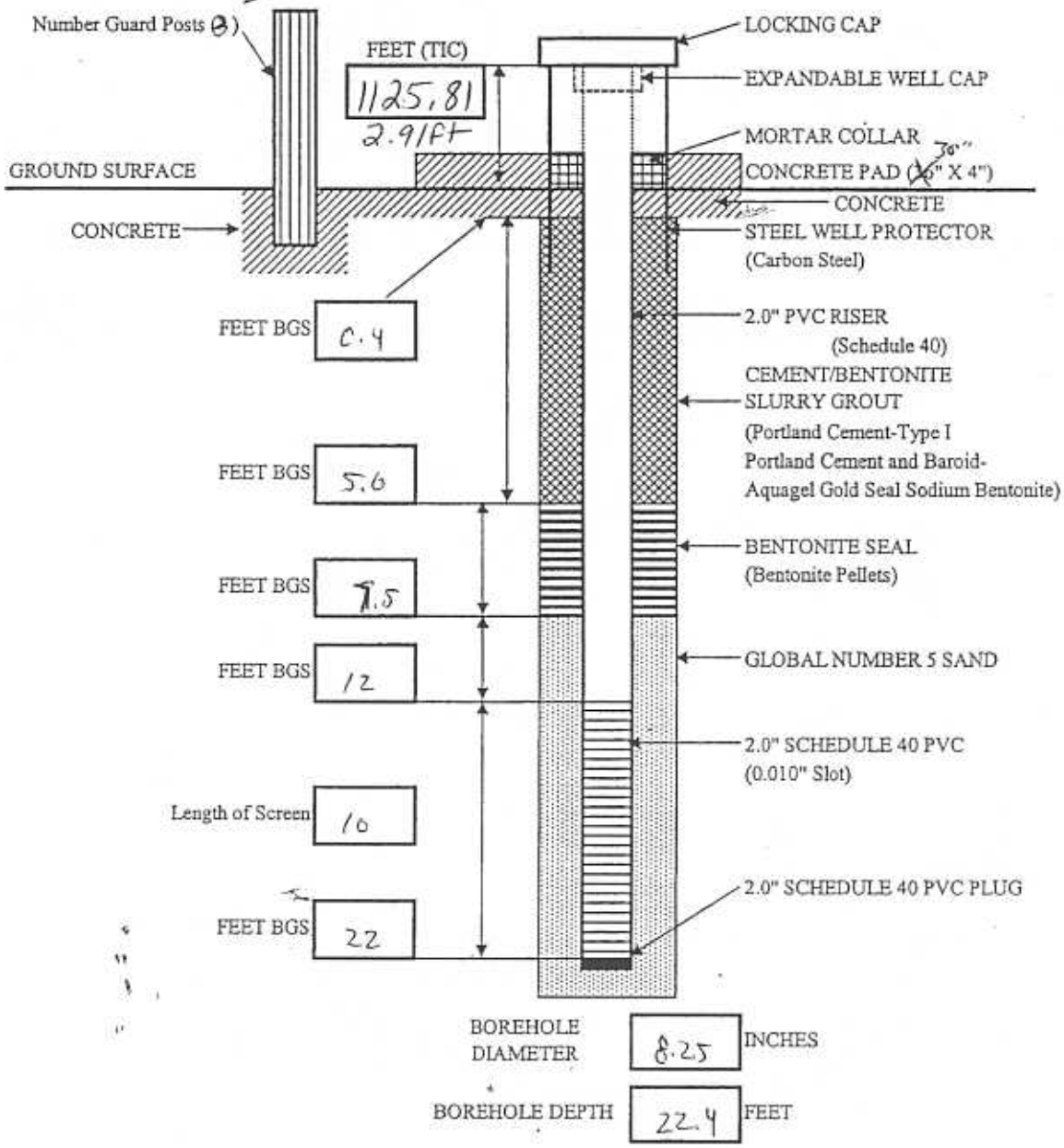
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: LLSmw 604	Begin: 09Dec04	End: 09Dec04
Coordinates: N: 554073.73 E: 2355006.44	Elevation: 1122.90	Reference Point:
Logged By:		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

1. COMPANY NAME: M&M Engineers Inc	DISTRICT: Louisville	HOLE NUMBER: LL5mw-005
2. DRILL SUBCONTRACTOR: HAD Drilling Contractors		SHEET 1 OF 3

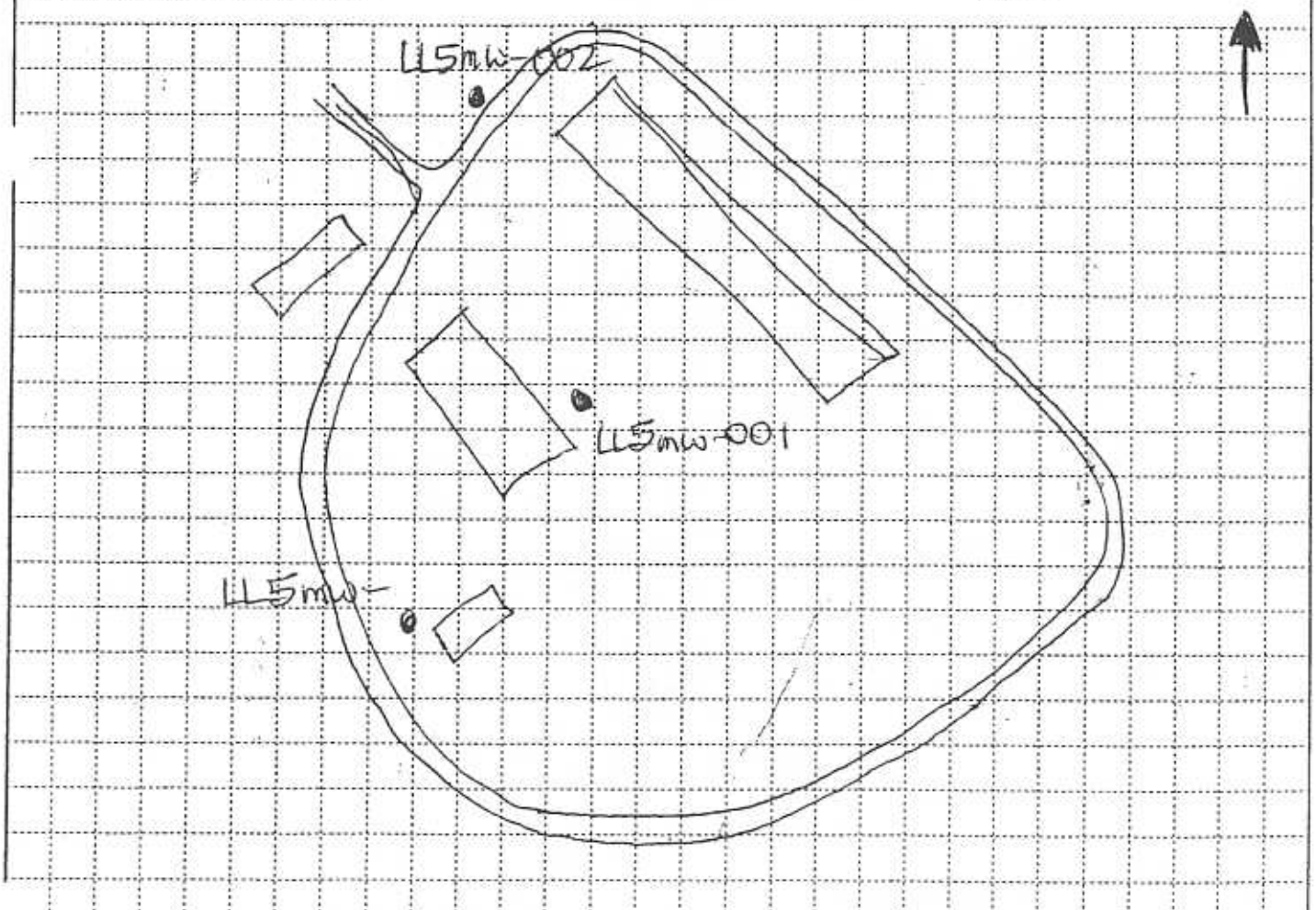
3. PROJECT: RVAAP RI 14	4. LOCATION: Load Line 5
5. NAME OF DRILLER: Sam Hostler	6. MANUFACTURER'S DESIGNATION OF DRILL: CME LC-60
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 8.25 OD HSA; 2" Split Spoons	8. HOLE LOCATION: West side of LL
	9. SURFACE ELEVATION: 1126.50 ASL
	10. DATE STARTED: 10 Dec 04 — 11. DATE COMPLETED: 10 Dec 04
12. OVERBURDEN THICKNESS: 26	15. DEPTH GROUNDWATER ENCOUNTERED: 19.24
13. DEPTH DRILLED INTO ROCK: 1.8	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 19.1 @ 0922 12/21/04
14. TOTAL DEPTH OF HOLE: 27.8	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
—	—	—	—	—	—	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO.
RVAAP RI 14	LL5mw-005

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LLSnw-005

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlay

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ RECOVERY	~~ANALYTICAL SAMPLE NO.~~ USCS	BLOW COUNT (g)	REMARKS (h)
1015		0.4' Topsoil					
		Dk Br. SILT 75% w/ Sand Damp Reddish Wooden No Staining No Plasticity	0.0	1.5	ML	1-1 2-3	7.5yr 5/6
	2	Changes to Dk Br + STIFF / Dry					
		White Mottles Begin	0.0	1.1	ML	2-4 11-16	7.5Y - 4/4
	4	SAA	0.0	1.4	ML	2-7 8-12	SAA
	6	Br. SILT 65% w/ Sand Dry Wooden No Plasticity No Staining Fine Gravel Present	0.0	1.9	ML	2-4 7-9	SAA
	8	Br. SILT 85% w/ Sand wet Wooden No Staining No Plasticity Br. SILT 65% w/ Sand Dry Wooden No Staining No Plasticity	0.0	1.8	ML	1-2 6-7	SAA
	10	SAA	0.0	1.9	ML	1-8 9-10	SAA
	12	Br. SAND Dry w/ Silt Dry Wooden No Staining No Plasticity	0.0	1.7	SM	2-8 9-9	SAA
		Br. SILT 65% w/ Sand Dry Wooden No Staining No Plasticity					
	14	SAA	0.0	1.7	ML	2-4 6-9	SAA
	16	SAA	0.0	1.8	ML	2-7 17-11	SAA
	18	Br SAND Dry w/ Silt wet Wooden No Staining No Plasticity	0.0	2.0	ML SM	5-8 13/13	SAA
	20	Br. SILT 65% w/ Sand Dry Wooden No Staining No Plasticity			ML		

PROJECT: RVAAP RI 14

HOLE NO. LLSnw-005

HTRW DRILLING LOG

(CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET / SHEETS
RVAAP RFI 4	Mark Dunkey	LLSmw 005	3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ RECOVERY (e)	~~ANALYTICAL SAMPLE NO.~~ USCS (f)	BLOW COUNT (g)	REMARKS (h)
		SAA	0.0	1.9	ML	2 7	SAA
		@ SAND 85% w/Silt wet No odor No Staining No Plasticity			SM	8 11	
	22	Ad. Lt Br. SILT 60% w/ Sand Damp No odor No Staining No Plasticity			ML		7.54-5/6
		Ad. Lt Br. SAND 70% w/Silt Dry No Odor No Plasticity Black and Red Staining	0.0	1.6	SM	3-14 / 16-17	
▽	24	Grey/Br. SAND 85% w/ Silt Saturated No odor No Plasticity No Staining	0.0	1.7	SM	8-12 / 17-12	7.57-6/2
	26	Grey weathered SS Fragments					
		weathered SS			SPIKE		
	28	BoH 27.8					BoH 27.8 Sand up to 27 Screen from 27 to 17 Sand up to 17 Bentonite to 11 Grout to surface Stick-up well Completion 5 gallons Hydration water used

PROJECT	HOLE NO.
RVAAP RFI 4	LLSmw-005

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

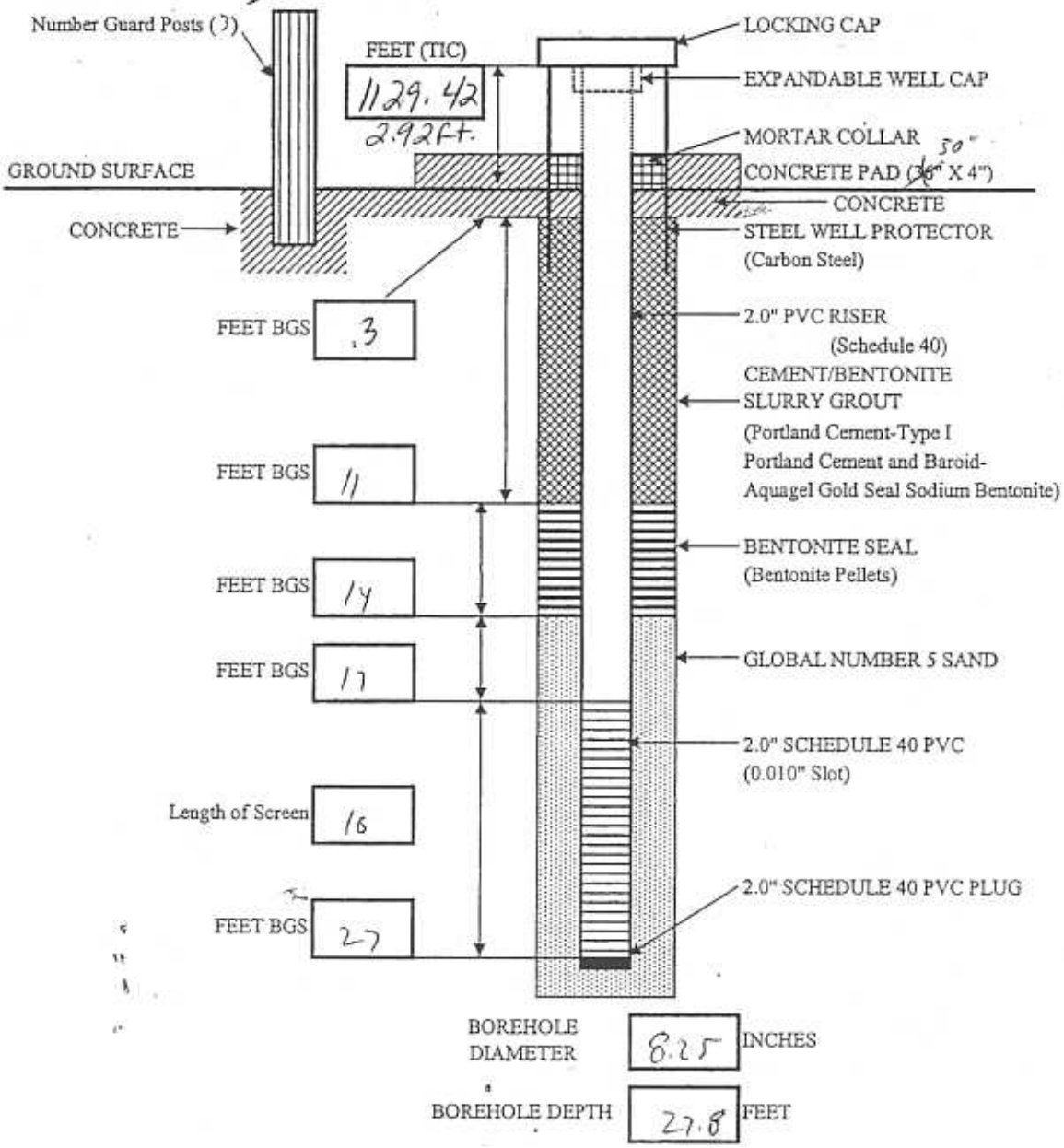
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: LLSmw-005	Begin: 10Dec04	End: 10Dec04
Coordinates: N: 554152.73 E: 2354422.02	Elevation: 1126.50	Reference Point:
Logged By: MD-daily		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

	DISTRICT: Louisville	HOLE NUMBER: LL5mw-006
1. COMPANY NAME: MK Engineers	2. DRILL SUBCONTRACTOR: H&A Drilling Contractors	SHEET 1 OF 2 SHEETS
3. PROJECT: RVAAP RI 14	4. LOCATION: Load Line 5	
5. NAME OF DRILLER: Sam Holle	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-LC 60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 6.25 CD HSA; 2" Splitspoons	8. HOLE LOCATION: South west mw	
	9. SURFACE ELEVATION: 1125.10 ASL	
	10. DATE STARTED: 10 Dec 04	11. DATE COMPLETED: 10 Dec 04
12. OVERBURDEN THICKNESS: 22	15. DEPTH GROUNDWATER ENCOUNTERED: 18.21	
13. DEPTH DRILLED INTO ROCK: 2.5	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 17.5 @ 1256 12/21/04	
14. TOTAL DEPTH OF HOLE: 24.5	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

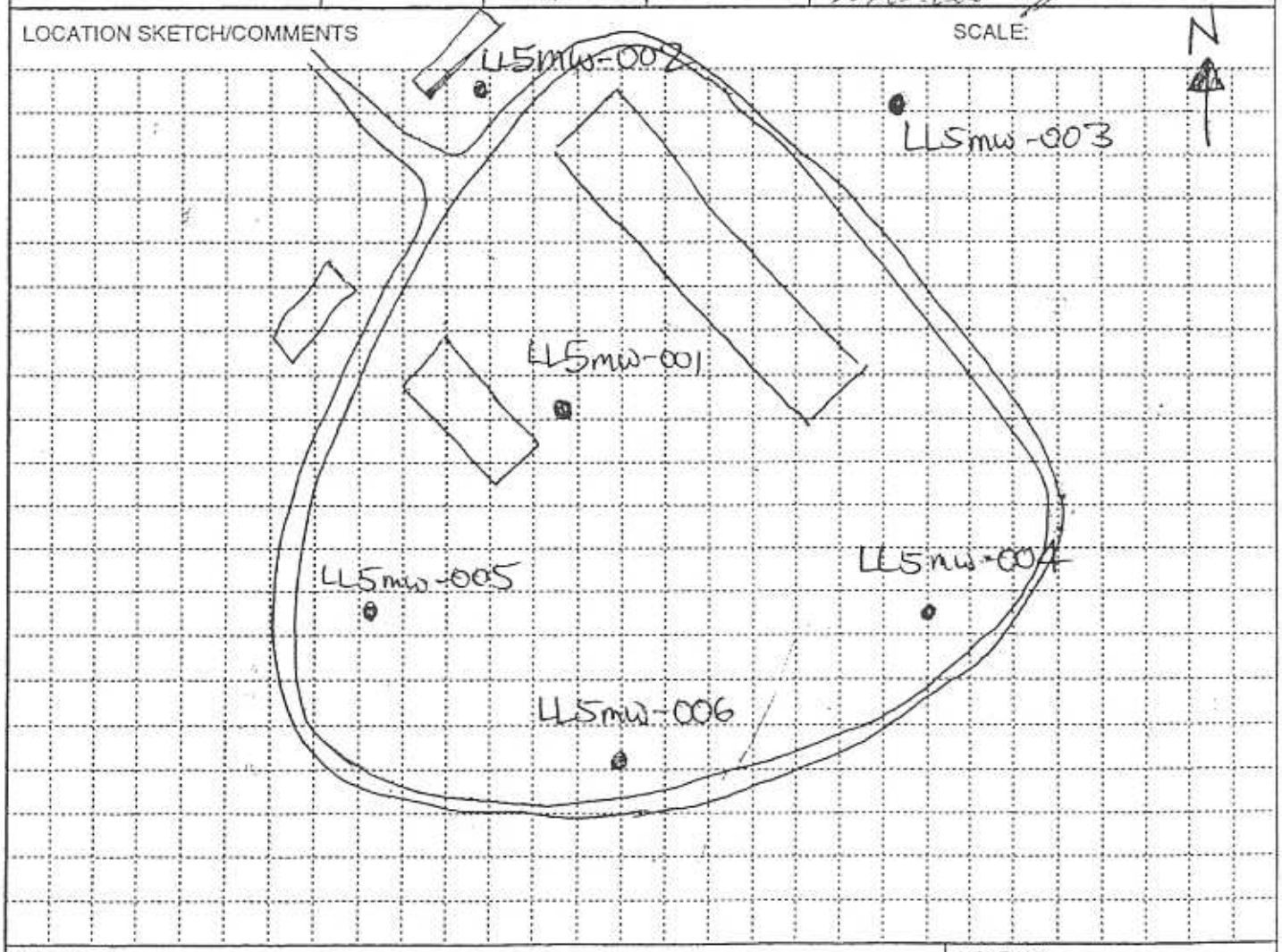
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
SHELBY TUBE 10-12'	—	X	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY — %
—	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	M. Darby

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT	HOLE NO.
RVAAP RI-14	LL5mw-006

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LLSMW-006

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlevy

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLES OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. USCS (f)	BLOW COUNT (g)	REMARKS (h)
0826	0	0.4 Topsoil LtBr. SELT 65% w Sand Damp No Odor No Plasticity Gray Mottling	0.5	1.5	ML	1-1 2-4	7.5Y-6/6
	2	DkBr. SELT 75% w/ Sand Dry Soft No Odor No Plasticity Gray Mottles Present	0.0	1.5	ML	1-5 6-11	7.5Y-4/6
	4	SAA	0.0	1.6	ML	3-6 6-11	SAA
	6	Br. SELT 65% w/ Sand Damp No Odor No Staining No Plasticity	0.0	1.7	ML	1-4 6-4	7.5Y-5/4
	8	SAA	0.0	1.9	ML	1-1 6-9	SAA
	10	0845 10 Dec 09 Shelby Tube					
	12	Br. SELT 65% w/ Sand Damp No Odor No Staining No Plasticity Change to Dry	0.5	1.7	ML	1-3 5-8	7.5Y-5/4
	14	SAA	0.0	1.4	ML	4-10 3-4	SAA
	16	SAA	0.0	1.8	ML	4-16 11-11	SAA
VI	18	Gray SELT 75% w/ Sand Dry No Odor No Staining No Plasticity water @ 18.3 Br. SELT 60% w/ Sand & Fine Gravel Dry No Odor No Staining No Plasticity	0.0	1.9	ML	6-16 12-11	7.5Y-5/1 7.5YR-5/6
	20						

PROJECT: RVAAP RI 14

HOLE NO.: LLSMW-006

HTRW DRILLING LOG (CONTINUATION SHEET)

PROJECT	INSPECTOR	HOLE NUMBER	SHEET
RVAAP RI 14	Mark Dunlap	LLSmw-006	3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
∇		SAA Br. SAND 85% w/ silt Saturated No odor No staining Split-Spoon Refusal weathered SS Bedrock		1.4	ML SM	8 10 23 50/5	SAA
	22						
	24	↓					
930		BOH 24.5					BOH 24.5 Sand up to 24 Screen from 24 to 14 Sand up to 11 Bentonite to 8 Grout to surface Stick-up Completion 5 gallons Hydration water used
	26						

PROJECT	HOLE NO.
RVAAP RI 14	LLSmw-006

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

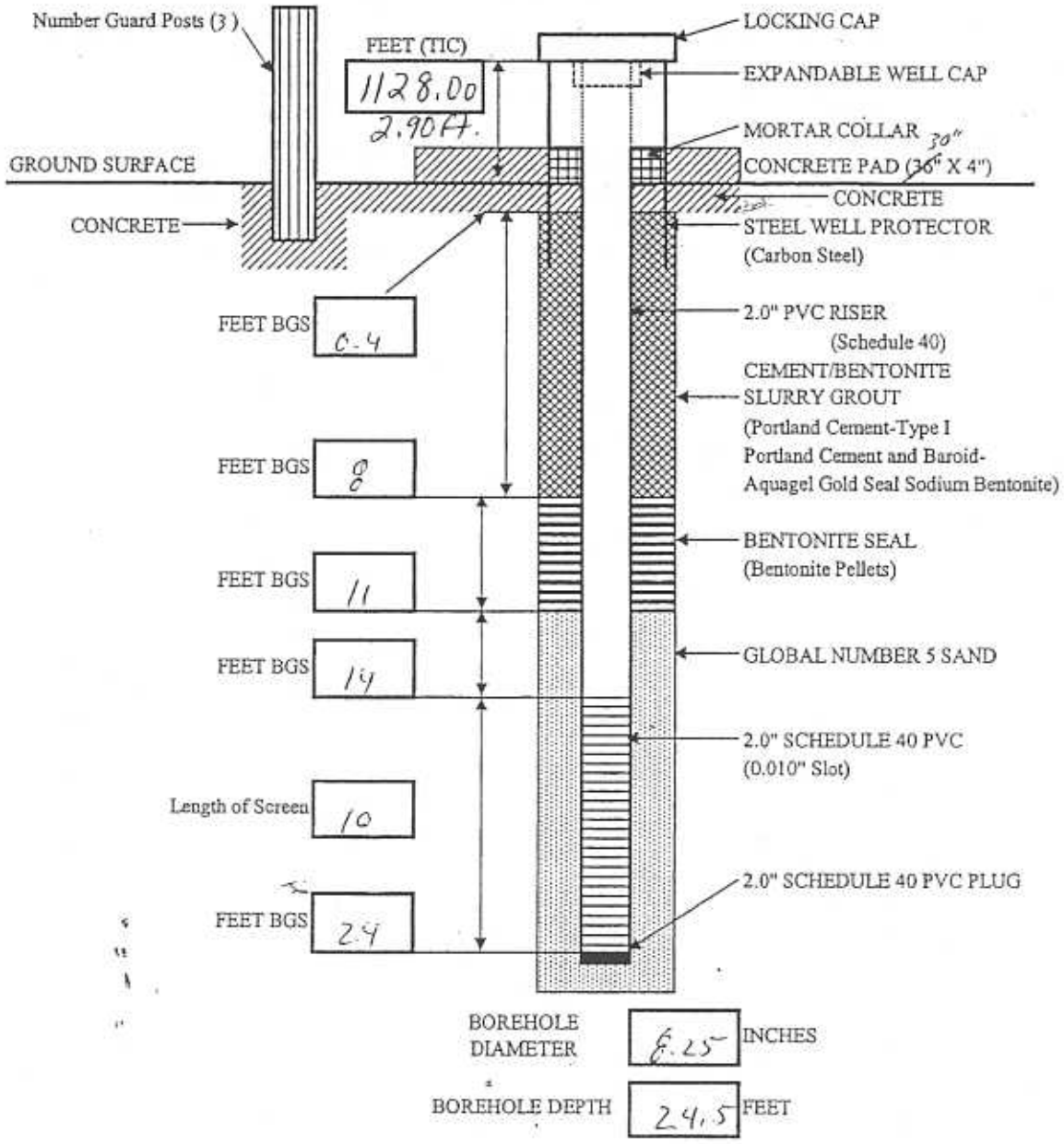
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP PI 19

Well Number: LL5mw-006	Begin: 10 Dec 04	End: 10 Dec 04
Coordinates: N: 553984.82 E: 2354730.78	Elevation: 1125.10	Reference Point:
Logged By:		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

RVAAP-41 LOAD LINE 8

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HTRW DRILLING LOG

1. COMPANY NAME: MKM ENGINEERS	DISTRICT: LOUISVILLE	HOLE NUMBER: LL8mw 005
2. DRILL SUBCONTRACTOR: HAD DRILLING		SHEET 1 OF 3 SHEETS

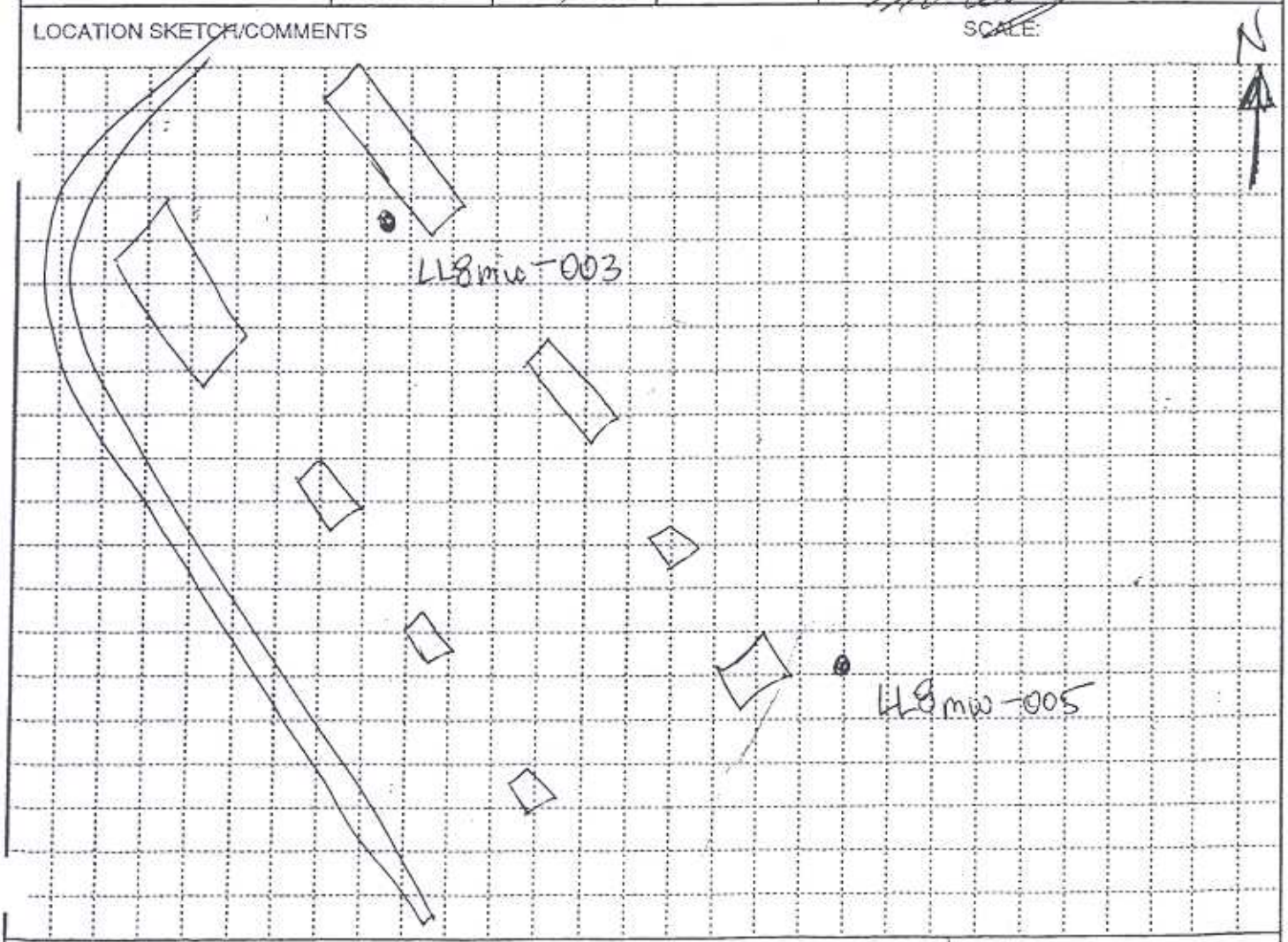
3. PROJECT: RVAAP RI 14	4. LOCATION: LOADLINE 8
5. NAME OF DRILLER: SAM HOFFER	6. MANUFACTURER'S DESIGNATION OF DRILL: CME LC60
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 8.25 HSA; 2" SPLIT SPOON	8. HOLE LOCATION: SE WELL LOCATION ADJACENT TO BLDG 2B-2
	9. SURFACE ELEVATION: 1112.51 ASL
	10. DATE STARTED: 12/07/04 — 11. DATE COMPLETED: 12/07/04
12. OVERBURDEN THICKNESS: 23.5	15. DEPTH GROUNDWATER ENCOUNTERED: 14.0, 17.6
13. DEPTH DRILLED INTO ROCK: 0.5 WEATHERED	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 9.7 @1035 12/16/04
14. TOTAL DEPTH OF HOLE: 24.0	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	—	X	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY — %
	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X		

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT: RVAAP - RI 14 — HOLE NO: LL8mw-005

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LL8mw-005

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlevy

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. Recovery (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		6" Topsoil					
		Br. SILT 70% w/Sand Damp No Odor No Staining No Plasticity	4.6	1.1	ML	1-1 2-4	7.5yr 4/6
	2	Grey Mottles present	7.7	1.4	ML	1-1 2-2	7.5yr 5/6
	4	SAA	0.0	1.6	ML	1-1 3-5	SAA
	6	SAA	6.0	1.8	ML SM ML	3-7 10-11	7.5yr 5/2
		2" Grey SAND 70% w/Silt No Odor No Staining No Plasticity					
	8	Reddish Br. SILT 60% w/Sand and Gravel No Odor No Staining No Plasticity	0.0	1.0	ML	1-7 10-4	7.5yr 5/4
	10						
		Br. SILT 75% w/Sand Damp No Odor No Staining No Plasticity	1.0	0.9	ML	1-7 13-4	7.5yr 4/6
	12						
		Grey SILT 80% w/Clay Damp No Odor No Staining Med. Plasticity	13.4	1.5	ML	2-2 5-5	
▽	14	Saturated @ 14.0					7.5yr 5/1
		Changes to damp @ 15.0	4.6	1.6	ML	4-2 3-2	
	16						
▽			1.7	1.8	ML SM	1-2 4-6	
		Grey Fine Grained SAND 85% w/Silt Saturated No Odor No Staining No Plasticity	12.4	1.6	SM	1-1 5-7	7.5yr 5/2
	18						
	20						

PROJECT: RVAAP RI 14

HOLE NO.: LL8mw-005

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LL8mw-005

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlevy

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. Recovery	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	22	SAA	0.0	1.4	SM	1-7 5-5	SAA
	24	weathered Gry SS Fine Grained	0.0	1.5	SM	5-11 13-18	SAA
		BOH 24 Ft.					BOH 24 Screen from 24 to 14 Sand up to 11 Bentonite to 8 Grout to surface Stick-up well Completion 5 gallons of water used to hydrate
	26						
	28						

PROJECT: RVAAP RI 14

HOLE NO. LL8mw-005

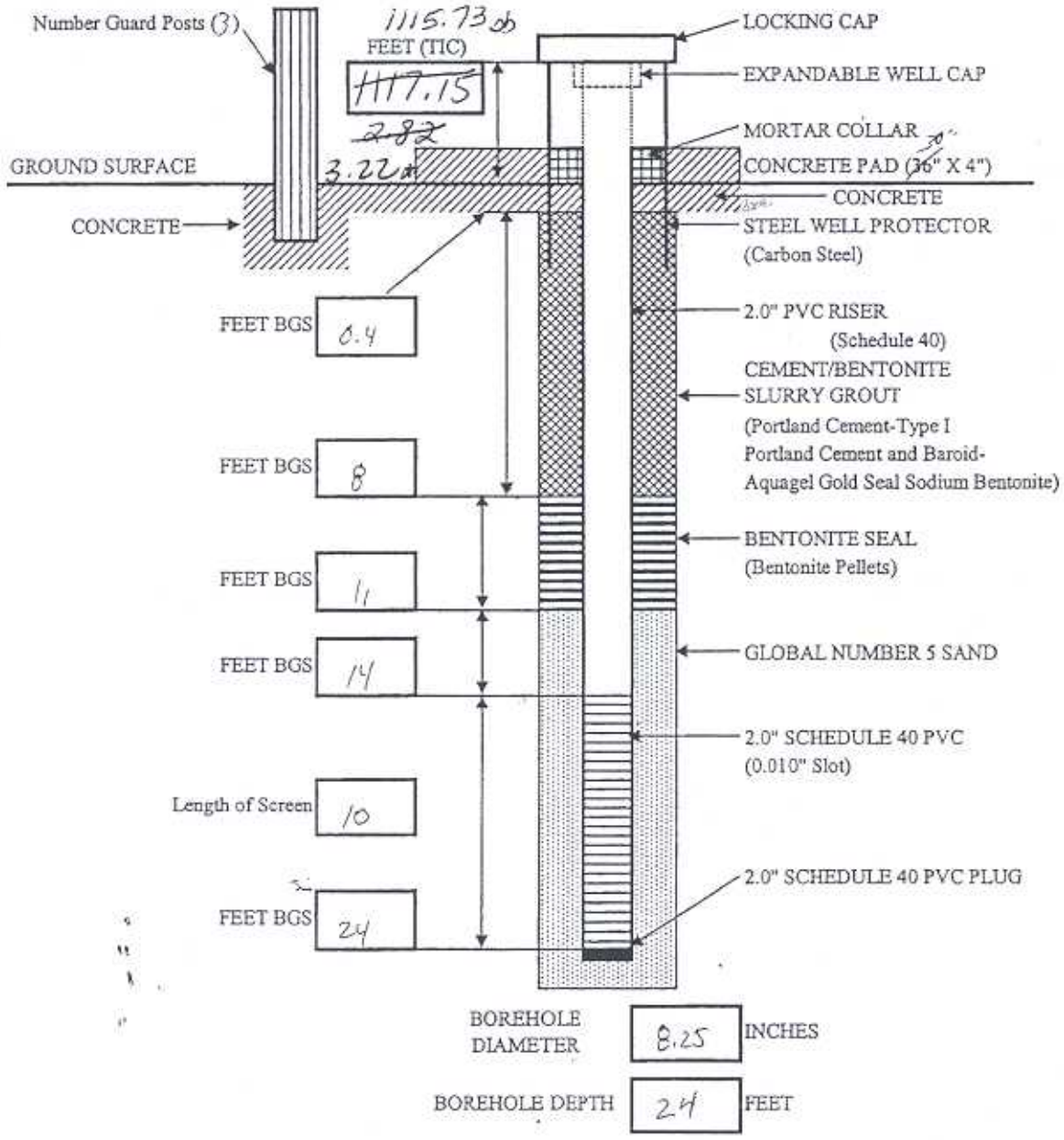
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RC 14

Well Number: LCBmw-005	Begin: 07 Dec 04	End: 07 Dec 04
Coordinates: N: 551522.48 E: 2351748.32	Elevation: ~~1114.33~~ 1112.51 ab	Reference Point:
Logged By:		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

1. COMPANY NAME: MKM ENGINEERS	DISTRICT: LOUISVILLE	HOLE NUMBER: LL8MW-006
	2. DRILL SUBCONTRACTOR: HAD DRILLING	SHEET 1 OF 3 SHEETS
3. PROJECT: RVAAP - RI 14	4. LOCATION: LOAD LINE 8	
5. NAME OF DRILLER: SAM HOFFER	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-LC60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 8.25 OD HSA; 2" SPLIT SPOON	8. HOLE LOCATION: SOUTHEND OF LL	
	9. SURFACE ELEVATION: 1174.33 ASL	
	10. DATE STARTED: 12/07/04	11. DATE COMPLETED: 12/07/04
12. OVERBURDEN THICKNESS: 20'	15. DEPTH GROUNDWATER ENCOUNTERED: 17.5	
13. DEPTH DRILLED INTO ROCK: 4' WEATHERED	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 18.7 @ 0930	12/16/04
14. TOTAL DEPTH OF HOLE: 24'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

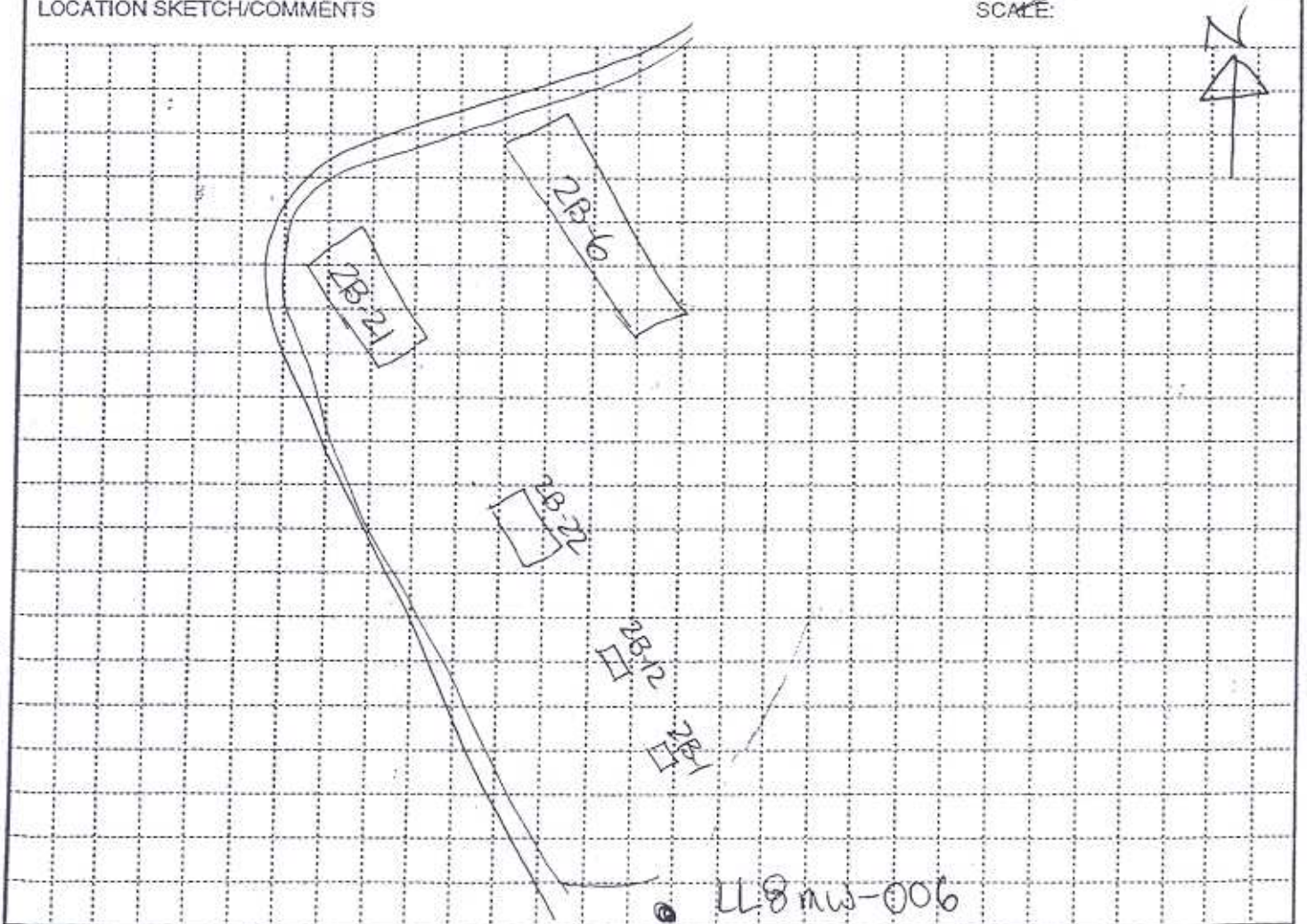
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
SHELBY TUBE 8'-10'	—	X	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT	HOLE NO.
RVAAP - RI 14	LL8MW-006

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LSMW-006

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlevy

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. Recovery	ANALYTICAL SAMPLE NO. USGS	BLOW COUNT (g)	REMARKS (h)
		1" Topsoil Lt. Br. SILT 65% w/ Sand Damp No Odor No Plasticity Competent	0.0	1.3	ML	1-1 2-4	7.5yr 6/6 7.5yr 4/4
	2	Changes to Stiff and Dry					
			5.0	1.5	ML SM	2-7 9-12	
	4	Br. SAND 70% w/ Silt Dry No Odor No Staining No Plasticity					
		Br. SILT 70% w/ Sand No Odor No Staining No Plasticity Dry	4.0	1.5	ML	2-6 5-7	SAA
	6						
		SAA	3.0	1.8	ML	2-4 8-9	SAA
	8						
		Shelby Tube					
	10						
		Br. SILT 70% w/ Sand Dry No Odor No Staining No Plasticity	1.8	1.2	ML	1-4	7.5yr 4/4
		DK. Reddish Br. SS Frag.					
		Br. SILT 70% w/ Sand Dry No Odor No Staining No Plasticity			ML	10-12	
	12						
		SAA	2.1	2.0	ML	4-11 13-11	SAA
	14						
		Becomes Damp	1.8	1.4	ML	2-4 7-14	SAA
		SAA					
	16						
▽		Gry SILT 85% w/ Clay Damp No Odor No Staining Mod Plasticity	0.0	1.5	ML	2-6 8-18	7.5yr 5/1
		Br. SILT 65% w/ sand Saturated No Odor No Staining No Plasticity					7.5yr 5/3
	18	Weathered Gry/White SS / Sand					7.5yr 6/1
			0.0	1.3	SS	2-13 12-5	

PROJECT: RVAAP RI 14

HOLE NO. LSMW-006

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: LL8mw-006

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlevy

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ Recovery (e)	~~ANALYTICAL SAMPLE NO.~~ USCS (f)	BLOW COUNT (g)	REMARKS (h)
	22	SAA	0.0	1.2	SS	10-12 17-23	SAA
		SAA	0.0	1.4	SS	5-6 9-10	SAA
	24	Bott 24.2					Bott 24.2 Sand to 24 Screen from 24 to 14 Sand up to 11 Bentonite to 8 Grout to surface Stick-up well completion 5 gallons of water used
	26						
	28						

PROJECT: RVAAP RI 14

HOLE NO.: LL8mw-006

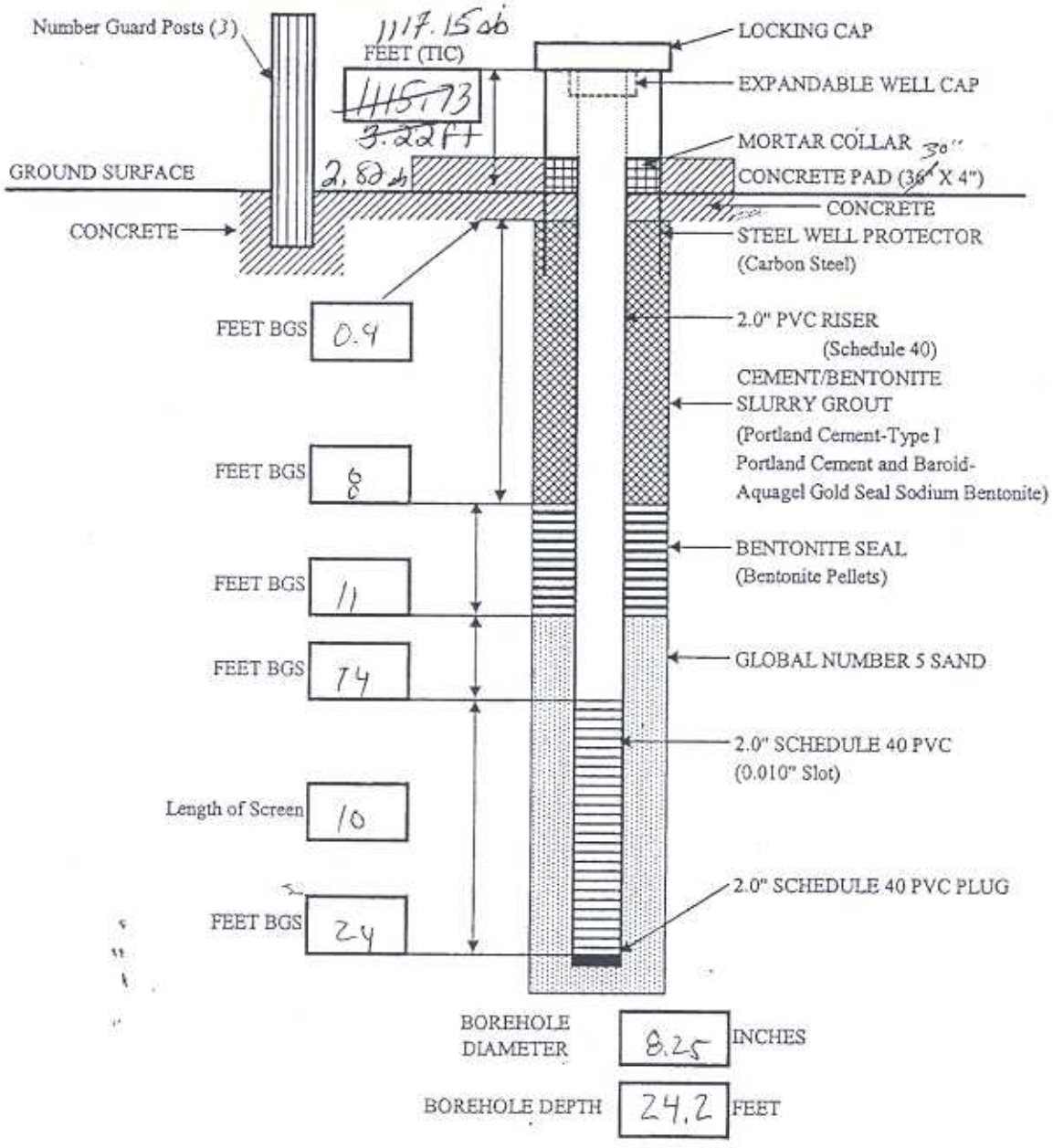
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: LL8mw-006	Begin: 07 Dec 04	End: 07 Dec 04
Coordinates: N: 551296.77 E: 2351483.58	Elevation: ~~1112.57~~ 1114.33 ab	Reference Point:
Logged By:		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

RVAAP-42 LOAD LINE 9

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HTRW DRILLING LOG

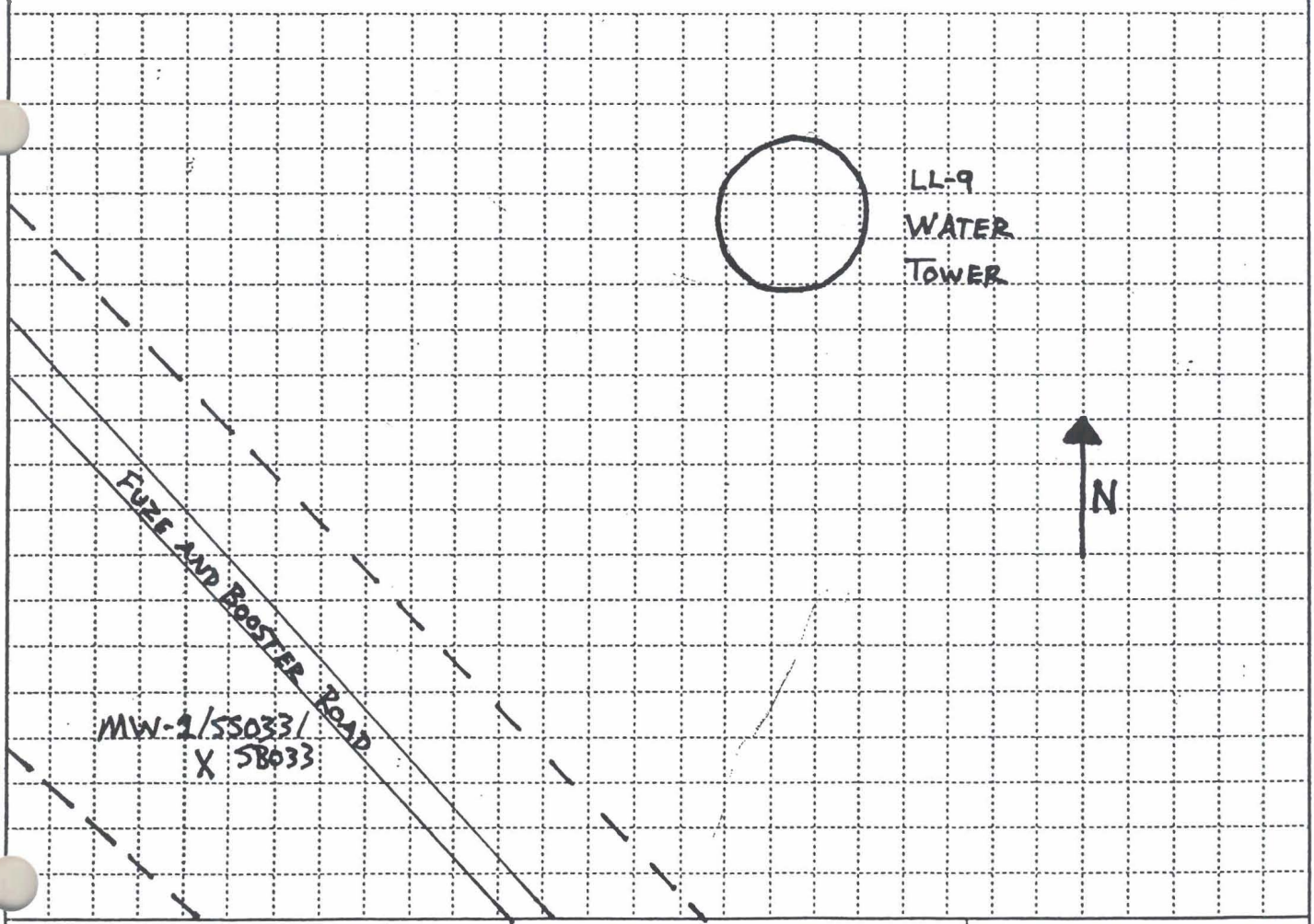
	DISTRICT: Louisville	HOLE NUMBER: SB033/MW1
1. COMPANY NAME: MKM Engineers	2. DRILL SUBCONTRACTOR: HAD Drilling	SHEET 1 OF 3 SHEETS
3. PROJECT: LL-9 RI	4. LOCATION: Load Line 9 RVAAP	
5. NAME OF DRILLER: Todd Bromley	6. MANUFACTURER'S DESIGNATION OF DRILL: CME - LC60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" Split-Spoons; 6.25" Tricone Air rotary Bit	8. HOLE LOCATION	
	9. SURFACE ELEVATION	
	10. DATE STARTED: 26 Nov 03	11. DATE COMPLETED: 26 Nov 03
12. OVERBURDEN THICKNESS: 15.5'	15. DEPTH GROUNDWATER ENCOUNTERED: 13.5'	
13. DEPTH DRILLED INTO ROCK: 22.0'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA	
14. TOTAL DEPTH OF HOLE: 22.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 11.77 during development	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA			1 core box 5 feet

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						90%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



PROJECT	HOLE NO.
LL-9 RI	SB033/MW1

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER SB033/MW1

PROJECT LL-9

INSPECTOR Mark Dailey

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. / Recovery	BLOW COUNT (g)	REMARKS (h)
		4" Topsoil					
		Reddish Brown SILT 60% w/ Sand 20% and Clay 20% Grey Mottling Present No Odor No Staining Low Plasticity Dry			1.4	1-3 3-5	10yr 6/6
	2						
		Brown SILT 70% w/ Sand 20% Stiff Non Plastic No Odor & Staining			1.8	3-3 5-13	10yr 5/4
	4						
		Brown SILT 60% No Odor No Staining Wet @ 5.5 No Plasticity Rounded Rocks Present Dry @ 5.8			1.6	11-13 7-11	10yr 5/4
	6						
		Same As Above			1.4	8-6 6-5	Same As Above
	8						
		Large Angular SAND Stone Fragments					
		Brown SILT 60% w/ Sand 30% No Odor No Staining No Plasticity Small Rounded Rocks Present Dry			1.2	1-4 6-6	Same As Above
	10						
		Fine Grained SAND 85% w/ Silt Possible weathered Bedrock No Odor No Staining No Plasticity Dry			1.0	4-32 34-14 +.0 refusal	10yr 7/6
	12						
		Hard Fine Grained SAND 4" Red "Iron Stained" SAND 85% w/ Silt 10% Wet No odor No Staining			0.9	2-6 7-9	10yr 5/4
▽		Saturated @ 13.5					
	14	Brown SAND 85% w/ Silt Saturated from Above Interval				4-14 50/2	Same As Above
		Dry SAND 85% @ 15.0 Spoon Refusal weathered Sandstone Bedrock					
	16	Top of Core #1					600 psi Recovery = 57/60 = 90% RQD = 18/57 = 31.5%
		Layered Sandstone and Siltstone Lt. Grey Sandstone 10yr 8/1 Grey Siltstone 10yr 5/1 Horizontal bedding planes					
	18						
		Red Iron Stained Sandstone					7.5yr 6/4
	20	Continued on Next page					

PROJECT LL-9 RI

HOLE NO. SB033/MW1

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SB033/MW1

PROJECT: LL-9 RI

INSPECTOR: Mark Dunlevy

SHEET 3 OF SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20	Layered SS. and Silt Stone Red Iron Staining					
		White and Black (Salt&Pepper) Sand Stone Competent very few fractures horizontal bedding planes 20-21					
	22	BOTTOM of CORE 621					
		BOH = 21.6					

PROJECT: LL-9 RI

HOLE NO. SB033/MW1

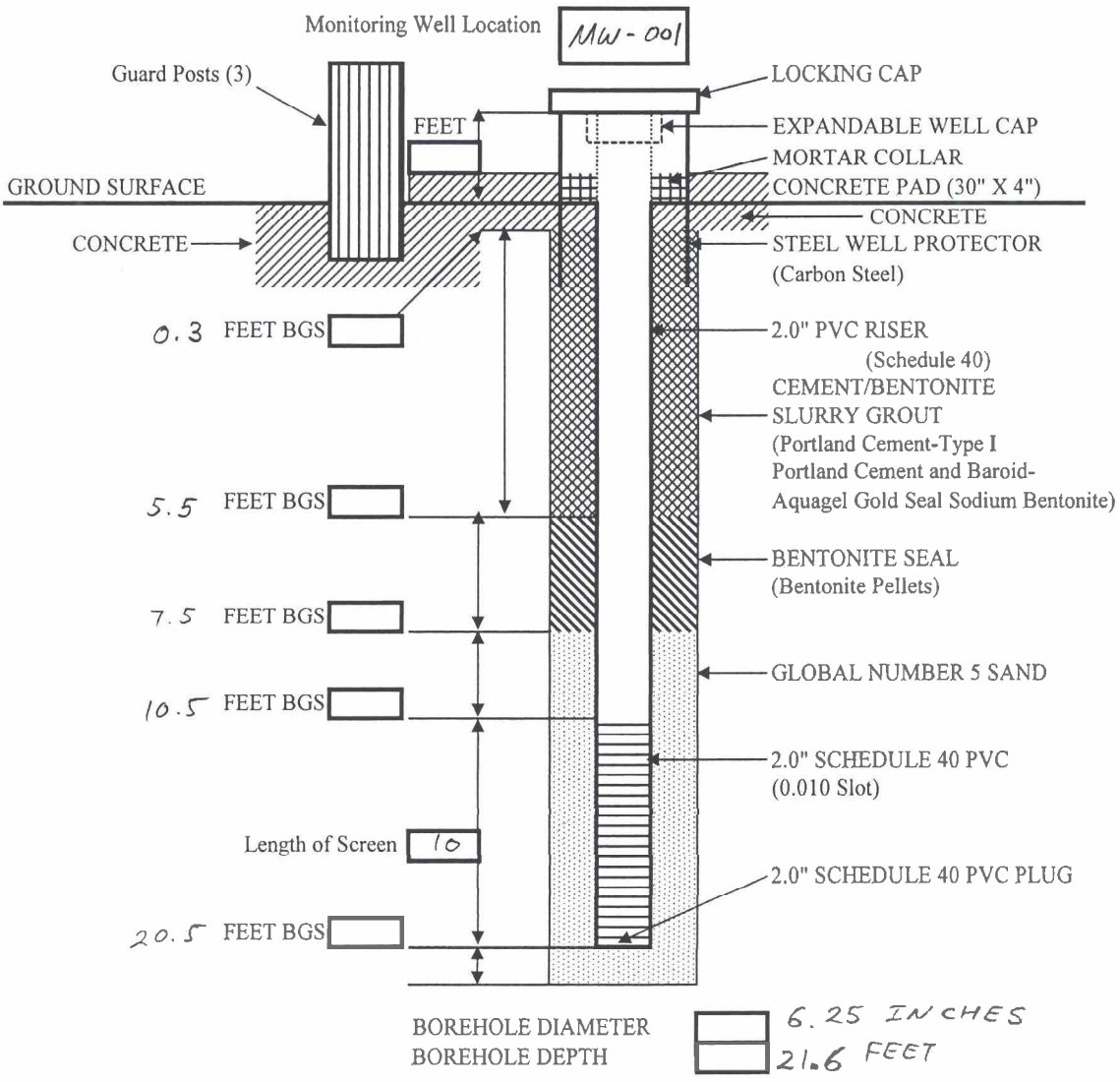
Pg 52 in Mark's field book.

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: ~~Load Line 6 RI~~ LL 9 RI

Well Number: MW-001	Begin: 11/26/03	End: 11/26/03
Coordinates: N: 556125.81 E: 2355817.04	Elevation: 1134.62	Reference Point:
Logged By:		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard post set in square configuration about the concrete pad.

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: SB33 / MW 1

PROJECT: LL9 - RI

INSPECTOR: Shahram Taherinia

SHEET 1 OF 1 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	16	Top of the Core weak to moderately strong, Ligth Gray moderately decomposed Partially weathered close spaced fractures with smooth surface interbedded, permeable shale & sand stone trace of Qtz trace of water path at various depth Some vertical fractures at various depth					
	17						
	18						
		structure changes to massive at 18' 4"					
	19	structure changes back to interbedded at 18' 9" moderately strong light Gray, slightly decom, partially weathered interbedded structure					
	20	fine grained sand stone few fractures along the interbedded shale (weak layer) water path at fracture					
	21	Bottom of the core					

PROJECT: LL9 - RI

HOLE NO. SB033 / MW 1

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RVAAP-50 ATLAS SCRAP YARD

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HTRW DRILLING LOG

1. COMPANY NAME: MKM ENGINEERS	DISTRICT: LOUISVILLE	HOLE NUMBER: ASYMW-001
2. DRILL SUBCONTRACTOR: HAD DRILLING		SHEET 1 OF 3 SHEETS

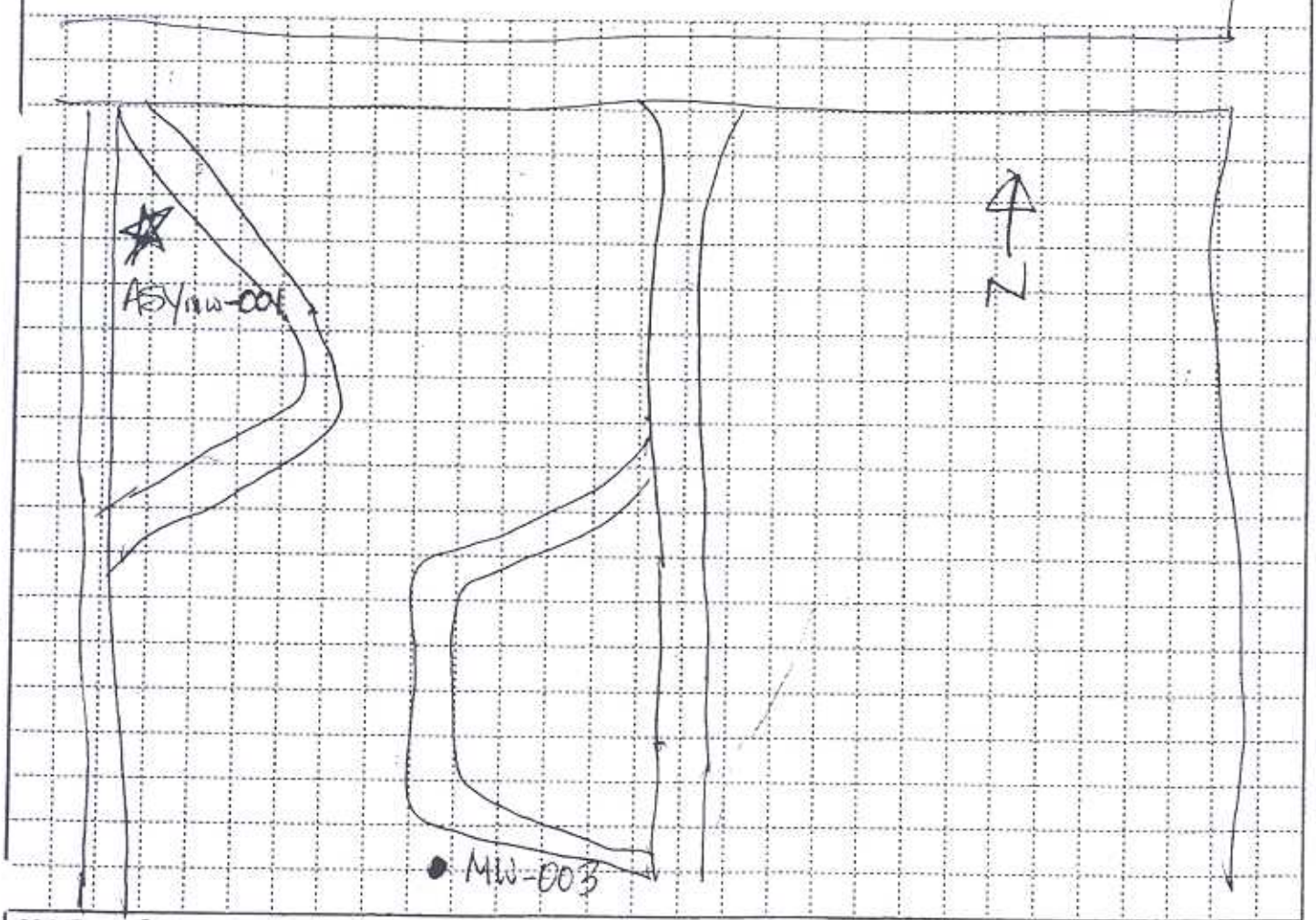
3. PROJECT: RVAAP-RI 14	4. LOCATION: RAVENNA, OH ATLAS SCRAP YARD
5. NAME OF DRILLER: SCOTT HEISER	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-55; 4¼" ID HSA; 2' SPLIT SPOON	8. HOLE LOCATION: NORTH WESTERN CORNER OF SITE
	9. SURFACE ELEVATION: 978.40 ASL
	10. DATE STARTED: 11/15/04 — 11. DATE COMPLETED: 11/15/04
12. OVERBURDEN THICKNESS: 16'	15. DEPTH GROUNDWATER ENCOUNTERED: ~18' BGS
13. DEPTH DRILLED INTO ROCK: 6'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 11.24 @ 0842 11/23/04
14. TOTAL DEPTH OF HOLE: 22' BGS	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
4-6' BGS		X	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
—	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	David R Emmett

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO.
RVAAP-RI 14	ASYMW-001

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYmw-001

PROJECT: RVAAP-RI 14 | INSPECTOR: DK EARNEST | SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ RECOVERY (e)	~~ANALYTICAL SAMPLE NO.~~ USCS (f)	BLOW COUNT (g)	REMARKS (h)
		2" TOPSOIL					
		6" DEBRIS & SOIL					
		DK GREY/BLK CL SILT (75%) W/SAND (5%)	7.2	1.4	ML	4/6	
	2					5/4	
		LT BRN MOTTLED W/LT GREY CLAYEY (BOLD) NO ODOR TRACE RED SILT (10%)	6.0	1.6	ML/CL	4/6	DAMP TO MOIST
		MED PLASTIC				9/10	
	4	STIFF TO V.S.					
		SHELBY TUBE	—	—	—	~~4/4~~ —	1415
	6	SAA MED BRN					
		LOW PLASTIC	7.6	1.4	ML	1/4	WET ON SPOON
						5/6	
	8	SAA	9.5	2.0	ML	1/4	
						6/10	
	10	SAA					
			7.8	1.5	ML	1/4	SAND LENS AT 10.5
		GREY SL CL SILT (40%) (60%)				6/7	MOIST TO WET AT END
	12	SAA LOW PLASTIC					
			8.6	1.5	ML	1/4	SAND LENS @ 13'
	14	SAA				4/6	
			3.6	1.0	ML	1/12	SPOON REFUSAL @ 15.5 SATURATED
	16	WEATHERED SANDSTONE			—	12/50+	
		GREY FINE TO MED GRAINED	—	/	SS	—	DRILLED THRU WEATHERED
	18	SAA					
			—	—	SS	—	ROCK TO 21'
	20						

PROJECT: RVAAP - RI 14 | HOLE NO: ASYmw - 001

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER
ASYMW-001

PROJECT	INSPECTOR	SHEET	SHEETS
RVAAP-RI 14	DK EARNEST	3	OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Gray- WEATHERED SANDSTONE					DRILLED TO 22'
	22	BOH- 22'					
		DRILLED TO 22					
		WELL SET AT 21					
		SCREEN 11-21'					
		SAND TO 9'					
		SEAL TO 7'					
		NO WATER ADDED					

PROJECT	HOLE NO.
RVAAP-RI 14	ASYmw-001

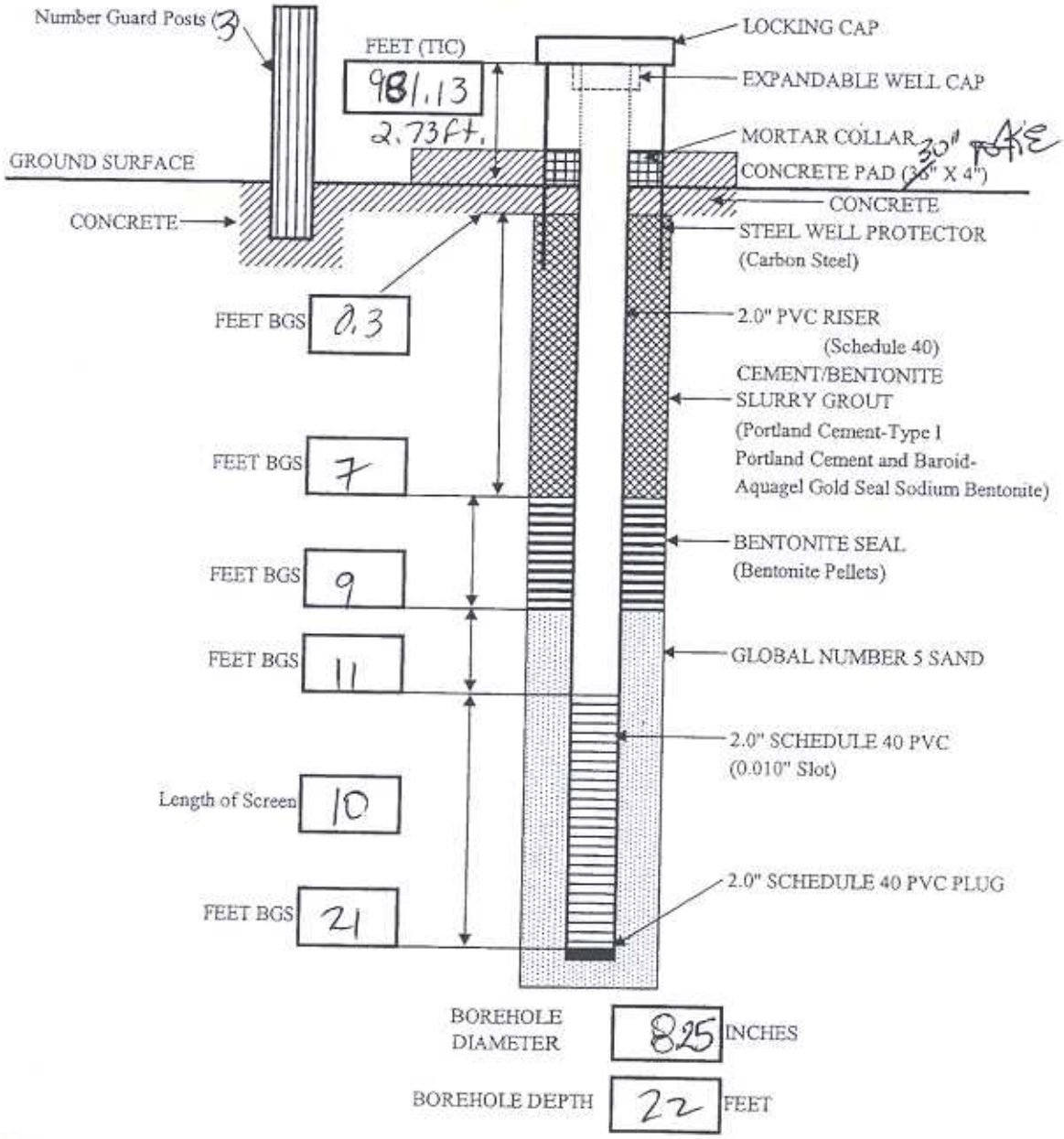
0 260

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI14

Well Number: ASY MW -001	Begin: 11/15/04	End: 11/15/04
Coordinates: N: 558404.04 E: 2366260.85	Elevation: 978.40	Reference Point:
Logged By: DAVID K. EARNEST		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

1. COMPANY NAME: MKM Engineers Inc	DISTRICT: Louisville	HOLE NUMBER: ASYmw-002
2. DRILL SUBCONTRACTOR: Hod Drilling		SHEET 1 OF 2 SHEETS
3. PROJECT: RVAAP RI 14	4. LOCATION: Atlas Scrap Yard	
5. NAME OF DRILLER: Sam Holter	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-LCGO	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 8.25 OD HSA; 2" Split Spoons	8. HOLE LOCATION: West Center	
	9. SURFACE ELEVATION: 982.00 ASL	
	10. DATE STARTED: 16 Nov 04	11. DATE COMPLETED: 16 Nov 04
12. OVERBURDEN THICKNESS: 18 Ft	15. DEPTH GROUNDWATER ENCOUNTERED: 11.7	
13. DEPTH DRILLED INTO ROCK: 2 Ft. (Weathered SS)	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 14.58 @ 1302 11/22/04	
14. TOTAL DEPTH OF HOLE: 20 Ft	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

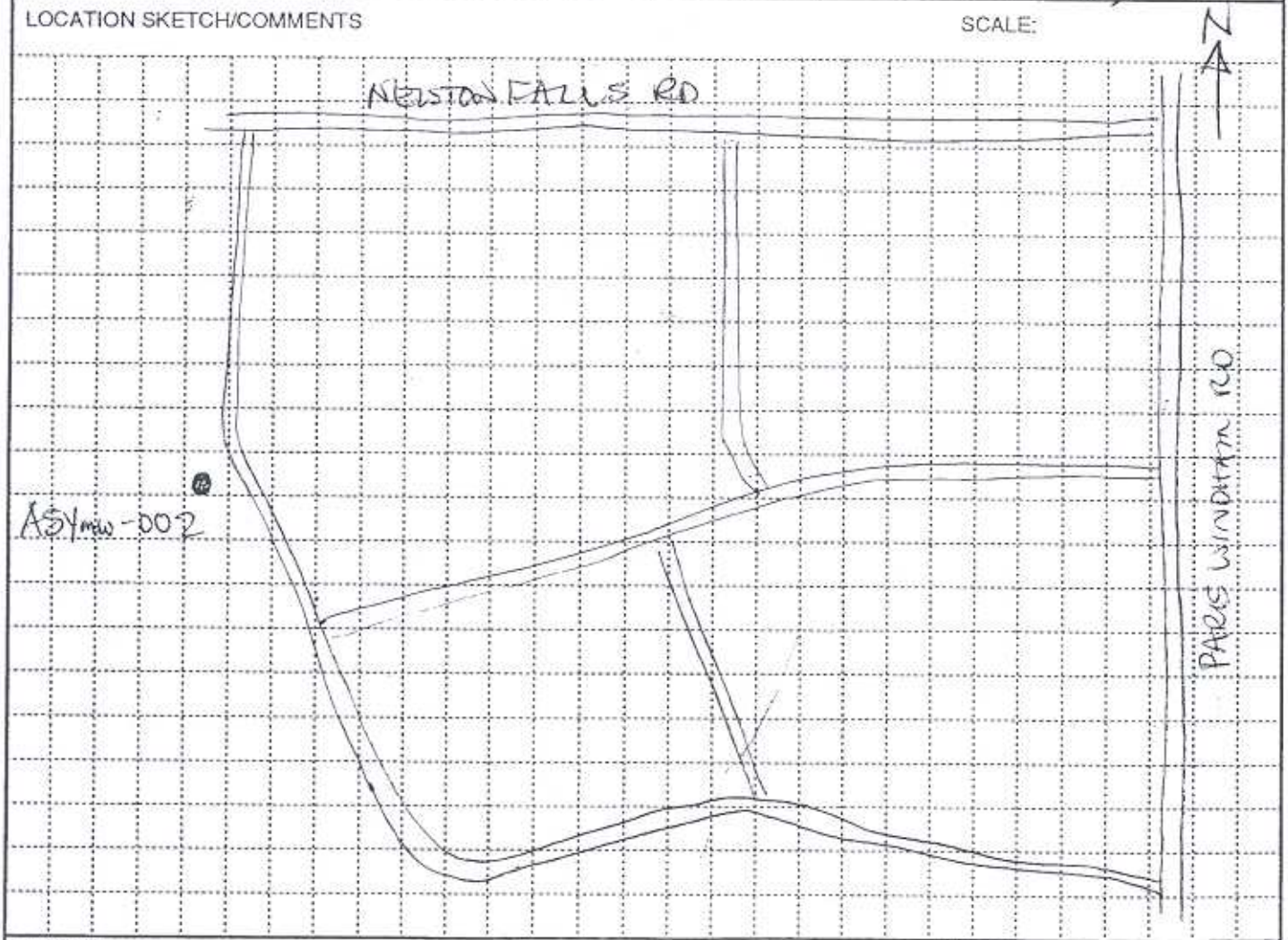
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	—	—	—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	—	—	—	—	—	— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT	HOLE NO.
RVAAP RI 14	ASYmw-002

ENG FORM 5056-R, AUG 94

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYMW-002

PROJECT: RVAAP RI 14

INSPECTOR: Mark Dunlay

SHEET 2 OF 2 SHEETS

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO. (E)	ANALYTICAL SAMPLE NO. (I)	BLOW COUNT (G)	REMARKS (H)
		2" Topsoil					Began Drilling 1030
		Br. SILT 70% w/ Sand Dry No Odor No Staining No Plasticity Gray Mottles Present	0.0	1.4	ML	1-1 2-4	7.5Y 5/8
	2						
		Br. SILT 75% w/ Sand Dry No Odor Mottles Stop No Plasticity	0.0	0.6	ML	1-4 5-10	7.5Y 5/4
	4						
		Br. SILT 75% w/ Clay - Dry No Odor No Plasticity	0.0	1.8	ML	3-7 10-12	7.5Y 4/3
		Brown SAND 75% w/ Silt Damp No Odor No Staining No Plasticity					5Y 4/4
	6	Rock Fragments Pres.			SM	6-10	
		4" SILT Layer 70% w/ Sand Dry No Odor No Staining	0.0	1.8	ML	7-11	7.5Y 4/4
		Reddish Brown SAND 75% w/ Silt Dry No Odor No Staining No Plasticity			SM		7.5Y 5/6
	8	Still Br. SILT w/ Sand Dry No Plasticity	0.0	1.8	ML	4-6	7.5Y 6/6
		Br. SAND 80% w/ Silt Dry No Odor No Staining No Plasticity			SM	7-10	7.5Y 5/4
	10						
			0.0	1.7	SM	4-4 3-2	Same As Above
▽	12	Saturated @ 11.7					
		Same As Above → Wet	0.0	1.3	SM	1-2 2-2	Same As Above
	14						
		Same As Above	7.5	1.0	SM	2-2 3-2	7.5Y 4/6
	16						
		Same As Above	2.9	1.4	SM	2-2 Refusal	7.5Y 4/4
	18	Split Spoon Refusal @ 18ft.					
		Augered to 20ft	—	—	—	—	Boh 20 Sand to 8.5 Sand to 19.5 Bentonite to 6.5 Section from 19.5 Grout to 9.5 Surface
	20	Boh 20ft					

PROJECT: RVAAP RI 14

HOLE NO.: ASYMW-002

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

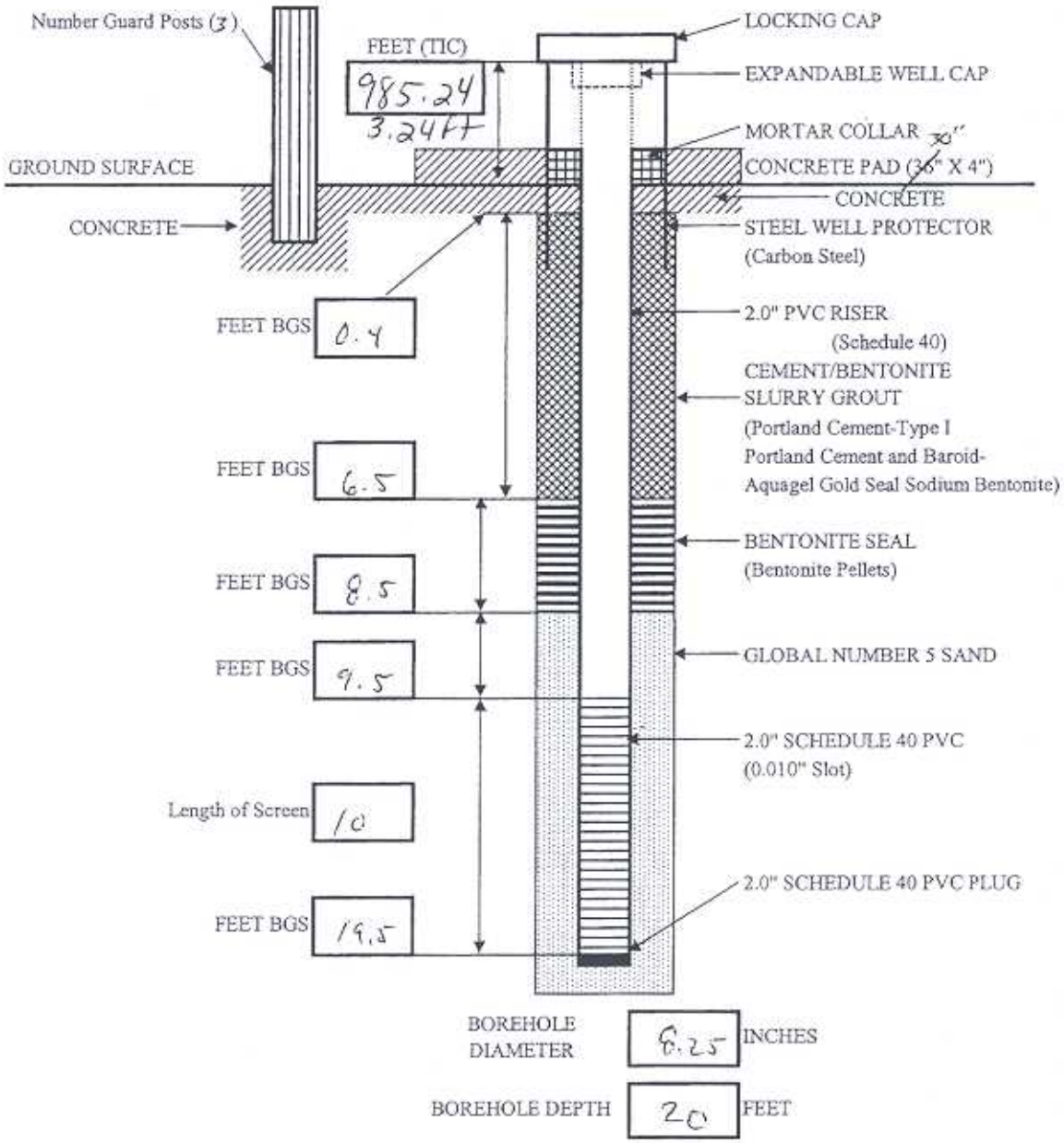
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI-14

Well Number: ASYmw-002	Begin: 16 Nov 04	End: 16 Nov 04
Coordinates: N: 557887.86 E: 2366170.86	Elevation: 982.00	Reference Point:
Logged By: M. Quinby		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

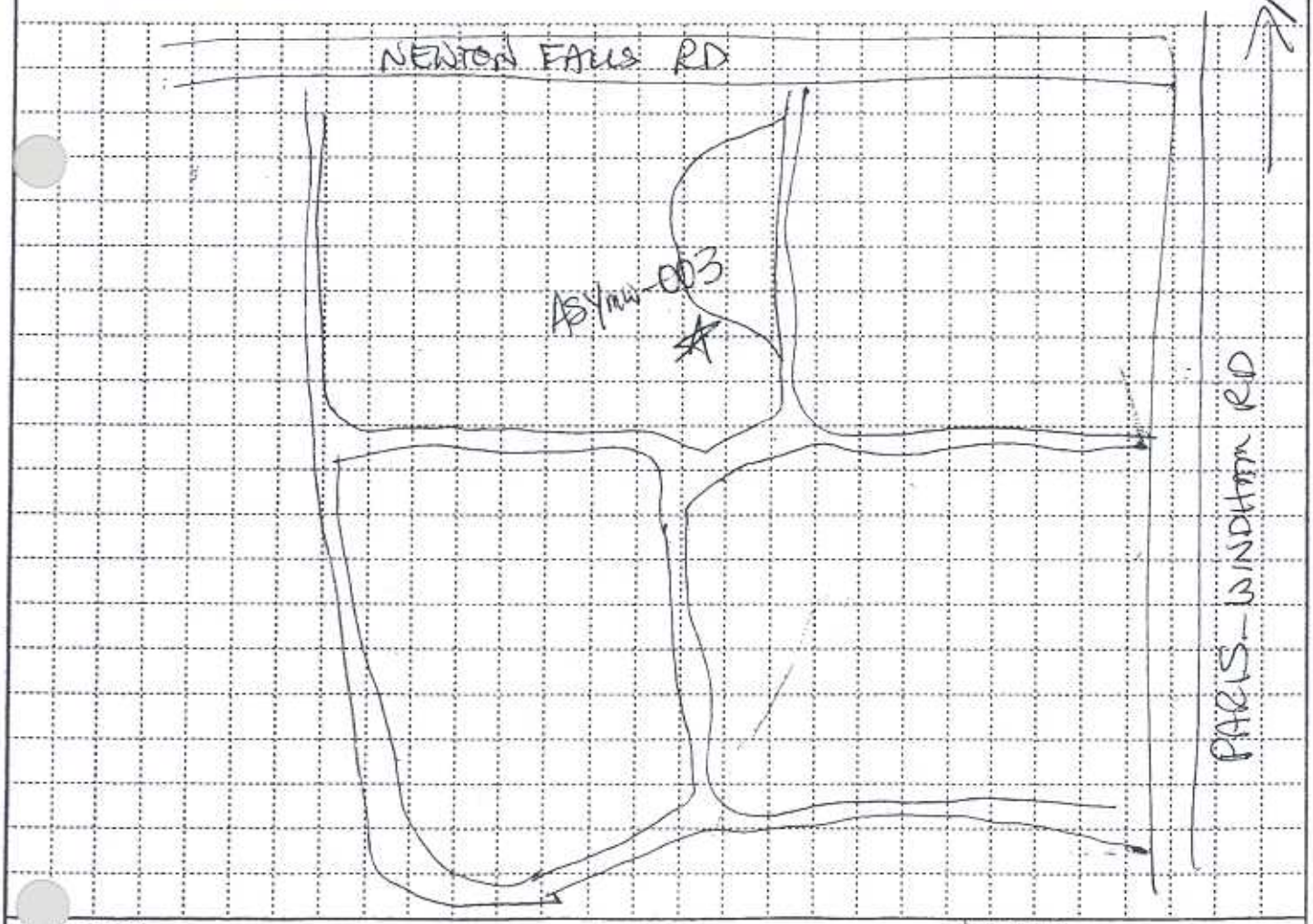
1. COMPANY NAME: MKM ENGINEERS	2. DRILL SUBCONTRACTOR: HAD DRILLING	HOLE NUMBER: ASI mw-003; SHEET 1 OF 3
3. PROJECT: RVAAP-R114	4. LOCATION: RAVENNA, OH ATLAS SCRAP YARD	
5. NAME OF DRILLER: SCOTT HEISER	6. MANUFACTURER'S DESIGNATION OF DRILL: CME	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" ID HSA; 2'-1½" ID SPLITSPOON	8. HOLE LOCATION: NORTHERN CENTRAL AREA OF SITE	
	9. SURFACE ELEVATION: 979.70 ASL	
	10. DATE STARTED: 11/11/04	11. DATE COMPLETED: 11/11/04
12. OVERBURDEN THICKNESS: 20	15. DEPTH GROUNDWATER ENCOUNTERED: 15'	
13. DEPTH DRILLED INTO ROCK: 1.5	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 12.15 @ 0915 11/7/04	
14. TOTAL DEPTH OF HOLE: 21.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
SHELBY TUBE 6'-8' BGS		X	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY: NA %
—	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	David Emm

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO.
RVAAP-R114	ASI mw-003

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYmw-003

PROJECT: RVAAP - RI 14

INSPECTOR: DK EARNEST

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. RECOVERY	ANALYTICAL SAMPLE NO. USCS	BLOW COUNT (g)	REMARKS (h)
730	0	6" TOPSOIL W/ DEBRIS					
		BROWN SILT (80%) LOW PLASTIC MOTTLED W/GREY	3.4	1.1	ML	6/5	7.5YR 4/3 DAMP
	2	TRACE SAND (10%) BROWN W/GREY MOTTLES DK FINE GRAVEL (10%)				3/3	DRY
			3.3	1.5	ML	5/6	7.5YR 5/6
		LESS MOTTLING W/ STIFF DEPTH				7/9	25% MOTTLING DRY
	4		3.9	1.5	ML	1/4	
						7/11	
	6	SHELBY TUBE	—	—	—	—	1245
	8	2" SAND SEAM					
		BROWN CLAYEY SILT (80%) (20%) STIFF TO V.S. NO PLASTIC	3.4	1.5	ML	1/4	7.5YR 5/6
						8/10	DRY
	10	SAND SEAM 3" AT TOP ROCK FRAGS AT 10.5				2/3	
		FINE TO SMALL GRAVEL	2.3	1.5	ML	5/6	MOIST
	12		2.8	1.8		2/6	
		GREY SILT (85%) TRACE PEBBLE			ML	5/4	MOIST
	14	NON PLASTIC TRACE SAND MED DENSE	3.7	1.8	ML	1/3	7.5YR 4/1
						2/3	WET @ 15
	16	SAA SOME SAND				1/3	
		SAND SOME PEBBLES SEAM AT 17"	2.8	1.7	ML	5/7	
	18	(20%) SANDY SILT (80%) DK GREY CLAYEY SILT (20%) (80%)				2/11	10YR 3/1
		5" ROCK FRAGS & PEBBLES SAND SEAM	4	1.6	ML SM	37/50+	SPOON REFUSAL

PROJECT: RVAAP - RI 14

HOLE NO.: ASYmw-003

ASY MW-003

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASY MW-003

PROJECT: RVAAP-R1 14

INSPECTOR: DK EARNEST

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20	DRILLED INTO SS TO 21.5'					
	21	BOH/ED 21.5'					
		WELL TO BE SET AT 21.0'					
		6" SAND BELOW SCREEN					
		SCREEN AT 11-21' BGS					
		SAND TO 9'					
		SEAL TO 7'					

PROJECT: RVAAP-R1 14

HOLE NO: ASY MW-003

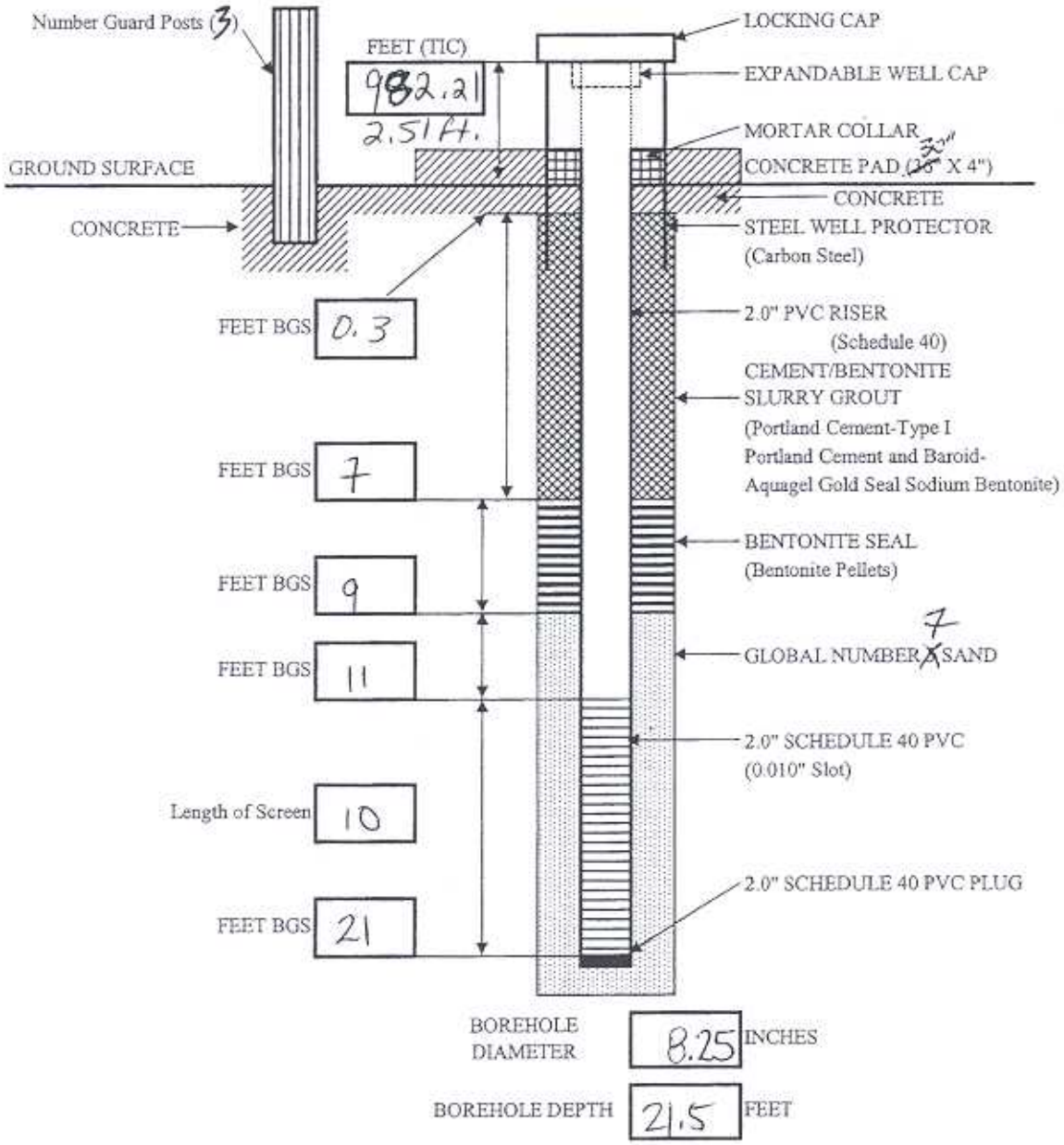
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: ASYmw-008	Begin: 11/11/04	End: 11/11/04
Coordinates: N: 558015.94 E: 2366651.49	Elevation: 979.70	Reference Point:
Logged By: DK EARNEST		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

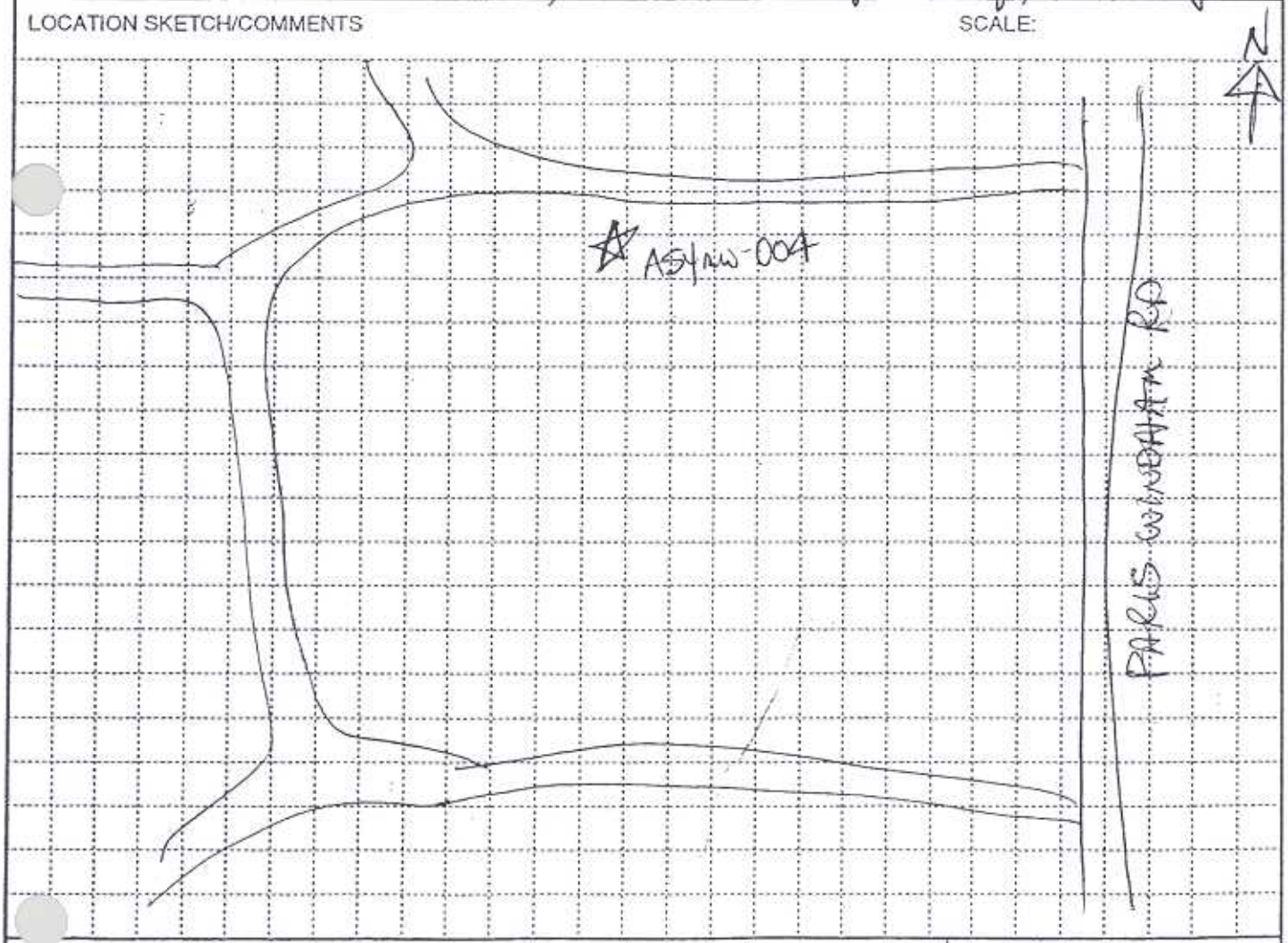
1. COMPANY NAME: MKM ENGINEERS	2. DRILL SUBCONTRACTOR: HAD DRILLING	HOLE NUMBER: ASYMW-004
3. PROJECT: RVAAP - R114	4. LOCATION: RAVENNA, OH ATLAS SCRAP YARD	SHEET 1 OF 3 SHEETS
5. NAME OF DRILLER: SCOTT HEISER	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-55	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4 1/4" ID HSA; 1 1/2" ID 2' SPLIT SPOON	8. HOLE LOCATION: CENTER OF SITE	
	9. SURFACE ELEVATION: 977.10 ASL	
	10. DATE STARTED: 11/10/04	11. DATE COMPLETED: 11/11/04
12. OVERBURDEN THICKNESS: 27.5	15. DEPTH GROUNDWATER ENCOUNTERED: 16'	
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 9.15 @ 0950 11/17/04	
14. TOTAL DEPTH OF HOLE: 27.8'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
—	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	David A. Eaman

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO.
RVAAP - R114	ASYMW-004

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYMW-004

PROJECT: RVAAP-RI 14 | INSPECTOR: DKEARNEST | SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ RECOVERY	~~ANALYTICAL SAMPLE NO.~~ USCS	BLOW COUNT (g)	REMARKS (h)
	0	8" GREY TOPSOIL					
		LT GREY W/ ORANGE CLAY, SILT (20%) (TRACE)	3.9	1.3	CL	3/5	930 AM
		MED TO LOW PLASTIC TRACE SAND (10%)				7/11	7.5YR 6/2 DRY WITH S/G 30%
	2	BROWN W/ GREY MOTTLED TRACE SMALL PEBBLES	7.6	1.4	CL	8/11 11/13	~~7.5YR 4/3~~ DRY
	4	LESS MOTTLING W/ DEPTH	4.8	1.4	CL	1/6 12/13	7.5YR 4/3 DRY
	6	SAA	7.7	1.5	CL	2/7 11/17	DRY
	8	SAA	6.2	1.6	CL	4/10 13/21	DRY
	10	GREY SILT, SL CLAY (20%) 80%	6.5	1.4 BLOW	ML	2/5 8/10	11' DAMP TO WET 7.5YR 5/1
	12	LOW TO NO PLASTIC STIFF NO ODOR SAA MED TO STIFF	5.7	1.7	ML	1/3 4/5	
	14	SAA	6.1	2.0	ML	1/2 3/5	
	16	SAA	3.3	2.0	ML	1/3 4/6	16-16.5 SAT
	18	SAA	3.8	1.8	ML	1/3 5/7	18-18.5 SAT
	20						

PROJECT: RVAAP-RI 14 | HOLE NO.: ASYMW-004

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYmw-004

PROJECT: RVAAP-RI 14

INSPECTOR: DKEARNEST

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ RECOVERY	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20	SAA					
			4.1	1.8	ML	1/2 3/6	1" SAND @ 21.5' 2.5Y 4/2
	22	SILT, SANDY BLUE GRAY LOW PLASTIC SOME COARSE SAND TO SMALL ~~PEBBLES~~ GRAVEL	2.7	2.0	ML	1/4 8/12	22.5' 4" COARSE SAND SEAM
	24	NONPLASTIC					
		DK GREY AT 25'	8.2	1.8	ML	4/8 12/13	7.5 YR 4/1 7.5YR 2.5/1
	26	SOME SS ROCK FRAGS	7.7	1.3	ML	2/11	
		SANDSTONE				50T	27.5 REFUSAL
	28	BOH 27.8'					
	30	REFUSAL 27.8' SCREEN 17-27 SAND TO 14' SEAL TO 11'	8 BAGS #7 SAND				

PROJECT: RVAAP-RI 14

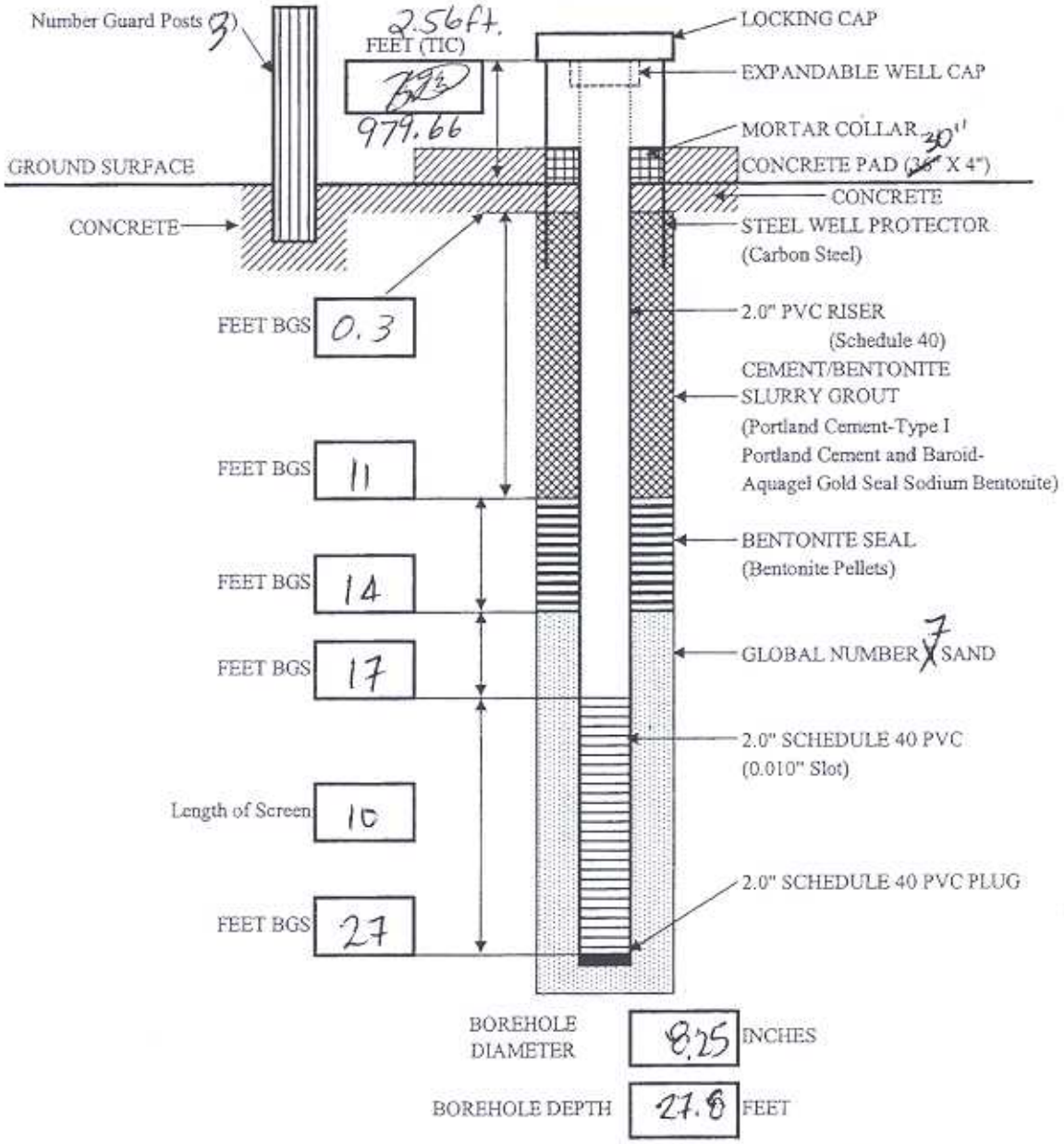
HOLE NO: ASYmw-004

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: ASY mw -004	Begin: 11/11/04	End: 11/11/04
Coordinates: N: 557640.81 E: 2367166.04	Elevation: 977.10	Reference Point:
Logged By: DK EARNEST		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

1. COMPANY NAME: MKM ENGINEERS	2. DRILL SUBCONTRACTOR: HAD DRILLING	HOLE NUMBER: ASYmw-005
	DISTRICT: LOUISVILLE	SHEET 1 OF 3 SHEETS
3. PROJECT: RVAAP-RI 14	4. LOCATION: ATLAS SCRAP YARD	
5. NAME OF DRILLER: SAM HOFFER	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-LC60	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 8.25" OD HSA; 2" SPLIT SPOON	8. HOLE LOCATION: EAST CENTER OF SITE	
	9. SURFACE ELEVATION: 977.60 ASL	
	10. DATE STARTED: 15 NOV 04	11. DATE COMPLETED: 16 NOV 04
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED: ~14.5'	
13. DEPTH DRILLED INTO ROCK	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 7.4 @ 1055 11/19/04	
14. TOTAL DEPTH OF HOLE: 25'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —	

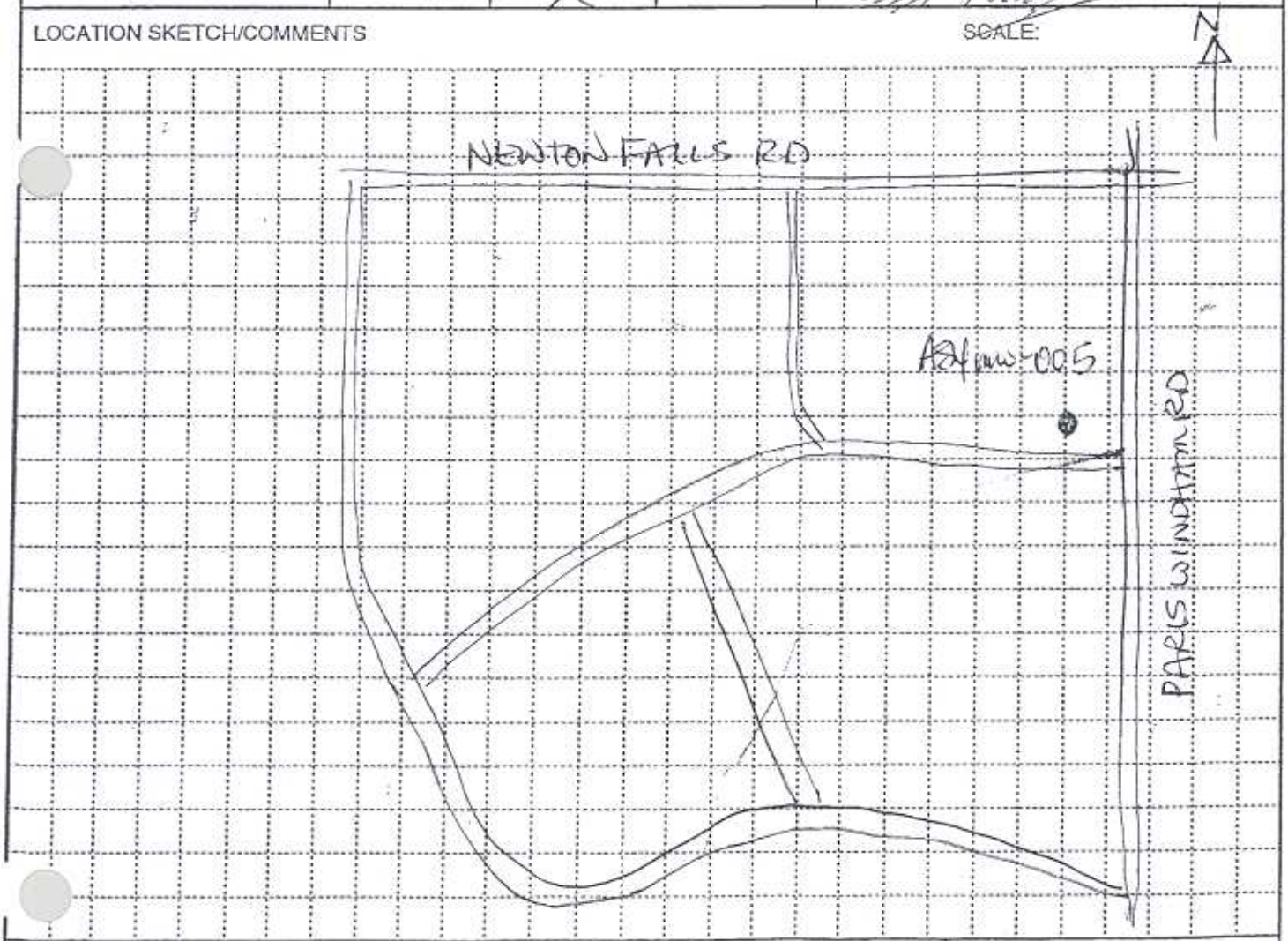
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
—	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT	HOLE NO.
RVAAP-RI 14	ASYmw-005

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYMW-005

PROJECT: RVAAP RI IV

INSPECTOR: Mark Dentley

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	2	0.7 Topsoil Br. SILT 70% w/ Sand 20% Damp No Odor No Plasticity Grey Mottles	1.5	1.6	ML	WT-1 1-3	7.5YR 5/6
		Rock in Rocksh Split Spoon	0.0	C		1-5 5-5	
	4	Br. SILT 70% w/ Sand 20% Dry No Odor No Plasticity & Hydrolattes	0.9	1.4	ML	1-2 5-7	75yr 5/6
	6	Same As Above	0.0	1.6	ML	3-6 10-11	7.5yr-5/6
	8	Same As Above	0.0	1.6	ML	4-6 10-13	7.5y-5/6
	10	Same As Above	0.0	1.8	ML	7-5 10-11	7.5y-4/4
	12	Grey SILT 75% w/ clay wet/Sat. No Plasticity No Odor No Staining	0.0	1.6	ML	5-16 11-10	7.5yr-5/1
	14	9" Sand w/ Silt Saturated					
		~~Same As Above~~	0.0	1.0	ML	1-3 5-7	SAA
	16	Grey/Br. SILT 70% w/ Sand Dry No Plasticity No Odor No Staining					
			0.0	1.2	ML	1-3 5-8	SAA
	18	1" Dry Sand Layer					
		Gray SILT 70% w/ Sand Dry No Plasticity No Odor No Staining	0.0	1.3	ML	1-3 5-8	SAA
	20						

PROJECT: RVAAP RI IV

HOLE NO. ASYMW-005

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYmw-005

PROJECT: RVAAP RI 14

INSPECTOR: Mark Donley

SHEET 3 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		Same As Above w/ rock frag beginning @ 21 ft.	0.0	1.4	ML	1-3 6-7	SAA
	22	Same As Above	0.0	1.7	ML	2-7 10-11	SAA
	24	Gray SILT 70% w/ Sand 20% Dry Stiff No Odor No Staining No Plasticity	0.0	1.8	ML	~~2-7~~ 6-16 21-22 ~~10-11~~	MDD MDD SAA
	26	Split spoon Refusal @ 26 ft			ML		
	28						
	30	BOH 29 ft					BOH 29 Ft waited over night to check water level -13 Ft. of Silt in borehole in morning -cleaned out/re drilled hole to 28 Ft. BOH 25 Sand to 24 Screen from 24 to 14 Sand to 11 Bentonite to 8 Grout to Surface Completion

PROJECT: RVAAP RI 14

HOLE NO.: ASYmw-005

ENG FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

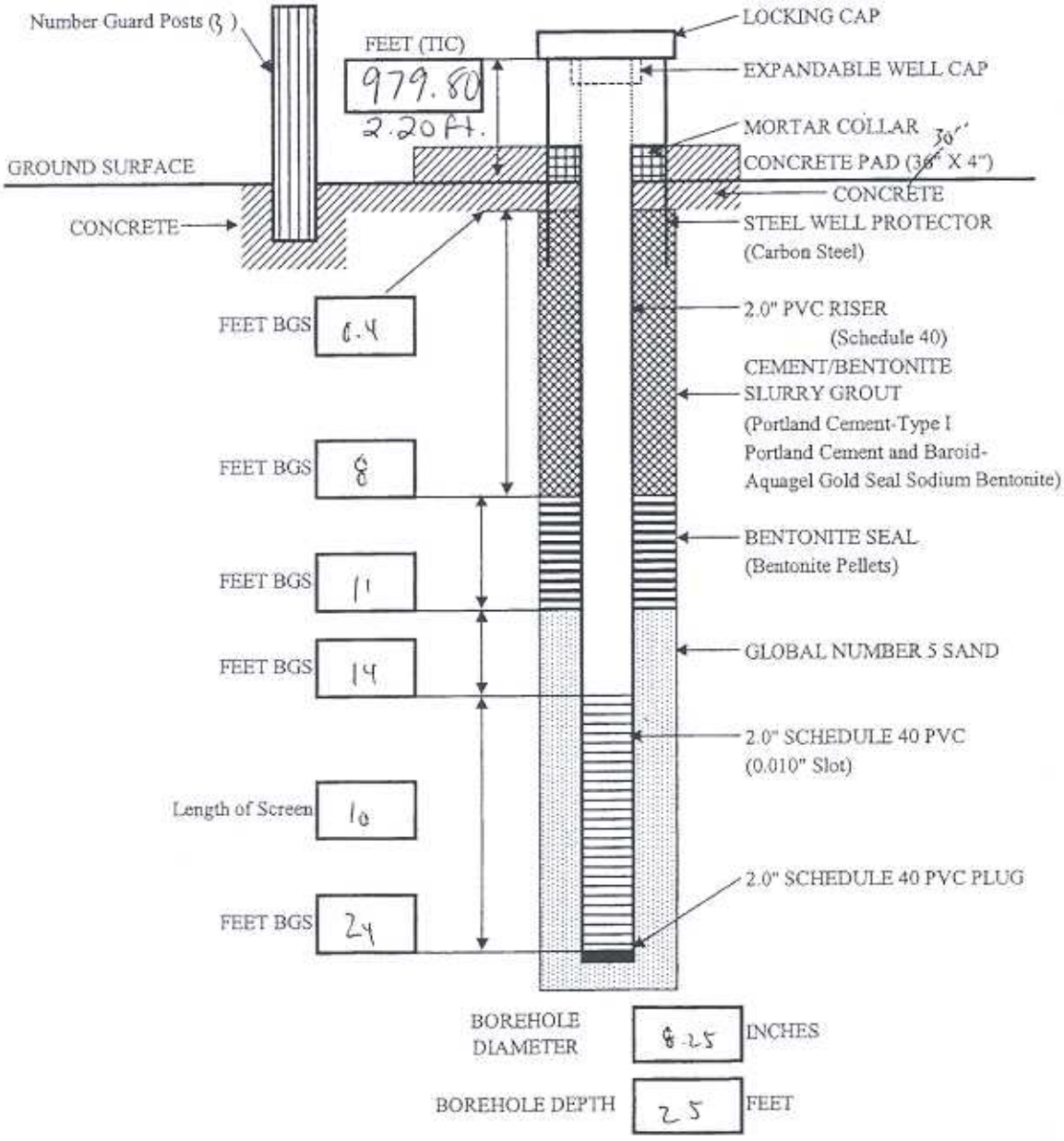
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: ASYmw-005	Begin: 15 Nov 04	End: 16 Nov 04
Coordinates: N: 557783.01 E: 2367448.16	Elevation: 977.60	Reference Point:
Logged By: Mark Dunlavy		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

1. COMPANY NAME: MKM ENGINEERS	DISTRICT: LOUISVILLE	HOLE NUMBER: ASY mw-006
2. DRILL SUBCONTRACTOR: HAD DRILLING		SHEET 1 OF 3 SHEETS
3. PROJECT: RVAAP-RI 14	4. LOCATION: RAVENNA, OH ATLAS SCRAP YARD	
5. NAME OF DRILLER: SCOTT HEISER	6. MANUFACTURER'S DESIGNATION OF DRILL: CME-55	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-55; 4¼" ID HSA; 2' SPLIT SPOON	8. HOLE LOCATION: SOUTH WESTERN PORTION OF SITE	
	9. SURFACE ELEVATION: 980.20 ASL	
	10. DATE STARTED: 11/15/04	11. DATE COMPLETED: 11/15/04
12. OVERBURDEN THICKNESS	15. DEPTH GROUNDWATER ENCOUNTERED: 12'	
13. DEPTH DRILLED INTO ROCK	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 13.45 @ 1442 11/18/04	
14. TOTAL DEPTH OF HOLE: 27' BGS	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

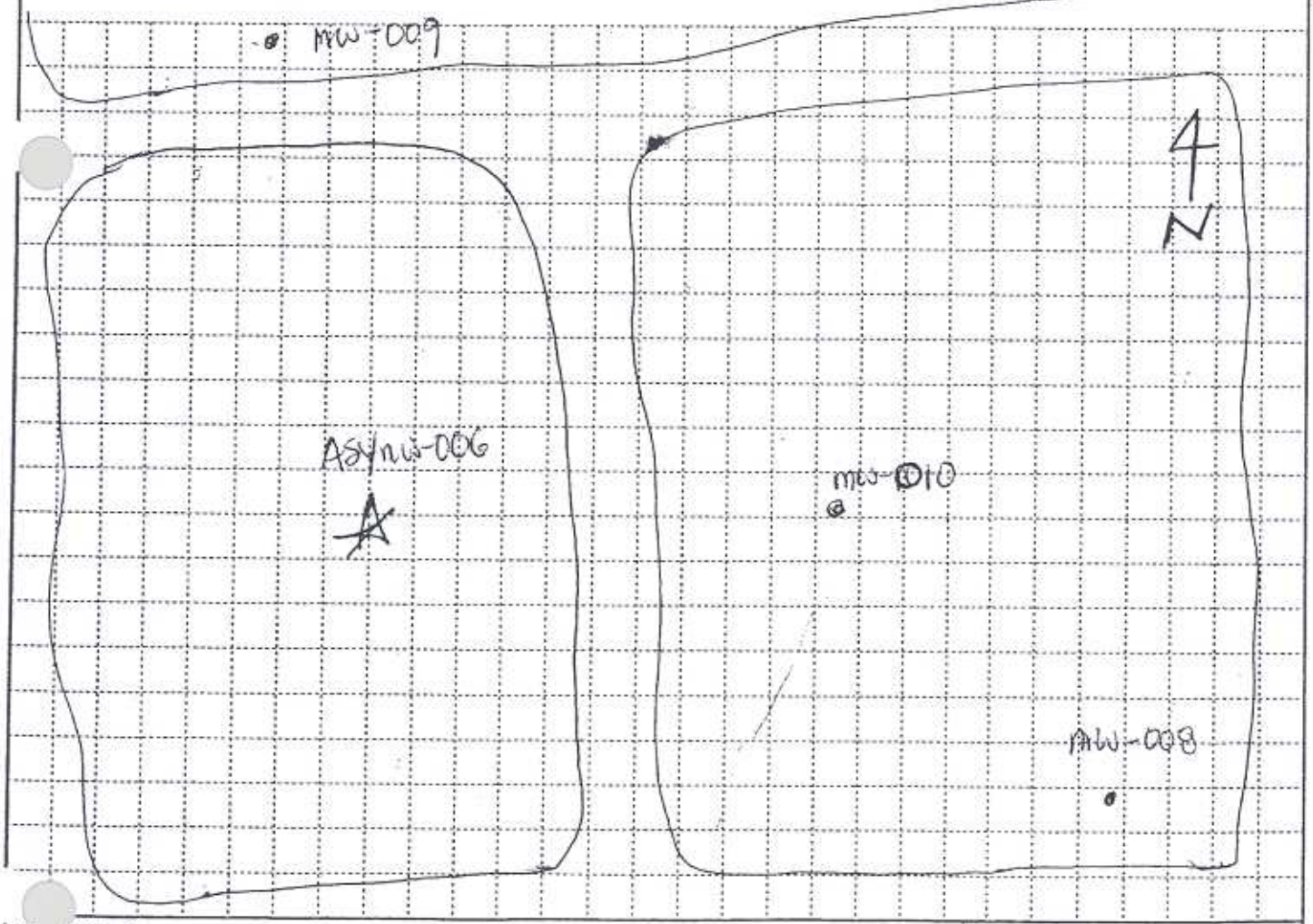
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE			NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		David Kearnes

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT: RVAAP-RI 14	HOLE NO: ASY mw-006

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYMW-006

PROJECT: RVAAP - RI 14

INSPECTOR: DK EARNEST

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECH SAMPLE OR CORE BOX NO.~~ RECOVERY	ANALYTICAL SAMPLE NO. USCS	BLOW COUNT (g)	REMARKS (h)
15		TOPSOIL - GRASS & ROOTS					
		DK BROWN CLAYEY SILT (20%)	5.4	0.2	ML	4/3	
		MED DENSE LOW PLASTIC				3/3	
	2	MED BRN MOTTLED W/ GREY					
		CLAYEY SILT (30%)	7.6	0.3	ML	4/6	
		STIFF TO V.S.				8/11	10YR 4/6 10YR 6/1 30%
	4	SAA SMALL GRAVEL REBBLES	(12.4) 219 684	1.2	ML	1/3	* 684
						7/9	
	6	SAA	676 (7.1)	1.7	ML	2/4	*
						9/17	
	8	VERY STIFF / LESS MOTTLING W/ DEPTH SAA	10.8	1.7	ML	2/10	
						12/17	WET @ 9.5
	10	SAA BROWN SL CL SILT (70%) (10%)	6.2	1.7	ML	1/5	10YR 4/3 DRY
		LOW PLASTIC STIFF TO V.S.				7/9	WET @ 11.5
	12	GREY SL CL SILT (80%) (10%)	11.5	1.7	ML	1/3	7.5YR 4/1
		LITTLE FINE (10%) SAND LOW PLASTIC MED DENSE				4/5	SAT
	14	SAA	6.9	1.8	ML	1/3	
						3/3	SAT
	16	SAA	4.2	1.8	ML	1/2	
						2/3	SAT
	18	SAA	6.1	2.0	ML	1/1	
						1/2	SAT

PROJECT: RVAAP - RI 14

HOLE NO: ASYMW - 006

ENG. FORM 5056A-R, AUG 94 (Proponent: CECW-EG)

* INITIAL PID READINGS WERE HIGH AND THOUGHT TO BE ANOMALOUS, RECHECK OF SOIL AFTER SEVERAL MINUTES RESULTED IN SUBSTANTIALLY REDUCED READINGS (IN PARA).

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASVmw-006

PROJECT: RVAAP - RI 14

INSPECTOR: DK Guernsey

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		SAA	8.6	1.1	ML-	1/1	SAT
	22	GREY SANDY SILT (60%) (40%) SOFT			ML/SM	1/3	
		SAA	4.7	2.0	ML	1/2	
	24	DK GREY SANDY SILT (40%) (60%) ROCK FRAG DENSE WEATHERED SANDSTONE				9/11	DRY
			10.3	1.0	ML/SM	9/11	7.5YR 2.5/1 DRY
	26					27/32	
			10.5	0.3	SM	4/50/3	SPOON REFUSAL
		BOH 27' AUGER REFUSAL @ 27'					
	28						
		SET WELL @ 26' SCREEN 16-26' SAND TO 13' BENT. SEAL TO 10'					
	30						

PROJECT: RVAAP - RI 14

HOLE NO: ASVmw-006

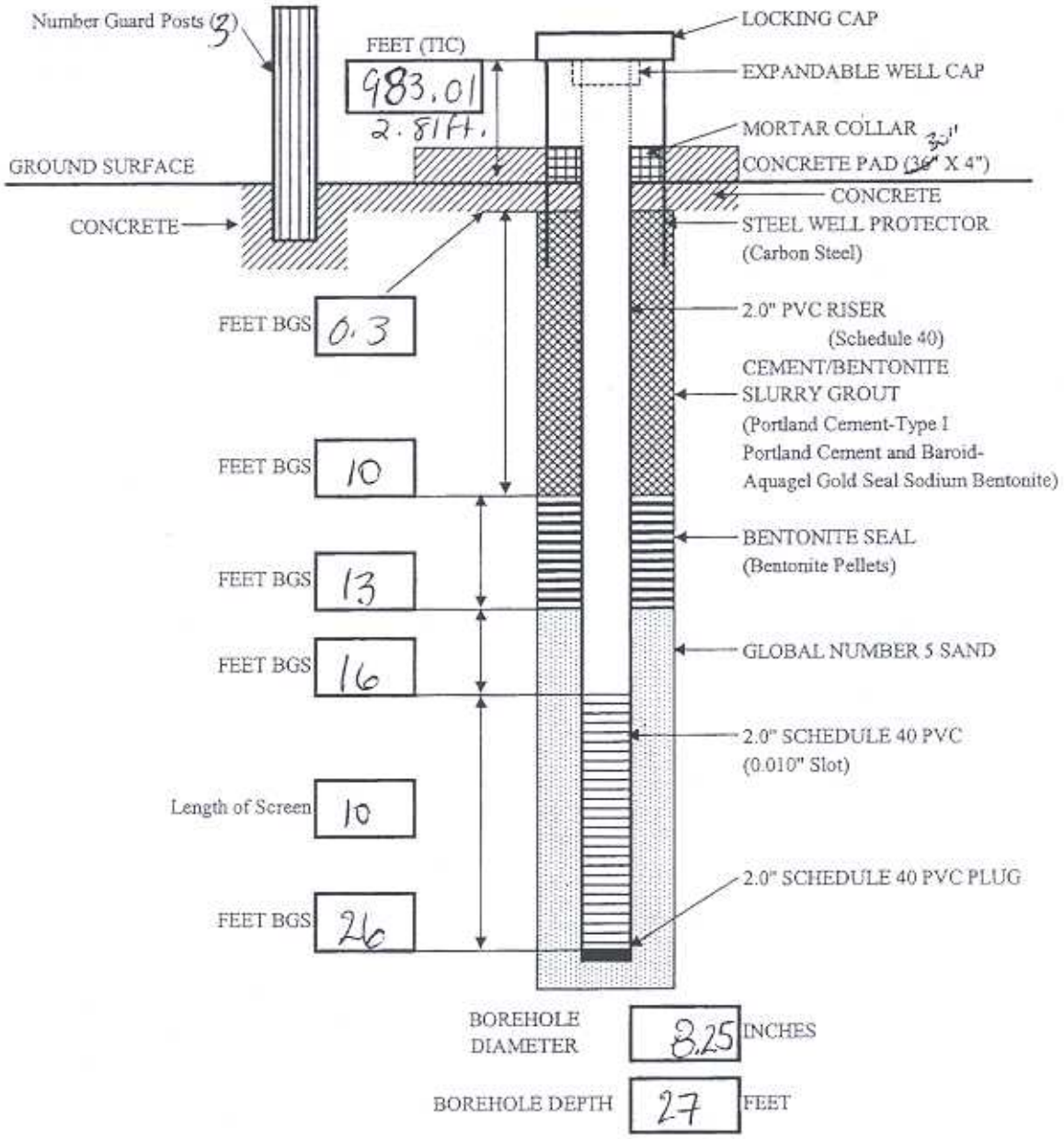
MKM

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: ASYmw-006	Begin: 11/15/04	End: 11/15/04
Coordinates: N: 557257.72 E: 2366746.73	Elevation: 980.20	Reference Point:
Logged By: DAVID K. EARNEST		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

HTRW DRILLING LOG

1. COMPANY NAME: MKM ENGINEERS	2. DRILL SUBCONTRACTOR: HAD DRILLING	HOLE NUMBER: ASY mw-009
		SHEET 1 OF SHEETS 3

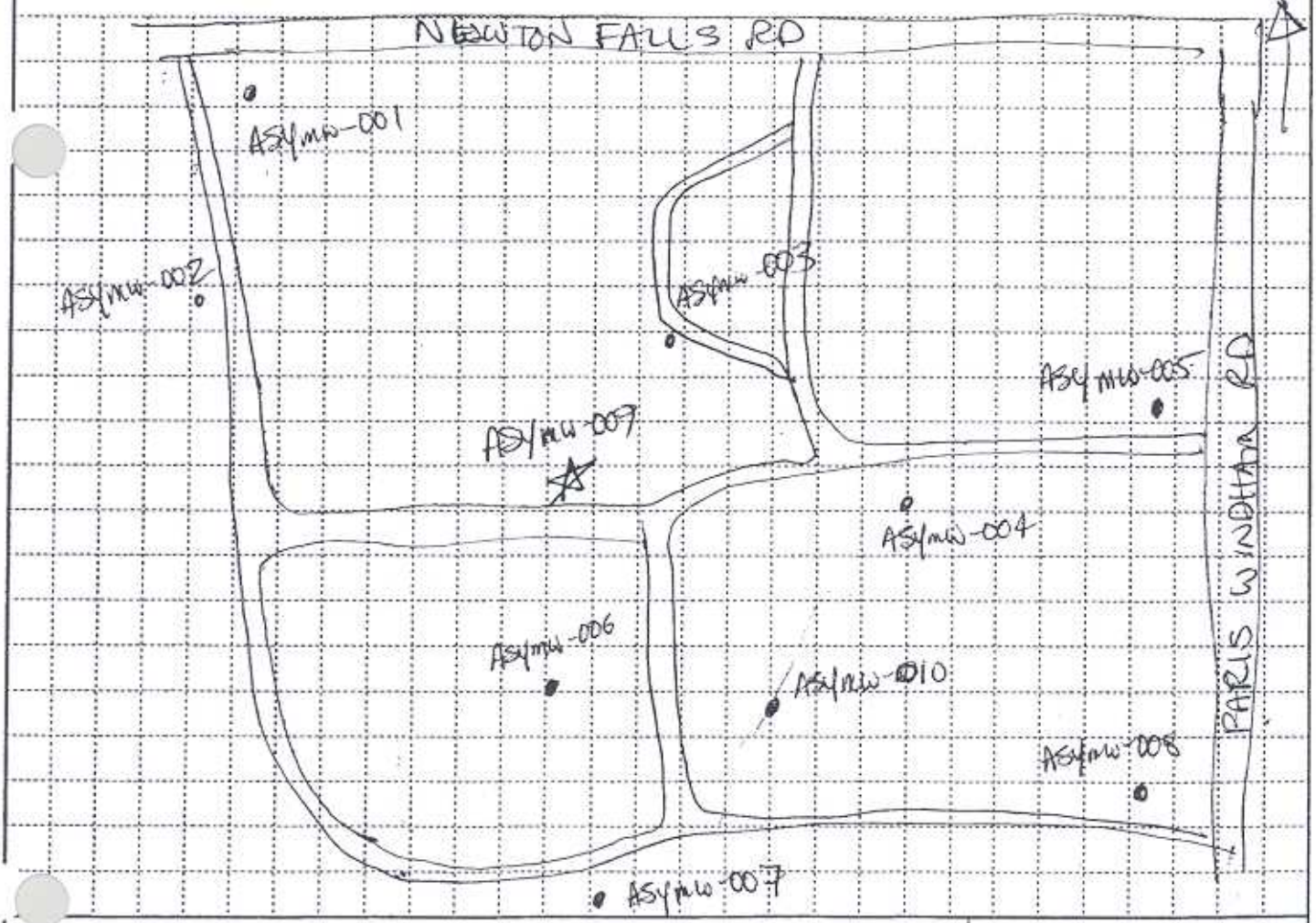
3. PROJECT: RVAAP - R1 14	4. LOCATION: RAVENNA, OH ATLAS SCRAP YARD
5. NAME OF DRILLER: SCOTT HEISER	6. MANUFACTURER'S DESIGNATION OF DRILL: CME - 55
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" ID HSA; 1½" ID 2' SPLIT SPOON	8. HOLE LOCATION: WEST CENTRAL
	9. SURFACE ELEVATION: 979.90 ASL
	10. DATE STARTED: 11/12/04 — 11. DATE COMPLETED: 11/12/04
12. OVERBURDEN THICKNESS:	15. DEPTH GROUNDWATER ENCOUNTERED: 14'
13. DEPTH DRILLED INTO ROCK: 0.5'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 12.45 @ 1010 11/18/04
14. TOTAL DEPTH OF HOLE: 22'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	—	—	NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
—	—	—	—	—	—	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
	—	X	—	

LOCATION SKETCH/COMMENTS — SCALE:



PROJECT	HOLE NO.
RVAAP - R1 14	ASY mw-009

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYMW-009

PROJECT: RVAAP-R1 14

INSPECTOR: DK EARNEST

SHEET 2 OF 3 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	~~GEOTECHSAMPLE OR CORE BOX NO.~~ RECOVERY	~~ANALYTICAL SAMPLE NO.~~ USCS	BLOW COUNT (g)	REMARKS (h)
	0	4" TOP SOIL, GRASS & ROOTS					
		MED BROWN CLAYEY SILT (70%) (20%) LOW PLASTIC MOTTLED SOME ROCK FRAG & DEBRIS (10%) MED DENSE	1.2	0.6	ML	2/3 3/3	DAMP 10YR 5/3
	2	LT BROWN MOTTLED W/LT GREY					
			2.9	1.6	ML	2/3 3/5	MOIST @ 2.5 10YR 6/3
	4	~~LOST~~ SAA LESS GREY MOTTLING REDDISH 4-4.5					
		TRACE ROCK FRAG	8.6	1.5	ML	1/4 6/6	DAMP
	6	SAA					
		TRACE GREY	8.8	1.8	ML	3/5 9/10	DRY 10YR 4/3
	8	SAA					
			8.6	1.5	ML	3/7 10/15	
	10	GREY SILT (80%) NO PLASTIC DRY TRACE SAND (20%)	4.4	1.5	ML	4/6 10/12	7.5YR 5/1
	12	SAND (60%) MED BROWN (20%) SILTY MED TO FINE 3" GREY CLAY SEAM @ 13' LOOSE TO MED DENSE	9.6	1.2	SM	1/4 5/5	10YR 5/4 MOIST TO WET
▽	14	SAA	6.5	1.3	SM	2/3 4/5	SAT SAND
	16	GR SILT, GREY (80%) SMALL ROCK FRAGS (10%) SOME SAND (10%)	10.3	1.5	ML	1/1 2/2	7.5YR 5/1 SAT
	18		7.6	1.8	ML	2/7 10/13	SAT
	20						

PROJECT: RVAAP-R1 14

HOLE NO: ASYMW-009

HTRW DRILLING LOG (CONTINUATION SHEET)

HOLE NUMBER: ASYmw-007

PROJECT: RVAAP-R1 14

INSPECTOR: DK EARNEST

SHEET 3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
	20					1/7	~~TOTR~~ 3/1
		DK GREY SILT, 90% SOME SAND 10%	11.0	1.5		11/50+	10YR 3/1
	22	ROCK FRAG NO PLASTIC					SPOON REFUSAL
		BOH 22'					
		BED ROCK @ ~22'					
		SET WELL @ 21.5					
		SCREEN 11.5 - 21.5					
		SAND TO 9.5					
		SEAL TO 7.5					
		7 BAGS #7 SAND					

PROJECT: RVAAP-R1 14

HOLE NO.: ASYmw-007

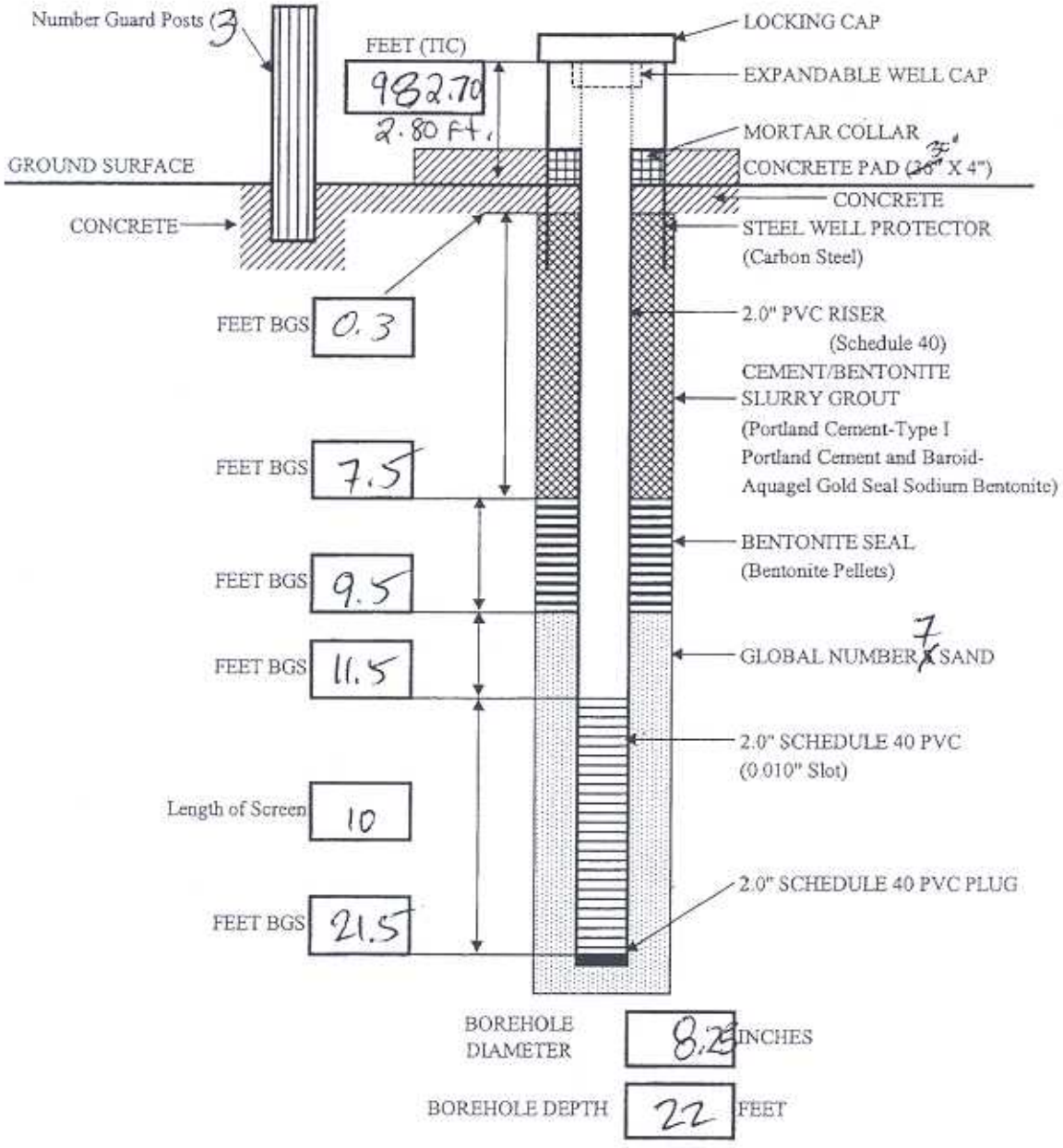
ENG. FORM 5056A-R, AUG 94

MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: ASYmw-009 ~~NE~~	Begin: 11/12/04	End: 11/12/04
Coordinates: N: 557603.68 E: 2366631.94	Elevation: 979.90	Reference Point:
Logged By: PKEARNEST		



Notes:

1) Figure not drawn to scale.
2) BGS = Below Ground Surface.
3) Well head protected with three guard posts set in triangle configuration about the concrete pad.

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RVAAP-66 FACILITY-WIDE GROUNDWATER

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HTRW DRILLING LOG

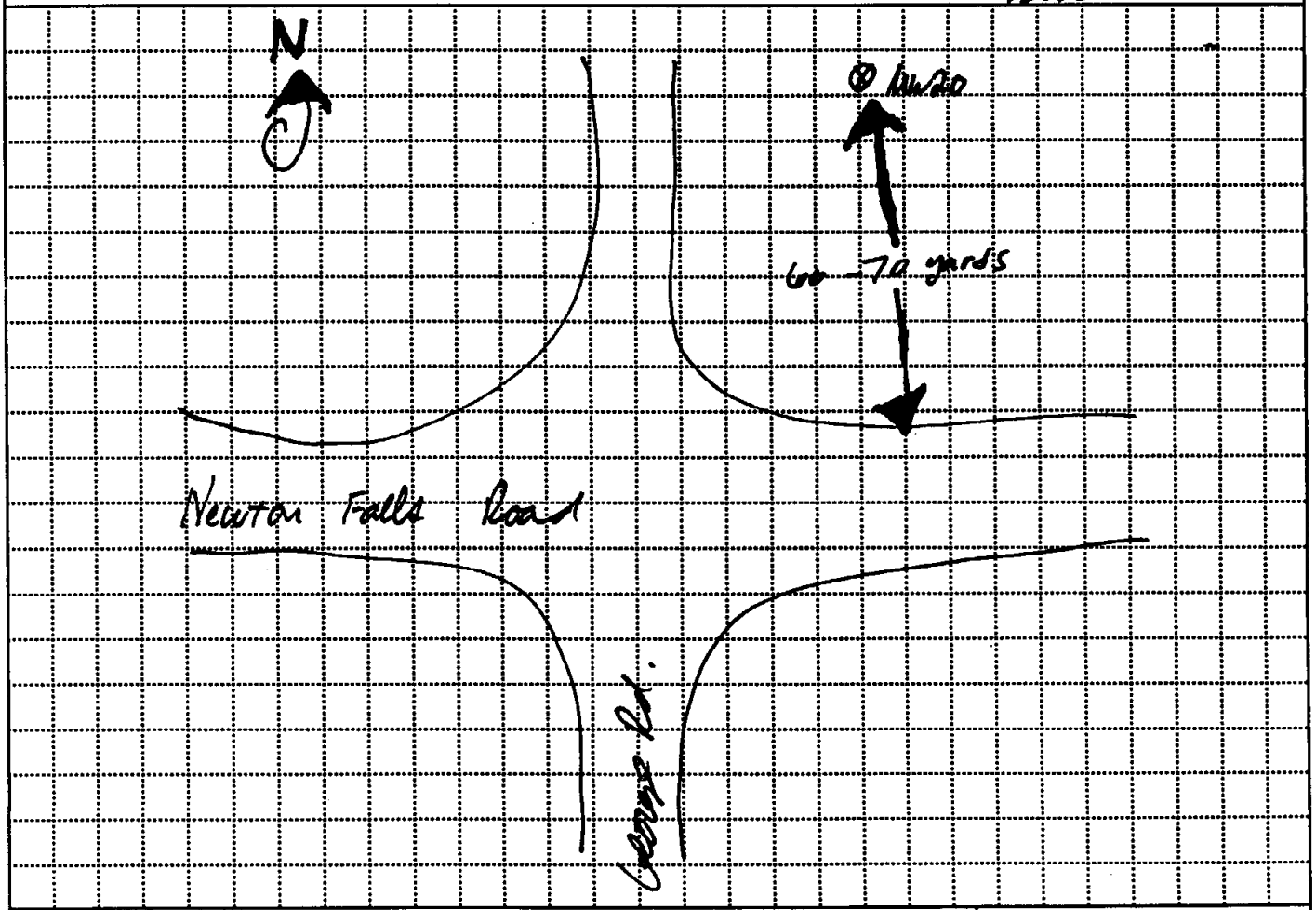
DISTRICT Louisville Corps		HOLE NUMBER BKG MW-20
1. COMPANY NAME SAIC	2. DRILL SUBCONTRACTOR Bowser-Morner	SHEET 1 OF 2
3. PROJECT Phase II RI at WinklepeckBurning Ground and Background Investigation	4. LOCATION RVAAP	
5. NAME OF DRILLER John Filburn	6. MANUFACTURERS DESIGNATION OF DRILL Versa-Sonic V-100	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 4" and 6" Ø, 10' long Sampling cores, 2' long Carbide tipped bit, Municipal H2O from Newton Falls	8. HOLE LOCATION N. of Newton Falls / George Rd Inter.	
	9. SURFACE ELEVATION 1062.68	
	10. DATE STARTED 5-7-96	11. DATE COMPLETED
12. OVERBURDEN THICKNESS ~9-10'	15. DEPTH GROUNDWATER ENCOUNTERED ~21'	
13. DEPTH DRILLED INTO ROCK 10'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 5' BGS after an 1.5 hr Recovery Period	
14. TOTAL DEPTH OF HOLE 30'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
1-2' and 3-4'	X		2

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY	OTHER (SPECIFY	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
		X	Explosives			100

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		

LOCATION SKETCH/COMMENTS SCALE: None



PROJECT Phase II RI at Winklepeck Burning Ground and Facility-wide Background Investigation, RVAAP	HOLE NO. MW-20

ENG FORM 5056-R, AUG 94 (Proponent: CECW-EG)

HTRW DRILLING LOG

HOLE NUMBER: BKG MW 020

PROJECT Phase II RI at WBG and Background Investigation

INSPECTOR: Matt Molony

SHEET 2 of 2

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	GEOTECH SAMPLE OR CORE BOX NO. (E)	ANALYTICAL SAMPLE NO. (F)	~~REMARKS (G)~~ Description of Mat'l. (C)	DEPTH
	0–1	TopSoil; DK grayish Brn Sandy Silt: Silt w/ F-C P.Sorted Sand; 6"-1.0' Some Clay		0-5 Core 100% Recov.			
	1–3	Silty CLAY (CL); Brown w/ Reddish Brn and Gray Mottling; Moist; Stiff-Hard Medium plasticity. No mottling Below 2'	0.0 PPM	2' Geotech BK0B10 1-2' + Geotech	BK0B11 3-4' + Geotech	Very Fine Sand/Siltstone Zone, Lt-gray in color. 21-23 SANDY SILTSTONE Lt. gray, Has some Horizontal cracks and cavities (Solution?) not Real Thick or Extensive Zone 20-30'	21–24
	4–5	↓ HARD				Core Box # MW20-2	24–25
	5–6			5-15 Core Core Refusal @ 13' Just Too Hard, Core barrel overheating w/out Running H_2O		Dark gray SHALE	25–26
	6–8	SANDY CLAY Zone maybe Dry, crumbly, slightly Moist 25% Poorly Sorted Sand including F. Gravel					26–28
	8–10	SILTY CLAY Cont'd Hard					28–30
	10–13	very weathered DK gray Shale w/ Clay				BOB at 30'	30–33
	13–15	DK Gray SHALE Thinly Bedded, Horizontal Bedding; trace Carbon imprints of plant or Small tree mat'ls.		13-20 Core All DK gray Shale Core Box # MW20-1			33–35
	15–20						35–40

PROJECT Phase II RI at Winklepeck Burning Ground and Background Investigation
N558756.241 E2357856 ELEV. 1065.001

HOLE NO. MW-20

MONITORING WELL INSTALLATION LOG HOLE NUMBER: BKG Mw-20

PROJECT: Phase II RI @ WBG and Background Investigation INSPECTOR: M. Osborn

SHEET 1 OF 1

MONITORING WELL ID: BKG/Mw-20

INSTALLATION START: DATE: 5-7-98 TIME: 1340

INSTALLATION FINISH: DATE: 5-7-98 TIME: 1530

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Quartz #7 QUANTITY: 7½ 50 lb bags

BENTONITE SEAL: TYPE: Pel-Plug 3/8" Pellets QUANTITY: 1 5 gallon bucket.

GROUT: TYPE: Portland type I w/ 5% Bent. Powder QUANTITY: 20 gallons

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): .010 SLOT CONFIGURATION: Horizontal

TOTAL OPEN AREA PER FOOT OF SCREEN: —

OUTSIDE DIAMETER: 2" + 5/16" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sch 40 COMPOSITION: PVC HKS 9-29-98

MANUFACTURER: Global Drilling Suppliers

TYPE OF MATERIAL BETWEEN BOTTOM OF BORING AND SCREEN: Cap (2') Sch 40 PVC HKS 9-29-98

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2 5/16" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sch 40 COMPOSITION: PVC

MANUFACTURER: Global

JOINT DESIGN AND COMPOSITION: Threaded PVC

CENTRALIZERS DESIGN AND COMPOSITION: —

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 4" square COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

HKS 9-29-98

Was all well screen and casing material used for construction free of foreign matter (e.g., adhesive tape, labels, soil, grease, etc.)? YES [✓] NO [ ]

Was all well screen and casing material used for construction free of unsecured couplings, ruptures, and other physical breakage and/or defects? YES [✓] NO [ ]

Is deformation or bending of the installed well screen and casing minimized to the point of allowing the insertion and retrieval of a 1.0-inch bailer throughout the entire length of the completed well? YES [✓] NO [ ]

QUANTITY OF APPROVED WATER USED FOR FILTER PACK ENPLACEMENT: 0 gal — NA

RECORDED BY: _____ (Signature & Date)

QA CHECK BY: Heather L Smith 9-29-98 (Signature & Date)

MONITORING WELL

PROJECT NAME: Phase II RI @ WBG and Background Investigation **DELIVERY ORDER NO:** 0060

WELL NUMBER: BKGMW-20 **BEGIN:** 5-7-98 @ 1340 **END:** 1530

COORDINATES: N: 558756.241 E: 2357856 **REFERENCE POINT:** Top of Riser Pipe **ELEVATION:** 1065.001 MSL

HLS 9-29-98