

Well ID: LNW_{mw} - 025-GW Monitoring Well Purging FormRavenna Army Ammunition Plant
Ravenna, OhioDate: 01/12/05

WELL OBSERVATIONS

Protective Casing: Intact Damaged Locked: Yes No Key No:
Concrete Base: Intact Damaged Inner Casing: 2" 4" · 6" · 8" Other:
Stickup Height: 25 1.93 (ft) TIC · TOC Difference: _____ (ft) 1.6 inch
Vapor Readings: HNu · OVA Background: _____ Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes No _____ Yes · No LNW_{mw} - 025-GW
DNAPL Yes No _____ Yes · No

CALCULATIONS

- (A) Depth to Well Bottom 18.0 (ft) TOC · TIC · BGS Measured Previously Measured (circle one)
(B) Depth to Water 4.62 (ft) TOC · TIC · BGS Time Measured: 1046
(C) Water Column Height (A-B) 13.38 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C · D) 2.1 (gal)
(F) Volumes to be Evacuated 93 40.75
(G) TOTAL VOLUME TO BE EVACUATED (E · F) 10.5 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: micropurge Device Number: _____Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · OffsiteCollected In: Tanks · Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1046	4.62	micropurge	-	0.304	10.25	7.13	335	3.59	INITIAL READING
1049	4.63	"	-	0.304	10.18	6.97	320	3.59	
1052	4.63	"	-	0.302	10.22	6.89	220	3.4	
1055	4.63	"	-	0.304	10.25	6.91	118	3.42	FINAL PURGING
									FINISHED

Logged By: NILESH SHRINGARPURE (Please Print)Reviewed By: C. YolkSignature: N. ShringarpureDate: 2/22/05

Location ID: LNWmw - 025 - G W

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 01/12/05

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	MICROPURGE PUMP ✓		Push Probe
Type/Construction			Mattocks
Miscellaneous	Well Purging Form (Yes) - No		

Sample Collection: 1100 hrsSample Type: Composite - MI - Grab
If MI, # of increments taken: NALocation: Plotted on Map - Staked in Field
Estimated - Measured - SurveyedSample Depth: 10-8 FT (below surface)Decon: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters	Other Parameters
PID / FID Readings:	VOC ✓	Corrosivity
Background: ppm	SVOC ✓	Reactivity Sulfide/Cyanide
Sample: NT ppm	Explosives ✓	Ignitability
	Propellants ✓	
Water Level 4.63 FT	TAL Metals ✓	QA Samples
Temperature 10.25 °C	Pesticides/PCBs ✓	MS/MSD Yes / No NA
Sp. Conductance: 0.304 uMHOs	Cyanides	Duplicate ID NA
pH 6.91 units	TOC	Equipment Rinse ID NA
Turbidity 118 N.T.U.	Grain Size	Trip Blank ID <u>Trip Blank</u> NA

Sample Description

NO ODOR NO SHEENDO = 3.42clear water, NO odor, NO SHEENmedium to high turbidity

Split Sample

Split Sample ID:

Name:

Agency/Company:

Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks

Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

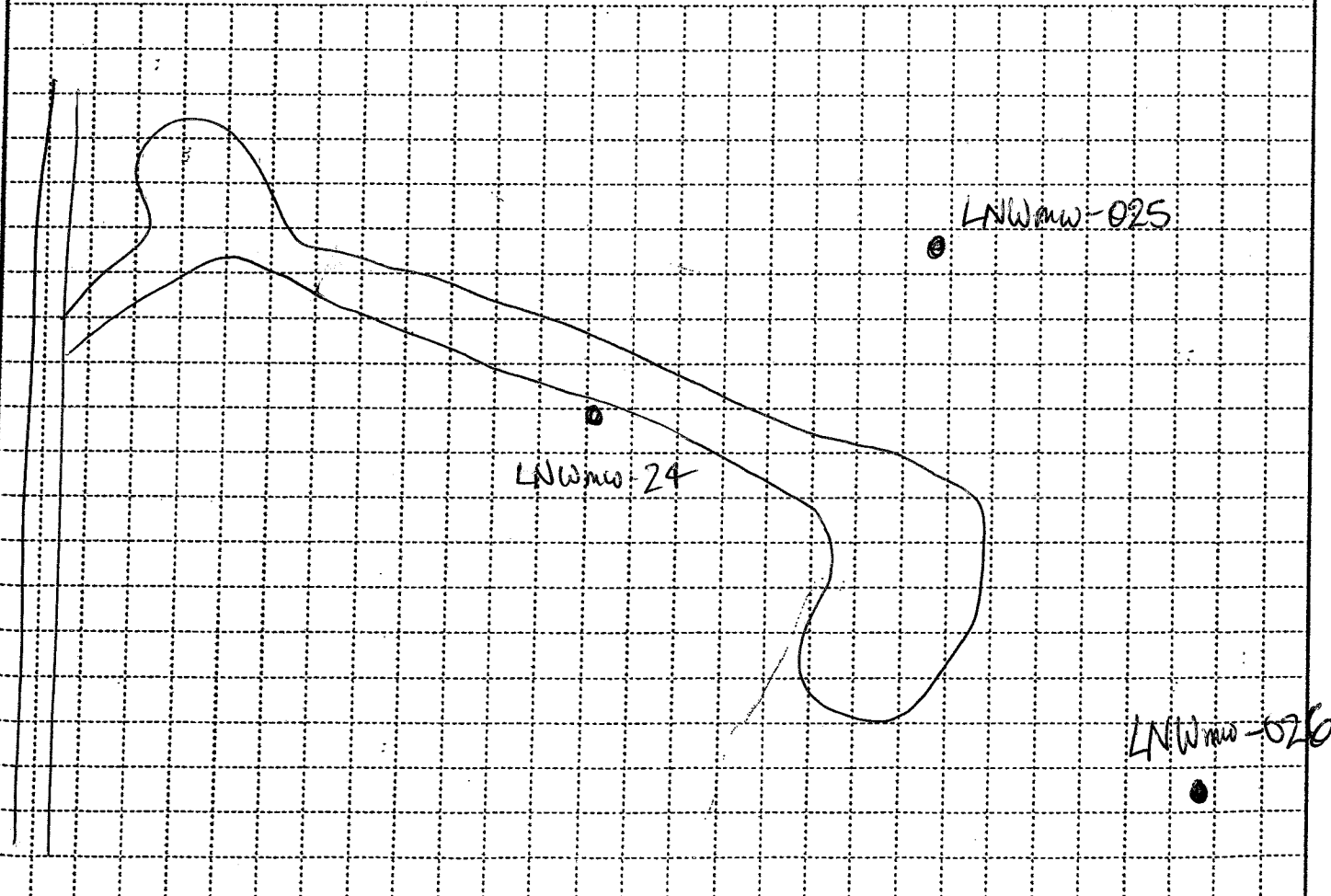
Color Odor Sheen Turbidity

Logged By: NILESH SHRINGARPURE (Please Print)Reviewed by: FALC EWIS (Please Print)Signature: N ShringarpureSignature: Elsh Date: 2/1/05

HTRW DRILLING LOG		DISTRICT <u>LOUISVILLE</u>		HOLE NUMBER <u>LNW mw-026</u>	
1. COMPANY NAME <u>MKM ENGINEERS</u>		2. DRILL SUBCONTRACTOR <u>HAD DRILLING</u>		SHEET <u>7</u> OF <u>3</u>	
3. PROJECT <u>RVAAP-R114</u>			4. LOCATION <u>RAVENNA, OH LANDFILL NORTH</u>		
5. NAME OF DRILLER <u>GREG</u>			6. MANUFACTURER'S DESIGNATION OF DRILL <u>CME-LC 60</u>		
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		8. HOLE LOCATION			
<u>4 1/4" ID HSA</u>		<u>EAST OF LANDFILL</u>			
<u>1 1/2" ID X 24" SPLIT SPOON</u>		9. SURFACE ELEVATION <u>1025.00</u>			
		10. DATE STARTED <u>12/14/04</u>		11. DATE COMPLETED <u>12/14/04</u>	
12. OVERBURDEN THICKNESS		15. DEPTH GROUNDWATER ENCOUNTERED <u>~13'</u>			
13. DEPTH DRILLED INTO ROCK		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <u>3.4' @ 1436</u> <u>12/22/04</u>			
14. TOTAL DEPTH OF HOLE <u>24' BGS</u>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)		
18. GEOTECHNICAL SAMPLES		DISTURBED <u> </u>		UNDISTURBED <u>X</u>	
19. TOTAL NUMBER OF CORE BOXES					
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <u> </u>		METALS <u> </u>	
		OTHER (SPECIFY) <u> </u>		OTHER (SPECIFY) <u> </u>	
22. DISPOSITION OF HOLE		BACKFILLED <u> </u>		MONITORING WELL <u>X</u>	
		OTHER (SPECIFY) <u> </u>		23. SIGNATURE OF INSPECTOR <u>David K Earnst</u>	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT <u>RVAAP-R114</u>	HOLE NO. <u>LNW mw-026</u>
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HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LNW-026

PROJECT

RVAAP-RI 14

INSPECTOR

D. K. EARNEST

SHEET

SHEETS

2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CELL NO. RECOVERY	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
900m		3" TOP SOIL - DK BROWN SANDY SILT NO ODOR NO STAINING BROWN SANDY SILT LOOSE (30%) (70%) SAA NON PLASTIC	0.0	2.0	ML SM	PUSH	MOIST TO WET 7.5 YR 4/4
	2		0.0	1.0	ML	3/4	WET
	4	SAA				4/3	
	6	GREY SILT SOME (60%) FINE SAND (20%) SAA LOW PLASTIC NO ODOR LOOSE NO STAINING	0.0	1.5	ML	1/1 2/2	SAT @ 5' PERCHED? 7.5 YR 3/1 SAT
	8	SAA	0	1.5	ML	1/2 3/3	
	10	GREY CLAYEY SILT (40%) (60%) MED PLASTIC SAA NO ODOR NO STAINING LOOSE	0	1.7	CL	1/2 3/4	CLAYEY @ 9' 7.5 YR 4/1
	12		0	2.0	CL	1/2 2/4	MOIST TO WET
	14	GREY SILT FINE SAND (80%) (20%) NO ODOR NON PLASTIC LOOSE NO STAINING	0	1.8	SM	5/5 6/5	SAT 7.5 YR 5/1
	16	GREY SLCK SILT (20%) (80%) SAA LOW PLASTIC NO ODOR NO STAINING LOOSE TO MED DENSE	0	1.7	ML	1/2 4/4	7.5 YR 4/1
	18	SAA	0	1.8	ML	2/5 7/7	SAT
	20		0	1.8	ML	3/3 4/5	

PROJECT

RVAAP-RI 14

HOLE NO.

LNW-026

(CONTINUATION SHEET)

LNW MW-026

RVAAP-Ri14

INSPECTOR

DK EARNEST

SHEET

SHEETS

3 OF 3

PROJECT	RVAAP-2114	HOLE NO.	LNWAW-026
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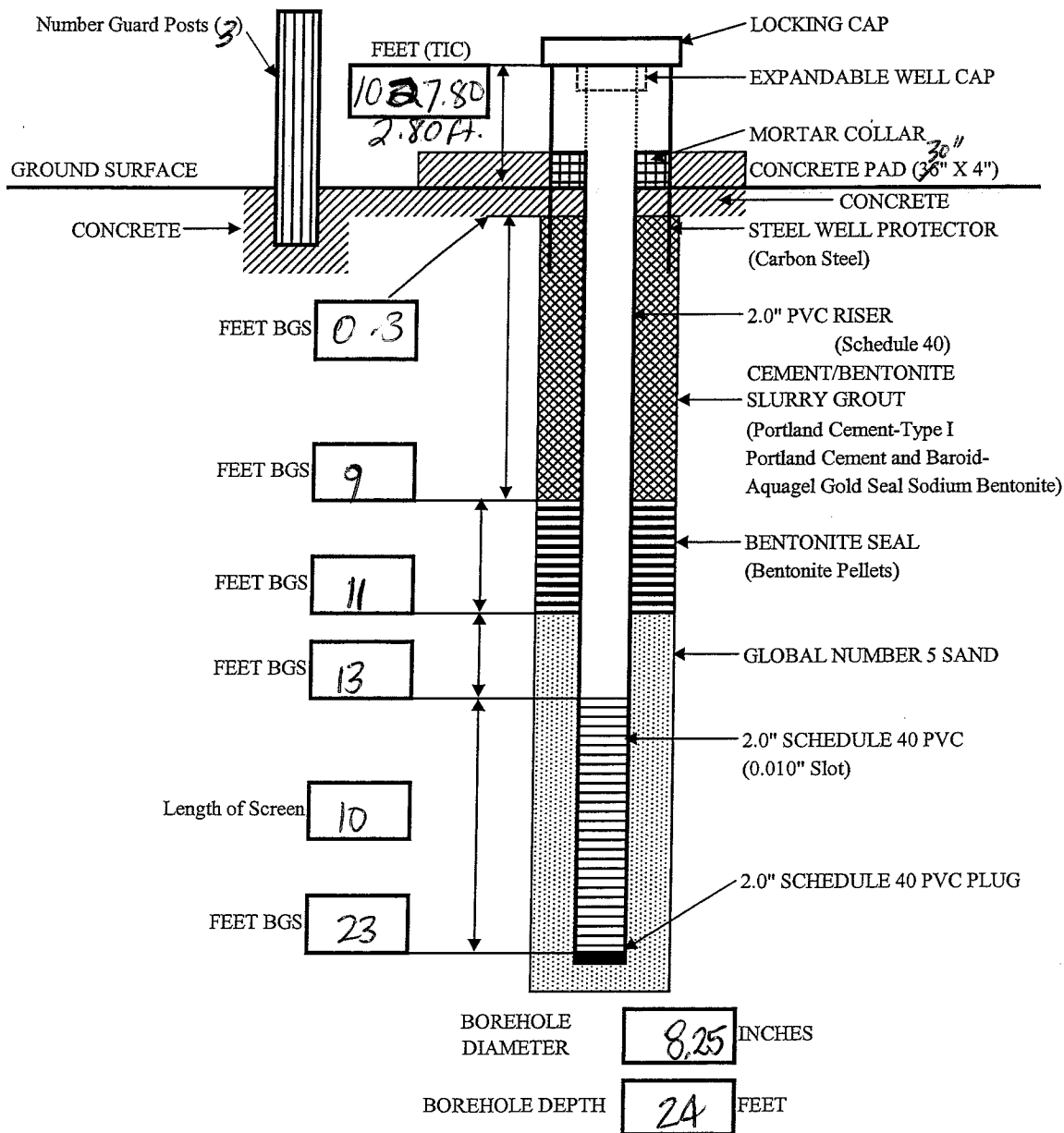


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project:

Well Number: <u>LNWMW-026</u>	Begin: <u>12/14/04</u>	End: <u>12/14/04</u>
Coordinates: N: <u>564658.16</u> E: <u>2358952.24</u>	Elevation: <u>1025.00</u>	Reference Point:
Logged By: <u>DK EARNEST</u>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well ID: <u>LNW_{mw}-026-GW</u> Date: <u>12/22/04</u>					Well Development Record					Ravenna Army Ammunition Plant- RVAAP 14 AOC Characterization				
Project: <u>RVAAP-14</u>					Development Method: <u>WHALE PUMP</u>									
Development Company: <u>MRM</u>					Comments: _____									
Well TD: <u>25.90</u> FT TIC		Depth to Water: <u>3.4</u> FT		Well Volume (gallons/foot)		2-inch = 0.16		6-inch = 1.47						
Water Column Height: <u>22.50</u> FT		One Well Volume: <u>1328</u> Gals				4-inch = 0.65		8-inch = 2.61						
Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments				
					pH	CON	DO	TEMP						
1436	DSB	3.4	-	-	-	-	-	-	-	-				
1444	DSE	3.8	-	-	-	-	-	-	-	-				
1445	DPB	3.8	-	-	-	-	-	-	-	-				
1456	DFM	-	-	12	7.67	0.32	4.36	9.41	>1000	1 st well vol (13 gal)				
1456	DPE	-	-	-	-	-	-	-	-	13 gal				
1019	DSB	3.4	-	-	-	-	-	-	-	-				
1024	DSE	3.6	-	-	-	-	-	-	-	-				
1025	DPB	3.6	-	-	7.60	0.304	5.10	8.7	>1000	-				
1029	DPE	DRY	-	7	-	-	-	-	-	20 gal (dry)				
1335	DFM	3.9	-	6	7.58	0.315	4.98	9.30	>1000	2 nd well vol (26 gal)				
1339	DPE	DRY	-	1	-	-	-	-	-	27 gal DRY				
1525	DPB	5.2	-	-	-	-	-	-	-	-				
1530	DPE	DRY	-	4	-	-	-	-	-	31 gal DRY				
0906	DSB	3.55												
0913	DSE	3.56												
FINAL														

WELL DEVELOPMENT CODES	FIELD MEASUREMENT CODES	TURBIDITY
DPB - Begin Pumping DPE - End Pumping DSB - Begin Surge Blocking DSE - End Surge Blocking DFM - Field Measurements DBB - Begin Bailing DBE - End Bailing DXB - Begin Other DXE - End Other Other: _____	MTP - Temperature MSC - Specific Conductance MPD - Photolizer (eg. HNu) MFD - Flame Ionizer (eg. OVA) MDO - Dissolved Oxygen MPH - pH MEH - eH MOT - Other _____	Enter Turbidity Meter Reading (Final should be < 5 NTU) OR Enter Qualitative Observations H - High: Muddy/Silty M - Medium: Cloudy/Translucent L - Low: Transparent N - None: Clear/No Sediment

Logged By: <u>NILESH SHRINGARPURE</u> (Please Print) Signature: <u>N. Shringarpure</u>	Reviewed By: <u>C. Eder</u> Date: <u>2/22/05</u>
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Well ID: LNWmw-026-GW
Date: 01/01/05

Project: RvAAP - 14

Development Method: WHALE PUMP

Development Company: MKM

Comments:

Well TD: 25.9 FT TIC Depth to Water: 34 FT
Water Column Height: 22.5 FT One Well Volume: _____

Well Volume
(gallons/foot)

2-Inch = 0.16

6-Inch # 1 47

4-Inch = 0.65

8-inch = 2.61

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other:

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)

OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPURE (Please Print)

Signature: Akhingarpure

Reviewed By:

Date: 4/27/05

Monitoring Well Purging Form

Well ID: LNWMW-026AW
Date: 01-26-05

Ravenna Army Ammunition Plant
Ravenna, Ohio

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.66 (ft) TIC · TOC Difference: 0.2 (ft)
Vapor Readings: HNu · OVA Background: 0 Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No _____ Yes No
DNAPL Yes · No _____ Yes No LNWMW-026W

CALCULATIONS

- (A) Depth to Well Bottom 25.87 (ft) TOC · TIC · BGS Measured Previously Measured (circle one)
(B) Depth to Water 6.65 (ft) TOC · TIC · BGS Time Measured: 0930
(C) Water Column Height (A-B) 19.22 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 3.07 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 15.38 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: Migco Pump Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite

Collected In: Tanks · Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
0941	6.65			0.293	9.82	6.55	0	9.03	Initial
0944	8.25			0.290	9.73	7.16	0	9.73	
0947	9.80			0.290	9.49	7.39	0	9.04	
0950	10.85			0.290	9.38	7.51	0	8.57	End Purge

Logged By: S. Halverson (Please Print)

Reviewed By: C. Esler

Signature: [Signature]

Date: 2/22/05

Field Sampling Report

Location ID: L MW MW - 026 Gw

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 01-26-05

Sampling Information

Source	<u>Groundwater</u> Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	<u>Micro Purge</u> X		Push Probe
Type/Construction			Mattocks
Miscellaneous	Well Purging Form Yes - No		

Sample Collection: 1000 hrs Sample Type: Composite - MI - Grab Location: Plotted on Map - Staked in Field
 If MI, # of increments taken: NA
 Sample Depth: 20 FT (below surface) Decon: Dedicated - Each Day - Each Location
 Estimated - Measured - Surveyed

Field Parameters (at time of sample)	Analytical Parameters	Other Parameters
PID / FID Readings:	VOC	Corrosivity
Background: ppm	SVOC	Reactivity Sulfide/Cyanide
<u>0.0</u>	Explosives	Ignitability
Sample: ppm	Propellants	
<u>0.0</u>	Nitrate	
Water Level	TAL Metals	QA Samples
<u>6.65</u> FT	Pesticides/PCBs	MS/MSD ☒ <u>Yes</u> / No NA
Temperature	Cyanides	Duplicate ID ☒ <u>L MW MW - 026-DJP</u> NA
<u>9.38</u> °C	TOC	Equipment Rinse ID <u>L MW MW - 026-ER</u> NA
Sp. Conductance: <u>0.290</u> uMHOs	Grain Size	Trip Blank ID <u>TRIP BLANK</u> NA
pH		
<u>7.51</u> units		
Turbidity		
<u>0</u> N.T.U.		

Sample Description

Clear water, no Sheen, no Odors
no turbidity

Split Sample

Split Sample ID: L MW MW - 026 Gw
 Name: John Jeff (CERCL-EX-00)
 Agency/Company: USACE - LOUISVILLE
 Address: 600 DE MARTIN WITHER KING & PULZ
LOUISVILLE, KY 40202

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
 Parameters: Same as Above As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Shahram Taherinia (Please Print)

Reviewed by: ERIC ELUS (Please Print)

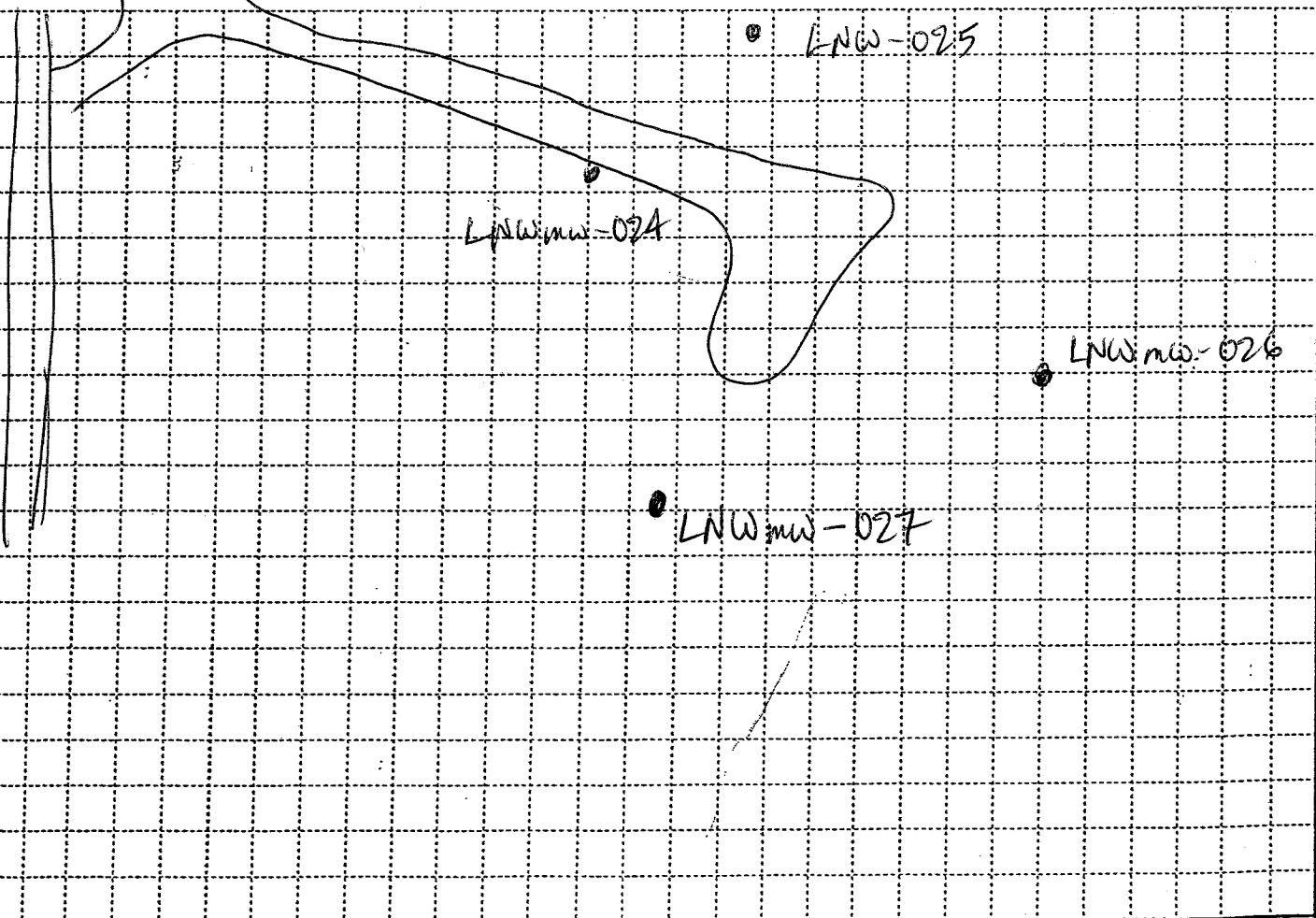
Signature: [Signature]

Signature: [Signature] Date: 2/1/05

HTRW DRILLING LOG		DISTRICT LOUISVILLE		HOLE NUMBER LNWmw-027	
1. COMPANY NAME MKM ENGINEERS		2. DRILL SUBCONTRACTOR HAD		SHEET 1 OF 1	
3. PROJECT RVAAP-R11A		4. LOCATION RAVENNA, OH LANDFILL			
5. NAME OF DRILLER GREZ		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 X	
19. TOTAL NUMBER OF CORE BOXES NA					
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC -		METALS -	
		OTHER (SPECIFY) -		OTHER (SPECIFY) -	
22. DISPOSITION OF HOLE		BACKFILLED -		MONITORING WELL X	
		OTHER (SPECIFY) -		21. TOTAL CORE RECOVERY - %	
		23. SIGNATURE OF INSPECTOR Dave Keane			

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT **RVAAP-R11A**

HOLE NO. **LNWmw-027**

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LW MW - 027

PROJECT

RVAAP-RL14

INSPECTOR

DK EARNEST

SHEET

SHEETS

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. (f)	BLOW COUNT (g)	REMARKS (h)
10/5		SILT/SAND GRAVEL/CLAYEY SILT					
		BROWN W/GREY SILTY SANDY SILT (10%) (20%) (50%) LOW PLASTIC SOME FINE TO MED GRAVEL LOOSE TO MED DENSE (10%)	0.0	1.8	ML	1/5H	7.5YR 4/3
	2						
	4	SAA	0	1.2	ML	3/4 4/6	
	6	CLAYEY SILT TRACES SAND (20%) (60%) (10%) MED PLASTIC	0	2.0	ML/CL	6/8 7/9	7.5YR 5/3
	8	SOME GRAVEL (5%) BROWN MOTTLED W/GREY ROCK FRAGS MED DENSE	0	1.9	ML/CL	9/7 15/13	
	10	SAA	0	1.0	ML/CL	7/31 56F	SPOON REFUSAL 8-9.5'
	12	DK GREY SHALE WEATHERED SAA FISSILE NO ODOR SOFT	0	NR	SH	20/29 18/11	AUGER TO 11' 10YR 3/1 11'-13'
	14	DR GREY WEATHERED SHALE	0	1.8	SH	8/14 20/14	DRU 13-15
	16	SAA	0	1.6	SH	10/13 13/14	15-17
	18	SAA	0	1.1	SH	23/56F	SPOON REFUSAL 17-19
	20	SAA	0	1.5	SH	22/18 15/18	19-21

PROJECT

RVAAP-RL14

HOLE NO.

LW MW - 027

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LNW MW-027

PROJECT

RVAAP-R1 14

INSPECTOR

DK EARNEST

SHEET

SHEETS

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)
	22	DK GREY WEATHERED SAA SHALE	0	1.8	SH	10/22 50+	21-23
	24	SAA	0	1.8	SH	10/12 16/18	23-25
	26	BOH 25' SAMPLED TO 24' DRILLED TO 25'					
	28	SET 24' WELL SET SCREEN AT 14-24' BGS SAND TO 11' BGS SILT TO 8' BGS					
	30	7 BAGS SAND					

PROJECT

RVAAP-R1 14

HOLE NO.

LNW MW-027

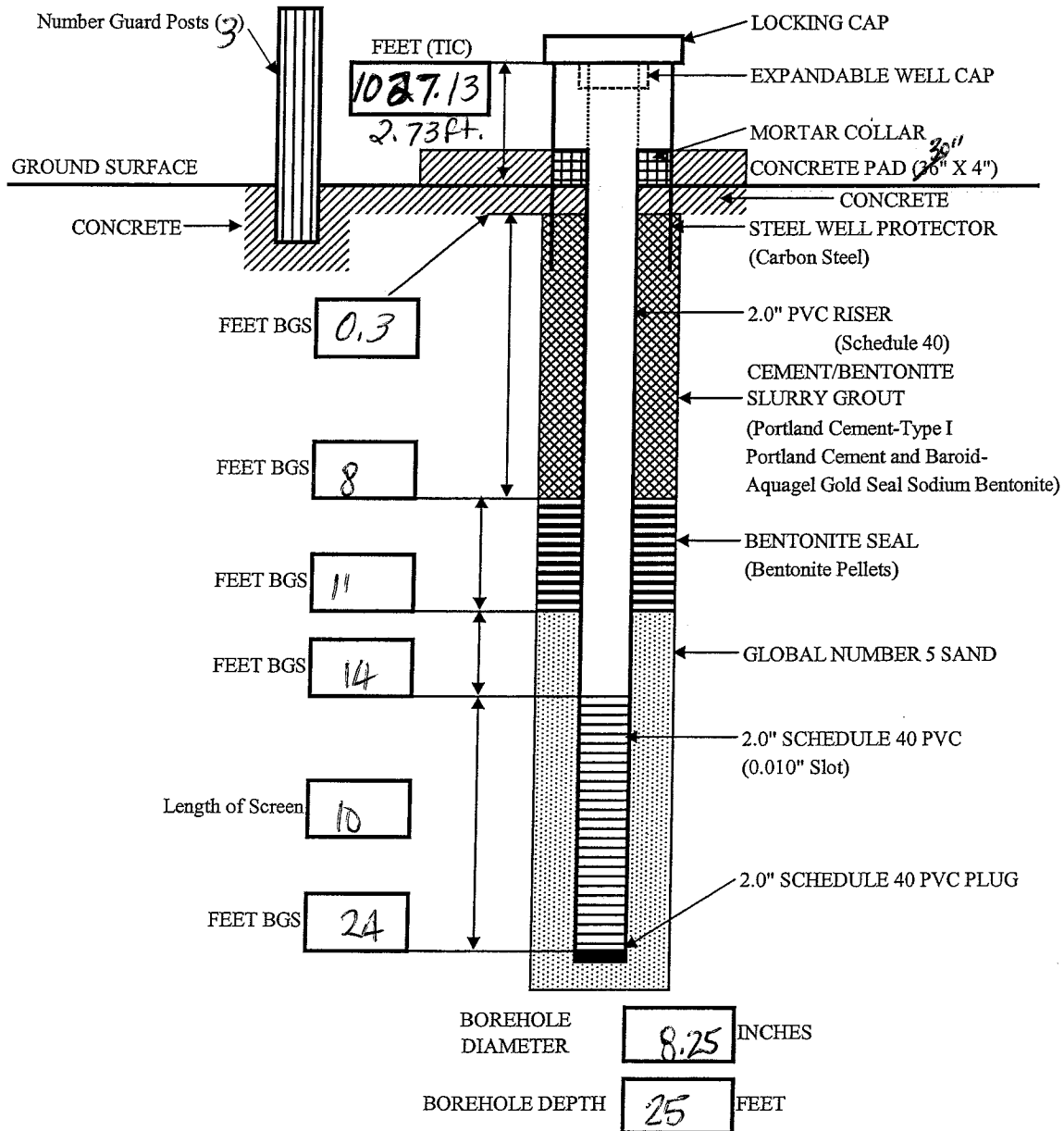


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP RI 14*

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



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: LNVmw-027-mw

Date: 12/22/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP

Development Method: WHALE PUMP

Development Company: MKM

Comments: _____

Well TD: 26.5 FT TIC Depth to Water: 18.5 FT

Water Column Height: 8 FT One Well Volume: 10.62 Gals

Well Volume
(gallons/foot)

2-inch = 0.16 6-inch = 1.47
4-inch = 0.65 8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	TEMP		
1030	DSB	8.5	-	-	-	-	-	-	-	
1035	DSE	8.2	-	-	-	-	-	-	-	
1037	DPB	8.2	-	-	-	-	-	-	-	
1059	DFM		-	11 gal	7.72	0.512	7.6	9.4	>1000	11 gal (1 WELL VOL)
1100	DPE	DRY	-	DRY(0)	-	-	-	-	-	11 gal (DRY)
1040	DSB	7.0	-	-	-	-	-	-	-	
1044	DSE	7.15	-	-	-	-	-	-	-	
1048	DPB	7.15	-	-	7.44	0.506	4.31	9.0	>1000	
1052	DPE	DRY	-	1	-	-	-	-	-	12 gal (DRY)
1100	DPB	-	-	-	-	-	-	-	-	
1113	DFM	-	-	10 gal	7.43	0.500	4.32	9.0	>1000	2 nd well vol (22 gal)
1115	DPE	-	-	1	-	-	-	-	-	23 gal (DRY)
1405	DPB	22.6	-	-	-	-	-	-	-	
1407	DPE	DRY	-	2	-	-	-	-	-	25 gal (DRY)
0925	DSB	6.1								
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations
H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPURE (Please Print)

Reviewed By: C. Esler

Signature: N. Shringarpure

Date: 2/22/05

Monitoring Well Purging Form

Well ID: 11W MW-02FGW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 01-21-05

WELL OBSERVATIONS

Protective Casing: Intact Damaged Locked: Yes No Key No:
Concrete Base: Intact Damaged Inner Casing: 2" 4" 6" 8" Other:
Stickup Height: 2.73 (ft) TIC · TOC Difference: 0.31 (ft)
Vapor Readings: HNu · OVA Background: _____ Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes No Yes · No
DNAPL Yes No Yes · No

CALCULATIONS

- (A) Depth to Well Bottom 26.8 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 6.2 (ft) TOC · TIC · BGS Time Measured: 13.35
(C) Water Column Height (A-B) 20.6 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 3.3 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 16.5 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: None Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite

Collected In: Tanks Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1341	6.2	micro purge	-	0.496	7.89	7.33	34	8.84	Initial
1344	6.35	"	-	0.496	8.74	7.47	17	8.06	
1347	6.45	"	-	0.497	8.87	7.53	10	7.80	
1350	6.55	"	-	0.497	8.86	7.60	4	7.63	End Purging

Logged By: Shahram Taheri (Please Print)

Reviewed By: C. Isler

Signature: Shahram Taheri

Date: 8/22/05

- 027 -

Field Sampling Report

Location ID: LWW MW - 027 GW

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 01-21-05

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Microsyringe		Push Probe
Type/Construction			Plastic Liner
Miscellaneous	Well Purging Form Yes No		Mattocks

Sample Collection: 1400 hrs Sample Type: Composite - MI - Grab Location: Plotted on Map Staked in Field
If MI, # of increments taken: NA
Sample Depth: 20 FT (below surface) Decon: Dedicated - Each Day - Each Location
Estimated - Measured Surveyed

Field Parameters (at time of sample)	Analytical Parameters	Other Parameters
PID / FID Readings:	VOC	Corrosivity
Background: ppm	TPH GRO	Reactivity Sulfide/Cyanide
	SVOC	Ignitability
	Explosives	
Sample: ppm	Chromium +6	
	Propellants	
	Nitrate	
Water Level	TAL Metals	QA Samples
Temperature	Pesticides/PCBs	MS/MSD
Sp. Conductance:	Cyanides	Yes / No
pH	TOC	NA
Turbidity	Grain Size	Duplicate ID
		Equipment Rinse ID
		NA
		Trip Blank ID
		NA

Sample Description

Clear water, no sheen
no odor, low turbidity

Split Sample

Split Sample ID:

Name:

Agency/Company:

Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Shalynn Isherwood (Please Print)

Reviewed by: ERIC FEWS (Please Print)

Signature: [Signature]

Signature: [Signature] Date: 2/1/05

HTRW DRILLING LOG				DISTRICT <u>LOUISVILLE</u>		HOLE NUMBER <u>NTAmw-107</u>	
1. COMPANY NAME <u>MKM ENGINEERS</u>				2. DRILL SUBCONTRACTOR <u>HAD DRILLING</u>		SHEET <u>1</u> OF <u>3</u> SHEETS	
3. PROJECT <u>RNAAP-R114</u>				4. LOCATION <u>NACA TEST AREA</u>			
5. NAME OF DRILLER <u>SCOTT HUBER</u>				6. MANUFACTURER'S DESIGNATION OF DRILL <u>CME-55</u>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <u>4 1/4" ID HSA</u>				8. HOLE LOCATION <u>WEST END OF SITE</u>			
<u>1 1/2" ID X 24" SPUTTER</u>				9. SURFACE ELEVATION <u>1077.65 ASL</u>			
12. OVERBURDEN THICKNESS				10. DATE STARTED <u>11/29/04</u>		11. DATE COMPLETED <u>11/29/04</u>	
13. DEPTH DRILLED INTO ROCK				15. DEPTH GROUNDWATER ENCOUNTERED <u>~16' BGS</u>			
14. TOTAL DEPTH OF HOLE <u>23' BGS</u>				16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <u>11.8' @ 1337 12/07/04</u>			
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)				19. TOTAL NUMBER OF CORE BOXES			
18. GEOTECHNICAL SAMPLES		DISTURBED		UNDISTURBED		21. TOTAL CORE RECOVERY %	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC		METALS		OTHER (SPECIFY)	
22. DISPOSITION OF HOLE		BACKFILLED		MONITORING WELL		OTHER (SPECIFY)	
		<u>X</u>		<u>X</u>		23. SIGNATURE OF INSPECTOR <u>David K. Earnest</u>	
LOCATION SKETCH/COMMENTS							
SCALE:							
<u>N</u> <u>NTAmw-107</u> 							
PROJECT <u>RNAAP-R114</u>						HOLE NO. <u>NTAmw-107</u>	

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTAMW-107

PROJECT

RVAAP - R114

INSPECTOR

DK EARNEST

SHEET

SHEETS

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)
1000		2" TOP SOIL, GRASS & ROOTS BROWN CL SILT (20%) (80%) w/GREY LOOSE	0	1.0	ML	2/3 3/2	MOIST 7.5YR 4/4
	2	LT GREY w/ ORANGE BROWN (20%) SANDY SILT (80%) LOW PLASTIC	0	1.4	ML	3/3 3/5	MOIST TO WET 2.5YR 6/1 w/7.5YR 6/8
	4	MED BROWN w/GREY SL CL SILT (20%) (80%) LOW PLASTIC	0	1.3	ML	1/2 5/6	DAMP TO MOIST 10YR 4/3 MOIST TO WET
	6	SAA	0	2.0	ML	1/4 4/5	
	8	SAA	0	2.0	ML	1/4 4/5	WET TO SAT
	10	SAA	0	2.0	ML	1/2 3/4	DAMP TO MOIST 2.5Y 5/1
	12	GREY SANDY SILT (80%) (20%) LOW PLASTIC	0	2.0	ML	1/2 3/4	
	14	SAA	0	2.0	ML	1/1 4/3	
	16	GREY SAND w/ GRAVEL MED TO FINE	0	2.5	SP/SA	10/16 15/13	7.5YR 6/1 SAT
	18	MED TO COARSE SAND SAA w/ SAND GRAVEL	0	1.5	SP	1/5 6/5	

PROJECT

RVAAP - R114

HOLE NO.

NTAMW-107

(CONTINUATION SHEET)

HOLE NUMBER
NTA MW-107

PROJECT

RV AAP - R114

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	SAA	0	1.5	SP/5m	2/4	SAT
	22	SAT	0	1.5	SP/5m	6/7	
	24	Grey clay silt (20%) BOH 23'	0	1.5	SP/5m mL	1/5 7/8	SAT
		SAMPLED TO 24 DRILLED TO 23 SET WELL AT 22' SCREENS AT 12'-22' SAND TO 9' BGS BENT SEAL TO 6' BGS NO WATER ADDED					

PROJECT

RVAAP - RI 14

HOLE NO.

NTA MW-107

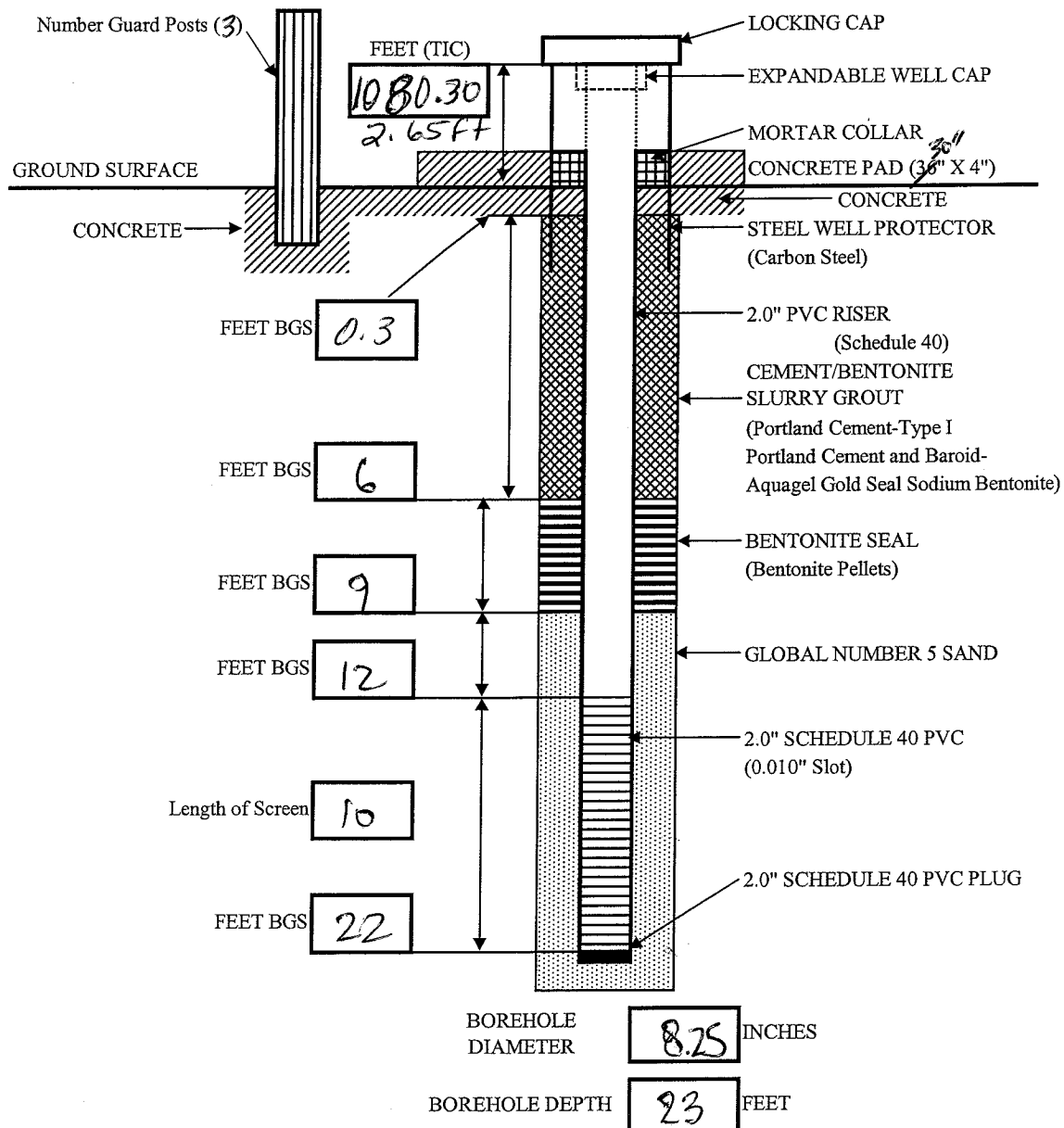


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP RI14*

Well Number: <i>NTA-107</i>	Begin: <i>11/29/04</i>	End: <i>11/29/04</i>
Coordinates: N: <i>551697.29</i> E: <i>2345433.40</i>	Elevation: <i>1077.65</i>	Reference Point:
Logged By: <i>DK. EARNEST</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: NTAMW-107-GN
Date: 12/7/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP 14

Development Method: Whale pumping

Development Company: MDM

Comments: _____

Well TD: 24.25 FT TIC Depth to Water: 11.8 FT ~7.5
Water Column Height: 12.45 FT One Well Volume: 7.38 Gals
Well Volume (gallons/foot) 2-Inch = 0.16 8-Inch = 1.47
4-Inch = 0.65 8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	Con	do	Temp		
1337	DSB	11.8								
1345	DSE	12.15								
1347	DPB	12.15			8.4	0.42	1.9	13	>1000	Initial Readings
1352	DFM	-	-	7.5	7.6	0.44	1.7	12	>1000	7.5 gal (1st well vol)
1356	DFM	-	-	7.5	7.5	0.33	2.5	12	>1000	15.0 gal (2nd well vol)
1401	DFM	-	-	7.5	7.4	0.43	2.5	12	>1000	22.5 gal (3rd well vol)
1405	DFM	-	-	7.5	7.4	0.43	3.0	12.0	>1000	30 gal (4th well vol)
1409	DFM	-	-	7.5	7.3	0.43	2.6	12.0	>1000	37.5 gal (5th well vol)
1413	DFM	-	-	7.5	7.3	0.32	2.0	12.0	>1000	45 gal (6th well vol)
1417	DFM	-	-	7.5	7.3	0.42	2.3	12.0	>1000	52.5 gal (7th well vol)
1422	DFM	-	-	7.5	7.5	0.42	3.8	12.0	>1000	60.0 gal (8th well vol)
1422	DPE	11.5	-	-	-	-	-	-	-	-
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolionizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations
H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Gubka (Please Print)

Reviewed By: Sue Boles

Signature: [Signature]

Date: 02/22/05

Monitoring Well Purging Form

Well ID: NTA MW-107GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/14/04

WELL OBSERVATIONS

Protective Casing: Intact Damaged Locked: Yes No Key No:
Concrete Base: Intact Damaged Inner Casing: 2" 4" 6" 8" Other:
Stickup Height: 2.5 (ft) TIC TOC Difference: 0.3 (ft)
Vapor Readings: HNu OVA Background: 0 Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes No Yes No
DNAPL Yes No Yes No NTA MW-107GW

CALCULATIONS

- (A) Depth to Well Bottom 24.6 (ft) TOC TIC BGS Measured Previously Measured (circle one)
(B) Depth to Water 11.3 (ft) TOC TIC BGS Time Measured: 1324
(C) Water Column Height (A-B) 13.3 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 2.13 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 10.64 (gal)

EVACUATION METHOD

Well Evacuation Method: Micro purging
Bailer Submersible Pump Other: Device Number:

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored Disposed Onsite Offsite

Collected In: Tanks Drums No. of Containers:

Comments:

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1325	11.3			0.90	9.53	7.96	1000	7.42	Initial reading
1328	11.95			0.957	10.53	7.83	1000	3.65	
1331	11.9			0.875	10.72	7.73	1000	3.11	
1334	11.9			0.502	10.71	7.67	1000	3.34	
1337	11.9			0.513	10.63	7.62	1000	3.72	
1340	11.8			0.545	10.54	7.69	1000	4.10	End purging

Logged By: Vijay Alluri (Please Print)

Reviewed By: [Signature]

Signature: Vijay

Date: 02/22/05

Location ID: NTAmw-107GW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 12/14/04

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Micro purging X		Push Probe
Type/Construction			Mattocks
Miscellaneous	Well Purging Form Yes - No		

Sample Collection: 1340 hrsSample Type: Composite - MI - Grab
If MI, # of increments taken: NALocation: Plotted on Map Staked in Field
Estimated - Measured - SurveyedSample Depth: 20 FT (below surface)Decon: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings: Background: <u>NT</u> ppm	VOC	X	TPH GRO	Corrosivity		
	SVOC	X	TPH DRO	Reactivity Sulfide/Cyanide		
Sample: <u>NT</u> ppm	Explosives	X	Chromium +6	Ignitability		
	Propellants	X	Nitrate			
Water Level <u>11.8</u> FT	TAL Metals	X		QA Samples		
Temperature <u>10.54</u> °C	Pesticides/PCBs	X		MS/MSD	Yes / No	NA
Sp. Conductance: <u>0.545</u> uMHOs	Cyanides			Duplicate ID		NA
pH <u>7.69</u> units	TOC			Equipment Rinse ID		NA
Turbidity <u>1000</u> N.T.U.	Grain Size			Trip Blank ID	<u>Trip Blank</u>	NA

Sample Description

Muddy color, No odor, No Sheen,
Medium to high turbidity,

Split Sample

Split Sample ID:

Name:

Agency/Company:

Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

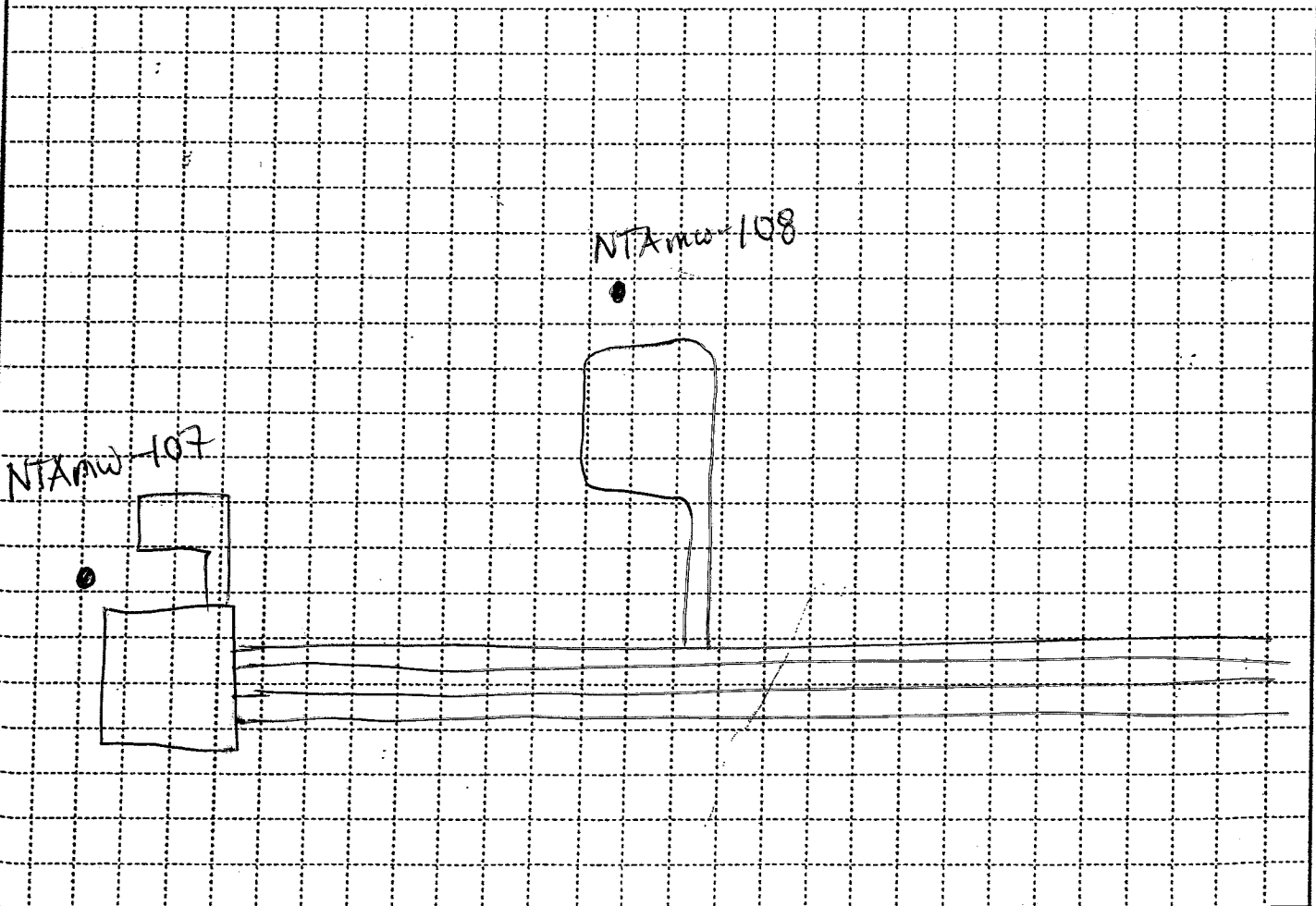
Color Odor Sheen Turbidity

Logged By: Vijay Alluri (Please Print)Reviewed by: ERIC ELIS (Please Print)Signature: VijaySignature: SP2H Date: 2/1/05

HTRW DRILLING LOG		DISTRICT LOUISVILLE		HOLE NUMBER NTAmw-108	
1. COMPANY NAME HKM ENGINEERS		2. DRILL SUBCONTRACTOR HAD DRILLING		SHEET 1 OF 3	
3. PROJECT RVAAP-R114		4. LOCATION RAVENNA, OHIO NACATEST AREA			
5. NAME OF DRILLER GREG BRADY		6. MANUFACTURER'S DESIGNATION OF DRILL CME - LEG LEGO			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT 4 1/4" HSA 2' - 1 1/2" ID SPLIT SPIN		8. HOLE LOCATION WEST END NORTH OF ROAD			
		9. SURFACE ELEVATION 1083.22 ASL			
		10. DATE STARTED 12/01/04		11. DATE COMPLETED 12/01/04	
12. OVERBURDEN THICKNESS		15. DEPTH GROUNDWATER ENCOUNTERED ~16'			
13. DEPTH DRILLED INTO ROCK		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 10.15 @ 0900 12/08/04			
14. TOTAL DEPTH OF HOLE 23'		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES		DISTURBED		UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES					
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC		OTHER (SPECIFY)	
		METALS		OTHER (SPECIFY)	
		OTHER (SPECIFY)		OTHER (SPECIFY)	
21. TOTAL CORE RECOVERY %					
22. DISPOSITION OF HOLE		BACKFILLED		MONITORING WELL	
		☒		OTHER (SPECIFY)	
				23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT **RVAAP-R114**

HOLE NO. **NTAmw-108**

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTAmw-108

PROJECT

RVAAP-R114

INSPECTOR

DK EARNEST

SHEET

SHEETS

2 OF 3

1015

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)
		TOP SOIL, GRASS ROOTS					
	2	GREY & BROWN (30%) SANDY SILT (60%) W/BROWN SILT STRINGERS NON PLASTIC SAA FINE GRAVEL (10%)	0	1.1	ML	PASIT	104R 4/4 104R 5/1 MOIST TO WET
	4	LT GREY CL SILT (80%) W/ORANGE LOW PLASTIC STIFF	0	1.9	ML	2/2 5/6	104R 6/1 MOIST
	6	SAD MED BROWN W/TRACE GREY MOTTLING STIFF	0	1.6	ML	3/8 6/6	104R 4/4
	8	SAA	0	2.0	ML	4/4 5/6	
	10	9.5 GREY SILT (70%) SL CL SANDY (10%) (20%) STIFF	0	1.8	ML	3/4 6/6	WET 8-8.5 2.5 4/1 2.5 4/1
	12	SAA	0	1.8	ML	—	WET # COUNT NOT RECORDED
	14	SAA	0	1.5	ML	4/4 5/6	WET
	16	15.5 BROWN SILT BROWN SAND & FINE MED TO COARSE SAND MIX (30%) MED TO FINE GRAVEL MED DENSE LESS GRAVEL	0	1.3	ML	2/4 3/6	WET
	18	17.5 BROWN SILT MED TO FINE GRAVEL MED DENSE LESS GRAVEL	0	1.9	SP	2/4 5/6	910 11/12 SAT
	20	ROCK FRAGS 19-20	0	1.0	SP	12/14 12/8	SAT

PROJECT

RVAAP-R114

HOLE NO.

NTAmw-108

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTA mw - 108

PROJECT

RVAAP-R114

INSPECTOR

DK EARNEST

SHEET

SHEETS

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)

BROWN SAND
MED DENSE
SAND & GRAVEL

1.0

28/
4m10/12
12/13

SAT

BOH 23'

DRILL TO 23'

SET WELL AT 22'

SCREEN AT 12-22' BGS

SAND TO 9' BGS

SEAL TO 6' BGS

7 BAGS SAND

NOWATER ADDED

PROJECT

RVAAP-R114

HOLE NO.

NTA mw - 108

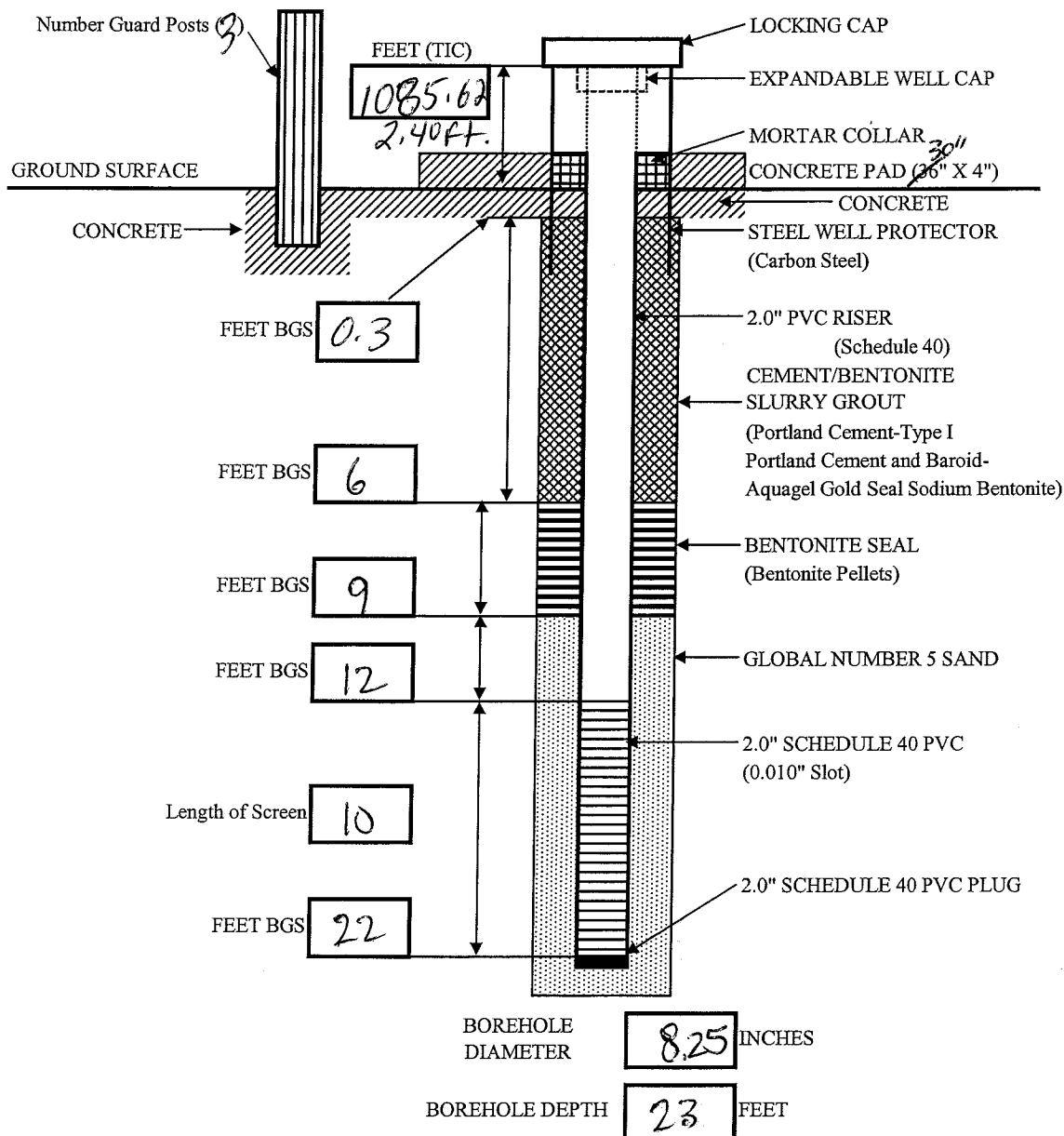


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP RE14*

Well Number: <i>NTA MW-108</i>	Begin: <i>12/01/04</i>	End: <i>12/01/04</i>
Coordinates: N: <i>551916.22</i> E: <i>2345781.60</i>	Elevation: <i>1083.22</i>	Reference Point:
Logged By: <i>DK BARNES</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: NTAMW - 108-GW
Date: 12/8/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP 14

Development Method: Whale pump

Development Company: MM

Comments: _____

Well TD: 22.25 FT TIC Depth to Water: 12.1 FT
Water Column Height: 10.15 FT One Well Volume: 6.01 Gals

Well Volume
(gallons/foot)

2-Inch = 0.16 6-Inch = 1.47
4-Inch = 0.65 8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	Tem		
0900	DSB	10.15								
0907	DSE	10.90								
0909	DPB	10.90			7.31	0.316	11.20	10.8	>1000	
0914	DPE	Dry	-	5gal	-	-	-	-	-	5gal
1100	DPB	17.0	-	-	-	-	-	-	-	-
1101	DFM	-	-	1gal	7.62	0.100	4.93	10.3	>1000	6gal (1st well vol)
1105	DPE	DRY	-	0.5gal	-	-	-	-	-	6.5gal
1312	DPE	18.2	-	-	-	-	-	-	-	-
1332	DPB	16.95	-	-	-	-	-	-	-	-
1335	DPE	DRY	-	2gal	-	-	-	-	-	8.5gal
0925	DSB	18.7	-	-	-	-	-	-	-	-
0930	DSE	16.9	-	-	-	-	-	-	-	-
0931	DPB	16.9	-	-	-	-	-	-	-	-
0932	DFM	-	-	3.5gal	6.96	0.416	4.86	10.7	>1000	12gal (2nd well vol)
0934	DPE	-	-	1.5gal	-	-	-	-	-	13.5gal
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolionizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Gubba (Please Print)

Reviewed By: Joe Bales

Signature: S. Gubba

Date: 02/22/05

Well Development Record

Well ID: NTAMW-108- GW
Date: 12/10/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP 14

Development Method: whale pump

Development Company: MCM

Comments: _____

Well TD: 22.25 FT TIC Depth to Water: 12.5 FT
Water Column Height: 10.15 FT One Well Volume: 12.01 Gals

Well Volume
(gallons/foot)

2-Inch = 0.16
4-Inch = 0.65

6-Inch = 1.47
8-Inch = 2.81

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	Con	DO	Temp		
1040	DSB	16.90	—	—	—	—	—	—	—	—
1050	DSE	16.55	—	3.5	—	—	—	—	—	-17.0 gal.
1000	DPB	16.55	—	—	—	—	—	—	—	—
1453	DPB	16.45	—	—	—	—	—	—	—	—
1455	DFM	—	—	1	6.84	0.432	5.47	10.8	1000	18gal (3 rd well vol.)
1503	DFM	—	—	6gal	7.24	0.483	4.79	10.8	1000	24gal (4 th well vol.)
1509	DFM	—	—	6gal	7.43	0.484	5.84	10.9	1000	30gal (5 th well vol.)
1514	DFM	—	—	6gal	7.43	0.484	4.98	10.9	780	36gal (6 th well vol.)
1520	DFM	—	—	6gal	7.69	0.483	5.29	10.9	236	42gal (7 th well vol.)
1521	DPE	16.3	—	—	—	—	—	—	—	—
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolnizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Gubla (Please Print)

Reviewed By: Sudheer Gubla

Signature: Sudheer Gubla

Date: 02/22/05

Well ID: NTAMW-1086W

Monitoring Well Purging Form

Ravenna Army Ammunition Plant
Ravenna, OhioDate: 12/21/04

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.0 (ft) TIC · TOC Difference: 0.2 (ft)
Vapor Readings: HNu · OVA Background: _____ Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No _____ Yes · No
DNAPL Yes · No _____ Yes · No

NTAMW-1086W

CALCULATIONS

- (A) Depth to Well Bottom 24.4 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 16.4 (ft) TOC · TIC · BGS Time Measured: 1344
(C) Water Column Height (A-B) 8.0 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) 2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT
(E) One Well Volume (C*D) 1.28 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 6.40 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: Micro purging Device Number: _____Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · OffsiteCollected In: Tanks Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1345	16.4			0.572	8.79	7.32	361	8.34	
1348	16.5			0.579	9.89	7.34	250	3.16	
1351	16.5			0.581	10.21	7.31	160	1.96	
1354	16.53			0.586	10.35	7.29	125	1.44	
1357	16.5			0.586	10.43	7.28	122	1.28	
1400	16.52			0.587	10.43	7.30	102	1.15	

Logged By: Vijay Alluri (Please Print)Reviewed By: [Signature]Signature: VijayDate: 02/22/05

Location ID: N Tamw - 108 GW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 12/21/04

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Micro purging X		Push Probe
Type/Construction			Mattocks
Miscellaneous	Well Purging Form (Yes - No)		

Sample Collection: 1405 hrs Sample Type: Composite - MI - Grab Location: Plotted on Map - Staked in Field
If MI, # of increments taken: NA
Sample Depth: 20 FT (below surface) Decon: Dedicated - Each Day - Each Location
Estimated - Measured - Surveyed

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings:	VOC	X	TPH GRO	Corrosivity		
Background: ppm	SVOC	X	TPH DRO	Reactivity Sulfide/Cyanide		
<u>20</u> <u>0.0</u> <u>1.15</u>	Explosives	X	Chromium +6	Ignitability		
Sample: <u>0.0</u> ppm	Propellants	X	Nitrate			
Water Level <u>16.4</u> FT	TAL Metals	X		QA Samples		
Temperature <u>10.43</u> °C	Pesticides/PCBs	X		MS/MSD	Yes / No	NA
Sp. Conductance: <u>0.587</u> uMHOs	Cyanides			Duplicate ID		NA
pH <u>7.30</u> units	TOC			Equipment Rinse ID		NA
Turbidity <u>102</u> N.T.U.	Grain Size			<u>Trip Blank ID</u>	<u>Trip Blank</u>	NA

Sample Description
No color, no odor, no sheen,
very low turbidity.

Split Sample
Split Sample ID:
Name:
Agency/Company:
Address:
QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:
Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:
Color Odor Sheen Turbidity

Logged By: Vijay Alluri (Please Print) Reviewed by: ERIC ELLIS (Please Print)

Signature: Vijay Signature: ERIC ELLIS Date: 2/1/05

HTRW DRILLING LOG		DISTRICT LOUISVILLE		HOLE NUMBER NTAMW-109	
1. COMPANY NAME MKM ENGINEERS		2. DRILL SUBCONTRACTOR HAD DRILLING		SHEET 1 OF 2	
3. PROJECT RVAAP-R114		4. LOCATION RAVENNA, OFF NACA TEST AREA			
5. NAME OF DRILLER GREG		6. MANUFACTURER'S DESIGNATION OF DRILL EME-LC60			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		8. HOLE LOCATION AND WEST ~300' SOUTH OF INTERSECTION OF ROAD & RUNWAY			
4 1/4" ID HGA		9. SURFACE ELEVATION 1076.89 ASL			
1 1/2" ID X 24" SPLITSPON		10. DATE STARTED 12/02/04		11. DATE COMPLETED 12/02/04	
12. OVERBURDEN THICKNESS 19		15. DEPTH GROUNDWATER ENCOUNTERED ~ 8'			
13. DEPTH DRILLED INTO ROCK 0		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 10.49 @ 1340 12/10/04			
14. TOTAL DEPTH OF HOLE 19'		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES NONE		DISTURBED		UNDISTURBED	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC		OTHER (SPECIFY)	
		METALS		OTHER (SPECIFY)	
22. DISPOSITION OF HOLE		BACKFILLED		MONITORING WELL	
		X		21. TOTAL CORE RECOVERY %	
				23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	
LOCATION SKETCH/COMMENTS					
SCALE: N					
PROJECT RVAAP-R114				HOLE NO. NTAMW-109	

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTAMW-109

PROJECT

RVAAP-R114

INSPECTOR

DK EARNEST

SHEET

SHEETS

2 OF 2

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEO TECH SAMPLE OR CORE BOX NO. RECOVERY	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
900		11" TOP SOIL / DK BROWN SILT, GRASS LT BROWN SL CLAYEY SILT (10%) TRACE SAND GREY MOTTLING NO STAINING NO ODOR		1.5	ML	PUSH	7.5 YR 3/3 MOIST
	2	SAA MED TO STIFF		.5	ML	3/2	
	4	SAA				5/6	7.5 YR 5/3
	6	S.5 BROWN (20%) SILTY SAND (75%) MED TO COARSE W/ FINE GRAVEL MED DENSE POORLY SORTED		1.8	ML	3/7	
	8	SAA		1.2	SP	10/4	
	10	SAA (10%) SILTY GREY SAND (90%) LOOSE BROWN SILTY STAIN				8/4	7.5 YR 4/3
	12	SAA		1.1	SP SM	4/4	
	14	SAA				3/2	SAT SAND 2.5 Y 5/1
	16	SAA		1.2	SP SM	3/2	
	18	SAA				2/2	SAT
	20	SAA		1.2	SP	2/1	SAT
	22	SAA		1.2	SP	1 1/2	2.5 Y 5/1
	24	SAA		1.6	SP	1/0	SAT
	26	SAA				1/4	
	28	SAA		1.8	SP	2/2	SAT
	30	SAA				2/2	
	32	DRILL TO 19' WELL SET AT 18', 6" SAND BELOW SCREEN AT 18-19' SAND TO 6' SEAL TO 4' WILL CUT 2' OFF CASING					

PROJECT

GROUT TO SURFACE,

RVAAP-R114

HOLE NO.

NTAMW-109

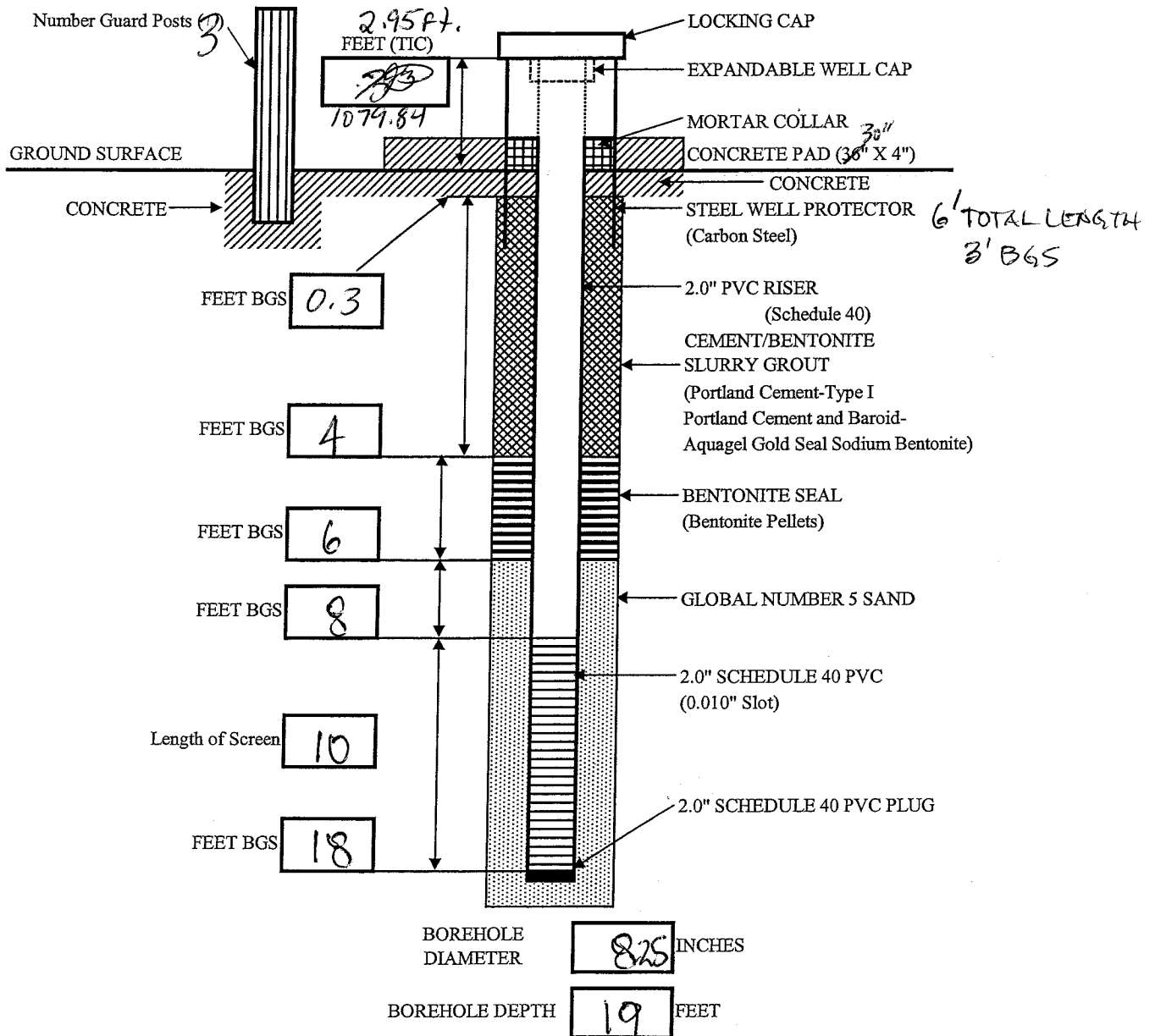


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP RI14*

Well Number: <i>NTA mw-109</i>	Begin: <i>12/02/04</i>	End: <i>12/02/04</i>
Coordinates: N: <i>551293.25</i> E: <i>2345997.72</i>	Elevation: <i>1076.89</i>	Reference Point:
Logged By: <i>DK LEARNES</i>		



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.

Well Development Record

Well ID: NTAMW-109-GW
Date: 12/10/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP 14

Development Method: Whale pumping

Development Company: MCM

Comments: _____

Well TD: 20.5 FT TIC Depth to Water: 10.49 FT 269.4
Water Column Height: 10.01 FT One Well Volume: 593 Gals

Well Volume
(gallons/foot)

2-inch = 0.16 6-inch = 1.47
4-inch = 0.65 8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	Con	DO	Temp		
1340	DPB	10.49								
134	DPE	10.4								
1345	DFM	—	—	6	7.12	0.116	4.66	10.9	>1000	1st well vol
1355	DFM	—	—	6	6.31	0.111	4.20	10.7	927	12gal (2nd ")
1359	DFM	—	—	6	6.39	0.111	6.49	11.0	392	18gal (3rd ")
1402	DFM	—	—	6	6.41	0.108	4.23	11.1	215	24gal (4th well vol)
1405	DEB	—	—	—	—	—	—	—	—	—
1415	DBE	—	—	—	—	—	—	—	—	—
1420	DFM	—	—	6	6.50	0.131	2.22	11.0	1000	30gal (5th well vol)
1425	DFM	—	—	6	6.52	0.119	3.99	10.9	131	36gal (6th well vol)
1430	DFM	—	—	6	6.27	0.100	4.62	11.1	16	42gal (7th well vol)
1435	DPE	—	130	—	—	—	—	—	—	—
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Subbar (Please Print)

Signature: [Signature]

Reviewed By: [Signature]

Date: 02/20/05

Monitoring Well Purging Form

Well ID: NTAMW-109-GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/21/04

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:

Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:

Stickup Height: 2.6 (ft) TIC · TOC Difference: 0.24 (ft)

Vapor Readings: HNu · OVA Background: 0 Inside Well Casing:

Present Depth Sampled Sample ID

LNAPL Yes · No Yes No

DNAPL Yes · No Yes No

NTAMW-109-GW

CALCULATIONS

- (A) Depth to Well Bottom 20.3 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 10.9 (ft) TOC · TIC · BGS Time Measured: 1444
(C) Water Column Height (A-B) 9.9 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 1.58 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 7.92 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other Micro purge Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite

Collected In: Tanks · Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1445	10.9			0.169	8.93	7.41	1000	5.43	Initial reading
1448	11.01			0.137	9.48	7.24	905	4.08	
1451	10.95			0.118	9.74	7.10	797	3.35	
1454	10.95			0.105	10.07	6.77	620	2.50	
1457	10.95			0.103	10.14	6.62	537	2.24	
1500	10.95			0.102	10.15	6.56	493	2.14	End purging

Logged By: Vijay Arora (Please Print)

Reviewed By: Subbala

Signature: Vijay

Date: 02/22/05

Field Sampling Report

Location ID: NTA mw -109 GW

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 12/21/04

Sampling Information

Source	Groundwater / Product		Surface Water		Soils / Sediments / Sludge	
Method	Bailer		Sample Bottle		Scoop	Trowel
	Pump		Bacon Bomb		Bowl	Hand Auger
	Micro purging X				Push Probe	Plastic Liner
Type/Construction					Mattocks	
Miscellaneous	Well Purging Form (Yes/No)					

Sample Collection: ISOD hrs

Sample Type: Composite - MI - Grab
If MI, # of increments taken: NA

Location: Plotted on Map Staked in Field
Estimated - Measured - Surveyed

Sample Depth: 17 FT (below surface)

Decon: Dedicated - Each Day - (Each Location)

Field Parameters (at time of sample)	Analytical Parameters				Other Parameters			
PID / FID Readings:	VOC	X	TPH GRO		Corrosivity			
Background: <u>0.0</u> ppm	SVOC	X	TPH DRO		Reactivity Sulfide/Cyanide			
<u>DO</u> : <u>2.14</u>	Explosives	X	Chromium +6		Ignitability			
Sample: <u>0.0</u> ppm	Propellants	X	Nitrate					
Water Level <u>10.9</u> FT	TAL Metals	X			QA Samples			
Temperature <u>10.15</u> °C	Pesticides/PCBs	X			MS/MSD	Yes / No	NA	
Sp. Conductance: <u>0.102</u> uMHOs	Cyanides				Duplicate ID		NA	
pH <u>6.56</u> units	TOC				Equipment Rinse ID		NA	
Turbidity <u>493</u> N.T.U.	Grain Size				Trip Blank ID	<u>Trip Blank</u>	NA	

Sample Description

No color, no odor, no sheen,
Medium to high turbidity

Split Sample ID:

Name:
Agency/Company:
Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Vijay Alluv (Please Print)

Reviewed by: ERIC EWS (Please Print)

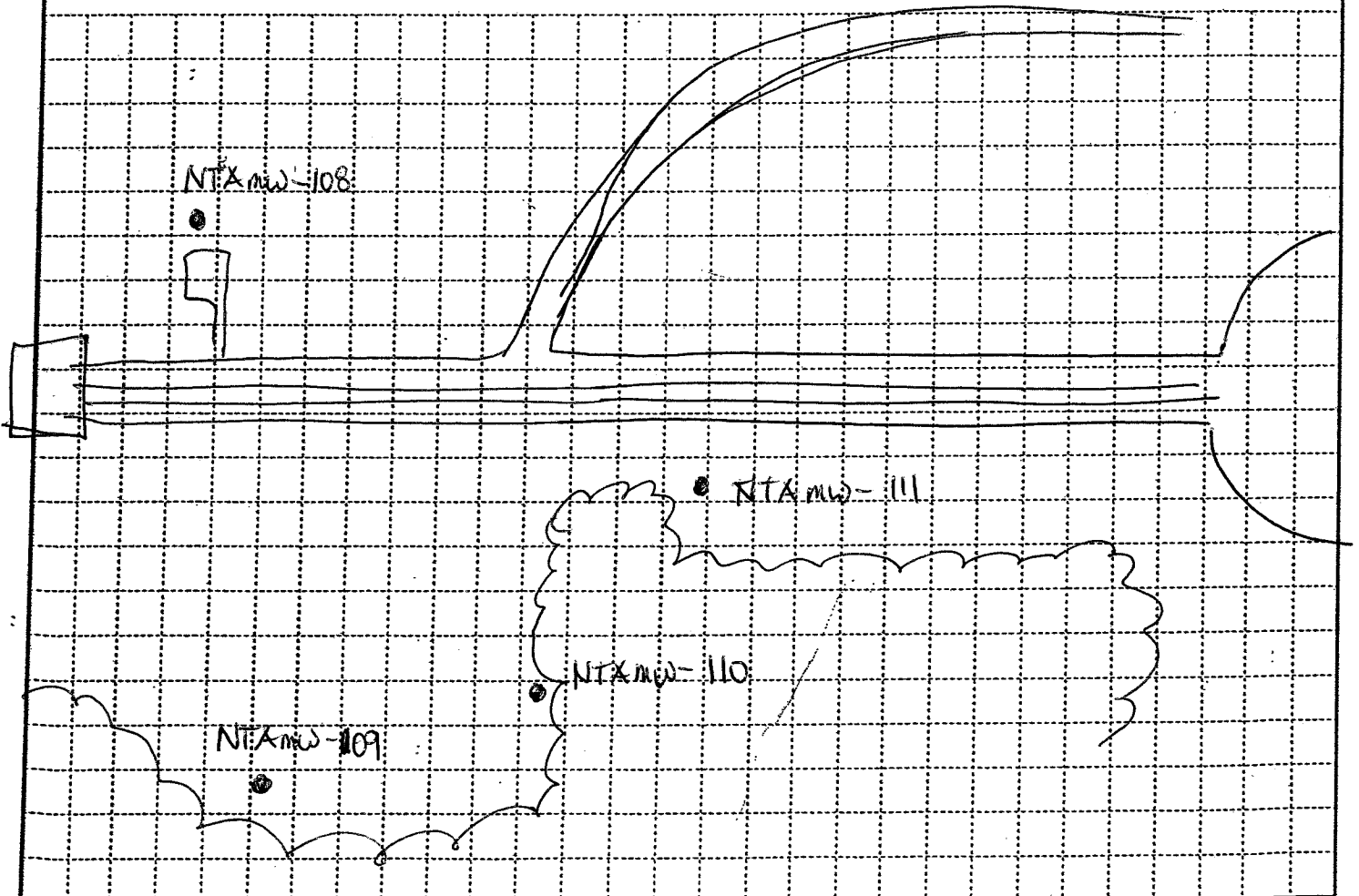
Signature: Vijay

Signature: SEK Date: 2/1/05

HTRW DRILLING LOG		DISTRICT LOUISVILLE		HOLE NUMBER NTAMW-110	
1. COMPANY NAME MKM ENGINEERS		2. DRILL SUBCONTRACTOR HAD DRILLING		SHEET 1 OF 3	
3. PROJECT RVAAP - RI 14		4. LOCATION NACA TEST AREA			
5. NAME OF DRILLER GREG BRADY		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 APPROX 200' SOUTH OF INTERSECTION OF ROAD & RUNWAY			
		9. SURFACE ELEVATION 1080.03 ASL			
		10. DATE STARTED 12/02/04		11. DATE COMPLETED 12/03/04	
12. OVERBURDEN THICKNESS 28'		15. DEPTH GROUNDWATER ENCOUNTERED ~10'			
13. DEPTH DRILLED INTO ROCK 0		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED 12.92' @ 0937 12/08/04			
14. TOTAL DEPTH OF HOLE 28'		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES NONE		DISTURBED		UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES NA					
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC		METALS	
				OTHER (SPECIFY)	
21. TOTAL CORE RECOVERY %				OTHER (SPECIFY)	
22. DISPOSITION OF HOLE		BACKFILLED		MONITORING WELL	
				OTHER (SPECIFY)	
				SIGNATURE OF INSPECTOR <i>[Signature]</i>	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT **RVAAP RI 14**

HOLE NO. **NTAMW-110**

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTAMW-110

PROJECT

RVAAP - RI 1A

INSPECTOR

DK EARNEST

SHEET

SHEETS

2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. RECOVER (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		BROWN SANDY SILT (60%) SILT SAND DKE	0	1.9	ML	PUSH	7.54R 4/3 WET SAND
	2	1.5' SAA BROWN W/GREY MOTTLED (20%) SILTY CLAY (40%) LOW TO MED PLASTIC MED TO STIFF	0	1.1	CL	2/3 5/6	DAMP TO MOIST 7.54R 5/3
	4	SAA	0	1.2	CL	4/5 5/7	
	6	SAA	0	1.5	ML	5/5 6/7	
	8	7' GREY SILT (90%) SAA SOME FINE SAND (10%) NO ODOR LOW PLASTIC NO STAINING MEDIUM	0.7	1.8	ML	3/4 6/6	WET TO SAT 7-8' MOIST 104R 3/1 WET - 9.5'-10'
	10	SAA	0	1.5	ML	1/1 2/2	
	12	SAA SILTY VERY FINE SAND LENS	0	1.8	ML	1/3 3/3	MOIST TO WET
	14	SAA	0	1.8	ML	2/2 3/4	
	16	SAA	0	2.0	ML	0/1 2/3	
	18	SAA	0	2.0	ML	1/2 3/3	
	20	SAND DKE					

PROJECT

RVAAP - RI 1A

HOLE NO.

NTAMW-110

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTA mw-110

PROJECT

RVAAP-RI14

INSPECTOR

JDK. EARNEST

SHEET

SHEETS

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. USCS	BLOW COUNT (g)	REMARKS (h)
	22	GIRBY SANDY CLAY SOME SILT MED PLASTIC	0	2.0	CL	2/2 3/4	
	24	GIRBY SILTY SAND (30%) (10%) LOOSE	0	1.8	SM	1/2 3/3	2.5YR 6/1
	26	MORE SILT MED PLASTIC	0	NR	SM	7/7 8/8	SMALL AMOUNT ON TIP OF SPOON
	28	SAA	0	1.5	SM	1/1 3/4	
	30	MORE SILT	0	1.2	SM	0/0 0/1	
	30	BOH 28' SAMPLED TO 30' DRILLED TO 28' SET SCREEN 17'-27' SAND TO 14' SEAL TO 11' 8 BAGS #7 SAND NO WATER ADDED					

PROJECT

RVAAP-RI14

HOLE NO.

NTA mw-110

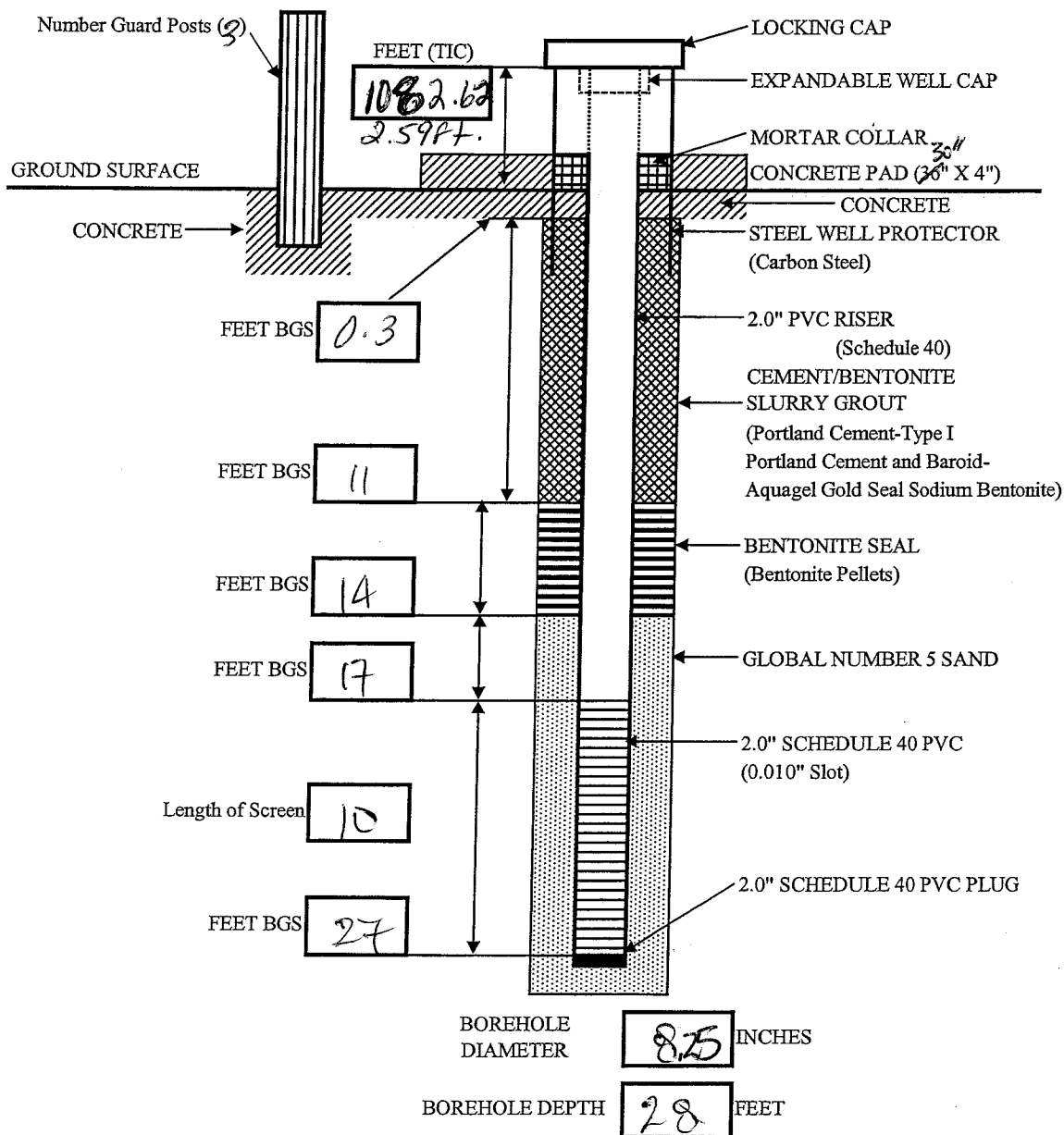


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP - RI 14*

Well Number: <i>NTA MW - 110</i>	Begin: <i>12/02/04</i>	End: <i>12/03/04</i>
Coordinates: N: <i>551351.46</i> E: <i>2346438.94</i>	Elevation: <i>1080.03</i>	Reference Point:
Logged By: <i>DK EARNEST</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: NTAMN-110-GN
Date: 12/8/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP 14

Development Method: Wale pumping

Development Company: MEM

Comments: _____

Well TD: 293 FT TIC Depth to Water: 12.92 FT ~ 1090
Water Column Height: 16.38 FT One Well Volume: 9.71 Gals

Well Volume
(gallons/foot)

2-inch = 0.16
4-inch = 0.65

6-inch = 1.47
8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					P DO	Con	Temp	DO		
0937	DSB	12.92	-	-	-	-	-	-	-	-
0943	DSE	12.93	-	-	-	-	-	-	-	-
0946	DPB	12.93	-	-	7.86	0.034	10.8	1.20	751	
0955	DPE	Dry	-	5.5	-	-	-	-	-	5.5 gal.
1045	DPB	17.1	-	-	-	-	-	-	-	-
1048	DPE	Dry	-	3	-	-	-	-	-	8.5 gal.
1130	DPB	19.78	-	-	-	-	-	-	-	-
1134	DFM	-	-	1.5	8.05	0.028	10.61	10.5	>1000	10 gal (1st well ro)
1136	DPE	Dry	-	-	-	-	-	-	-	-
1312	DPB	19.3	-	-	-	-	-	-	-	-
1315	DPE	Dry	-	3.5	-	-	-	-	-	13.5
12/9/04 0938	DSB	13.78	-	-	-	-	-	-	-	-
0943	DSE	13.90	-	-	-	-	-	-	-	-
0945	DPB	13.90	-	-	-	-	-	-	-	-
0948	DPE	Dry	-	5.0	-	-	-	-	-	18.5 gal
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Gubba (Please Print)

Signature: G. Gubba

Reviewed By: Sudheer Gubba

Date: 02/22/05

Ravenna Army Ammunition Plant- RVAAP 14 AOC Characterization

Development Method: WHALE PUMP

Comments: _____

2-inch = 0.16	6-inch = 1.47
4-inch = 0.65	8-inch = 2.61

04/16/05

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Reviewed By: *Sue Cole*

Date: 07/22/05

Monitoring Well Purging Form

Date: 01/18/05

**Ravenna Army Ammunition Plant
Ravenna, Ohio**

WELL OBSERVATIONS

Protective Casing: Intact / Damaged Locked: Yes No Key No:
Concrete Base: Intact / Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 28 (ft) TIC · TOC Difference: 0.24 (ft)
Vapor Readings: HNu · OVA Background: _____ Inside Well Casing:

	Present	Depth	Sampled Sample ID
LNAPL Yes · No	_____	Yes · <u>No</u>	
DNAPL Yes · No	_____	Yes · <u>No</u>	NT

NTAMW-110-Gv2

CALCULATIONS

- (A) Depth to Well Bottom 29.6 (ft) TOC · TIC · BGS Measured Previously Measured (circle one)
- (B) Depth to Water 12.42 (ft) TOC · TIC · BGS Time Measured: 1344
- (C) Water Column Height (A-B) 17.18 (ft)
- (D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
- (E) One Well Volume (C*D) 2.75 (gal)
- (F) Volumes to be Evacuated 5
- (G) TOTAL VOLUME TO BE EVACUATED (E * F) 13.74 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: Micro Pumping Device Number:

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored Disposed Onsite Offsite

Collected In: Tanks Drums No. of Containers:

Comments:[illegible]

Logged By: Vijay Allam (Please Print)

Signature: May

Reviewed By: Julie Davis

Date: 02/22/05

Location ID: NTAmw - 110 GW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 01/18/05

Sampling Information

Source	Groundwater / Product		Surface Water		Soils / Sediments / Sludge	
Method	Bailer		Sample Bottle		Scoop	Trowel
	Pump		Bacon Bomb		Bowl	Hand Auger
	Micro purging X				Push Probe	Plastic Liner
Type/Construction					Mattocks	
Miscellaneous	Well Purging Form Yes No					

Sample Collection: 1400 hrsSample Type: Composite - MI - Grab
If MI, # of increments taken: NALocation: Plotted on Map Staked in Field
Estimated - Measured - SurveyedSample Depth: 20 FT (below surface)Decon: Dedicated - Each Day Each LocationField Parameters
(at time of sample)

Analytical Parameters

Other Parameters

PID / FID Readings:

Background: 0.0 ppmDO 1.20Sample: 0.0 ppmWater Level: 12.47 FTTemperature: 10.25 °CSp. Conductance: 0.476 uMHOspH: 7.85 unitsTurbidity: 20.9 N.T.U.

VOC X

SVOC X

Explosives X

Propellants X

TAL Metals X

Pesticides/PCBs X

Cyanides

TOC

Grain Size

TPH GRO

TPH DRO

Chromium +6

Nitrate

Corrosivity

Reactivity Sulfide/Cyanide

Ignitability

QA Samples

MS/MSD

Yes / No

NA

Duplicate ID

NA

Equipment Rinse ID

NA

Trip Blank ID

Trip Blank

NA

Sample Description

No color, No odor, No sheen,low turbidity

Split Sample ID:

Split Sample

Name:

Agency/Company:

Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Vijay Alluri (Please Print)Signature: vijayReviewed by: ERIC ELLIS (Please Print)Signature: ERIC ELLIS Date: 2/1/05

HTRW DRILLING LOG			DISTRICT <u>Coville</u>			HOLE NUMBER <u>NTAmw-112</u>			
1. COMPANY NAME <u>MKM Engineers Inc</u>			2. DRILL SUBCONTRACTOR <u>HAD Drilling Contractors</u>			SHEET <u>1</u> OF <u>2</u> SHEETS			
3. PROJECT <u>RvAAPRE 14</u>			4. LOCATION <u>NAC Test Area</u>						
5. NAME OF DRILLER <u>Sam Holters</u>			6. MANUFACTURER'S DESIGNATION OF DRILL <u>CME-LC60</u>						
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <u>8.25" OD HSA</u> <u>2" SPLITSPOON</u>			8. HOLE LOCATION <u>Sandwot Runway</u>						
			9. SURFACE ELEVATION <u>1078.07 ASL</u>						
			10. DATE STARTED <u>03 Dec 04</u>			11. DATE COMPLETED <u>03 Dec 04</u>			
12. OVERBURDEN THICKNESS <u>20 ft</u>			15. DEPTH GROUNDWATER ENCOUNTERED <u>12.5</u>						
13. DEPTH DRILLED INTO ROCK <u>0.0</u>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <u>3.0 @ 1350 12/08/04</u>						
14. TOTAL DEPTH OF HOLE <u>20.0</u>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY) <u></u>						
18. GEOTECHNICAL SAMPLES <u>SHELBY TUBE 4-6</u>		DISTURBED <u>-</u>		UNDISTURBED <u>X</u>		19. TOTAL NUMBER OF CORE BOXES <u>-</u>			
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <u>-</u>		METALS <u>-</u>		OTHER (SPECIFY) <u>-</u>		21. TOTAL CORE RECOVERY <u>-</u> %	
22. DISPOSITION OF HOLE		BACKFILLED <u>-</u>		MONITORING WELL <u>X</u>		OTHER (SPECIFY) <u>-</u>		23. SIGNATURE OF INSPECTOR <u>[Signature]</u>	
LOCATION SKETCH/COMMENTS SCALE:									
PROJECT <u>RvAAPRE 14</u>						HOLE NO. <u>NTAmw-111</u>			

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTA mw-111

PROJECT

ZVAAP RE 14

INSPECTOR

Mark Dunlap

SHEET SHEETS

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)	BLOW COUNT (g)	REMARKS (h)
0835		6" Topsoil					
		Redish Br. SILT 70% w/ Sand Dry SHLL No Color No Staining No Plasticity Gray mottles	0.0	1.4	ML	1-1 2-4	7.5 y 5/3
	2	DK. Br. SILT 75% w/ Sand Dry SHLL No Color White/Gray Staining No Plasticity	0.0	1.2	ML	2-4 7-7	7.5 y 4/3
	4	0322004 0845					
		Shelby Tube					
	6	Br. SILT 75% w/ Clay Dry No Color Gray Mottling No Plasticity	0.0	1.0	ML	1-3 5-6	7.5 y 4/4
	8						
		Br/gray SAND 70% (Fine Grained) SILT Wet Saturated	0.0	1.8	SM	2-3 4-7	SAA
	10	Br. SILT 70% w/ Clay Dry No Color No Staining No Plasticity			ML	1-4	
		Br/gray SILT 85% w/ Clay SATURATED No Color No Staining	0.0	1.4		4-8	SAA
	12	DK Br. SILT 80% w/ Clay Dry No Color No Staining Changes to Saturated @ 12.5			ML	1-5	
		Changes to Dump @ 13.5	0.0	1.9		7-9	SAA
	14	Changes to Dry @ 15.5			ML	1-4 5-8	SAA
		Changes to Gray	0.0	1.8			
	16	SAA			ML	2-6 8-9	7.5 y 5/2
			0.0	1.5			
	18	Gray SILT 65% w/ Sand + Fine Grained Gravel Dry No Color No Staining No Plasticity	0.0	1.2	ML	2-7 7-8	SAA Dell 20 Sand to 19.5 Screen from 19.5 to 9.5 Send up to 7.0
	20						Bottom to 5.0 Go out to Surf level No water used

PROJECT

ZVAAP RE 14

HOLE NO.

NTA mw-111

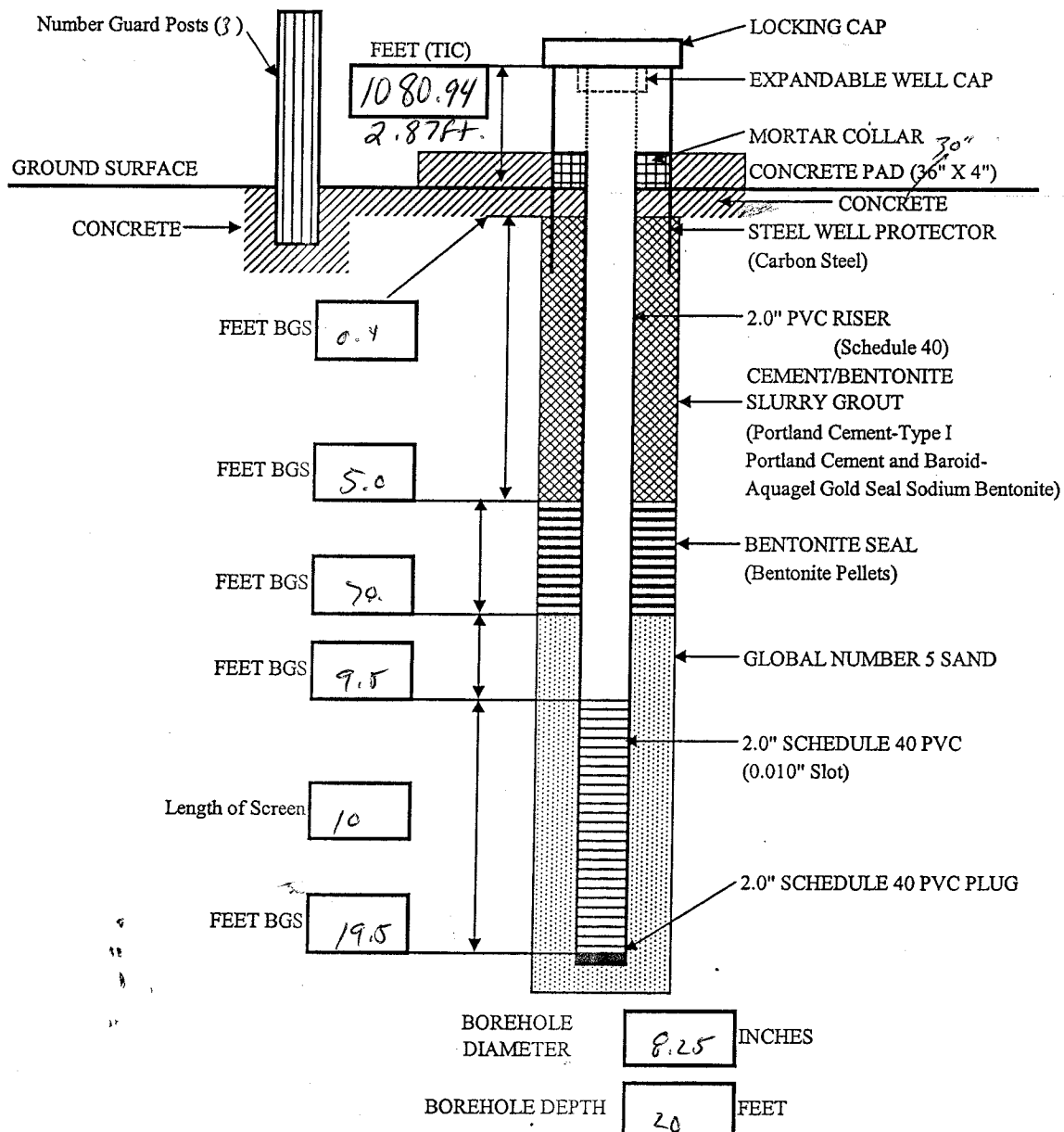


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RV AAP R2 14*

Well Number: <i>NTAmw-111</i>	Begin: <i>03 Dec 04</i>	End: <i>03 Dec 04</i>
Coordinates: N: <i>551538.60</i> E: <i>2346638.01</i>	Elevation: <i>1078.07</i>	Reference Point:
Logged By: <i>[Signature]</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: NTAMW-III-GW
Date: 12/08/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP 14

Development Method: Whale pumping

Development Company: MKM

Comments: _____

Well TD: 22.0 FT TIC Depth to Water: 3.0 FT ≈ 11 gal
Water Column Height: 19.0 FT One Well Volume: 11.2 Gals
Well Volume (gallons/foot) 2-Inch = 0.16 6-Inch = 1.47
4-Inch = 0.65 8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	Con	DO	Temp		
1350	DSB	<u>3.0</u>								
1400	DSE	<u>3.7</u>	-	-	-	-	-	-	-	
1401	DPB	<u>3.7</u>	-	-	<u>7.61</u>	<u>0.031</u>	<u>3.75</u>	<u>10.5</u>	<u>>1000</u>	Initial readings
1410	DFM	-	-	<u>11.2</u>	<u>7.57</u>	<u>0.426</u>	<u>1.69</u>	<u>11.1</u>	<u>>1000</u>	11.2 gal (1st well vol)
1412	DPE	<u>Dry</u>	-	<u>1.5</u>	-	-	-	-	-	
1438	DPB	<u>4.1</u>	-	-	-	-	-	-	-	
1444	DPE	<u>Dry</u>	-	<u>6.0</u>	-	-	-	-	-	18.9 (2nd well vol)
1513	DPB	<u>3.7</u>	-	-	-	-	-	-	-	
1515	DFM	-	-	<u>3.7</u>	<u>7.35</u>	<u>0.427</u>	<u>3.75</u>	<u>11.5</u>	<u>>1000</u>	22.4 (2nd well vol)
1516	DPE	<u>Dry</u>	-	<u>1.5</u>	-	-	-	-	-	23.9 gal
0850	DSB	<u>3.33</u>	-	-	-	-	-	-	-	
0856	DSE	<u>3.70</u>	-	-	-	-	-	-	-	
0858	DPB	<u>3.70</u>	-	-	-	-	-	-	-	
0904	DPE	<u>Dry</u>	-	<u>6.5</u>	-	-	-	-	-	30.4
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolionizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Gubba (Please Print)

Reviewed By: Sudheer

Signature: G. Sudheer

Date: 02/22/05

Well Development Record

Well ID: NTAMW-111-GW
Date: 12/09/04Ravenna Army Ammunition Plant-
RVAAP 14 AOC CharacterizationProject: RVAAP14Development Method: Whale pumpingDevelopment Company: MKM

Comments: _____

Well TD: 22.0 FT TIC Depth to Water: 3.0 FT ~ 11 gal Well Volume (gallons/foot) 2-Inch = 0.16 6-Inch = 1.47
Water Column Height: 19.0 FT One Well Volume: 11.2 Gals 4-Inch = 0.65 8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	Temp		
0955	DPB	4.37	4.37	-	-	-	-	-	-	-
0957	DFM	-	-	3 gal	7.09	0.461	3.49	10.8	925	33 gal (3 rd well vol)
1000	DPE	Dry	-	3 gal	-	-	-	-	-	36 gal
1018	DPB	4.4	-	-	-	-	-	-	-	-
1022	DPE	Dry	-	6 gal	-	-	-	-	-	42 gal
1054	DPB	3.70	-	-	-	-	-	-	-	-
1055	DFM	-	-	2 gal	7.56	0.467	3.87	11.2	449	44 gal (4 th well vol)
1057	DPE	Dry	-	4 gal	-	-	-	-	-	48 gal
1120	DPB	4.1	-	-	-	-	-	-	-	-
1124	DPE	Dry	-	5.5 gal	-	-	-	-	-	53.5 gal
1143	DPB	4.8	-	-	-	-	-	-	-	-
1144	DFM	-	-	1.5 gal	7.75	0.499	4.54	11.4	305	55 gal (5 th well vol)
1146	DPE	Dry	-	4.0	-	-	-	-	-	to 59 gal
1300	DPB	3.4	-	-	-	-	-	-	-	-
1304	DPE	Dry	-	6.0	-	-	-	-	-	65 gal
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other:

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Gubba (Please Print)Reviewed By: SudheerSignature: G. SudheerDate: 02/22/05

Well ID: NTAMN-111-GW
Date: 12/09/04

Project: RYAAP 14

Development Method: Whale pumping

Development Company: MM

Comments: _____

Well TD: 22.0 FT TIC Depth to Water: 30 FT
Water Column Height: 19.0 FT One Well Volume: 11.2 Gals ≈ 1194

**Well Volume
(gallons/foot)**

2-Inch = 0.16	6-Inch = 1.47
4-Inch = 0.65	8-Inch = 2.61

WELL DEVELOPMENT CODES	FIELD MEASUREMENT CODES	TURBIDITY
DPB - Begin Pumping	MTP - Temperature	Enter Turbidity Meter Reading
DPE - End Pumping	MSC - Specific Conductance	(Final should be < 5 NTU)
DSB - Begin Surge Blocking	MPD - Photoionizer (eg. HNu)	OR
DSE - End Surge Blocking	MFD - Flame Ionizer (eg. OVA)	Enter Qualitative Observations
DFM - Field Measurements	MDO - Dissolved Oxygen	
DBB - Begin Bailing	MPH - pH	H - High: Muddy/Silty
DBE - End Bailing	MEH - eH	M - Medium: Cloudy/Translucent
DXB - Begin Other	MOT - Other _____	L - Low: Transparent
DXE - End Other	_____	N - None: Clear/No Sediment
Other: _____	_____	

Logged By: Sudheer Gubba (Please Print)

Reviewed By: [Signature]

Signature:

Date: 07/22/05

Monitoring Well Purging Form

Well ID: NTAMW-11-GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/16/04

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.4 (ft) TIC · TOC Difference: 0.3 (ft)
Vapor Readings: HNu · OVA Background: Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No Yes · No
DNAPL Yes · No Yes · No

NTAMW-11-GW

CALCULATIONS

- (A) Depth to Well Bottom 22 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 3.9 (ft) TOC · TIC · BGS Time Measured: 1115
(C) Water Column Height (A-B) 18.1 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) 2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT
(E) One Well Volume (C*D) 2.89 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 14.48 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: Misc Pump Device Number:

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite

Collected In: Tanks · Drums No. of Containers:

Comments:

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1024	3.9			0.654	9.8	7.91	96	11.35	Initial Reading
1127	4.05			0.656	10.4	7.63	25	10.55	
1130	4.40			0.667	10.3	7.53	26	10.64	
1133	4.61			0.661	10.4	7.48	26	10.28	

Logged By: Sudheer Gubba (Please Print)

Signature: S. Gubba

Reviewed By: [Signature]
Date: 02/22/05

Location ID: NTAMN-III-GW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 12/16/04

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Micro purge 1x		Push Probe
Type/Construction	stainless steel		Mattocks
Miscellaneous	Well Purging Form Yes - No		

Sample Collection: 1135 hrsSample Type: Composite - MI - GrabLocation: Plotted on Map - Staked in Field
Estimated - Measured - SurveyedSample Depth: 4-61 FT (below surface)Decon: Dedicated - Each Day - Each Location

Field Parameters

(at time of sample)

PID / FID Readings:

Background:

ppm

NT

Sample:

NT

ppm

Water Level

4-61

FT

Temperature

10.4

°C

Sp. Conductance:

0.661

uMHOs

pH

7.48

units

Turbidity

26

N.T.U.

Analytical Parameters

VOC

X

TPH GRO

SVOC

X

TPH DRO

Explosives

X

Chromium +6

Propellants

X

Nitrate

TAL Metals

X

Pesticides/PCBs

X

Cyanides

TOC

Grain Size

Other Parameters

Corrosivity

Reactivity Sulfide/Cyanide

Ignitability

QA Samples

MS/MSD

Yes / No

NA

Duplicate ID

NA

Equipment Rinse ID

NA

Trip Blank ID

Trip Blank

NA

Sample Description

clear water, No odor, No sheen, No turbidity

Split Sample ID:

Split Sample

Name:

Agency/Company:

Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Sudheer Gubba (Please Print)Reviewed by: ERIK ELLIS (Please Print)Signature: [Signature]Signature: [Signature] Date: 2/1/05

HTRW DRILLING LOG				DISTRICT <i>Louisville</i>		HOLE NUMBER <i>NTAmw-112</i>	
1. COMPANY NAME <i>MKM Engineers Inc.</i>				2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractors</i>		SHEET <i>1</i> OF <i>3</i>	
3. PROJECT <i>KVAAP RI 14</i>				4. LOCATION <i>NACA Test Area</i>			
5. NAME OF DRILLER <i>Sam Holler</i>				6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME LC-60</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		<i>8.25 HSA</i>		8. HOLE LOCATION <i>N of Runway</i>		9. SURFACE ELEVATION <i>1075.36 ASL</i>	
		<i>2" splitspoons</i>		10. DATE STARTED <i>02 Dec 04</i>		11. DATE COMPLETED <i>02 Dec 04</i>	
12. OVERBURDEN THICKNESS <i>23.9</i>				15. DEPTH GROUNDWATER ENCOUNTERED <i>18.0 Ft.</i>			
13. DEPTH DRILLED INTO ROCK <i>0.0</i>				16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>7.9' @ 140l 12/09/04</i>			
14. TOTAL DEPTH OF HOLE <i>23.9</i>				17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES <i>SHRUB TUBED</i>		DISTURBED <i>-</i>		UNDISTURBED <i>X</i>		19. TOTAL NUMBER OF CORE BOXES <i>-</i>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>-</i>		METALS <i>-</i>		OTHER (SPECIFY) <i>-</i>	
						21. TOTAL CORE RECOVERY <i>-</i> %	
22. DISPOSITION OF HOLE		BACKFILLED <i>-</i>		MONITORING WELL <i>X</i>		23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	
LOCATION SKETCH/COMMENTS				SCALE:			
PROJECT <i>KVAAP RI 14</i>				HOLE NO. <i>NTAmw-112</i>			

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NAAMW-112

PROJECT

RVAAP RI 14

INSPECTOR

Mark Drulky

SHEET

SHEETS

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. USCS	BLOW COUNT (g)	REMARKS (h)
1230		3" Topsoil Reddish Br SILT 65% w/ Sand and fine gravel wet/damp No Odor No Staining No Plasticity	0.0	1.4	ML	1-1 2-5	7.5yr 5/6
	2	SAA	0.0	1.5	ML	1-4 8-8	SAA
	4	SAA	0.0	1.9	ML	1-3 5-7	SAA
	6	SAA	0.0	1.9	ML	2-3 6-10	SAA
	8	SAA	0.0	1.6	ML	1-5 10-11	SAA
	10	Gray/Br SILT 75% w/ Sand Dry Still No Odor No Staining No Plasticity			ML		7.5yr 5/3
	12	1250 02 Dec 04 Shelby Tube					
	14	Gray SILT 65% w/ Sand Damp No Odor No Staining No Plasticity	0.0	1.2	ML	2-3 6-6	7.5yr 5/2
	16	SAA	0.0	2.0	ML	4-2 5-5	SAA
	18	SAA	0.0	2.0	ML	2-4 6-7	SAA
	20	Gray SILT 85% w/ clay wet/saturated Low Plasticity No Odor No Staining	0.0	2.0	ML		
	22	Gray SAND 90% Saturated Gravel to Fine Gravel	0.0	2.0	SP SM	weight	SAA

PROJECT

RVAAP RI 14

HOLE NO.

NAAMW-112

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTA mw-112

PROJECT

RVAAP RI 14

INSPECTOR

Mark Dunlevy

SHEET

SHEETS

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)
	22	SAA		2.0	SP/ SM	Weight - 1 2-2	SAA
	24	SAA		2.0	SP/ SM	1-2 4-5	SAA
1430	24	Bolt 23.9					Bolt 23.9 Send to MDH Screen from 23.9 to 13.9 Sand up to 11 Bentonite to 8 Grout to surface Stick-up Completion 5 gallons Hydration water used
	26						

PROJECT

RVAAP RI 14

HOLE NO.

NTA mw-112

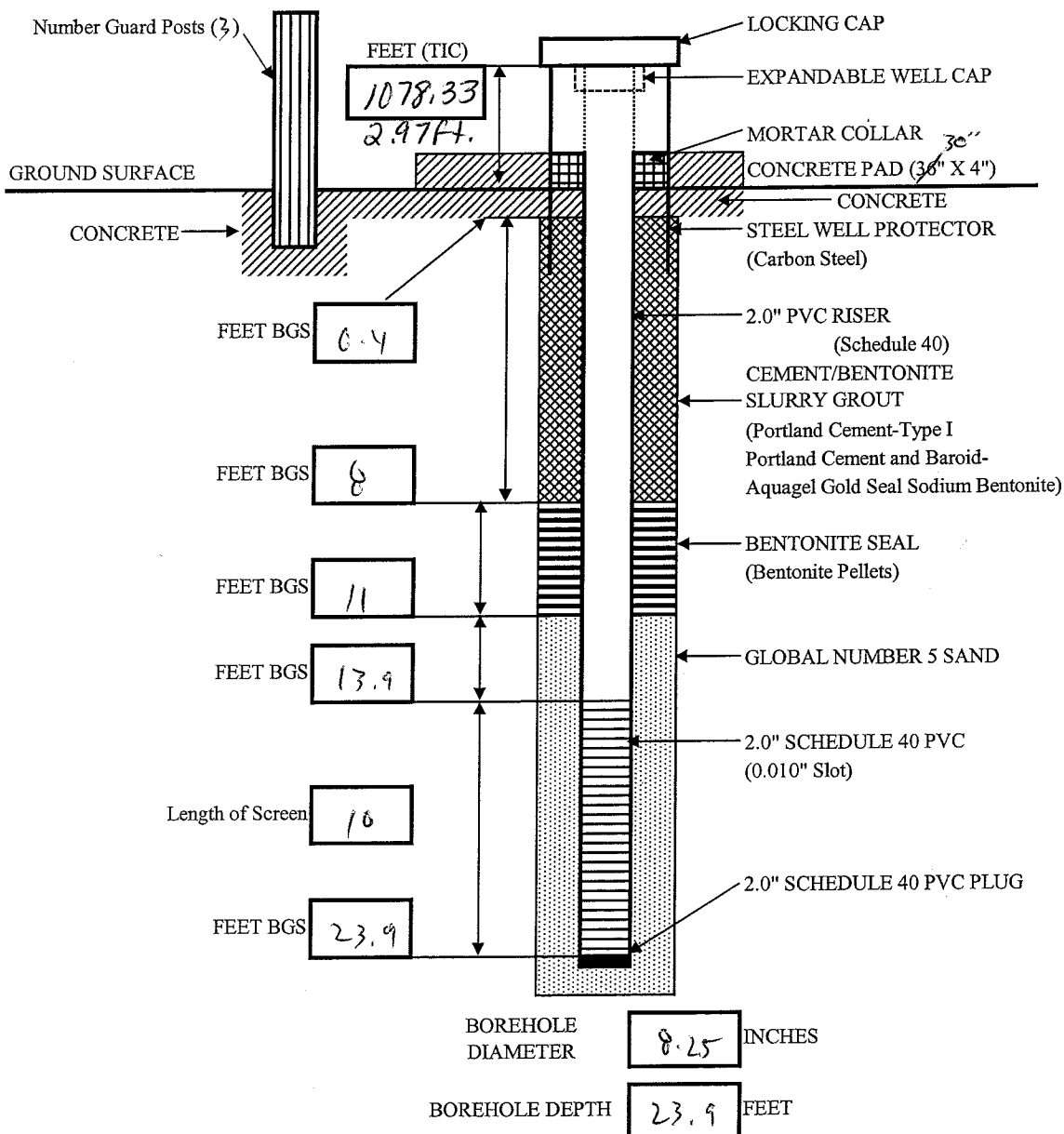


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP RI 14*

Well Number: <i>NTA mw 712</i>	Begin: <i>02 Dec 04</i>	End: <i>02 Dec 04</i>
Coordinates: N: <i>551712.14</i> E: <i>2346889.48</i>	Elevation: <i>1075.36</i>	Reference Point:
Logged By: <i>[Signature]</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: NTAMN-112-GW
Date: 12/09/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP 14

Development Method: Whole pumping

Development Company: MEM

Comments: _____

Well TD: 26.5 FT TIC Depth to Water: 7.9 FT ~ 119
Water Column Height: 18.6 FT One Well Volume: 11.02 Gals

Well Volume
(gallons/foot)

2-inch = 0.16
4-inch = 0.65

6-inch = 1.47
8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	Con	DO	Temp		
1401	DSB	7.9	—	—	—	—	—	—	—	—
1420	DSE	8.7	—	—	—	—	—	—	—	—
1422	DPB	8.7	—	—	7.83	0.712	3.52	11.2	>1000	—
1430	DFM	—	—	11 gal	7.97	0.736	3.48	11.2	>1000	11 gal (1st well vol)
1432	DFM	—	—	11 gal	7.38	0.692	2.70	11.2	925	22 gal (2nd well vol)
1444	DFM	—	—	11 gal	7.32	0.710	3.12	11.3	488	33 gal (3rd well vol)
1450	DFM	—	—	11 gal	7.24	0.733	3.36	11.2	446	44 gal (4th well vol)
1456	DFM	—	—	11 gal	7.42	0.694	2.71	11.2	348	55 gal (5th well vol)
1502	DFM	—	—	11 gal	8.04	0.683	4.29	11.2	214	66 gal (6th well vol)
1508	DFM	—	—	11 gal	8.16	0.688	5.43	11.1	85	77 gal (7th well vol)
1509	DPE	10.0	—	—	—	—	—	—	—	End Development
FINAL										

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Gubba (Please Print)

Signature: Sudheer Gubba

Reviewed By: Sudheer Gubba

Date: 02/22/05

Monitoring Well Purging Form

Well ID: NTAMW-112-GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/16/04

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.4 (ft) TIC · TOC Difference: 0.3 (ft)
Vapor Readings: HNu · OVA Background: Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No Yes · No NTAMW-112-GW
DNAPL Yes · No Yes · No

CALCULATIONS

- (A) Depth to Well Bottom 26.5 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 7.95 (ft) TOC · TIC · BGS Time Measured: 10:15
(C) Water Column Height (A-B) 18.55 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 2.97 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 14.84 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other Micro Purge Device Number:
Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite
Collected In: Tanks Drums No. of Containers:

Comments:

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1023	7.95			0.834	11.02	6.24	999	12.52	
1026	8.05			0.824	11.3	6.52	999	11.37	
1029	8.10			0.820	11.1	7.19	999	11.25	
1032	8.10			0.821	11.1	7.20	999	11.30	
1035	8.12			0.820	11.1	7.19	999	11.41	

Logged By: Sudheer Gubba (Please Print)

Reviewed By: Sudheer

Signature: S. Gubba

Date: 02/22/05

Field Sampling Report

Location ID: NTAON-112-GN

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 12/16/04

Sampling Information

Source	Groundwater / Product		Surface Water		Soils / Sediments / Sludge	
Method	Bailer		Sample Bottle		Scoop	Trowel
	Pump		Bacon Bomb		Bowl	Hand Auger
	Micro Barge	X			Push Probe	Plastic Liner
Type/Construction	Stainless Steel				Mattocks	
Miscellaneous	Well Purging Form (Yes) - No					

Sample Collection: 1040 hrs

Sample Type: Composite - MI - Grab

Location: Plotted on Map - Staked in Field
Estimated - Measured - Surveyed

Sample Depth: 8.12 FT (below surface)

Decon: Dedicated : Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters				Other Parameters			
PID / FID Readings: Background: <u>NT</u> ppm	VOC	X	TPH GRO		Corrosivity			
	SVOC	X	TPH DRO		Reactivity Sulfide/Cyanide			
	Explosives	X	Chromium +6		Ignitability			
Sample: <u>NT</u> ppm	Propellants	X	Nitrate		QA Samples MS/MSD Yes / No NA Duplicate ID NA Equipment Rinse ID NA Trip Blank ID <u>Trip Blank</u> NA			
Water Level <u>8.12</u> FT	TAL Metals	X						
Temperature <u>11.1</u> °C	Pesticides/PCBs	X						
Sp. Conductance: <u>0.820</u> uMHOs	Cyanides							
pH <u>7.19</u> units	TOC							
Turbidity <u>1000</u> N.T.U.	Grain Size							

Sample Description
Not clear, No odor, No Sheen, High turbidity

Split Sample ID:

Name:
Agency/Company:
Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Sudheer Gubbay (Please Print)

Reviewed by: ERIC ELIS (Please Print)

Signature: [Signature]

Signature: [Signature] Date: 2/1/05

HTRW DRILLING LOG			DISTRICT <i>Louisville</i>			HOLE NUMBER <i>NTAmw-113</i>		
1. COMPANY NAME <i>Mk Engineers</i>			2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractor</i>			SHEET <i>1</i> OF <i>3</i>		
3. PROJECT <i>RVAAPR 14</i>			4. LOCATION <i>NACA Test Area</i>					
5. NAME OF DRILLER <i>Sam Holler</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME LC-60</i>					
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <i>2" Split Spoon</i>			8. HOLE LOCATION <i>South of Runway - East End</i>			9. SURFACE ELEVATION <i>1072.61 ASL</i>		
			10. DATE STARTED <i>02 Dec 04</i>			11. DATE COMPLETED <i>02 Dec 04</i>		
12. OVERBURDEN THICKNESS <i>27.5</i>			15. DEPTH GROUNDWATER ENCOUNTERED <i>23 Ft.</i>					
13. DEPTH DRILLED INTO ROCK <i>0.0</i>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>7.1' @ 0927 12/07/04</i>					
14. TOTAL DEPTH OF HOLE <i>27.5</i>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)					
18. GEOTECHNICAL SAMPLES <i>SHELBY TUBE 6-8</i>			DISTURBED <i>-</i>		UNDISTURBED <i>X</i>		19. TOTAL NUMBER OF CORE BOXES <i>-</i>	
20. SAMPLES FOR CHEMICAL ANALYSIS			VOC <i>-</i>		METALS <i>-</i>		OTHER (SPECIFY) <i>-</i>	
							21. TOTAL CORE RECOVERY <i>-</i> %	
22. DISPOSITION OF HOLE			BACKFILLED <i>-</i>		MONITORING WELL <i>X</i>		23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	
LOCATION SKETCH/COMMENTS			SCALE:					
PROJECT <i>RVAAPR 14</i>						HOLE NO. <i>NTAmw-113</i>		

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
NTAmw-113

PROJECT

RVAAP RE 14

INSPECTOR

Mark Dunlevy

SHEET SHEETS

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)
0846		0.4 ft. Topsoil Lt. Br. SILT 70% w/ Clay Dry No Odor No Plasticity Gray Mottles Present	0.0	1.4	ML	1-2 4	7.5y-3 1/2
	2	SAA	0.0	1.2	ML	1-3 5-7	SAA
	4	Br. SAND 65% w/ Silt wet No Odor No Plasticity Gray Mottles Reddish Br. SILT 65% w/ Sand damp No Odor No Plasticity Iron staining and Gray Mottles	0.0	1.7	ML Sm ML	1-3 9-5	SAA
	6	0852 02 Rec'd	Shelby Tube				
	8	Br. SILT 80% w/ clay Dry still No Odor No Plasticity Gray Mottles	0.0	1.3	ML	1-6 5-12	7.5y-4 1/4
	10	Br. SILT 65% w/ Sand Dry No Odor No staining No Plasticity Br. SILT 70% w/ Sand wet No Odor No staining Br. SILT 65% w/ Sand and fine gravel Damp No Odor No staining No Plasticity	0.0	1.5	ML	1-3 5-4	7.5y-4 1/6
	12	Change to wet SAA	0.0	1.7	ML	1-5 7-9	SAA
	14	SAA	0.0	1.1	ME	1-5 5	SAA
	16	2' Br/ly SAND wet/saturated Br. Gray SILT 65% w/ Silt & fine Grained Gravel	0.0	1.9	ML	1-1 3-4	SAA
	18	SAA	0.0	1.4	ML	1-1 1-3	SAA
	20						

PROJECT

RVAAP RE 14

HOLE NO.

NTAmw-113

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
NTA mw-113
SHEET 3 OF 3

PROJECT

RVAAP RI 14

INSPECTOR

Mark D. Dwyer

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	SAA		1.9	ML	2-5	SAA
	24	Gray Fine Grained Sand 85% w/ Silt Saturated No Odor No Staining No Plasticity		1.9	ML SM	1-3 7-7	SAA
	26	Br. Gray SILT 65% w/ Sand and Fine Gravel No Odor No Staining No Plasticity		1.9	SM ML	1-3 4-3	SAA
	28	Bot 27.5					Bot 27.5 Sand up to 27 Screen from 27 to 27 Sand up to 14 Bentonite to 11 Grout to Surface <u>No water used</u> <u>to hydrate</u>

PROJECT

RVAAP RI 14

HOLE NO.

NTA mw-113

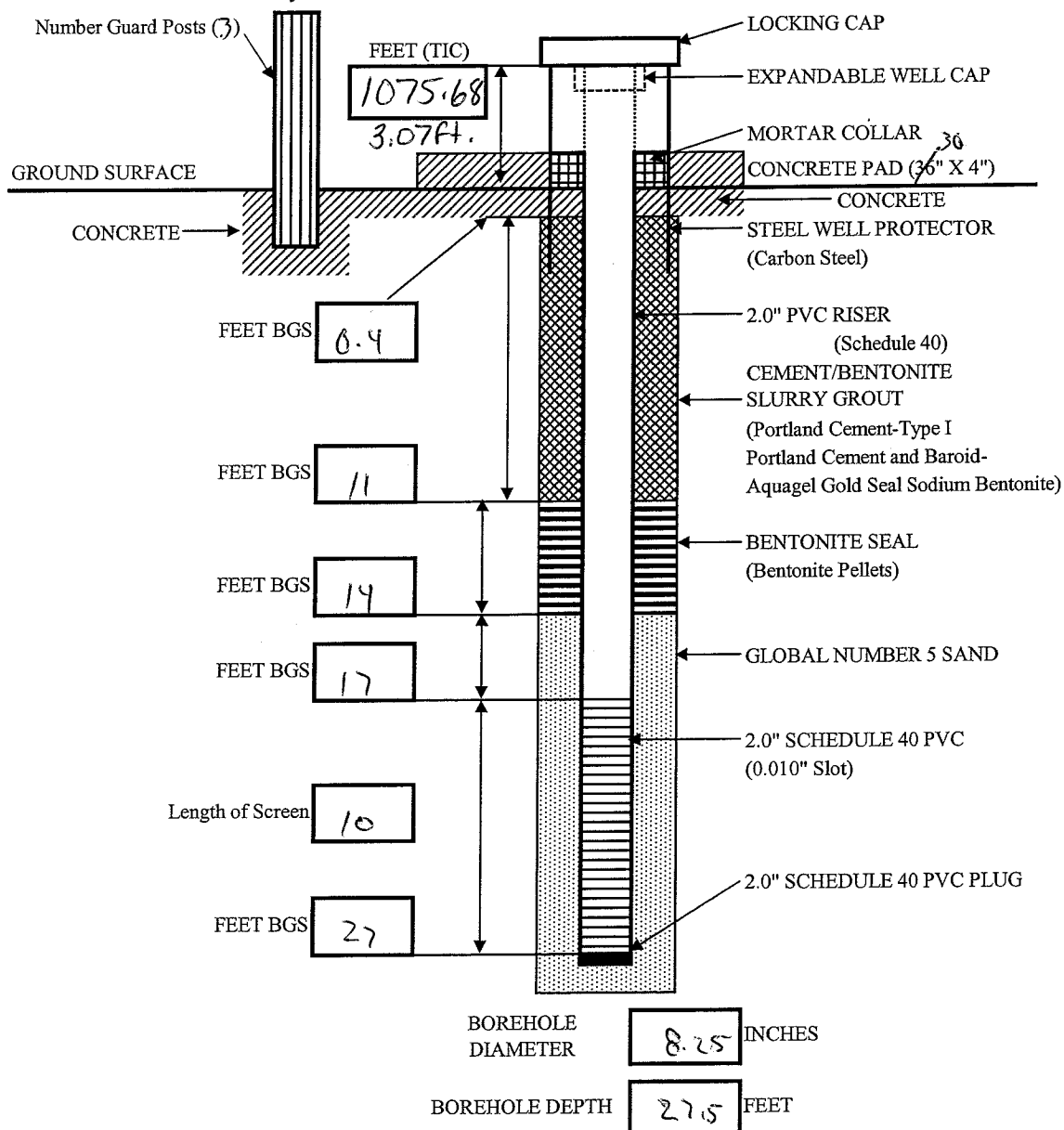


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RUAAP RE 14*

Well Number: <i>NTAmw-113</i>	Begin: <i>02 Dec 04</i>	End: <i>02 Dec 04</i>
Coordinates: N: <i>551488.52</i> E: <i>2347082.83</i>	Elevation: <i>1072.61</i>	Reference Point:
Logged By: <i>[Signature]</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: NTAMW-113-GW

Date: 12/7/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP 14

Development Method: Whale pumping

Development Company: MK

Comments: _____

Well TD: 27.2 FT TIC Depth to Water: 7.1 FT ~12 gals
Water Column Height: 20.7 FT One Well Volume: 12.27 Gals

Well Volume (gallons/foot)
2-inch = 0.16 6-inch = 1.47
4-inch = 0.65 8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	THO	Temp		
0927	DSB	7.1	—	—	—					
0934	DSE	7.2	—	—	—					
0938	DPB	7.2	—	—	7.1	0.64	2.1	12	>1000	
0947	DFM	—	—	12.2	6.9	0.64	0.8	12	>1000	1 st WV (12.2)
0956	DFM	—	—	12.2	7.1	0.66	2.1	12	>1000	2 nd WV (24.4)
1003	DFM	—	—	12.2	7.3	0.85	2.6	12	>1000	3 rd WV (36.6)
1009	DFM	—	—	12.2	7.3	0.56	2.5	12	>1000	4 th WV (48.8)
1013	DFM	—	—	12.2	7.5	0.66	3.3	12	470	5 th WV (61.0)
1025	DFM	—	—	12.7	7.3	0.66	3.4	12	>1000	6 th WV (73.2)
1032	DFM	—	—	12.2	7.5	0.66	4.2	12	380	7 th WV (85.4)
1038	DPE	9.0	—	—	—	—	—	—	—	—
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Sudheer Gubba (Please Print)

Signature: S. Gubba

Reviewed By: Sudheer

Date: 8/22/05

Monitoring Well Purging Form

Well ID: NTAMW-1136W

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/14/04

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.5 (ft) TIC · TOC Difference: 0.3 (ft)
Vapor Readings: HNu · OVA Background: Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No Yes · No NTAMW-1136W
DNAPL Yes · No Yes · No

CALCULATIONS

- (A) Depth to Well Bottom 29.6 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 6.0 (ft) TOC · TIC · BGS Time Measured: 1444
(C) Water Column Height (A-B) 23.6 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) ($2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61$ GAL/FT)
(E) One Well Volume (C · D) 3.78 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E · F) 18.88 (gal)

EVACUATION METHOD

Micro purging

Well Evacuation Method: Bailer · Submersible Pump · Other: Device Number:

Purge Water Disposition: 1. Discharged Onsite 2. Collected And Stored · Disposed Onsite Offsite

Collected In: Tanks · Drums No. of Containers:

Comments:

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1445	6			0.653	10.34	7.43	1000	3.81	Initial reading
1448	6.2			0.542	10.37	7.28	1000	3.72	
1451	6.3			0.691	10.62	7.92	1000	4.24	
1454	6.3			0.472	10.72	7.34	1000	3.64	
1457	6.41			0.481	10.65	7.84	1000	7.21	
1500	6.41			0.494	10.64	7.69	1000	7.22	End purging

Logged By: Vijay Alluri (Please Print)

Reviewed By: [Signature]

Signature: [Signature]

Date: 02/22/05

Location ID: NTAMW-113 GW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 12/14/04

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Micro purging X		Push Probe
Type/Construction			Mattocks
Miscellaneous	Well Purging Form Yes No		

Sample Collection: 1500 hrsSample Type: Composite - MI - Grab
If MI, # of increments taken: NALocation: Plotted on Map Staked in Field
Estimated - Measured - SurveyedSample Depth: 26 FT (below surface)Decon: Dedicated - Each Day Each Location

Field Parameters (at time of sample)	Analytical Parameters				Other Parameters			
PID / FID Readings: Background: ppm	VOC	X	TPH GRO		Corrosivity			
	SVOC	X	TPH DRO		Reactivity Sulfide/Cyanide			
	Explosives	X	Chromium +6		Ignitability			
	Sample: NT ppm	Propellants	X	Nitrate				
Water Level: 6.41 FT	TAL Metals	X			QA Samples			
Temperature: 10.64 °C	Pesticides/PCBs	X			MS/MSD	Yes / No	NA	
Sp. Conductance: 0.494 uMHOs	Cyanides				Duplicate ID		NA	
pH: 7.69 units	TOC				Equipment Rinse ID		NA	
Turbidity: 1000 N.T.U.	Grain Size				Trip Blank ID	Trip Blank	NA	

Sample Description

Mud color, No odor, No sheen,
Medium to high turbidity

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Split Sample ID: Split Sample

Name:
Agency/Company:
Address:QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As ListedLogged By: Vijay Alluri (Please Print)Reviewed by: ERIC ELUS (Please Print)Signature: VijaySignature: ERIC ELUS Date: 2/1/05

HTRW DRILLING LOG				DISTRICT <i>Louisville</i>		HOLE NUMBER <i>NTAmw-114</i>	
1. COMPANY NAME <i>MEM Engineering Inc.</i>				2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractors</i>		SHEET <i>1</i> OF <i>2</i>	
3. PROJECT <i>RVAAP RE 14</i>				4. LOCATION <i>NACA Test Area</i>			
5. NAME OF DRILLER <i>Sam Hahler</i>				6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME-LC60</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		<i>8.25 OD HSA</i>		8. HOLE LOCATION <i>East End of Runway</i>		9. SURFACE ELEVATION <i>1075.61 ASL</i>	
<i>2" Split Spoons</i>				10. DATE STARTED <i>18 Nov 04</i>		11. DATE COMPLETED <i>18 Nov 04</i>	
12. OVERBURDEN THICKNESS <i>20 FT</i>				15. DEPTH GROUNDWATER ENCOUNTERED <i>~ 9.5</i>			
13. DEPTH DRILLED INTO ROCK <i>0 FT</i>				16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>6.5' @ 0850 11/22/04</i>			
14. TOTAL DEPTH OF HOLE <i>20 FT</i>				17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES <i>NONE</i>		DISTURBED <i>—</i>		UNDISTURBED <i>—</i>		19. TOTAL NUMBER OF CORE BOXES <i>—</i>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>—</i>		METALS <i>—</i>		OTHER (SPECIFY) <i>—</i>	
						21. TOTAL CORE RECOVERY <i>—</i> %	
22. DISPOSITION OF HOLE		BACKFILLED <i>—</i>		MONITORING WELL <i>X</i>		23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	
LOCATION SKETCH/COMMENTS				SCALE: N ↑			
PROJECT <i>RVAAP RE 14</i>						HOLE NO. <i>NTAmw-114</i>	

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
NTA mw - 114
SHEET 2 OF 2

PROJECT
RVAAP RI 14

INSPECTOR
Mark Dunkley

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)
0900		2" Topsoil					
		Br. SILT 70% w/ Clay Damp No odor No staining No Plasticity	0.0	1.2	ML	1-2	7.5yr 4/4
	2					4-4	
		Same As Above	0.0	0.65	ML	1-1	7.5yr 4/4
	4	Changes to Moist				2-2	
		Grey SILT 60% w/ Clay Moist Mod. Plasticity No odor No staining	0.0	1.6	ML	Push Push	
	6					1-1	7.5yr 4/1
		Same As Above	0.0	1.9	ML	Wt. 1	
	8					1-2	7.5yr 4/1
		Br. SAND 75% w/ Silt. Fine Grained	0.0	1.9		1-4	
	10	Saturated No odor No staining			SM	5-5	7.5yr 5/6
		95 Br. SILT 75% w Sand					
		95 Br. SAND 75% w/ Silt Wet					
		Grey SILT 70% w Sand Damp No odor No Plasticity No staining	1.6	1.3	ML	3-4	
	12					5-5	7.5yr 4/1
		Same As Above w/ Pea Gravel present	0.8	1.6	ML	1-3	Same As Above
	14					7-9	
			0.0	1.9		1-2	
	16	Br/Grey SAND 80% w/ Silt No odor No staining wet/saturated Grades from Fine Grained to Coarse Grained			SM	4-5	Same As Above
			0.0	0.9		Push 2	Same As Above
	18	Grey SILT w/ Sand wet No odor No staining				4-4	
		Grey Fine Grained SAND 75% w/ Silt wet No odor No staining No Plasticity					
	20	Grey SILT 70% w/ Clay Damp No Plasticity No odor	0.0	2.0	ML	1-2	Bot 20 Sand up to 7.5 Screen from 19.5 Bentonite to 3.5 to 9.5 Grout to Sur. Case
0940						4-4	No water Used to Hydrate

PROJECT
RVAAP RI 14

BOH 20'

HOLE NO.
NTA mw - 114

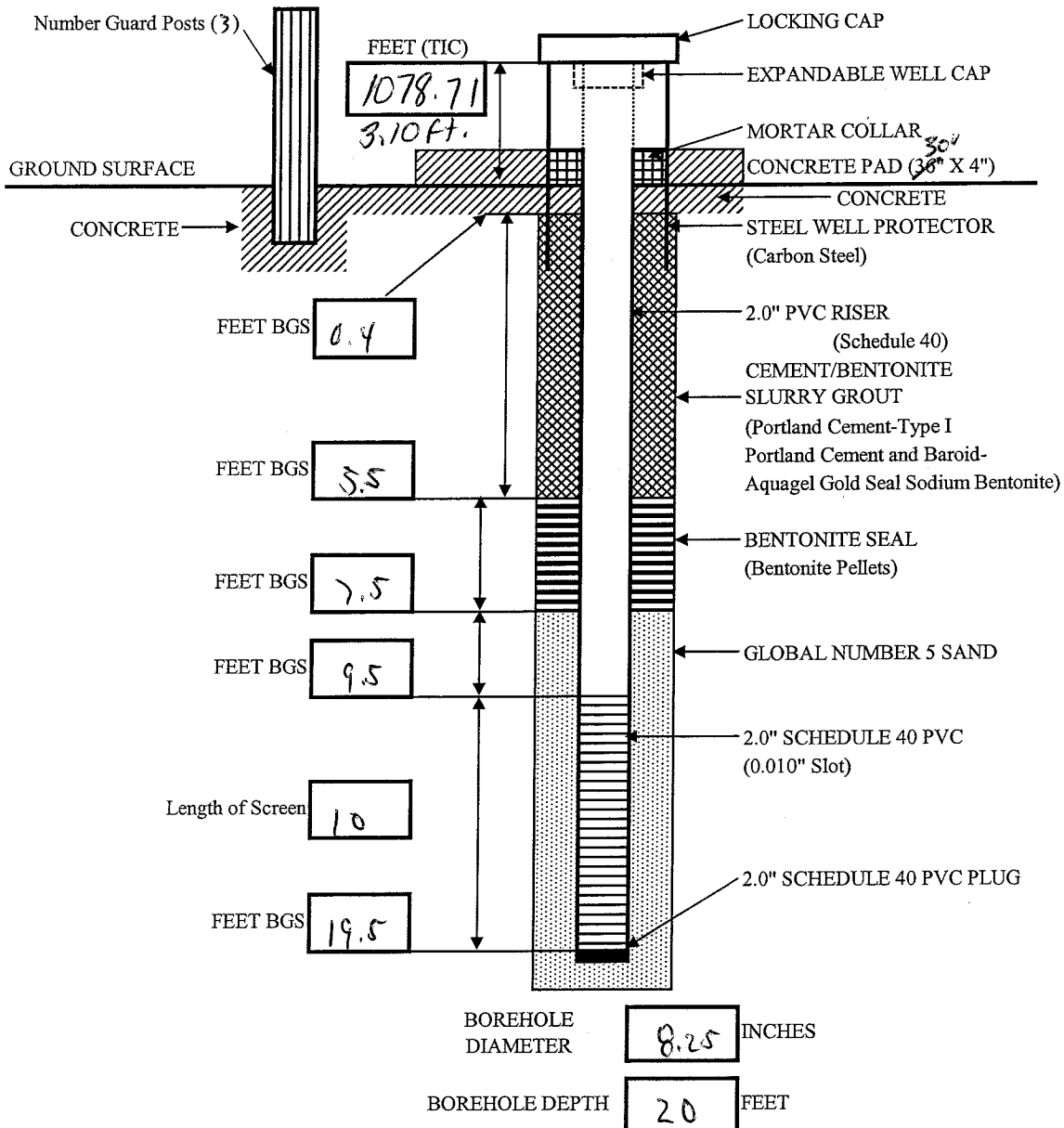


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP RI 14*

Well Number: <i>NTAmw-014</i>	Begin: <i>18 Nov 04</i>	End: <i>18 Nov 04</i>
Coordinates: N: <i>551592.94</i> E: <i>2347301.57</i>	Elevation: <i>1075.61</i>	Reference Point:
Logged By: <i>MacDonalwy</i>		



Notes:

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

Well ID: NTA MW - 114 → GW
 Date: 11/22/04

Well Development Record

Ravenna Army Ammunition Plant-
 RVAAP 14 AOC Characterization

Project: NVAAP

Development Method: WHALE PUMP

Development Company: MKM

Comments: _____

Well TD: 22.8 FT TIC Depth to Water: 6.5 FT
 Water Column Height: 16.3 FT One Well Volume: 9.62 Gals

Well Volume (gallons/foot)
 2-inch = 0.16 6-inch = 1.47
 4-inch = 0.65 8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	COND	DO	TEMP		
08:50	DBB	6.5								
08:55	DSE	5-8.5	-	-	-	-	-	-		
08:57	DPB	5-8.5	-	-	6.32	0.83	10.10	12.5	1000	
09:10	DFM	13.9	-	9.5	6.97	0.72	5.61	13.1	1000	1 st well vol 95
09:17	DFM	13.7	-	9.5	7.28	0.63	8.28	12.8	1000	2 nd well vol 19 gal
09:31	DFM	13.3	-	9.5	7.45	0.64	6.66	12.83	1000	3 rd well vol 28.5 gal
09:44	DFM	13.35	-	9.5	7.25	0.61	9.49	12.57	1000	4 th well vol 38 gal
10:03	DFM	10.8	-	9.5	7.47	0.612	7.46	12.47	1000	5 th well vol 47.5 gal
10:20	DFM	9.35	-	9.5	7.66	0.614	8.07	12.65	1000	6 th well vol 57 gal
10:45	DPAE	DRY	<u>11</u>	<u>DRY 51</u>	-	-	-	-	1000	7 th well vol 66.5 gal
10:52	DPB	7.55	-	-	7.4	-	-	-		
10:59	DFM	6.6	-	-	7.53	0.544	4.40	12.58	512	
11:01	DPE	DRY	-	6	-	-	-	-		63 gal
11:08	DPB	6.37	-	3.5	7.64	0.607	6.6	12.67	1000	7 th well vol
	FINAL									

DRY

WELL DEVELOPMENT CODES

DPB - Begin Pumping
 DPE - End Pumping
 DSB - Begin Surge Blocking
 DSE - End Surge Blocking
 DFM - Field Measurements
 DBB - Begin Bailing
 DBE - End Bailing
 DXB - Begin Other
 DXE - End Other
 Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
 MSC - Specific Conductance
 MPD - Photolizer (eg. HNu)
 MFD - Flame Ionizer (eg. OVA)
 MDO - Dissolved Oxygen
 MPH - pH
 MEH - eH
 MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
 (Final should be < 5 NTU)
 OR
 Enter Qualitative Observations
 H - High: Muddy/Silty
 M - Medium: Cloudy/Translucent
 L - Low: Transparent
 N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPURE (Please Print)

Reviewed By: [Signature]

Signature: [Signature]

Date: 02/22/05

Monitoring Well Purging Form

Well ID: NTAMW-114GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/02/04

WELL OBSERVATIONS

Protective Casing: Intact Damaged Locked: Yes No Key No: 6000
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.9 (ft) TIC · TOC Difference: 0.3 (ft)
Vapor Readings: HNu · OVA Background: _____ Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No _____ Yes · No NTAMW-114GW
DNAPL Yes · No _____ Yes · No

CALCULATIONS

(A) Depth to Well Bottom 19.5 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 5.3 (ft) TOC · TIC · BGS Time Measured: 0852
(C) Water Column Height (A-B) 14.2 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 2.27 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 11.36 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: Micro purging Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite

Collected In: Tanks · Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
0853	5.3			1.04	12.02	6.37	1000	5.61	Initial reading
0856	5.3			1.04	12.61	6.66	1000	0.41	
0859	5.7			0.99	12.60	6.74	1000	0.0	
0902	5.3			0.94	12.52	6.73	932	0.28	
0905	5.7			0.983	12.60	6.32	533	0.15	
0908	5.8			0.926	12.61	6.36	301	2.56	End purging

Logged By: Vijay Alluri (Please Print)

Reviewed By: [Signature]
Date: 12/22/05

Signature: vijay

Field Sampling Report

Location ID: NTAMW-114 GW

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 12/02/04

Sampling Information

Source	Groundwater / Product		Surface Water		Soils / Sediments / Sludge	
Method	Bailer		Sample Bottle		Scoop	Trowel
	Pump		Bacon Bomb		Bowl	Hand Auger
	Micro purge	X			Push Probe	Plastic Liner
Type/Construction					Mattocks	
Miscellaneous	Well Purging Form Yes No					

Sample Collection: 0900 hrs

Sample Type: Composite - MI - Grab
If MI, # of increments taken: NA

Location: Plotted on Map Staked in Field
Estimated - Measured - Surveyed

Sample Depth: 12 FT (below surface)

Decon: Dedicated - Each Day Each Location

Field Parameters (at time of sample)	Analytical Parameters			Other Parameters		
PID / FID Readings: Background: <u>0.0</u> ppm	VOC	X	TPH GRO	Corrosivity		
	SVOC	X	TPH DRO	Reactivity Sulfide/Cyanide		
	Explosives	X	Chromium +6	Ignitability		
Sample: <u>0.0</u> ppm	Propellants	X	Nitrate			
Water Level <u>5.3</u> FT	TAL Metals	X		QA Samples		
Temperature <u>12.61</u> °C	Pesticides/PCBs	X		MS/MSD	Yes / No	NA
Sp. Conductance: <u>0.926</u> uMHOs	Cyanides			Duplicate ID	NTAMW-114-DUP NA	
pH <u>6.86</u> units	TOC			Equipment Rinse ID	NA	
Turbidity <u>301</u> N.T.U.	Grain Size			Trip Blank ID	TRIP BLANK NA	

Sample Description

Not clear, No odor, No sheen,
Medium to high Tur

Split Sample

Split Sample ID: NTAMW-114-GW
Name: JANET (CERCLER-ED)
Agency/Company: USACE-LOUISVILLE
Address: 600 AL MARTIN WATER KING JR. PLAZA
LOUISVILLE, KY 40202

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

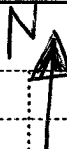
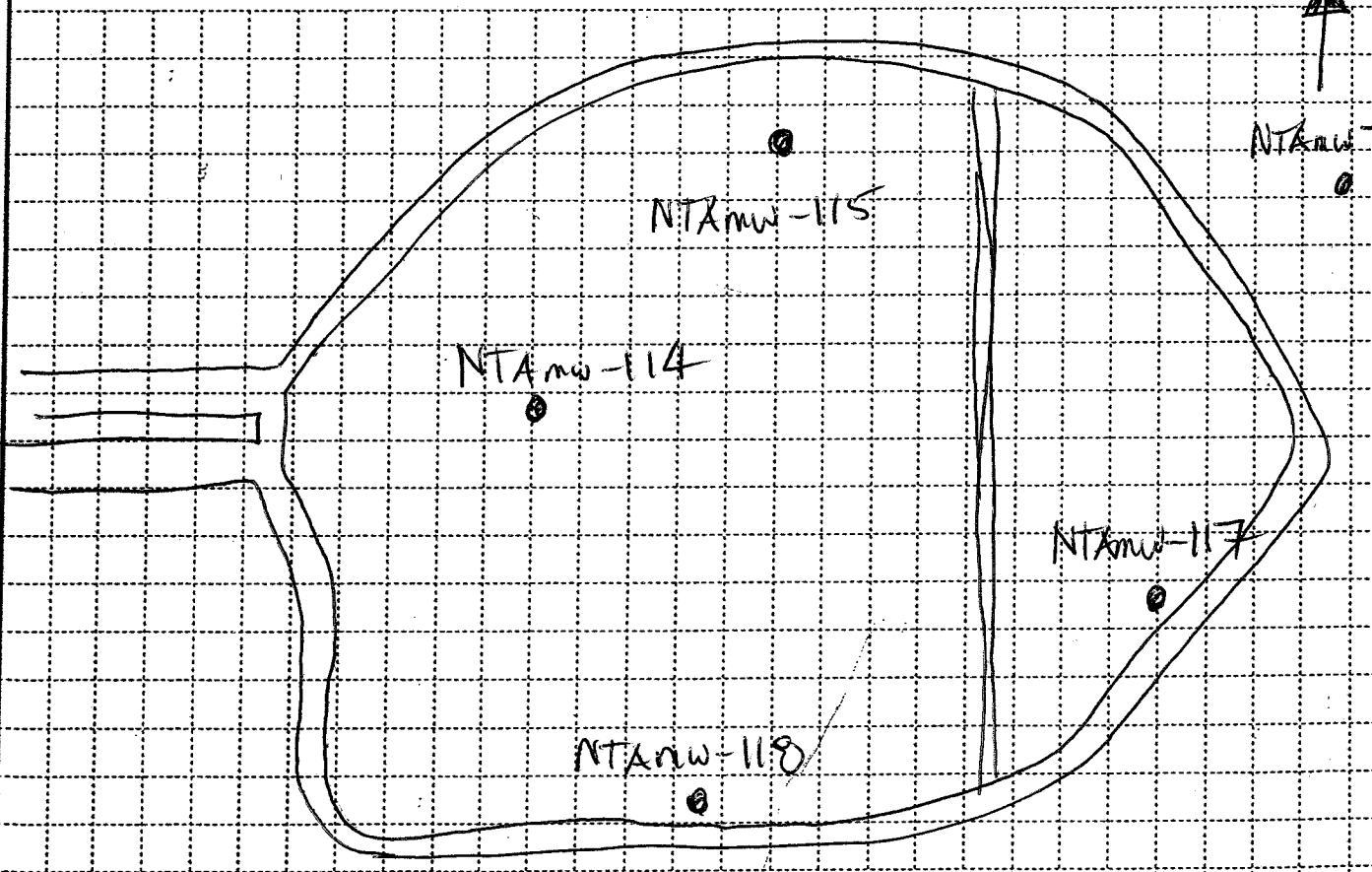
Color Odor Sheen Turbidity

Logged By: Vijay Alluri (Please Print)

Reviewed by: ERIC BUS (Please Print)

Signature: Vijay

Signature: SPSH Date: 2/1/05

HTRW DRILLING LOG			DISTRICT <i>Louisville</i>			HOLE NUMBER <i>NTAmw-115</i>		
1. COMPANY NAME <i>MTM Engineers Inc</i>			2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractors</i>			SHEET <i>1</i> OF <i>3</i>		
3. PROJECT <i>RVAAP RZ 14</i>			4. LOCATION <i>NACA Test Area</i>					
5. NAME OF DRILLER <i>Sara Holder</i>			6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME LC-60</i>					
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <i>8.25 HSA OD</i> <i>2" Splitspoons</i>			8. HOLE LOCATION <i>ON NORTH CIRCLE AT EAST END</i>					
			9. SURFACE ELEVATION <i>1086.91 ASL</i>					
			10. DATE STARTED <i>18 Nov 04</i>			11. DATE COMPLETED <i>18 Nov 04</i>		
12. OVERBURDEN THICKNESS <i>24"</i>			15. DEPTH GROUNDWATER ENCOUNTERED <i>12.5 19</i>					
13. DEPTH DRILLED INTO ROCK <i>0</i>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>14.0 @ 1125 11/22/04</i>					
14. TOTAL DEPTH OF HOLE <i>24"</i>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)					
18. GEOTECHNICAL SAMPLES <i>NONE</i>		DISTURBED		UNDISTURBED		19. TOTAL NUMBER OF CORE BOXES		
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC		METALS		OTHER (SPECIFY)		21. TOTAL CORE RECOVERY
								%
22. DISPOSITION OF HOLE		BACKFILLED		MONITORING WELL		OTHER (SPECIFY)		23. SIGNATURE OF INSPECTOR
				<i>X</i>				<i>[Signature]</i>
LOCATION SKETCH/COMMENTS SCALE:  <i>NTAmw-116</i> 								

HTRW DRILLING LOG				(CONTINUATION SHEET)		HOLE NUMBER NTAMW-115	
PROJECT RVAAP R2 14			INSPECTOR Mark Dunlavy			SHEET 2 OF 3	
ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEO TECH SAMPLE OR CORE BOX NO. RECOVERED (e)	ANALYTICAL SAMPLE NO. USICS (f)	BLOW COUNT (g)	REMARKS (h)
12.10		4" Topsoil				1-3	
		Br./Reddish Br. SILT 70% w/ Sand Damp No Odor No Plasticity	1.6	1.7	ML	4-4	7.5yr 5/6
	2	Br. SILT 60% w/ Sand Damp No Odor No Staining	2.4	1.6	ML	4-4	7.5yr 4/4
		Br. SILT 75% w/ Clay Dry Still				6-6	7.5yr 5/4
		Br. SAND Damp w/ Silt.					
	4	Gray Br. SILT 70% w/ Sand Dry					
		Br. SAND 75% w/ Silt Wet No Odor No Staining No Plasticity	2.4	1.7	SM	6-6	Same As Above
		Br. SILT 20% w/ Sand Damp.				6-7	
	6	No Odor No Staining No Plasticity					
		Changes to Dry	0.0	2.0	ML	4-7	SAA
		Br. SILT 80% w/ Clay Dry No Odor No Staining No Plasticity				10-10	
	8						
		Br. SILT 70% w/ Sand Dry No Odor No Staining	0.0	2.0	ML	2-3	SAA
		Gray Mottles Begin				5-6	
	10						
		Br. SILT 80% w/ Clay Dry No Odor No Staining No Plasticity	0.0	2.0	ML	2-4	SAA
		Changes to Gray, Wet/Saturated				7-7	10yr 5/1
	12	Same As Above	0.0	2.0	ML	1-2	SAA
						3-4	
	14	Same As Above	0.0	2.0	ML	1-1	SAA
						3-2	
	16	Same As Above	0.0	1.6	ML	1-5	SAA
						5-8	
	18	Gray/Br. SILT 65% w/ Sand Wet No Odor No Staining No Plasticity					7.5yr 5/1
		Br. Gray Layers SILT 80% w/ clay wet/Saturated	0.0	2.0	ML	1-2	
						2-4	
	20						

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
NTA MW-115

PROJECT
RVAAP RI 14

INSPECTOR
Mark Dunlavy

SHEET 3 OF SHEETS

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 (e)	REMARKS (f)
	22	Samples Above ↓ Grey/Bc. SILT Gt w/ sand wet		1.8	ML	1-2 2-3	7.5 y/s/1
	24	BoH 24'		1.6	ML	1-2 2-4	7.5 y/s/1
	26						BoH 24 Sand to 22.5 Screen from 22.5 to 12.5 Sand up to 9.5 Bentonite to 6.5 Grout to surface Backed hole off to 23 ft. Split spooned to 24 5 gallons of water for hydration
	28						

PROJECT
RVAAP RI 14

HOLE NO.
NTA MW-115

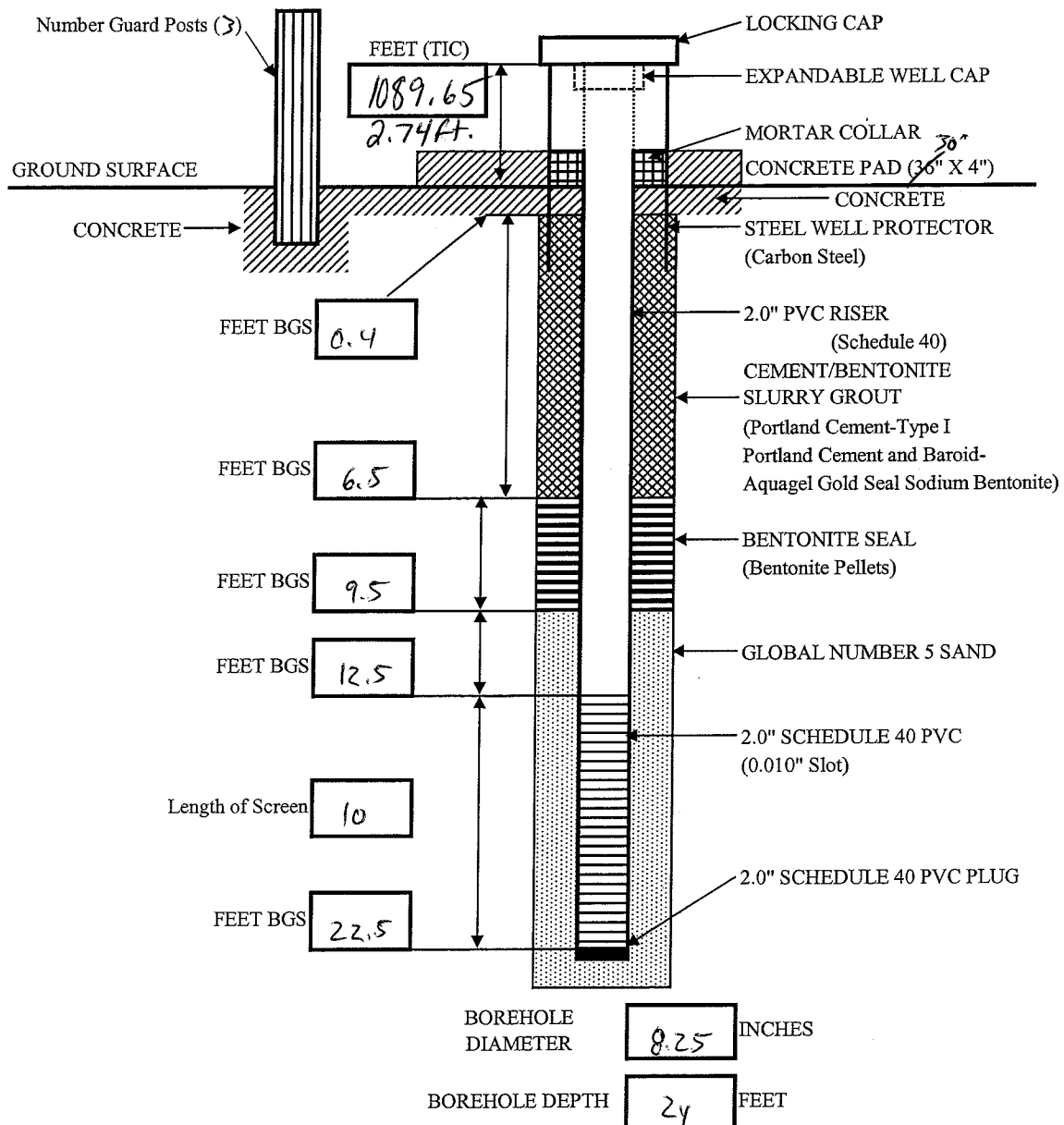


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP R214*

Well Number: <i>NTA mw - 115</i>	Begin: <i>18 Nov 04</i>	End: <i>18 Nov 04</i>
Coordinates: N: <i>551791.78</i> E: <i>2347581.16</i>	Elevation: <i>1086.91</i>	Reference Point:
Logged By: <i>Mark Dunlavy</i>		



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.

Well Development Record

Well ID: NTAMW-115-GW
Date: 11/22/04Ravenna Army Ammunition Plant-
RVAAP 14 AOC CharacterizationProject: NAA RVAAPDevelopment Method: WHALE PUMPDevelopment Company: MKM

Comments: _____

Well TD: 25.25 FT TIC Depth to Water: 14 FT
Water Column Height: 11.25 FT One Well Volume: 6.64 Gals
Well Volume (gallons/foot) 2-inch = 0.16 6-inch = 1.47
4-inch = 0.65 8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	TEMP		
1125	DFM	14	-	-	7.41	0.59	9.9	10.42	1000	
1127	DSB	14	-	-	-	-	-	-		
1135	DSE	14.02	-	-	-	-	-	-		
1142	DPB		-	-	-	-	-	-		
1148	DPE	DRY	-	4.0	-	-	-	-		
1311	DPB	19.5	-	-	-	-	-	-		
1318	DFM	23.6	-	-	7.43	-	-	-		1 well vol (6.64 gal)
1320	DPE	DRY	-	1.0	-	-	-	-		7.74 (dry)
1455	DPB	17.32	-	-	-	-	-	-		
1501	DPE	DRY	-	4.0	-	-	-	-		11.74 (dry)
1517	DPB	22.85	-	-	-	-	-	-		
1518	DFM		-	-	7.45	0.589	9.4	11.79	1000	2 nd well vol (13 gal)
Nov 22 0956	DSB	13.55	-	-	-	-	-	-		
1001	DSE		-	-	-	-	-	-		
1004	DPB		-	-	7.62	0.58	10.52	11.60	1000	
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPUR (Please Print)Reviewed By: [Signature]Signature: [Signature]Date: 02/22/05

Well Development Record														
Well ID: <u>NTA m4-115 GW</u>		Ravenna Army Ammunition Plant- RVAAP 14 AOC Characterization												
Date: <u>11/23/05</u>														
Project: <u>RVAAP</u>					Development Method: <u>WHALE PUMP</u>									
Development Company: <u>M/K/M</u>					Comments: _____									
Well TD: <u>25.25</u> FT TIC		Depth to Water: <u>14</u> FT		Well Volume (gallons/foot)		2-inch = 0.16 6-inch = 1.47 4-inch = 0.65 8-inch = 2.61								
Water Column Height: <u>11.25</u> FT		One Well Volume: <u>6.64</u> Gals												
Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments				
					pH	CON	DO	TEMP						
1007	DPE	DRY	-	5.5	-	-	-	-		18.5 gal (dry)				
1512	DPB	13.65	-	-	-	-	-	-						
1514	DFM	17.85	-	-	7.25	0.524	10.84	12.60	784	3 rd volume @ (19.5 gal)				
1515	DPE	DRY	-	2.5	-	-	-	-		22 gal (DRY)				
1549	DPB	13.68	-	-	-	-	-	-						
1550	DPE	DRY	-	2.5	-	-	-	-		24.5 gal (DRY)				
	DSB	13.4	-	-	-	-	-	-						
	DPB/DSE	13.7	-	-	6.75	0.64	9.95	12.74	1000					
	DFM	15.25	-	-	6.5	0.65	10.51	12.2	1000	4 th well vol.				
	DPE	DRY	-	2.5	-	-	-	-		28.5 gal (dry)				
11/29/05 1319	DPB	13.3	-	-	-	-	-	-						
1325	DSE	13.4	-	-	-	-	-	-						
1326	DPB	13.4	-	-	-	-	-	-						
1328	DFM		-	4.0	7.49	0.59	4.06	10.6	1000	32.5 (5 th well vol)				
1330	DPE	DRY	-	1	-	-	-	-		33.5				
	FINAL													
WELL DEVELOPMENT CODES DPB - Begin Pumping DPE - End Pumping DSB - Begin Surge Blocking DSE - End Surge Blocking DFM - Field Measurements DBB - Begin Bailing DBE - End Bailing DXB - Begin Other DXE - End Other Other: _____					FIELD MEASUREMENT CODES MTP - Temperature MSC - Specific Conductance MPD - Photoionizer (eg. HNu) MFD - Flame Ionizer (eg. OVA) MDO - Dissolved Oxygen MPH - pH MEH - eH MOT - Other _____					TURBIDITY Enter Turbidity Meter Reading (Final should be < 5 NTU) OR Enter Qualitative Observations H - High: Muddy/Silty M - Medium: Cloudy/Translucent L - Low: Transparent N - None: Clear/No Sediment				
Logged By: <u>NILESH SHRINGAPURE</u> (Please Print)					Reviewed By: <u>Subales</u>									
Signature: <u>N. Shringarpure</u>					Date: <u>02/22/05</u>									

Well Development Record

Well ID: NTA MW - 115 - GW
Date: 11/29/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP

Development Method: WHALE PUMP

Development Company: M/KM

Comments: _____

Well TD: 25.25 FT TIC Depth to Water: 14 FT
Water Column Height: 11.25 FT One Well Volume: 664 Gals

Well Volume
(gallons/foot)

2-inch = 0.16
4-inch = 0.65

6-inch = 1.47
8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	TEMP		
1540	DPB	14.8	-	-	-	-	-	-		
1548	DPE	DRY	-	35	-	-	-	-		3 gal (dry)
0932	DSB	13.35	-	-	-	-	-	-		
0937	DSB	13.8	-	-	-	-	-	-		6th well vol (390)
0938	DPB	13.95	-	-	-	-	-	-		
0940	DFM	14.5	-	2 gal	7.45	0.4	7.24	11.4	580	6th well vol (390)
0942	DPE	DRY	-	40	-	-	-	-		43 gal (dry)
1255	DPB	11.0	-	-	-	-	-	-		
1258	DPE	DRY	-	40	-	-	-	-		47 gal (dry)
1511	DPB	13.45	-	-	-	-	-	-		
1512	DFM		-	25	7.53	0.315	7.48	11.1	142	45.5 gal 7th well vol.
1515	DPE	DRY	-	1.5	-	-	-	-		47 gal dry
										Development complete
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)

OR
Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPURE (Please Print)

Reviewed By: Sue Bolos

Signature: N. Shringarpure

Date: 02/22/05

Monitoring Well Purging Form

Well ID: NTAMW-115GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/02/04

WELL OBSERVATIONS

Protective Casing: Intact Damaged Locked: Yes No

Key No: 6000

Concrete Base: Intact Damaged Inner Casing: 2" 4" 6" 8" Other:

Stickup Height: 2.4 (ft) TIC TOC Difference: 0.2 (ft)

Vapor Readings: HNu OVA Background: Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes No Yes No
DNAPL Yes No Yes No

NTAMW-115GW

CALCULATIONS

(A) Depth to Well Bottom 22.5 (ft) TOC TIC BGS Measured Previously Measured (circle one)

(B) Depth to Water 12.8 (ft) FOC TIC BGS Time Measured: 1100

(C) Water Column Height (A-B) 9.7 (ft)

(D) Well Diameter Factor 0.16 (gal/ft) ($2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61$ GAL/FT)

(E) One Well Volume (C*D) 1.55 (gal)

(F) Volumes to be Evacuated 5

(G) TOTAL VOLUME TO BE EVACUATED (E * F) 7.76 (gal)

EVACUATION METHOD

Well Evacuation Method: Micro purging Bailer Submersible Pump Other: Device Number:

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored Disposed Onsite Offsite

Collected In: Tanks Drums No. of Containers:

Comments:

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1102	12.8			0.662	10.63	7.52	166	11.43	
1105	13.4			0.636	10.19	7.40	59	12.06	
1108	13.6			0.626	11.19	7.38	68	12.42	
1111	13.6			0.642	11.10	7.32	30	11.23	
1114	13.8			0.656	10.91	7.24	66	8.56	

Logged By: Vijay Almy (Please Print)

Reviewed By: [Signature]

Signature: Vijay

Date: 12/22/05

Location ID: NTA MW - 11SGW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 12/02/04

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Micro purge x		Push Probe
Type/Construction			
Miscellaneous	Well Purging Form Yes - No		

Sample Collection: 1120 hrsSample Type: Composite/(MI) - Grab
If MI, # of increments taken: NALocation: Plotted on Map - Staked in Field
Estimated - Measured - SurveyedSample Depth: 16 FT (below surface)Decon: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters	Other Parameters
PID / FID Readings: Background: <u>0.0</u> ppm	VOC <u>X</u>	Corrosivity
	SVOC <u>X</u>	Reactivity Sulfide/Cyanide
	Explosives <u>X</u>	Chromium +6
Sample: <u>0.0</u> ppm	Propellants <u>X</u>	Ignitability
Water Level <u>12.8</u> FT	TAL Metals <u>X</u>	
Temperature <u>10.91</u> °C	Pesticides/PCBs <u>X</u>	
Sp. Conductance: <u>0.656</u> uMHOs	Cyanides	
pH <u>7.24</u> units	TOC	
Turbidity <u>66</u> N.T.U.	Grain Size	
		QA Samples
		MS/MSD Yes / No NA
		Duplicate ID NA
		Equipment Rinse ID NA
		Tip Blank ID <u>Tip Blank</u> NA

Sample Description
No color, No odor, No sheen,
low turbidity

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Split Sample ID: _____

Name: _____

Agency/Company: _____

Address: _____

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks

Parameters: Same as Above - As Listed

Logged By: Vijay Alluri (Please Print)Reviewed by: ERIC FUS (Please Print)Signature: VijaySignature: Eric Date: 2/1/05

HTRW DRILLING LOG				DISTRICT <i>Covington</i>		HOLE NUMBER <i>NTAmw-116</i>	
1. COMPANY NAME <i>MKM Engineers Inc</i>				2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractors</i>		SHEET <i>1</i> OF <i>3</i>	
3. PROJECT <i>RVAAP R214</i>				4. LOCATION <i>NACA Test Area</i>			
5. NAME OF DRILLER <i>Sam Harker</i>				6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME-LC60</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		<i>8.25 OD HSA</i>		8. HOLE LOCATION <i>East end of Runway</i>		9. SURFACE ELEVATION <i>1091.68 ASL</i>	
<i>2" Split spoons</i>				10. DATE STARTED <i>19 Nov 04</i>		11. DATE COMPLETED <i>19 Nov 04</i>	
12. OVERBURDEN THICKNESS <i>22 LF</i>				15. DEPTH GROUNDWATER ENCOUNTERED <i>5.5, 8.5</i>			
13. DEPTH DRILLED INTO ROCK <i>0 LF</i>				16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>5.05 @ 1332 11/22/04</i>			
14. TOTAL DEPTH OF HOLE <i>22 LF</i>				17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES		DISTURBED ☐		UNDISTURBED ☐		19. TOTAL NUMBER OF CORE BOXES <i>0</i>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC ☐		METALS ☐		OTHER (SPECIFY) ☐	
						21. TOTAL CORE RECOVERY % <i>—</i>	
22. DISPOSITION OF HOLE		BACKFILLED ☐		MONITORING WELL ☒		23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	
LOCATION SKETCH/COMMENTS						SCALE:	
The sketch shows a large irregular boundary enclosing several points. The points are labeled as follows: NTAmw-114: Located in the upper left quadrant of the boundary. NTAmw-115: Located near the top center of the boundary. NTAmw-116: Located on the right side of the boundary. NTAmw-117: Located in the lower right quadrant of the boundary. NTAmw-118: Located near the bottom center of the boundary. A north arrow is drawn in the top right corner, pointing upwards.							
PROJECT <i>RVAAP R214</i>						HOLE NO. <i>NTAmw-116</i>	

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
NTAmw-116

PROJECT

RVAAP R# 14

INSPECTOR

Mort Dunlap

SHEET 2 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECHNICAL OR CORE LOGGING RECOVERY (e)	ANALYTICAL SAMPLING USGS (f)	BLOW COUNT (g)	REMARKS (h)
	0	4" Topsoil				1-2	
	1	Dr Br. SILT 60% w/ Sand Damp No Odor No Staining No Plasticity	0.0	2.0	ML	2-3	7.5 yr 4/2
	2	LT. Br. SILT w/ Sand Damp					7.5 yr 5/6
	3				ML	1-4	
	4	Br. SAND 75% Fine to medium Grained Wet	0.0	1.7	SM	4-4	7.5 yr 4/4
	5					1-2	
	6	Saturated Layer @ 5.0 Changes to damp @ 5.5	0.0	1.4	SM	3-3	
	7		0.0	2.0	SM	1-1 1-2	
	8	Another Saturated Layer @ 8.5	0.0	1.3	SM	1-2 3-3	
	9				SM	2-2	
	10		0.0	1.8		3-4	7.5 yr 5/1
	11	Gray SILT 80% w/ Clay Wet No Odor No Staining Low-Med. Plasticity	0.0	0.8	ML CL	1-3 3-4	
	12					2-2	
	13		0.0	0.7		4-2	
	14					2-3	
	15		0.0	1.1		4-2	
	16					2-2	
	17		0.0	1.3		3	

PROJECT

RVAAP R# 14

HOLE NO.

NTAmw-116

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTA mv-116

PROJECT

RVAAP RE 14

INSPECTOR

Mark Dunham

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 (e)	REMARKS (f)
	20	Same As Above	0.0	1.4		2-2 3-1	Same As Above
	22	BOH 22 ft.					and up to 20 Screen from 20 to 10 Sand up to 7.5 Bentonite to 4 Due to mis- calculation GROUT to Surface Stick-up was cut short to 3 ft out and 4 ft in ground No Hydration water used
	24						
	26						

PROJECT

RVAAP RE 14

HOLE NO.

NTA mv-116

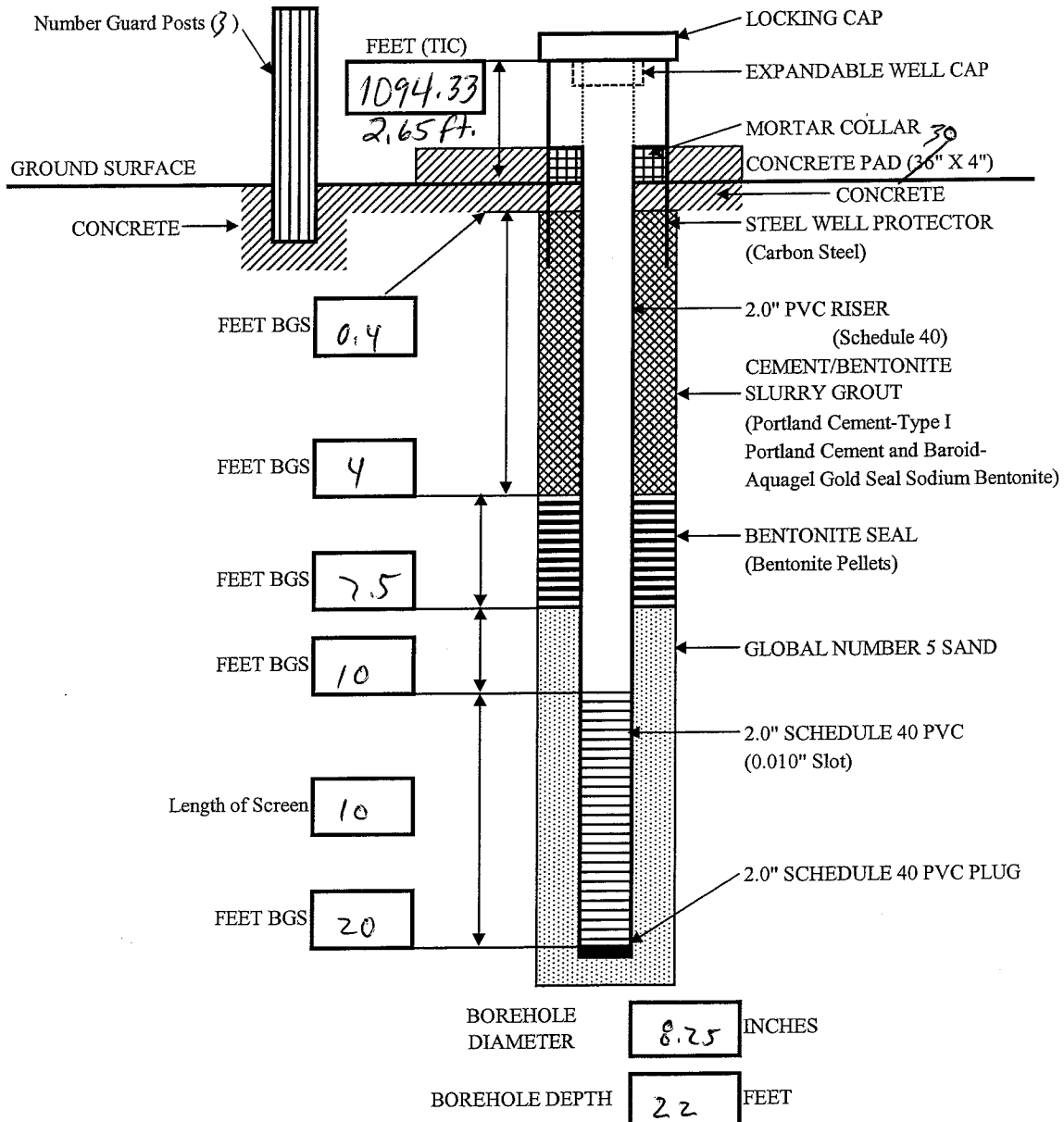


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RUAAP RE 14

Well Number: NTA mw-116	Begin: 19 Nov 04	End: 19 Nov 04
Coordinates: N: 551748.00 E: 2348196.39	Elevation: 1091.68	Reference Point:
Logged By: Mark Dunlap		



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.

Well Development Record

Well ID: NTA mw-116 -GW
Date: 11/22/05

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: AVAA S

Development Method: WHALE PUMP

Development Company: MKM

Comments: _____

Well TD: 22.5 FT TIC Depth to Water: 5.05 FT
Water Column Height: 17.45 FT One Well Volume: 10.5 Gals

Well Volume
(gallons/foot)

2-inch = 0.16 6-inch = 1.47
4-inch = 0.65 8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	TEMP		
1332	DBB	5.05	-	-	-	-	-	-		
1338	DSE	4.95	-	-	-	-	-	-		
1342	DPB	-	-	-	7.33	0.569	9.51	12.48	1000	
1350	DFM	13.95	-	10.5	7.72	0.289	9.48	12.57	1000	1 well vol reached (10.5 gal)
1357	DFM	14.35	-	10.5	7.26	0.195	8.01	13.42	778	2 nd well vol (21 gal)
1405	DFM	15.8	-	10.5	6.33	0.188	9.73	13.43	1000	3 rd well vol (31.5 gal)
1413	DFM	16.45	-	10.5	7.45	0.215	9.55	13.23	1000	4 th well vol (42 gal)
1420	DFM	17.15	-	10.5	7.23	0.122	9.21	13.23	1000	5 th well vol (52.5 gal)
1427	DFM	18.2	-	10.5	7.20	0.187	9.78	13.13	1000	6 th well vol (63 gal)
1435	DFM	18.85	-	10.5	7.10	0.192	9.48	13.53	1000	7 th well vol (73.5 gal)
1442	DFM	19.25	-	10.5	7.10	0.177	9.51	13.21	1000	8 th well vol (84 gal)
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photolionizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPURE (Please Print)

Reviewed By: S. Boles

Signature: N. Shringarpure

Date: 02/22/05

Monitoring Well Purging Form

Well ID: NTAMW-116-GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/1/09

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.65 (ft) TIC · TOC Difference: , 27 (ft)
Vapor Readings: HNu · OVA Background: Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No Yes · No
DNAPL Yes · No Yes · No

NTAMW-116-GW

CALCULATIONS

- (A) Depth to Well Bottom 23.45 (ft) TOC TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 3.65 (ft) TOC TIC · BGS Time Measured: 0900
(C) Water Column Height (A-B) 20.80 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 3.20 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 16.0 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other Micro Purge Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite

Collected In: Tanks · Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
0915	3.65		0.0	0.523	11.22	6.25	128	5.07	Initial
0918	3.96		0.0	0.653	11.71	6.65	412	5.01	
0921	3.80		0.0	0.492	11.77	6.30	411	6.12	
0924	3.79		0.0	0.423	12.05	6.83	416	6.28	End

Logged By: Sudheer Gubbis (Please Print)

Reviewed By: Sudheer Gubbis

Signature: S. Gubbis

Date: 02/22/05

Field Sampling Report

Location ID: NTAMN-116-GW

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 12/1/04

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Micro purge / X		Push Probe
Type/Construction	Stainless steel		Mattocks
Miscellaneous	Well Purging Form Yes No		

Sample Collection: 930 hrs

Sample Type: Composite - MI - Grab

Location: Plotted on Map - Staked in Field

Sample Depth: 3-79 FT (below surface)

Decon: Dedicated - Each Day Each Location

Estimated - Measured - Surveyed

Field Parameters (at time of sample)	Analytical Parameters				Other Parameters			
PID / FID Readings:	VOC	X	TPH GRO		Corrosivity			
Background: ppm	SVOC	X	TPH DRO		Reactivity Sulfide/Cyanide			
Sample: NT ppm	Explosives	X	Chromium +6		Ignitability			
	Propellants	X	Nitrate					
Water Level <u>3-39</u> FT	TAL Metals	X			QA Samples			
Temperature <u>12.05</u> °C	Pesticides/PCBs	X			MS/MSD	Yes / No	NA	
Sp. Conductance: <u>0.423</u> uMHOs	Cyanides				Duplicate ID	✓ NTAMN-116-DP	NA	
pH <u>6.28</u> units	TOC				Equipment Rinse ID		NA	
Turbidity <u>416</u> N.T.U.	Grain Size				Trip Blank ID	TRIP BLANK	NA	

Sample Description

Not clear, No odor, No sheen
Moderate turbid

Split Sample

Split Sample ID: NTAMN-116-GW

Name: JANET (CERCLER-50)

Agency/Company: USACE LOUISVILLE

Address: 600 DR MARTIN LUTHER KING JR. BLVD
LOUISVILLE, KY 40202

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks

Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Sudheer Gulka (Please Print)

Reviewed by: ERL EWS (Please Print)

Signature: [Signature]

Signature: [Signature] Date: 4/29/05

HTRW DRILLING LOG				DISTRICT <i>Louisville</i>		HOLE NUMBER <i>NTAmw-117</i>	
1. COMPANY NAME <i>M&M Engineers Inc</i>				2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractors</i>		SHEET SHEETS <i>1 OF 3</i>	
3. PROJECT <i>RVAAP RZ 14</i>				4. LOCATION <i>NACA Test Area</i>			
5. NAME OF DRILLER <i>Sam Hoffer</i>				6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME- LCGC</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		<i>8.25 OD HSA</i>		8. HOLE LOCATION <i>East End, Interior Road Circle</i>			
		<i>2" Split Spoons</i>		9. SURFACE ELEVATION <i>1091.67 ASL</i>			
				10. DATE STARTED <i>01 Dec 04</i>		11. DATE COMPLETED <i>01 Dec 04</i>	
12. OVERBURDEN THICKNESS <i>25 ft</i>				15. DEPTH GROUNDWATER ENCOUNTERED <i>4.8, 9.2, 17.8</i>			
13. DEPTH DRILLED INTO ROCK <i>0 ft</i>				16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>12.5 @ 1410 12/06/04</i>			
14. TOTAL DEPTH OF HOLE <i>25 ft</i>				17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES <i>NONE</i>		DISTURBED <i>—</i>		UNDISTURBED <i>—</i>		19. TOTAL NUMBER OF CORE BOXES <i>NA</i>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>—</i>		METALS <i>—</i>		OTHER (SPECIFY) <i>—</i>	
						21. TOTAL CORE RECOVERY <i>—</i> %	
22. DISPOSITION OF HOLE		BACKFILLED <i>—</i>		MONITORING WELL <i>X</i>		23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	
LOCATION SKETCH/COMMENTS				SCALE:			
PROJECT <i>RVAAP RZ 14</i>				HOLE NO. <i>NTAmw-117</i>			

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NAAMW-117

PROJECT

RVAAP RE 14

INSPECTOR

Mark D. Maly

SHEET

SHEETS

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)
		5" Topsoil					
		Reddish Br. SILT 65% w/ sand wet No Odor No Staining No Plasticity	0.0	1.5	ML	1-2 1	7.5yr 5/8
	2	Br. SILT 75% w/ Sand Damp No Odor No Plasticity Grey Mottles Pres.	0.0	1.7	ML	1-4 4-5	7.5yr 4/4
	4	Br. SILT 85% w/ Clay Saturated No Odor No Staining No Plasticity	0.0	1.8	ML	3-5 5-6	SAA
	6	Br. SILT 70% w/ Sand Shift No Odor No Plasticity No Staining Dry					
		Br. SILT 85% w/ Clay Dry No Odor No Staining No Plasticity	0.0	1.2	ML	1-3 5-8	SAA
	8	Changes to wet / Low Plasticity @ 8.4					
		Saturated @ 9.2	0.0	1.6	ML	1-2 5-6	SAA
	10	Damp @ 9.8 Changes to dry @ 10.1					
			0.0	1.4	ML	1-2 5-5	7.5yr 5/1
	12						
		SAA	0.0	1.5	ML	1-1 2-2	SAA
	14						
		SAA	0.0	1.3	ML	1-3 3-3	SAA 7.5yr 5/2
	16	Grey Br. SAND 65% w/ Silt wet No odor No Staining No Plasticity					
		Grey SILT 70% w/ sand Dry No odor No Staining No Plasticity	0.0	1.4	ML	1-3 5-11	7.5yr 5/1
		Fine Gravel Present Becomes wet @ 16.4 Dry @ 17.2					
	18	Fine Grained SAND 85% w/ SILT Saturated No odor No Staining No Plasticity			SM	4-6	
		Br. Grey SILT 65% w/ sand No odor No Staining No Plasticity	0.0	1.4	ML	8-11	7.5yr 5/2

PROJECT

RVAAP RE 14

HOLE NO.

NAAMW-117

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTAmw-117

PROJECT

RWAAP R2 14

INSPECTOR

Mark D. Riley

SHEET

SHEETS

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)
	22	SAA	0.0	1.4	ML	2-3 8-8	7.5 yr 5/2
	24	Same As Above		1.5	ML	1-3 7-9	7.5 yr 5/2
					ML		
		Bot 25					Bot 25 Sand to 24.5 Screen from 24.5 to 14.5 Sand up to 11 Bentonite to 8 Grout to Surface Stick-up completion 5 gallons of hydration water used

PROJECT

RWAAP R2 14

HOLE NO.

NTAmw-117

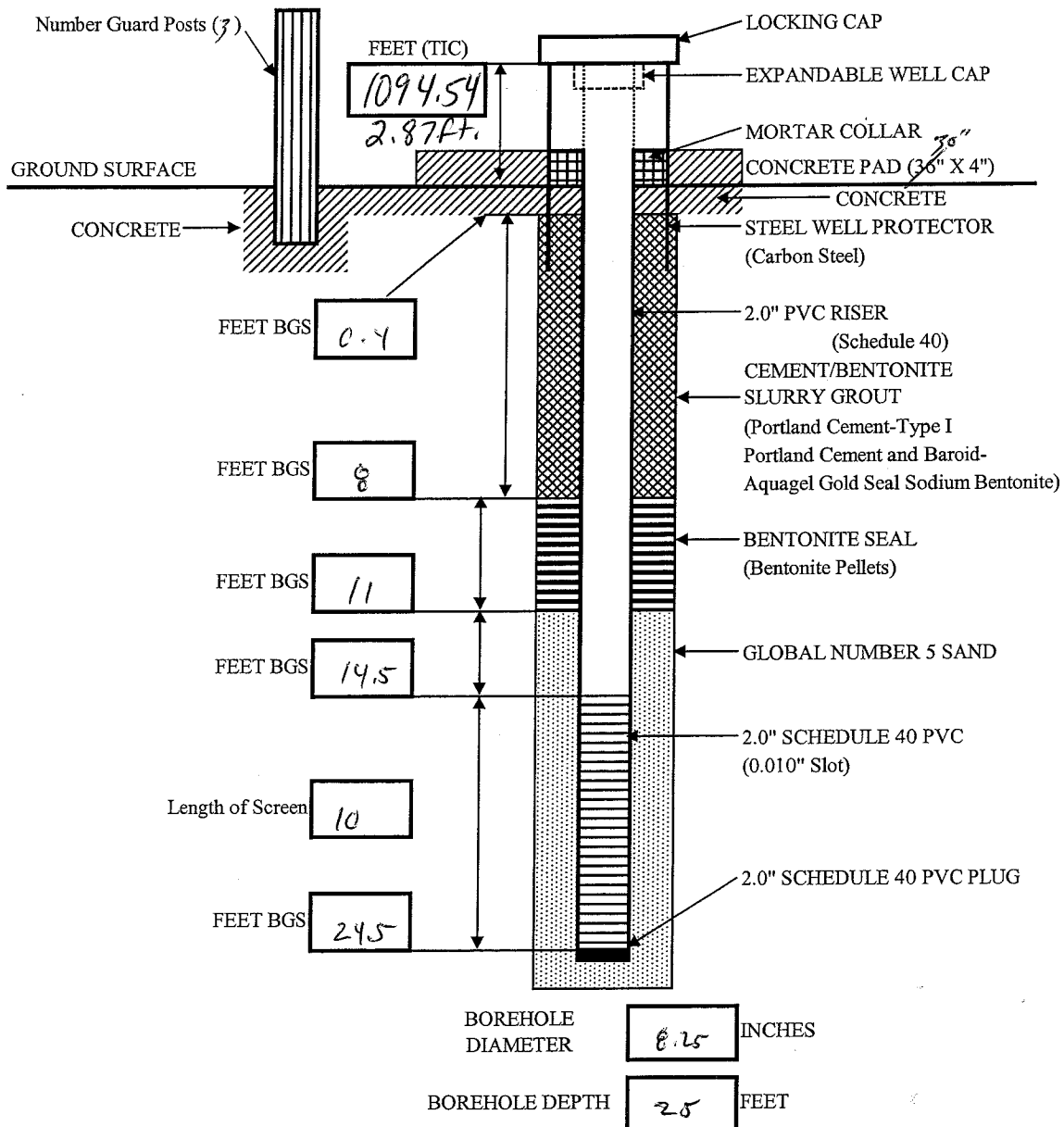


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP RZ14*

Well Number: <i>NTA mw-117</i>	Begin: <i>01 Dec 04</i>	End: <i>01 Dec 04</i>
Coordinates: N: <i>551584.57</i> E: <i>2347994.83</i>	Elevation: <i>1091.67</i>	Reference Point:
Logged By: <i>[Signature]</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: NTAMW-117GW
Date: 12/06/04Ravenna Army Ammunition Plant-
RVAAP 14 AOC CharacterizationProject: RVAAP-14Development Method: Whale PumpDevelopment Company: MKM

Comments: _____

Well TD: 27.42 FT TIC Depth to Water: 12.5 FT
Water Column Height: 14.92 FT One Well Volume: 8.8 Gals
Well Volume (gallons/foot) 2-Inch = 0.16 6-Inch = 1.47
4-Inch = 0.65 8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					PH	CON	DO	Temp		
1410	DSB	12.5	-	-	-	-	-	-	-	-
1415	DSE	13.0	-	-	-	-	-	-	-	-
1416	DPB	13.0	-	-	-	-	-	-	-	-
1430	DFM	-	-	9 gal	8.3	0.48	4.0	12.0	>1000	9 gal 1 st volume
1432	DPE	DRY	-	3 gal	-	-	-	-	-	12 gal
1445	DPB	16.0	-	-	-	-	-	-	-	-
1450	DPE	DRY	-	5.5	-	-	-	-	-	17.5 gal
1505	DPB	16.9	-	0.0	-	-	-	-	-	-
1508	DFM	-	-	0.5	7.7	0.42	5.3	12.0	>1000	18 gal 2 nd volume
1510	DPE DRY	17.1 17.1	-	4.5	-	-	-	-	-	22.5 gal
1525	DPB	17.1	-	-	-	-	-	-	-	-
1530	DFM	-	-	4.5	7.4	0.36	3.9	12.2	>1000	27 gal (3 rd vol)
1534	DPB	DRY	-	4.5	-	-	-	-	-	31.5 gal 27.0
1547	DPB	18.2	-	4.5	-	-	-	-	-	-
1552	DPE	DRY	-	4.0	-	-	-	-	-	31 gal
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: vijay Alluri (Please Print)Reviewed By: Sue BakerSignature: vijayDate: 02/22/05

Well Development Record

Well ID: NTAMN-117-GWDate: 12/06/04Ravenna Army Ammunition Plant-
RVAAP 14 AOC CharacterizationProject: RVAAP 14Development Method: Whale pumpDevelopment Company: MKM

Comments: _____

Well TD: 2742 FT TICDepth to Water: 12.5 FTWater Column Height: 14.92 FTOne Well Volume: 8.8 GalsWell Volume
(gallons/foot)

2-Inch = 0.16

6-Inch = 1.47

4-Inch = 0.65

8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	Temp		
0903	DSB	12.35	—	—	—	—	—	—	—	—
0907	DSE	12.55	—	—	—	—	—	—	—	—
0910	DPB	13.55	—	5.5	7.32	1.02	6.2	11.9	>1000	36 (4 th well vol)
0913	DPE	Dry	—	0.5	—	—	—	—	—	36.5 gal.
1114	DPB	12.9	—	—	—	—	—	—	—	—
1120	DPE	Dry	—	5.0	—	—	—	—	—	—
1317	DPB	13.3	—	—	—	—	—	—	—	—
1319	DFM	—	—	3.5	7.7	0.34	5.8	13	>1000	45 (5 th well vol)
1321	DPE	Dry	—	2.5	—	—	—	—	—	47.5 gal.
1440	DPB	13.5	—	—	—	—	—	—	—	—
1445	DPE	Dry	—	5.5	—	—	—	—	—	53 gal.)
1523	DPE	15.1	—	—	—	—	—	—	—	—
1525	DFM	—	—	1	7	0.40	5.8	12.0	>1000	54 gal (6 th well)
1530	DPE	Dry	—	4	—	—	—	—	—	58 gal.
0936	DPB	13.8	—	—	—	—	—	—	—	—
0942	FINAL	25.20	—	6.5	6.63	0.307	4.44	15	>1000	End Pump

WELL DEVELOPMENT CODES

DPB - Begin Pumping
 DPE - End Pumping
 DSB - Begin Surge Blocking
 DSE - End Surge Blocking
 DFM - Field Measurements
 DBB - Begin Bailing
 DBE - End Bailing
 DXB - Begin Other
 DXE - End Other
 Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
 MSC - Specific Conductance
 MPD - Photolionizer (eg. HNU)
 MFD - Flame Ionizer (eg. OVA)
 MDO - Dissolved Oxygen
 MPH - pH
 MEH - eH
 MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
 (Final should be < 5 NTU)
 OR
 Enter Qualitative Observations

 H - High: Muddy/Silty
 M - Medium: Cloudy/Translucent
 L - Low: Transparent
 N - None: Clear/No Sediment

Logged By: Sudheer Gubba (Please Print)Reviewed By: Sue BalesSignature: Sudheer GubbaDate: 02/22/05

Monitoring Well Purging Form

Well ID: NTAMW-117-GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 12/16/04

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.4 (ft) TIC · TOC Difference: 6.3 (ft)
Vapor Readings: HNu · OVA Background: _____ Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No _____ Yes · No NTAMW-117-GW
DNAPL Yes · No _____ Yes · No

CALCULATIONS

- (A) Depth to Well Bottom 27.28 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 12.48 (ft) TOC · TIC · BGS Time Measured: 1320
(C) Water Column Height (A-B) 14.8 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 2.31 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 11.84 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: Micro purge Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite

Collected In: Tanks · Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1320	12.48			0.475	9.7	8.48	0	10.21	Initial reading (purging)
1323	12.90			0.479	9.7	7.90	0	10.00	
1326	13.21			0.477	9.7	7.77	0	9.70	
1329	13.45			0.472	9.8	7.71	0	9.49	

Logged By: Sudheer Gubbba (Please Print)

Reviewed By: Jim Boles

Signature: S. Gubbba

Date: 02/22/05

Field Sampling Report

Location ID: NTAMW-117-GW

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 12/16/04

Sampling Information

Source	Groundwater / Product		Surface Water		Soils / Sediments / Sludge	
Method	Bailer		Sample Bottle		Scoop	Trowel
	Pump		Bacon Bomb		Bowl	Hand Auger
	Micro Purge	X			Push Probe	Plastic Liner
Type/Construction					Mattocks	
Miscellaneous	Well Purging Form Yes - No					

Sample Collection: 1335 hrs Sample Type: Composite - MI - Grab Location: Plotted on Map Staked in Field
 Sample Depth: 13.45 FT (below surface) IFMI # of increments taken: NA Estimated - Measured - Surveyed
 Decon: Dedicated Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters				Other Parameters			
PID / FID Readings:	VOC	X	TPH GRO		Corrosivity			
Background: ppm	SVOC	X	TPH DRO		Reactivity Sulfide/Cyanide			
Sample: <u>NT</u> ppm	Explosives	X	Chromium +6		Ignitability			
	Propellants	X	Nitrate					
Water Level <u>13.45</u> FT	TAL Metals	X			QA Samples			
Temperature <u>9.8</u> °C	Pesticides/PCBs	X			MS/MSD	Yes / No	NA	
Sp. Conductance: <u>0.472</u> uMHOs	Cyanides				Duplicate ID		NA	
pH <u>7.71</u> units	TOC				Equipment Rinse ID		NA	
Turbidity <u>0.0</u> N.T.U.	Grain Size				Tap Blank ID	<u>Trip Blank</u>	NA	

Sample Description

Clear water, No odor, No sheen, No turbidity

Split Sample

Split Sample ID:

Name:

Agency/Company:

Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
 Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Sudheer Gubba (Please Print)

Reviewed by: ERIC EUS (Please Print)

Signature: G. Gubba

Signature: SESH Date: 2/1/05

HTRW DRILLING LOG				DISTRICT <i>Louisville</i>		HOLE NUMBER <i>NTAmw-118</i>	
1. COMPANY NAME <i>MEM Engineers Inc</i>				2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractors</i>		SHEET <i>1</i> OF <i>3</i>	
3. PROJECT <i>RVAAP RE 14</i>				4. LOCATION <i>NACA Test Area</i>			
5. NAME OF DRILLER <i>Andy Wolff</i>				6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME LC-60</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		<i>8.25 HSA</i>		8. HOLE LOCATION <i>South end of Circle Road</i>		9. SURFACE ELEVATION <i>1078.86 ASL</i>	
		<i>2" Split Spoons</i>		10. DATE STARTED <i>20 Nov 04</i>		11. DATE COMPLETED <i>20 Nov 04</i>	
12. OVERBURDEN THICKNESS <i>22.5</i>				15. DEPTH GROUNDWATER ENCOUNTERED <i>~ 11.5 18.5</i>			
13. DEPTH DRILLED INTO ROCK <i>0</i>				16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>7.45' @ 1045 2/02/04</i>			
14. TOTAL DEPTH OF HOLE <i>22.5</i>				17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES <i>NONE</i>		DISTURBED <i>—</i>		UNDISTURBED <i>—</i>		19. TOTAL NUMBER OF CORE BOXES <i>—</i>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>—</i>		METALS <i>—</i>		OTHER (SPECIFY) <i>—</i>	
						21. TOTAL CORE RECOVERY <i>—</i> %	
22. DISPOSITION OF HOLE		BACKFILLED <i>—</i>		MONITORING WELL <i>X</i>		23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	
LOCATION SKETCH/COMMENTS				SCALE:			
PROJECT <i>RVAAP RE 14</i>						HOLE NO. <i>NTAmw-118</i>	

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

ATAMW-118

PROJECT

RVAAP RE 14

INSPECTOR

Mark Dunaway

SHEET SHEETS

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. USCS	BLOW COUNT (g)	REMARKS (h)
	5"	Topsoil					
		Reddish SILT 60% w/ Sand Damp	0.0	1.7	ML	1-2	Sy 5/8
		No odor No Plasticity No Staining				2-2	
	2						
		Br. SILT 75% w/ Clay Still dry	0.0	1.5	ML	Push 2	2.5y 5/4
	4	No odor No Staining No Plasticity				4-7	
		Br. SILT 85% w/ Clay Wet No odor No Staining	0.0	2.0	ML	Push 6	7.5y 5/4
		No Plasticity				8-10	
	6	Br. SILT 70% w/ Clay Low Plasticity					
		No Staining					
		Br. SILT 70% w/ Sand Damp	0.0	2.0	ML	3-5	SAA
		No odor No Staining No Plasticity				6-7	
	8						
			0.0	2.0	ML	Push 2	SAA
						5-5	
	10						
			0.0	2.0	ML	2-4	SAA
		Br. SAND 85% w/ Silt Damp/Wet	0.0	2.0	SM	4-6	7.5y 5/4
	12	Br. Gravelly to Grey SILT 70% w/ Sand					
		No odor No Staining No Plasticity	0.0	1.1	ML	3-5	SAA
						5-6	
	14						
		Large Rock Fragments	0.0	1.7	ML	L-3	SAA
	16					4-5	
		Same As Above	0.0	2.0	ML	2-4	SAA
						7-7	
	18						
		Fine to Med. Grained SAND Grey	0.0	1.7	SM	2-5	SAA
		Saturated				4-3	
	20						

PROJECT

RVAAP RE 14

HOLE NO.

ATAMW-118

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

NTAmw-118

PROJECT

RVAAP RE 14

INSPECTOR

Mark Dooling

SHEET SHEETS

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	Same as Above				1-3	
		Grain sized changes to Large Grained	1.0	1.3	SM	4-5	SAA
	22						
		BoH 22.5					BoH 22.5
	24						Sanid to 22.6
							Screen from 22
							to 12
							Sand up to 9
							Bentonite to 6
							Grout to Surface
	26						Shut-up well Completion
							No Water Used
							for Hydration

PROJECT

RVAAP RE 14

HOLE NO.

NTAmw-118

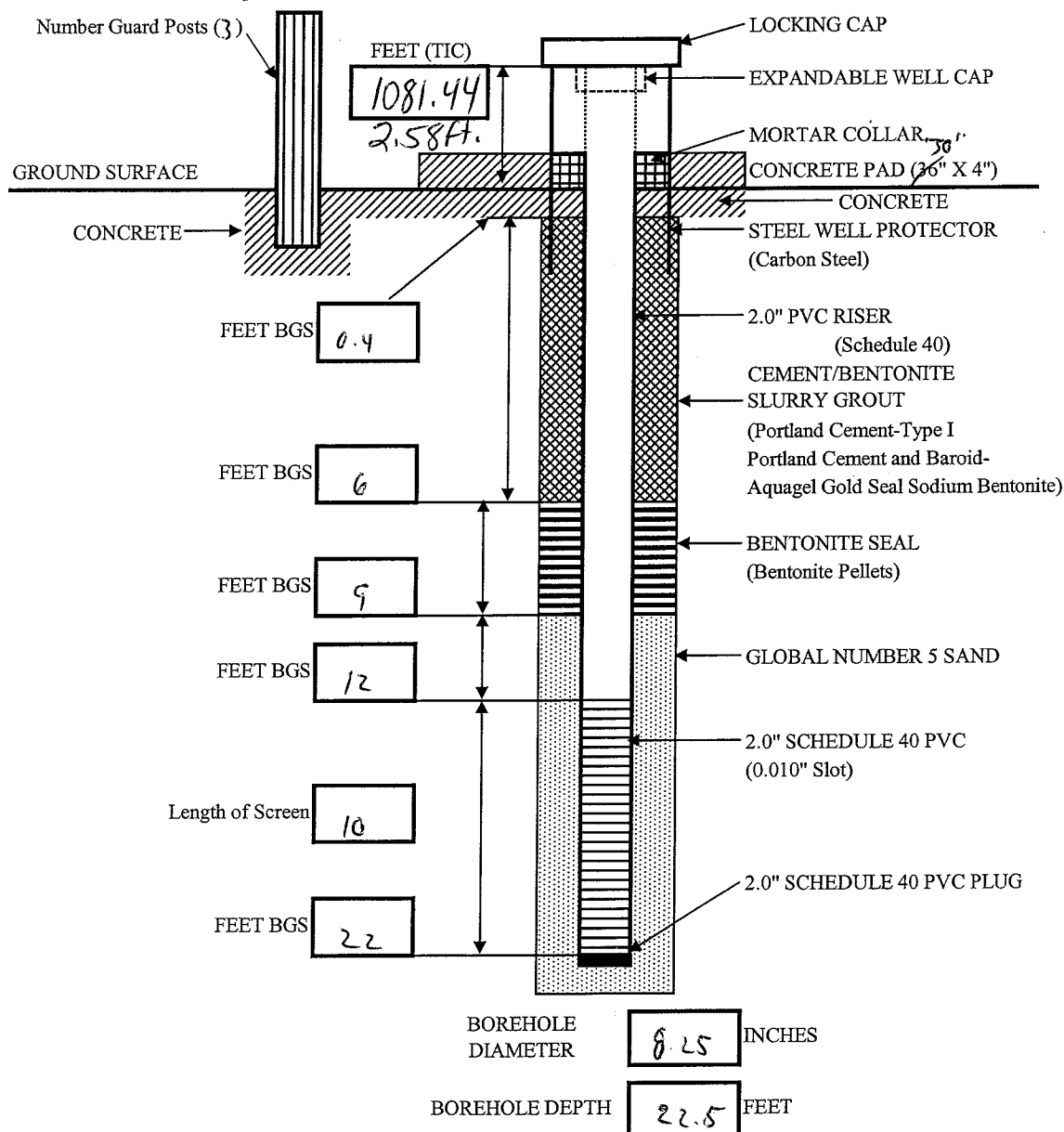


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RVAAP RI 14

Well Number: <i>NT4.mw-118</i>	Begin: <i>30 Nov 04</i>	End: <i>30 Nov 04</i>
Coordinates: N: <i>551335.04</i> E: <i>2347609.41</i>	Elevation: <i>1078.86</i>	Reference Point:
Logged By: <i>[Signature]</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: B1 NTA_{mw} - 118 - GW
 Date: 12/03/04

Ravenna Army Ammunition Plant-
 RVAAP 14 AOC Characterization

Project: RVAAP

Development Method: WHALE PUMP

Development Company: MIKM

Comments: _____

Well TD: 24.3 FT TIC Depth to Water: 7.45 FT
 Water Column Height: 16.85 FT One Well Volume: 10 Gals
 Well Volume (gallons/foot) 2-Inch = 0.16 6-Inch = 1.47
 4-Inch = 0.65 8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	TEMP		
1045	DSB	7.45	—	—	—	—	—	—	—	—
1050	DSE	7.12	—	—	—	—	—	—	—	—
1052	DPB	—	—	—	7.45	0.53	1.71	9.9	>1000	—
1107	DFM	—	—	—	7.18	0.567	4.38	11.1	>1000	WELL VOL (10 gal)
1109	DPE	DRY	1.5	—	—	—	—	—	—	11.5 dry
12/6/04 0930	DSB	7.90	—	—	—	—	—	—	—	—
0937	DSE	7.8	—	—	—	—	—	—	—	—
0940	DPB	8.8	—	—	—	—	—	—	—	—
0950	DFM	—	8.5	—	7.3	0.57	5.6	11.0	>1000	20 gal (2 nd well vol)
1010	DFM	—	10	—	7.4	0.52	7.0	12.0	>1000	30 gal (3 rd well vol)
1031	DFM	—	10	—	8.2	0.50	6.3	12.0	>1000	40 gal (4 th well vol)
1040	DFM	—	10	—	7.8	0.38	6.4	12.0	>1000	50 gal (5 th well vol)
1108	DFM	—	10	—	7.7	0.50	5.4	12.3	>1000	60 gal (6 th well vol)
1122	DFM	—	10	—	7.9	0.40	5.2	11.8	>1000	70 gal (7 th well vol)
	DBE	24.0	—	—	—	—	—	—	—	—
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
 DPE - End Pumping
 DSB - Begin Surge Blocking
 DSE - End Surge Blocking
 DFM - Field Measurements
 DBB - Begin Bailing
 DBE - End Bailing
 DXB - Begin Other
 DXE - End Other
 Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
 MSC - Specific Conductance
 MPD - Photoionizer (eg. HNu)
 MFD - Flame Ionizer (eg. OVA)
 MDO - Dissolved Oxygen
 MPH - pH
 MEH - eH
 MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
 (Final should be < 5 NTU)
 OR
 Enter Qualitative Observations
 H - High: Muddy/Silty
 M - Medium: Cloudy/Translucent
 L - Low: Transparent
 N - None: Clear/No Sediment

Logged By: Sudheer Gubba (Please Print)

Reviewed By: Joe Boles

Signature: S. Gubba

Date: 02/22/05

Well ID: NTAMW-118

Monitoring Well Purging Form

Ravenna Army Ammunition Plant
Ravenna, OhioDate: 12/13/04

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.7 (ft) TIC · TOC Difference: 0.2 (ft)
Vapor Readings: HNu · OVA Background: _____ Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No _____ Yes · No
DNAPL Yes · No _____ Yes · No

NTAMW-118

CALCULATIONS

- (A) Depth to Well Bottom 24 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 8.5 (ft) TOC · TIC · BGS Time Measured: 1:14
(C) Water Column Height (A-B) 15.5 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) ($2" = 0.16$, $4" = 0.65$, $6" = 1.47$, $8" = 2.61$ GAL/FT)
(E) One Well Volume (C*D) 2.48 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 12.4 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other: Micro purging Device Number: _____Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored Disposed Onsite · Offsite

Collected In: Tanks · Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1115	8.5			0.716	12.5	6.49	315	7.0	Initial reading
1118	8.6			0.695	11.13	6.92	775	6.0	
1121	8.9			0.692	11.10	7.05	581	5.0	
1124	9.6			0.688	11.14	7.15	518	0.0	
1127	9.1			0.642	11.20	7.02	516	0.0	
1130	9.3			0.672	11.24	7.12	506	0.0	End purging

Logged By: Vijay Alluri (Please Print)Reviewed By: [Signature]Signature: VijayDate: 02/22/05

Field Sampling Report

Location ID: NTAmw-118GW

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCs

Date: 12/13/04

Sampling Information

Source	Groundwater / Product		Surface Water		Soils / Sediments / Sludge	
Method	Bailer		Sample Bottle		Scoop	Trowel
	Pump		Bacon Bomb		Bowl	Hand Auger
	Micro purging X				Push Probe	Plastic Liner
Type/Construction					Mattocks	
Miscellaneous	Well Purging Form ☒ Yes ☐ No					

Sample Collection: 1130 hrs

Sample Type: Composite - MI - Grab

Location: Plotted on Map - Staked in Field
Estimated - Measured - Surveyed

Sample Depth: 18 FT (below surface)

Decon: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)

Analytical Parameters

Other Parameters

PID / FID Readings: Background: <u>NT</u> ppm Sample: <u>NT</u> ppm	VOC	X	TPH GRO		Corrosivity	
	SVOC	X	TPH DRO		Reactivity Sulfide/Cyanide	
	Explosives	X	Chromium +6		Ignitability	
Water Level	<u>8.5</u> FT	TAL Metals	X		QA Samples MS/MSD Yes / No <u>NA</u> Duplicate ID <u>NA</u> Equipment Rinse ID <u>NA</u> Trip Blank ID <u>Trip Blank</u> <u>NA</u>	
Temperature	<u>11.24</u> °C	Pesticides/PCBs	X			
Sp. Conductance:	<u>0.672</u> uMHOs	Cyanides				
pH	<u>7.12</u> units	TOC				
Turbidity	<u>506</u> N.T.U.	Grain Size				

Sample Description

Mud color, No odor, No sheen,
Medium turbidity

Split Sample

Split Sample ID: _____

Name: _____

Agency/Company: _____

Address: _____

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Vijay Alluri (Please Print)

Reviewed by: ERIC EWS (Please Print)

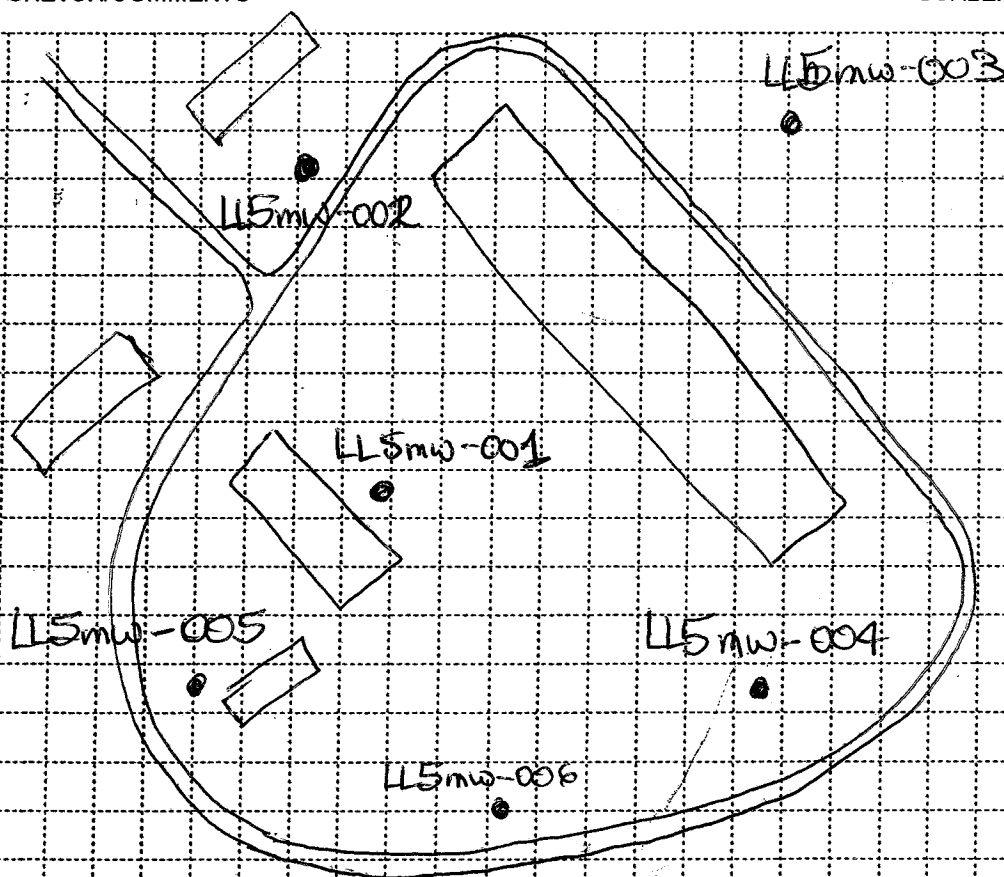
Signature: Vijay

Signature: Sesh Date: 2/1/05

HTRW DRILLING LOG		DISTRICT <u>Carrollville</u>		HOLE NUMBER <u>LL5mw-001</u>	
1. COMPANY NAME <u>MAIN Engineers</u>		2. DRILL SUBCONTRACTOR <u>HAD Drilling Contractors</u>		SHEET <u>1</u> OF <u>3</u> SHEETS	
3. PROJECT <u>RVAAP RI 14</u>		4. LOCATION <u>Load Line 5</u>			
5. NAME OF DRILLER <u>Sam Holker</u>		6. MANUFACTURER'S DESIGNATION OF DRILL <u>CME LCGO</u>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <u>8.25 HSA</u>		8. HOLE LOCATION <u>ADJACENT TO BLDG 1F-8</u>			
<u>2" Split Spoons</u>		9. SURFACE ELEVATION <u>1125.00 ASL</u>			
		10. DATE STARTED <u>08 Dec 04</u>		11. DATE COMPLETED <u>08 Dec 04</u>	
12. OVERBURDEN THICKNESS <u>2.6</u>		15. DEPTH GROUNDWATER ENCOUNTERED <u>~15' ~18'</u>			
13. DEPTH DRILLED INTO ROCK <u>0</u>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <u>17.74 @ 1055' 12/17/04</u>			
14. TOTAL DEPTH OF HOLE <u>2.6</u>		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES <u>SHELBY TUBE 6-8</u>		DISTURBED <u>-</u>		UNDISTURBED <u>X</u>	
19. TOTAL NUMBER OF CORE BOXES <u>-</u>					
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <u>-</u>		METALS <u>-</u>	
		OTHER (SPECIFY) <u>-</u>		OTHER (SPECIFY) <u>-</u>	
21. TOTAL CORE RECOVERY <u>-</u> %					
22. DISPOSITION OF HOLE		BACKFILLED <u>-</u>		MONITORING WELL <u>X</u>	
		OTHER (SPECIFY) <u>-</u>		23. SIGNATURE OF INSPECTOR <u>[Signature]</u>	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT RVAAP RI 14

HOLE NO. LL5mw-001

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LLS, nw - 001

PROJECT

RVAAP RI 14

INSPECTOR

Mark Dunlavy

SHEET

SHEETS

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)
1230		4" Topsoil				1-2	
		Reddish/B. SILT 70% w Sand Damp No Odor No Plasticity Grey mottling	0.0	1.6	ML	4-5	7.5y-5/6
	2	SAA	0.0	1.7	ML	1-4	SAA
	4	DK Br. SILT 75% w Sand Dry SHL	0.0	1.7	ML	8-8	
		No Odor No Plasticity No Staining	0.0	1.7	ML	1-4	7.5y-4/3
	6					5-13	
	8	Shelby Tube				1-5 HDD 6-6	
	8	Br. SILT 60% w Sand Dry No Odor No Staining No Plasticity	0.0	1.5	ML	1-3	7.5y-4/6
	10	SAA	0.0	2.0	ML	2-4	SAA
	12	SAA	0.0	1.7	ML	6-14	SAA
	14	SAA	0.0	1.7	ML	1-2	SAA
	16	LT Br. SAND 85% w SILT Dry No Odor No Plasticity No Staining Pass the weathered Rock Fract	0.0	1.5	SM	2-5	7.5y-7/4
	16	Br. SILT 45% w Sand Damp/Moist No Odor No Staining	0.0	1.7	ML	24-18	
	18	Gray SILT 70% w SILT Damp No Odor No Staining No Plasticity	0.0	0.9	SM	5-5	
	20					5-5	
	20					1-1	7.5y-5/2
	20					2-1	

PROJECT

RVAAP RI 14

HOLE NO.

LLS, nw - 001

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LL5011-001

PROJECT

RVAAPRI 14

INSPECTOR

Mark Dunbar

SHEET SHEETS

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)
	22	SAA Reddish Br. SAND 76% w/ Silt Dry w/ider No staining No Plasticity Weathered Bedrock	0-0	1.4	SM	2-10 10-3	SAA 7.5y 5/6
	24	SAA	0-0	1.1	SM	2-13 13-8	SAA
	26	SAA	0-0	0.7	SM	1-4 2-6	SAA
	28						BOT 26 Screen from 2y to 14 Sand to 11 Bentonite to 8 Grout to surface 2.5 gallons hydration water used Stick-up complete

PROJECT

RVAAP RI 14

HOLE NO.

LL5011-001

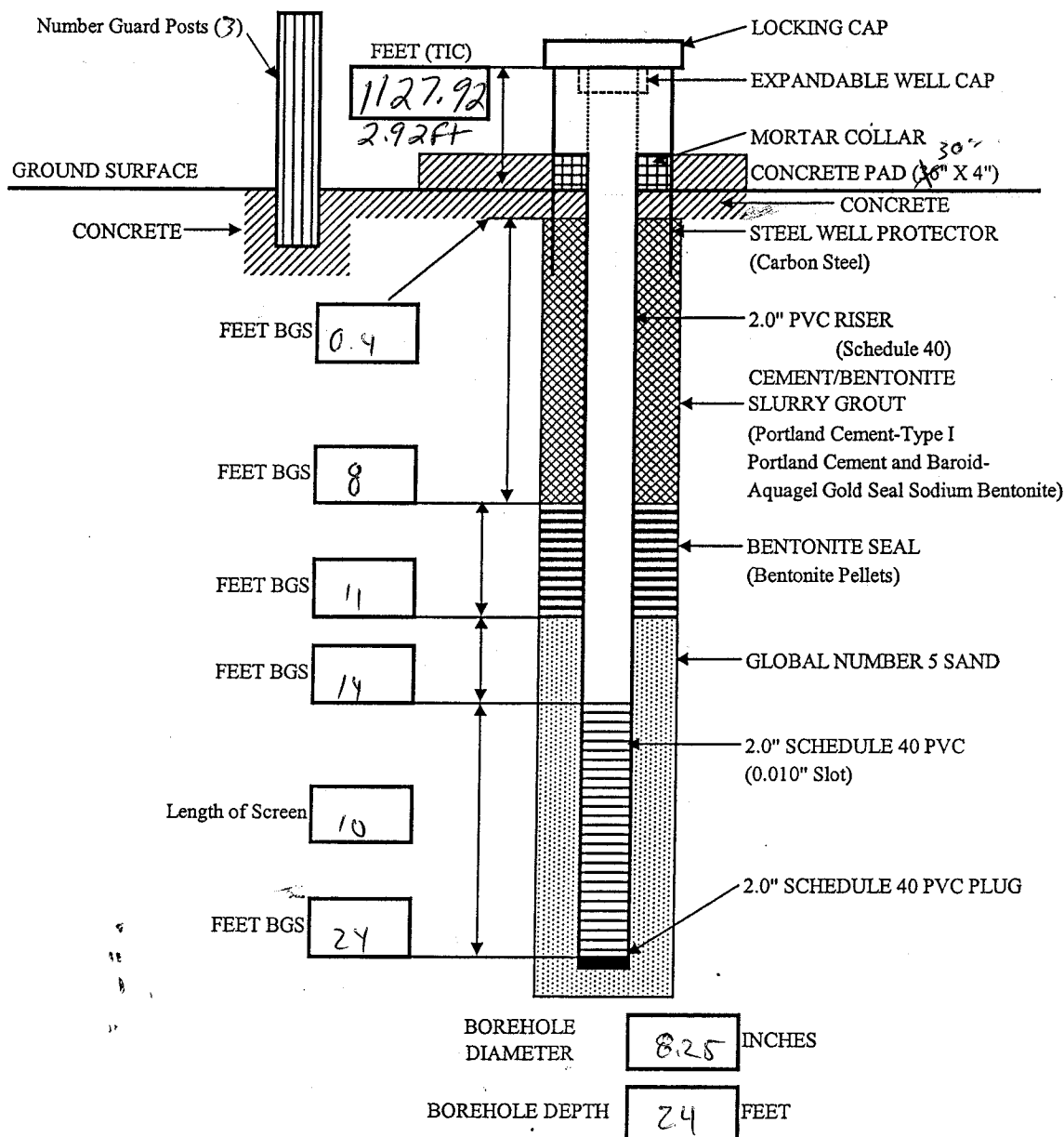


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RVAAP RZ 14*

Well Number: <i>U5mw-001</i>	Begin: <i>08Dec04</i>	End: <i>08Dec04</i>
Coordinates: N: <i>554319.25</i> E: <i>2354625.07</i>	Elevation: <i>1125.00</i>	Reference Point:
Logged By: <i>[Signature]</i>		



Notes:

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

Well Development Record

Well ID: LL5mw-001-GW
Date: 12/17/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP-14

Development Method: WHALE PUMPING

Development Company: MKM

Comments: _____

Well TD: 25.8 FT TIC Depth to Water: 17.74 FT ~5
Water Column Height: 8.06 FT One Well Volume: 4.75 Gals

Well Volume (gallons/foot)
2-inch = 0.16 6-inch = 1.47
4-inch = 0.65 8-inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	TEMP		
1055	DSB	17.74	-	-	-	-	-	-	-	-
1105	DSE	17.50	-	-	-	-	-	-	-	-
1107	DPB	17.50	-	-	-	-	-	-	-	-
1117	DFM	-	-	5 gal	8.06	0.333	10.75	9.6	71000	5 gal (1 st well vol)
1120	DPE	DRY	-	-	-	-	-	-	-	-
12/20/04 1040	DSB	18.8	-	-	-	-	-	-	-	-
1045	DSE	18.1	-	-	-	-	-	-	-	-
1046	DPB	18.1	-	-	-	-	-	-	-	-
1101	DFM	-	-	5 gal	8.21	0.495	7.13	11.4	71000	10 gal (2 nd well vol)
1118	DFM	-	-	5 gal	8.00	0.492	10.4	11.6	71000	15 gal (3 rd well vol)
1131	DFM	-	-	5 gal	7.64	0.487	7.20	11.4	768	20 gal (4 th well vol)
1203	DFM	-	-	5 gal	7.54	0.487	5.85	11.0	173	25 gal (5 th well vol)
1203	DPE	DRY	-	1 gal	-	-	-	-	-	26 gal (DRY)
1400	DPB	-	-	-	-	-	-	-	-	-
1411	DFM	18.5	-	4 gal	8.13	0.489	6.5	11.8	71000	30 gal (6 th well vol)
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations
H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPURE (Please Print)

Reviewed By: Christy Esker

Signature: N. Shringarpure

Date: 22-Feb-05

Ravenna Army Ammunition Plant- RVAAP 14 AOC Characterization

Well ID: LL5mw-001-GW
Date: 12/18/04

Project: RVAAP-14Development Method: WHALE PUMPING

Development Company: MKM

Comments: _____

Well TD: 25.8 FT TIC Depth to Water: 17.74 FT
Water Column Height: 8.06 FT One Well Volume: 475 Gals

Well Volume (gallons/foot)	2-inch = 0.16	6-inch = 1.47
	4-inch = 0.65	8-inch = 2.61

[illegible]

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other

Other:

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)

OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPURE (Please Print)

Reviewed By: M. Ester

Signature: Whittington

Date: 22 Feb 05

Monitoring Well Purging Form

Well ID: LL5 MW-001GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 01/04/05

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" 4" · 6" · 8" Other:
Stickup Height: 2.6 (ft) TIC · TOC Difference: 0.3 (ft)
Vapor Readings: HNu · OVA Background: _____ Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes No _____ Yes · No
DNAPL Yes No _____ Yes · No

LL5 MW-001GW

CALCULATIONS

- (A) Depth to Well Bottom 26.9 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 17.4 (ft) TOC · TIC · BGS Time Measured: 10:56
(C) Water Column Height (A-B) 9.5 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C·D) 1.52 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 7.60 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer · Submersible Pump · Other Micro purging Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed Onsite · Offsite

Collected In: Tanks · Drums No. of Containers: _____

Comments: _____

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1100	17.4			0.474	9.45	7.37	621	8.57	Initial reading
1103	17.3			0.48	9.91	7.41	559	7.16	
1106	17.3			0.482	10.46	7.24	505	6.31	
1109	17.4			0.484	10.34	7.55	480	6.78	
1112	17.4			0.488	10.95	7.59	495	5.85	
1115	17.3			0.487	11.07	7.65	480	5.76	End purging

Logged By: Vijay Alluri (Please Print)

Reviewed By: Christy Eiler

Signature: Vijay

Date: 22 Feb-05

Location ID: LLS MW - 001 GW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 01/04/05

Sampling Information

Source	<u>Groundwater / Product</u>	Surface Water	Soils / Sediments / Sludge	
Method	Bailer	Sample Bottle	Scoop	Trowel
	Pump	Bacon Bomb	Bowl	Hand Auger
	<u>Micro purging X</u>		Push Probe	Plastic Liner
Type/Construction			Mattocks	
Miscellaneous	<u>Well Purging Form</u> <u>Yes</u> - No			

Sample Collection: 115 hrsSample Type: Composite - MI - Grab NA
If MI, # of increments taken:Location: Plotted on Map - Staked in Field
Estimated - Measured - SurveyedSample Depth: 22 FT (below surface)Decon: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters				Other Parameters			
PID / FID Readings:	VOC	<u>X</u>	TPH GRO		Corrosivity			
Background: <u>0.0</u> ppm	SVOC	<u>X</u>	TPH DRO		Reactivity Sulfide/Cyanide			
<u>DO</u> <u>5.76</u>	Explosives	<u>X</u>	Chromium +6		Ignitability			
Sample: <u>0.0</u> ppm	Propellants	<u>X</u>	Nitrate	<u>X</u>				
Water Level <u>17.4</u> FT	TAL Metals	<u>X</u>			QA Samples			
Temperature <u>11.07</u> °C	Pesticides/PCBs	<u>X</u>			MS/MSD	Yes / No	NA	
Sp. Conductance: <u>0.487</u> uMHOs	Cyanides				Duplicate ID		NA	
pH <u>7.65</u> units	TOC				Equipment Rinse ID		NA	
Turbidity <u>480</u> N.T.U.	Grain Size				<u>Trip Blank ID</u>	<u>Trip Blank</u>	NA	

Sample Description

No color, No odor, No sheen,
Medium to high turbidity

Split Sample ID:

Name:
Agency/Company:
Address:QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Vijay Alluri (Please Print)Reviewed by: ERIC ELLIS (Please Print)Signature: VijaySignature: ERIC ELLIS Date: 2/3/05

HTRW DRILLING LOG			DISTRICT <u>Louisville</u>			HOLE NUMBER <u>LLSMW-002</u>	
1. COMPANY NAME <u>MEM Engineers Inc</u>			2. DRILL SUBCONTRACTOR <u>HAD Drilling Contractors</u>			SHEET <u>1</u> OF <u>3</u>	
3. PROJECT <u>RVAAP RI 14</u>			4. LOCATION <u>Load Line 5</u>				
5. NAME OF DRILLER <u>Sam Hollar</u>			6. MANUFACTURER'S DESIGNATION OF DRILL <u>CME LC-60</u>				
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <u>8.25 HSA-00</u> <u>2" Split Spoons</u>			8. HOLE LOCATION <u>North side of LL in front of Change House</u>				
			9. SURFACE ELEVATION <u>1125.80 ASL</u>				
			10. DATE STARTED <u>09 Dec 04</u>		11. DATE COMPLETED <u>09 Dec 04</u>		
12. OVERBURDEN THICKNESS <u>24.6</u>			15. DEPTH GROUNDWATER ENCOUNTERED <u>18, 24.5</u>				
13. DEPTH DRILLED INTO ROCK <u>0.4</u>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <u>15.6' @ 905</u> <u>12/17/04</u>				
14. TOTAL DEPTH OF HOLE <u>25.0</u>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)				
18. GEOTECHNICAL SAMPLES		DISTURBED <u>—</u>		UNDISTURBED <u>—</u>		19. TOTAL NUMBER OF CORE BOXES <u>—</u>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <u>—</u>		METALS <u>—</u>		OTHER (SPECIFY) <u>—</u>	
						21. TOTAL CORE RECOVERY <u>—</u> %	
22. DISPOSITION OF HOLE		BACKFILLED <u>—</u>		MONITORING WELL <u>X</u>		23. SIGNATURE OF INSPECTOR <u>[Signature]</u>	
LOCATION SKETCH/COMMENTS SCALE:							
PROJECT <u>RVAAP RI 14</u>						HOLE NO. <u>LLSMW-002</u>	

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LLS/mw-002

PROJECT

BLAAPR 14

INSPECTOR

Mark Dunsley

SHEET SHEETS

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	0.4'	Topsoil					
	1	Lt Br. SILT 65% w/ sand Damp No odor No Plasticity No Staining	0.3	1.4	ML	2-3	7.5y-6/6
	2	DR Reddish/Brown Rock Frag 1/2"					
	3	DK Br. SILT 70% w/ sand Dry No odor No Staining No 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
	5	very stiff					
	6	Br. SILT 60% w/ sand Damp No odor No Staining No Plasticity	0.0	1.5	ML	1-7 4-10	SAA
	7	SAA changes to Dry	0.0	1.6	ML	1-8 6-7	SAA
	8	SAA	0.0	1.5	ML	1-4 6-7	SAA
	9	SAA	0.0	1.4	ML	1-3 10-16	SAA
	10	SAA	0.0	0.7	ML	1-6 9-16	SAA
	11	changes to Gummy/Damp-Moist	0.0	1/6	ML	1-2	7.5y-5/1
	12	Slightly saturated/spoon was wet					
	13	SAA	0.0	0.8	ML	3-4 1-2 4-8	SAA
	14						
	15						
	16						
	17						
	18						
	19						
	20						

PROJECT

BLAAPR 14

HOLE NO.

LLS/mw-002

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LLS MW-002

PROJECT

RWAAPRI 14

INSPECTOR

Mark Dunlavy

SHEET SHEETS

3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEO TECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		SAA				4-10	
		Grey Fine Grained SS Rock Frag 1"	0.0	1.6	ML	10-13	SAA
		Grey SILT 70% w Sand and Gravel					
		Dry no odor No Plasticity No Staining					
	22	4" SAND Grey 75% w silt Moist No odor				2-2	
		No Staining No Plasticity					
		Grey SILT 70% w Sand and Gravel Damp No odor No Staining	0.0	1.7	ML	2-4	
		Grey weathered SS SAND 70% w silt					
	24	Grey SAND 85% Disturbed No odor No Staining	0.0		SP/SM	2/50/3	
		No Plasticity					
		Grey Fine Grained SS slightly weathered					
		Bottom 25					Bottom 25
	20						Screen from 25
							to 15
							Sand up to 12
							Bentonite to 9
							Grout to Surface
							Stick up completion
							Sequillions used to
							hydrate

PROJECT

RWAAPRI 14

HOLE NO.

LLS MW-002

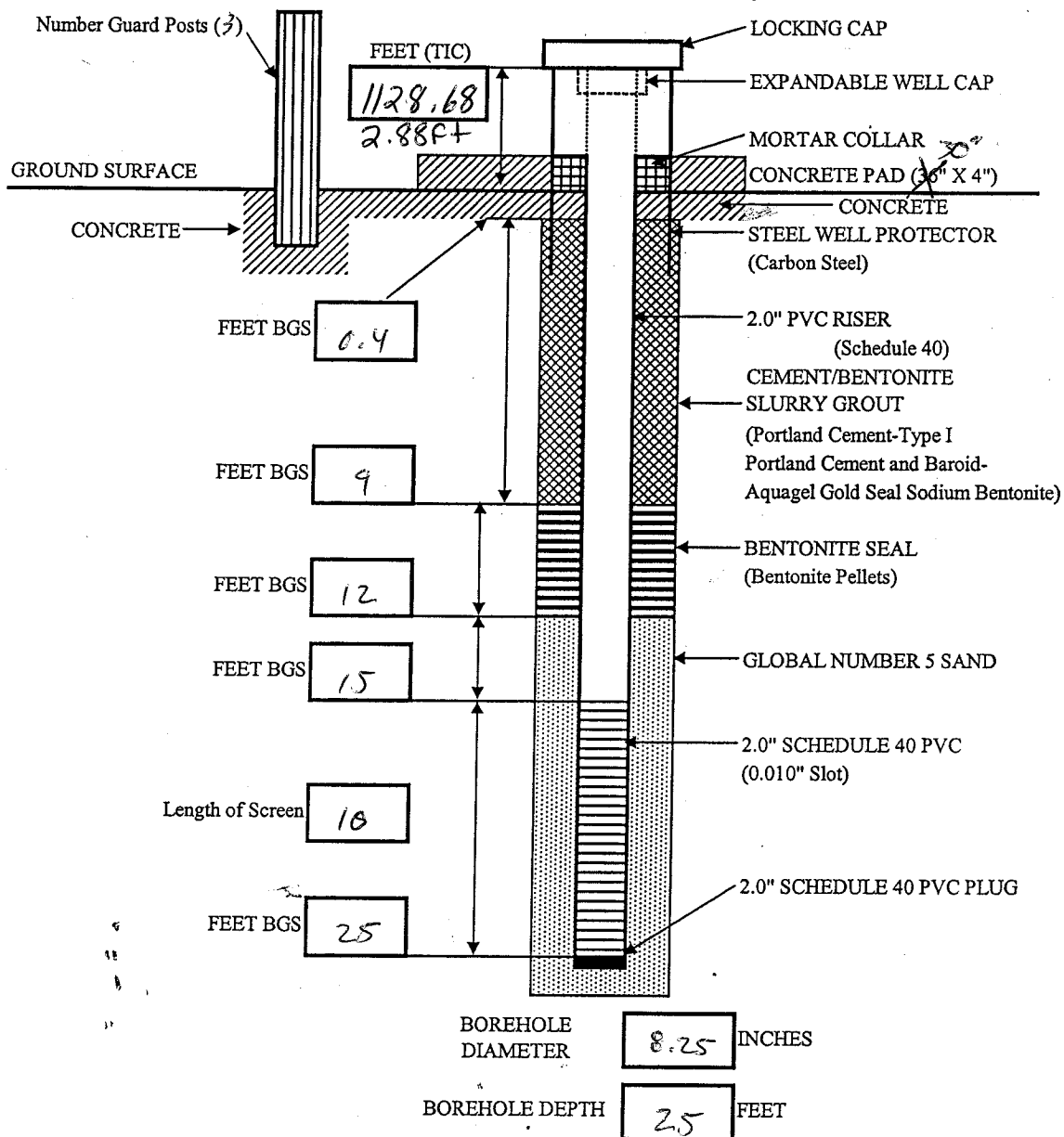


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: RAAAPRI 14

Well Number: <u>LLSMW-002</u>	Begin: <u>09Dec04</u>	End: <u>09Dec04</u>
Coordinates: N: <u>534604.01</u> E: <u>2354571.52</u>	Elevation: <u>1125.80</u>	Reference Point:
Logged By: <u>[Signature]</u>		



Notes:

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

Well Development Record

Well ID: LLSmw-002 GW
Date: 12/17/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP-14

Development Method: Whale Pumping

Development Company: MKM

Comments: _____

Well TD: 25.3 FT TIC Depth to Water: 15.6 FT ~ 6
Water Column Height: 9.7 FT One Well Volume: 5.72 Gals

Well Volume (gallons/foot) 2-Inch = 0.16 6-Inch = 1.47
4-Inch = 0.65 8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					PH	CON	DO	Temp		
905	DSB	15.6	-	-	-	-	-	-	-	-
0910	DSE	16.3	-	-	-	-	-	-	-	-
0910	DPB	16.3	-	-	-	-	-	-	-	-
0915	DPE	DRY	-	4	-	-	-	-	-	4 gal
12/20/04 1500	DSB	17.7	-	-	-	-	-	-	-	-
1505	DSE	17.1	-	-	-	-	-	-	-	-
1506	DPB	17.1	-	-	-	-	-	-	-	-
12/24/04 1507	DPE	DRY	-	2	7.82	0.453	10.72	104	7000	6 gal (1 well vol)
0836	DSB	17.6	-	-	-	-	-	-	-	-
0845	DSE	17.2	-	-	-	-	-	-	-	-
0846	DPB	17.2	-	-	-	-	-	-	-	-
0849	DPE	DRY	-	2	-	-	-	-	-	8 gal (DRY)
01/07/05 1105	DSB	16.5	-	-	-	-	-	-	-	-
1115	DSE	17.75	-	-	-	-	-	-	-	-
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)

OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Vijay Alluri (Please Print)

Reviewed By: C. Eaker

Signature: Vijay

Date: 2/22/05

Well ID: LLSmw-002GW
 Date: 01/07/05

Well Development Record

Ravenna Army Ammunition Plant-
 RVAAP 14 AOC Characterization

Project: RVAAP-14

Development Method: Whale Pumping

Development Company: MKM

Comments: _____

Well TD: 25.3 FT TIC

Depth to Water: 15.6 FT ~ 6

Water Column Height: 9.7 FT

One Well Volume: 5.72 Gals

Well Volume
(gallons/foot)

2-Inch = 0.16

6-Inch = 1.47

4-Inch = 0.65

8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					PH	CON	DO	Temp		
1115	DPB	17.75								
1125	DFM	—	—	4 gal	7.42	0.273	4.29	10.3	71000	12 gal (2nd well vol)
1130	DPE	Dry	—	3 gal	—	—	—	—	—	15 gal
1258	DPB	17.10	—	—	—	—	—	—	—	—
1306	DFM	—	—	3 gal	7.77	0.281	11.42	10.9	71000	18 gal (3rd well vol)
1308	DPE	Dry	—	1 gal	—	—	—	—	—	19 gal
1325	DPB	19.0	—	—	—	—	—	—	—	—
1329	DPE	Dry	—	2.5	—	—	—	—	—	21.5 gal
1350	DPB	19.05	—	—	—	—	—	—	—	—
1355	DPE	Dry	—	2.5	8.42	0.233	13.72	10.9	281	24 gal (4th well vol)
1425	DPB	18.7	—	3.5	—	—	—	—	—	27.5 gal
1430	DPE	Dry	—	3.5	—	—	—	—	—	27.5 gal
1444	DPB	20.8	—	—	—	—	—	—	—	—
1451	DPE	Dry	—	2.5	8.20	0.284	5.35	11.5	1000	30 gal (5th well vol)
1515	DPB	20.4	—	—	—	—	—	—	—	—
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
 DPE - End Pumping
 DSB - Begin Surge Blocking
 DSE - End Surge Blocking
 DFM - Field Measurements
 DBB - Begin Bailing
 DBE - End Bailing
 DXB - Begin Other
 DXE - End Other
 Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
 MSC - Specific Conductance
 MPD - Photolionizer (eg. HNU)
 MFD - Flame Ionizer (eg. OVA)
 MDO - Dissolved Oxygen
 MPH - pH
 MEH - eH
 MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
 (Final should be < 5 NTU)

OR

Enter Qualitative Observations

H - High: Muddy/Silty
 M - Medium: Cloudy/Translucent
 L - Low: Transparent
 N - None: Clear/No Sediment

Logged By: Sudheer Gubbs (Please Print)

Signature: S. Gubbs

Reviewed By: C. Ester

Date: 2/22/05

Monitoring Well Purging Form

**Ravenna Army Ammunition Plant
Ravenna, Ohio**

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 2.58 (ft) TIC · TOC Difference: 0.27 (ft)
Vapor Readings : HNu · OVA Background: 0 Inside Well Casing:

Present		Depth	Sampled Sample ID
LNAPL	Yes ☒ No ☐	Yes ☐ No ☐	
DNAPL	Yes ☒ No ☐	Yes ☐ No ☐	

CALCULATIONS

- (A) Depth to Well Bottom 27.35 (ft) TOC · TIC · BGS ~~Measured~~ Previously Measured (circle one)
- (B) Depth to Water 17.32 (ft) TOC · TIC · BGS Time Measured: 9.57
- (C) Water Column Height (A-B) 10.03 (ft)
- (D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
- (E) One Well Volume (C*D) 1.60 (gal)
- (F) Volumes to be Evacuated 5
- (G) TOTAL VOLUME TO BE EVACUATED (E * F) 8.02 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer • Submersible Pump • Other: micropipe Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored Disposed Onsite Offsite

Comments: Collected In: Tanks · Drums No. of Containers: _____

[illegible]

Logged By: S. H. [Signature] (Please Print)

Signature:

Reviewed By: C. Ester

Date : 2/22/05

Location ID: 663 MW-0026W

Date: 1-13-05

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge			
Method	Bailer	Sample Bore	Scoop		Trowel	
	Pump	Bacon Bore	Bowl		Hand Auger	
	Micropipe IX		Push Probe		Plastic Liner	
Type/Construction			Mattocks			
Miscellaneous	Well Purging Form (Yes) - No					

Sample Collection: 1100 hrs Sample Type: Composite - MI - Grab Location: Plotted on Map - Staked in Field
Sample Depth: 22 FT (below surface) If MI, # of increments taken: NA Estimated - Measured - Surveyed
Decon: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)		Analytical Parameters				Other Parameters			
PID / FID Readings:		VOC	X	TPH GRO		Corrosivity			
Background:	ppm	SVOC	X	TPH DRO		Reactivity Sulfide/Cyanide			
	0.0	Explosives	X	Chromium +6		Ignitability			
Sample:	ppm	Propellants		Nitrate	X				
	0.0								
Water Level	FT	TAL Metals	X			QA Samples			
	17.32								
Temperature	°C	Pesticides/PCBs	X			MS/MSD	Yes / No	NA	
	9.88								
Sp. Conductance:	uMHOs	Cyanides				Duplicate ID		NA	
	0.388								
pH	units	TOC				Equipment Rinse ID		NA	
	7.70								
Turbidity	N.T.U.	Grain Size				Trip Blank ID	Trip Blank	NA	
	25								

Clear water
no silt, no rocks
Low turbidity

Split Sample ID:	Split Sample
Name:	
Agency/Company:	
Address:	
QA/QC Provided: MS/MSD - Duplicate, Trip Blanks, Field Blank	
Parameters: Same as Above - As Listed	

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Color Odor Sheen Turbidity

Reviewed by: ERIC ELLIS (Please Print)

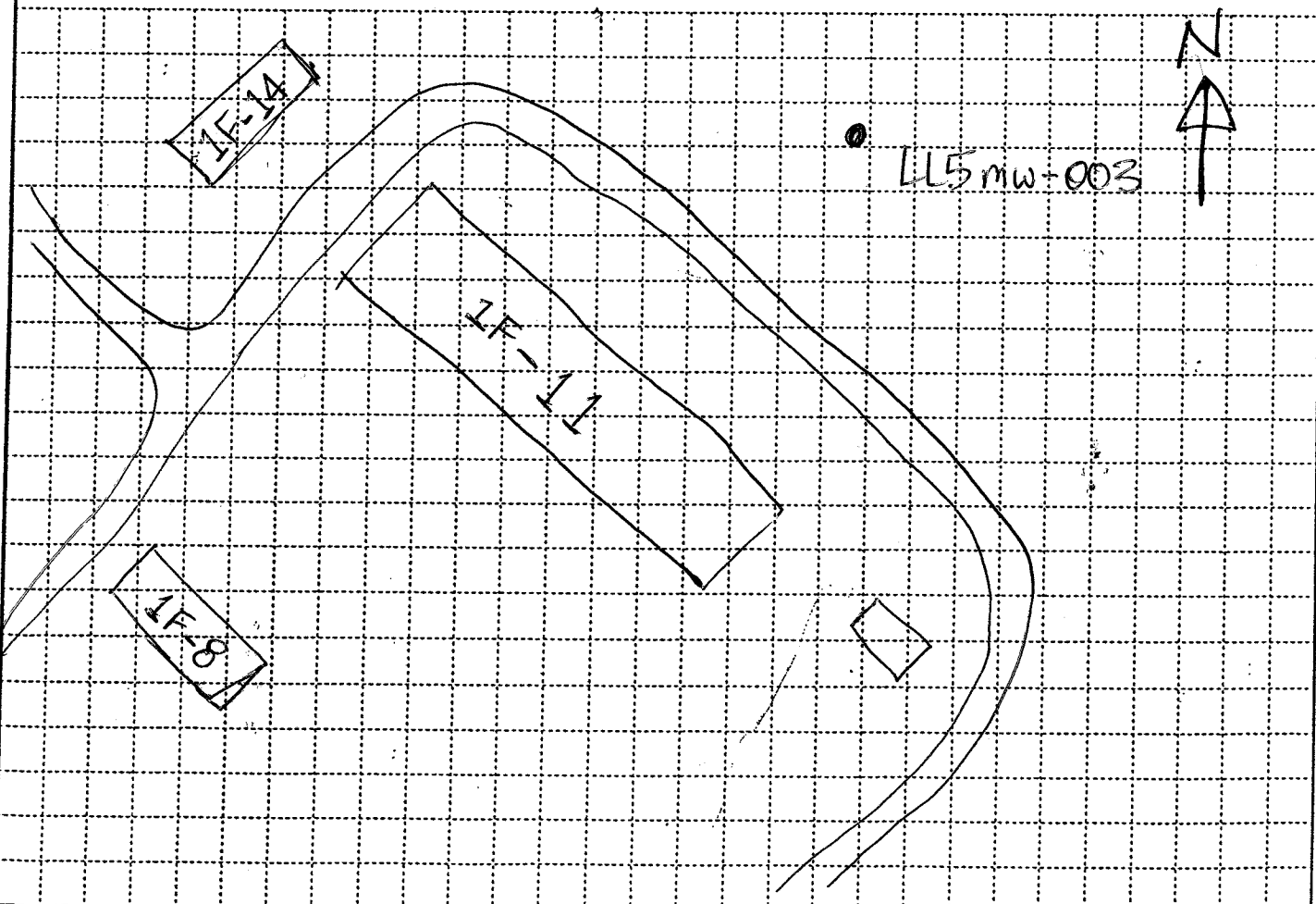
Signature: _____ Signature: SLK Date: 2/3/05

HTRW DRILLING LOG		DISTRICT <i>Louisville</i>	HOLE NUMBER <i>LL5mw-003</i>
1. COMPANY NAME <i>MEM Engineers Inc</i>		2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractors</i>	SHEET SHEETS <i>1 OF 3</i>
3. PROJECT <i>RIAAP RE 14</i>		4. LOCATION <i>Landline 5</i>	
5. NAME OF DRILLER <i>Sam Holter</i>		6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME-LL66</i>	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <i>8.25" OD HSA</i>		8. HOLE LOCATION <i>East Side</i>	
<i>2" SplitSpoons</i>		9. SURFACE ELEVATION <i>1124.70 ASL</i>	
		10. DATE STARTED <i>09 Dec 04</i>	11. DATE COMPLETED <i>09 Dec 04</i>
12. OVERBURDEN THICKNESS <i>21</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>11, 14.5</i>	
13. DEPTH DRILLED INTO ROCK <i>0</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>17.1 @ 0925 12/17/04</i>	
14. TOTAL DEPTH OF HOLE <i>21</i>		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	

18. GEOTECHNICAL SAMPLES <i>SHELBY TUBE 8-10'</i>	DISTURBED <i>-</i>	UNDISTURBED <i>X</i>	19. TOTAL NUMBER OF CORE BOXES <i>-</i>		
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC <i>-</i>	METALS <i>-</i>	OTHER (SPECIFY) <i>-</i>	OTHER (SPECIFY) <i>-</i>	OTHER (SPECIFY) <i>-</i>
22. DISPOSITION OF HOLE	BACKFILLED <i>-</i>	MONITORING WELL <i>X</i>	OTHER (SPECIFY) <i>-</i>	23. SIGNATURE OF INSPECTOR <i>[Signature]</i>	
				21. TOTAL CORE RECOVERY <i>-</i>	

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT <i>RIAAP RE 14</i>	HOLE NO. <i>LL5mw-003</i>
-------------------------------	------------------------------

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LSmw-003

PROJECT

RVA APR 14

INSPECTOR

Mark Dunlop

SHEET

SHEETS

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)
	0.4	Topsoil				1-1	
		Br. SILT 65% w Sand Damp No odor No staining No Plasticity	5.1	1.3	ML	2-3	7.5y-4/6
	2	Lt Br. SILT 75% w Clay No Color Damp Low Plasticity No staining					7.5y-6/4
		Br. SILT 70% w Sand Dry No odor No staining No Plasticity	6.4	1.6	ML	1-3 9-10	7.5y-4/6
	4	Very SLT white Mottling Br. tint DBS SAA	0.0	1.7	ML	1-4 8-13	7.5y-4/4
	6	SAA					
		Br. sq No odor w Silt wet/saturated No odor No staining No Plasticity	0.0	1.5	SM	2-7	
	8	Br. SILT 65% w Sand Dry No odor No staining No Plasticity			ML	8-11	
		1056 09 Dec 04				1-1 7-11	
		Shelby Tube					
	10	Br. SAND 80% w Silt Fine Grained Damp but saturated 8/11	0.0	1.6	SM	1-1 3-3	7.5y-4/4
	12	Br. SILT 65% w Sand Dry No odor No Plasticity No staining	0.0	1.7	ML	2-2 3-5	SAA
	14	Br. SAND 85% w Silt Saturated No Color No staining No Plasticity	0.0	1.6	SM	1-1	SAA
	16	Br. SILT 60% w Sand Damp No odor No staining No Plasticity			ML	5-6	
		SAA	0.0	1.5	ML	1-6 8-13	SAA
	18						
			0.0	1.4	ML	1-4 7-11	
	20	Lt Br. SAND 80% w Silt Saturated No odor No staining			SM		7.5y-7/6

PROJECT

RVA APR 14

HOLE NO.

LSmw-003

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
LL5mw-003

PROJECT

RWAAPRI 14

INSPECTOR

Mark Dunbar

SHEET SHEETS
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	0.0		SM		SAA
	22	BoH 21					BoH 21
	24						Sand from 21 to 11 Sand to 8 Bentonite to 5 Grout to surface Stick up completion

PROJECT

RWAAPRI 14

HOLE NO.

LL5mw-003

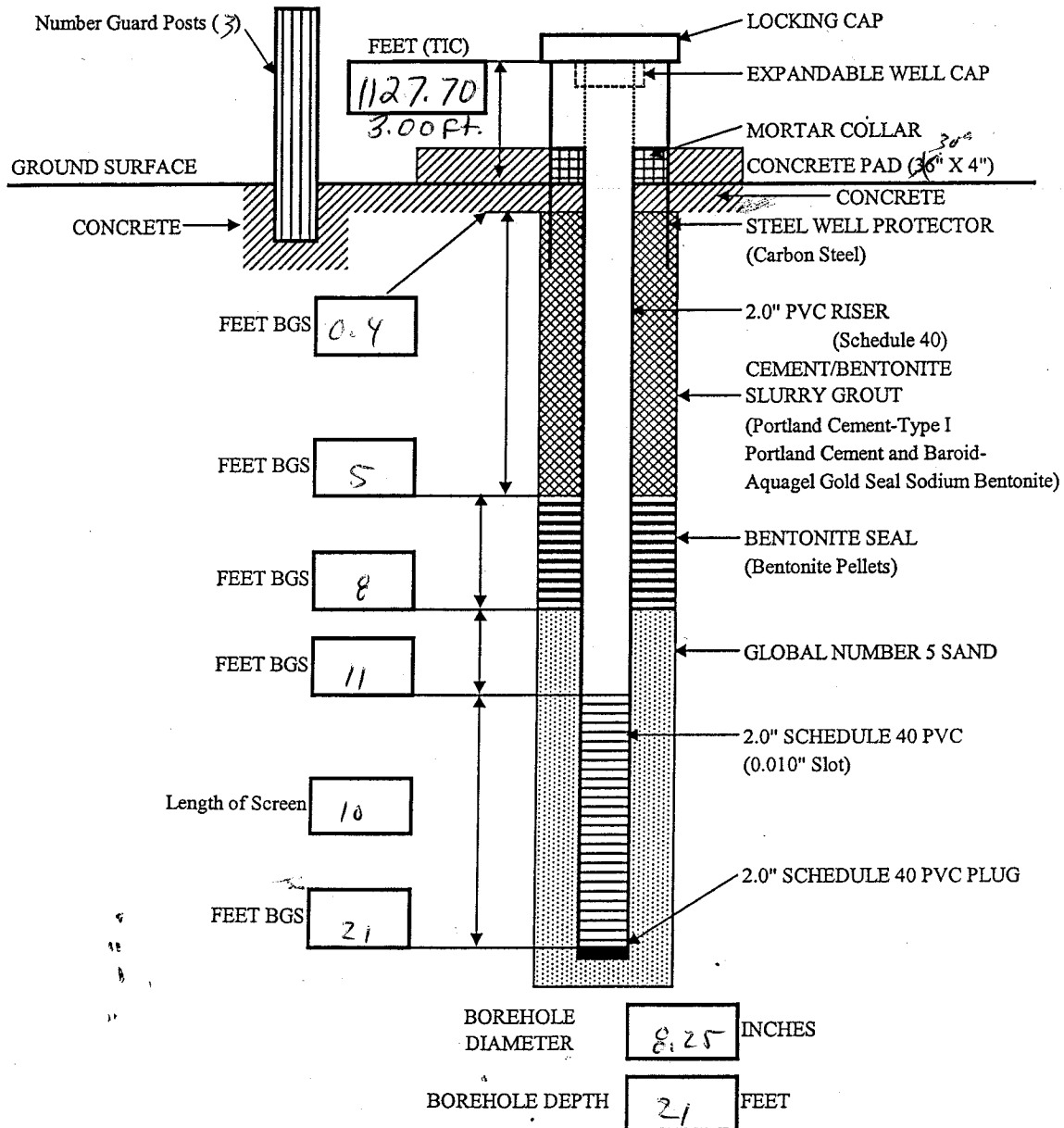


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RMAP RZ 14*

Well Number: <i>LL5mw-003</i>	Begin: <i>09 Dec 04</i>	End: <i>09 Dec 04</i>
Coordinates: N: <i>554535.41</i> E: <i>2354964.47</i>	Elevation: <i>1124.70</i>	Reference Point:
Logged By: <i>[Signature]</i>		



Notes:

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

Well Development Record

Well ID: LLS mw -003 GW

Date: 12/17/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP -14

Development Method: Whale Pumping

Development Company: MKM

Comments: _____

Well TD: 23.65 FT TIC

Depth to Water: 17.8 FT ~4

Water Column Height: 6.55 FT

One Well Volume: 3.86 Gals

Well Volume
(gallons/foot)

2-Inch = 0.16
4-Inch = 0.65

6-Inch = 1.47
8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					PH	CON	DO	Temp		
0925	DSB	17.1	-	-	-	-	-	-		
0932	DSE	16.9	-	-	-	-	-	-		
0932	DPB	16.9	-	-	-	-	-	-		
0935	DPE	DRY	-	3.5	-	-	-	-		3.5 gal
1516	DSB	16.52	-	-	-	-	-	-		
1522	DSE	17.10	-	-	-	-	-	-		
1523	DPB	17.10	-	-	-	-	-	-		
1524	DFM	19.5	-	0.5	7.02	0.567	2.86	97	71000	1 well vol (4 gal)
1526	DPE	DRY	-	3.5	-	-	-	-		7.5 gal (dry)
0905	DSB	16.35	-	-	-	-	-	-		
0910	DSE	16.00	-	-	-	-	-	-		
0912	DPB	16.00	-	-	-	-	-	-		
0912	DFM	19.7	-	0.5	6.36	0.620	3.20	11.2	71000	8 gal (2nd well vol)
0914	DPE	DRY	-	3.0	-	-	-	-		11 gal (dry)
0900	DSB	17.3	-	-	-	-	-	-		
	FINAL									

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR
Enter Qualitative Observations
H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Vijay Alluri (Please Print)

Reviewed By: C. Exler

Signature: Vijay

Date: 2/20/05

Well ID: LL5mw-003-mw
Date: 1/11/05

Project: RyAAP-

Development Method: whale pump

Development Company: MLM

Comments: _____

Well TD: 23.65 FT TIC
Water Column Height: 6.55 FT

Depth to Water: 17 FT

One Well Volume: 3.86 Gals

Well Volume
(gallons/foot)

2-Inch = 0.16

Pinch = 1.47

4-Inch = 0.65

8-Inch = 2.61

WELL DEVELOPMENT CODES

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photololnizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: Vijay Alluri (Please Print)

Signature: V. K. V.

Reviewed By: C. Ester

Date: 2/22/85

Monitoring Well Purging Form

Date: 01/18/05

Ravenna Army Ammunition Plant
Ravenna, Ohio

WELL OBSERVATIONS

Protective Casing: Intact / Damaged Locked: Yes / No Key No: _____
Concrete Base: Intact / Damaged Inner Casing: 2" / 4" / 6" / 8" Other: _____
Stickup Height: 3.00 (ft) TIC · TOC Difference: 0.2 (ft)
Vapor Readings: HNu · OVA Background: 0.0 Inside Well Casing

Present Depth

LNAPL Yes No Yes No

DNAPL Yes No Yes No

Sampled Sample ID

LL5 MW-003 GW

CALCULATIONS

- (A) Depth to Well Bottom 23.2 (ft) TOC • TIC • BGS Measured Previously Measured (circle one)
- (B) Depth to Water 15.25 (ft) TOC • TIC • BGS Time Measured: 0910
- (C) Water Column Height (A-B) 8.35 (ft)
- (D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
- (E) One Well Volume (C*D) 1.37 (gal)
- (F) Volumes to be Evacuated 5
- (G) TOTAL VOLUME TO BE EVACUATED (E * F) 6.84 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer • Submersible Pump • Other: mc50 pump Device Number: _____

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored Disposed Onsite Offsite

Collected In: Tanks - Drums No. of Containers:

Comments:[illegible]

Logged By: Shahgan (Please Print)

Signature: 

Reviewed By: *P. Zelen*

Date: 2/22/05

Location ID: LL5 MW-003C_W

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 01-18-05

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bomb	Scoop
	Pump	Bacon Bomb	Bowl
	<u>Microsyringe</u> <u>X</u>		Push Probe
Type/Construction			Mattocks
Miscellaneous	Well Purging Form (Yes - No)		

Sample Collection: 0.5 hrsSample Type: Composite - MI Grab
If MI, # of increments taken: NALocation: Plotted on Map - Staked in Field
Estimated - Measured - SurveyedSample Depth: 18 FT (below surface)Decon: Dedicated - Each Day - Each LocationField Parameters
(at time of sample)

Analytical Parameters

Other Parameters

PID / FID Readings:

Background:

ppm

0.0

Sample:

0.0

ppm

Water Level

15.25

FT

Temperature

8.99

°C

Sp. Conductance:

0.624

uMHOs

pH

7.12

units

Turbidity

113

N.T.U.

VOC

X

TPH GRO

SVOC

X

TPH DRO

Explosives

X

Chromium +6

Propellants

ST

Nitrate

X

TAL Metals

X

Pesticides/PCBs

X

Cyanides

TOC

Grain Size

Corrosivity

Reactivity Sulfide/Cyanide

Ignitability

QA Samples

MS/MSD

Yes / No

NA

Duplicate ID

NA

Equipment Rinse ID

NA

Trip Blank ID

Trip Blank

NA

Sample Description

Clear water, no odor
no sheen, med to low
turbidity

Split Sample

Split Sample ID:

Name:

Agency/Company:

Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Requested

Soil sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

Water sample description should include:

Color Odor Sheen Turbidity

Logged By: Shah (Please Print)Reviewed by: ERIC EWS (Please Print)Signature: [Signature]Signature: [Signature] Date: 2/3/05

HTRW DRILLING LOG			DISTRICT <u>Louisville</u>			HOLE NUMBER <u>LL5mw-004</u>			
1. COMPANY NAME <u>MKM Engineers Inc</u>			2. DRILL SUBCONTRACTOR <u>HAD Drilling Contractors</u>			SHEET <u>1</u> OF <u>3</u>			
3. PROJECT <u>RVAAP RI 14</u>			4. LOCATION <u>Load Line 5</u>						
5. NAME OF DRILLER <u>Sam Haller</u>			6. MANUFACTURER'S DESIGNATION OF DRILL <u>CME LC-60</u>						
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <u>0.25 OD HSA</u> <u>2" Split Spoon</u>			8. HOLE LOCATION <u>South Side of RR</u>						
			9. SURFACE ELEVATION <u>1122.90 ASL</u>						
			10. DATE STARTED <u>09 Dec 04</u>			11. DATE COMPLETED <u>09 Dec 04</u>			
12. OVERBURDEN THICKNESS <u>21.8</u>			15. DEPTH GROUNDWATER ENCOUNTERED <u>17.5</u>						
13. DEPTH DRILLED INTO ROCK <u>0.6</u>			16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <u>16.00 @ 0955</u> <u>12/17/04</u>						
14. TOTAL DEPTH OF HOLE <u>22.4</u>			17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)						
18. GEOTECHNICAL SAMPLES		DISTURBED <u> </u>		UNDISTURBED <u> </u>		19. TOTAL NUMBER OF CORE BOXES <u> </u>			
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <u> </u>		METALS <u> </u>		OTHER (SPECIFY) <u> </u>		21. TOTAL CORE RECOVERY % <u> </u>	
22. DISPOSITION OF HOLE		BACKFILLED <u> </u>		MONITORING WELL <u>X</u>		OTHER (SPECIFY) <u> </u>		23. SIGNATURE OF INSPECTOR <u>[Signature]</u>	
LOCATION SKETCH/COMMENTS SCALE:									
PROJECT <u>RVAAP RI 14</u>						HOLE NO. <u>LL5mw-004</u>			

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LSmw-009

PROJECT

RVAAP RE 14

INSPECTOR

Mark Dunbar

SHEET SHEETS

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)
1330		0-6' Topsoil				1-1	
	2	Lt Redish Br. SILT 65% w Sand Damp No Odor No Plasticity Gray Mottles	0.0	1.7	ML	1-2	7.5yr 5/6
	4	Br. SILT 75% w Sand Dry SH, LL No Odor No Staining No Plasticity	0.0	1.6	ML	4-1 9-2	7.5yr 4/4
	6	White Mottles Begin	0.0	1.1	ML	4-8 11-13	SAA
	8	White Mottles Stop	0.0	1.6	ML	1-8 14-12	SAA
	10	Redish Br. SAND w/ Silt wet No Odor No Staining No Plasticity			SM		
	12	Br. SILT 70% w Sand Damp No Odor No Staining No Plasticity	0.0	1.5	ML	2-6 5-8	SAA
	14	SAA	0.0	2.0	ML	1-4 7-7	SAA
	16	SAA	0.0	1.6	ML	14 7-9	SAA
	18	SAA	0.0	2.0	ML	5-5 6-13	SAA
	20	Br. SAND 85% w/ Silt Fine Grained wet No Odor No Staining No Plasticity	0.0	1.7	SM	6-17 37-14	SAA
		Saturated @ 17.5'					7.5yr G/L6
		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 4/4

PROJECT

RVAAP RE 14

HOLE NO.

LSmw-009

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
LLS mw 004

PROJECT
RVAAPRE 14

INSPECTOR
Mark Dunbar

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	0.0	1.0	SM	3-8 10-10	SAA
	22	Split Spoon tests 22.0 weathered SS Bedrock					
		Bot 22.4					Bot 22.4 Sand to 22 Screen from 22 to 12 Sand up to 7.5 Bentonite to 5 Grout to surface Stick-up completion Spallens of water Lo hydration
	24						
	26						

PROJECT
RVAAPRE 14

HOLE NO.
LLS mw 004

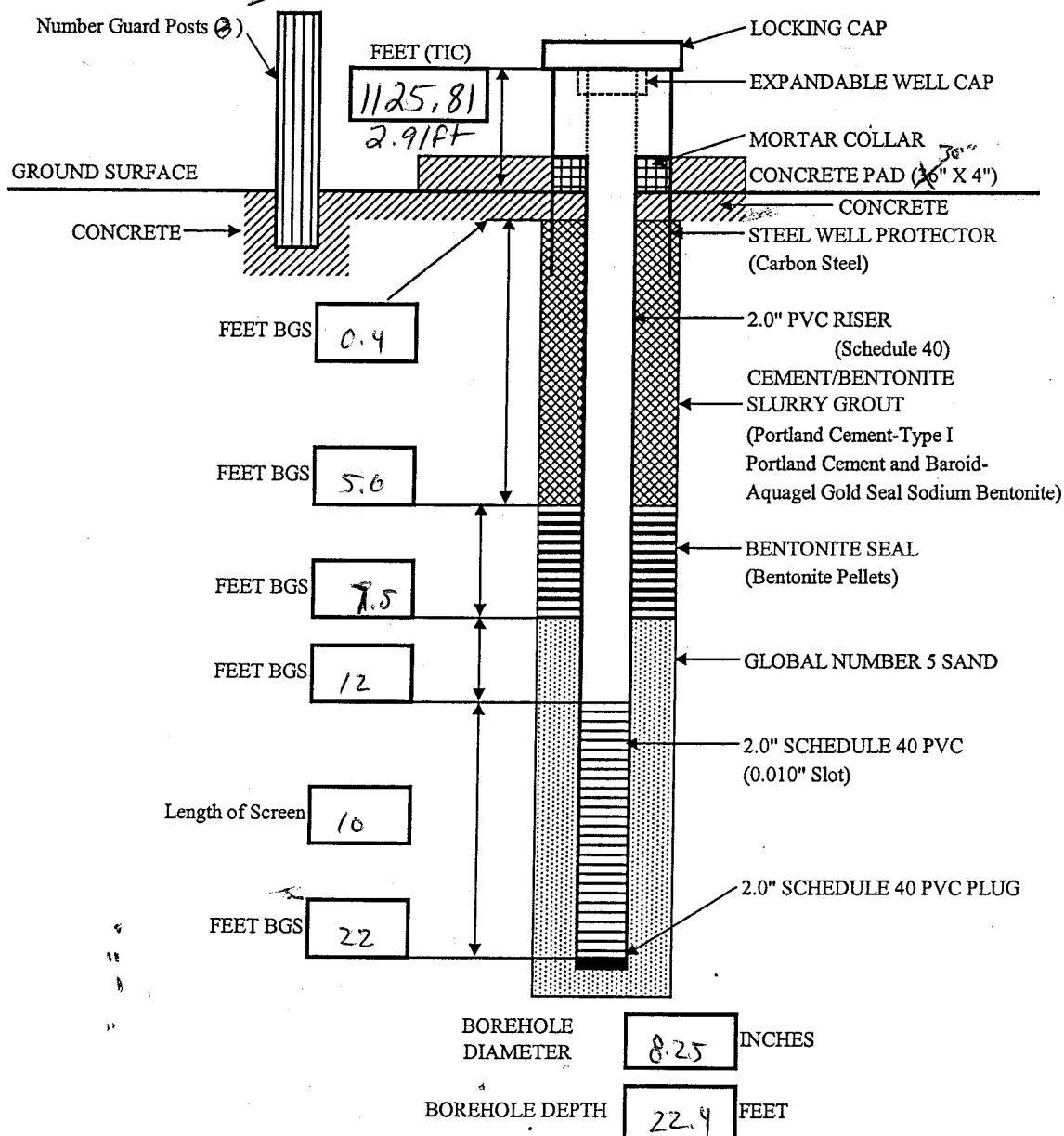


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RAAP RI 14*

Well Number: <i>LL5mw 004</i>	Begin: <i>09Dec04</i>	End: <i>09Dec04</i>
Coordinates: N: <i>554073.73</i> E: <i>2355006.44</i>	Elevation: <i>1122.90</i>	Reference Point:
Logged By: <i>[Signature]</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Well Development Record

Well ID: LLS MW - 004 GW
Date: 12/17/04

Ravenna Army Ammunition Plant-
RVAAP 14 AOC Characterization

Project: RVAAP-14

Development Method: Whale Pumping

Development Company: MKM

Comments: _____

Well TD: 24.8 FT TIC Depth to Water: 16.00 FT ~5
Water Column Height: 8.8 FT One Well Volume: 5.19 Gals

Well Volume
(gallons/foot)

2-Inch = 0.16
4-Inch = 0.65

6-Inch = 1.47
8-Inch = 2.61

Time	Well Dev. Code	Depth to Water (ft)	Purge Rate (gpm)	Purge Volume (gal)	Field Measurements				Turbidity	Comments
					pH	CON	DO	Temp		
0955	DSB	16.00	—	—	—	—	—	—	—	—
1000	DSE	15.7	—	—	—	—	—	—	—	—
1000	DPB	15.7	—	—	—	—	—	—	—	—
1011	DFM	—	—	5gal	5.95	0.083	6.6	11.1	>1000	5gal (1st well vol)
1028	DFM	—	—	5gal	6.88	0.386	6.47	10.9	308	10gal (2nd well vol)
1041	DFM	—	—	5gal	7.60	0.378	7.35	10.8	0	15gal (3rd well vol)
1043	DPE	DRY	—	—	—	—	—	—	—	—
0920	DSB	15.55	—	—	—	—	—	—	—	—
0905	DSE	15.90	—	—	—	—	—	—	—	—
0907	DPB									
0936	DFM	—	—	5gal	6.93	0.564	6.61	8.4	71000	20gal (4th well vol)
0949	DFM	—	—	5gal	7.48	0.545	8.05	10.6	470	25gal (5th well vol)
1009	DFM	—	—	5gal	7.86	0.521	7.44	11.8	962	30gal (6th well vol)
1030	DFM	19.4	—	5gal	8	0.546	5.82	12.1	550	35gal (7th well vol)
1031	DPE	DRY	—	15gal	—	—	—	—	—	365gal (dry)
	FINAL									Development complete

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other: _____

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNU)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other _____

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)
OR

Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: vijay Aluri (Please Print)

Reviewed By: C. Esler

Signature: vijay

Date: 2/22/05

Monitoring Well Purging Form

Well ID: LL5mw-0046w

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 01/04/05

WELL OBSERVATIONS

Protective Casing: Intact Damaged Locked: Yes No Key No:
Concrete Base: Intact Damaged Inner Casing: 2" 4" 6" 8" Other:
Stickup Height: 30.4 (ft) TIC TOC Difference: 0.26 (ft)
Vapor Readings: HNu OVA Background: Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes No Yes No
DNAPL Yes No Yes No

LL5mw-0046w

CALCULATIONS

- (A) Depth to Well Bottom 25.4 (ft) TOC TIC BGS Measured Previously Measured (circle one)
(B) Depth to Water 14.4 (ft) TOC TIC BGS Time Measured: 1354
(C) Water Column Height (A-B) 11.0 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 1.76 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 8.80 (gal)

EVACUATION METHOD

Well Evacuation Method: Bailer Submersible Pump Micro purging Other: Device Number:

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored Disposed Onsite Offsite

Collected In: Tanks Drums No. of Containers:

Comments:

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
1355	14.4			0.568	9.24	7.65	1000	5.98	Initial reading
1358	14.3			0.570	9.46	7.61	1000	3.33	
1401	14.3			0.570	9.50	7.6	886	2.21	
1404	14.4			0.572	9.51	7.6	707	1.61	
1407	14.5			0.575	9.51	7.6	627	1.43	
1410	14.5			0.575	9.16	7.6	473	1.66	End purging

Logged By: Vijay Alluri (Please Print)

Reviewed By: C. reddy

Signature: Vijay

Date: 2/22/05

Location ID: LLSmw-004 GW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 01/04/05

Sampling Information

Source	Groundwater Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Micro purging X		Push Probe
Type/Construction			Plastic Liner
			Mattocks
Miscellaneous	Well Purging Form (Yes - No)		

Sample Collection: 1415 hrsSample Type: Composite - MI - GrabIf MI, # of increments taken: NALocation: Plotted on Map - Staked in Field
Estimated - Measured - SurveyedSample Depth: 21 FT (below surface)Decon: Dedicated - Each Day - Each Location

Field Parameters (at time of sample)	Analytical Parameters				Other Parameters			
PID / FID Readings:	VOC	X	TPH GRO		Corrosivity			
Background: <u>0.0</u> ppm	SVOC	X	TPH DRO		Reactivity Sulfide/Cyanide			
<u>DO</u> <u>1.16</u>	Explosives	X	Chromium +6		Ignitability			
Sample: <u>0.0</u> ppm	Propellants EKE	X	Nitrate	X				
Water Level <u>14.4</u> FT	TAL Metals	X			QA Samples			
Temperature <u>9.16</u> °C	Pesticides/PCBs	X			MS/MSD	<u>Yes</u> / No		NA
Sp. Conductance: <u>0.575</u> uMHOs	Cyanides				Duplicate ID	<u>LLSmw-004-DUP</u>		NA
pH <u>7.6</u> units	TOC				Equipment Rinse ID	<u>LLSmw-004-ER</u>		NA
Turbidity <u>473</u> NTU	Grain Size				<u>Trip Blank ID</u>	<u>TRIP BLANK</u>		NA

Sample Description

Not clear, No odor, No sheen,
Medium to high turbiditySplit Sample
Split Sample ID: LLSmw-004-GW
Name: John Kent (2642-ER-80)
Agency/Company: USACE - Louisville
Address: 650 DE MARTIN WITHFIELD KING JR PLAZA
LOUISVILLE, KY 40202QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

If sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

After sample description should include:

Color Odor Sheen Turbidity

Signed By: Vijay Alluri (Please Print)Reviewed by: ERIC EUS (Please Print)Signature: VijaySignature: [Signature] Date: 2/3/05

HTRW DRILLING LOG				DISTRICT <u>Louisville</u>		HOLE NUMBER <u>LL5mw-005</u>	
1. COMPANY NAME <u>MEM Engineers Inc</u>				2. DRILL SUBCONTRACTOR <u>HAD Drilling Contractors</u>		SHEET <u>1</u> OF <u>3</u>	
3. PROJECT <u>RVAAP RE 14</u>				4. LOCATION <u>Locid Line S</u>			
5. NAME OF DRILLER <u>Sam Haller</u>				6. MANUFACTURER'S DESIGNATION OF DRILL <u>CME LC-60</u>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT		<u>8-25 OD HSA</u>		8. HOLE LOCATION <u>West side of LL</u>		9. SURFACE ELEVATION <u>1126.50 ASL</u>	
		<u>2" SplitSpoons</u>		10. DATE STARTED <u>10 Dec 04</u>		11. DATE COMPLETED <u>10 Dec 04</u>	
12. OVERBURDEN THICKNESS <u>2.6</u>				15. DEPTH GROUNDWATER ENCOUNTERED <u>19.24</u>			
13. DEPTH DRILLED INTO ROCK <u>1.8</u>				16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <u>19.1 @ 0922 12/21/04</u>			
14. TOTAL DEPTH OF HOLE <u>27.8</u>				17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES <u>NONE</u>		DISTURBED <u>—</u>		UNDISTURBED <u>—</u>		19. TOTAL NUMBER OF CORE BOXES <u>—</u>	
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <u>—</u>		METALS <u>—</u>		OTHER (SPECIFY) <u>—</u>	
						21. TOTAL CORE RECOVERY <u>—</u> %	
22. DISPOSITION OF HOLE		BACKFILLED <u>—</u>		MONITORING WELL <u>X</u>		23. SIGNATURE OF INSPECTOR <u>[Signature]</u>	
LOCATION SKETCH/COMMENTS				SCALE:			
PROJECT <u>RVAAP RE 14</u>				HOLE NO. <u>LL5mw-005</u>			

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER LCSmw-005
PROJECT RWAPRI 14			INSPECTOR Mark Dunley				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. USGS	BLOW COUNT (g)	REMARKS (h)
1015	0.4'	Topsoil					
		Dr Br. SILT 75% w/ Sand Damp No odor No staining No Plasticity	0.0	1.5	ML	1-1 2-3	7.5% 5/6
	2	Changes to Dr Br + STIFF / Dry				2-4	7.5% 4/4
		white mottles Begin	0.0	1.1	ML	11-16	
	4	SAA	0.0	1.4	ML	2-7 8-12	SAA
	6	Br. SILT 65% w/ Sand Dry No odor No Plasticity No staining Fine Gravel Present	0.0	1.9	ML	2-4 7-9	SAA
	8	Br. SILT 65% w/ sand wet No odor No staining No Plasticity	0.0	1.8	ML	1-2 6-7	SAA
	10	Br. SILT 65% w/ sand Dry No odor No staining No Plasticity					
		SAA	0.0	1.9	ML	1-8 9-10	SAA
	12	Br. SAND 80% w/ silt Dry No odor No staining No Plasticity	0.0	1.7	SM	2-8 9-9	SAA
	14	Br. SILT 65% w/ sand Dry No odor No staining No Plasticity					
		SAA	0.0	1.7	ML	2-4 8-9	SAA
	16	SAA	0.0	1.8	ML	2-7 17-11	SAA
	18						
		Br. SAND 80% w/ silt wet No odor No staining No Plasticity	0.0	2.0	ML SM ML	5-8 13-15	SAA
	20	Br. SILT 65% w/ sand Dry No odor No staining No Plasticity					

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

LLSMW 005

PROJECT

LVAAAP RE 14

INSPECTOR

Mark Donahy

SHEET

SHEETS

3 OF 3

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE DOWN RECOVERY (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
		SAA			ML	2-7	SAA
	22	2" SAND 85% w/ silt wet No odor No staining No Plasticity	0.0	1.9	SM	8-11	7.54-5/6
		Reddish Br. Silt 60% w Sand Damp No odor No staining No Plasticity			ML	3-14	
	24	Reddish Br. SAND 70% w/ silt Dry No odor No Plasticity Black and Red Striations	0.0	1.6	SM	16-17	
		Grey/Br. SAND 85% w/ silt Saturated No odor No Plasticity No staining				8-12	7.54-6/2
	26	Grey weathered SS fragments	0.0	1.7	SM	17-12	
		weathered SS			SPAKE		
	28	Bot 27.8					Bot 27.8 Sand up to 27 Screen from 27 to 17 Sand up to 19 Beaumont to 11 Grout to surface Stick-up well completion Spallons Hydroponics water used

PROJECT

LVAAAP RE 14

HOLE NO.

LLSMW-005

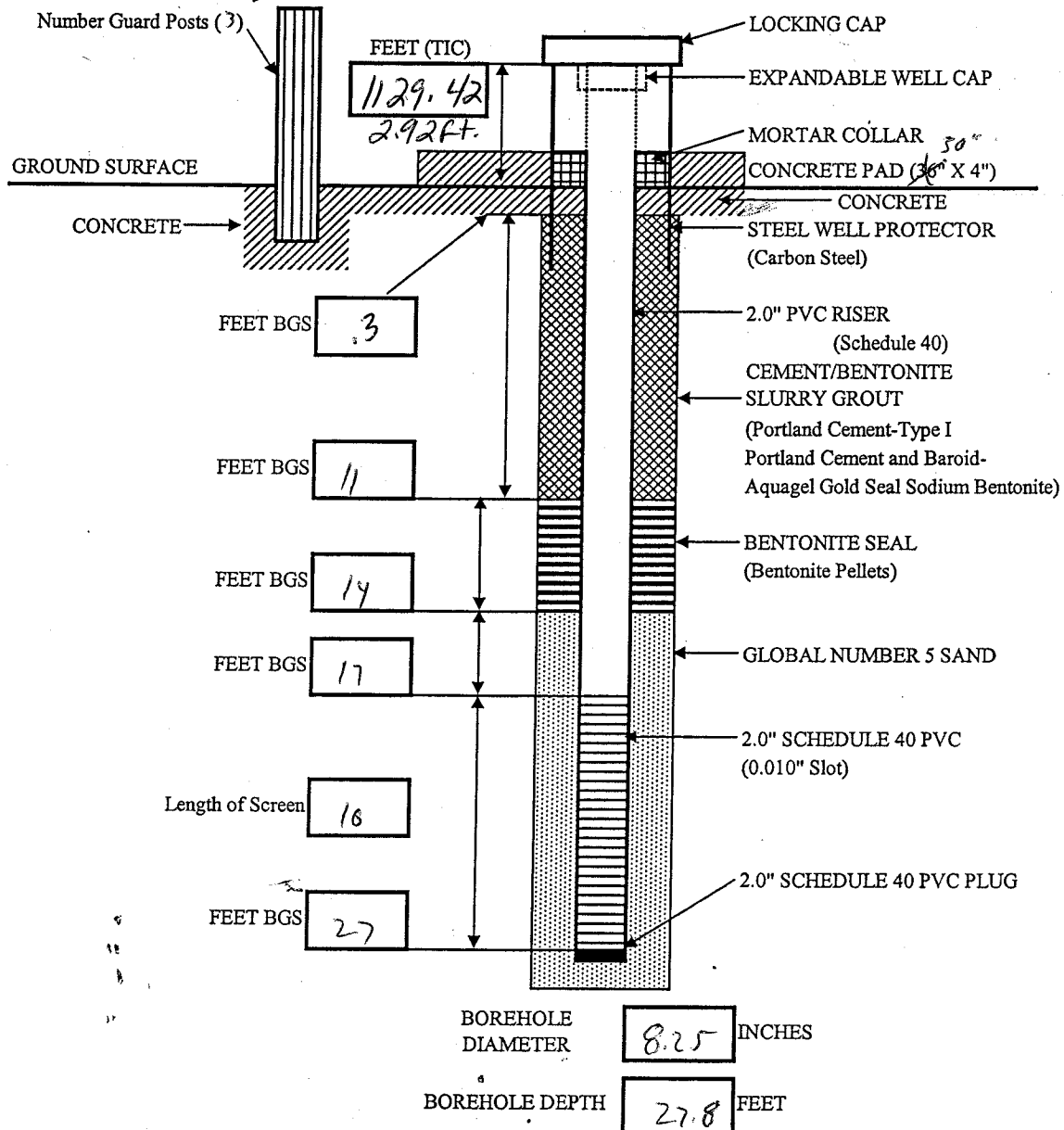


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *RUAP RE 14*

Well Number: <i>LL5mw-005</i>	Begin: <i>10 Dec 04</i>	End: <i>10 Dec 04</i>
Coordinates: N: <i>554152.73</i> E: <i>2354422.02</i>	Elevation: <i>1126.50</i>	Reference Point:
Logged By: <i>MC-daly</i>		



Notes:

- Figure not drawn to scale.
- BGS = Below Ground Surface.

- Well head protected with three guard posts set in triangle configuration about the concrete pad.

Ravenna Army Ammunition Plant- RVAAP 14 AOC Characterization

Well ID: LL5mw-005-GW
Date: 12/21/04

Project: RVAAP-14

Development Method: WHALE PUMPING

Development Company: MGM

Comments:

Well TD: 29.5 FT TIC Depth to Water: 10.1 FT ~6
Water Column Height: 10.45 FT One Well Volume: 6.16 Gals

**Well Volume
(gallons/foot)**

2-inch = 0.16	6-inch = 1.47
4-inch = 0.65	8-inch = 2.61

[illegible]

WELL DEVELOPMENT CODES

DPB - Begin Pumping
DPE - End Pumping
DSB - Begin Surge Blocking
DSE - End Surge Blocking
DFM - Field Measurements
DBB - Begin Bailing
DBE - End Bailing
DXB - Begin Other
DXE - End Other
Other:

FIELD MEASUREMENT CODES

MTP - Temperature
MSC - Specific Conductance
MPD - Photoionizer (eg. HNu)
MFD - Flame Ionizer (eg. OVA)
MDO - Dissolved Oxygen
MPH - pH
MEH - eH
MOT - Other

TURBIDITY

Enter Turbidity Meter Reading
(Final should be < 5 NTU)

OR
Enter Qualitative Observations

H - High: Muddy/Silty
M - Medium: Cloudy/Translucent
L - Low: Transparent
N - None: Clear/No Sediment

Logged By: NILESH SHRINGARPURE (Please Print)

Reviewed By: P. Weller

Signature: Shringarpure

Date: 2/22/05

Monitoring Well Purging Form

Well ID: LL5mw-005GW

Ravenna Army Ammunition Plant
Ravenna, Ohio

Date: 01/04/05

WELL OBSERVATIONS

Protective Casing: Intact · Damaged Locked: Yes · No Key No:
Concrete Base: Intact · Damaged Inner Casing: 2" · 4" · 6" · 8" Other:
Stickup Height: 23.97 (ft) TIC · TOC Difference: 0.24 (ft)
Vapor Readings: HNu · OVA Background: 0 Inside Well Casing:

Present Depth Sampled Sample ID
LNAPL Yes · No Yes · No
DNAPL Yes · No Yes · No LL5mw-005GW

CALCULATIONS

- (A) Depth to Well Bottom 29.6 (ft) TOC · TIC · BGS Measured · Previously Measured (circle one)
(B) Depth to Water 18.5 (ft) TOC · TIC · BGS Time Measured: 0923
(C) Water Column Height (A-B) 11.1 (ft)
(D) Well Diameter Factor 0.16 (gal/ft) (2" = 0.16, 4" = 0.65, 6" = 1.47, 8" = 2.61 GAL/FT)
(E) One Well Volume (C*D) 1.78 (gal)
(F) Volumes to be Evacuated 5
(G) TOTAL VOLUME TO BE EVACUATED (E * F) 8.88 (gal)

EVACUATION METHOD

Well Evacuation Method: Micro purging
Bailer · Submersible Pump · Other: Device Number:

Purge Water Disposition: 1. Discharged Onsite 2. Collected And: Stored · Disposed · Onsite · Offsite

Collected In: Tanks · Drums No. of Containers:

Comments:

TIME	DEPTH TO WATER (ft)	PURGE RATE (gpm)	Field Measurements						Comments
			HNu	Spec Cond	Temp	pH	Turb	DO	
0925	18.5			0.585	11.21	6.21	302	7.41	Initial reading
0928	18.4			0.574	11.28	6.54	304	3.18	
0931	18.5			0.571	11.24	6.74	316	1.67	
0934	18.6			0.567	10.87	7.01	194	0.15	
0937	18.6			0.56	10.87	7.11	170	0.0	End purging

Logged By: Vijay Alluri (Please Print)

Reviewed By: C. Cooper

Signature: Vijay

Date: 2/22/05

Location ID: LLS MW - 005 GW

Field Sampling Report

Ravenna Army Ammunition Plant
Characterization of 14 RVAAP AOCsDate: 01/04/05

Sampling Information

Source	Groundwater / Product	Surface Water	Soils / Sediments / Sludge
Method	Bailer	Sample Bottle	Scoop
	Pump	Bacon Bomb	Bowl
	Micro purging X		Push Probe
Type/Construction			Plastic Liner
Miscellaneous	Well Purging Form Yes No		Mattocks

Sample Collection: 0940 hrsSample Type: Composite - MI - Grab
If MI, # of increments taken: NALocation: Plotted on Map Staked in Field
Estimated - Measured SurveyedSample Depth: 24 FT (below surface)Decon: Dedicated - Each Day - Each LocationField Parameters
(at time of sample)

Analytical Parameters

Other Parameters

PID / FID Readings:

Background: 0.0 ppm20 0.0 ppmSample: 0.0 ppm

VOC	X	TPH GRO	
SVOC	X	TPH DRO	
Explosives	X	Chromium +6	
Propellants EXE	X	Nitrate	X

Corrosivity			
Reactivity Sulfide/Cyanide			
Ignitability			

Water Level: 18.5 FTTemperature: 10.87 °CSp. Conductance: 0.56 uMHOspH: 7.11 unitsTurbidity: 170 NTU

TAL Metals	X		
Pesticides/PCBs	X		
Cyanides			
TOC			
Grain Size			

QA Samples

MS/MSD	Yes / No	NA
Duplicate ID		NA
Equipment Rinse ID		NA
Trip Blank ID	<u>Trip Blank</u>	NA

Sample Description

No color, No odor, No sheen,
Medium to low turbidity

Split Sample

Split Sample ID:

Name:

Agency/Company:

Address:

QA/QC Provided: MS/MSD - Duplicate - Trip Blanks - Field Blanks
Parameters: Same as Above - As Listed

If sample description should include:

Munsell Color Odor Staining Texture Sorting Plasticity Moisture

If sample description should include:

Color Odor Sheen Turbidity

Signed By: Vijay Alluri (Please Print)Reviewed by: ERIC FWS (Please Print)Signature: VijaySignature: SPS Date: 2/3/05

HTRW DRILLING LOG		DISTRICT <i>Louisville</i>		HOLE NUMBER <i>LL5mw-006</i>	
1. COMPANY NAME <i>MK ME Engineers</i>		2. DRILL SUBCONTRACTOR <i>HAD Drilling Contractors</i>		SHEET <i>1</i> OF <i>3</i>	
3. PROJECT <i>RVAAP RE 14</i>		4. LOCATION <i>Lead Line 5</i>			
5. NAME OF DRILLER <i>Sara Hollier</i>		6. MANUFACTURER'S DESIGNATION OF DRILL <i>CME-LC 60</i>			
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT <i>8.25 OD HSA</i> <i>2" Split spools</i>		8. HOLE LOCATION <i>South west mw</i>			
		9. SURFACE ELEVATION <i>1125.10 ASL</i>			
		10. DATE STARTED <i>10 Dec 04</i>		11. DATE COMPLETED <i>10 Dec 04</i>	
12. OVERBURDEN THICKNESS <i>2.2</i>		15. DEPTH GROUNDWATER ENCOUNTERED <i>18.21</i>			
13. DEPTH DRILLED INTO ROCK <i>2.5</i>		16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED <i>17.5 @ 1256</i> <i>12/21/04</i>			
14. TOTAL DEPTH OF HOLE <i>24.5</i>		17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)			
18. GEOTECHNICAL SAMPLES <i>SHALLOW TUBE 10-12</i>		DISTURBED <i>—</i>		UNDISTURBED <i>X</i>	
19. TOTAL NUMBER OF CORE BOXES <i>NA</i>					
20. SAMPLES FOR CHEMICAL ANALYSIS		VOC <i>—</i>		METALS <i>—</i>	
		OTHER (SPECIFY) <i>—</i>		OTHER (SPECIFY) <i>—</i>	
21. TOTAL CORE RECOVERY <i>—</i> %		22. DISPOSITION OF HOLE <i>BACKFILLED</i> <i>X</i>		23. SIGNATURE OF INSPECTOR <i>M. D. Dwyer</i>	
24. MONITORING WELL <i>X</i>		OTHER (SPECIFY) <i>—</i>			
LOCATION SKETCH/COMMENTS SCALE:					
PROJECT <i>RVAAP RE 14</i>				HOLE NO. <i>LL5mw-006</i>	

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
LLSMW-006
SHEET 2 OF 3

PROJECT
RVAAP RE 14

INSPECTOR
Mark Dunkley

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEO TECH SAMPLE OR SORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
0826	0.4	Topsoil					
	1	LT Br. SILT 65% w/ Sand Damp No odor No Plasticity Gray Mottling	0.5	1.5	ML	1-1	7.5y-6/6
	2	DR Br. SILT 75% w/ Sand Dry Still No odor No Plasticity Gray Mottling Present				2-4	
			0.0	1.5	ML	1-5	7.5y-4/6
	4					8-11	
		SAA	0.0	1.6	ML	3-6	SAA
	6					8-11	
		Br. SILT 65% w/ Sand Damp No odor No Staining No Plasticity	0.0	1.7	ML	1-4	7.5y-5/4
	8					8-4	
		SAA	0.0	1.9	ML	1-1	SAA
	10					6-9	
		0845 10 Dec 04 Shelby Tube					
	12	Br. SILT 65% w/ Sand Damp No odor No Staining No Plasticity	0.5	1.7	ML	1-3	7.5y-5/4
	14	Change to Dry				5-8	
		SAA	0.0	1.4	ML	4-10	SAA
	16					3-4	
		SAA	0.0	1.8	ML	4-10	SAA
	18	Gray SILT 75% w/ Sand Dry No odor No Staining No Plasticity wet @ 18.5				11-11	7.5y-5/1
		Br. SILT 60% w/ Sand & Fine Gravel Dry No odor No Staining No Plasticity	0.0	1.9	ML	6-10	7.5y-5/6
	20					12-11	

PROJECT
RVAAP RE 14

HOLE NO.
LLSMW-006

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
LL5mw-006
SHEET 3 OF 3

PROJECT

RVAAP RE 14

INSPECTOR

Mark Drilling

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	22	SAA Br. SAND & silt w/ silt saturation No odor No staining Split-Spoon Rejected Weathered SS Bedrock		1.4	ML SM	8 10 23 5/5	SAA
24	24						
26	26	Do it 24.5					Do it 24.5 Sand up to 24 Series from 24 to 14 Sand up to 11 Bentonite to 8 GROUT to surface Stick-up completion <u>5 gallons Hydration water used</u>

PROJECT

RVAAP RE 14

HOLE NO.

LL5mw-006

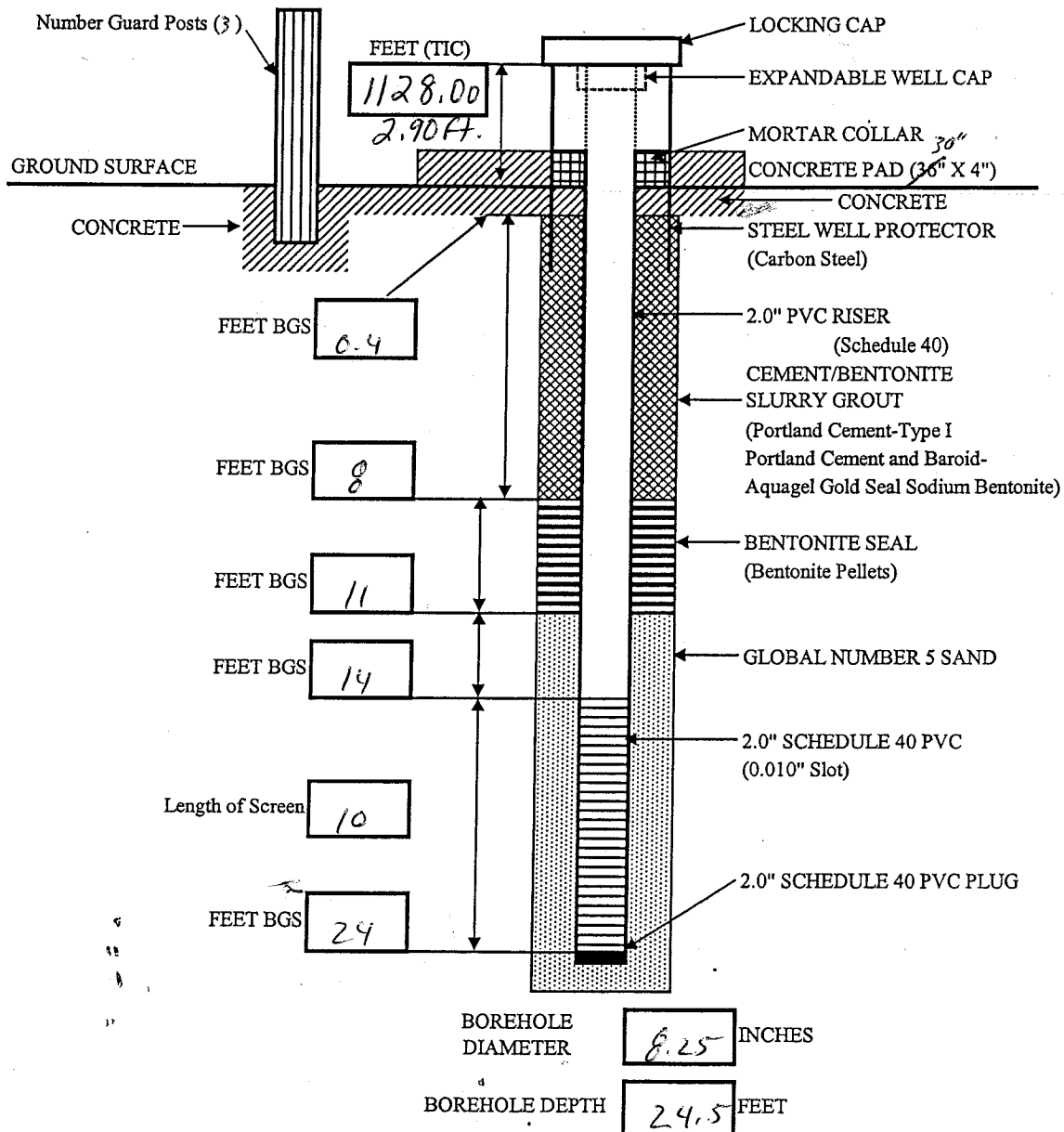


MONITORING WELL CONSTRUCTION DIAGRAM

RAVENNA ARMY AMMUNITION PLANT

Project: *ZMAP RE 14*

Well Number: <i>LL5mw-006</i>	Begin: <i>10 Dec 04</i>	End: <i>10 Dec 04</i>
Coordinates: N: <i>553984.82</i> E: <i>2354730.78</i>	Elevation: <i>1125.10</i>	Reference Point:
Logged By: <i>[Signature]</i>		



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.

Well ID: LL5mw-006-GW
Date: 12/21/04

Project: RVAAP--14

Development Method: WHALE

Development Company: MRM

Comments:

Well TD: <u>27.5</u>	FT TIC	Depth to Water: <u>17.5</u>	FT	Well Volume	2-inch = 0.16	6-inch = 1.47
Water Column Height: <u>10</u>	FT	One Well Volume: <u>5.9</u>	Gals	(gallons/foot)	4-inch = 0.65	8-inch = 2.61

WELL DEVELOPMENT CODES	FIELD MEASUREMENT CODES	TURBIDITY
DPB - Begin Pumping	MTP - Temperature	Enter Turbidity Meter Reading
DPE - End Pumping	MSC - Specific Conductance	(Final should be < 5 NTU)
DSB - Begin Surge Blocking	MPD - Photoionizer (eg. HNu)	OR
DSE - End Surge Blocking	MFD - Flame Ionizer (eg. OVA)	Enter Qualitative Observations
DFM - Field Measurements	MDO - Dissolved Oxygen	
DBB - Begin Bailing	MPH - pH	H - High: Muddy/Silty
DBE - End Bailing	MEH - eH	M - Medium: Cloudy/Translucent
DXB - Begin Other	MOT - Other _____	L - Low: Transparent
DXE - End Other	_____	N - None: Clear/No Sediment
Other: _____	_____	

Logged By: NILESH SHRINGAPURE (Please Print)

Reviewed By:

Signature:

Date: