APPENDIX C
MONITORING WELL INSTALLATION AND DEVELOPMENT LOGS

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MONITORING WELL INSTALLATION AND DEVELOPMENT LOGS

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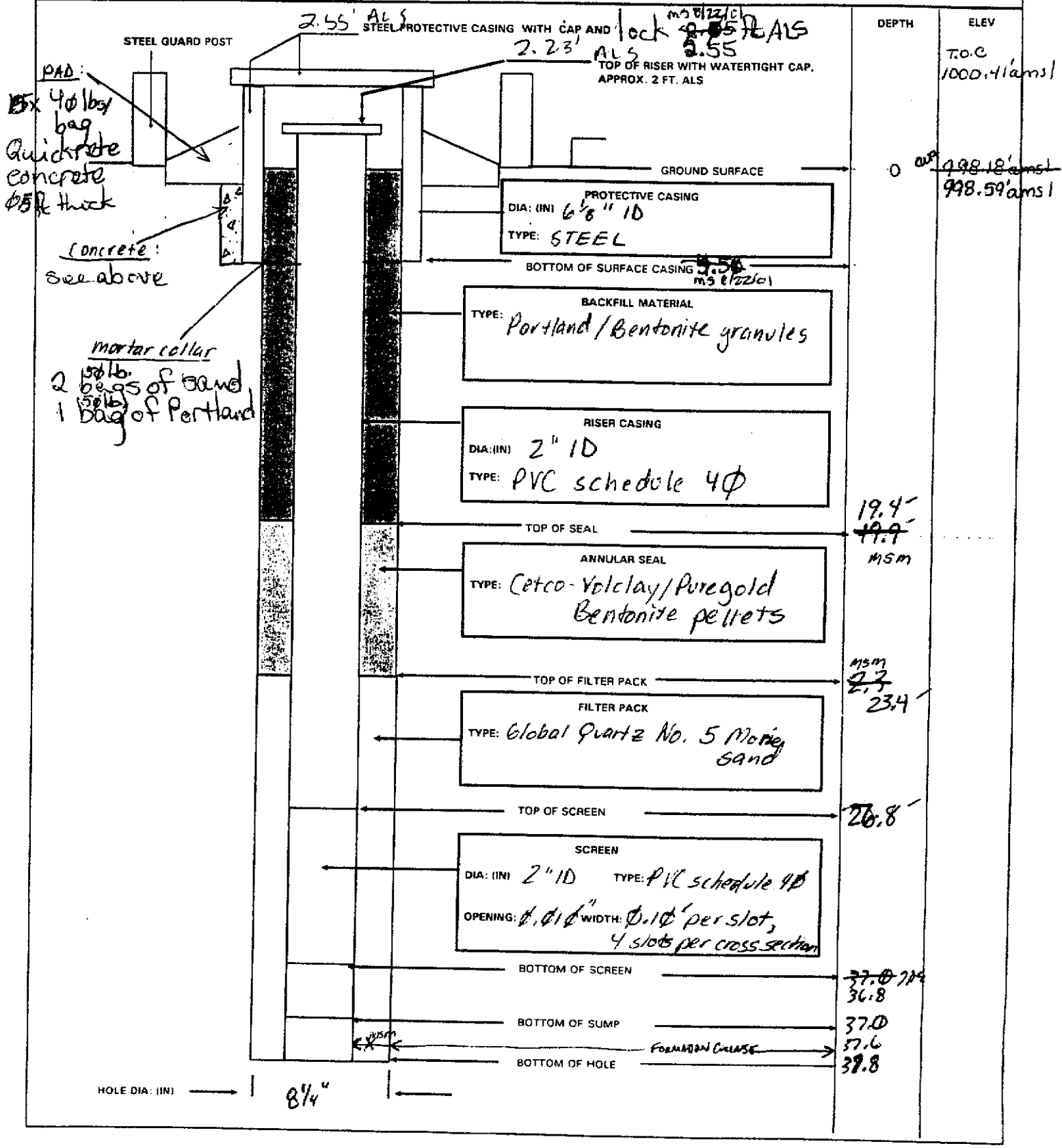
MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI — **DELIVERY ORDER NO.:** ECAS #186

WELL NUMBER: LL3MW-232	**BEGIN:** 08/13/01 0925	**END:** 08/22/01 1415
COORDINATES: N: 561365.12 E: 2369863.32	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1000.41' amsl



HTRW DRILLING LOG

	DISTRICT: Louisville	HOLE NUMBER LL3MW-232
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 5

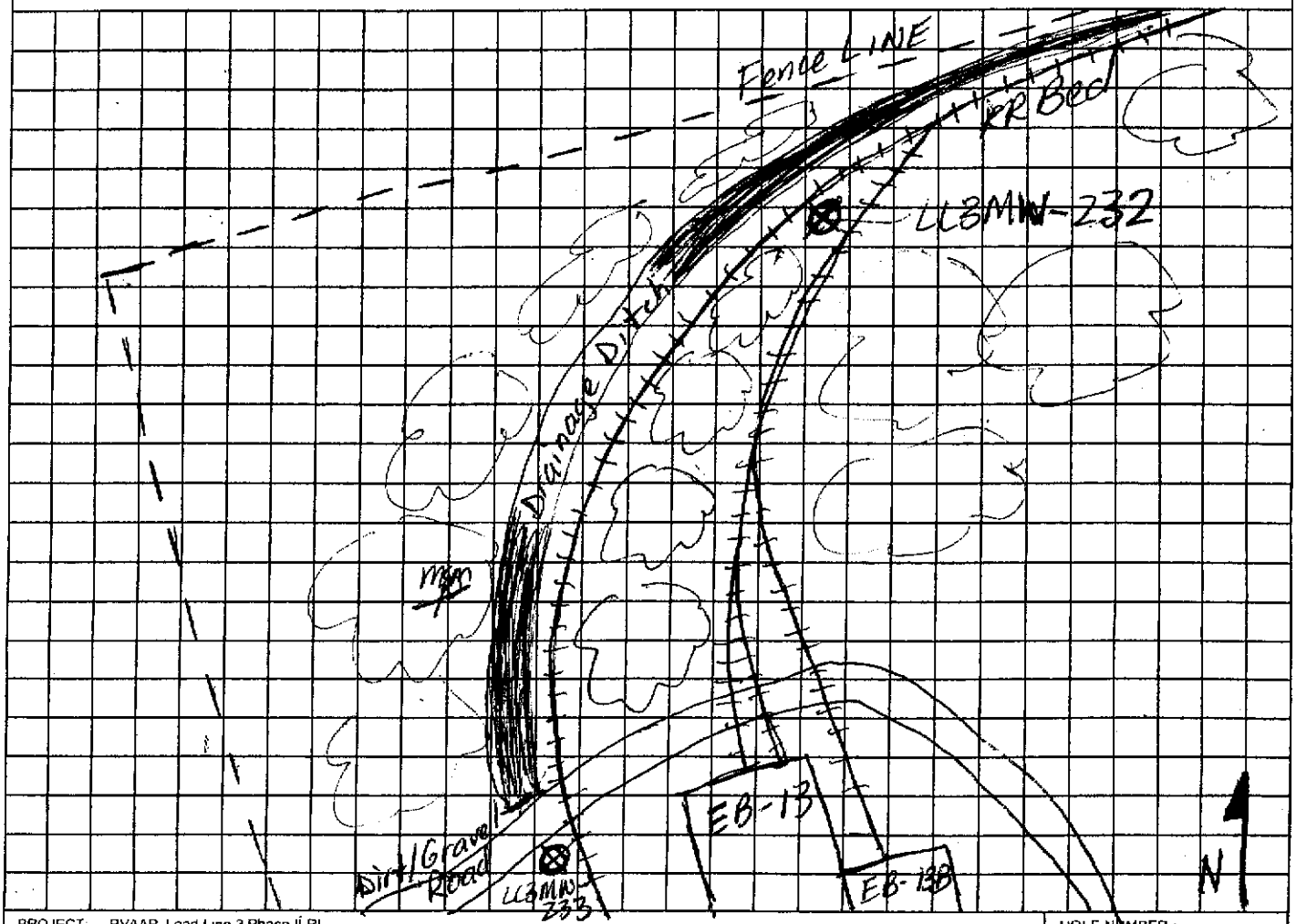
3. PROJECT: RVAAP, Load Line 3 Phase II RI	4. LOCATION: (N) end of LL3, between 2 RR beds
5. NAME OF DRILLER: Bob Gollihue	6. MANUFACTURERS DESIGNATION OF DRILL: CME 550
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 550 4¼" ID Augers 2" diam. split spoons 140 lb split spoon hammer NQ Coring ~~MSM 8/13/01~~	8. HOLE LOCATION: See map below
	9. SURFACE ELEVATION: 1000.4 (TOC) 56136.12N 2369363.32E Tol 11/3/02
	10. DATE STARTED: 8/12/01 — 11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: ~22'	15. DEPTH GROUNDWATER ENCOUNTERED: ~30.5' bgs - rose to 21" overnight
13. DEPTH DRILLED INTO ROCK: ~15.8'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 21' bgs @ 1345 on 08/14/01
14. TOTAL DEPTH OF HOLE: 37.8' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 8/22/01 1010: 21.30' BGS.

18. GEOTECHNICAL SAMPLES: 1	DISTURBED	(UNDISTURBED)	19. TOTAL NUMBER OF CORE BOXES: 1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY: 55%
N/A	N/A	N/A	N/A	N/A	N/A	

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

LOCATION SKETCH/COMMENTS: LL3MW-232 — SCALE: NTS



PROJECT: RVAAP, Load Line 3 Phase II RI — HOLE NUMBER: LL3MW-232

HTRW DRILLING LOG

HOLE NUMBER LL3MW-232

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 2 OF 5

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	SILTY GRAVEL (GM) DRY, ANGULAR GRAVEL - SS	N/A - PID NOT WORKING	N/A	N/A	SPLIT SPOON 0-2' 7/5/5/22 1.1/2.0
	1	LIGHT YELLOWISH BROWN (10YR6/4) CLAYEY SILT (ML), DRY, CRUMBLY				
	2	WEATHERED SS. GRAVEL, SUB-ANG.				SPLIT SPOON 2-4' 18/20/10/12 1.7/2.0
	3	GRAYISH BROWN (2.5Y5/2) CLAYEY SILT w/(ML) WITH YELLOWISH RED (5YR5/8) MOTTLING, ~5% ANGULAR GRAVEL				
	4	NO RECOVERY, DROVE LARGE PIECE OF GRAVEL THUD SECOND SPOON				SPLIT SPOON 4-6' 3/4/5/6 NO RECOVERY DROVE LARGE PIECE OF GRAVEL
	5	DROPPED TO 6'				
	6	CONTACT IN INTERVAL ABOVE, UNSURE OF EXACT DEPTH DUE TO NO RECOVERY W/SPOON OLIVE GRAY (5Y4/2) CLAY, COHESIVE, MEDIUM PLASTICITY, MOIST, OCCASSIONAL SUB-ANGULAR GRAVEL				SPLIT SPOON 6-8' 3/4/4/4 ~~1.1/2.0~~ 1.0/2.0
	7					
	8					SPLIT SPOON 8-10' 2/2/2/2 1.2/2.0
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER LL3MW-232

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 3 OF 5

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
		SAME AS ABOVE	N/A - PID NOT WORKING		N/A	SPLIT SPOON 10-12' 2/9/12/13 1.9/2.0
	11	LIGHT GRAY (N7) CLAY, MOIST, HARD, MEDIUM PLASTICITY W/ YELLOWISH BROWN (10YR 5/8) MOTTLING, TRACE OF SMALL ANGULAR GRAVEL, ~~DRY~~ MOIST TOP (10.6 - 11.7)				
	12	DARK YELLOWISH BROWN (10YR 4/4) CLAYEY SILT, ~20% SUB-ANGULAR TO ANGULAR GRAVEL, DRY				SPLIT SPOON 12-14' 6/7/8/11 1.7/2.0
		SAME AS 10.6 - 11.7' INTERVAL				
		~~SAME AS 6-10' INTERVAL~~				
		DARK YELLOWISH BROWN (10YR 4/4) CLAYEY SILT, DRY, HARD				
	13	LIGHT OLIVE BROWN (2.5Y 5/3) SILTY CLAY, MOIST, MEDIUM PLASTICITY				
		DARK YELLOWISH BROWN (10YR 4/4) CLAYEY SILT, DRY, HARD		SHELBY TUBE 13.5 - 15.5' 850 PSI 21" PUSH 1133 1.7' REC LL3MW-232-1113		
	14					SPLIT SPOON 14-16' 3/9/11/14 1.9/2.0
	15	SANDY SILT SEAM < 0.1' OLIVE BROWN (2.5Y 4/4) CLAYEY SILT, DRY, HARD				
	16	OLIVE (5Y 4/4) VERY FINE GRAINED SAND - SILTY, SATURATED,				SPLIT SPOON 16-18' 12/12/15/16 2.0/2.0
	17	LIGHT OLIVE BROWN (2.5Y 5/3) SILTY CLAY, DRY, HARD, LOW PLASTICITY, LOW COHESIVENESS, TRACE SUB-ROUNDED GRAVEL (16.6 - 18.3)				
	18	VERY COARSE SAND, SILTY, SATURATED				SPLIT SPOON 18-20' 8/10/13/15 0.9/2.0
		SAME AS 16.6 - 18.3 INTERVAL				
		SS FRAGMENTS/GRAVEL - ANGULAR				
	19	LIGHT OLIVE BROWN (2.5Y 5/3) SILTY CLAY, DRY, HARD, LOW PLASTICITY, ANGULAR GRAVEL ~ 10%				

HTRW DRILLING LOG

HOLE NUMBER L13MW-232

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Todd Eaby

SHEET 4 OF 5

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	21	- ? - ? - ? -	N/A - PID NOT WORKING	N/A	N/A	SPLIT SPOON 20-22' 12/12/15/20 ~~0.3/2.0~~ TPE No Recovery
	22	VERY DARK GRAY (N3) VERY WEATHERED SHALE, CRUMBLY, DRY				SPLIT SPOON 22-24' 13/34/50-6" 1.4/1.5
	23					
	24					SPLIT SPOON 24-26' 24/50-4" ~~1.0/0.9~~ TPE 1.0/0.85'
	25					
	26					Split SPOON 26-28' 24/50-4" 0.95/0.85 REC
	27					
	28					split spoon 28-30' 15/50-5" 0.9/0.9 REC
	29					
	30					

HTRW DRILLING LOG

HOLE NUMBER LL3MW-232

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 5 OF 5

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	30	SAME AS ABOVE -? - ? - ? - - ! ? - ?- - AUGERED FROM 30-31, HARD ZONE, SLOW AUGERING - POSSIBLY SAME AS 31-31.25 INTERVAL	N/A - PID NOT WORKING	N/A	N/A	SPLIT SPOON 30-32' 50-4" 0.5/0.35 - ADVANCED AUGERS TO 31' BGL RUN 1 START 1653 1704 STOP 1657 1716 PD 37.8 CD 37.8 RUN ~~6.8~~ 6.8 GAIN: NA LOSS = ~~3.5~~ 2.5 RQD = 0 - TRACE OF H_2O BLOWN FROM HOLE AT BEGINNING OF CORE RUN
	31	GRAY (N5) FINE GRAINED SANDSTONE, HARD, MINOR SHALEY INTERVALS		Box 1		
	32	- CORE SLIGHTLY WET WHEN RETRIEVED FROM CORE BARREL				
	33					
	34					
	35	ACCUMULATED LOSS (34.3 - 37.8')				
	36					
	37					
	38	TD = 37.8 CORING				
	39	AASAA 8/11/01				

Well volume calculation sheet

Date 8/23/91 Time 1332
Well ID Num 443MW-232
Well Location (N) end of 443, between 2 RR beds

Total depth of well (ft BTOC) 39.9
Depth to water (ft BTOC) 23.82
Height of water column (ft) (Hc) 16.08

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc = 0.35 cu. ft.
$\pi \left(\frac{1}{12}\right)^2 (16.08)$

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 1.05 cu. ft. $\pi \left[\left(\frac{4.125}{12}\right)^2 - \left(\frac{1}{12}\right)^2\right](10 ft)(0.30)$

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 10.5 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .083 (ft)
Hc = height of water column 16.08 (ft)
Rf = radius of filter pack .34 (ft)
Rc = radius of inside casing .083 (ft)

WELL DEVELOPMENT FORM

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

Date: 8/23/01 and 8/24/01 Time: 1332

Well Number and Location: LL3MW-232, (N) end of LL3

Development Crew: Molly McCann - SAIC
Kate McCormick - SAIC

Driller (if applicable): Bob Gollihue - To/Test
~~TJSM 8/24/01~~

Water Levels / Time: Initial: 23.82 / 8/23/01 1340 Pumping: 24.0 / 8/23/01 1540
25.7 on 8/24/01, 1335
Final: 35.9 / 8/24/01 1614

Total Well Depth: Initial: 39.9 FT BTOC Final: 39.9 FT BTOC

Date and Time: Begin: 8/23/01 / 1350 Completed: 8/24/01 / 1607

Development Method(S): pumping
~~TJSM 8/25/01~~

Total Quantity of Water Removed: 63 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14652	8/23/01 again on 8/24/01
Specific Conductivity	↓	↓ ↓
pH		
Turbidity	↓	↓ ↓

WELL DEVELOPMENT RECORD

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

PAGE 1 OF 1

WELL NUMBER AND LOCATION: LL3MW-232, (N) end of Load Line 3

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/23/01	1355	0	18.9°	653	7.45	>999	0	0	Initial Reading
"	1554	10.5	13.2°	633	6.88	>999	10.5	1	
"	1639	10.5	14.5°	584	6.97	849	21	2	
8/24/01	0800	10.5	13.7°	621	6.82	>999	31.5	3	* MSM 8/24/01
"	1340	10.5	13.3°	538	6.83	>999	42.0	4	
"	1434	10.5	16.7°	539	6.91	628	52.5	5	
"	1520	5.0	16.2°	549	6.91	228	57.5	5.5	
"	1607	5.5	16.2°	556	6.93	438	63.0	6.0	Final Reading

MSM 8/24/01

RECORDED BY: [signature] 8/23/01 and 8/24/01
(Signature and Date)

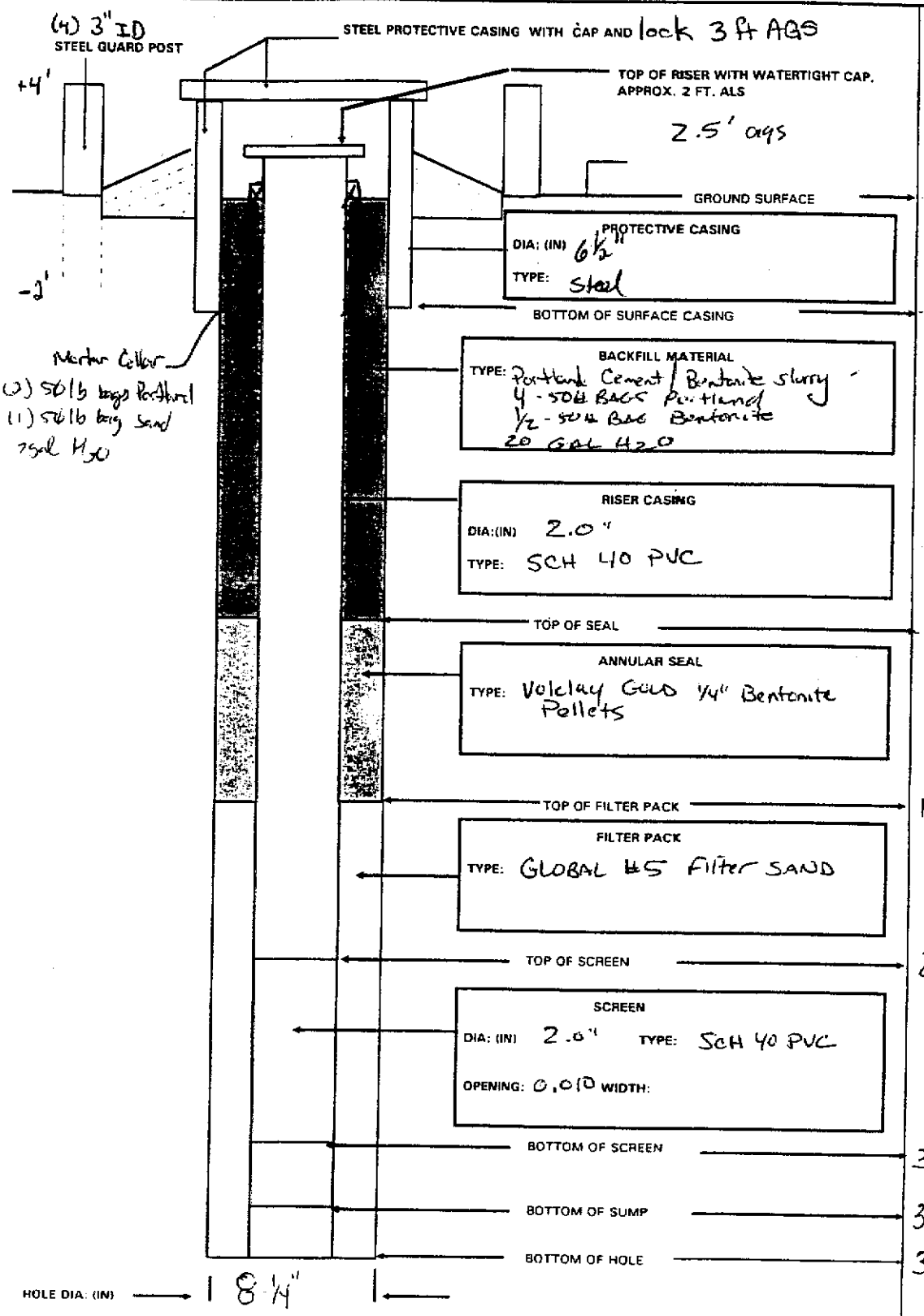
QA CHECK BY: [signature] 9/26/01
(Signature and Date)

C-13

MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI [illegible] **DELIVERY ORDER NO.:** ECAS 4186

WELL NUMBER: MW-233	**BEGIN:** 08/12/01 1515	**END:** 08/14/01
COORDINATES: N: 560750.64 E: 23699933.58	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1004.36 amsl



HTRW DRILLING LOG

1. COMPANY NAME: SAIC	DISTRICT: Louisville	HOLE NUMBER: MW-233
	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 1

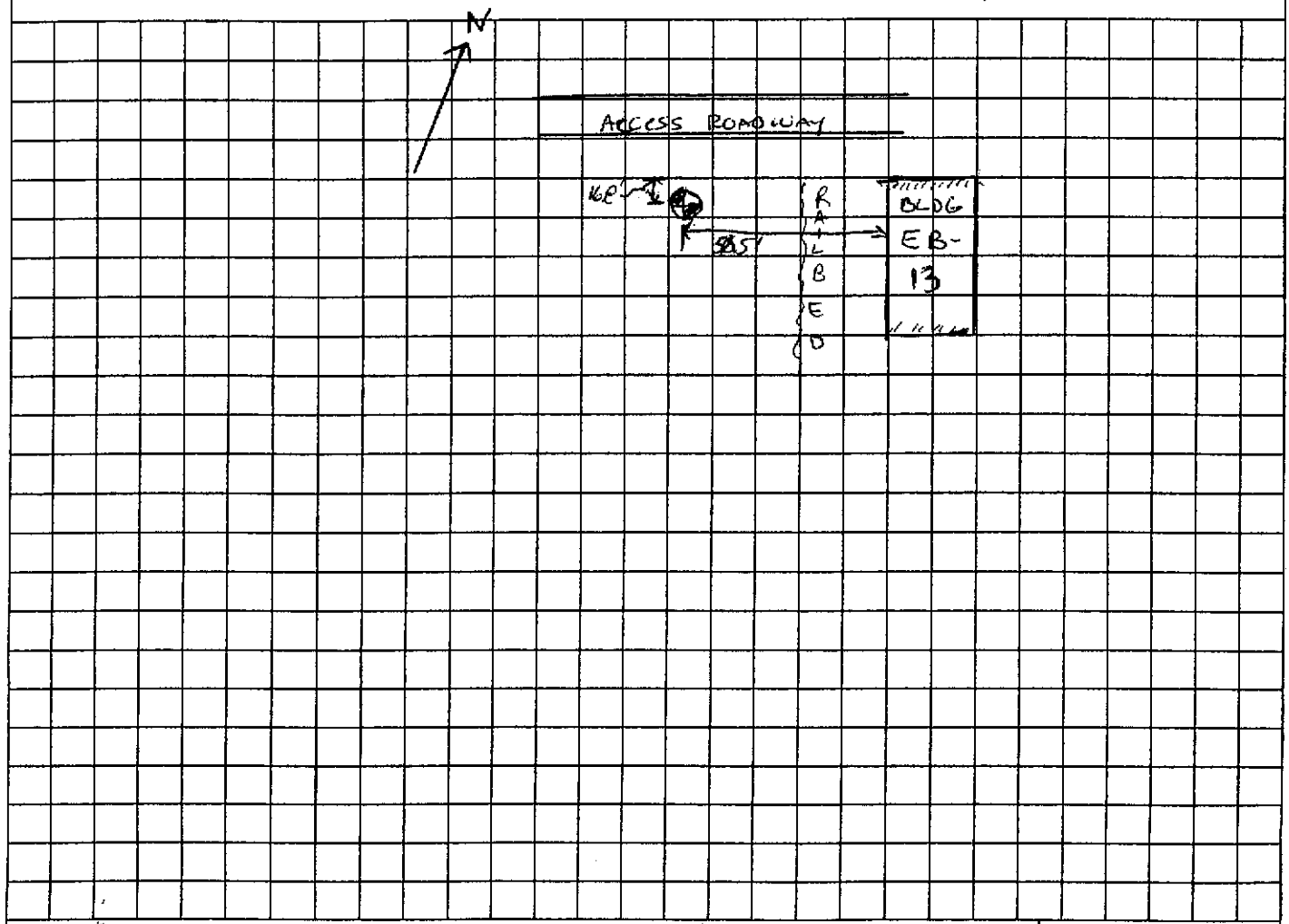
3. PROJECT: RVAAP, Load Line 3 Phase II RI	4. LOCATION: LL3
5. NAME OF DRILLER: Neil Winkler	6. MANUFACTURERS DESIGNATION OF DRILL: CME 75
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" ID HSA; 2" X 2' split spoon; 3" x 10' L wire line core barrel.	8. HOLE LOCATION: see sketch below
	9. SURFACE ELEVATION: 1006.56 TOC 5688594.47 N 2370296.54 E (KLP 1/31/02)
	10. DATE STARTED: 08/12/01 — 11. DATE COMPLETED: 08/12/01
12. OVERBURDEN THICKNESS: 0 feet	15. DEPTH GROUNDWATER ENCOUNTERED: 22 feet bgs
13. DEPTH DRILLED INTO ROCK: 23.82 feet	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 26.74 bgs 17 hours 30.98 btoc 8/13/01
14. TOTAL DEPTH OF HOLE: 31.82 feet bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 31.48 btoc 8/14/01

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A			1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A						82%

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

LOCATION SKETCH/COMMENTS — SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 3 Phase II RI — HOLE NUMBER: MW-233

HTRW DRILLING LOG

HOLE NUMBER MW-233

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey Lindau | SHEET 1 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS (Ppm)	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	10YR4/3 Brown silt, Loose, dry (ML)				Blow Count - 8, 11, 11, 7
		Fractured sandstone				Recovery 1.8/2
	1	10YR3/3 Brown silt Some fine gravel, stiff, (ML)				
		10YR3/3 lean clay, low Plasticity, soft, moist (CL)				
	2	AS Above				Blow Count - 7, 7, 8, 12
	3	Sandstone fragments				Recovery 1.4/2
	4	10YR3/3 Brown silt, Stiff to very Stiff, with gray mottling and trace fine to coarse gravel (ML)				Blow Count 7, 8, 10, 11
	5					Recovery 1.4/2
	6	AS Above				Blow Count 12, 12, 20, 20
	7					Recovery 1.5/2
		10YR 5/6 Yellowish Brown Very Stiff Silt, trace of gravel (ML)				
	8	gray to orange very Stiff Silt mixed with weathered Shale, moist (ML)				Blow Count 20, 30, 40, 27
	9	WEATHERED SHALE				Recovery 2/2
	10					

HTRW DRILLING LOG

HOLE NUMBER MW-233

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey Lindow | SHEET 2 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS (ppm)	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	10	As Above				Blow Count 8,8,19 Recovery 1.2/1.5
	11					
	12	As Above				Blow Count 12,14,18,28 Recovery 1.9/2
	13					
	14	10YR5/1 Gray weathered shale, dry				Blow Count 13,30,45,50 Recovery 1.95/2
	15					
	16	Dark gray shale, laminated dry				Blow Count 18, 50/5 Recovery 1.3/2
	17	COMPETENT BEDROCK @ 16.9' (Dark Gray SHALE)				
	18					1st core run. 18.5-28.5' Start @ 1347 and @ 1420 Pull depth 28.5 actual depth 28.45 recovery 6.5/9.95'
	19	Shale, dark gray				
	20					

HTRW DRILLING LOG

HOLE NUMBER MW-233

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey Linder | SHEET 3 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	20					
		grading into a dark gray, fine-grained siltstone				
	21					
	22					
		grading into a light gray, fine-grained sandstone				
	23					
	24					
	25					
	26					
	27					
	28					
		Dark gray siltstone / shale				2nd core run:
	29	28.4 - 29.4'				28.4 - 32'
		grades into light gray fine-grained sandstone				start @ 1428
						end @ 1440
						pull depth 32'
						actual depth 31.82'
	30					

HTRW DRILLING LOG

HOLE NUMBER MW-233

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR | SHEET 4 OF 4

CR 12/02

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	30	Light gray fine grained SANDSTONE				Recovery 4.4'/5.0'
	31.	Dark gray siltstone				
		Light gray sandstone, fine grained				Bottom of cored interval
	32	TOC 31.82' bgs				
	33					
	34					
	35					
	36					

9-10-01 vb

16

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 08/22/01 Su M Tu (W) Th F Sa PAGE 1 OF _____

Task Team Members:

Bob Gollihue ToiTest

Molly McCann SAIC

~~Enson 8/23/01~~ BGH 8/22/01

Narrative (include time and location):

0757 - Arrived at site LL3MW-233 and began well development. Water column only 0.7'.

0809 - Not able to remove any water from well. Pump working but cannot lift the 0.7' of water. Leave to work on another well and consult with Brad Richardson.

Daily Weather Conditions: A.M. Sunny, calm, ~60°F

P.M. N/A

Recorded By: Molly S McCann QA Checked By [signature] 01-20-03

Well volume calculation sheet

Date 8/22/01 Time 0757
Well ID Num LL3MW-233
Well Location Load Line 3, near Bldg EB-13 @ RR Bed

Total depth of well (ft BTOC) 32.8
Depth to water (ft BTOC) 32.1
Height of water column (ft) (Hc) 0.7

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.015 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.073 cu. ft. $= \pi\left[\left(\frac{4.125}{12}\right)^2-\left(\frac{1}{12}\right)^2\right](0.7)(0.30)$

Vt = (Vc+Vf)*(7.48 gal/cu ft) $= (.015+.073)(7.48)$
= 0.66 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .083 (ft) ~1"
Hc = height of water column 0.7 (ft) 0.7'
Rf = radius of filter pack .34 (ft) 4.125"
Rc = radius of inside casing .083 (ft) 1"

5 well volumes - 3.3 gal
10 " " 6.6 gal

WELL DEVELOPMENT FORM

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

Date: 8/22/01 Time: 1757

Well Number and Location: LL3MW-233, Load Line 3, next to Bldg

Development Crew: Molly McCann - SAIC

Bob Gollihue - TolTest

Driller (if applicable): (Bob Gollihue)

Water Levels / Time: Initial: 32.1 / 0757 Pumping: ____ / ____

Final: ____ / ____

Total Well Depth: Initial: 32.8 FT BTOC Final: ____ FT BTOC

Date and Time: Begin: ~~8/22/01~~ 8/23/01 / ____ Completed: ____ / ____

Development Method(S): pumping

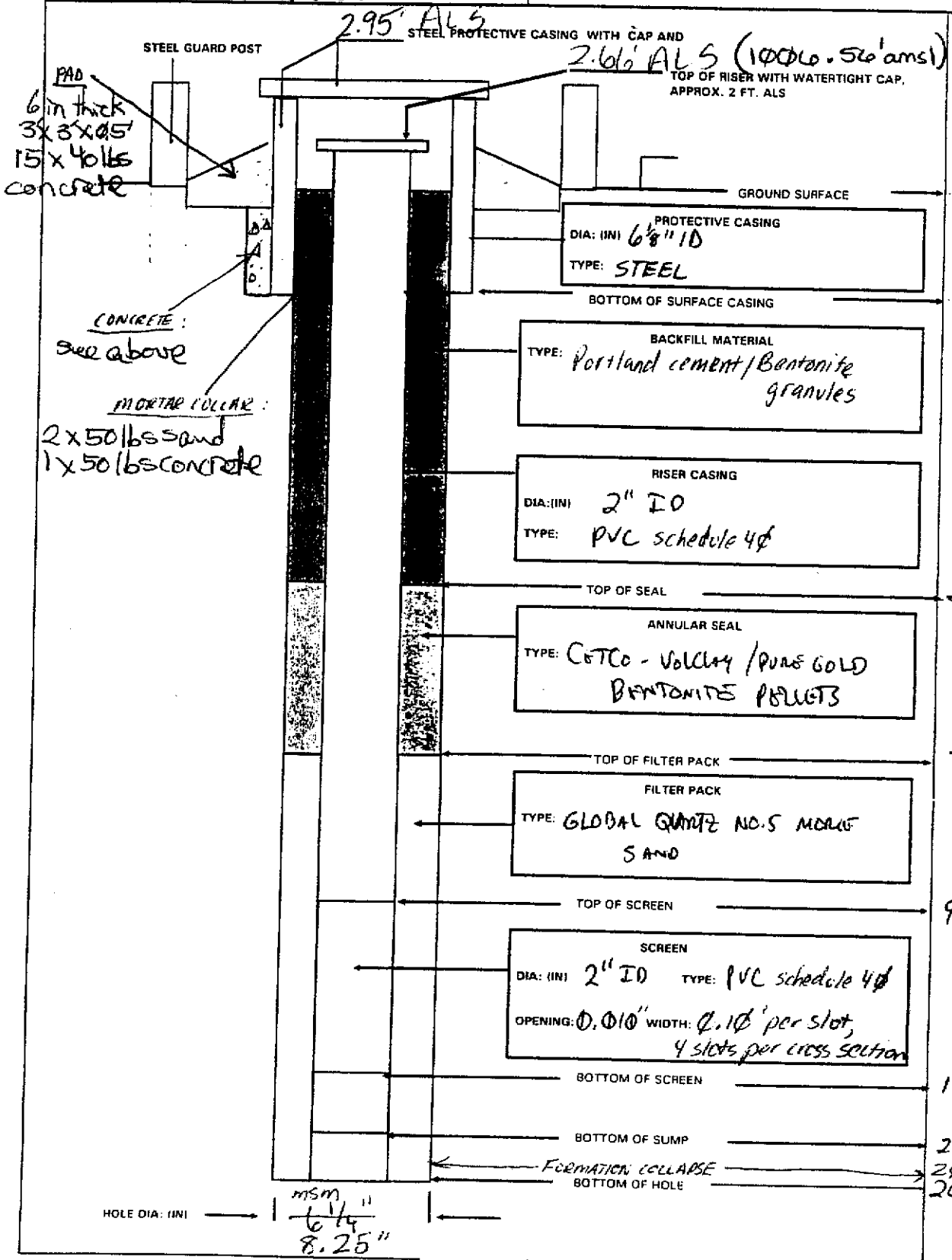
Total Quantity of Water Removed: ____ gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature		
Specific Conductivity		
pH		
Turbidity		

MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI **DELIVERY ORDER NO:** ECAS 186

WELL NUMBER: LL3MW-234	**BEGIN:** 8/12/01 1010	**END:** 8/22/01 1555
COORDINATES: N: 560059.47 E: 2370296.54	**REFERENCE POINT:** TOC	**ELEVATION:** 1006.56' amsl

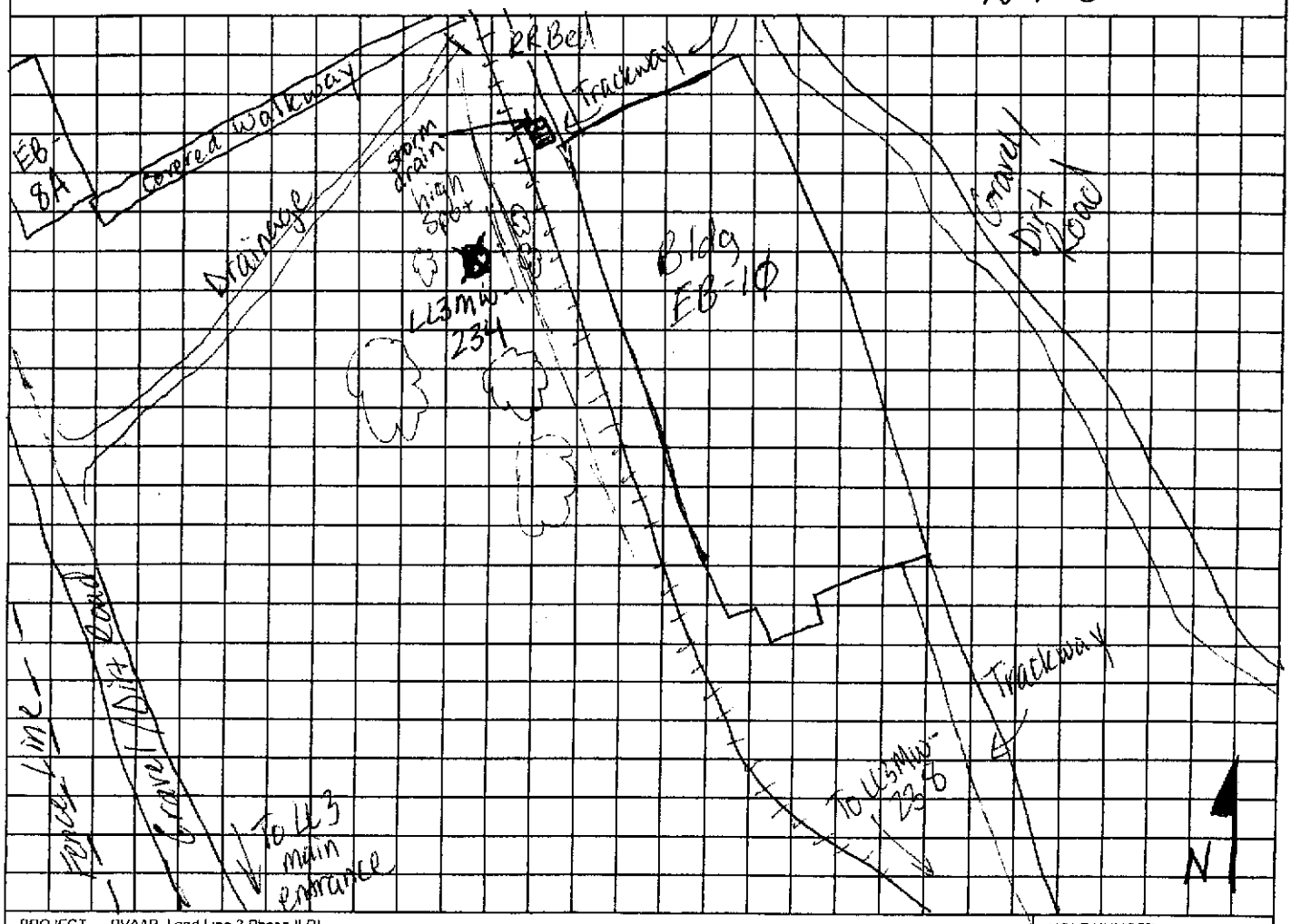


HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER: LL3MW-234
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 4
3. PROJECT: RVAAP, Load Line 3 Phase II RI	4. LOCATION: (N) half of LL3, just (W) of Bldg EB-10 across RR Bed	
5. NAME OF DRILLER: Bob Gollihue	6. MANUFACTURERS DESIGNATION OF DRILL: CME 550	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 550; 4¼ ID AUGERS; 2" Diam SPLIT SPOON; 140lb HAMMER; NQ DIAMOND ROCK CORING; TMSM 8/13/01	8. HOLE LOCATION: see map below	
	9. SURFACE ELEVATION: 1086.56 TOC; 568059.473 N 2370296.54 E KYP 1/31/02	
	10. DATE STARTED: 8/11/01	11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: ~3.5'	15. DEPTH GROUNDWATER ENCOUNTERED: ~9.9' bgs	
13. DEPTH DRILLED INTO ROCK: ~17.0'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 9.53' bgs @ 1415 08/13/01	
14. TOTAL DEPTH OF HOLE: 20.5' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 9.03' BGS on 8/22/01 10yrs; 9.47' bgs @ 1342 08/14/01	

18. GEOTECHNICAL SAMPLES: 1	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES: 1			
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY: 95%
N/A	N/A	N/A	N/A	N/A	N/A	
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: Molly McKee		
		X				

LOCATION SKETCH/COMMENTS: LL3MW-234 SCALE: NTS



PROJECT: RVAAP, Load Line 3 Phase II RI — HOLE NUMBER: LL3MW-234

HTRW DRILLING LOG

HOLE NUMBER LL3MW-234

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 2 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	PALE YELLOW (2.5Y 7/3) SILT, DRY, CRUMBLY, TRACE ANGULAR GRAVEL ML	N/A - PID NOT WORKING		N/A	SPLIT SPOON 0-2' 3/7/7/5 1.8/2.0
	1	YELLOWISH BROWN (10YR 5/6) MOTTLED LIGHT GRAY (N7) SILT DRY, HARD, CRUMBLY, ML				
	2			SHELBY TUBE 1200 PSI 18" PUSH 18" RECOVERY 5.5' LL3MW-234-111450		SPLIT SPOON 2-4' 3/18/50-6" 0.9/1.5
	3	SS. FRAGMENT				
	4	LIGHT YELLOWISH BROWN (10YR 6/4) POORLY CEMENTED, FINE GRAINED SS.				AUGERED TO 4.5' TO SET ANCHS
	5	FRACTURE ZONE FRAC		BOX #1		RUN 1 START 1710 1720 STOP 1715 1728 PD 13' CD 12.9' RUN 8.5 GAIN N/A LOSS 0.9 RQD 1.7/8.5 = 0.2
	6	FRAC VERTICAL FRACTURE, MINOR FE STAINING				
	7	FRACTURE ZONE, MINOR FE STAINING				
	8					BLOWING HOLE, TRACE OF H_2O
	9	DARK GRAY (2.5Y 4/1) WEATHERED SHALE PALE BROWN (10YR 6/3), FINE GRAINED SS, POORLY CEMENTED FRAC FRAC FRAC FRAC ZONE				
	10					

HTRW DRILLING LOG

HOLE NUMBER LL3 MW-234

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 3 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
			PID NOT WORKING	Box #1, cont.	N/A	
		FRAC ZONE				
		FINE WITH A FINE TO 10.8'				
		STRONG BROWN (7.5YR 5/6) FINE GRAINED SS, POORLY CEMENTED				
	11	10.9 SILTSTONE INTERBED				
		FE BANDING AND STAINING, FRACTURED				
		FRAC				
		FINE ZONE				
	12	FRAC				
		ACCUMULATED LOST CORE				
	13	LIGHT BROWNISH GRAY (10YR 6/2) FINE GRAINED SS. POORLY CEMENTED				
		DARK GRAY (2.5Y 4/1) SHALE, WEATHERED FE STAINING				
		REDDISH YELLOW (7.5YR 6/6) POORLY CEMENTED SS				
		LIGHT OLIVE GRAY (5Y 6/2) POORLY CEMENTED SS				
	14	FRAC				
		FINE				
		FE STAINING, FRAC @ 14.4 FE STAINED				
		DARK GRAY (N4) SHALE,				
		FRAC				
		FINE				
		FRAC, FE STAINED				
	15	GRAY (2.5Y 6/1), FINE GRAINED SS.				
	16	FRAC				
		BOX BREAK				
		BOX BREAK				
	17	BOX BREAK				
	18	LIGHT OLIVE GRAY (5Y 6/2) POORLY CEMENTED SS				
		18.2 FRAC, FE STAINED				
	19					
		SHALEY INTERBEDS, VERY MINOR				

RUN 2
START @ 844 Ø9Ø5
STOP Ø857 Ø912
PD 20.5
CD 20.4
RUN 7.5
GAIN ~~Ø~~ 0.1
LOSS Ø
RQD 4.1/7.5 = Ø.55

HTRW DRILLING LOG

HOLE NUMBER LL3MW-234

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 4 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		- Shelby Extended, Very Minor Recovered Lost Core	PID NOT WORKING	Box #1, core	N/A	N/A
		TD = 20.5'				

MSM 8/14/01

PROJECT: RVAAP, Load Line 3 Phase II RI | HOLE NUMBER LL3MW-234

Well volume calculation sheet

Date 8/24/01 Time 0840
Well ID Num LC3 MW-234
Well Location LOMB LINE 3, along RR Bed near Bldg EB-10

Total depth of well (ft BTOC) 22.7'
Depth to water (ft BTOC) 12.5'
Height of water column (ft) (Hc) 10.2'

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc .222 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 1.05 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 9.5 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .083 (ft)
Hc = height of water column 10.2 (ft)
Rf = radius of filter pack .344 (ft)
Rc = radius of inside casing .083 (ft)

WELL DEVELOPMENT FORM

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

Date: 8/24/01 Time: 0840

Well Number and Location: LL3MW-234

Development Crew: Molly McCann, KATE McCormick, BOB GOLLIHUE MSM 8/24/01

Driller (if applicable): (Bob Gollihue) MSM 8/24/01

Water Levels / Time: Initial: 0837 / 12.5' Pumping: NOT TAKEN

Final: 1200 / 14.1'

Total Well Depth: Initial: 22.7' FT BTOC Final: 22.7' FT BTOC

Date and Time: Begin: 8/24/01 / 0845 Completed: 8/24/01 / 1155

Development Method(S): pump w/ whale pump MSM 8/25/01

Total Quantity of Water Removed: 47.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	HORIBA 14652	8/24/01
Specific Conductivity	↓	↓
pH	↓	↓
Turbidity	↓	↓

WELL DEVELOPMENT RECORD

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

WELL NUMBER AND LOCATION: LL3MW-234 LOAD LINE 3 NEAR BUILDING EB-10

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/24/01	0845	0	14.7°	317	6.74	>999	0	0	INITIAL READING
	0856	9.5	14.8°	249	7.10	>999	9.5	1	
	0951	14.0	15.8°	218	7.40	168	23.5	2+	BW 09-13-01
	1022	5.0	16.2°	205	6.95	22	28.5	3	
	1054	9.5	17.1°	200	6.87	0	38	4	Increase in temp due to long tubing sitting in sun w/ low flowrate
	1155	9.5	19.3°	204	6.79	0	47.5	5	FINAL READING

MSM 8/24/01

RECORDED BY: Kathy C. McCoach 8/24/01
(Signature and Date)

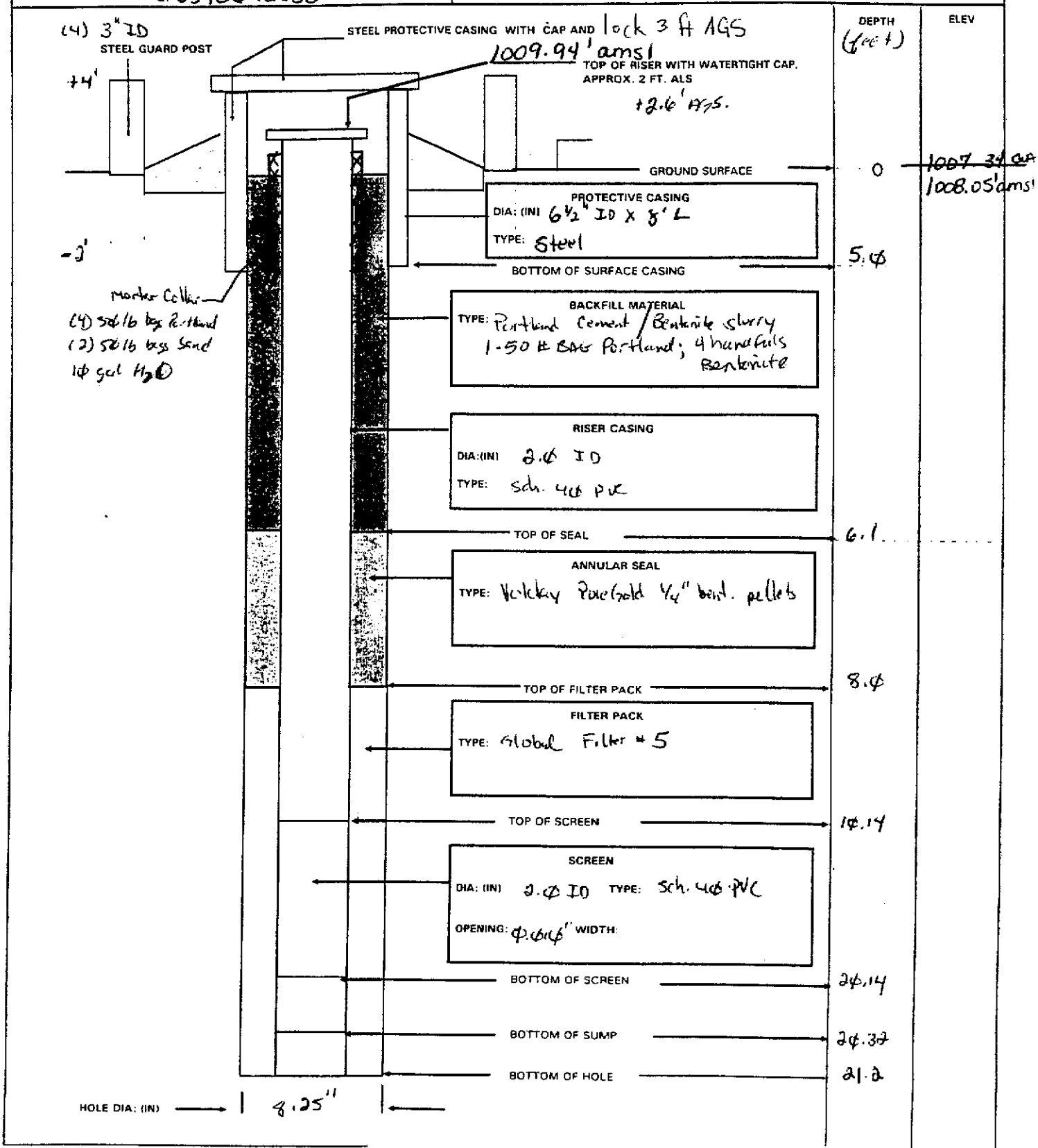
QA CHECK BY: [signature] 8/24/01
(Signature and Date)

B.W.H. 09-13-01

MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI **DELIVERY ORDER NO.:** ECAS 186

WELL NUMBER: MW-235	**BEGIN:** 08/08/01 @ 1300	**END:** 08/15/01
COORDINATES: N: 559811.55 E: 2370642.38	**REFERENCE POINT:** TOC.	**ELEVATION:** 1009.94' amsl



HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: MW-235

1. COMPANY NAME: SAIC

2. DRILL SUBCONTRACTOR: Tol-Test

SHEET 1 OF 1

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

4. LOCATION: LL3,

5. NAME OF DRILLER: Ne.1 Wisker Tol Test

6. MANUFACTURERS DESIGNATION OF DRILL: CME 75

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" HSA; 2" OD X 2' split spoon; 3" OD X 10'L wire line core barrel

8. HOLE LOCATION: See sketch below

9. SURFACE ELEVATION: 1009.94 TOC 559811.55 N 2370642.3 E 1/31/02 KLK

10. DATE STARTED: 08/08/01

11. DATE COMPLETED: 08/08/01

12. OVERBURDEN THICKNESS: 4.0'

15. DEPTH GROUNDWATER ENCOUNTERED: 10' bgs

13. DEPTH DRILLED INTO ROCK: 17.2'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 22.15' btoc / 19 hrs

14. TOTAL DEPTH OF HOLE: 21.2' bgs

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 20.77 btoc 08/10/01 @ 0355 20.87 btoc 8/11/01 @ 1505

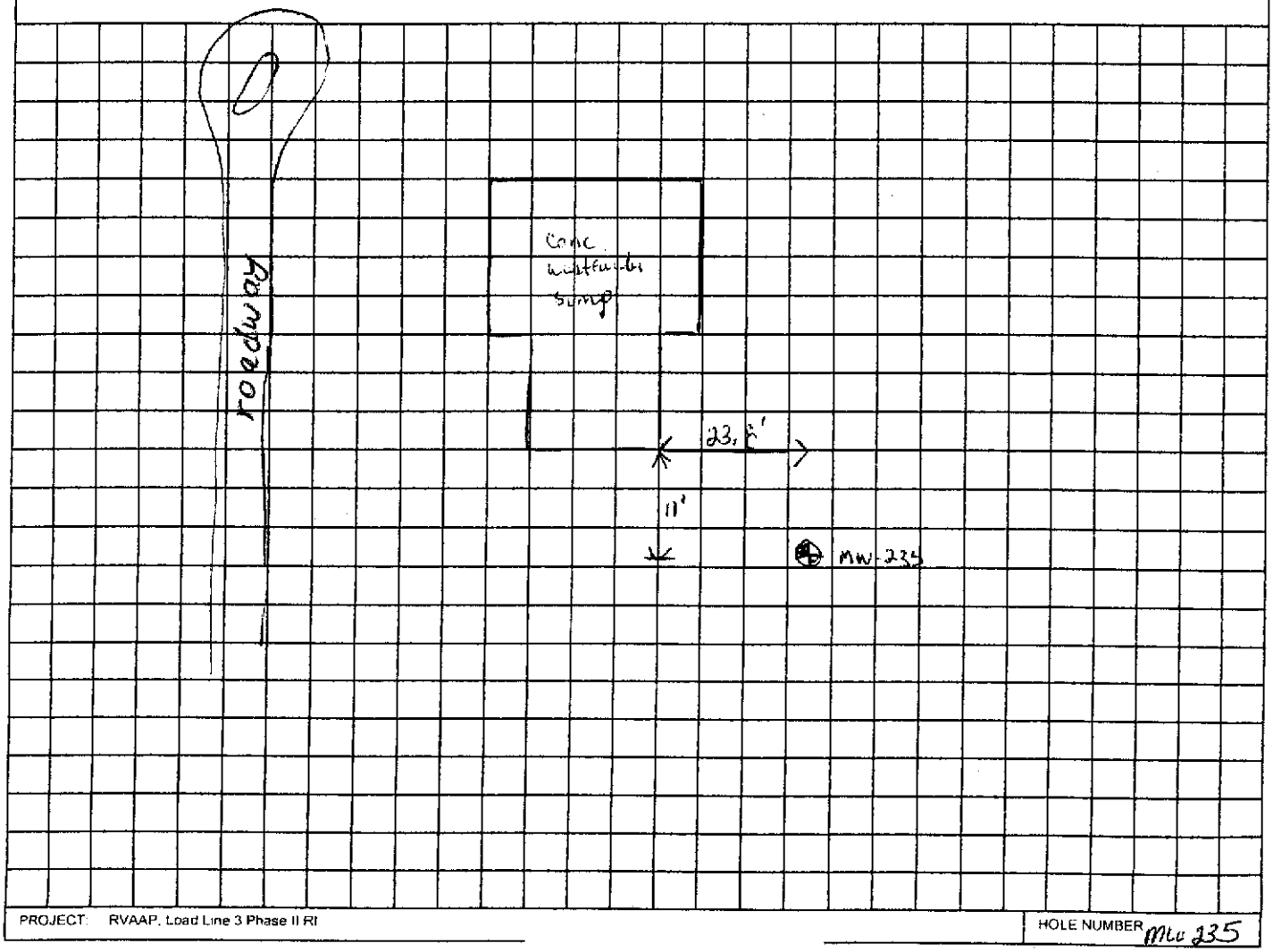
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A			1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A						87 %

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

LOCATION SKETCH/COMMENTS

SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 3 Phase II RI

HOLE NUMBER: MW-235

HTRW DRILLING LOG

HOLE NUMBER MW 235

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey J. Cinder | SHEET 1 OF 3

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	~~topsoil~~ ~~brown~~ SM lean clay, with orange mottling, greasy texture, stiff, dry, trace of rock material, 10YR6/2 light brownish gray (CL)	(1ppm) 0.0			Blow count 7,8,17,22 Recovery 1.3/2
	1					
		Bottom of shoe - weathered Sandstone, weakly cemented medium grained, dry				
	2	As above, weathered sandstone; 10YR6/8 brownish-yellow, fine sand w/ sandstone fragments	0.0			Blow count 60/6 Recovery .3/2
	3					
	4	Competent bedrock at 4'	¢			1st core run 4' - ~~13.6'~~ 14' Begin @ 0935 End @ 1007 Full depth = 14' Actual = 13.6' Loss = 0.4' Recov = 8.4'/~~10~~ 9.6' dlf 5/6/16
	5	Brown SANDSTONE, massive, medium grained, horizontal fracturing & iron staining w/in fractures. Interbedded dark gray shale @ 8.8', 10.2', & 12.7' (0.1' - 0.7' thickness), friable, laminated.				
	6					
	7					
	8					
	9	8.8' Dark gray Shale				
	10					Encountered water @ 10' bgs

PROJECT: RVAAP, Load Line 3 Phase II RI

HOLE NUMBER MW 235

HTRW DRILLING LOG

HOLE NUMBER MW 235

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey J. Lindaw

SHEET 2 OF 3

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	10					
		10.2' Dark Gray SHALE				
		Brown SANDSTONE, as above	Φ ppm			
	11					
	12					
		12.7' Dark Gray SHALE				
	13	Brown SANDSTONE, as above.				
	14					2nd core run: 14' - 19'
						Began @ 1026
						End @ ~~1045~~ 1117
						8/18/01
	15					pul depth = 19'
						actual = 19.25'
						gain = 0.25'
						recov = 4.75'/5.25'
	16	16'-16.3' Dark gray SHALE				
			Φ ppm			
	17	Color change @ 17' to Gray SANDSTONE, same lithology as above.				
	18					
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER MW-235

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey J. Linden

SHEET 3 OF 3

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	20	Dark Gray SHALE, laminated	0 ppm			
	21					
		TD @ 21.2' bgs				
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					

PROJECT: RVAAP, Load Line 3 Phase II RI

HOLE NUMBER MW 235

Well volume calculation sheet

Date 8/22/01 Time 0824
Well ID Num LF3MW-235
Well Location Load Line 3,

Total depth of well (ft BTOC) ~~30.9~~ 23.0
Depth to water (ft BTOC) 21.6
Height of water column (ft) (Hc) 1.4

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.0305 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.147 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 1.33 gal.

5 well volumes = 6.65 gal
10 " " = 13.3 gal

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .083 (ft) ~ 1 "
Hc = height of water column 1.4 (ft)
Rf = radius of filter pack .34 (ft) 4.125 "
Rc = radius of inside casing .083 (ft) 1 "

WELL DEVELOPMENT FORM

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

Date: 8/22/01 Time: 0824

Well Number and Location: LL3MW-235

Development Crew: Molly McCann - SAIC
Bob Gollihue - Tetra Tech

Driller (if applicable): ~~N/A~~ msm (Bob Gollihue)
msm 8/23/01

Water Levels / Time: Initial: 21.6 / 0824 Pumping: 22.3 / msm 1714

Final: /

Total Well Depth: Initial: 23.0 FT BTOC Final: FT BTOC

Date and Time: Begin: 8/22/01 / 0824 Completed: /

Development Method(S): pumping
msm 8/23/01

Total Quantity of Water Removed: <0.5 gals well dry, allowed to recharge
SV 3/11/04

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14652	8/22/01
Specific Conductivity	"	"
pH	"	"
Turbidity	"	"

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 3 Phase II RI **DELIVERY ORDER NO.:** CY04

PAGE 1 OF 1

WELL NUMBER AND LOCATION: LL3MW-235, Load Line 3

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (μMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/22/01	0829	0	14.0	610	6.57	>999	0	0	Initial Reading

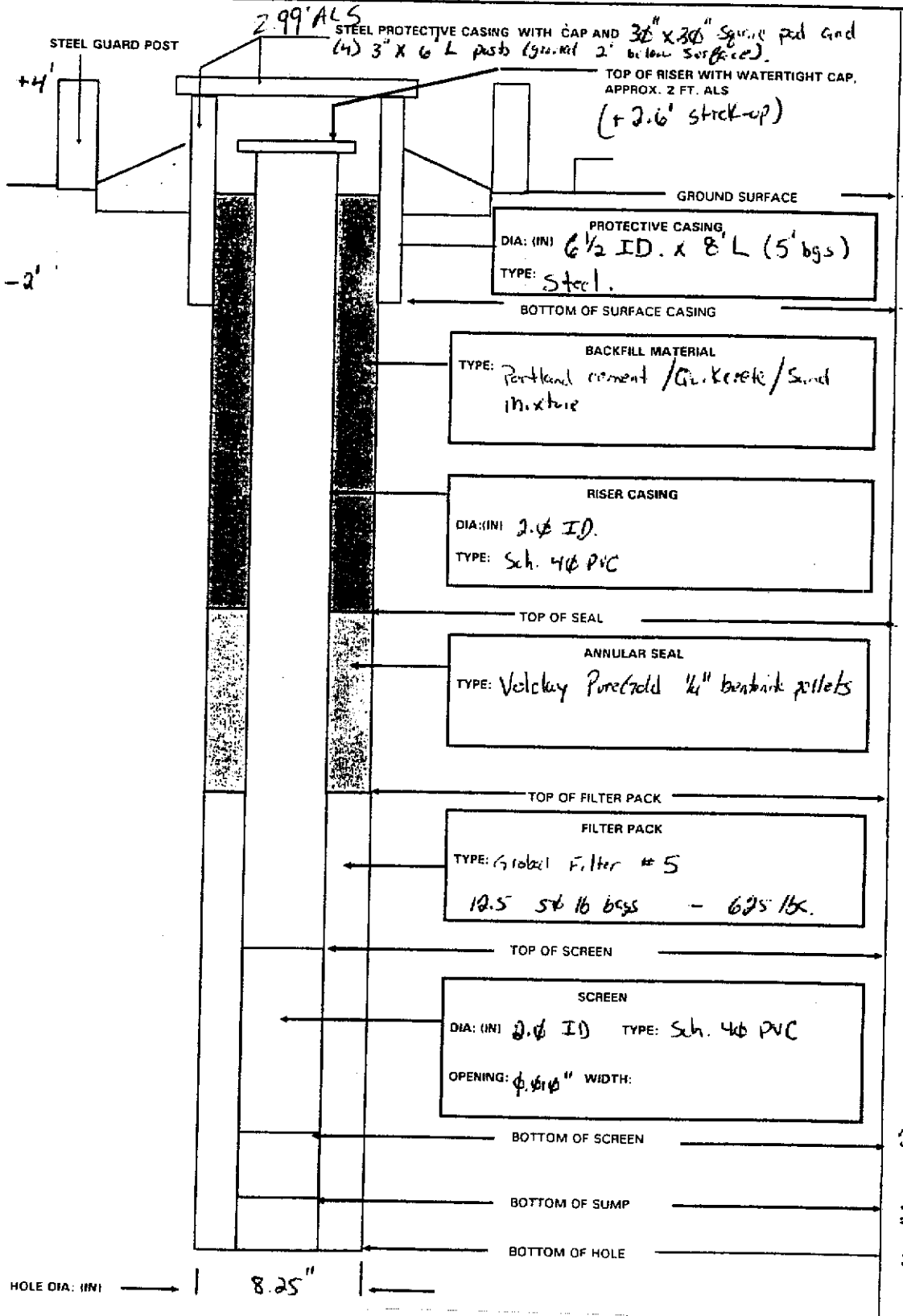
RECORDED BY: Debby Tran 8/22/01
(Signature and Date)

QA CHECK BY: _____
(Signature and Date)

MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI — **DELIVERY ORDER NO.:** ECAS-186

WELL NUMBER: MW 236	**BEGIN:** 08/07/01 @ 0840	**END:** 08/09/01 @ 1130
COORDINATES: N: 559867.34 E: 237117.61	**REFERENCE POINT:** TOC	**ELEVATION:** 1011.70



HTRW DRILLING LOG

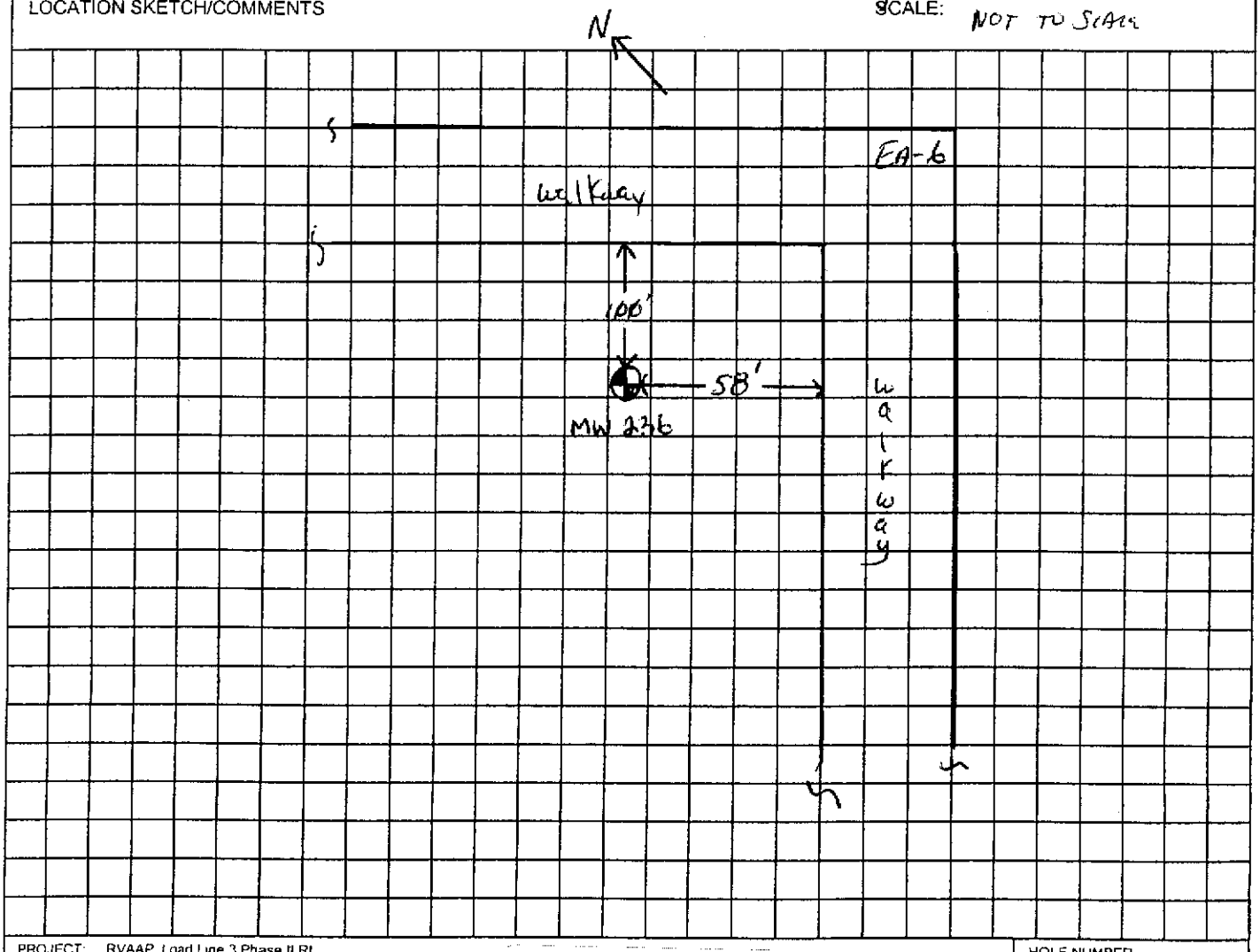
	DISTRICT: Louisville	HOLE NUMBER MW 236
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 1

3. PROJECT: RVAAP, Load Line 3 Phase II RI	4. LOCATION: LL3 North of Bldg EA-6
5. NAME OF DRILLER: NEIL WIKTOR	6. MANUFACTURERS DESIGNATION OF DRILL: CME MODEL 75
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4 1/4" HSA; 2" OD x 2' Long Split spoons; 3" OD x 2.5' Long 5' Shelby Tube; 3" OD x 10' Long wireline core barrel	8. HOLE LOCATION: see sketch below
	9. SURFACE ELEVATION: 1211.7 TOC; 559867.34 N, 2371179 E (NAD 27 11/31/02)
	10. DATE STARTED: 08/06/01; 11. DATE COMPLETED: 08/06/01
12. OVERBURDEN THICKNESS: 5.8 feet	15. DEPTH GROUNDWATER ENCOUNTERED: 14' bgs
13. DEPTH DRILLED INTO ROCK: 18.13 feet 8/13/01 (~~20.73~~)	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 14.84' bgs / 14 hours
14. TOTAL DEPTH OF HOLE: 26.53 feet from TOC; 23.93 bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 16.38' bgs 8/08/01 0750; 22.18' BGS 8/~~07~~/01

18. GEOTECHNICAL SAMPLES	DISTURBED	(UNDISTURBED)	19. TOTAL NUMBER OF CORE BOXES: 1			
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY 77%
	N/A		X			
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: Jeffrey J. Law		
		X				

LOCATION SKETCH/COMMENTS

SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 3 Phase II RI — HOLE NUMBER MW 236

MW 236

HTRW DRILLING LOG

HOLE NUMBER

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey J Lindaw | SHEET 1 OF 3

ELEV (A)	DEPTH (B) feet	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	7.5YR 2.5/3, Very dark brown silt, dry, trace of clay, (ML)	0.0	N/A	N/A	Blow Count: 5, 8, 8, 7 Recovery .25/2'
	2	Gray slag/fill in shoe of spoon – No recovery – cuttings indicate 10YR 5/4 yellowish brown, silt, dry, stiff, (ML)	0.0	N/A [Shelby Tube 3.5'-5.5'] Sample # LL3MW-236-1115-SD	N/A	Blow Count 5, 12, 13, 13 Recovery – 0/2'
	4	10YR 5/3 brown very dry silt w/ shale fragments, friable, (ML)	0.0	N/A	N/A	BC. 9, 10, 15, 30 Rec. 1.85/2 refusal at ~~6~~ 5.8', bedrock
	5	Bedrock at 5.8'				
	6	Brown poorly-cemented fine-grained Sandstone w/ some shale partings	0.0		N/A	Coring rate: 1st core run = 6'-~~16~~ 15' JJL 8/16/01 Begin core @ 1531 End core run @ 1542 pull depth = ~~16~~ 15' JJL 8/16/01 actual depth = 14.8' Loss = ~~1.2~~ 0.2' JJL 8/16/01 Note: water on tape @ 14' bgs Recov = 7.2/9.0'
	7					
	8					
	9					
	10					

MW 236

HTRW DRILLING LOG

HOLE NUMBER

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey J. Lindau | SHEET 2 OF 3

ELEV (A)	DEPTH (B) feet	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	10	C 10' grading into light gray, thinly-laminated Shale, friable.	0.0		N/A	
	11					
	12					
		Abund. qtz, Fe-staining c 12.5' - 14' bgs. moist-wet rock.				
	13					
	14					
		14.1' - Light gray-white massive Sandstone Abund qtz. Some horiz. fracturing along bedding planes	0.0		N/A	
	15					2nd Core run 15' - 25' Beg. c 1054 End c 1720 Pull depth = 25' actual depth = 24.72' Loss = 0.28' Note: water at 24' bgs. Recov = 7.35'/10'
	16					
	17	C17' - 17.3': Dark gray Shale, friable, thinly laminated.				
		Buff Sandstone w/ some gray (clay lenses) and iron-staining throughout. Some horizontal fracturing.				
	18					
	19					
	20					

MW 236

HTRW DRILLING LOG

HOLE NUMBER

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey J Lindgren

SHEET 3 OF 3

ELEV (A)	DEPTH (B) feet	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	20	Silt Sandstone, some clay and iron-staining. Some horiz. fracturing.				
	21					
	22					
	23					
	24					
	25	TD @ 25'				Soil & drilling 8/6/01 TD = 25' Begin rock coring @ 25' on 8/7/01 JJ 8/7/01
	26					
	27					
	28					
	29					
	30					

Well volume calculation sheet

Date 8/22/01 Time 0937
Well ID Num LL3MW-230
Well Location Local Line 3, near Bldg EA-6 in center of Load Line

Total depth of well (ft BTOC) 26.5
Depth to water (ft BTOC) ~~20.15~~ 20.2
Height of water column (ft) (Hc) 6.3

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.137 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.660 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 5.96 gal. ~ 6 gal

5 well volumes = 30 gal
10 " " = 60 gal

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .083 (ft) ~ 1"
Hc = height of water column 6.3 (ft)
Rf = radius of filter pack .34 (ft) ~ 4.125"
Rc = radius of inside casing .083 (ft) 1"

2

WELL DEVELOPMENT FORM

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

Date: 8/22/01 and 8/23/01 Time: 0937

Well Number and Location: LL3MW-236

Development Crew: Bob Gollihue - Tetra Tech Kate McCormick - SAIC (on 8/23/01)
Molly McCann - SAIC

Driller (if applicable): (Bob Gollihue)

Water Levels / Time: Initial: 20.2 / 8/22/01 0937 Pumping: 22.1 / 8/23/01 1424
Final: 25.5 / 8/23/01 1528 water level Final: 23 ft BTOC / 1355 (8/26/01)

Total Well Depth: Initial: 26.5 FT BTOC Final: ~~27.6~~ msm 26.6 FT BTOC 26.65' 8/26/01

Date and Time: Begin: 8/22/01 / 0937 Completed: 8/23/01 / 1527
8/26/01 / 1355

Development Method(S): pumping

Total Quantity of Water Removed: ~~30~~ KCM 8/26/01 gals (+ 7 gals removed during RAB demonstration on 8/11/01. Total = 37 gals)
8/26/01 42 gal

Collected 2 more well volumes to stabilize parameters

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14652	8/22/01 again on 8/23/01
Specific Conductivity	"	" "
pH	"	" "
Turbidity	"	" "

WELL DEVELOPMENT RECORD

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

WELL NUMBER AND LOCATION: LL3MW-236, Load Line 3 near Bldg EA-6

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/22/01	0940	0	13.9°	231	6.43	368	0	0	Initial reading
"	1029	6	15.1°	243	6.54	505	6	1	
"	1400	6	17.1°	250	6.54	523	12	2	
"	1722	6	16.5°	275	6.69	10	18	3	BW 09-13-01
8/23/01	1133	6	15.6°	256	6.96	283	24	4	
"	1520	6	19.8°	322	6.58	31	30	5	Final reading
					BW 09-13-01				
NOTE: Additional 7 gals. were removed during RAB demonstration on 8/11/01; however, no ~~turb~~ insp measurements of above parameters were made.									
8/26/01	0948	6	22.3°	300	6.05	0	36	6	return to see if parameters stabilize
↓	1225	6	24.1°	318	6.52	0	42	7	FINAL READING

BW 09-13-01

RECORDED BY: [signature] 8/27/01
(Signature and Date)

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

B. Williams 09-13-01

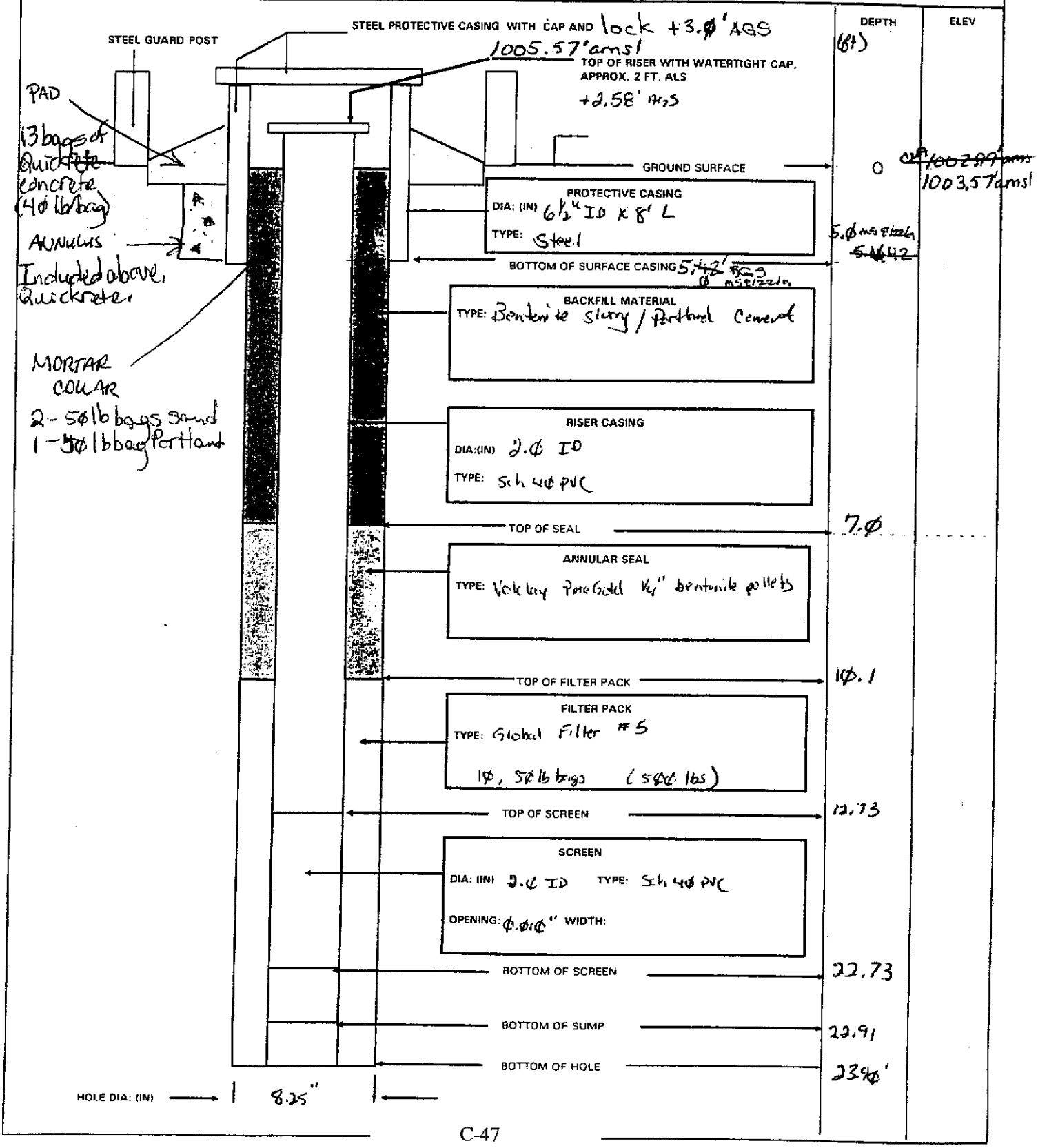
C46

23

MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI/FS **DELIVERY ORDER NO:** ECAS 186?

WELL NUMBER: MW-237	**BEGIN:** 08/07/01 @ 1615	**END:** 8/22/01 0855
COORDINATES: N: 559327.11 E: 2371474.81	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1005.57' amsl



HTRW DRILLING LOG

1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	HOLE NUMBER MW-237
		SHEET 1 OF 1

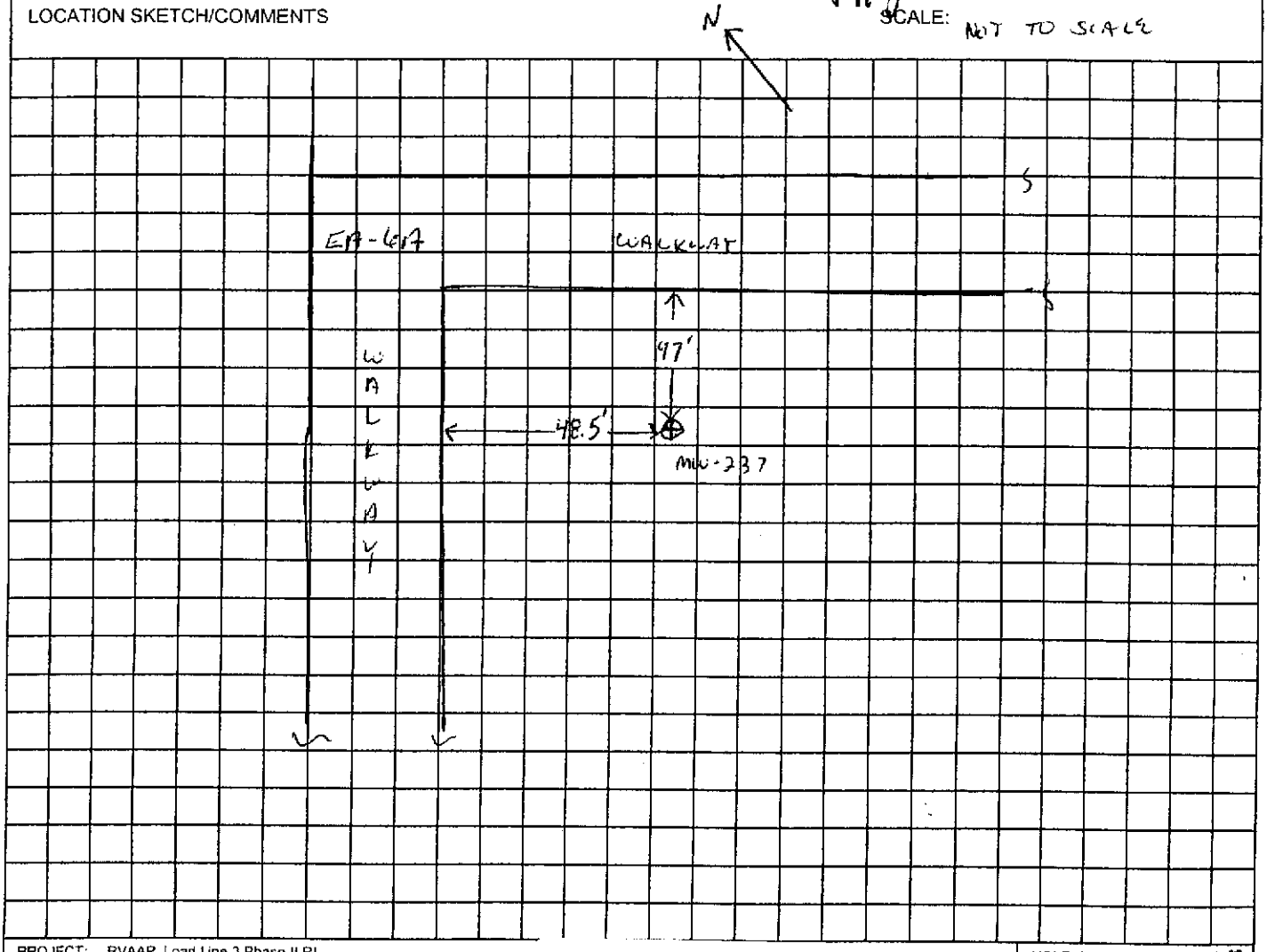
3. PROJECT: RVAAP, Load Line 3 Phase II RI	4. LOCATION: LL3, South of Bldg EA-6A
5. NAME OF DRILLER: Nick Walker	6. MANUFACTURERS DESIGNATION OF DRILL: CME-75
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" HSA; 2" OD X 2' Split Spoon; 3" OD X 10' L wire line Core barrel	8. HOLE LOCATION: see sketch below
	9. SURFACE ELEVATION: 1005.97 TOC 559327.11 N 2371474.81 E (X&Y #3/02)
	10. DATE STARTED: 08/07/01 — 11. DATE COMPLETED: 08/07/01
12. OVERBURDEN THICKNESS: 5.0 feet	15. DEPTH GROUNDWATER ENCOUNTERED: 14.1' bgs
13. DEPTH DRILLED INTO ROCK: 18.90 feet	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 16.98 bgs 14.5 hours
14. TOTAL DEPTH OF HOLE: 23.90 feet	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 18.8' BGS 8/21/01 1715; 20.04 btoc @ 0840 (08/09/01); 20.38 btoc @ 1615 8/11/01

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A			1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A						82%

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

LOCATION SKETCH/COMMENTS — SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 3 Phase II RI — HOLE NUMBER MW-237

MW 237

HTRW DRILLING LOG

HOLE NUMBER

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey J. Lindaw | SHEET 1 OF 3

ELEV (A)	DEPTH (B) (feet)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GROTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	10YR6/3 Pale Brown lean clay, low (CL) plasticity with Yellowish Brown mottling, 10YR5/8, stiff, moist	0.0			Blow count 3,5,7,7 Recovery 1.5 3/12
	1	As above, color change to brown 7.5YR 4/3, some gravel, Subrounded 5-10 mm, Stiff to very Stiff, moist				
	2	As Above (CL)				Blow count 9,11,22,29 Recovery 2/2
	3					
	4	Poorly Cemented fine to medium Sandstone DK Yellowish Brown 10YR 4/4				Blow Count 50/6 Recovery 1.1/2 Bedrock at 5'
	5	7.5YR3/2 DK Brown clay, lean, moist low plasticity w/ sandstone fragments, stiff				1st core run = 5'-8.5' Begin @ 1312 End @ 1335 pull depth = 8.5' actual depth = 8.5' gain/loss = 0 Recovery = 2.1'/3.5'
	6	Brown SANDSTONE, fine med. grained, massive, some hairline fracturing				
	7					
	8					2nd core run = 8.5'-17.87' Begin @ 1340 End @ 1430 pull depth = 17.87' actual depth = 17.87' gain/loss = 0 Recovery = 7.6'/9.37'
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER MW 237

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey Urban

SHEET 2 OF 3

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	OROTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	10	Brown SANDSTONE, hard, massive				
	11					
	12					
	13					
	14	13.6'-14.7' : Gray SHALE, wet, laminated, friable.				
	15	Brown-Gray SANDSTONE, hard, massive, fine-med. grained, quartzic.				
	16					
	17					
	18					3rd core run : 17.8' - 22.75' Begin @ 1439 End @ 1545 Recov = 4.95'/4.95'
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER MW 237

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey Lindsey

SHEET 3 OF 3

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	20	Same as above				
	21					
		21.5-22' - Dark gray SHALE, Fe stained, laminated				
	22	Gray, massive, competent SANDSTONE				
	23					
	24	TD @ 23.9' bgs				
	25					
	26					
	27					
	28					
	29					
	30					

Well volume calculation sheet

Date 8/23/01 Time 0800
Well ID Num LL3MW-23J
Well Location LL3 NEAR BUILDING EA-6A

Total depth of well (ft BTOC) 25.6'
Depth to water (ft BTOC) 21.4'
Height of water column (ft) (Hc) 4.2'

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc .0092 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= .44 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 3.98 gal. ≈ 4 gal

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing ~~.34~~ (ft) .0833 ft Rem 8/23/01
Hc = height of water column 4.2' (ft)
Rf = radius of filter pack .34 (ft)
Rc = radius of inside casing .0833 (ft)

WELL DEVELOPMENT FORM

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

Date: 8/23/01 Time: 0805

Well Number and Location: LL3MW-23J

Development Crew: Molly McCann, Bob Gollihue, Kate M. Cormick

MSM 8/25/01

Driller (if applicable): (Bob Gollihue To/Test)

MSM 8/25/01

Water Levels / Time: Initial: 21.4 / 0800 Pumping: NOT TAKEN

Final: 23.65 / 1041

Total Well Depth: Initial: 25.6' FT BTOC Final: 25.65' FT BTOC

Date and Time: Begin: 08/23/01 / 0813 Completed: 08/23/01 / 1033

Development Method(S): pumping w/ a whale pump

~~MSM 8/25/01~~

Total Quantity of Water Removed: 33 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	HoRIBA 14652	8/23/01
Specific Conductivity	↓	↓
pH		
Turbidity	↓	↓

WELL DEVELOPMENT RECORD

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

WELL NUMBER AND LOCATION: LL3MW-23I LOADLINE 3

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/23/01	0813	5	14.6	321	6.35	>999	5	1	INITIAL READING
	0820	4	13.0	316	6.41	739	4	1	
	0835	4	13.5	268	6.37	>999	8	2	
	0855	4	14.3	251	6.36	>999	12	3	
	0915	4	14.0	248	6.36	791	16	4	
	0934	4	13.9	242	6.38	212	20	5	
	0957	5	14.2	239	6.47	543	25	6+	
	1014	4	14.1	240	6.46	25	29	7+	~~FINAL READING~~ KCM 8/23/01
	1033	4	14.3	242	6.58	0	33	8+	FINAL READING

PW 09-13-01

KCM 8/23/01

RECORDED BY: Kathryn C McCormick 8/23/01
(Signature and Date)

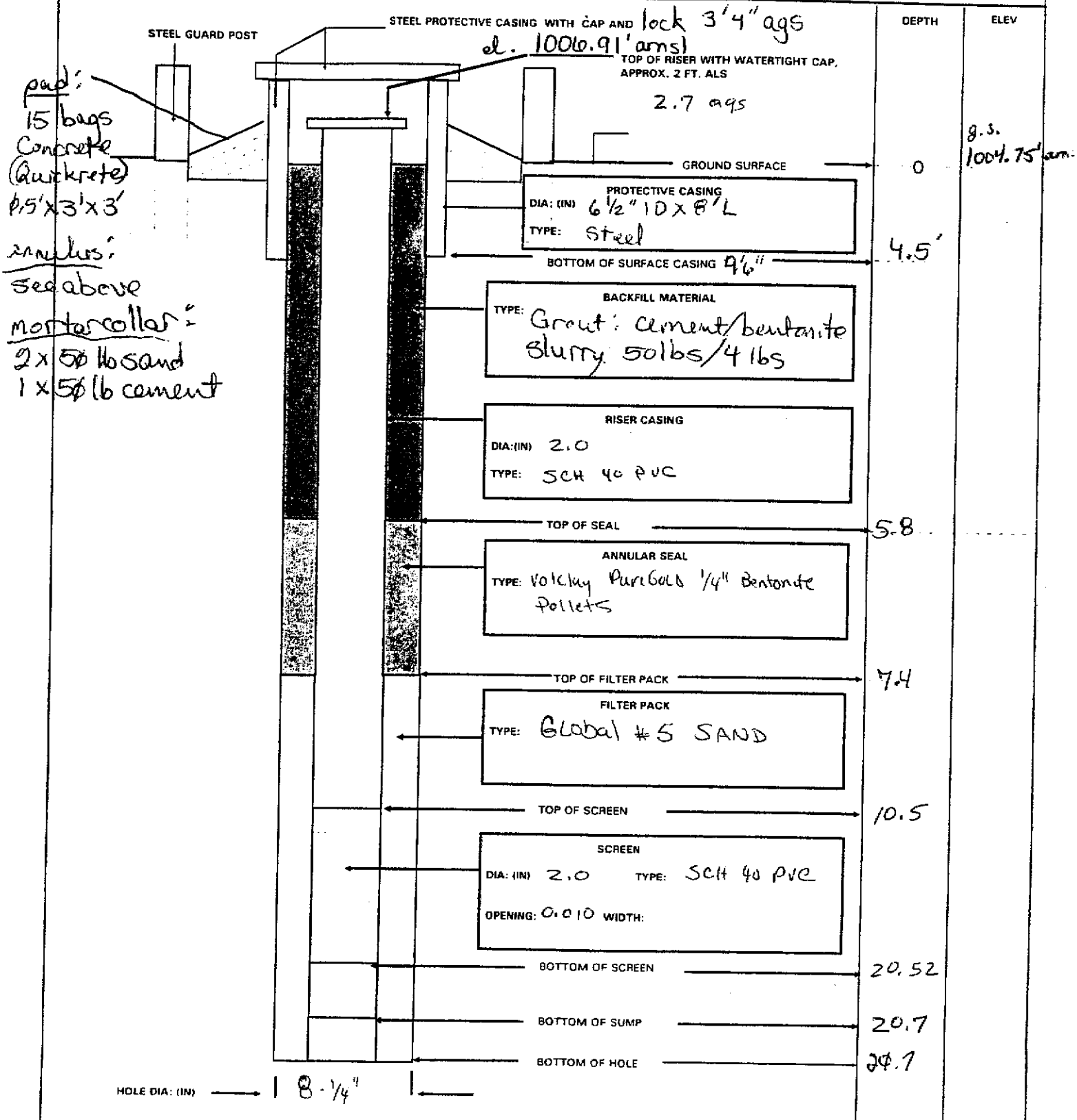
QA CHECK BY: [signature] 8/24/01
(Signature and Date)

B.W. Williams 09-13-01

MONITORING WELL

PROJECT NAME: Load Line 3 Phase I RI's **DELIVERY ORDER NO.:** ECAS-186

WELL NUMBER: MW 238	**BEGIN:** 8/12/01 0845	**END:** 8/22/01 1720
COORDINATES: N: 559569.39 E: 2370624.55	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1006.91' amsl



6C

HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: MW 238

1. COMPANY NAME: SAIC

2. DRILL SUBCONTRACTOR: Tol-Test

SHEET 1 OF 1

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

4. LOCATION: LOAD LINE #3

5. NAME OF DRILLER: Neil Wiktor

6. MANUFACTURERS DESIGNATION OF DRILL: CME MODEL 75

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" ID HSA; 2" x 2' L split Spoon; 3" OD x 10' L wire line core barrel; 3" OD x 2.5' L Shelby tube

8. HOLE LOCATION: SEE SKETCH BELOW

9. SURFACE ELEVATION: 1006.91 TOC 559569.39 N 2370624.56 E 11/3/02 TOC

10. DATE STARTED: 08/11/01

11. DATE COMPLETED: 08/12/01

12. OVERBURDEN THICKNESS: 1.5 feet

15. DEPTH GROUNDWATER ENCOUNTERED: 7.5' bgs

13. DEPTH DRILLED INTO ROCK: 19.2 feet

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 15.37 bgs 18hrs 17.37 btoc 8/13/01 0735

14. TOTAL DEPTH OF HOLE: 20.7 feet

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 15.51' BGS 8/22/01 1002

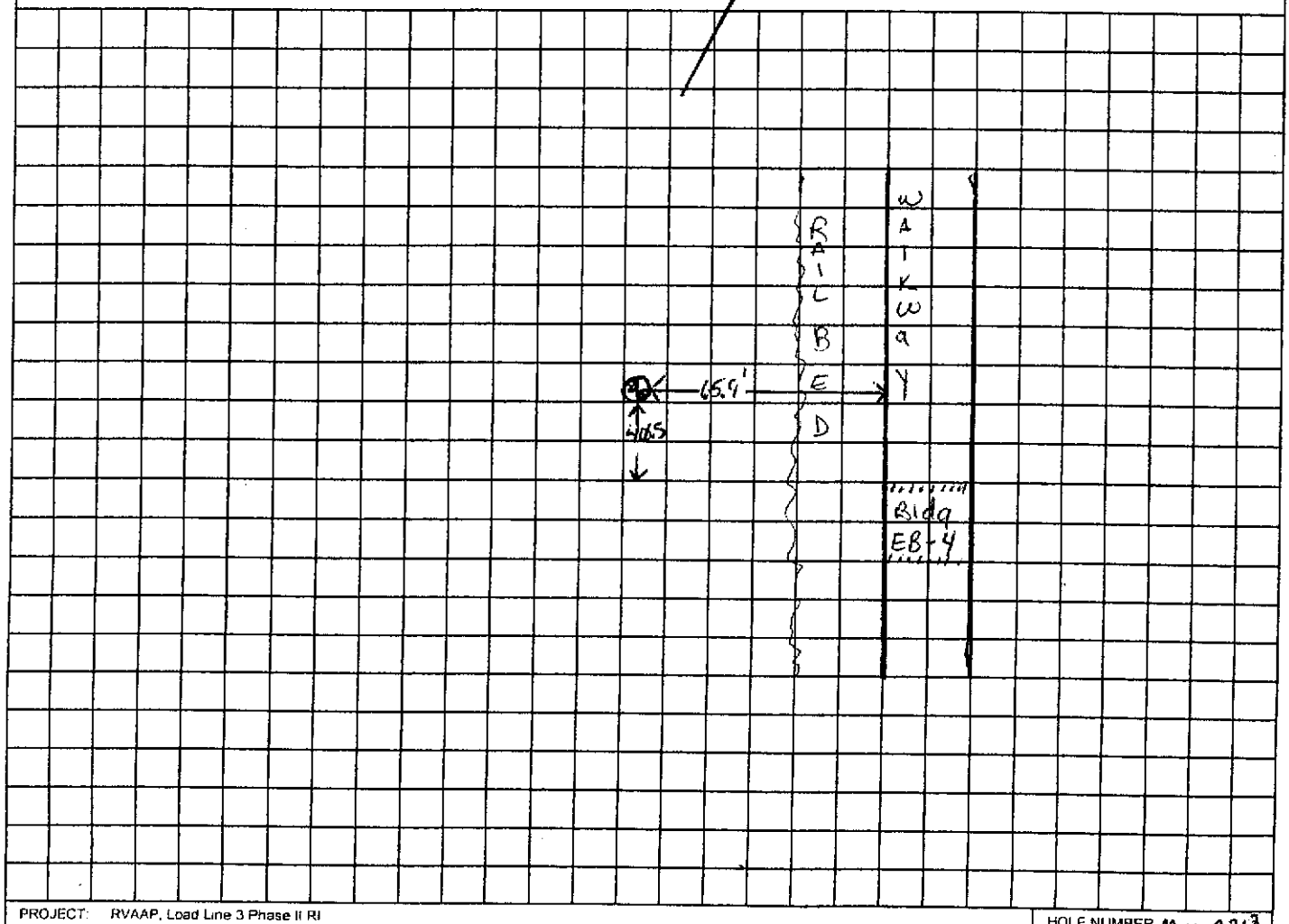
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A			1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A						95%

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

LOCATION SKETCH/COMMENTS

SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 3 Phase II RI

HOLE NUMBER: MW 238

HTRW DRILLING LOG

HOLE NUMBER MW 238

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey J. Lindaw

SHEET 1 OF

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	10YR 3/3 DK Brown SILT, dry (ML)	0.0			Blow Count- 6, 8, 30/6
		10yr 6/3 Pale brown silt, some SS fragments, some gray silt, dry, Med. Stiff (ML)				Recovery 1.08/2
	1	Buff colored weakly cemented fine sandstone in shoe				Bedrock encountered at approx ~~4.2'~~ 1.5' BGL 8/16/01
	2					
	3					
	4	Brown sandstone, fine grained, hard				1ST core run - 4' - 9.05'
		fracturing along bedding (horiz)				Start @ 1125
	5					end @ 1150
						pull depth - 9'
	6					actual depth 9.05
						recovery 4.8'
						4.8/5.05'
	7					
						Encountered water at approximately 7.5'
	8	DK. Gray shale, laminated, wet				
		Brown sandstone fine grained, hard ~~SAND~~ SM				
	9					Core run #2 9' - 14'
						Start @ 1158
						end @ 1225
						pull depth - 13.75
						actual depth 13.75

HTRW DRILLING LOG

HOLE NUMBER MW 238

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey J. Lindaw

SHEET 2 OF

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
						Recovery 4.3'/4.75'
		Shale, dark gray, laminated, soft				
	11	Gray medium-grained sandstone, abundance of quartz, very hard				
	12					
		Shale, dark gray, laminated, soft				
	13	Gray medium-grained sandstone, abundance of quartz, very hard				
	14					3rd core run 14' - 19'
						Start @ 1400
						end @ 1422
						full depth 19'
	15					actual depth 19.2'
						recovery 5.1'/5.2'
	16	fractured sandstone with iron staining; wet				
	17					
	18					
		weathered & fractured sandstone with clay; wet				
	19					Bottom of cored interval @ 19.2'

HTRW DRILLING LOG

HOLE NUMBER MW 238

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey J. Lindner

SHEET 3 OF

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21					Bottom of Hole 20.7'
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					

9-16-01 vjb

PROJECT: RVAAP, Load Line 3 Phase II RI

HOLE NUMBER MW 238

Well volume calculation sheet

Date 8/24/01 Time 1625
Well ID Num LL3MW-238
Well Location Load Line 3, (W) of Bldg EB-4 along RR Bed

Total depth of well (ft BTOC) msmt 23.45
Depth to water (ft BTOC) 17.75
Height of water column (ft) (Hc) 5.70

23.45
17.75
5.70

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.124 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.597 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 5.4 gal.

5 well volumes = 27 gals.
10 " " = 54 gals

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .083 (ft) ~1"
Hc = height of water column 5.7 (ft)
Rf = radius of filter pack .344 (ft) 4.125"
Rc = radius of inside casing .083 (ft) 1"

WELL DEVELOPMENT FORM

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

Date: 8/24/01 and 8/25/01 Time: 1625

Well Number and Location: LL3MW-238, Load Line 3, (W) of Bldg EB-4 along RR bed

Development Crew: Molly McCann
Kate McCormick

Driller (if applicable): Bob Gollihue (- TOLTEST) BW 8-13-01
~~AHSM 8/24/01~~

Water Levels / Time: Initial: 17.75 BTOC, 8/24/01 1625 Pumping: 23.0 BTOC, 8/24/01 1726
21.66 BTOC 0905 8/25/01

* well was dry after last well volume was collected Final: ~~23.4~~ ran 17.95' ~~N~~16 (8/26/01)

Total Well Depth: Initial: 23.45 FT BTOC Final: 23.4' 8/26/01 ~~1415~~ ran FT BTOC

Date and Time: Begin: 8/24/01 1625 Completed: 8/25/01 1440

Development Method(S): pumping with Whale® pump
~~AHSM 8/25/01~~

Total Quantity of Water Removed: 16.2 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14652	8/24/01 again on 8/25/01
Specific Conductivity	↓	↓ ↓
pH		
Turbidity	↓	↓ ↓

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 3 Phase II RI

DELIVERY ORDER NO.: CY01

PAGE 1 OF 1

WELL NUMBER AND LOCATION: LL3MW-238, Load Line 3, W of Bldg EB-4

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/24/01	1656	0	16.8°	189	7.01	>999	0	0	Initial Reading
↓	1705	5.4	16.8°	187	6.82	>999	5.4	1	
8/25/01	0800	5.4	14.9°	205	6.20	805	10.8	2	BW 09-13-01
↓	1440	5.4	15.7°	205	6.60	>999	16.2	3	Final Reading

8/25/01

RECORDED BY: [signature] 8/24/01
(Signature and Date)

QA CHECK BY: [signature]
(Signature and Date)
9/26/01

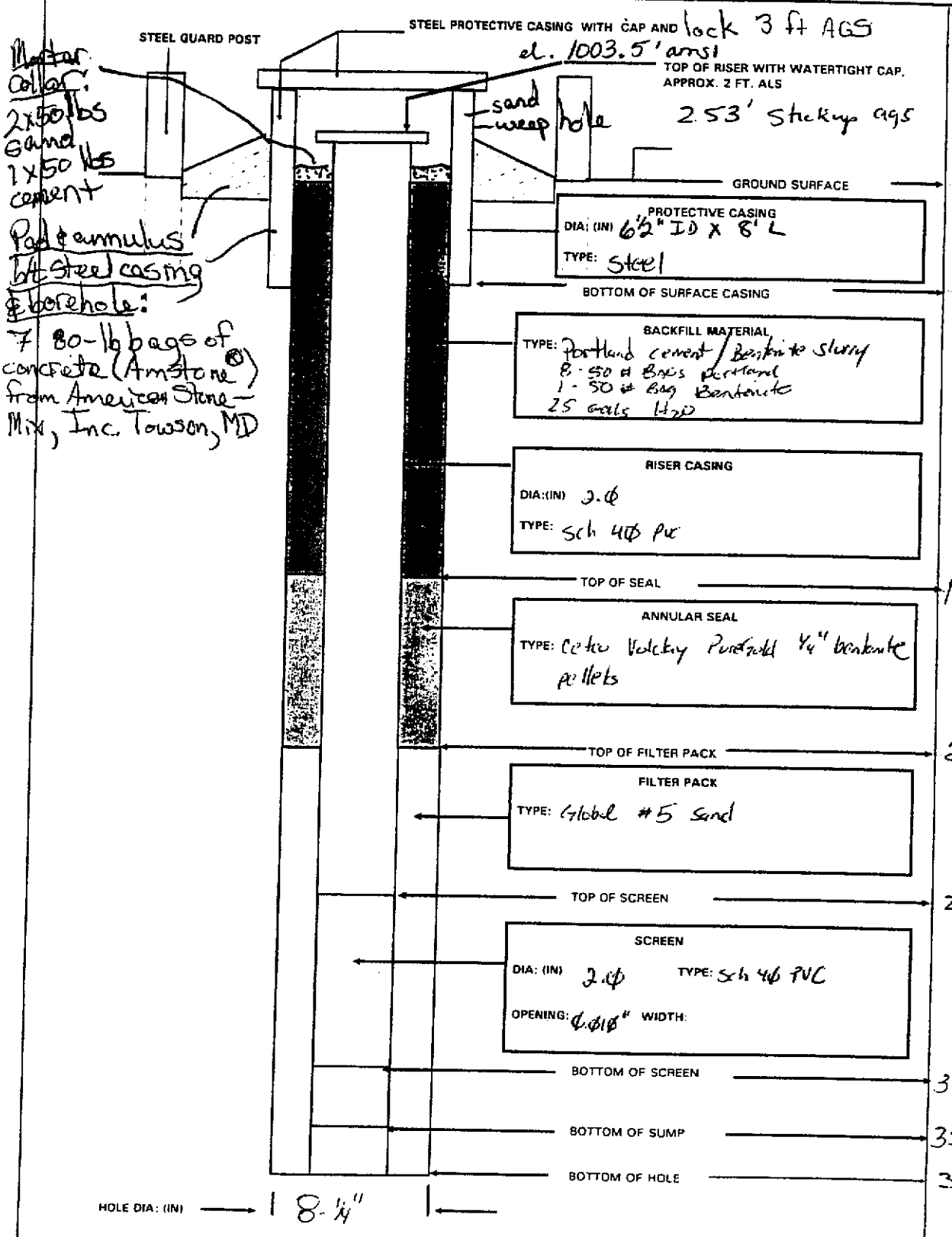
C-62

30

MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI — **DELIVERY ORDER NO.:** ECAS 1861

WELL NUMBER: MW 239	**BEGIN:** 08/11/01 0750	**END:** 8/23/01 0935
COORDINATES: N: 559101.84 E: 2370894.17	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1003.50 amsl



Y-7

HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: MW-239

1. COMPANY NAME: SAIC

2. DRILL SUBCONTRACTOR: Tol-Test

SHEET 1 OF 1

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

4. LOCATION: LOAD LINE 43

5. NAME OF DRILLER: Neil Wikter

6. MANUFACTURERS DESIGNATION OF DRILL: CME-75

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" ID HSA; 2" OD x 2' L Split Spoon; 3" OD x 10' L wire line core barrel; 3" OD x 2.5' L Shelby Tube

8. HOLE LOCATION: See Sketch below

9. SURFACE ELEVATION: 559101.84 N; G.S. 1001.7' amsl; 2370894.17 E

10. DATE STARTED: 08/10/01

11. DATE COMPLETED: 08/11/01

12. OVERBURDEN THICKNESS: 6.5 feet

13. DEPTH DRILLED INTO ROCK: 28.7 feet

14. TOTAL DEPTH OF HOLE: 35.2 feet

15. DEPTH GROUNDWATER ENCOUNTERED: 29' bgs

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 26.28 bgs; 24 hrs; 29.88 btoc; 8/12/01 0730

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 28.66 bgs 8/22/01 1902

18. GEOTECHNICAL SAMPLES: DISTURBED; (UNDISTURBED)

19. TOTAL NUMBER OF CORE BOXES: 2

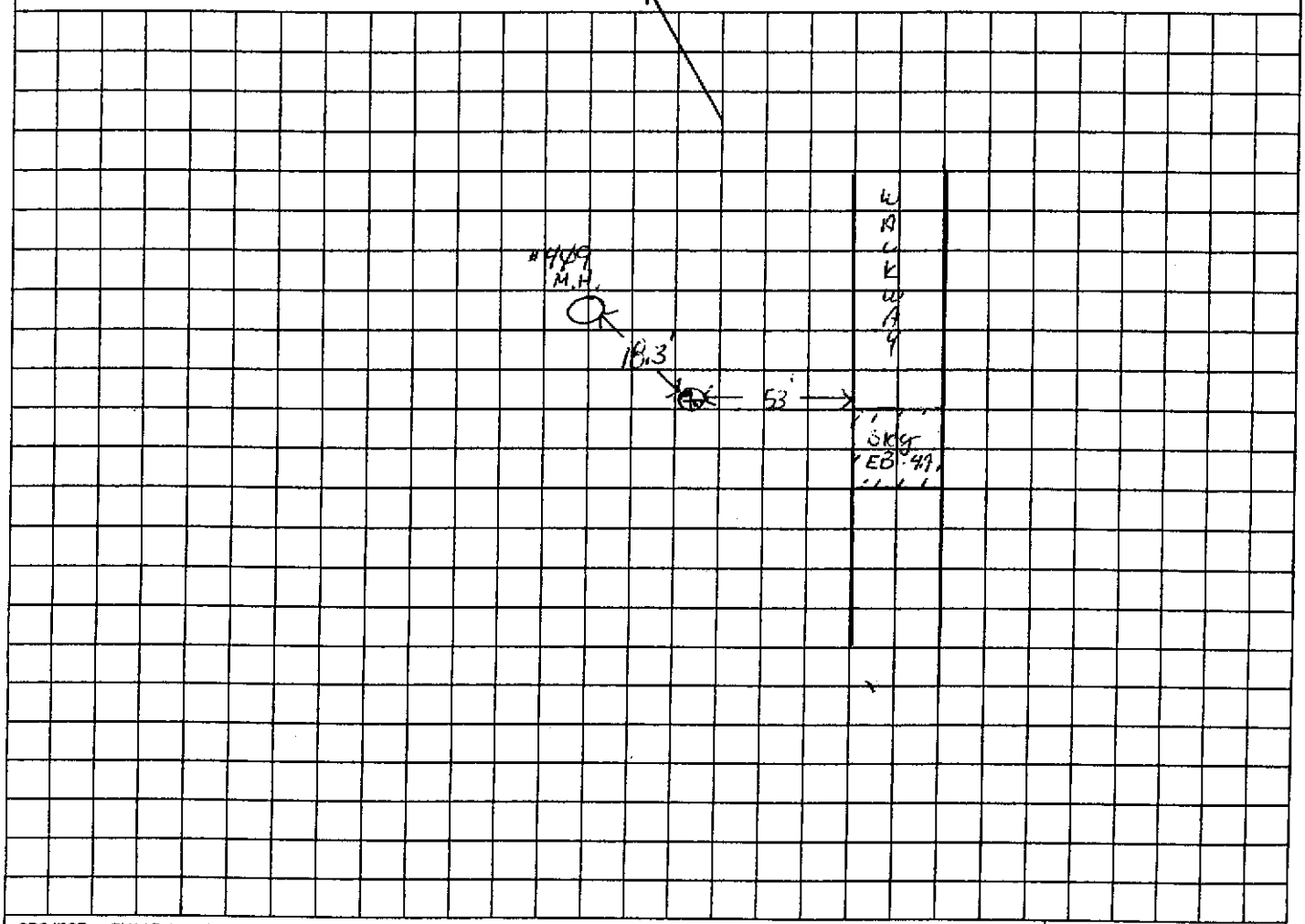
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A						85 %

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

LOCATION SKETCH/COMMENTS

N

SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 3 Phase II RI

HOLE NUMBER: MW-239

HTRW DRILLING LOG

HOLE NUMBER mw 239

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey Linder | SHEET 1 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS (ppm)	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Cuttings - 10YR4/4 dk yellowish brown, SILT, trace of clay & gravel, dry (ML)	(ppm)			Augered through top 2' - rock or concrete at surface - unable to split spoon this interval
	2	10YR5/2 grayish brown stiff SILT, dry, with gray mottling and a trace of gravel, low plasticity (ML)	0.0	Shelby Tube Sample #43mw-239-1116-SO 3.5 to 5.5 interval		5, 9, 12, 12 Blow Count Recovery: 1.6/2
	4	As above, stiff to very stiff, with some fine gravel	0.0			Blow Count 8, 11, 12, 13 Recovery 1.66/2
	6	Yellowish brown 10YR5/6 weathered sandstone in a clay matrix				Blow Count 4, 50/6 Recovery .5/2
	7	Brown fine-grained SANDSTONE, massive, competent				Core run #1 8'-19' begin @ 1128 end @ 1155 pull depth = 19' actual = 19' recov = 8.33'/11.0'
	10					

HTRW DRILLING LOG

HOLE NUMBER MW-239

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey Lindner | SHEET 2 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS (ppm)	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	10	Brown fine-grained SANDSTONE, massive, v. hard, granular				
	11	some horizontal to 30° fracturing				
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					2nd Core Run 19' - 29' Begin @ 1205 8/10/00 end @ ~~1302~~ 1402 pull depth = 26.3
	20					

PROJECT: RVAAP, Load Line 3 Phase II RI | HOLE NUMBER MW-239

HTRW DRILLING LOG

HOLE NUMBER MW-239

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey Linda.

SHEET 3 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS (ppm)	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	20					actual depth - 26.3
	21					recovery - 6.5'/7.3'
	22					
	23					
	24					
	25					
	26					3rd core run: 26.3' - 34.3'
						Begin @ 1444
						End @ ~~1452~~ 1508 8/19/10
	27					actual depth: 34.3'
						Recovery: 7.6'/8.0'
	28					
	29					
	30					

MW 237

HTRW DRILLING LOG

HOLE NUMBER

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey Linden

SHEET 4 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	30	@ 30'. Color change to Gray SANDSTONE w/ minor interbedded Shale.	(ppm)			
	31					
	32					
	33					
	34					
	35					
		End of drilling @ 35.2' bgs Slight odor				
	36					
	37					
	38					
	39					
	40 bgs					

Well volume calculation sheet

Date 8/24/01 Time 14:35
Well ID Num LL3-MW239
Well Location Load Line 3 RVAAP

Total depth of well (ft BTOC) 37.56
Depth to water (ft BTOC) 31.08
Height of water column (ft) (Hc) 6.48

Well Volume Calculation (.0069)

$(3.142)(.083)^2(6.48)$

Vc = 3.142(Rc^2)*Hc .140 cu. ft.

$(3.142)(.344^2 - .100^2)(6.48)(.300)$

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= .660 cu. ft.

$(0.800)(7.48)$

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 5.98 gal.

1 volume = 5.98 gal
5 volume = 30 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume .10 MS 8/24/01
Ro = outside radius of casing .083 (ft)
Hc = height of water column ~~12.2~~ (ft) 6.48 MS 8/24/01
Rf = radius of filter pack .344 (ft)
Rc = radius of inside casing .083 (ft)

WELL DEVELOPMENT FORM

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

Date: 8/24/01 Time: 14:35

Well Number and Location: LL3-MW239 RVAAP Load Line 3

Development Crew: Matt Root - SAIC
Chantelle Carroll - EIS

Driller (if applicable): Josh Rich - EOTI

Water Levels / Time: Initial: 31.08 / 8/24/01 14:35 Pumping: 34.78 / 8/25/01 07:56
Final: 32.85 / 8/26/01 14:24

Total Well Depth: Initial: 37.56 FT BTOC Final: 37.70 FT BTOC

Date and Time: Begin: 8/24/01 / Completed: 8/26/01 / ~~8/26/01~~ MS 14:24

Development Method(S): Submersible pump. Surge with pump.
BW 09-13-01

Total Quantity of Water Removed: 22 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14639	8/24/01
Specific Conductivity	"	"
pH	"	"
Turbidity	"	"

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 3 Phase II RI DELIVERY ORDER NO.: 0Y01

PAGE 1 OF 1

WELL NUMBER AND LOCATION: LL3-MW239

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (μMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/24/01	15:25	4	15.71	.537	6.06	turbid	4	.67	DO = 6.66
	16:12	MS 8/27 4	20.16	.624	6.06	turbid	8	1.33	DO = 9.92
	17:20	5	18.68	.555	5.95	turbid	13	2.17	DO = 11.2
8/25/01	7:55	2	11.36	.552	5.97	turbid	15	2.5	DO = 7.56
	11:05	MS 8/27 3	13.42	.562	6.09	turbid	18	3	DO = 12.19
	11:13	2	14.11	.551	6.06	cloudy	20	3.3	DO = 8.45
	14:16	2	14.13	.543	5.92	cloudy	22	3.67	DO = 18.08
8/26/01	14:20	8	—	—	—	—	MS 8/27 26 30	5	WL = 32.85' BTOC TD = 37.70' BTOC
									Development complete

MS 8/27/01

RECORDED BY: [signature] (Signature and Date)

QA CHECK BY: [signature] 8/27/01 (Signature and Date)

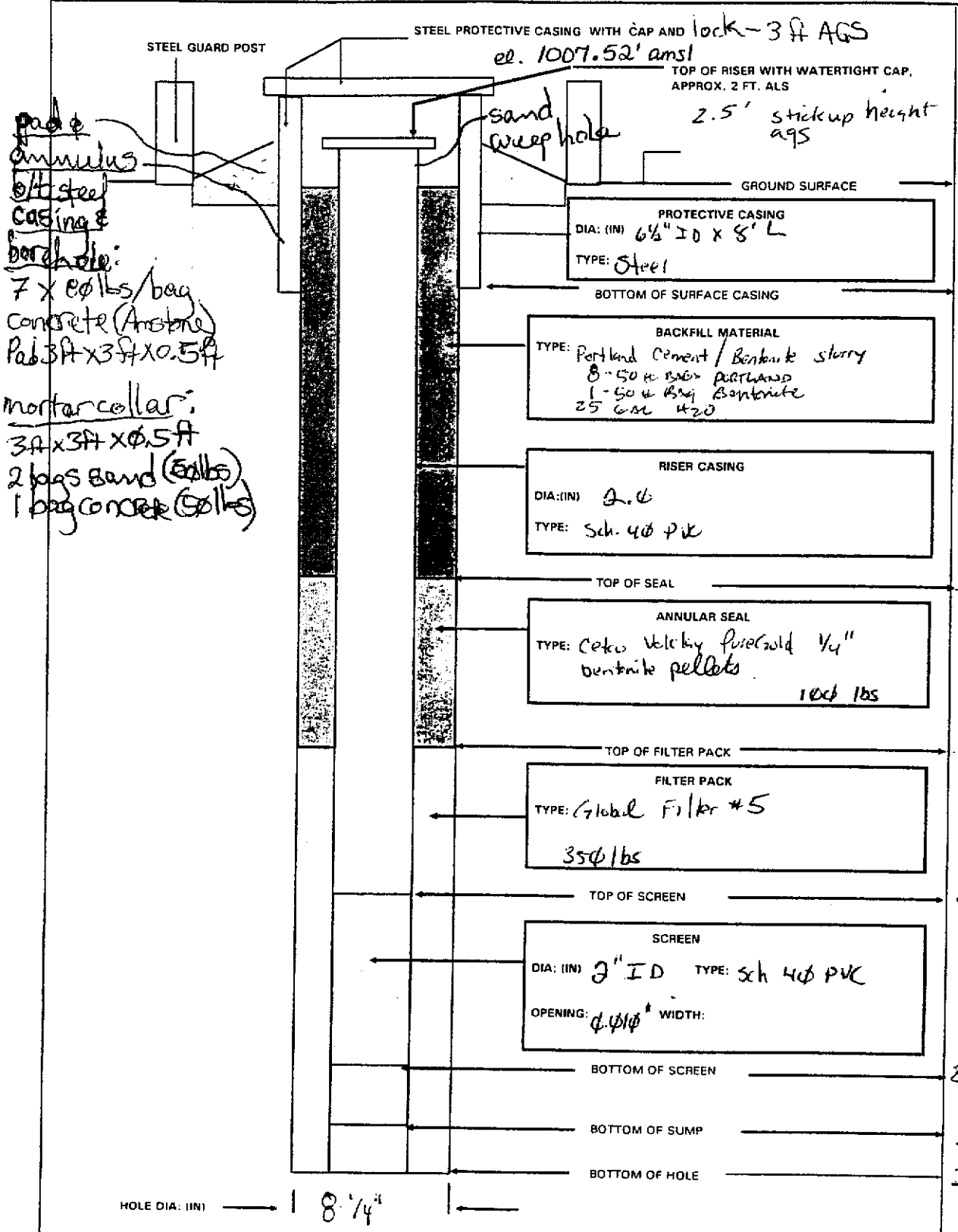
C-71

65

MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI — **DELIVERY ORDER NO.:** ECAS-186

WELL NUMBER: MW-24Ø	**BEGIN:** 08/10/01 @ 0830	**END:** 8/23/01 1145
COORDINATES: N: 558204.42 E: 2371308.54	**REFERENCE POINT:** T.D.C.	**ELEVATION:** 1007.52' amsl



HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER: MW 24Φ
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 1

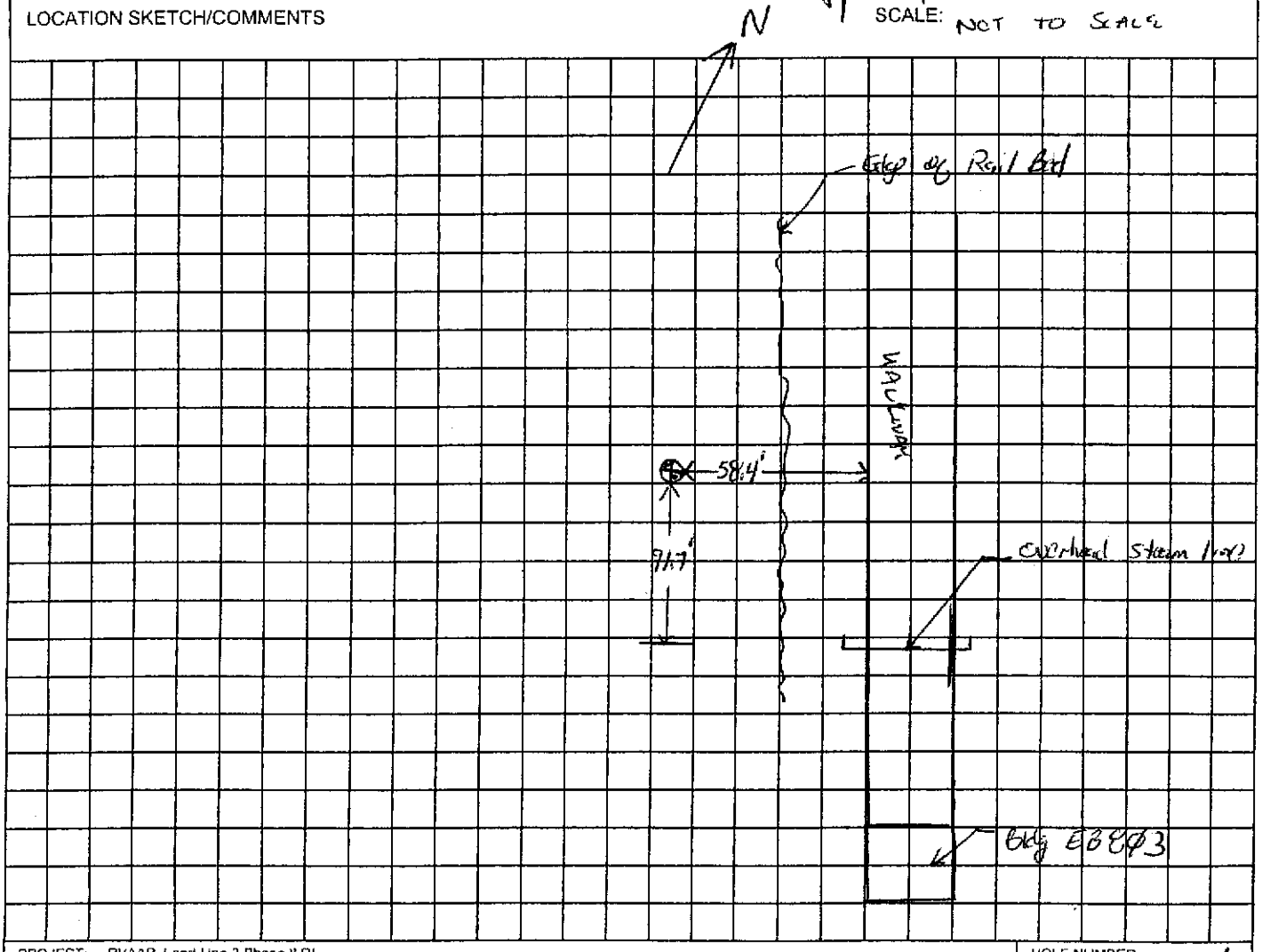
3. PROJECT: RVAAP, Load Line 3 Phase II RI	4. LOCATION: LL3
5. NAME OF DRILLER: No. 1 Walker	6. MANUFACTURERS DESIGNATION OF DRILL: CME 75
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" HSA; 2" OD x 2' L Split Spoon; 3" OD x 10' L core line core barrel	8. HOLE LOCATION: See Sketch below
	9. SURFACE ELEVATION: g.s. 1005.60 'amsl; 558204.42 N 2371308.54 E
	10. DATE STARTED: 7/18/9/11 — 11. DATE COMPLETED: 08/16/01
12. OVERBURDEN THICKNESS: 15.5 feet	15. DEPTH GROUNDWATER ENCOUNTERED: 26' bgs MS 8/22/01 ~~17.28~~
13. DEPTH DRILLED INTO ROCK: 20 feet	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: ~~26.38 bgs 8/22/01~~ 26.39 bgs 23 hrs 26.38 bgs 8/23/01 0832
14. TOTAL DEPTH OF HOLE: 35.5 feet	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 26.39 ft BGS 8/22/01

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A			1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A						74%

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

LOCATION SKETCH/COMMENTS — SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 3 Phase II RI — HOLE NUMBER: MW-24Φ

MW-240

HTRW DRILLING LOG

HOLE NUMBER

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey Lindsay | SHEET 1 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	10YR 5/3 Brown Silty Clay, med stiff to stiff, dry, with gray mottling, non-plastic (CL)	0.0			B.C. 4, 6, 8, 11 Recovery 1.8/2
	2	As Above	0.0			B.C. 17, 14, 14, 14 Recovery 1.9/2
	3	10YR 5/6 Yellowish brown fine Sand, moist, med. dense (SW)				
	4	10YR 5/3 brown very fine to fine Sand, trace of silt, moist, med-dense (SM)				
	4	As Above	0.0			BC. 4, 6, 7, 7 Recovery 1.75/2
	6	As above	0.0			BC. 7, 8, 8, 8 Recovery 1.8/2
	7	10YR 5/4 yellowish brown ~~SM~~ fine Sand, loose, damp, fine to medium (SW)				
	8	As above	0.0			BC 5, 4, 5, 5 Recovery 1.7/2
	9	10YR 5/3 brown very fine Sand, moist, loose to very loose, some Silt (SM)				

MW-240

HTRW DRILLING LOG

HOLE NUMBER

PROJECT: RVAAP, Load Line 3 Phase II RI

INSPECTOR Jeffrey J. Lindau

SHEET 2 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	10	As above	0.0			BC. 7, 6, 5, 5 Recovery 1.9/2.
	11	10YR 5/3 brown med. sand, loose, moist				
	12	As above				BC. 5, 5 to 5 Recovery 1.2/2
	13	10YR 4/3 brown med. to coarse sand, loose				
	14	10YR 5/3 brown silt, trace of clay, some fine gravel, moist	0.0			B.C. 14, 28, 50/4 Recovery 1.4/2
	15	Sandstone, brown, fine grained 10YR 6/2 light brownish gray weathered sandstone in a silt matrix with trace of clay, slightly plastic, moist. Poorly-cemented SS at bottom of shoe				Bedrock encountered at approx. 15.5' bgs
	16	Brown - light gray fine grained SANDSTONE, massive, some horiz. bedding visible.				1st core run: 15'-24.5' Begin @ 1145 End @ 1505 full depth = 24.5' actual = 24.0' recov = 5.32'/9.0' loss = 0.5'
	17	moist @ 16-17' bgs.				
	18					
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER MW-24Ø

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Jeffrey J. Cvelcar | SHEET 3 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	20	Same as above				
	21					
	22					
	23					
	24					
	25					2nd core run: 24.5' - 29.5' End run @ 1528 pull depth: 29.5' recovd = 29.2' loss = Ø.3' recovery = 4.75'/4.7' gain - Ø.Ø5'
	26					
	27					
	28	@ 28': ~~3~~ 60°-80° fracture w/ iron staining				
	29	@ 29': Dark gray SHALE (29-29.15')				
	30					

HTRW DRILLING LOG

MW 240

PROJECT: RVAAP, Load Line 3 Phase II RI	INSPECTOR Jeffrey J. Lindau	HOLE NUMBER
		SHEET 4 OF 4

ELEV (A)	DEPTH (B) (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	30	Light gray fine-grained SANDSTONE, massive, hard				
	31	TD @ 31.4' bgs JH 08/10/01				Ended drilling @ 31.4' on 8/9/01. Continued augering on 8/10/01
	32					
	33					
	34	~~TD @ 34.5' bgs~~ JH 08/10/01				
	35					
		TD @ 35.5'				
	36					
	37					
	38					
	39					
	40					

Well volume calculation sheet

Date 08/24/01 Time 1315
Well ID Num CC3mw24D
Well Location CC3

Total depth of well (ft BTOC) 37.00'
Depth to water (ft BTOC) 28.90'
Height of water column (ft) (Hc) 8.10'

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.171 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.834 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 7.54 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.083 (ft)
Hc = height of water column 8.10 (ft)
Rf = radius of filter pack 0.344 (ft)
Rc = radius of inside casing 0.083 (ft)

SV 3/11/04

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 4 Phase II RI DELIVERY ORDER NO.: CY01

Date: 08/24/01 Time: 1315

Well Number and Location: LL3mw240

Development Crew: Jeffrey Lindsey

Driller (if applicable): Charlie Moore

Water Levels / Time: Initial: 28.94 / 1315 Pumping: See p.45 /

Final: 28.89 / 8/28/01 1058

Total Well Depth: Initial: 37.00 FT BTOC Final: 36.89 FT BTOC

Date and Time: Begin: 08/24/01 / 1400 Completed: 08/24/01 / 1530

Development Method(S): whale pump / Surge

Total Quantity of Water Removed: 60 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	Horiba U-10 # 14639	08/24/01
Specific Conductivity	↓	↓
pH		
Turbidity		

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 4 Phase II RI DELIVERY ORDER NO.: CY01

WELL NUMBER AND LOCATION: LL3mw24Ø

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
Ø8/24/Ø1	14Ø5	Ø	15.3	Ø.264	6.75	>999	Ø	Ø	Initial Reading
	1416	7	13.Ø	Ø.154	6.24	>999	7	~1	wl = 29.Ø5' btoc
	1423	7	12.4	Ø.153	6.21	426	14	~2	wl = 29.Ø5' btoc
	1433	7	12.4	Ø.152	6.23	277	21	~3	
	1442	4	12.Ø	Ø.152	6.2Ø	154	25	~3+	wl = 29.Ø6' btoc
	1450	5	12.4	Ø.151	6.18	1Ø1	3Ø	4	
	1504	1Ø	12.2	Ø.151	6.2Ø	136	4Ø	5.5	
	1515	1Ø	12.4	Ø.151	6.22	139	5Ø	~7	
	1522	5	11.9	Ø.152	6.21	43	55	7.5	wl = 29.13' btoc
	1530	5	11.6	Ø.15Ø	6.23	44	6Ø	8	collect (1) Qt meoh jar

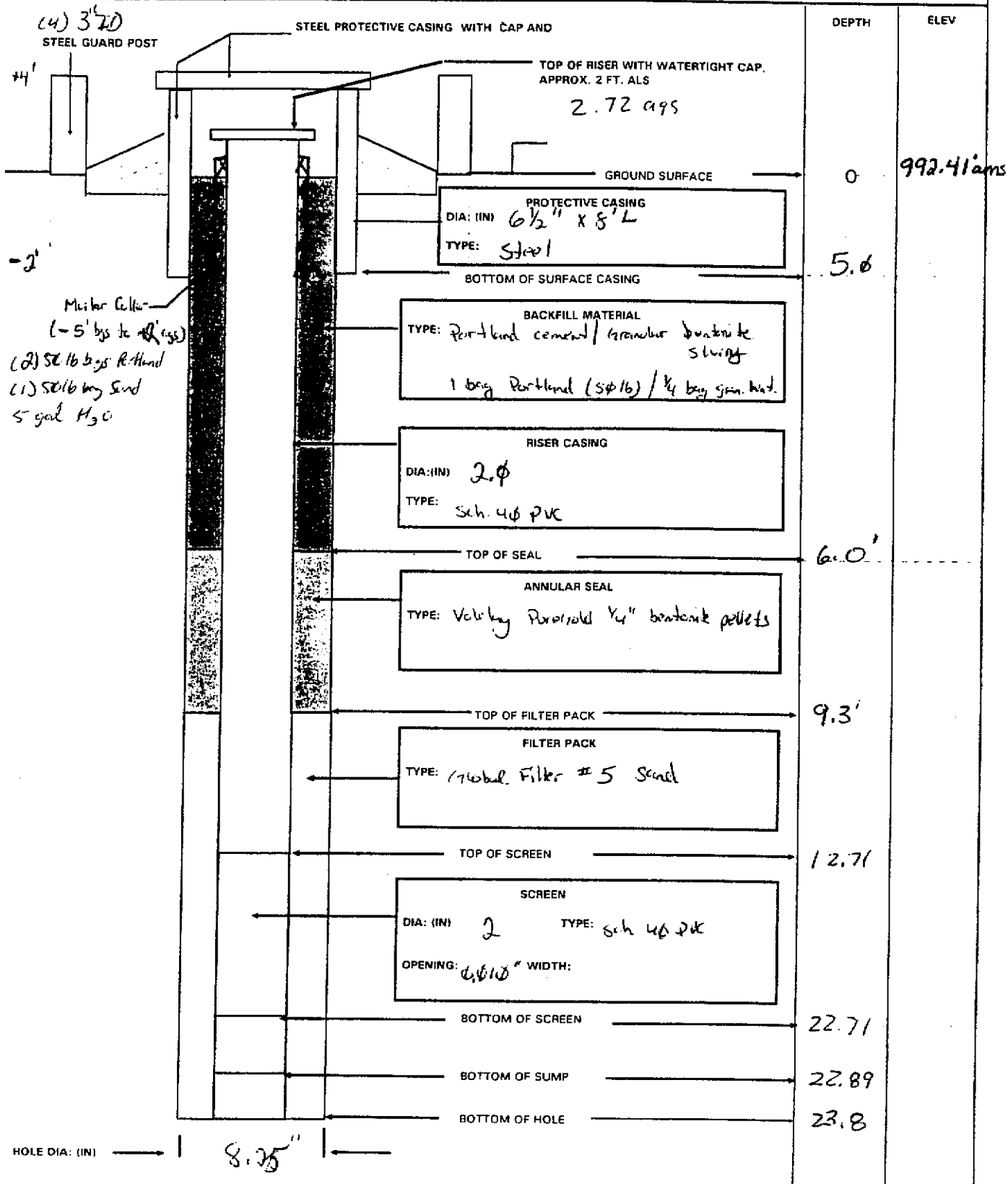
RECORDED BY: [signature] 08/24/01
(Signature and Date)

QA CHECK BY: Vicki Brumbach 9-11-01
(Signature and Date)

MONITORING WELL

PROJECT NAME: Load Line 2 Phase II RI ~~2~~ 3 **DELIVERY ORDER NO.:** ECAS-186

WELL NUMBER: LL3 MW 241	**BEGIN:** 8/13/01 @ 1110	**END:** 8/14/01 1240
COORDINATES: N: 559291.00 E: 2370332.94	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 994.65' ams



HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: MW 241

1. COMPANY NAME: SAIC

2. DRILL SUBCONTRACTOR: Tol-Test

SHEET 1 OF 1

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

4. LOCATION: LOAD LINE 3

5. NAME OF DRILLER: NEIL WIKTOR

6. MANUFACTURERS DESIGNATION OF DRILL: CME MODEL 75

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4¼" ID HSA; 2" OD x 2' LONG SPLIT SPOONS; 3" OD x 10' LONG WIRE LINE CORE BARRELS

8. HOLE LOCATION: LOAD LINE 3 SEE SKETCH

9. SURFACE ELEVATION: 994.65 TOC 559294.80 E/P 2370332.94 1/31/02

10. DATE STARTED: 08/13/01

11. DATE COMPLETED: 8/13/01

12. OVERBURDEN THICKNESS: 1.5 feet

15. DEPTH GROUNDWATER ENCOUNTERED: 11.5 feet

13. DEPTH DRILLED INTO ROCK: 22.3 feet

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 16.52 btoc 20 hours

14. TOTAL DEPTH OF HOLE: 23.8 feet bgs

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

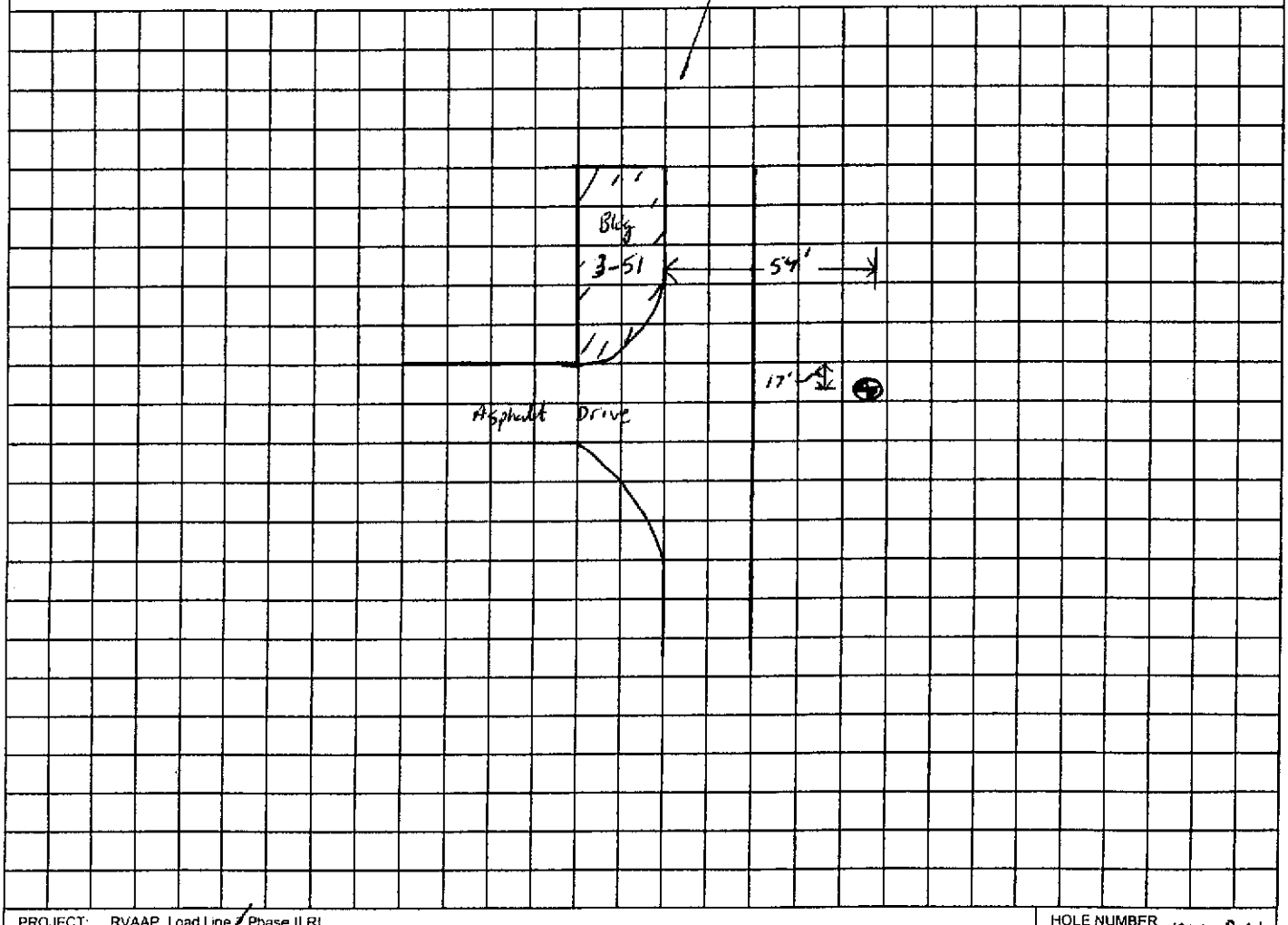
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
N/A			1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A						96%

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

LOCATION SKETCH/COMMENTS

SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 3 Phase II RI

HOLE NUMBER: MW-241

3 SM

HTRW DRILLING LOG

HOLE NUMBER MW-241

PROJECT: RVAAP, Load Line 2 Phase II RI

INSPECTOR

SHEET 1 OF 3

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	10YR 3/2 VERY DK Grayish Brown Silt, trace very fine sand, dry (ML)	0.0			Blow Count 9, 9, 9, 50/2 Recovery 1.65/2
		Broken Sandstone fragments in a silt matrix ~~Bedrock~~ SM				
	1	10YR 5/3 Brown silt, dry trace of clay, Stiff (ML)				
		Brown Sandstone, very hard, fine-grained				
	2					
	3					
	4	Brown fine-grained Sandstone, with cross-bedding				1st core run 4' - 14.5' Start @ 0847 end @ 0918 Pull depth 14.5' actual depth 14.05' Recovery: 9.67'/ 10.05'
	5					
	6					
	7					
	8					
	9					

3 of

HTRW DRILLING LOG

HOLE NUMBER MW-241

PROJECT: RVAAP, Load Line 2 Phase II RI

INSPECTOR Jeffrey Lindsey

SHEET 2 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	10					
	11	Color change to a light gray sandstone, water evident at 11.5', with iron staining and fracturing.	—	—	—	—
	12					
	13					
	14					2ND Core Run 14.05' - 17.23' Start @ 0940 END @ 1000 Pull depth 17.23' Actual depth 17.23' Recovery 3.09'/3.18'
	15					
	16	DK GRAY SHALE @ 15.9', about .1 ft in thickness.				
		Gray SANDSTONE, fine-grained w/ some Fe-staining & fracturing				
	17					3rd Core Run 17.23' - 18.55 Start @ 1015 END @ 1030 Pull depth 18.55 Actual depth 18.55 Recovery 1.2'/1.32'
	18	Bottom of cored interval @ 18.55'				
	19					
	20					

3 SM

HTRW DRILLING LOG

HOLE NUMBER MW-341

PROJECT: RVAAP, Load Line 2 Phase II RI

INSPECTOR Jeffrey Linden

SHEET 3 OF 3

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	20	Same as above				
	21					
	22					
	23					
						TOTAL DEPTH 23.8'
	24					
	25					
	26					
	27					
	28					
	29					
	30					

Well volume calculation sheet

Date 8-21-01 Time 1305
Well ID Num LLSMW-241
Well Location Load Line 3 near Bldg EB-8

Total depth of well (ft BTOC) 25.65
Depth to water (ft BTOC) 18.1
Height of water column (ft) (Hc) 7.55

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc $\pi\left(\frac{1}{12}\right)^2(7.55)$ 0.165 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.791 cu. ft. $\pi\left[\left(\frac{4.125}{12}\right)^2-\left(\frac{1}{12}\right)^2\right](7.55)(0.30)$

Vt = (Vc+Vf)*(7.48 gal/cu ft) $= (.165+.791)(7.48)$
= 7.2 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.0833 (ft) 1"
Hc = height of water column 7.55 (ft)
Rf = radius of filter pack 0.344 (ft) 4.125"
Rc = radius of inside casing 0.0833 (ft) 1"

WELL DEVELOPMENT FORM

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

Date: 8/21/01 and 8/22/01 Time: 1305

Well Number and Location: LL3MW-241, LOAD LINE 3, near Bldg EB-8

Development Crew: Bob Gollihue - ToITest

Molly McCann - SAIC

Driller (if applicable): ~~AFSM~~ A/TA (Bob Gollihue)

~~AFSM 8/26/01~~

Water Levels / Time: Initial: 18.1 BTOC (8/21/01) / 1305 Pumping: 24.5 BTOC (8/22/01) / 1419

Final: 23.0 BTOC (8/22/01) / 1520

Total Well Depth: Initial: 25.65 (8/21/01) FT BTOC Final: 25.65 8/22/01 FT BTOC

Date and Time: Begin: 8/21/01 / 1305 Completed: 8/22/01 / 1520

Development Method(S): pumping

~~AFSM 8/26/01~~

Total Quantity of Water Removed: 44.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14652	8/21/01 again on 8/22/01
Specific Conductivity	"	"
pH	"	"
Turbidity	"	"

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 3 Phase I RI DELIVERY ORDER NO.: 3QY01

WELL NUMBER AND LOCATION: LL3MW-241, near Bldg EB-8

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
~~8/21/01~~ 8/23/01	1313	0	16.2°	240	6.34	>999	0	0	Initial reading
8/21/01	1335	~7.5	17.1°	240	6.43	7999	7.5	1	BW 09-13-01
"	1433	~3.5	21.1°	225	6.70	7999	11.0	1.5	Left after this reading to allow well recharge
"	1605	4.0	17.2°	232	6.20	7999	15.0	2.0	BW 09-13-01
"	1745	5.0	18.5°	262	6.68	156	20.0	2.7	Recharge is slow. Development over the 4.5 hours enough.
8/22/01	0846	9.0	14.5°	227	6.64	320	29.0	4	
"	1124	8.0	15.2°	241	6.55	457	37.0	5	BW 09-13-01
"	1448	7.5	15.5°	245	6.60	425	44.5	6	Final reading

AASM 8/23/01

RECORDED BY: [signature] 8/21/01
(Signature and Date)

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

B.W.11 09-13-01

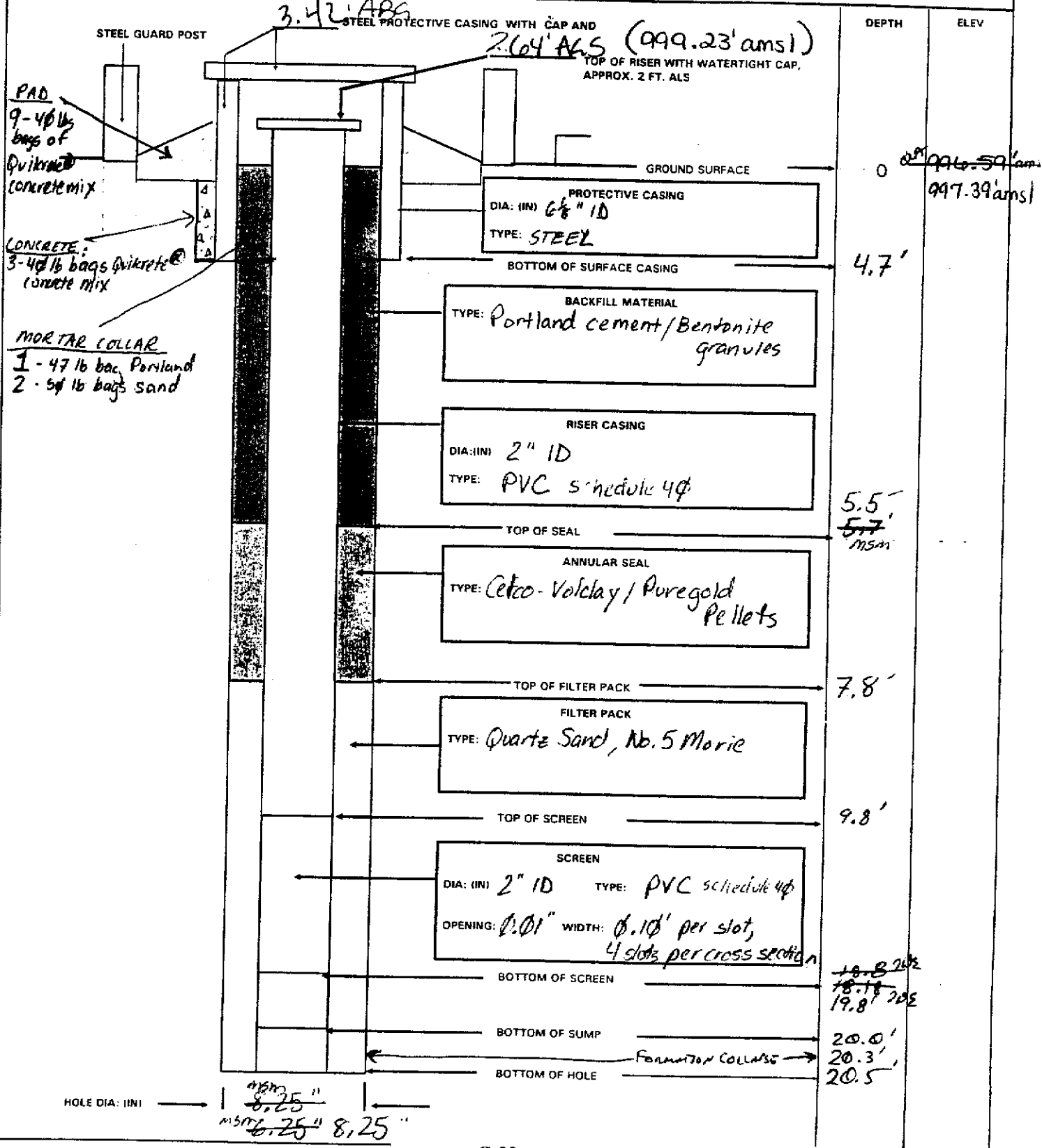
C-88

15

MONITORING WELL

PROJECT NAME: Load Line 3 Phase II RI — **DELIVERY ORDER NO.:** ECAS-186

WELL NUMBER: LL3MW-242	**BEGIN:** 8/10/01 1105	**END:** 08/14/01 1034
COORDINATES: N: 537035.28 E: 2371993.44	**REFERENCE POINT:** TOC	**ELEVATION:** 999.23' amsl



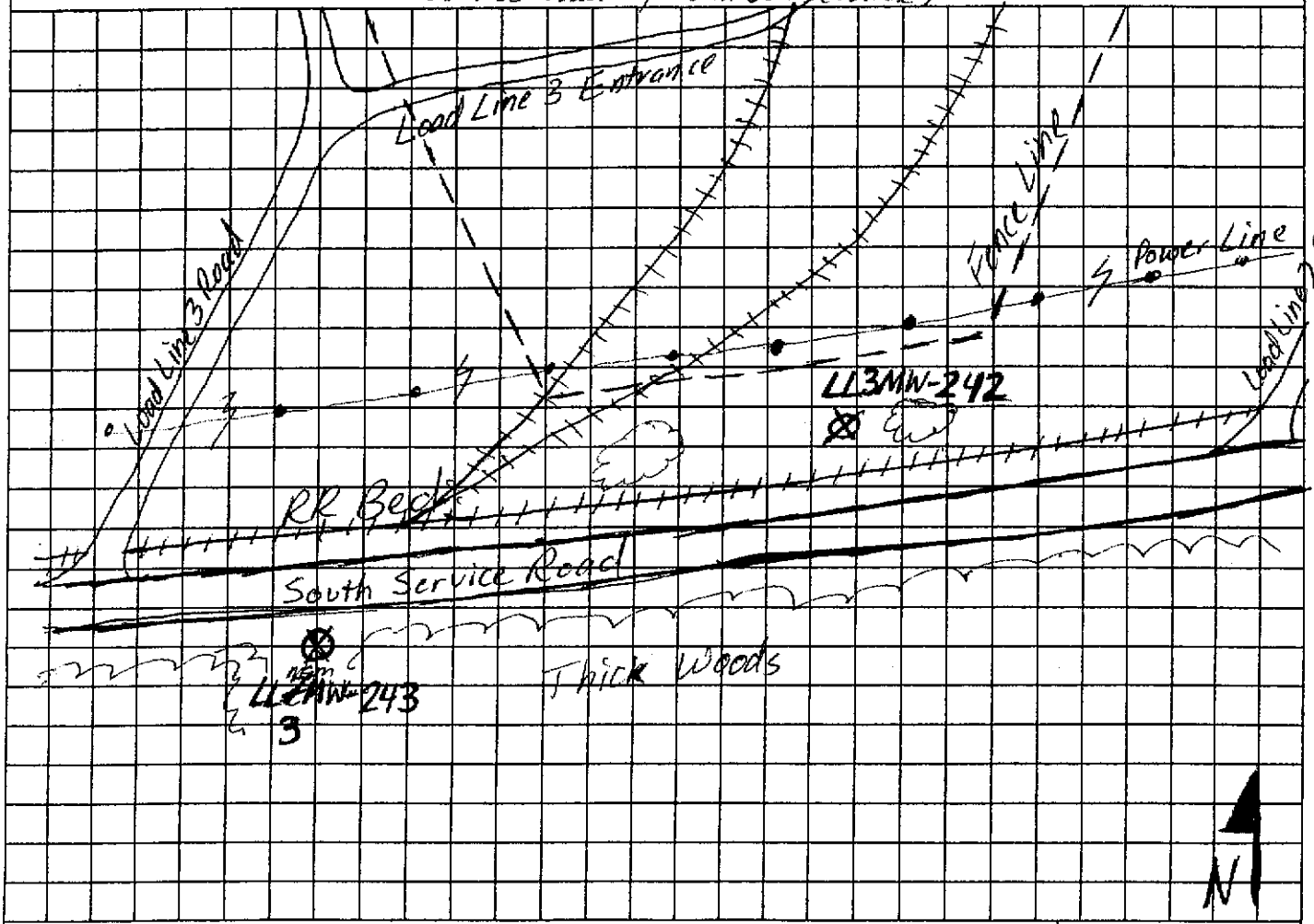
HTRW DRILLING LOG

	DISTRICT: Louisville	HOLE NUMBER LL3MW-242
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 4

3. PROJECT: RVAAP, Load Line 3 Phase II RI	4. LOCATION: (S) side of LL3, (N) side of south Service Road
5. NAME OF DRILLER: Bob Gollihue	6. MANUFACTURERS DESIGNATION OF DRILL: CME 55Ø
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 55Ø drill rig; 4¼" ID augers; NQ diamond core; 2" diam. split spoons; 14Ø lb. split spoon hammer ~~MSM 8-13-Ø1~~	8. HOLE LOCATION: See map below
	9. SURFACE ELEVATION: 999.32 TOC; 557035.28 N, 2371993.44 E KCP 1/17/02
	10. DATE STARTED: Ø8/Ø9/Ø1; 11. DATE COMPLETED: Ø8/14/Ø1
12. OVERBURDEN THICKNESS: ~ 3.1'	15. DEPTH GROUNDWATER ENCOUNTERED: ~ 1Ø.2' bgs
13. DEPTH DRILLED INTO ROCK: ~~17.2'~~ MSM 17.4'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: ~ 14.75' bgs ~ 2Ø hours
14. TOTAL DEPTH OF HOLE: ~~2Ø.3'~~ MSM 2Ø.5' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 16.1' bgs @ Ø916 on 8/14/Ø1

18. GEOTECHNICAL SAMPLES: N/A	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES: 2			
20. SAMPLES FOR CHEMICAL ANALYSIS: N/A	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY: 92 %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL: X	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: [signature]		

LOCATION SKETCH/COMMENTS: Note: Moved to (N) side of South Service Road by John Jent (USACE) SCALE: NTS



PROJECT: RVAAP, Load Line 3 Phase II RI | HOLE NUMBER LL3MW-242

HTRW DRILLING LOG

HOLE NUMBER LL3MW-242

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 2 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	LIGHT OLIVE BROWN (2.5Y 5/3) SILT, DRY, TRACE OF SUB-ANGULAR GRAVEL	N/A-DID NOT LOOKING	N/A	N/A	SPLIT SPOON 0-2' 3/8/8/7 1.6/2.0
	1'	LIGHT GRAY (N7) W/ ORANGE MOTTLES SILT, TRACE SUB-ANGULAR GRAVEL				
	2'	BROWN (10YR 5/4), CLAYEY SILT YELLOWISH, TRACE ANGULAR GRAVEL				SPLIT SPOON 2-4' 9/13/50-2" 0.9/~~2.0~~ 1.2 WET
	3'	BROWN (10YR 5/3) FINE GRAINED WEATHERED SANDSTONE, POORLY CEMENTED				
	4'			BOX #1		SPLIT SPOON 4-6' 50-5" RUN 1 START 0751 0809 STOP 0805 0818 PD 12.8' CD 12.3' RUN 8.8' LOSS 1.5 GAIN: N/A 8.8 0.04 REC 0.35/~~7.3~~ = ~~0.05~~ WET
	5'	YELLOWISH BROWN (10YR 5/4) FINE GR SS (4.4-4.55); LIGHT GRAY (2.5Y 7/1) CLAY, MOIST PLASTIC, MED. VH CONSISTENCY (4.55-4.7); LIGHT GRAY (2.5Y 7/2) FINE GR SS (4.7-4.8), POORLY CEMENTED; GRAY (2.5Y 6/1) WEATHERED SHALE (4.8-4.9); BROWN (10YR 5/3) VERY FINE GR SS, POORLY CEMENTED, SUBVERTICAL FRAC. FROM 5-5.5' (4.9-5.9)				
	6'	~~BROWN (10YR 5/3) MOIST~~ BROWN (10YR 5/3) CLAY, MOIST PLASTIC (5.90-5.92'); BLACK STAINED FRAC. YELLOWISH BROWN (10YR 5/6) FINE GRAINED SANDSTONE, POORLY CEMENTED SUBVERTICAL FRAC.				
	7'	VERY MINOR CLAY SEAM				
	8'	FRAC., MINOR FE STAINING				
	9'					
		(5.92-10')				
	10'					

LL3MW-242

HTRW DRILLING LOG

HOLE NUMBER

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 3 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11'	PALE YELLOW (2.5Y 7/4) VERY FINE GRAINED SS., POORLY CEMENTED, MINOR CLAY SEAM, Fe BANDING/STAINING YELLOWISH BROWN (10YR 5/6) FINE GRAINED SS, Fe BANDING/STAINING & 70% SANDSTONE 30% POORLY CEMENTED (10.4 - 11.4)	N/A PID NOT WORKING	~~N/A~~ MSM Box #1, cont'd	N/A	
	12'	ACCUMULATED LOST CORE (11.4 - ~~12.8~~ 12.6 MSM)				
	13'	* YELLOWISH BROWN (10YR 5/6) FINE GRAINED SS. POORLY CEMENTED		Box #2		RUN 2 START 0832 0858 STOP 0850 0910 PD 20.5 CD 20.3 RUN 7.7 LOSS 0 GAIN 0.2 ~~7.7~~ 0.36 RQD 2.8 / ~~7.7~~ = ~~0.35~~ MSM MSM * ALL DEPTHS OF THE INTERVALS BELOW 12.8' NEED TO BE ADJUSTED UP 0.2' DUE TO THE GAIN ACHIEVED ON RUN 2
	14'	VERY MINOR CLAY SEAM FRAC. MINOR Fe STAINING				
	15'	FRAC FE STAINING, TRACE OF CLAY SUB VERTICAL FRACT. Fe STAINED				
	16'	INTERBEDDED SHALE (N5) AND LIGHT YELLOWISH BROWN (2.5Y 6/4) FINE GRAINED SANDSTONE, POORLY CEMENTED LIGHT GRAY (N7) SS. POORLY CEMENTED, Fe STAINING AND BANDING SHALE (N5) SOFT				
	17'	~~LIGHT YELLOWISH BR~~ 70% BROWNISH YELLOW (10YR 6/6) SS POORLY CEMENTED Fe STAINING/BANDING (16.6 - 17.2) LIGHT GRAY (N7) SS. POORLY CEMENTED SS				
	18'	SAME AS 16.6 - 17.2 INTERVAL GRAY (N5) WEATHERED SHALE, Fe STAINED SAME AS 16.6 - 17.2 INTERVAL LIGHT GRAY (N7) SS, POORLY CEMENTED SAME AS 16.6 - 17.2 INTERVAL				
	19'	~~LIGHT G~~ 90% GRAY (N5) WEATHERED SHALE 45° FRAC. SAME AS 16.6 - 17.2 INTERVAL LIGHT GRAY (N7) SS. POORLY CEMENTED				
	20'					

HTRW DRILLING LOG

HOLE NUMBER LL3MW-242

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 4 OF 4

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		SAME AS ABOVE	N/A - PID NOT WORKING	~~N/A~~ MSM Box #2, cont'd	N/A	
		SAME AS 16.6 - 17.2' Interval				
	21'	TD = ~~20.3~~ MA 20.5 *				

8-11-01

Well volume calculation sheet

Date 20 Aug 01 Time 1000
Well ID Num 13mw247
Well Location Load Line 3 off S. Service Rd

Total depth of well (ft BTOC) 22.47
Depth to water (ft BTOC) 19.13
Height of water column (ft) (Hc) 3.35

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc .073 cu. ft.
$\pi \left(\frac{1}{12}\right)^2 (3.35)$

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= .351 cu. ft.
$3.142\left[\left(\frac{4.125}{12}\right)^2 - \left(\frac{1}{12}\right)^2\right] 3.35(.3)$

.073 + .351

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 3.2 gal.
.118 − .007
(.111)

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .083 (ft)
Hc = height of water column 3.35 (ft)
Rf = radius of filter pack 0.344 (ft)
Rc = radius of inside casing .083 (ft)

WELL DEVELOPMENT FORM

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

Date: 8/20/01 Time: 1000

Well Number and Location: LL3mw242

Development Crew: M. Clough - SAIC

BOB GOLLIHUE - TOLTEST

Driller (if applicable): CHARLIE MOORE - TOLTEST

MSM 8/26/01

Water Levels / Time: Initial: 19.13 / 1000 8/20 Pumping: NR /

Final: 19.40 / 1446 8/26 ← taken 6 days after completion of development

Total Well Depth: Initial: 22.47 FT BTOC Final: 22.60 FT BTOC

Date and Time: Begin: 8/20/01 1000 Completed: 8/26/01 1442

Development Method(S): Pump

MSM 8/26/01

Total Quantity of Water Removed: 41 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14639	20 Aug 01
Specific Conductivity		
pH		
Turbidity		

WELL DEVELOPMENT RECORD

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

WELL NUMBER AND LOCATION: LL3MW242, N side of So. Service Road

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/20/01	1011	0	14.6	0.278	6.05	>999	0	0	
	1014	4	12.7	0.235	6.13	>999	4	1	
	1030	9	13.3	0.212	6.21	>999	9		
	1052	4	13.4	0.212	6.17	888	13		
	1200	3.5	13.3	0.210	6.31	>999	16.5		
	1232	1.5	14.6	0.209	6.38	>999	18		
	1340	2	14.6	0.211	6.39	508	24		
	1412	8	14.9	0.211	6.39	552	28		
		4	15.1	0.209	6.27	375	32	2	
	1509	2	15.2	0.205	6.21	275	34		
	1541	3	14.6	0.207	6.24	188	37		
	1614	2	14.4	0.217	6.19	121	39		
	1642	2	14.1	0.206	6.28	124	41		

~~FINAL 8/20/01~~

RECORDED BY: M. Clough 8/20/01
(Signature and Date)

QA CHECK BY: B. Will 09-13-01
(Signature and Date)

C-96

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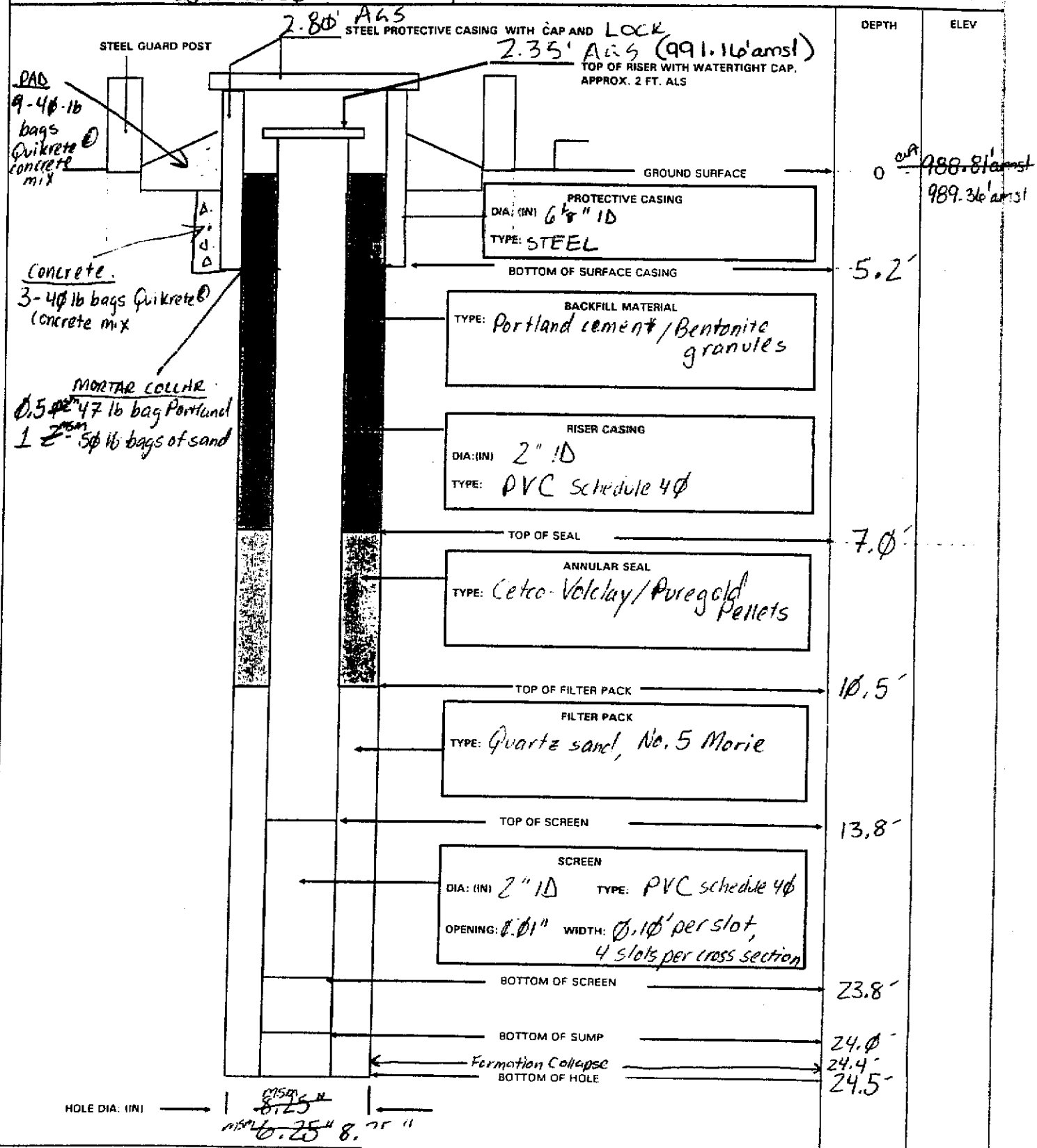
MONITORING WELL

PROJECT NAME: Load Line 3 Phase II-RI **DELIVERY ORDER NO.:** ECAS #186

WELL NUMBER: LL3MW-243	**BEGIN:** 8-11-01 1327	**END:** 8-14-01 1222
COORDINATES: N: 556688.50 E: 2371532.06	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 991.16' amsl



HTRW DRILLING LOG

	DISTRICT: Louisville	HOLE NUMBER LL3MW-243
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 4

3. PROJECT: RVAAP, Load Line 3 Phase II RI	4. LOCATION: (S) side of LL3, (S) side of South Service Road
5. NAME OF DRILLER: Bob Gotlihue	6. MANUFACTURERS DESIGNATION OF DRILL: CME 550
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 550; 4¼" ID augers; NQ diamond core; 2" diam. split spoons; 140 lb. split spoon hammer; ~~MSM 8-13-01~~	8. HOLE LOCATION: See map below
	9. SURFACE ELEVATION: 991.16 TOC; 5566 89.58 N, 2371532.86 E KAP 11/30/01
	10. DATE STARTED: 8/10/01 — 11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: ~~8.0~~ MSM ~8.1'	15. DEPTH GROUNDWATER ENCOUNTERED: 16.3' bgs
13. DEPTH DRILLED INTO ROCK: ~~16.5~~ MSM ~16.4'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 16.57' bgs @ 1041 on 8/14/01
14. TOTAL DEPTH OF HOLE: 24.5' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES – 1	DISTRICT	(UNDISTURBED)	19. TOTAL NUMBER OF CORE BOXES: 1			
20. SAMPLES FOR CHEMICAL ANALYSIS: N/A	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY 32 %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL: X	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: Molly Flam		

LOCATION SKETCH/COMMENTS: LL3MW-243 — SCALE: NTS

SEE MAP FOR LL3MW-~~243~~ 242 MSM

PAGE 5 THIS VOLUME

PROJECT: RVAAP, Load Line 3 Phase II RI — HOLE NUMBER LL3MW-243

HTRW DRILLING LOG

HOLE NUMBER LL3MW-243

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 2 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	DARK GRAY (10YR 4/1) SILT, DRY, CRUMBLY	N/A - PID NOT WORKING		N/A	SPLITSPOON 0-2'
		PALE YELLOW (5Y 7/3) SILT, DRY, CRUMBLY INCREASING YELLOWISH BROWN (10YR 5/4) MOTTLING W/ DEPTH, ANGULAR GRAVEL ~5% AT BOTTOM OF INTERVAL				4/5/8/10 1.4/2.0
	1					
	2	LIGHT OLIVE BROWN (2.5Y 5/4) CLAYEY SILT, DRY, HARD				SPLITSPOON 2-4' 14/12/14/12 N.8/2.0
		SHALE FRAGMENT				
		PALE YELLOW (5Y 7/3) SILT, DRY, HARD, OCCASSIONAL ANGULAR GRAVEL <5%				
	3					
	4	PALE YELLOW (2.5Y 7/3) SILT, DRY CRUMBLY (ML)				SPLITSPOON 4-6' 5/8/14/15 1.4/2.0
		PALE YELLOW (5Y 7/3) SILT, DRY, HARD, ML, OCCASSIONAL ANGULAR GRAVEL				
	5					
	6			LL3MW-243-1118-SO		SPLIT SPOON 6-8' 8/14/18/40 1.7/2.0
	7	GRAVEL - ANGULAR INCREASED TO ~5-10%				SHELBY TUBE 6-8' 1400 PSI FOR 11"
		LIGHT YELLOWISH BROWN (10YR 6/4) SANDY GRAVELLY SILT, WEATHERED SLIG-ANGULAR TO ANGULAR GRAVEL ~20-30%, VERY FINE SAND, DRY, CRUMBLY				
	8	LIGHT YELLOWISH BROWN (2.5Y 6/4) WEATHERED FINE GRAINED SS, VERY FRACTURED, POORLY CEMENTED				SPLITSPOON 8-10 50-4" 0.5/0.35
	9					
						RUN 1
	10					

HTRW DRILLING LOG

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | HOLE NUMBER LL3MW-243 | SHEET 2 OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11'	SAME AS ABOVE	N/A PID NOT WORKING	BOX. 1	N/A	RUN 1 PD 17.8 CD 17.8 RUN 8.1 LOSS 2.4 GAIN = N/A RQD 0/8.1 = 0 START 1607 1620 STOP 1613 1631
	12'					
		YELLOWISH BROWN (10YR 5/4) FINE TO V. FINE STAINED SS, FRACTURED, POORLY CEMENTED				
	13'	PALE YELLOW (2.5Y 7/4) V. FINE GRAINED SS, POORLY CEMENTED, FRACTURED — 13.1 FRAC.				
		BLACK STAINED FRAC.				
		BLACK STAINED FRAC.				
	14'	BLACK STAINED FRAC				
		BLACK STAINED FRAC.				
		BLACK STAINED FRAC.				
	15'	BLACK STAINED FRAC				
	16'	ACCUMULATED LOST CORE				
	17'					16:48 TAPED HOLE FOR WATER 16.4' BGL, APPEARS TO BE STABILIZED
	18'	SAME AS 13 - 15.5' INTERVAL BLACK STAINED FRAC. BLACK STAINED FRAC.				RUN 2 START 1654 1712 STOP 1707 1716 PD 24.5 CD 24.5 RUN 6.7 LOSS 0.3 GAIN 0 RQD 2.3/6.7 = 0.34 ~~0.36~~
	19'	V. MINOR STAINING ON FRAC. FRAC. BROWN STAINED FRAC. FRAC.				

HTRW DRILLING LOG

HOLE NUMBER LL3MW-243

PROJECT: RVAAP, Load Line 3 Phase II RI | INSPECTOR Todd Eaby | SHEET 3 (msm) OF 4

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21'	FRAC. WEATHERED SS SAME AS ABOVE DARK YELLOWISH BROWN (10YR 4/1) POORLY CEMENTED FINE GRAINED SS, IRON BANDING HEAVILY STAINED FRAC. BROWN TO BLACK AT ~45° FRAC. LIGHT OLIVE GRAY (5Y 6/2) POORLY CEMENTED FINE GRAINED SS.	N/A - PID NOT WORKING	Box 1	N/A	N/A
	22'	INTERBEDDED LIGHT OLIVE GRAY (5Y 6/2) AND LIGHT YELLOWISH BROWN (10YR 6/4) FINE GRAINED SS. POORLY CEMENTED FRAC. - BLACK STAINED WEA. FRAC. FRAC. FRAC. WEA. ZONE				
	23'	FRAC. FRAC. W/SHALEY SURFACES FRAC.				
	24'	ACCUMULATED LOSS CORE				
		TD = 24.5'				
	25'	msm 8-13-01				
	26'					
	27'					
	28'					
	29'					
						30'

Well volume calculation sheet

Date 8/21/01 Time 0905
Well ID Num LL3MW-243
Well Location @ of LL3, (S) side of South Service Road

Total depth of well (ft BTOC) 26.5'
Depth to water (ft BTOC) 19.3'
Height of water column (ft) (Hc) 7.2'

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.157 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.755 cu. ft. $3.142\left[\left(\frac{4.125''}{12''}\right)^2-\left(\frac{1'}{12''}\right)^2\right]\times(7.2')\times(0.30)$
$= 0.755$

Vt = (Vc+Vf)*(7.48 gal/cu ft) $= (0.157\ ft^3 + 0.755\ ft^3)\left(7.48\ \frac{gal}{ft^3}\right)$
= 6.82 gal. (~7 gal)

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.0833 (ft) (1")
Hc = height of water column 7.2 (ft)
Rf = radius of filter pack 0.344 (ft) (4.125")
Rc = radius of inside casing 0.0833 (ft) (1")

WELL DEVELOPMENT FORM

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

Date: 8/21/01 Time: 0905

Well Number and Location: LL3MW-243, south side of So. Service Road at LL3

Development Crew: Bob Gollihue - TolTest

Molly McCann - SAIC

Driller (if applicable): (Bob Gollihue)

~~MSM 8/22/01~~

Water Levels / Time: Initial: ~~19~~ ~~19.8~~ MSM 19.3' 0905 Pumping: NOT TAKEN

Final: 19.4' / 1103

Total Well Depth: Initial: 26.5 FT BTOC Final: 26.5 FT BTOC

Date and Time: Begin: 8/21/01 / 0903 Completed: 8/21/01 / 1105

Development Method(S): pumping

~~MSM 8/26/01~~

Total Quantity of Water Removed: 56 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14652	8/21/01 0730
Specific Conductivity	"	" "
pH	"	" "
Turbidity	"	" "

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 3 Phase I RI

DELIVERY ORDER NO.: (illegible)

WELL NUMBER AND LOCATION: LL3MW-243, (S) side of So. Service Road

PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/21/01	0920	0	15.5	0.186 mS/cm	5.62	7999	0	0	Initial reading
"	0950	7	13.1	0.163	5.85	113	7	1	
"	1013	~~14~~ 7	12.5	0.217	4.96	94	14	2	
"	1019	7	12.6	0.160	5.36	~~225~~ 125	21	3	
"	1022	7	11.7	0.160	5.55	118	28	4	
"	1034	7	11.2	0.158	5.62	10	35	5	
"	1037	7	11.2	0.159	5.54	8	42	6	
"	1045	7	11.6	0.158	5.55	3	~~56~~ 49	7	
"	1057	7	11.5	0.158	5.64	-10 (0)	56	8	Final reading

~~AM~~ 8/23/01

RECORDED BY: [signature] 8/21/01
(Signature and Date)

QA CHECK BY: Kathryn McCormick
(Signature and Date)

B. Will 09-13-01

C-104

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