APPENDIX C
MONITORING WELL INSTALLATION AND DEVELOPMENT LOGS

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MONITORING WELL INSTALLATION AND DEVELOPMENT LOGS

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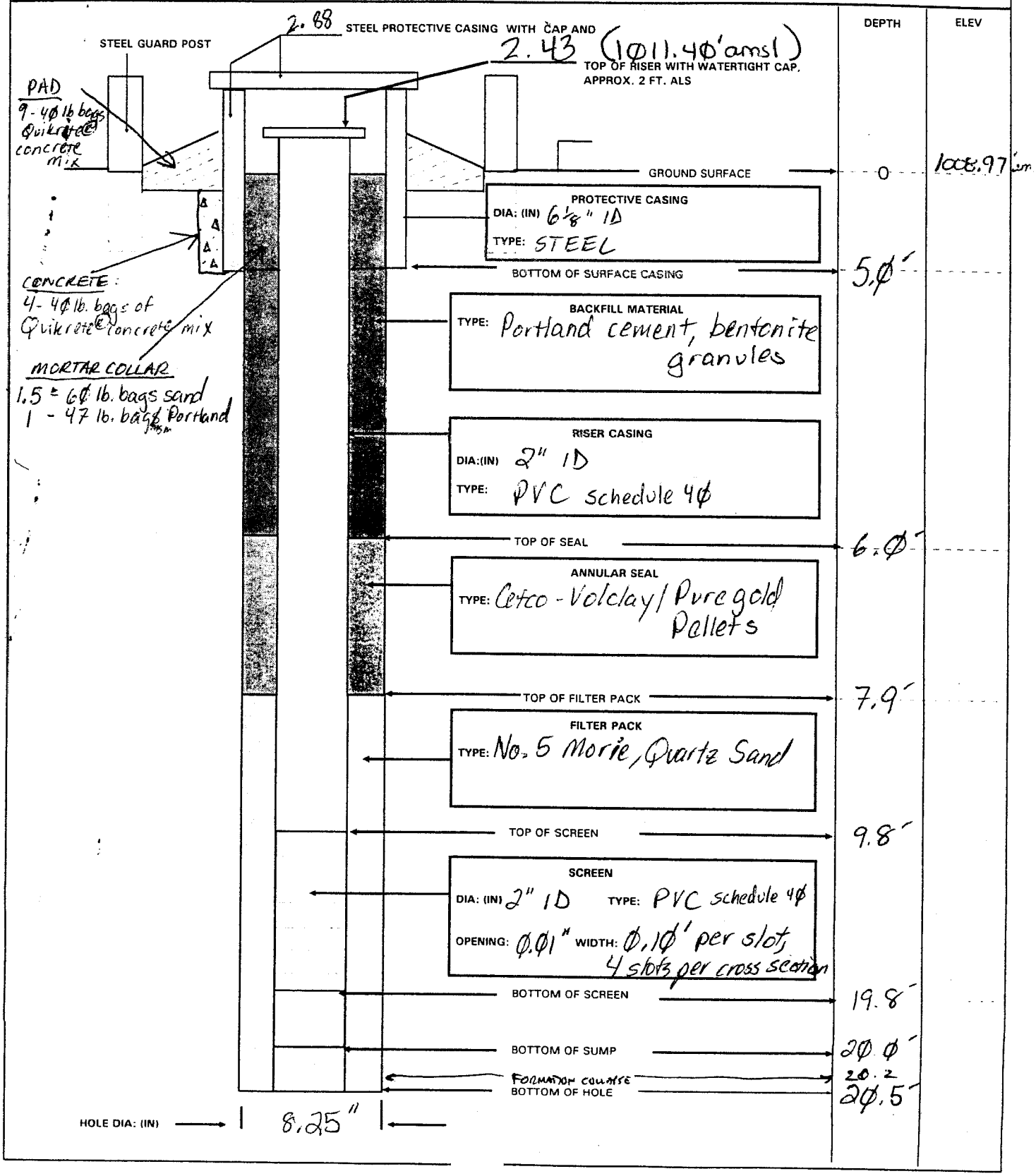
MONITORING WELL

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

WELL NUMBER: LL2MW-261	**BEGIN:** 08/09/01 1137	**END:** 08/15/01 0845
COORDINATES: N: 561898.59 E: 2333317.01	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1011.40



HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: LL2MW-261

SHEET 1 OF 4

1. COMPANY NAME: SAIC
2. DRILL SUBCONTRACTOR: Tol-Test
3. PROJECT: RVAAP, Load Line 2 Phase II RI
4. LOCATION: N. half of LL2, N of Bldg DB-10
5. NAME OF DRILLER: Bob Gollihue
6. MANUFACTURERS DESIGNATION OF DRILL: CME 550
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT:
   - CME 550 drill rig
   - 4¼" ID augers
   - NQ diamond core
   - 2" diam. split spoons
   - 140 lb. split spoon hammer
   - ~~MBM 8/14/01~~
8. HOLE LOCATION: See map below
9. SURFACE ELEVATION: 1011.40 TOC; 561398.59 N; 2373317.01 E (KH 11/31/01)
10. DATE STARTED: 08/09/01
11. DATE COMPLETED: 8/15/01
12. OVERBURDEN THICKNESS: ~0.7'
13. DEPTH DRILLED INTO ROCK: ~19.8'
14. TOTAL DEPTH OF HOLE: 20.5' bgs
15. DEPTH GROUNDWATER ENCOUNTERED: ~11.5' bgs
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 5.9' bgs @ 1630 on 8/14/01
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):
18. GEOTECHNICAL SAMPLES (DISTURBED / UNDISTURBED): None - see note in journal/log sheet
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						95 %

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

LOCATION SKETCH/COMMENTS: LL2MW-261 SCALE: NTS

PROJECT: RVAAP, Load Line 2 Phase II RI

HOLE NUMBER: LL2MW-261

Bldg DB-9

HTRW DRILLING LOG

HOLE NUMBER LL2MW-261

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

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	BROWN (10YR 4/3) SILT, DRY, CRUMBLY	N/A	None collected - See note in journal / task team log	N/A	SPLIT SPOON 0-2' 5/10/28/50-5" 1.6/2.0
	1	BROWN (10YR 4/3) SILT, DRY, CRUMBLY, ~10-15% GRAVEL - ANGULAR				
		~~VERY POOR BROWN (10YR 7/4) FINE GRAINED WEATHERED SANDSTONE~~ LIGHT YELLOWISH BROWN (10YR 6/4))				
	2	(0.7 - 4.5')				SPLIT SPOON 2-4' 50-1" ~0.1 / 0.1
	3					
	4					
		BROWNISH YELLOW (10YR 6/6) FINE GRAINED SANDSTONE, FRACTURED, POORLY CEMENTED, Fe STAINED FRACTURES		CORE BOX 1		RUN 1 START 0820 0838 STOP 0834 0851 PD 13' CD 12.95 RUN ~~8.5~~ 8.5' MSM LOSS 0.4 GMN: N/A RQD 5.1/~~8.1~~ 8.5 MSM = 0.6 POSSIBLE WATER ~ 11-11.5' BGL MUD ON ROPS
	5	SPIN ~~BLACK~~ BLACK STAINING Lt. BROWNISH GRAY (2.5Y 6/2) FINE GRAINED POORLY CEMENTED SANDSTONE Fe STAINED FRAC.				
	6	SPIN BLACK STAINED FRAC.				
	7					
	8					
	9	Fe STAINED FRAC.				
		Fe STAINED FRAC.				
	10					

HTRW DRILLING LOG

HOLE NUMBER LL2MW-261

SHEET 3 OF 4

PROJECT: RVAAP, Load Line 2 Phase II RI

INSPECTOR Todd Eaby

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	~~N/A~~ 2 core box 1	N/A	
		Fe STAINED FRAC.				
	11'	GRAY (5Y 6/1) VERY FINE TO FINE GRAINED SANDSTONE, POORLY CEMENTED				- POSSIBLE WATER @ 11-11.5' BGL, MUD ON RODS
	12'					
	13'					RUN 2
						START @910 @952 STOP @938 1010 PD 20.5 CD 20.4 RUN 7.5 LOSS 0.4 GAIN 0 RQD 4.9/7.5 = 0.65 - WATER BLOWN FROM HOLE AT BEGINNING OF RUN
	14'					
		- VERY MINOR SHALEY INTERBDS (11.1 - 15')				
	15'	VERY DARK GRAY (N3) TO BLACK (N2.5) SHALE (15-15.1')				
		15.2 - MINOR SHALEY INTERBDS				
		- SAME AS 11.1-15' INTERVAL W/ VERY MINOR SHALEY INTERBDS (15.1 - 20.1)				
	16'					
	17'					
	18'					
	19'					

HOLE NUMBER LL2MW-261

HTRW DRILLING LOG

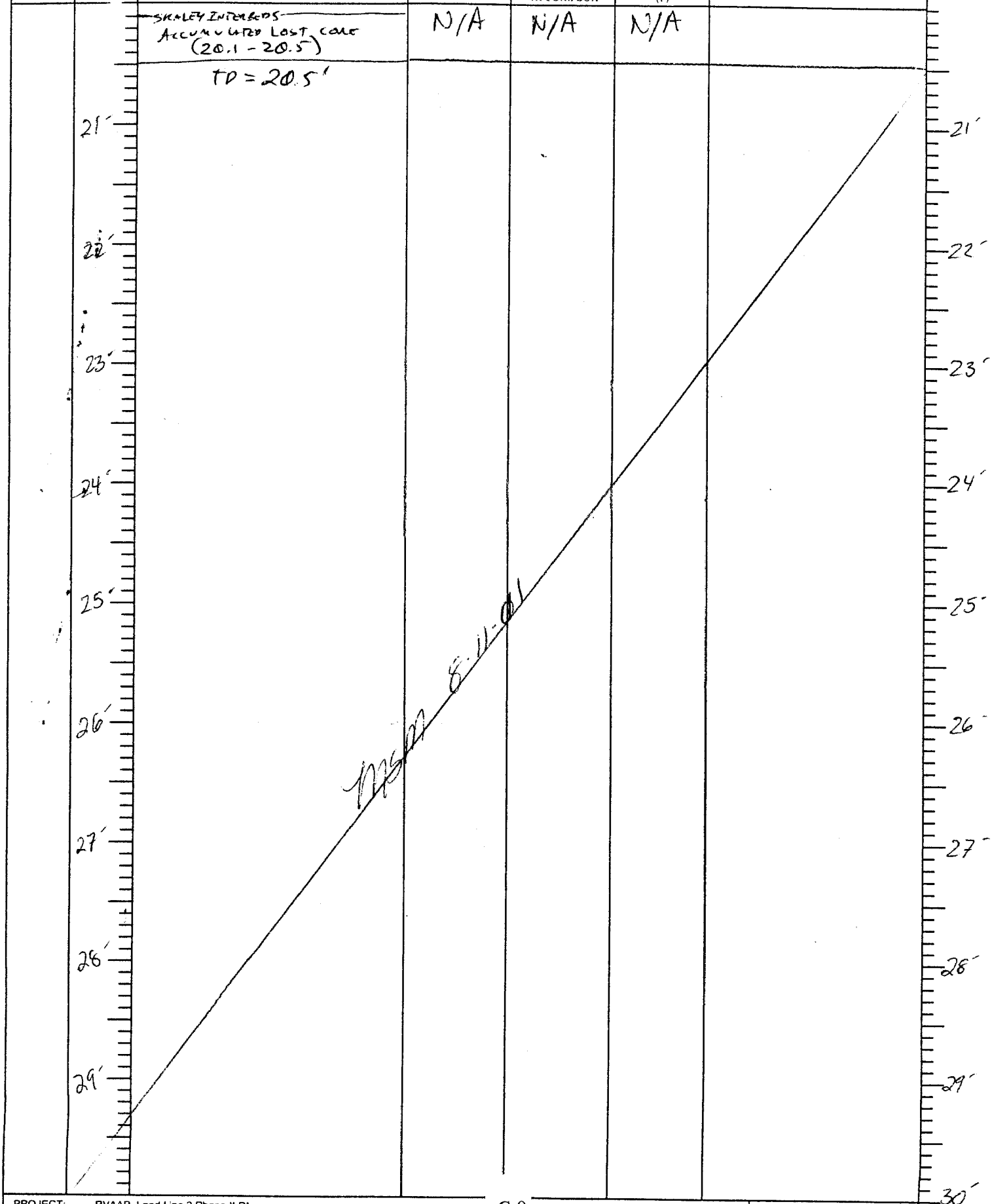
HOLE NUMBER LL2MW-261

PROJECT: RVAAP, Load Line 2 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)
		SHALEY INTERBEDS ACCUMULATED LOST CORE (20.1 - 20.5) TD = 20.5'	N/A	N/A	N/A	



Well volume calculation sheet

Date 08/25/01 Time 0800
Well ID Num MW 261
Well Location LOAN LINE 2

Total depth of well (ft BTOC) 22.42
Depth to water (ft BTOC) 8.45
Height of water column (ft) (Hc) 13.97

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.28 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
= 0.47 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 5.6 gal.

5 volumes = 5 x 5.6 gal
28.0 gallons

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.10 (ft)
Hc = height of water column 13.97 (ft)
Rf = radius of filter pack 0.245 (ft)
Rc = radius of inside casing 0.08 (ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: CY01

Date: 8/25/01 Time: 0800

Well Number and Location: LL2 - MW 261 LOAD LINE 2

Development Crew: MEG STAINES SAIC

SUSAN McCAUSLIN SPECPRO

Driller (if applicable): Chris White - TOHist

Water Levels / Time: Initial: 8.45 / 0800 Pumping: 15.15 / 0834

Final: 17.62 / 0934

Total Well Depth: Initial: 22.42 FT BTOC Final: 22.42 FT BTOC

Date and Time: Begin: 08/25/01 / 0800 Completed: 08/25/01 / 0934

Development Method(S): Whale Pump

Total Quantity of Water Removed: 40 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	MP 20-1028	08/25/01
Specific Conductivity	"	"
pH	"	"
Turbidity	N/A	N/A

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO: CY01

WELL NUMBER AND LOCATION: MW-26I

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
08/25/01	0820	0	14.0	.517	7.48	clear	0	0	INITIAL READING
	0830	5	13.14	.518	7.42	clear	5	.9	
	0838	5 8/25/01	12.92	.514	7.42	clear	10	1.8	
	0846	5	12.80	.513	7.42	clear	15	2.7	
	0855	5	12.75	.514	7.43	Clear	20	3.6	
	0904	5	12.75	.516	7.44	clear	25	4.5	
	0913	5	12.78	.515	7.46	clear	30	5.4	
	0924	5	12.84	.514	7.50	cloudy	35	6.3	
	0933	5	12.80	.514	7.47	clear	40	7.2	Final reading

MS 8/25/01

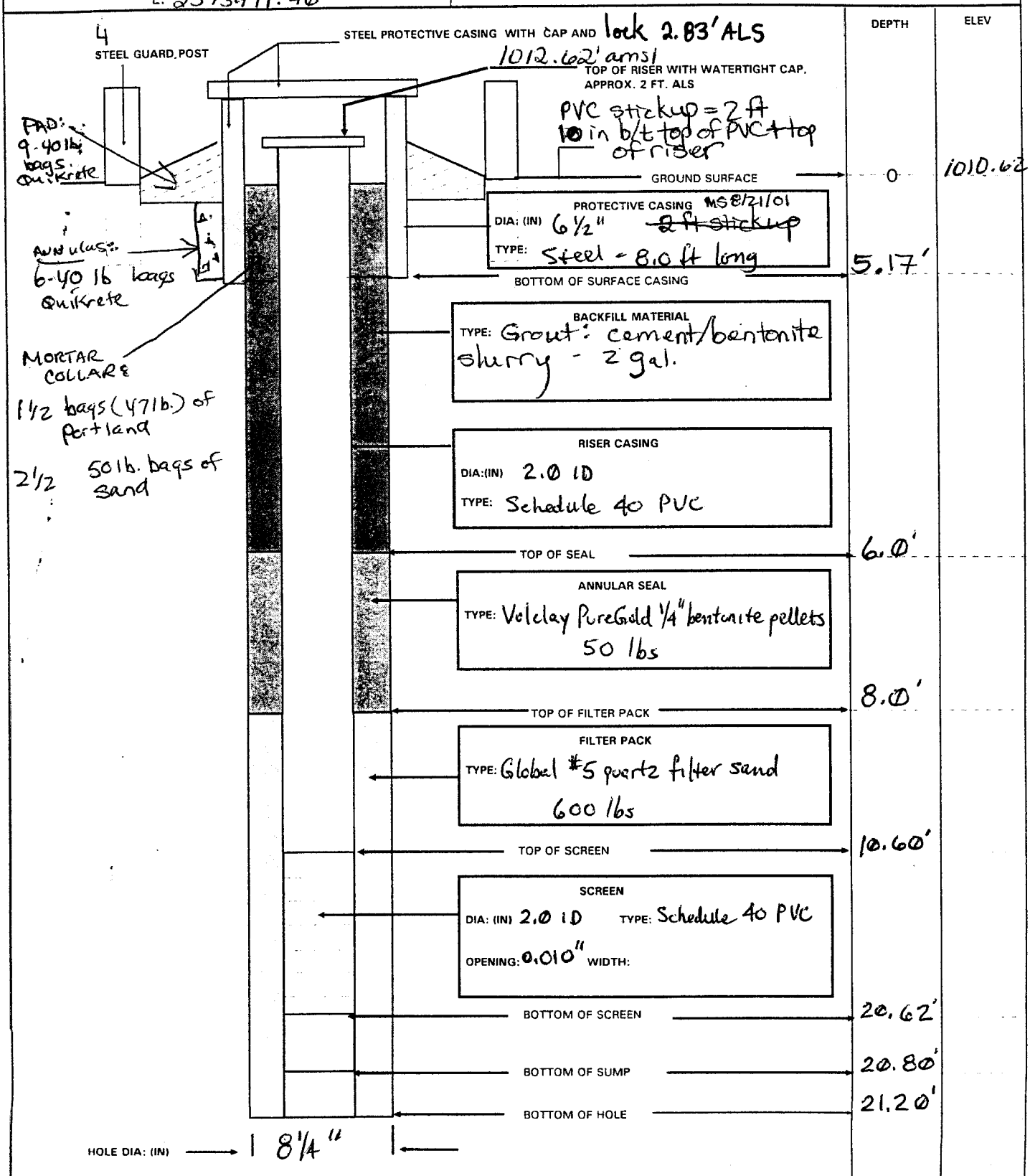
RECORDED BY: T. McCauley 08/25/01
(Signature and Date)

QA CHECK BY: Vicki Bornmann 8-28-01
(Signature and Date)

MONITORING WELL

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

WELL NUMBER: MW 262	**BEGIN:** 07/31/01 1339	**END:** 07/31/01 1500
COORDINATES: N: 562219.47 E: 2373971.46	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1012.62



HTRW DRILLING LOG

HTRW DRILLING LOG	DISTRICT: Louisville	HOLE NUMBER MW 262
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 4

3. PROJECT: RVAAP, Load Line 2 Phase II RI	4. LOCATION: Load Line 2
5. NAME OF DRILLER: Neil Wiktor	6. MANUFACTURERS DESIGNATION OF DRILL: CME 75
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4 1/4" ID Hollow Stem Augers; 2" OD by 2.0 ft long split spoons; 3" OD by 10 ft long wireline core barrel; 3" OD by 2.5 ft long Shelby tubes	8. HOLE LOCATION: At end of Cul de Sac off Remalia Rd. See attached sketch map
	9. SURFACE ELEVATION: 1012.62 TOC 562019.47 N 2373971.46 E KJP 1/31/02
	10. DATE STARTED: 07/31/01 — 11. DATE COMPLETED: 07/31/01
12. OVERBURDEN THICKNESS: 5.2 ft bgs	15. DEPTH GROUNDWATER ENCOUNTERED: 13 ft bgs
13. DEPTH DRILLED INTO ROCK: 15.10 ft	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 13.40 ft TOC after 18 hrs
14. TOTAL DEPTH OF HOLE: 21.20 ft bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

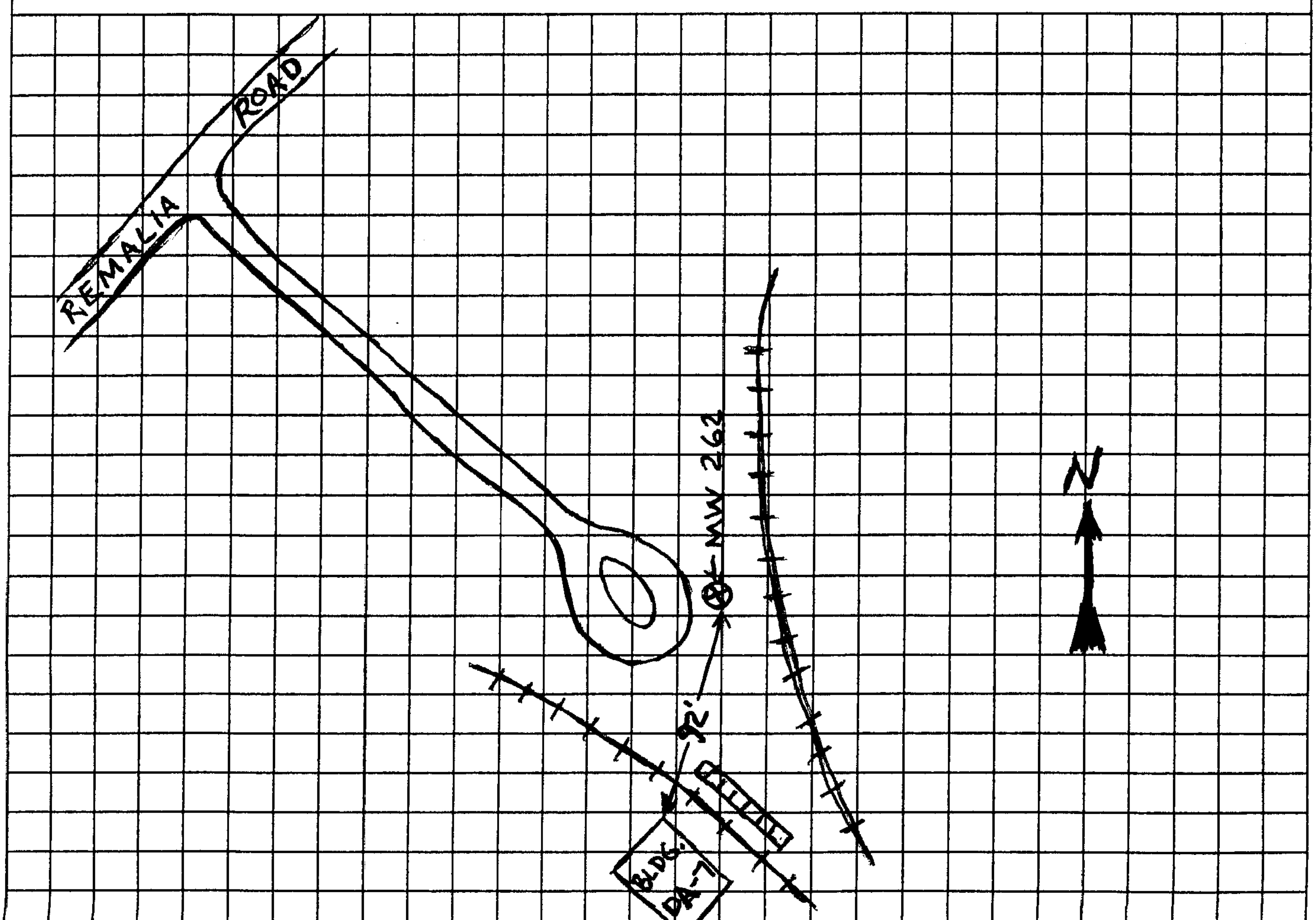
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	-		One

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						90 %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Completed as Monitor Well		MW 262		E Schultheis

LOCATION SKETCH/COMMENTS

SCALE:



PROJECT: RVAAP, Load Line 2 Phase II RI — HOLE NUMBER MW 262

HTRW DRILLING LOG

HOLE NUMBER MW 262

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR Efschultheis | 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)
	0.5	SILT (ML), 5-10% fine gravel, loose, root zone, dry, very pale brn 10YR 7/3	11.6 ppm			Blow cts: 4-5-6-8 Recovery. 1.65/2.0 * PID down hole readings peaked around 35.4 ppm - Breathing zone 0.0 ppm
	1	CLAYEY SILT (ML); lt. brnish gray 10YR 6/2, yellowish brn mottling 10YR 5/8, 1-5% coarse sand, damp, very stiff, non-plastic				
	2	color change to yellowish brown 10YR 5/4	12.4 ppm			Blow Cts. 5-7-12-11 Recovery: 1.1'/2' *PID in augers 39.7 ppm breathing zone 0.0 ppm Contact uncertain due to low recovery
	3					
	4	CLAYEY SILT (ML); light yellowish brown 10YR 6/4, 5% coarse sand to fine gravel, very stiff, non-plastic, damp	0.0 ppm			Blow Cts. 25-36-50/6" Recovery: 1.6'/2'
	5					
	6	WEATHERED SHALE (BR); very pale brown 10YR 7/4, finely laminated very loose, damp, grades to sandy shale toward bottom	0.0 ppm on soil core			Blow Cts. 50/3" Recovery: 0.15'/2' PID 0.3 ppm in augers 0 ppm in BZ
	7	Sample not acquired from 6-8 ft; Augered 2 ft into rock to get a good seal. Contact between weathered shale and Sandstone is uncertain				
	8	SANDSTONE; fine to medium grain, weakly cemented, yellowish gray 5Y 7/2, massive iron staining, medium soft, some cross bedding.	0.0 ppm			Rock colors from GSA Rock-Color Chart 1995 ed.
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER MW262

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR Efschuetheis | 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	SANDSTONE; fine grained, moderately cemented, massive, some horizontal fracturing w/ gray clay in fractures and bedding planes, very light gray N8				
	12					Coring rate ~8 Min/ft. lost circulation & bit lodged in hole at 13 ft.
	13					
	14					
	15	localized (1") zone of Shale, med. dark gray N4, brittle, finely laminated, breaks easily into thin waters				
	16	Interbedded SANDSTONE & SHALE Sandstone predominate in upper 1.2 ft, fine grained moderately well cemented w/ thin interbeds of laminated med. dark gray (N4) shale, some vertical fracturing. Shale predominate in bottom section				
	17					Coring rate ~7½ min/ft
	18					
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER MW262

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR E/Schultheis | 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)
	21	SANDSTONE; fine grained, massive, hard, some shaley laminations, buff colored				
		Bottom of boring	at	21.20	ft bgs	
	22					

8/11/01 SM

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER MW262

Well volume calculation sheet

Date 08/23/01 Time 1430
Well ID Num LL2 262
Well Location LOAD LINE 2 RVAAP

Total depth of well (ft BTOC) 22.60
Depth to water (ft BTOC) 12.02
Height of water column (ft) (Hc) 10.58

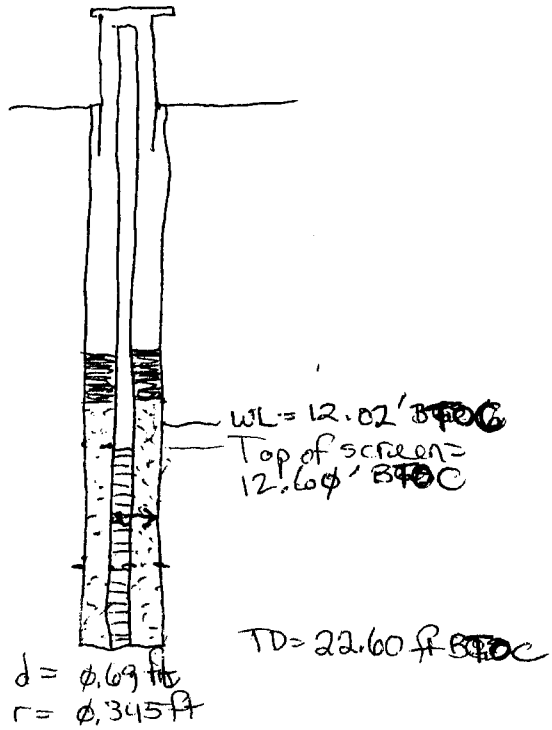
Well Volume Calculation

Vc = 3.142(Rc^2)*Hc .21 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
= .50 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 5.31 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.10 (ft)
Hc = height of water column 10 (ft)
Rf = radius of filter pack 0.245 (ft)
Rc = radius of inside casing 0.08 (ft)



Target Water Quality Stability Approximate Values (Target)

TEMP Initial = 14.55 10% = 1.45°C

COND Initial = 0.555 10% = 0.056 mS/cm

pH Initial = 6.22 10% = 0.62

TURB 5 NTU target value

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: CY01

Date: 08/24/01 Time: 0745

Well Number and Location: MW 262 - LOAD LINE 2

Development Crew: MEG STAINES - SAIC
SUSAN McCAULIN - Spec Pro

Driller (if applicable): _____

Water Levels / Time: Initial: 12.02 / 0745 Pumping: 17.30 / 0815
Final: 22.60 / 1345

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

Date and Time: Begin: 08/24/01 / 0745 Completed: 08/24/01 / 1345

Development Method(S): whale pump (submersible). Surge + pump until parameters stable, sediment <0.10 ft, 5+ well volumes, and turbidity ≤ 5 NTU.

Total Quantity of Water Removed: 31.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	QED FLOW CELL METER MP20	08/23/01
Specific Conductivity	"	"
pH	"	"
Turbidity	visual	NA

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 2 Phase II RI **DELIVERY ORDER NO.:** [illegible]

PAGE 1 OF 1

WELL NUMBER AND LOCATION: MW-262 LOAD LINE 2

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (μMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
08/24/01	0745	Ø	14.55	0.555	6.22	Very cloudy	Ø	Ø	INITIAL
	0812	5	14.25	0.577	7.04	"	5	1	
	Ø815	ms 8/24/01 ~~2~~ 2	–	–	–	–	7	1.4	pumped dry
	Ø82Ø	2	14.14	Ø.56Ø	7.17	very cloudy	9	1.8	
	Ø825	1	13.75	Ø.548	6.89	very cloudy	10	2	
	Ø828	1.5	–	–	–	–	11.5	2.3	pumped dry WL = 18.75 BTOC
	Ø92Ø	Ø	14.41	Ø.541	6.11	clear then cloudy	11.5	2.3	resumed pumping WL = 15.7 BTOC
	Ø925	3.5	–	–	–	very cloudy	15	3	pumped dry WL = 22.9ØBTOC
	1Ø15	Ø	14.28	Ø.53Ø	8.35	clear to cloudy	15	3	resumed pumping WL = 13.3' BTOC
	1Ø2Ø	5	14.22	Ø.543	8.23	cloudy	2Ø	4	stopped pumping WL = 22.3' BTOC
	11ØØ	Ø	14.38	Ø.525	8.92	clear to cloudy	2Ø	4	resumed pump WL = 13.8' BTOC
	11Ø5	2.5	14.45	Ø.534	8.67	cloudy	22.5	4.5	
	11Ø7	–	–	–	–	–	26.5	5.3	stopped pump
	115Ø	3	14.36	Ø.53Ø	8.62	cloudy	29.5	5.9	Resume pumping WL = [illegible]
	1152	4	13.95	Ø.52Ø	8.72	cloudy	3Ø.5	6.1	Stopped pumping ms 8/24/01 WL = ~~13~~ 13.2 ft BTOC
	1345 1340	1	14.63	Ø.538	8.72	cloudy	31.5	6.3	Final reading

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

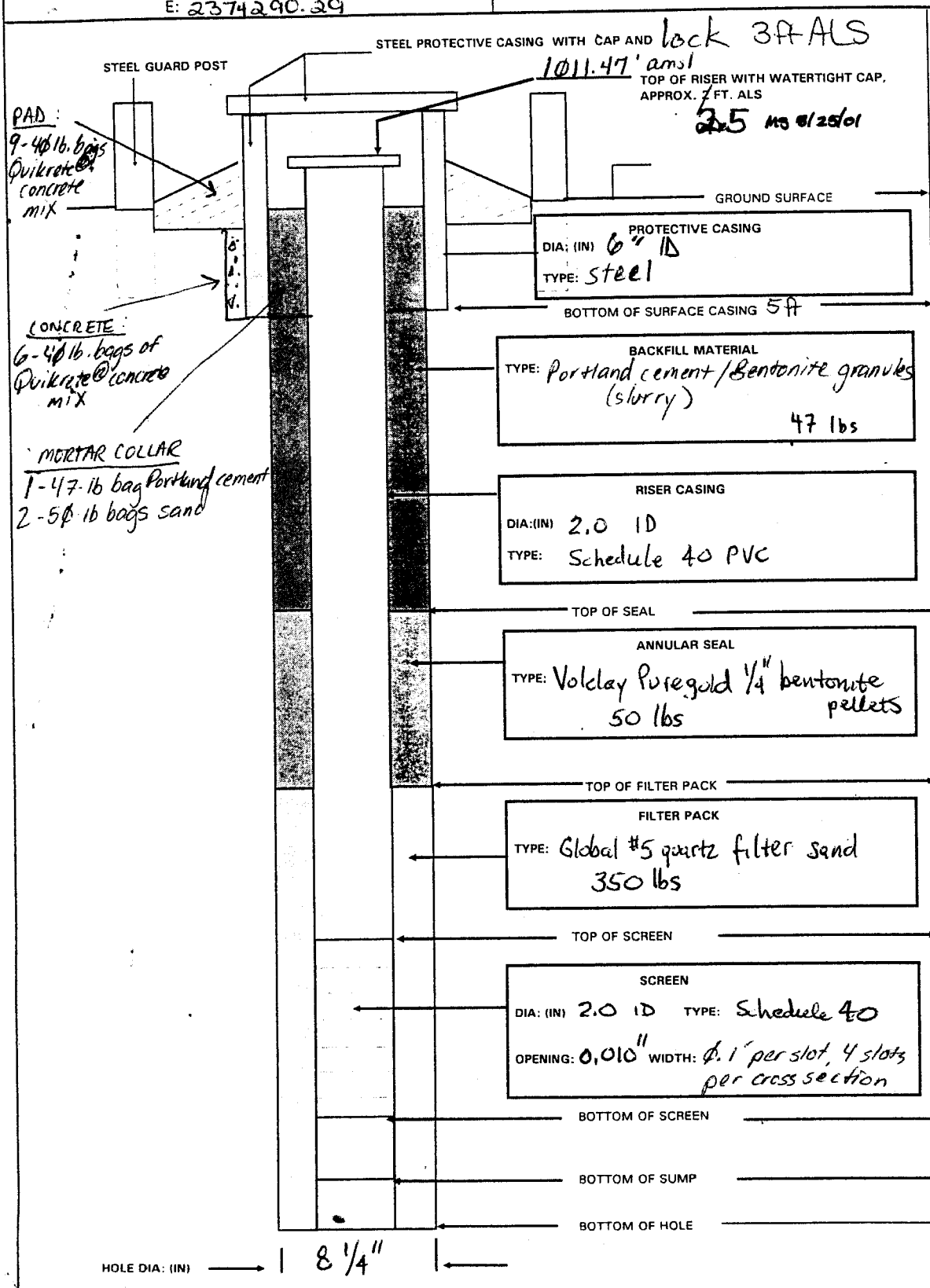
QA CHECK BY: Vicki Brumbach 8-28-01 (Signature and Date)

C-20

MONITORING WELL

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

WELL NUMBER: MW 263	**BEGIN:** 07/30/01 1550	**END:** ~~07/30/01~~ 08/21/01 0835
COORDINATES: N: 561590.92 E: 2374290.29	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1011.47 'amsl



HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: MW263

1. COMPANY NAME: SAIC

2. DRILL SUBCONTRACTOR: Tol-Test

SHEET 1 OF 4

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

4. LOCATION: Load Line 2

5. NAME OF DRILLER: Neil Wiktor

6. MANUFACTURERS DESIGNATION OF DRILL: CME 75

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 4 1/4" ID Hollow Stem Augers; 3" OD by 10ft long wireline corer; 2" OD by 2.0 ft long Split spoon Samplers; 3" OD by 2.5ft long Shelby Tubes

8. HOLE LOCATION: See map below

9. SURFACE ELEVATION: 1011.47 TOC 561500.42 N 2374290.29 E KYO 1/31/02

10. DATE STARTED: 07/30/01

11. DATE COMPLETED: ~~07/30/01~~ 07/31/01

12. OVERBURDEN THICKNESS: 6 ft bgs

15. DEPTH GROUNDWATER ENCOUNTERED: 9 ft bgs

13. DEPTH DRILLED INTO ROCK: 16 ft

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 11.70 ft TOC after 16 hrs

14. TOTAL DEPTH OF HOLE: 22.20 ft

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 9.3 ft bgs @ 1526 on 8/20/01; 11.41 ft TOC after 23 hrs

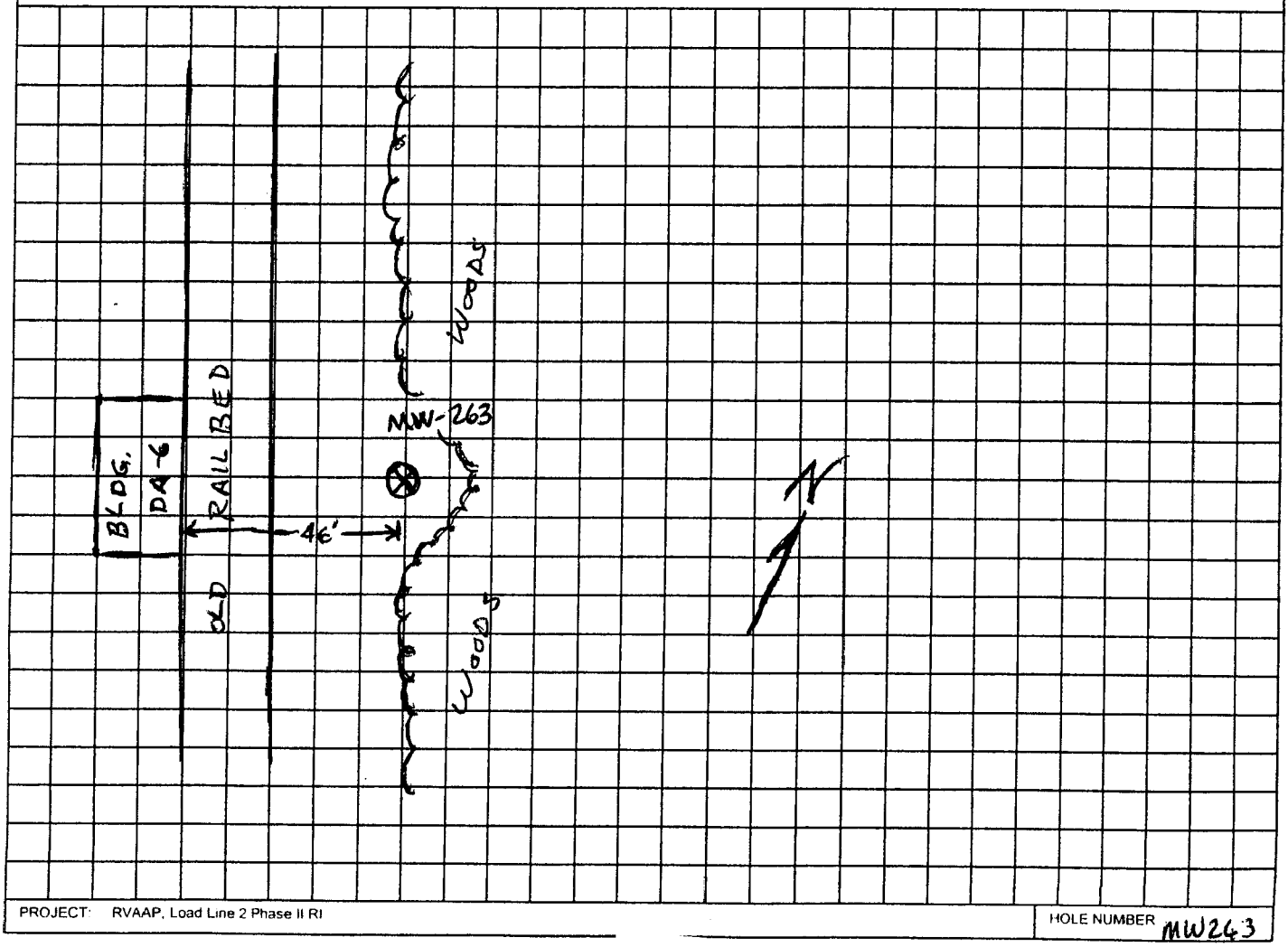
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	(X) EJS	(1)	One

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						95%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Completed as Monitor Well		MW263		EJSchultheis

LOCATION SKETCH/COMMENTS

SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 2 Phase II RI

HOLE NUMBER: MW263

HTRW DRILLING LOG

HOLE NUMBER MW 263

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR EJSchultheis | 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	CLAYE SILT (ML); yellowish brown 10YR 5/4, non plastic firm, damp, 1% course sand	0.0 ppm			Blow Counts: 3-6-~~4~~ 4-6
	1	SILTY CLAY (CL); gray 10YR 5/1, iron staining, firm, 1-5% sand, damp				Recovery: 1.4'/2'
	2	SILTY CLAY (cl); yellowish brown 10YR 5/6 w/gray mottling, 1-5% fine sand, low plasticity, firm, moist	0.0 ppm			Blow Counts: 4-5-6-6
	3					Recovery 1 ft/2'
	4		0.0 ppm			Blow Counts: 5-5-8-8
	5	Color change to brown 10YR 4/3				Recovery: 2'/2'
	6	Weathered Sandstone BR - only 0.1 ft in spoon				Blow Counts: 50/3"
	7	Auger to 8 ft NO Sample				Recovery: no recovery - Augered to 8.ft in weathered rock to get a good seal
	8	SANDSTONE, fine grained, massive, Some horizontal fracturing, some vertical fracturing w/iron staining, weakly cemented near top, Moderately hard, pale yellowish brown 10YR 6/2, thin shaley laminations increasing toward bottom				Breathing zone PID - 0.0 ppm - in augers 0.0 ppm Coring rate 3min/ft — water encountered at 9 ft bgs
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER MW263

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR EJSchuldheis | 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)
		Same Sandstone as above				
	11					
	12					
	13					
	14					
	15					
	16					
	17	Interbedded sandstone and Shale				
	18	SHALE, med. light gray (N6), thin layers of interbedded Sandstone, medium soft, parting along bedding planes laminated.				
	19	SANDSTONE, fine to med grain, massive, very hard, well cemented, yellowish gray 5Y 7/2, localized iron staining				
	20					

HTRW DRILLING LOG

HOLE NUMBER MW263

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR EJschultheis | 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)
	21					
		Thin Shale zone				
	22					
		Bottom of boring at	22.20	ft bgs		

Well volume calculation sheet

Date 8/24/01 Time 14:10
Well ID Num LL2-MW263
Well Location Load line 2 RVAAP

Total depth of well (ft BTOC) 22.21
Depth to water (ft BTOC) 11.84
Height of water column (ft) (Hc) 10.37

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.209 cu. ft.
(3.142)(.0064)(10.37)

(3.142)(.050)(.010)(10ft)(0.30)

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.471 cu. ft.

(.209 ft³ + .471 ft³)(7.48)

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 5.089 gal.

5 volumes = 25.4 gallons

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.10 (ft)
Hc = height of water column 10.37 (ft)
Rf = radius of filter pack 0.245 (ft)
Rc = radius of inside casing 0.08 (ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: CY01

Date: 8/24/01 Time: 1430

Well Number and Location: LL2 - MW263 RVAAP

Development Crew: Chris White - TolTest Susan McCaustin - Spec Pro
Meg Staines - SAIC

Driller (if applicable): Chris White - TolTest

Water Levels / Time: Initial: 11.84 ft BTOC / 14:10 Pumping: 15.50 / 15:05
Final: 13.48 15:45

Total Well Depth: Initial: 22.21 FT BTOC Final: 22.83 FT BTOC

Date and Time: Begin: 8/24/01 / 14:10 Completed: 8/24/01 / 15:45

Development Method(S): Pump with submersible pump, vinyl tubing, flow cell.

Total Quantity of Water Removed: 36 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	MP20 - 1028	8/24/01
Specific Conductivity	"	"
pH	"	"
Turbidity	visual	NA

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.

WELL NUMBER AND LOCATION: LL2-MW263

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/24/01	14:50	1	13.53	0.318	8.82	muddy	1	0.20	Start
8/24/01	15:00	5	12.93	0.341	8.81	muddy	~~6~~ 6 AS of 8/24/01	1	
8/24/01	15:05	5	12.86	0.343	8.79	muddy	~~10~~ 11	2	
8/24/01	15:10	5	12.89	0.345	8.74	muddy	16	3	
8/24/01	15:20	5	12.75	0.344	8.69	cloudy	21	4	
8/24/01	15:30	5	12.82	0.345	8.68	cloudy	26	5	
8/24/01	15:37	5	12.91	0.345	8.69	cloudy	31	6	
8/24/01	15:42	4	12.85	0.345	8.71	clear	35	7	
8/24/01	15:45	1	—	—	—	clear	36	7	Stop

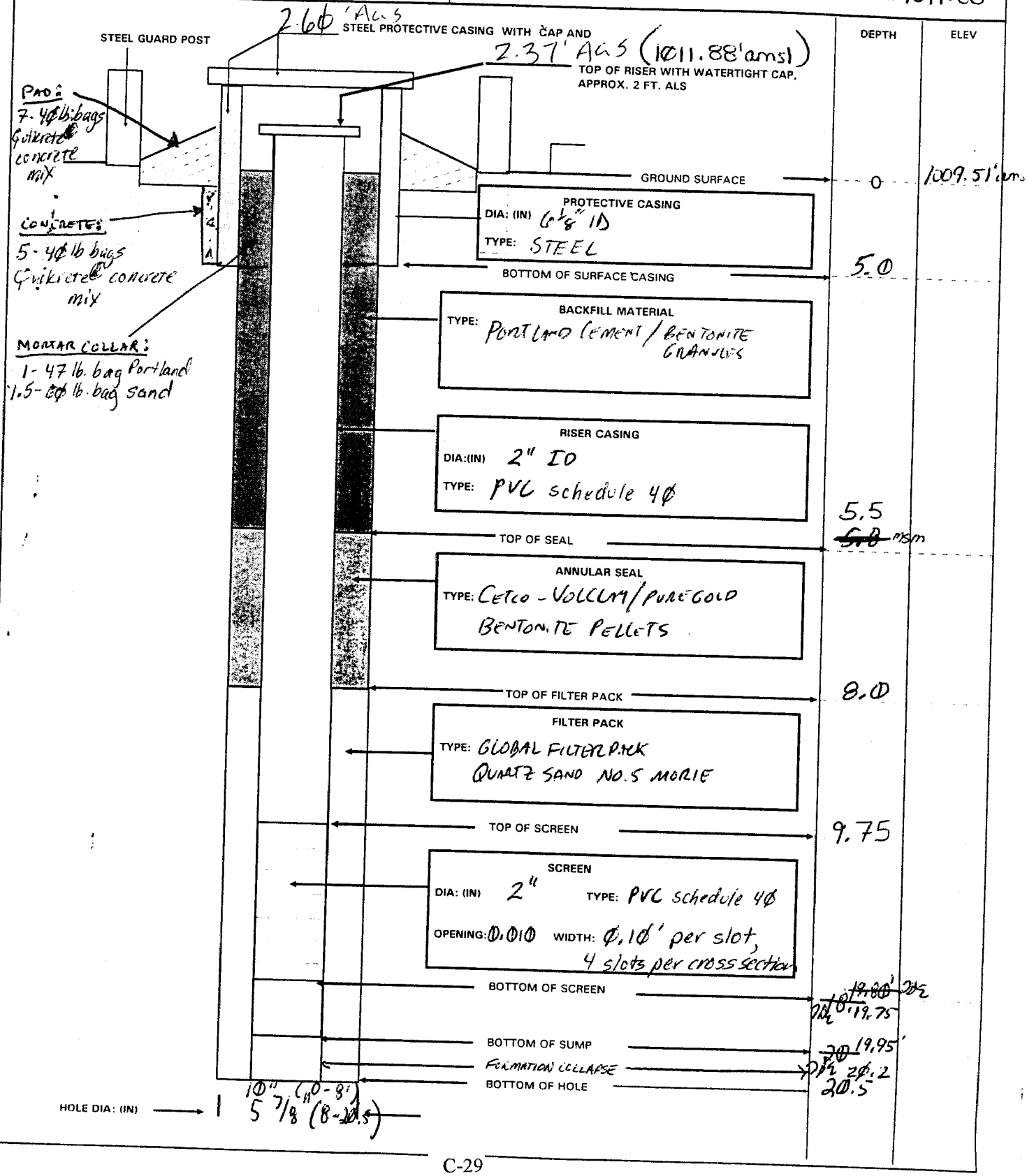
RECORDED BY: [signature] 8/24/01
(Signature and Date)

QA CHECK BY: Vicki Brumbach 8-28-01
(Signature and Date)

MONITORING WELL

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

WELL NUMBER: LL2mw-264	**BEGIN:** 7/31/01 1422	**END:** 8/15/01 1135
COORDINATES: N: 561173.63 E: 2374532.76	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1011.88



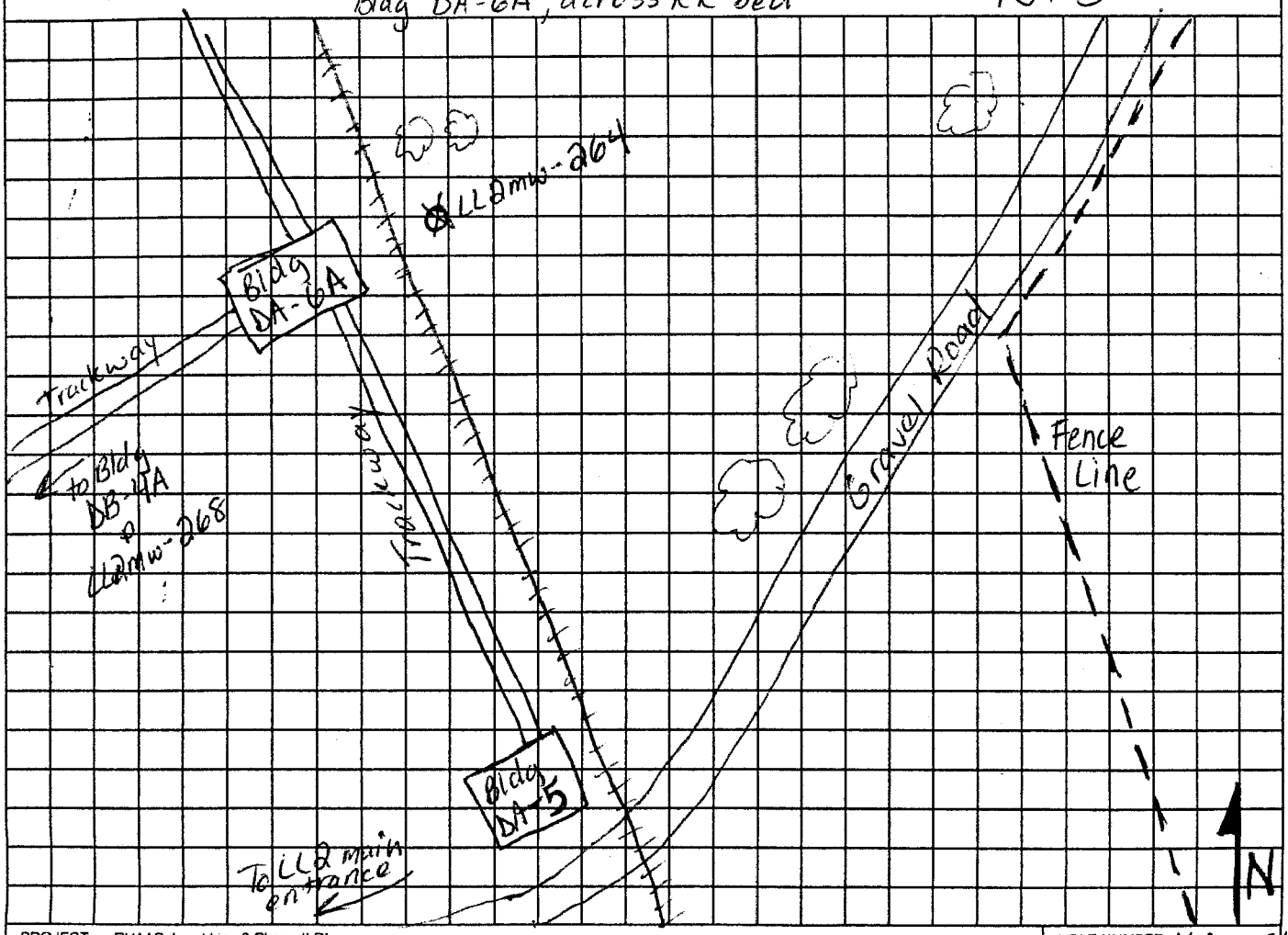
HTRW DRILLING LOG

1 COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	HOLE NUMBER: LL2mw-26.4
		SHEET 1 OF 4

3. PROJECT: RVAAP Load Line 2 Phase II RI	4. LOCATION: E side of Bldg DA-6A, across RR bed
5. NAME OF DRILLER: Bob Collins	6. MANUFACTURERS DESIGNATION OF DRILL: CME 75
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: ~~CME 55# Auger Rig~~ CME 6¼" ID Augers; 2" x 2' split spoon samplers; CME 75 AUGER RIG; 140 lb. split spoon hammer; NQ Rock CORING - AIR CORING	8. HOLE LOCATION: see map below
	9. SURFACE ELEVATION: 1011.88 TOC; 561173.63 N, 2374532.76 E (NAD 83)
	10. DATE STARTED: ~~7/31/01~~ 8/1/01; 11. DATE COMPLETED: 8/15/01
12. OVERBURDEN THICKNESS: ~~msm 6.3'~~ ~6.2'	15. DEPTH GROUNDWATER ENCOUNTERED: ~~msm 13'~~ bgs; rose to 3.5' bgs day after coring to 13'
13. DEPTH DRILLED INTO ROCK: ~~msm 15.2'~~ ~~msm 15'~~ 14.3'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 8.1' bgs @ 1610 on 8/14/01
14. TOTAL DEPTH OF HOLE: ~~msm 21.5'~~ ~20.5' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES: N/A	~~DISTURBED~~	~~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: 97 %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: Molly Mita		

LOCATION SKETCH/COMMENTS: SE quadrant of LL2, E side of Bldg DA-6A, across RR bed — SCALE: NTS



PROJECT: RVAAP, Load Line 2 Phase II RI — HOLE NUMBER: LL2mw-26.4

HTRW DRILLING LOG

HOLE NUMBER 112mw 264

PROJECT: RVAAP, Load Line 2 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 (2.5 Y 5/4) CLAYEY SILT, HARD, DRY, CRUMBLY, ML	N/A	N/A	N/A	SPLIT SPOON 0-2' 3/4/6/6 REC 1.3/2.0
	1	GRAY (N6) SILT, DRY, CRUMBLY, MINOR BROWNISH YELLOW (10YR 6/6) MOTTLING, ML				
	2	YELLOWISH BROWN (10YR 5/8) AND GRAY (N5) ~~CLAY~~ THE ~~MEDIUM PLASTICITY~~ MSM MEDIUM PLASTICITY, SL. MOIST, HARD, CL, MOTTLED, SILTY CLAY				SPLIT SPOON 2-4' 3/5/9/9 2.0/2.0
	3	(1.8 - 6.2')				
	4					SPLIT SPOON 4-6' 3/6/8/9 1.5/2.0
	5					
	6	VERY LIGHT GRAY (N8) FINE GRAINED SANDSTONE				SPLIT SPOON 6-8' 8/50-4" - AUGERS ADVANCED TO 8' BGL 0.5/2.0
	7	NO RECOVERY, AUGERED TO 8' BGL				RUN 1 RUN START 20E ~~1634~~ 1658 RUN STOP 1743 PD 13' CD - HOLE SLICED/CAVED RUN 5' LOSS 0.4 GAIN - N/A 1ST RUN RQD (0.7/5') = 0.14
	8	BROWN (10YR 5/3) FINE GRAINED, ~~WEATHERED~~ SANDSTONE		BOX 1		
		- GRAY (5N) CLAY INTERBED				
	9	GRAY (2.5Y 6/1) FINE GRAINED SS BEDDING 145° POORLY CEMENTED - FE STAINED FRAC. - Fe STAINED FRAC. (8.6 - 11.8')				
	10					

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER 112mw-264

HTRW DRILLING LOG

HOLE NUMBER LL2mw-364

PROJECT: RVAAP, Load Line 2 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		N/A	~~N/A~~ 20C BOX 1	N/A	
	12	GRADED TO GRAY (5Y 6/1) FINE GRAINED SS, ~45° BEDDING, POORLY CEMENTED				
		(11.8 - 20.05')				
	13					RUN 2 TOC START 0956 0849, 0956 STOP 0943, 1030 PD 20.3 CD 20.3 RUN 7.3 LOSS 0' GAIN 0 RQD 0.39
	14					
	15					
	16					
	17					
	18	POSSIBLE CROSS BEDDING				
		POSSIBLE CROSS BEDDING				
	19					
	20					

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER: LL2mw-364

HTRW DRILLING LOG

HOLE NUMBER LL2mw 264

PROJECT: RVAAP, Load Line 2 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)
	20.5	VERY DARK GRAY (N3) SHALE 0.05' THICK SPN	N/A	~~N/A~~ None Box 1	N/A	CORED TO 20.3' BGL
		SS BELOW SHALE SAME AS 11.8-20.8' INTERVAL				
		TD = 20.5' / 21.5' msm				

msm 8-1-01

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER LL2mw 264

Well volume calculation sheet

Date 8/24/01 Time 16:10
Well ID Num LL2-MW264
Well Location RVAAP Load Line 2

Total depth of well (ft BTOC) 22.34
Depth to water (ft BTOC) 11.25
Height of water column (ft) (Hc) 11.09

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.223 cu. ft.
(3.142)(.0064)(11.09)
(3.142)[(.050)](10)(.030)

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.471 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 5.19 gal.

5 volumes = 26 gallons

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.10 (ft)
Hc = height of water column 11.09 (ft)
Rf = radius of filter pack 0.245 (ft)
Rc = radius of inside casing 0.08 (ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: CY01

Date: 8/24/01 Time: 16:10

Well Number and Location: LL2-MW264 RVAAP Load Line 2

Development Crew: Susan McCauslin - SpecPro
Meg Staines - SAIC

Driller (if applicable): Chris White - TolTest

Water Levels / Time: Initial: 11.25 ft BTOC / 16:10 Pumping: 19.21 ft BTOC / 16:50

Final: 19.59 ft BTOC / 17:10

Total Well Depth: Initial: 22.34 ft BTOC FT BTOC Final: 22.34 FT BTOC

Date and Time: Begin: 8/24/01 / 16:10 Completed: 8/24/01 / 1710

Development Method(S): Whale pump (two inline submersible), poly tubing

Total Quantity of Water Removed: 40 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	MPZ0-1028	8/24/01
Specific Conductivity	"	"
pH	"	"
Turbidity	NA	NA

WELL DEVELOPMENT RECORD

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

WELL NUMBER AND LOCATION: LL2-MW264

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/24/01	16:34	2	12.07	0.414	9.36	muddy	2	0.4	Begin pumping
"	16:35	5	12.21	0.415	9.29	muddy	7	1	
"	16:37	3	11.77	0.420	9.14	muddy	10	2	
"	16:48	5	11.53	0.430	9.02	muddy	15	3	
"	16:45	5	11.41	0.435	8.93	muddy	20	4	
"	16:52	5	11.29	0.437	8.86	cloudy	25	5	
"	16:55	5	11.29	0.437	8.84	cloudy	30	6	
"	16:58	3	11.32	0.436	8.84	sl. cloudy	33	6.3	
"	17:00	2	11.30	0.437	8.83	sl. cloudy	35	7	
"	17:10	5	11.26	0.437	8.83	sl. cloudy	40	8	End pumping
				MS 8/24/01					

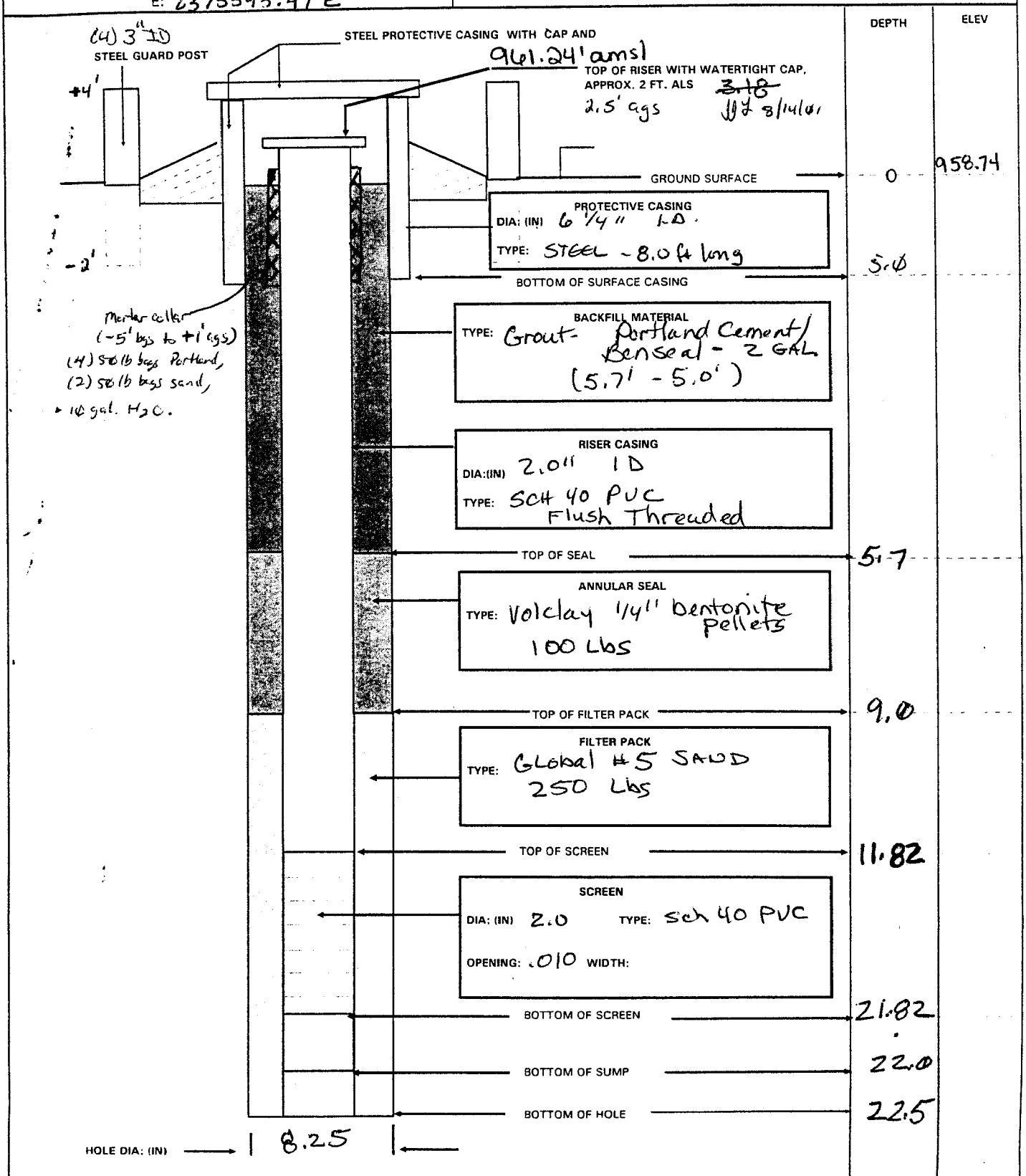
RECORDED BY: [signature] 8/24/01
(Signature and Date)

QA CHECK BY: Vicki Bramble 8-28-01
(Signature and Date)

MONITORING WELL

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

WELL NUMBER: MW 265	**BEGIN:** 7/28/01	**END:** 7/28/01 1920 8/14/01
COORDINATES: N: 557972.08 N E: 2375593.47 E	**REFERENCE POINT:** TOC	**ELEVATION:** 961.24' amsl



HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER MW 265
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 4
3. PROJECT: RVAAP, Load Line 2 Phase II RI	4. LOCATION: South of Load Line 2, RVAAP	
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" ID HSA for overburden; 2" OD x 2' long Split Spoons; 3" ID x 2.5' long Shelby Tubes; Bedrock Drilling – Air Rotary; 6.5" bit; Core 3 1/8" OD, 1 7/8" ID, 5 7/8" bit	8. HOLE LOCATION: SE of Kelly's Pond (see map below)	
	9. SURFACE ELEVATION: 961.24 TOC; 557472.08 N; 2375593.47 E	
	10. DATE STARTED: 07/24/01	11. DATE COMPLETED: 7/28/01
12. OVERBURDEN THICKNESS: 8 feet	15. DEPTH GROUNDWATER ENCOUNTERED: 14 FT BGS	
13. DEPTH DRILLED INTO ROCK: 13.5 feet	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 12.28 ft TOC after 4 hrs	
14. TOTAL DEPTH OF HOLE: 21.5 feet	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 12.70 ft TOC after 96 hrs	

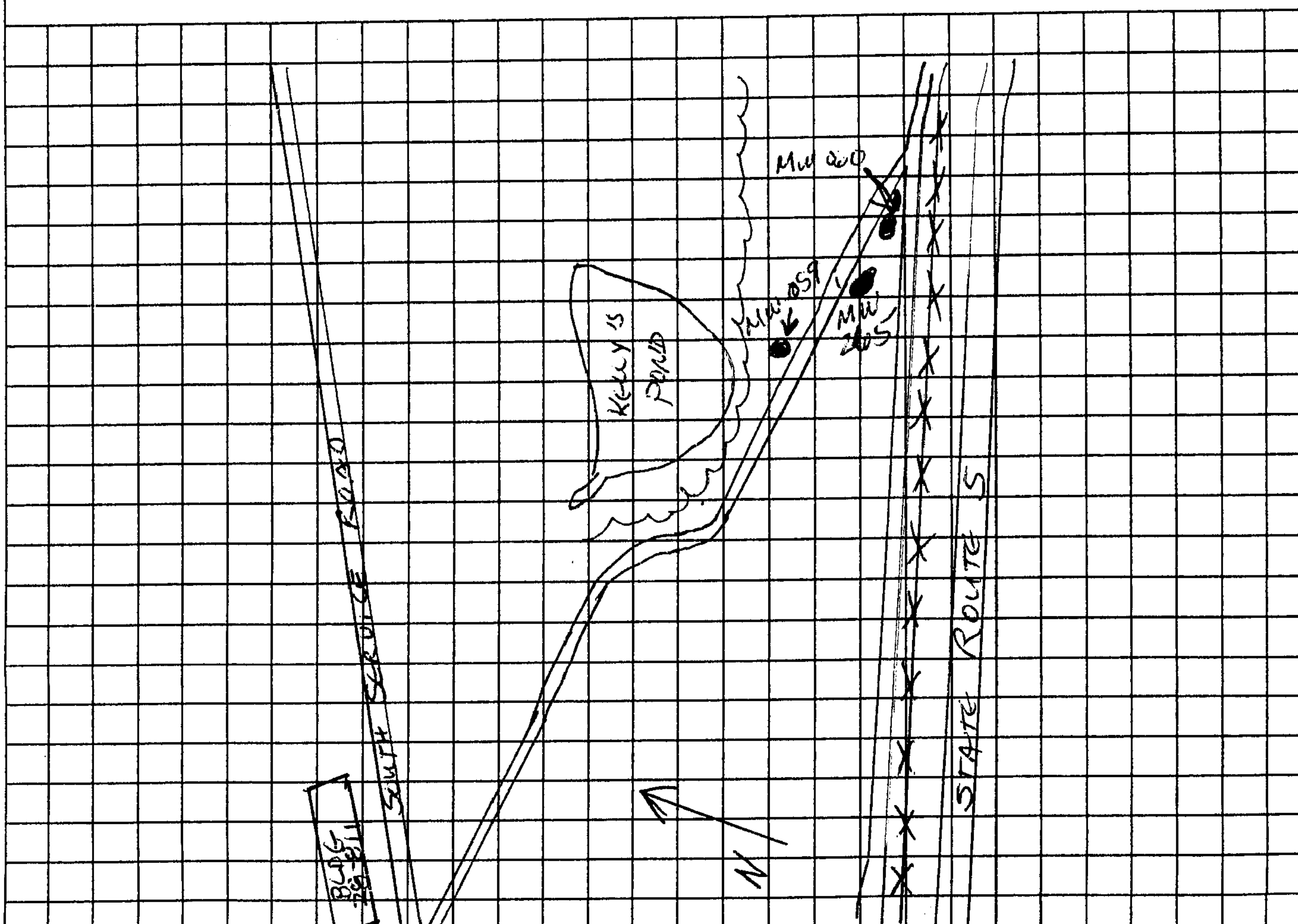
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
		2	1

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
None	—	—	—			93

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Completed as Monitor Well	n/a	LL2 MW 265	n/a	[signature]

LOCATION SKETCH/COMMENTS

SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 2 Phase II RI

HOLE NUMBER MW 265

HTRW DRILLING LOG

HOLE NUMBER 265

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR E.J. Schultheis | 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	Silt, DK yellowish brown 10YR 4/4; 10% sand, Med. Stiff, med. dense, DRY ML				Recovery 1.7/2 BC 3,5,8,7
	1	Sandy silt, yellowish brown, 10YR 5/6 5-10% clay. Some iron staining trace gravel. MED. STIFF, Med. dense, ML				
	2	DRY				
	2	Silty Clay, DK. yellowish brown, 10YR 4/4; some gray mottling, trace of sand, gravel. Low plasticity, Firm, damp CL				BC 12, 14, 18, 20 Recovery 2/2
	4	SAME AS ABOVE, with up to 10% gravel (fine) CL		Pressed Shelby Tube 1100 - 1300 psi Recovery 1.9/2		BC 12,14,13,12 Recovery 1.6/2
	6	SAME AS ABOVE		Pressed Shelby Tube 1500 psi down pressure Recovery .8/2		BC 12,20,36,50/5 Recovery 1.4/2
	7	Fine to very fine sand, Yellowish brown 10YR5/6; 10% fine to med. gravel, 5-10% clay. Soft, non Plastic, loose, damp. SP-SC				
	8	sandstone at bottom				BC 30/0. Refusal @ 8ft
	8	sandstone, grayish-orange, 10YR 7/4, Massive, iron staining, some horizontal fracturing, with localized weathered zones of silt. Sandstone is fine to Medium grained. Very hard,				Drilling rate 4 mins. / foot (Coring rate)
	10					

HTRW DRILLING LOG

HOLE NUMBER 265

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR E Schuckhein | 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					
	12					
	13					
	14	Sandstone, fine to medium grained, Lt. Olive gray, 5Y 6/1, black staining in areas, some 30° fracturing, silty clay present along some bedding planes, very hard.				WATER AT 14'
	15					
	16					
	17	10% quartz pebbles, 2 to 10 mm in size at depth of about 18.5 ft				
	18					
	19					

HTRW DRILLING LOG

HOLE NUMBER	265

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR E Schubbert | 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)
	21	Bottom of core at 21.0' bgs				
	22	no sample				Bottom of Hole 21.5'; Reamed to 22.5' w/ tri cone bit

SU 8/1/01

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER MW 265

Well volume calculation sheet

Date 8/25/01 Time 0730
Well ID Num LL2-MW265
Well Location Load Line 2 - RVAAP

Total depth of well (ft BTOC) 24.37
Depth to water (ft BTOC) 12.13
Height of water column (ft) (Hc) 12.24

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.266 cu. ft.
$(3.142)(\frac{1}{12})^2(12.24) = 0.266 ft^3$

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 12.82 cu. ft. $3\left[3.142\left(\frac{4.125}{12}\right)^2(12.24) - 0.266\right] = 12.82$
$3.142(.111)(10)(0.3) = 1.04$

Vt = (Vc+Vf)*(7.48 gal/cu ft) $= (0.266 + 1.04)\,7.48$ gal
= 9.81 gal.

5 volumes = 50 gallons

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .010 (ft)
Hc = height of water column 12.24 (ft)
Rf = radius of filter pack .245 (ft)
Rc = radius of inside casing .080 (ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 2 Phase II RI | DELIVERY ORDER NO.: CY01

Date: 8/25/01 (25; MS 8/26/01) Time: 0730

Well Number and Location: LL2-MW265 RVAAP Load Line 2

Development Crew: Jeff Lindaugh - SAIC

Driller (if applicable): Charlie Moore - TolTest

MS 8/25/01

Water Levels / Time: Initial: 12.13 / 0730 Pumping: 16.91 ft / 0900 (MS 8/25/01)

Final: 18.5 ft / 1100 (MS 8/25/01)

Total Well Depth: Initial: 24.37 FT BTOC Final: 24.37 FT BTOC

Date and Time: Begin: 8/25/01 / 0730 Completed: 8/25/01 / 1030

Development Method(S): Submersible pump. Surge well with pump.

Total Quantity of Water Removed: 40 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14639	8/25/01
Specific Conductivity	"	"
pH	"	"
Turbidity	"	"

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: CY01

WELL NUMBER AND LOCATION: LL2-MW265

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/25/01	0810	5	12.7	0.507	6.28	>999	5	1/2	WL= 21.93' BTOC
	0815	5	12.4	0.478	6.51	>999	10	1	
	0841	5	13.2	0.453	6.49	30	15	1 1/2	WL= 16.91' BTOC
	0910	5	13.7	0.437	6.46	77	20	2	
	0944	6	14.5	0.423	6.47	5	26	2 1/2	≈ 8 volumes
	1100	14	15.0	0.417	6.42	23	40	4	4 volumes
									Stable parameters
									Collect 1 mason jar

MS 8/25/01

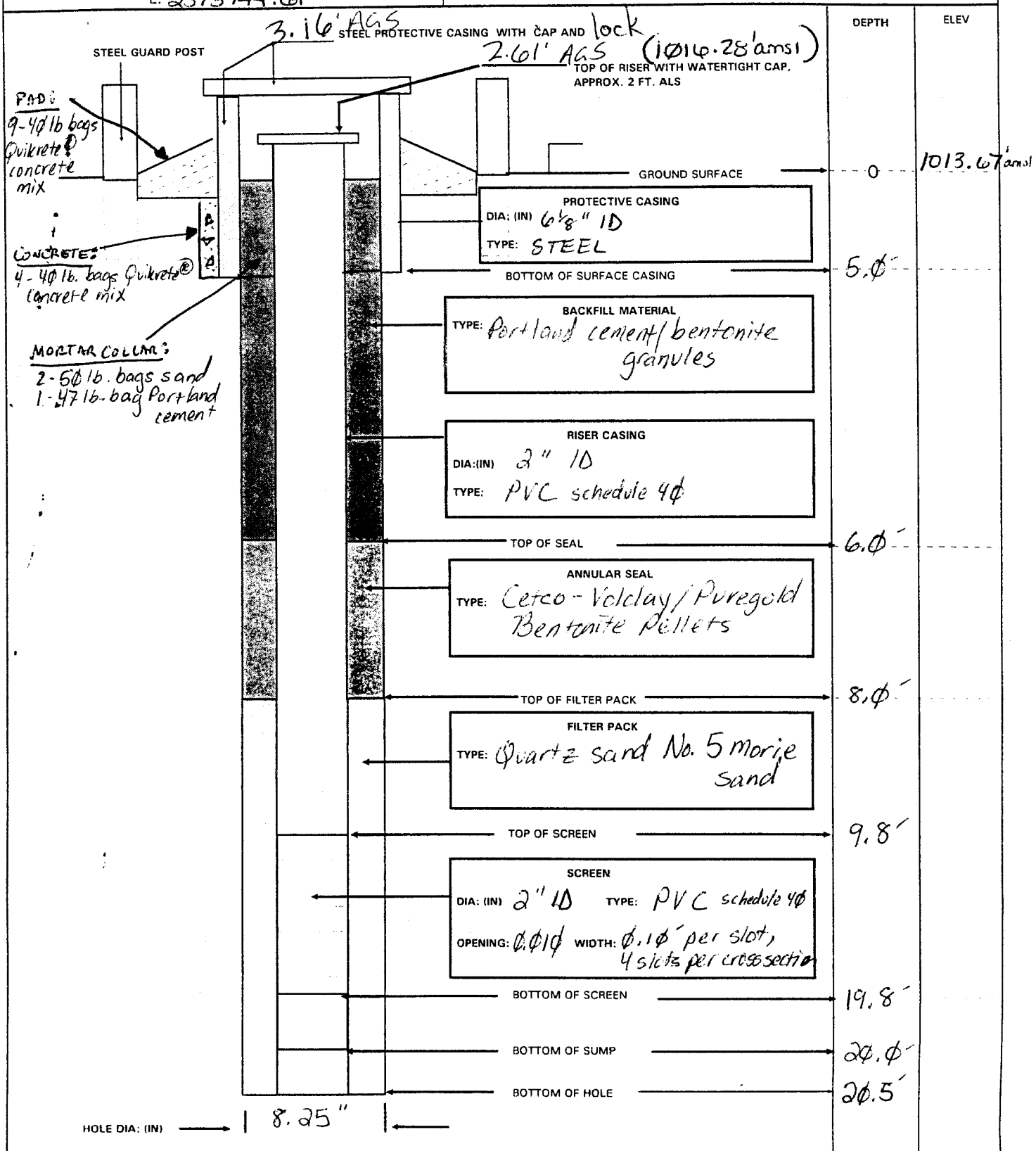
RECORDED BY: [signature] 8/25/01
(Signature and Date)

QA CHECK BY: Vicki Brumbaugh 8-28-01
(Signature and Date)

MONITORING WELL

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

WELL NUMBER: LL2 MW - 266	**BEGIN:** 08/06/01 1703	**END:** 08/20/01 1150
COORDINATES: N: 561982.68 E: 2373744.61	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1016.28'



HTRW DRILLING LOG

	DISTRICT: Louisville	HOLE NUMBER LL2MW-266
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 4

3. PROJECT: RVAAP Load Line 2 Phase II RI

4. LOCATION: (N) half of LL2, adjacent to Concrete Settling tanks

5. NAME OF DRILLER: Bob Gollihue

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

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT:
~~CME 75 AUGER RIG~~ TDE
CME 550 AUGER RIG
4¼" ID AUGERS
2" ID DIAMOND CORE BARREL - NQ
140lb SPLIT SPOON HAMMER
2" DIAMETER SPLIT SPOONS

8. HOLE LOCATION: See map below

9. SURFACE ELEVATION: 1016.28 TOC 561982.68 N 2373744.61 E kdf 1/3/02

10. DATE STARTED: 8/6/01

11. DATE COMPLETED: 8/20/01

12. OVERBURDEN THICKNESS ~5.95'

13. DEPTH DRILLED INTO ROCK ~14.55'

14. TOTAL DEPTH OF HOLE 20.5' bgs

15. DEPTH GROUNDWATER ENCOUNTERED: ~11.5' bgs

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:
11.45' bgs @ 1626 on 8/14/01

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):
12.1' bgs @ 0952 on 8/20/01

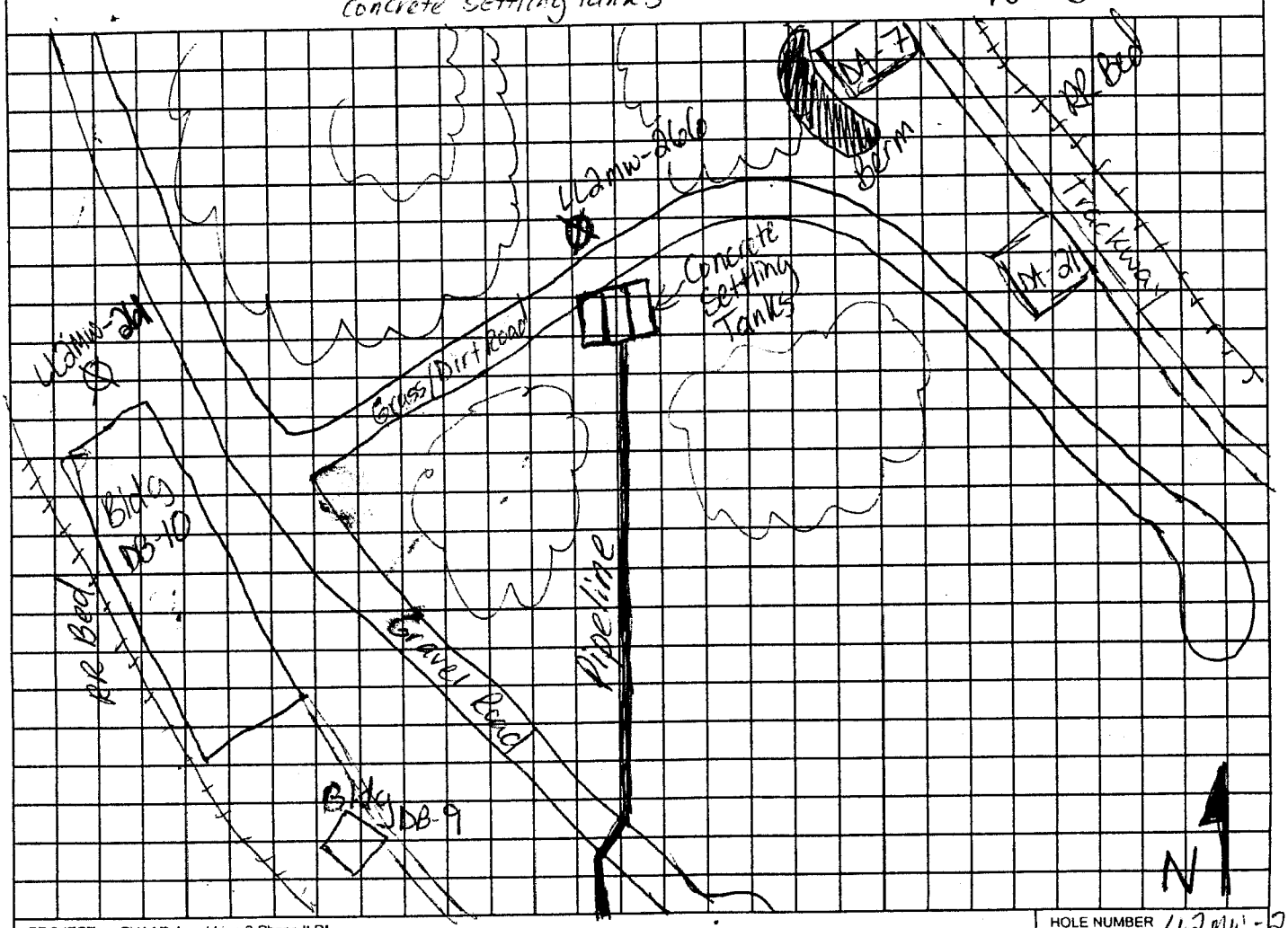
18. GEOTECHNICAL SAMPLES	~~DISTURBED~~	~~UNDISTURBED~~	19. TOTAL NUMBER OF CORE BOXES	
None			1	

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
N/A						97 %

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

LOCATION SKETCH/COMMENTS: (N) half of LL2, adjacent to Concrete settling tanks

SCALE: NTS



PROJECT: RVAAP, Load Line 2 Phase II RI

HOLE NUMBER LL2MW-266

HTRW DRILLING LOG

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR Todd Eaby | HOLE NUMBER LL2MW-26C | 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	VERY DARK GRAYISH BROWN (10YR 3/2) SILT, ROOT ZONE, DRY, CRUMBLY (ML)	N/A	N/A	N/A	SPLIT SPOON 0-2'
		LIGHT YELLOWISH BROWN (2.5Y 6/3) SILTY CLAY, DRY, CRUMBLY, ~5% GRAVEL, GRAY MOTTLING, (CL)				6/12/13/16
	1					~~1.0/2.0~~ DUP
						1.2/2.0
	2	DARK GRAYISH BROWN (2.5Y 4/2) MOTTLING, HARD				SPLIT SPOON 2-4'
						16/16/14/16
	3					1.6/2.0
	4					SPLIT SPOON 4-6'
						6/11/25/50-5"
		YELLOWISH RED (5YR 5/6) SILTY CLAY, LOW PLASTICITY, BLACK MOTTLING, HARD AND DRY				1.3/2.0
	5					
	6	LIGHT OLIVE BROWN (2.5Y 5/4) SEVERELY WEATHERED SHALE, VERY CRUMBLY				SPLIT SPOON 6-8'
						22/50-6"
						1.0/~~2.0~~ 1.0 DUP
	7					
	8					SPLIT SPOON 8-10'
						5/50-6"
						0.5/~~2.0~~ 1.0 DUP
	9					
	10					

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER LL2MW-26C

HTRW DRILLING LOG

HOLE NUMBER LL2 MW-206

PROJECT: RVAAP, Load Line 2 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	(2.5Y 7/1) LIGHT GRAY, VERY FINE GRAINED SANDSTONE - SHALEY INTERBED - FRACTURES, Fe STAINED DARK GRAY (2.5Y 4/1) SHALE Fe STAINED FRACTURE	N/A	~~N/A~~ 2nd BOX 1	N/A	SPLIT SPOON 10-12' SD-3" < Ø.1 / Ø.25 RUN 1 START 1325 } 34" 1348 } 5' STOP 1343 } 1403 PD 18' CD 18' RUN 8' LOSS ~~NE~~ Ø.4' GAIN NA RQD 4.9 / ~~7.6~~ 8.0 msm = Ø.61
	12	(2.5Y 7/1) LIGHT GRAY VERY FINE TO FINE GRAINED SANDSTONE, SOME Fe STAINED				
	13	DARK GRAY (2.5Y 4/1) SHALE INTERBED - SHALEY INTERBED > SHALEY PARTING				
	14	GRAY (N6) W/ DARK GRAY (N4) INTERBEDS FINE GRAINED SANDSTONE				
	15					
	16					
	17					
	18	ACCUMULATED LOST CORE SAME AS ABOVE - SHALEY INTERBEDS				RUN 2 START 1435 STOP 1445 PD 20.5 CD 20.5 RUN 2.5 LOSS Ø GAIN Ø.1 RQD 1.15 / ~~2.6~~ 2.5 msm = Ø.46
	19					
	20					

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER LL2MW-206

HTRW DRILLING LOG

HOLE NUMBER LL2MW-26

PROJECT: RVAAP, Load Line 2 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	~~SPLIT N/A~~ CORE BOX 1	N/A	
		TD = 20.5'				

21 22 23 24 25 26 27 28 29

LL2M 8-11-01

Well volume calculation sheet

Date 8/25/01 Time 10:20
Well ID Num LL2-MW266
Well Location KVAAP Load Line 2

Total depth of well (ft BTOC) 20.84
Depth to water (ft BTOC) 14.75
Height of water column (ft) (Hc) 6.09

Well Volume Calculation

(3.142)(.0064)(6.09)

Vc = 3.142(Rc^2)*Hc .122 cu. ft.

.050
0.225

(3.142)(0.225-0.010)(6.09)(0.30)

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= .287 cu. ft.

(.122+.287)(7.48)

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 3.06 gal.

3.06 gal x 5 = 15.3 gallons

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .010 (ft)
Hc = height of water column 6.09 (ft)
Rf = radius of filter pack .245 (ft)
Rc = radius of inside casing .080 (ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: CY01

Date: 8/25/01 Time: 16:20

Well Number and Location: LL2-MW2666

Development Crew: Meg Staines - SAIC
Susan McCaughlin - SpecPro

Driller (if applicable): Chris White - TolTest

Water Levels / Time: Initial: 14.75 / 10:20 8/25/01 Pumping: 20 ft / 10:40 8/25/01
18.58 ft / 14:40 8/26/01

Final: 19.50 / 12:00 8/25/01 8/26/01
18.30 / 14:10

Total Well Depth: Initial: 20.84 FT BTOC Final: ~~22.84~~ 22.67 FT BTOC MS 8/26/01

Date and Time: Begin: 8/25/01 / 10:20 Completed: 8/26/01 / 1200

Development Method(S): Submersible pump w/ 1/2" ID vinyl tubing. Surging with pump. Remove 5+ volumes, until parameters are stable, sediment is <0.1 ft, & turbidity is < 5 NTU

Total Quantity of Water Removed: 24.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	MP20 - 1028	8/25/01
Specific Conductivity	"	"
pH	"	"
Turbidity	visual	NA

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: CY01

WELL NUMBER AND LOCATION: LL2-MW266

1 vol = 3.06 gal

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (μMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/25/01	1040	0	15.03	.719	7.51	muddy	0	0	Begin pumping
	1152	2.5	~~15.32~~ 12.32 MS 8/25/01	—	—	muddy	2.5	0.8	Pumped dry
	1350	1	12.50	.465	13.39	muddy	3.5	MS 8/26/01 ~~1.1~~	Pumped dry
	1430	1.5	12.84	.362	12.25	muddy	5	1.6	Resumed pumping
	1530	1.5	12.11	.345	8.58	muddy	6.5	2.1	Resumed pumping
	1630	1	12.55	.471	8.31	muddy	7.5	2.5	Resumed pumping
	1730	1	12.00	.455	8.00	muddy	8.5	2.7	Resumed pumping
	1735	1.5	12.08	.461	7.88	muddy	10	3.3	Pumped dry
8/26/01	~~0905~~	2.0	12.92	.514	7.76	muddy	12	3.9	Before calibration of flow cell. Resumed pumping
	1050	1.5	15.63	.487	7.45	muddy	13.5	4.4	Resumed pumping
	1155	1	12.71	.481	7.45	muddy	14.5	4.7	Resumed pumping
	1200	1.5	12.39	.444	7.54	muddy	16	5.2	~~Final~~ MS 8/26/01 WL = 19.5 ft BTOC
	1420	2	13.02	.456	7.83	muddy	18	5.9	~~Development complete~~ MS 8/26/01
	1450	3	12.98	.411	7.72	muddy	21	6.9	WL = 19.3 ft BTOC
	1500	2	12.99	.438	7.80	muddy	23	7.5	
	1510	~~10.5~~ MS 8/26/01	13.10	.420	7.91	very cloudy	~~23~~ 24.5 MS 8/24/01	~~8~~ 7.7 MS 8/26/01	WL = 18.3 ft BTOC Develop — Final reading, meat complete

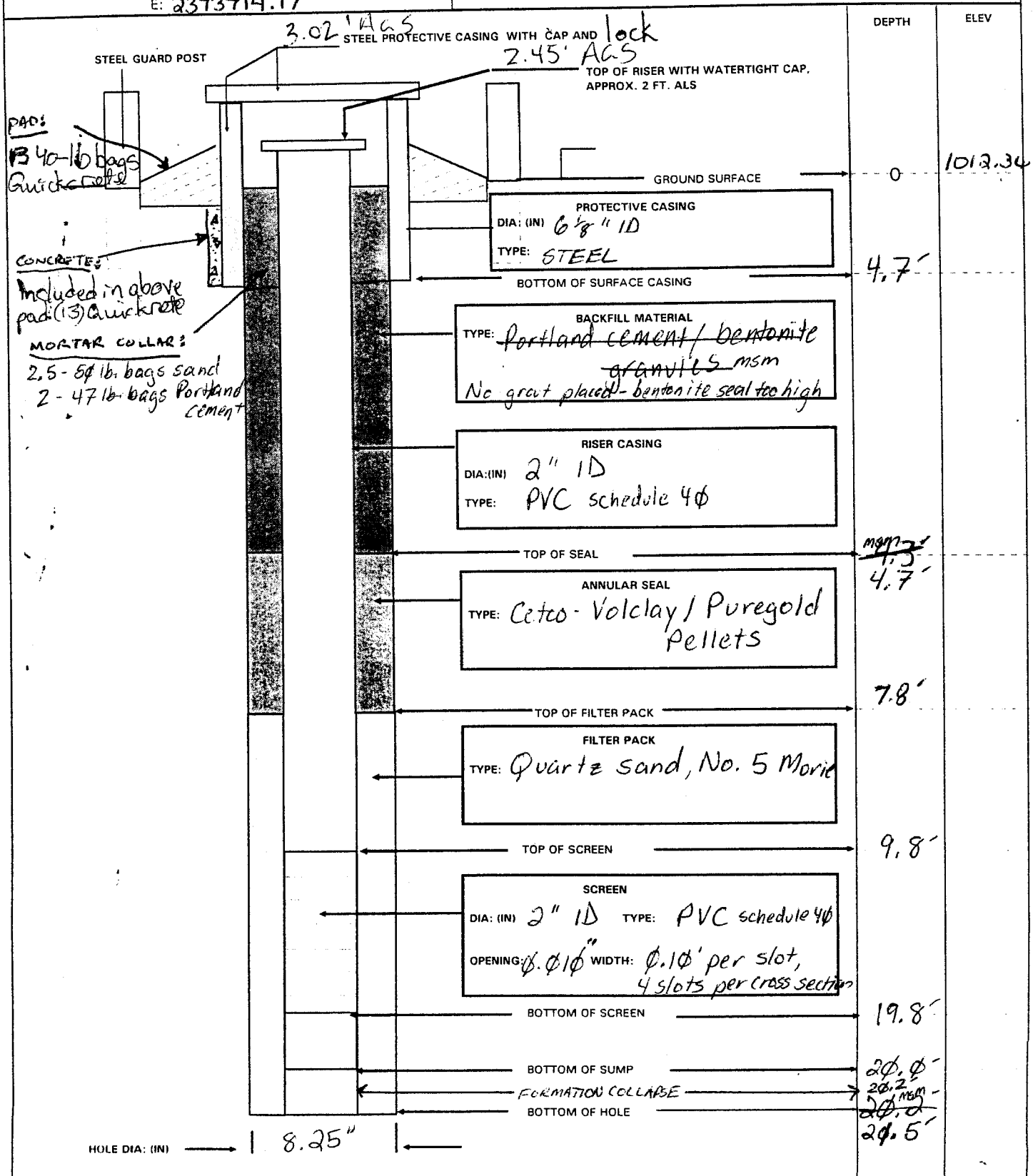
RECORDED BY: [signature] 8/25/01
(Signature and Date)

QA CHECK BY: Vicki Brumbach 8-28-01
(Signature and Date)

MONITORING WELL

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

WELL NUMBER: LL2MW-267	**BEGIN:** 08/07/01 1400	**END:** 08/21/01 0940
COORDINATES: N: 561393.73 E: 2373714.17	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1014.81 (msl)



HTRW DRILLING LOG

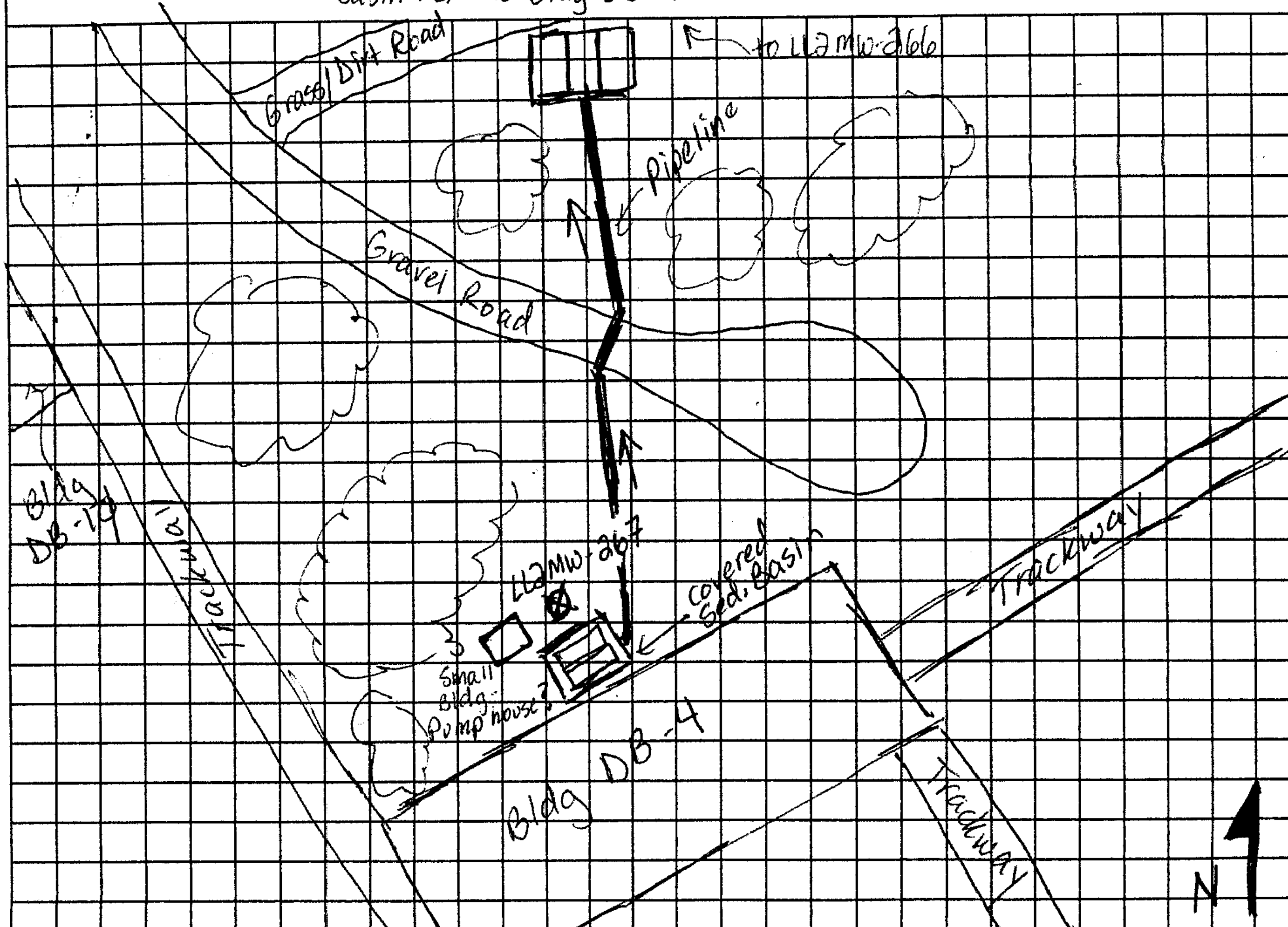
HTRW DRILLING LOG	DISTRICT: Louisville	HOLE NUMBER LL2MW-267
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 4
3. PROJECT: RVAAP, Load Line 2 Phase II RI	4. LOCATION: near covered sedimentation basin next to Bldg DB-4; Load Line 12	
5. NAME OF DRILLER: Bob Gollihue	6. MANUFACTURERS DESIGNATION OF DRILL: CME 55Ø	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 55Ø Auger Rig; 4¼" ID Augers; NQ Diamond Core; 2" Diam. Split Spoon; 14Ø lb. splitspoon hammer; ~~ASTM C-14-01~~	8. HOLE LOCATION: see map below	
	9. SURFACE ELEVATION: 1Ø14.21 TOC; 561393.73 N; 2373714.17 E	
	10. DATE STARTED: Ø8/Ø7/Ø1	11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: ~9.75'	15. DEPTH GROUNDWATER ENCOUNTERED: ~11.5' bgs	
13. DEPTH DRILLED INTO ROCK: ~1Ø.75'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 9.4' bgs @ 1619 on Ø8/14/Ø1	
14. TOTAL DEPTH OF HOLE: ~2Ø.5Ø' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 9.7' bgs @ 133Ø on 8/2Ø/Ø1	

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

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

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

LOCATION SKETCH/COMMENTS: (N) half of LL2, (N) of covered sedimentation basin next to Bldg DB-4 SCALE: NTS



PROJECT: RVAAP, Load Line 2 Phase II RI HOLE NUMBER LL2MW-267

HTRW DRILLING LOG

HOLE NUMBER LL2MW-267

PROJECT: RVAAP, Load Line 2 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	(7.5YR3/1) VERY DARK GRAY SILT, SLOG FRAGMENTS, ML	N/A	N/A	N/A	SPLIT SPOON 0-2' 4/7/8/8 0.5/2.0
	1	LIGHT GRAY (2.5Y7/1) SILTY CLAY, MOTTLED WITH OLIVE YELLOW (2.5Y6/8) DRY, CRUMBLY, CL, LOW PLASTICITY, LOW COHESIVENESS				
	2					SPLIT SPOON 2-4' 6/7/7/8 1.6/2.0
	3					
	4					SPLIT SPOON 4-6' 3/5/7/7 1.6/2.0
	5	OLIVE YELLOW (2.5Y6/8) SILTY CLAY WITH LIGHT GRAY (2.5Y7/1) MOTTLING, DRY, LOW PLASTICITY, LOW TO MEDIUM COHESIVENESS, CL, TRACE OF ANGULAR GRAVEL, DRY				
	6					SPLIT SPOON 6-8' 8/10/16/18 0.8/2.0
	7					
	8					SPLIT SPOON 8-10' 7/11/50-6" 1.3/1.5
	9	GRAY (5Y5/1) CLAYEY SILT, DRY, CRUMBLY, ~5% ANGULAR GRAVEL ML				
		SEE NEXT PAGE		CORE BOX 1		BEGIN RUN 1 CORING

HTRW DRILLING LOG

HOLE NUMBER LL2MW-367

PROJECT: RVAAP, Load Line 2 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	LIGHT YELLOWISH BROWN (2.5Y 6/4) VERY FINE GRAINED SANDSTONE, FRACTURED, IRON STAINING AND BANDS OF Fe STAINING AT FRACTURES	N/A	~~N/A~~ CORE BOX 1	N/A	RUN 1 START 1006.3' 1034.5' 11:00 STOP 1026.3' 1035.0' 11:00 PD 20.5 CD 20.1 RUN 10.75' LOSS 0.4 GAIN N/A RQD 3.15/10.75 = 0.29 - MUD W/ CUTTINGS AT BEGINNING OF CORING RUN - INCREASE IN WATER W/ CUTTINGS ~ 11.5' BGL
	12	LIGHT YELLOWISH BROWN (2.5Y 6/4) VERY FINE GRAINED SANDSTONE				
	13					
	14	LIGHT YELLOWISH BROWN (2.5Y 6/4) VERY FINE GRAINED SANDSTONE W/ SOME IRON STAINED ZONES - Fe STAINED FRAC.				
	15	- SHALEY INTERBED LIGHT GRAY (N7) FINE GRAINED SANDSTONE, MINOR DARK GRAY (N4) CROSS BEDDING - Fe STAINING - SHALEY INTERBED				
	16					
	17					
		DARK GRAY (N4) SHALE, WEATHERED				X 205
	18	LIGHT GRAY (N7) FINE GRAINED SANDSTONE, DARK GRAY (N4) CROSS BEDDING				
		DARK GRAY (N4) SHALE, MINOR LIGHT GRAY FINE GRAINED INTERBEDDED SANDSTONE				
	19	LIGHT GRAY (N7) FINE GRAINED SANDSTONE, DARK GRAY (N4) CROSS BEDDING				

HTRW DRILLING LOG

HOLE NUMBER LL2 MW 267

PROJECT: RVAAP, Load Line 2 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)
		SEE ABOVE ~~X WASH~~	N/A	~~N/A~~	N/A	
		ACCUMULATED LOST CORE		CORE BOX 1		
		TD = 20.5'				
	21					21

8-11-04

Well volume calculation sheet

Date 8/26/01 Time 1345
Well ID Num LLZ-MW267
Well Location RVAAP-Load

Total depth of well (ft BTOC) 20.2 ft BTOC
Depth to water (ft BTOC) 12.4
Height of water column (ft) (Hc) 7.80
MS 8/26/01

Well Volume Calculation

(3.142)(.006)(7.80)

Vc = 3.142(Rc^2)*Hc .17 cu. ft.

(3.142)(.111)(7.8)(0.3)

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= .81 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 7.38 gal.

Five volumes:
7.38 X 5 = 36.9 gal

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .010 (ft)
Hc = height of water column 7.80 (ft)
Rf = radius of filter pack .245 (ft)
Rc = radius of inside casing .080 (ft)

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: CY01

Date: 8/25/01 Time: 1345

Well Number and Location: LL2-MW267

Development Crew: Jeff Lindaw - SAIC
Charlie Moore - Tol Test

Driller (if applicable): Charlie Moore - Tol Test

Water Levels / Time: Initial: 12.4 ft BTOC / 1345 Pumping: 19.7 ft BTOC / 1434
Final: 19.7 ft BTOC / 1645

Total Well Depth: Initial: 20.2 ft BTOC FT BTOC Final: 22.64 FT BTOC

Date and Time: Begin: 8/25/01 / 1345 Completed: 8/25/01 / 1645

Development Method(S): Submersible pump. Surged with pump.
Water quality monitored with Horiba

Total Quantity of Water Removed: _____ gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14639	8/25/01
Specific Conductivity	"	"
pH	"	"
Turbidity	"	"

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO.: GY01

WELL NUMBER AND LOCATION: LL2-MW267

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (μMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/25/01	~~1400~~ 1345 MS 8/27/01	0	21.8	.487	7.07	>999	0	0	Initial
	1418	10	16.0	.357	6.78	>999	10	1+	
	1500	10	16.5	.330	6.77	>999	20	2+	
	1530	5	16.7	.340	6.75	>999	25	3+	3 vols
	1550	5	17.6	.344	6.72	790	30	4+	
	1640	7	17.8	.345	6.76	>999	37	5	5 vols

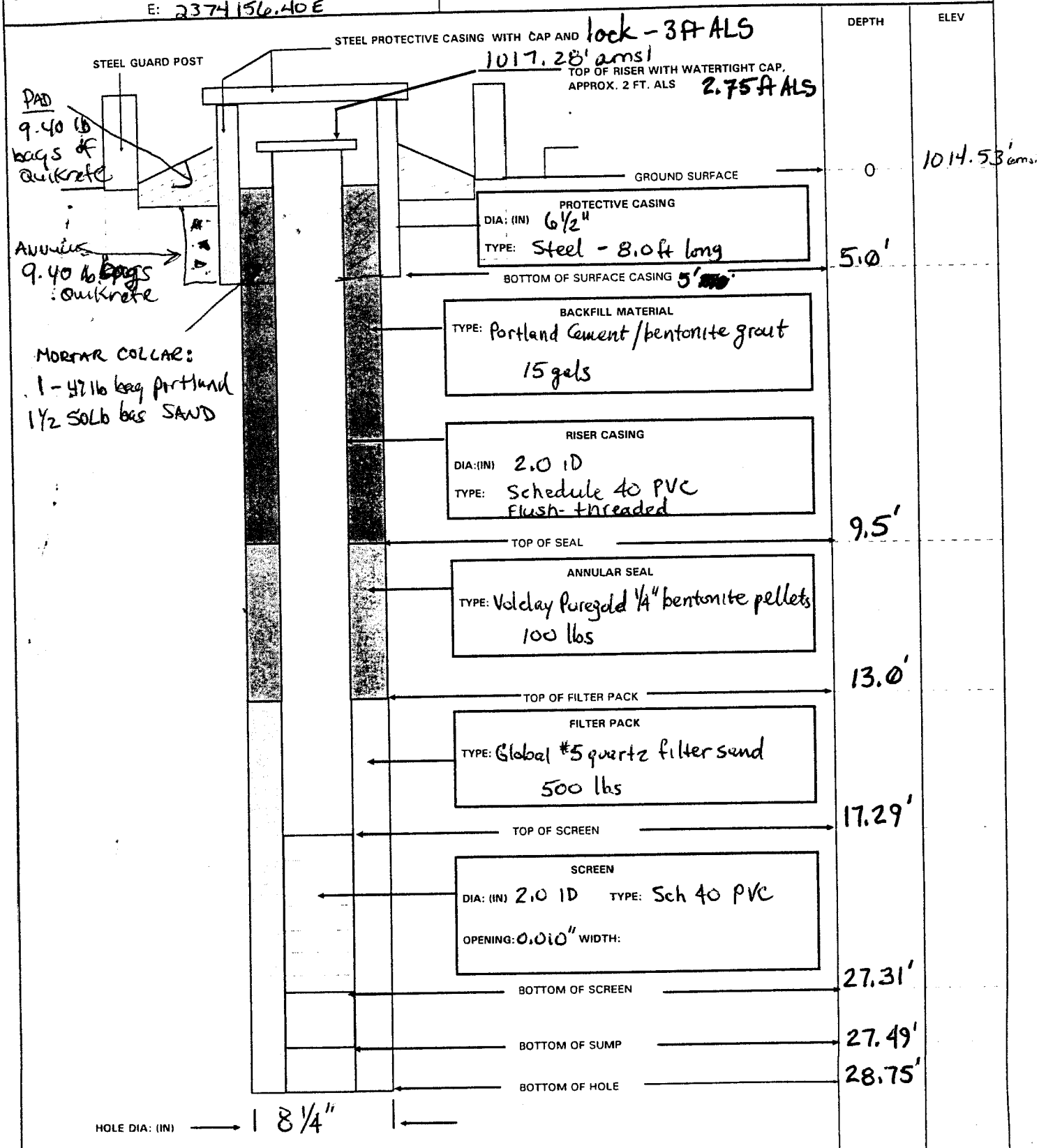
RECORDED BY: [signature] 8-25-01
(Signature and Date)

QA CHECK BY: Vicki Brumbach 8-28-01
(Signature and Date)

MONITORING WELL

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

WELL NUMBER: MW 268	**BEGIN:** 7/29/01 1556	**END:** 7/29/01 1700
COORDINATES: N: 560831.44 N E: 2374156.40 E	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1017.28' amsl

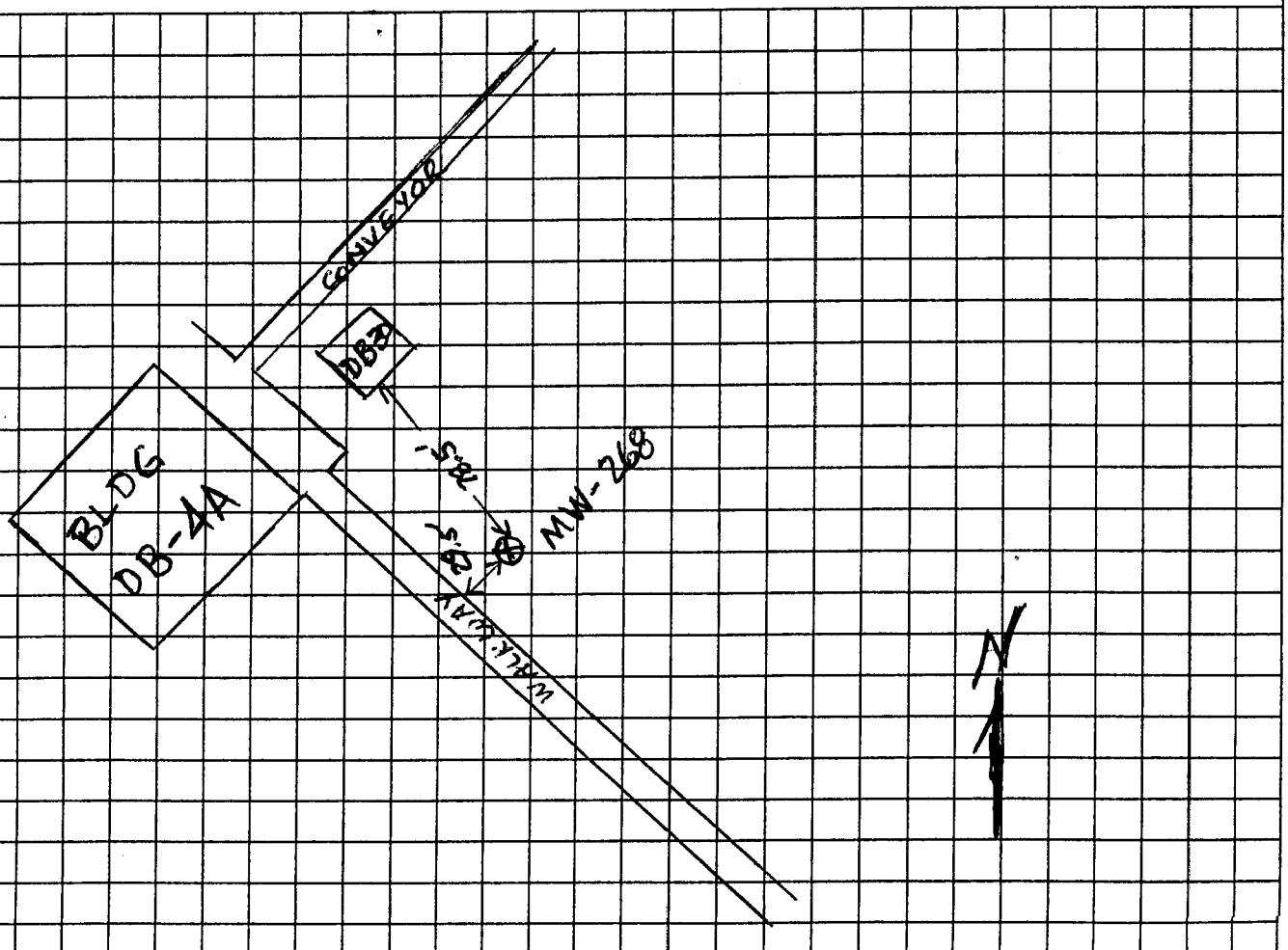


HTRW DRILLING LOG

1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	HOLE NUMBER MW268 / SHEET 1 OF 4
3. PROJECT: RVAAP, Load Line 2 Phase II RI	4. LOCATION: Load Line 2	
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 2ft long split spoons; 3" OD by 2.5ft long Shelby Tube Sampler; 3" OD by 10ft long wireline core barrel	8. HOLE LOCATION: See maps below	
	9. SURFACE ELEVATION: 1017.28 TOC; 560831.40 N, 2374156.90 E (KF 1/31/02)	
	10. DATE STARTED: 07/29/01 0820	11. DATE COMPLETED: 07/29/01 1700
12. OVERBURDEN THICKNESS: 12.25 ft	15. DEPTH GROUNDWATER ENCOUNTERED: 19 ft bgs	
13. DEPTH DRILLED INTO ROCK: 16.5 ft	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 16.95ft TOC after 16hrs	
14. TOTAL DEPTH OF HOLE: 28.75 ft bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 16.90ft TOC after 48hrs	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES: One			
20. SAMPLES FOR CHEMICAL ANALYSIS: None	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY: 77 %
22. DISPOSITION OF HOLE: Completed as Monitor Well	BACKFILLED	MONITORING WELL: MW268	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: EKSchultheis		

LOCATION SKETCH/COMMENTS — SCALE: NOT TO SCALE



PROJECT: RVAAP, Load Line 2 Phase II RI — HOLE NUMBER MW268

HTRW DRILLING LOG

HOLE NUMBER MW268

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR E J Schultheis | 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)
	1					B.C. 6, 12, 17, 18 No Recovery
	2					
		Sandy gravel, angular to sub-angular, 30% fine to medium sand, 10% silt, dry, Yel. Brown, 10YR 5/4	0.0			B.C. 3, 4, 5, 7 Rec. 1.4/2
	3	Clayey silt, Yel Brown 10YR 5/6, 5% course sand, some iron staining, non plastic, moist, firm ML				
	4	As above, clayey silt, moist	0.0			B.C. 3, 4, 5, 7 Rec. 2/2; Fill, ? sloughed material top 1' of spoon.
	5	ML				
	6	Clayey silt, low plasticity, Yel. Brown 10YR 5/6, ext. iron staining, moist, firm	0.0			B.C. 5, 6, 8, 11 Rec. 1.6/2
	7	ML				
	8	Clayey silt, yel brwn, 10YR 5/4, 10% coarse sand, some fine gravel, non plastic, hard, moist	0.0	*Shelby Tube sample 8-10 ft depth down pressure 650-700 psi recovery 1.9'/2.0'		B.C. 3, 2, 12, 6 Rec. 1.6/2 *Shelby tube sample collected from 2nd hole w/in 5ft of monitoring well borehole
	9	ML				

HTRW DRILLING LOG

HOLE NUMBER MW268

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR E. Jo Schlueteis | 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)
		SAME AS ABOVE	0.0			BC 10, 14, 22, 19 Rec 1.9/2
	11	Clayey silt, grayish brn 10YR 5/2, 10% fine to med gravel, hard, moist, some iron staining, non-plastic ML				
	12	As above	0.0			BC 5, 23, 44, 50/5 Rec 1.5/2
		Weathered shale, finely-laminated, soft, iron staining, lt. brn-gray, 2.5Y 6/2, blocky				Weathered bedrock at 12.35 ft
	13					
	14	SHALE, med. gray (N5), med. soft, finely laminated, core sample very broken up.				
	15	SANDSTONE, fine grained, Massive, yellowish gray 5Y 7/2 to 5Y 8/1, moderately soft, moderately cemented				Coring rate: 1ft/1.5min. down pressure: 100psi Water at approx 19'
	16					
	17					
	18					
	19	localized fine shaley laminations				

HTRW DRILLING LOG

HOLE NUMBER MW268

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR E Schultheis | 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)
	21					
	22					
		thin shaley zone				
	23					
	24					
		thin shaley zone				
	25					
	26					
	27					
	28					Bottom of Hole 28.75'
	29					

Well volume calculation sheet

Date 8/25/01 Time 0905
Well ID Num LL2MW-26B
Well Location LOAD LINE 2 NEAR BLDG DB-4A

Total depth of well (ft BTOC) 29.35'
Depth to water (ft BTOC) 17.15'
Height of water column (ft) (Hc) 12.2'

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc .264 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
KCM 8/25/01 note ** use length of screen if Hc > length of screen
= ~~1.28~~ cu. ft.
1.05

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= ~~11.5~~ gal.
KCM 8/25/01 9.8

5 volumes =
9.8 x 5 = 49 gallons

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume .10 MS 8/25/01
Ro = outside radius of casing ~~.083~~ (ft)
Hc = height of water column 12.2 (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: 8/25/01 Time: 0905

Well Number and Location: LL2MW-26B Near Bldg DB-4A

Development Crew: Molly McCann, Kate McCormick, Bob Gollihue

Driller (if applicable): Bob Gollihue - Talbst (BW 09-13-01) MSM 8/25/01

Water Levels / Time: Initial: 17.15' / 0900 Pumping: NOT TAKEN

Final: 18.25' / 1340

Total Well Depth: Initial: 29.35' FT BTOC Final: 30.0 FT BTOC

Date and Time: Begin: 8/25/01 / 0900 Completed: 8/25/01 / 1340

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

Total Quantity of Water Removed: 78.4 gals

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

WELL DEVELOPMENT RECORD

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

WELL NUMBER AND LOCATION: LL2MW-26B Near Bldg DB-4A

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
8/25/01	0908	0	13.6°	473	7.10	>999	0	0	Initial Reading
	0921	9.8	13.7°	476	7.09	>999	9.8	1	
	0940	9.8	13.7°	480	7.11	>999	19.6 Run 8/25/01	2	
	1004	9.8	14.1°	475	7.01	533	29.4	3	
	1022	9.8	14.1°	478	7.16	7999	39.2	4	BW 09-13-01
	1043	9.8	14.4°	478	7.09	627	49.0	5	
	1106	9.8	14.8°	467	7.05	586	58.8	6	
	1129	9.8	14.9°	455	7.03	387	68.6	7	
	1157	9.8	15.2°	471	7.04	287	78.4	8	Final Reading

JMcM 8/25/01

RECORDED BY: Kathryn M. Cosick 8/25/01
(Signature and Date)

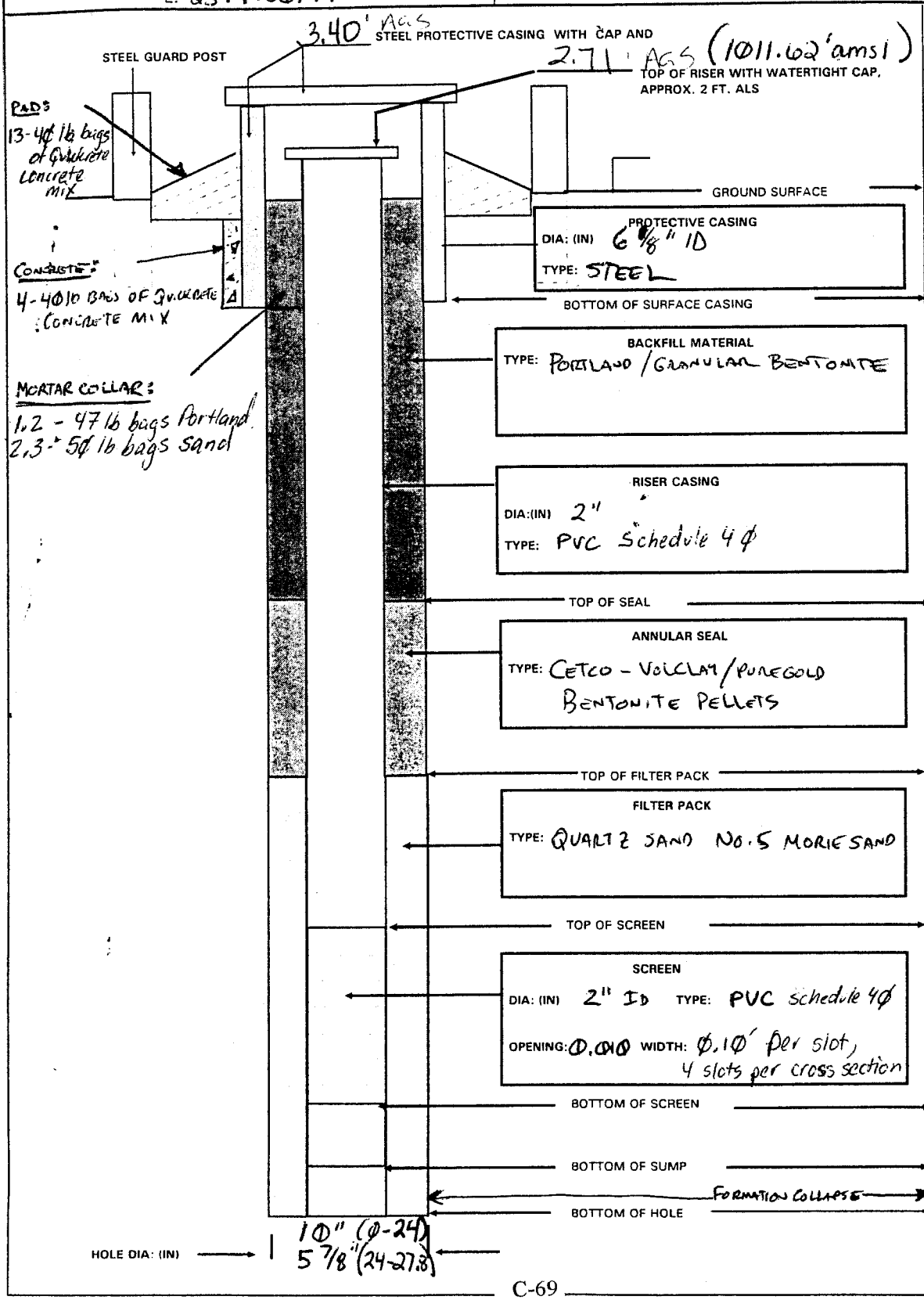
QA CHECK BY: Molly S Mac 8/25/01
(Signature and Date)

B. Will 09-13-01

MONITORING WELL

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

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



HTRW DRILLING LOG	DISTRICT: Louisville	HOLE NUMBER LL2-269
1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	SHEET 1 OF 4

3. PROJECT: RVAAP, Load Line 2 Phase II RI	4. LOCATION: SE end of Bldg DB-802
5. NAME OF DRILLER: BoB Gollihue	6. MANUFACTURERS DESIGNATION OF DRILL: CME ~~75~~ 550 MSM
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME 550 Auger Rig; 6 1/4" ID Augers; 140 lb Hammer - 2" x 2' split spoon samplers; 3" OD Core Bit; ~~5 7/8" OD Roller Bit~~ MSM 7-29-01	8. HOLE LOCATION: LL2-269, SE end of Bldg DB-802 @ edge of drainage ditch - see map below
	9. SURFACE ELEVATION: 1011.62 TOC; 559483.40; 2374756.74
	10. DATE STARTED: 7/28/01 — 11. DATE COMPLETED: 8/14/01
12. OVERBURDEN THICKNESS: ~18.6'	15. DEPTH GROUNDWATER ENCOUNTERED: ~18.3 bgs
13. DEPTH DRILLED INTO ROCK: ~9.4'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 18.59' bgs @ 8/13/01 1630
14. TOTAL DEPTH OF HOLE: 28.0' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

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

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

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

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

PROJECT: RVAAP, Load Line 2 Phase II RI — HOLE NUMBER LL2-269

HTRW DRILLING LOG

HOLE NUMBER LL4 MW-269

PROJECT: RVAAP, Load Line 2 Phase II RI

INSPECTOR Todd A. Eddy

SHEET 2 OF 4

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

HTRW DRILLING LOG

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

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

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

HTRW DRILLING LOG

HOLE NUMBER LL2MW-269

PROJECT: RVAAP, Load Line 2 Phase II RI | INSPECTOR Todd D. Eaky | SHEET 4 OF 4

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

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER LL2MW-269

Well volume calculation sheet

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

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

Well Volume Calculation

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

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

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

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

5C

WELL DEVELOPMENT FORM

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

Date: 8/25/01 Time: 0835

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

Development Crew: Molly McCann, Kate McCormick, Bob Gollihue

BW 09-13-01

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

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

Final: 28.0' / 1750

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

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

Development Method(S): pumping with Whale© pump

MSM 8/26/01

Total Quantity of Water Removed: 41.5 gals

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

WELL DEVELOPMENT RECORD

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

PAGE 1 OF 1

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

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

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

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

B. Williams 09-13-01

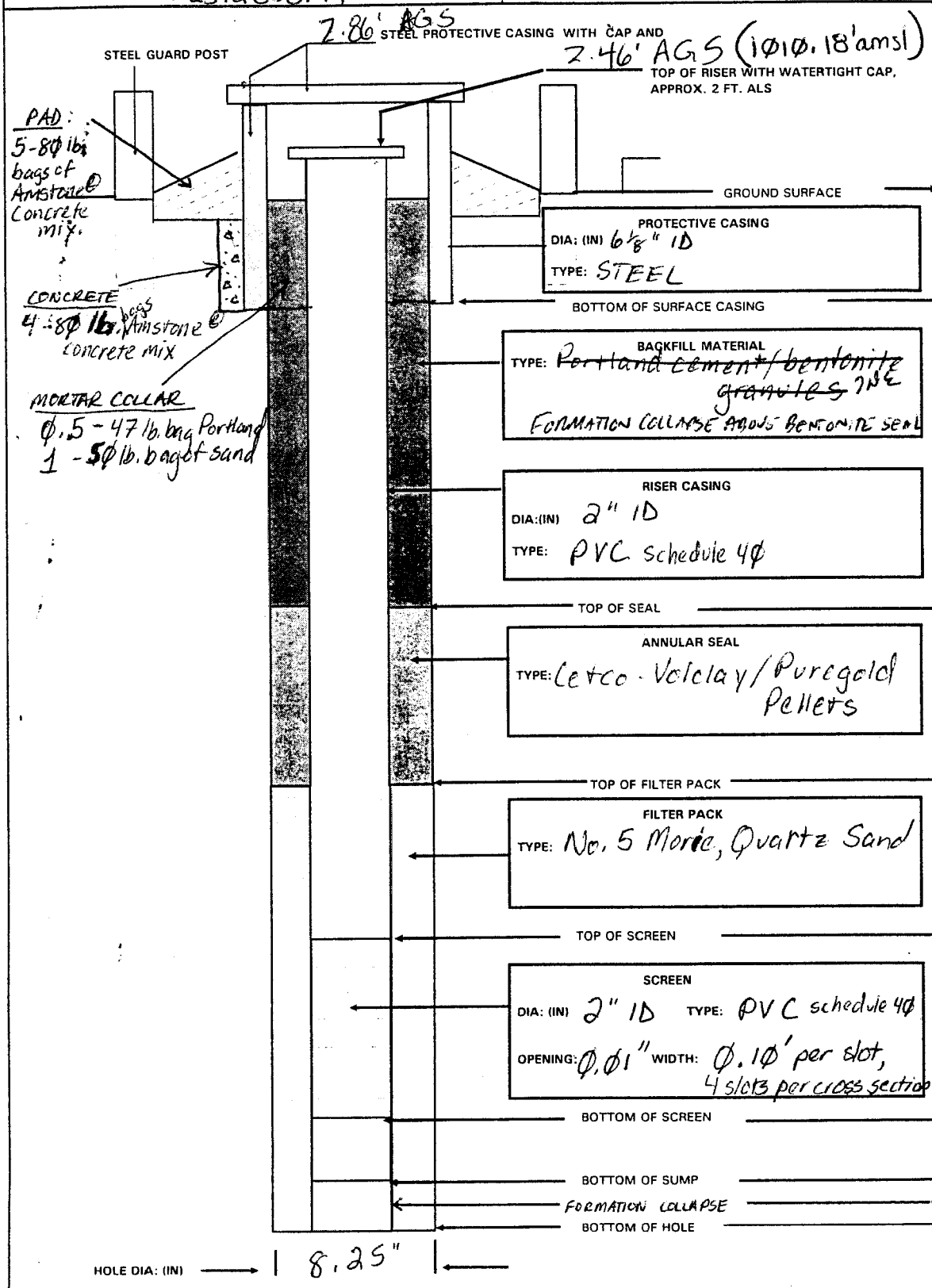
C-76

55

MONITORING WELL

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

WELL NUMBER: LL2 MW-27Ø	**BEGIN:** Ø8/Ø8/Ø1 1315	**END:** Ø8/14/Ø1 16Ø3
COORDINATES: N: 562656.18 E: 2372858.94	**REFERENCE POINT:** T.O.C.	**ELEVATION:** 1Ø1Ø.18' amsl

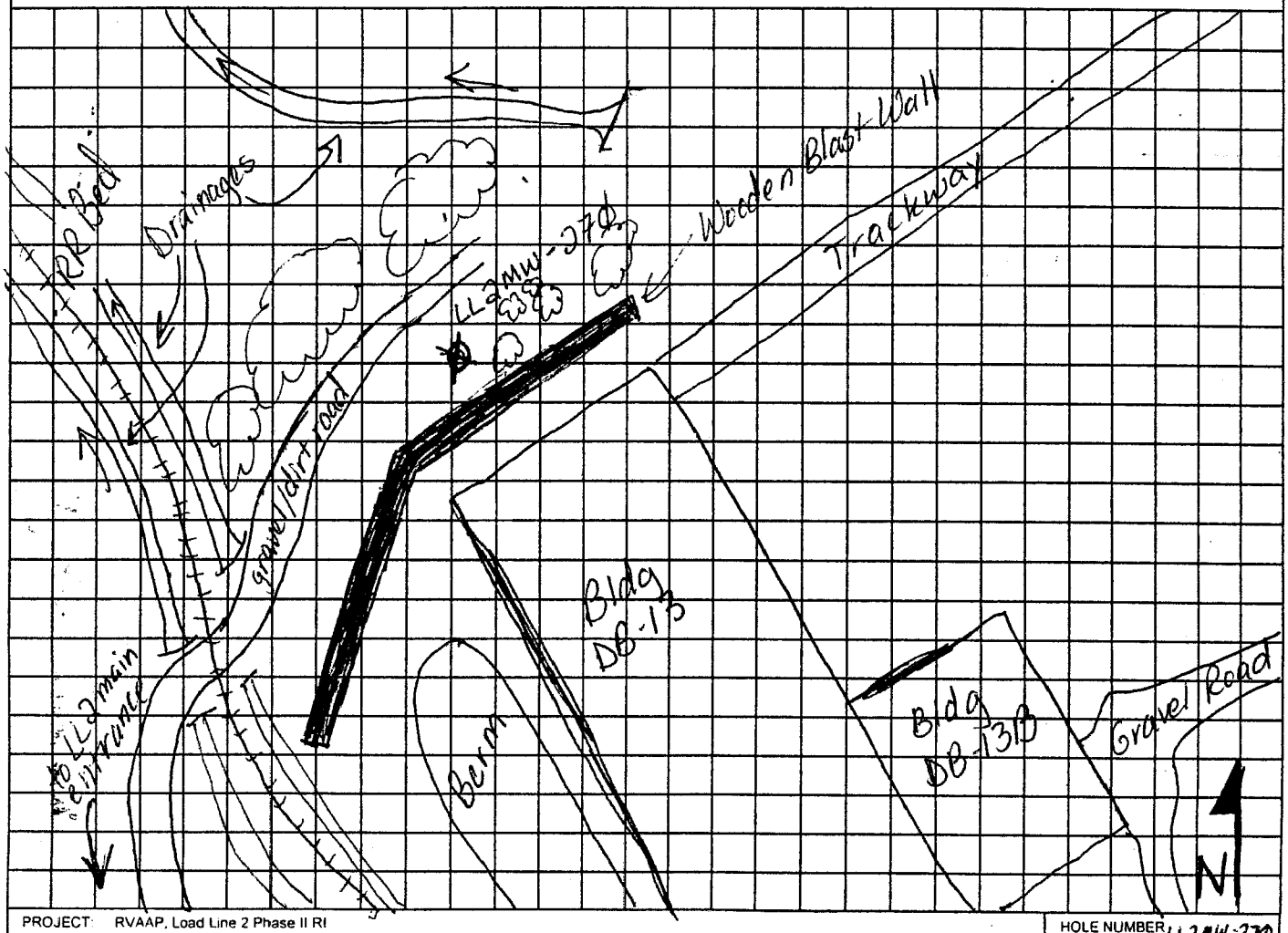


HTRW DRILLING LOG

1. COMPANY NAME: SAIC	2. DRILL SUBCONTRACTOR: Tol-Test	HOLE NUMBER: LL2MW-27D; SHEET 1 OF 4
3. PROJECT: RVAAP, Load Line 2 Phase II RI	4. LOCATION: NW Quadrant of LL2, just (N) of Bldg DB-13 and blast wall	
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 spoon; 140 lb. Split spoon hammer; ~~425A1 8/14/Ø1~~	8. HOLE LOCATION: see map below	
	9. SURFACE ELEVATION: 1Ø1Ø.18 TOC 562656.18 N 2372852.94 E	
	10. DATE STARTED: Ø8/Ø8/Ø1	11. DATE COMPLETED: 8/14/Ø1
12. OVERBURDEN THICKNESS: ~7.7' bgs	15. DEPTH GROUNDWATER ENCOUNTERED: ~11.5' bgs	
13. DEPTH DRILLED INTO ROCK: ~12.8' ~~bgs~~ msm	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 8.54' bgs @ 1426 on 8/14/Ø1	
14. TOTAL DEPTH OF HOLE msm 2Ø.5' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES: N/A	~~DISTURBED~~	~~UNDISTURBED~~	19. TOTAL NUMBER OF CORE BOXES: 1			
20. SAMPLES FOR CHEMICAL ANALYSIS: N/A	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY): N/A	21. TOTAL CORE RECOVERY: 98 %
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL: X	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: Molly M. Farr		

LOCATION SKETCH/COMMENTS: LL2MW-27Ø SCALE: NTS



PROJECT: RVAAP, Load Line 2 Phase II RI — HOLE NUMBER: LL2MW-27D

HTRW DRILLING LOG

HOLE NUMBER LL2MW-270

PROJECT: RVAAP, Load Line 2 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 GRAYISH BROWN (10YR 4/2) SANDY SILT, SLAG GRAVEL ~ 30%, DRY, CRUMBLY, ~~SP~~ SP/SC, SM	N/A	N/A	N/A	Split spoon 0-2' 5/6/15/26 1.5/2.0
	1	LIGHT BROWNISH GRAY (10YR 6/2) SILTY, GRAVELLY FINE GRAINED SAND ~ 20% ANGULAR GRAVEL, DRY, CRUMBLY, SP				
	2					SPLIT SPOON 2-4' 15/31/5/6 1.3/2.0
	3					
	4	LIGHT BROWNISH GRAY (10YR 6/2) SILT W/ MOTTLING FE STAINING, DRY, CRUMBLY, ML				SPLIT SPOON 4-6' 4/6/8/9 1.4/2.0
	5	~~SAME AS ABOVE BUT SOFTER~~ CLAYEY SILT STRONG BROWN (7.5YR 5/6) CLAYEY SILT, LIGHT GRAY MOTTLING, ML				
	6	BROWN (10YR 5/3) CLAYEY SILT, DRY, HARD, ML				SPLIT SPOON 6-8' 10/15/18/50-2" 1.1/1.7
	7	BROWN (10YR 5/3 CLAYEY SILT, DRY HARD, ~ 10% WEATHERED SHALE FINES., ML				
	8	GRAY (2.5Y 6/1) FINE GRAINED SANDSTONE				SPLIT SPOON 8-10' 50-2" 0.1/0.2
	9					
	10	LIGHT YELLOWISH BROWN (2.5Y 6/3) FINE GRAINED SANDSTONE, FRACTURED, BLACK STAINED FRACTURES		CORE BOX 1		RUN 1

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER LL2MW-270

HTRW DRILLING LOG

HOLE NUMBER LL2 MW-27D

PROJECT: RVAAP, Load Line 2 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	SAME AS ABOVE	N/A	~~N/A~~ CORE BOX 2	N/A	RUN 1 START 0941 0959 1117 1028 STOP 0952 1017 1038 PD 20' CD 20 RUN 10.5' LOSS 0.2' GAIN: N/A RQD 1.25/10.5 = 0.12 - POSSIBLY WATER @ ~11.5 - HOLE BLOWN @ 12.8 AND WATER IN HOLE
	12	GRAY (5Y 7/1) FINE GRAINED SANDSTONE - Fe STAINED FRAC.				
	13	- Fe STAINED FRAC. - SHALEY INTERBEDS				
	14	- Fe STAINED FRACTURE				
	15	- Fe STAINED FRAC.				
	16	- Fe OXIDE BANDING				
		- Fe STAINED BANDING				
	17	- Fe STAINED FRAC.				
	18	- BLACK CROSSBEDDING AND Fe STAINING				
	19	LIGHT OLIVE BROWN (2.5Y 5/3) FINE GRAINED SANDSTONE, Fe BANDING				

PROJECT: RVAAP, Load Line 2 Phase II RI | HOLE NUMBER LL2 MW-27D

HTRW DRILLING LOG						HOLE NUMBER LL2MW-270
PROJECT: RVAAP, Load Line 2 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	~~N/A~~ TDE Core Box 1	N/A	
		TD = 20.5'				
	21					21 ~~20~~ TDE
	22					22 ~~21~~ TDE
	23					23
	24					24
	25					25
	26					26
	27					27
	28					28
	29					29
						30

TDSM 8-11-01

PROJECT: RVAAP, Load Line 2 Phase II RI — HOLE NUMBER LL2MW-270

Well volume calculation sheet

Date 08/25/01 CR 10-302 Time 1130
Well ID Num LL2mw 27
Well Location

Total depth of well (ft BTOC) 22.38'
Depth to water (ft BTOC) 11.67'
Height of water column (ft) (Hc) 10.71'

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.231 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
= 1.04 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 9.54 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 10.71 (ft)
Rf = radius of filter pack 0.344 (ft)
Rc = radius of inside casing 0.083 (ft)

SV 8/24/01

$(3.14)\left(\frac{1}{12}\right)^2(10.71) = 0.231\ ft^3$

$(3.14)(.111)(10)(0.3) = 1.04$

1 vol = 9.54 gal

WELL DEVELOPMENT FORM

PROJECT NAME: Load Line 2 Phase II RI DELIVERY ORDER NO: CY01

Date: 08/25/01 Time: 1130

Well Number and Location: LL2MW27B

Development Crew: Jeffrey Linden

Driller (if applicable): Charlie Moore

Water Levels / Time: Initial: 11.67'btoc 1130 Pumping: _____/_____

Final: _____/_____

Total Well Depth: Initial: 22.38 FT BTOC Final: _____ FT BTOC

Date and Time: Begin: 08/25/01 / 1130 Completed: 08/25/01 / 1300

Development Method(S): pump i surge

Total Quantity of Water Removed: 70 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	14639	08/25/01
Specific Conductivity	↓	↓
pH		
Turbidity		

WELL DEVELOPMENT RECORD

PROJECT NAME: Load Line 2 Phase II RI

DELIVERY ORDER NO.: CY0

WELL NUMBER AND LOCATION: LL2 MW 27Ø

DATE	TIME	GALLONS REMOVED	TEMP(C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
Ø8/25/Ø1	114Ø	Ø	15.Ø	Ø.353	6.47	>999	Ø		Initial Reading
	1145	5	13.3	Ø.349	6.33	>999	5		
	1155	5	13.2	Ø.35Ø	6.3Ø	>999	1Ø		1 vol.
	121Ø	15	14.2	Ø.342	6.3Ø	6ØØ	25		
	122Ø	1Ø	14.3	Ø.343	6.3Ø	412	35		3.5 vol
	123Ø	1Ø	14.2	Ø.344	6.26	3Ø8	45		
	125Ø	2Ø	14.6	Ø.342	6.29	252	65		
	13ØØ	1Ø	14.7	Ø.342	6.27	191	7Ø		7 vols. End of develop. Collect 1 Qt jar.

8-28-Ø1 Vb

RECORDED BY: [signature] ØØ/25/Ø1
(Signature and Date)

QA CHECK BY: Vicki Brumbach 8-28-Ø1
(Signature and Date)