APPENDIX C

MONITORING WELL LOGS, WELL DEVELOPMENT RECORDS, AND SLUG TEST DATA

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APPENDIX C MONITORING WELL LOGS, WELL DEVELOPMENT RECORDS AND SLUG TEST DATA

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SIGNATURE PAGE

Signature	Printed Name	Initials
Mark F. Deering	Mark F. Deering	MFD
Ronda S. Bailey	Ronda S. Bailey	
Chantelle Carroll	Chantelle Carroll	CC
Amy Greenawald	AMY GREENAWALD	AG

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/8/03 Su M Tu (W) Th F Sa PAGE 1 OF 1

Task Team Members:

Mark Deering	Chris White (TolTest)
Steve King (MKM)	John Moore (")
Neil ~~Witkof~~ Winton (TolTest) MPD	Ronda Bailey

Narrative (include time and location):

0820: Location cleared by S. King

0825: Arrive @ location FBQ-166 + begin to set-up

0845: Push Shelby tube: 0-2' bgs

0905: " " " : 2-4' bgs

0910: Begin SS sampling

0920: Push Shelby tube: 6-8' bgs

0940: Cont. SS sampling

1030: Completed cleaning out borehole + began to construct mon. well

1130: Completed construction, w/ exception of concrete work around well + protector posts

Shelby tubes used - 3

(Note: @ 1015, had t/c w/ C. McCambridge - OEPA re. need to modify well construct specs. (from FSAP) -- top of screen @ water table, 2' of sand pack, + 1' of pellets. She ok'd + will note in OEPA files.)

[signature] 12/23/03

Daily Weather Conditions: A.M. Sunny, 52°F

P.M.

Recorded By Mark Deering QA Checked By [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10-28-03 Su M (Tu) W Th F Sa PAGE 2 OF 6

Task Team Members:

Chantelle Carroll — Andre Bailey Leon

Todd Fisher

Randa Bailey

Narrative (include time and location):

15:45 Arrive at FBQ-166

15:47 initial reading with Bailer

ph 7.29 Cond 900. DO 3.45 turb >999 temp 12.8

15:48 Began to use Whaler

16:00 Whaler - silty-up - go back to bailing

11 Gallons removed w/ Whaler

16:00 ph 7.45 Cond 716.0 DO 7.62 turb >999 temp 12.9

1 Gallons removed w/ bailer - total of 12 gal removed

16:25 Returned to Whaler after 3 gallons.

16:30 Silt-up - return to bailing

1640 - 90 GAL REMOVAL

pH 7.55 TEMP 12.7 TURB >999 COND 731 DO 9.10

1655 - 5 GAL REMOVAL

pH 7.59 TEMP 13.0 TURB >999 COND 712 DO 7.10

1700 - STOPPED DUE TIME & SLOW RECHARGE

DIST TO WATER 18' // DIST. TO BOTTOM 19'7".

Daily Weather Conditions: A.M.

P.M. Overcast, occasional light rain, 40's

Recorded By: Chantelle Carroll QA Checked By: Randa Bailey

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10.29.03 Su M Tu (W) Th F Sa PAGE 3 OF 6

Task Team Members:

ANDRE CROON
RHONDA BAILEY
CHANTELLE CARROLL

Narrative (include time and location): DIST. TO WATER - 4'2".2 // DIST TO BOTTOM - 19'7"

0920 - ARRIVED AT FBP-166 (DAY 2)
0930 - INITIAL READING W/BAILER
pH 7.36 TEMP 14.0 TURB 193.0 COND 696 DO 6.56
1000 - 12 gal removed + 29 (from 10/27/03)
PH 7.41 TEMP 14.7 TURB 999 COND 704 DO 5.54
1020 3 GAL REMOVAL
pH 7.53 TEMP 13.5 TURB 130.0 COND 703 DO 6.54
1035 - 2 GAL REMOVAL
pH 7.54 TEMP 13.5 TURB 999 COND 701 DO 6.41
BEGAN TO BAIL, WATER SLOW, BAILER FILLING ONLY 1/3 EACH TIME, RECHARGE RATE 1/10 A MINUTE, DISTANCE TO BOTTOM 1'.15 WATER COLUMN
1105 - 1 GAL REMOVAL // FINAL READING
pH 7.51 TEMP 13.1 TURB 77.8 COND 766 DO 6.96
FIVE WELL VOLUMES REMOVED TOTAL
DIST TO WATER 14'.51" // DIST. TO BOTTOM 19'.69"
1115 - FINISH WELL

Daily Weather Conditions: A.M. OVERCAST, BREEZE, 40.5°

P.M.

Recorded By: Andre Croon QA Checked By: Rhonda Bailey

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TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11 19 03 Su M Tu (W) Th F Sa PAGE 4 OF 6

Task Team Members:
Ronda Bailey
Andre Leon

Narrative (include time and location):
1000 - Arrive @ FBQ 166. Take initial readings and begin purge.
1005 - 18 gal removed; 5 bailers ~6" of H_2O
Depth to Water 18.7. Depth of well 19.7.
Advised by Chantelle Carroll to leave well. "Well is dry". Return within 24 hrs/Facility Wide Document

11/20/03

Daily Weather Conditions: A.M. Heavy Rain, mid A/C
P.M.

Recorded By _____ QA Checked By Amy Townsend

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 112∅03 Su M Tu W (Th) F Sa PAGE 5 OF 6

Task Team Members:

Ronda Bailey

Narrative (include time and location):

∅945 - Arrive @ FBQ HQ. Take initial reading (see pg 77): Depth of Water: 4.31' Depth of well: 19.7'. Retrieve Sample FBQmw166∅3∅6GW

∅930 - Depth of water. 8.71', Depth of Well: 19.7' Leave well. ∅

12/4/03

Daily Weather Conditions: A.M. Sunny, mid 50s

P.M.

Recorded By Ronda Bailey QA Checked By Amy Hamawaki

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TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/03/03 Su M Tu W Th F Sa PAGE 6 OF 6

Task Team Members:

Narrative (include time and location):

1535 Arrive @ FBQ166. Set up slug test and PC. 4.52'

1600 Slug in.

1603 - Leave well.

0940 - Arrive @ FBQ166, Extract Data

0945 - Slug out

0950 - Leave for FBQ170

1210 - Arrive check slug test.

1215 - Test complete / Leave site

AG
12-5-03

Daily Weather Conditions: A.M. _____

P.M. Sunny, 71°

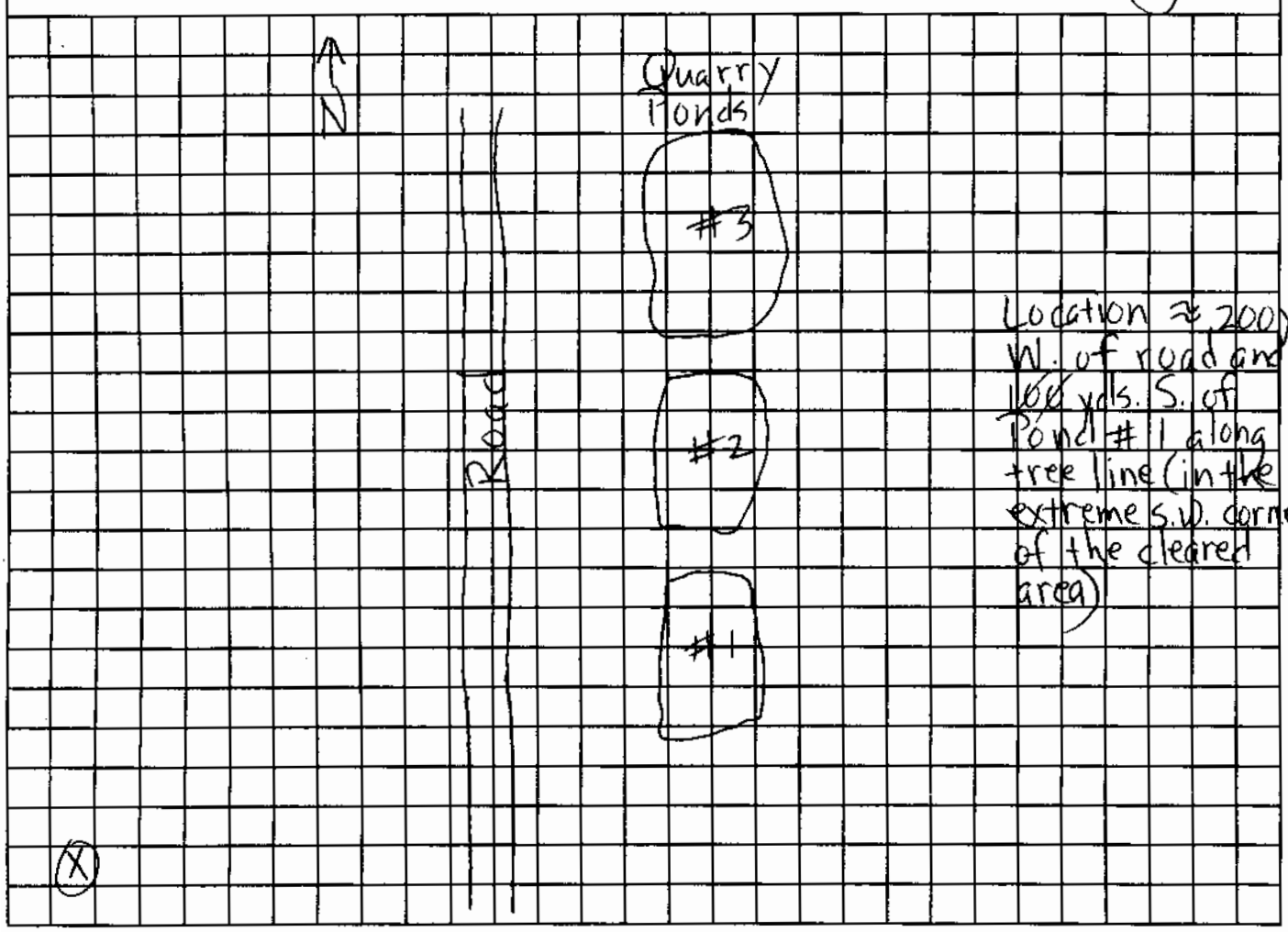
Recorded By [signature] QA Checked By [signature]

HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER: FBQ-166
1. COMPANY NAME: SpecPro, Inc.	2. DRILL SUBCONTRACTOR: Tol Test	SHEET 1 OF 1
3. PROJECT: Fuze & Booster/RVAAP	4. LOCATION: Fuze & Booster Quarry Landfill/Pond	
5. NAME OF DRILLER: Neil Witkof Wiktor	6. MANUFACTURERS DESIGNATION OF DRILL: CME-75	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-75 Auger Rig 10.25" O.D./6.25" I.D.	8. HOLE LOCATION: FBQ-166	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/8/03	11. DATE COMPLETED: 10/8/03
12. OVERBURDEN THICKNESS: 16'	15. DEPTH GROUNDWATER ENCOUNTERED: 5.5' (est. in SS) (10/8/03)	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 0.7' bgs / 46 hr 5 min	
14. TOTAL DEPTH OF HOLE: 16' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

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

LOCATION SKETCH/COMMENTS — SCALE: Not to scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-166

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

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Med-dk brn silty Topsoil to 6"; @ 6", change to yel brn clayey silt (ML) tr-l+l fn-~~med~~ cse grv, dry, dense MFD	Ø ppm	FBQ-166 (ST-1)		Push Shelby tube from Ø-2' bgs
	2	Clayey Silt A/A (as above), dry	Ø	FBQ-166 (ST-2)		Push Shelby tube from 2-4' bgs
	3					
	4	Yel brn silty Clay (CL) tr-l+l fn-med grav, damp-M moist to ~~at~~ 5'3"; change yel brn clayey Silt, tr grv, damp-moist, dense to 5'6"; change to yel brn clayey v.fn.-fn Sand, wet-sat., loose	Ø			Blow Counts: 5-6-7-9 Recov.: 19"
↓	5					
	6	Yel brn grading to olv brn sandy Clay, sat., soft, plastic	Ø	FBQ-166 (ST-3)		Push Shelby tube from 6-8' bgs
	7					
	8	Olv brn ~~Sandy~~ Clay ~~Clayey Sand~~ A/A, ~~grading from yel brn to olv~~ brn, sat., firm ~~soft~~ plastic MFD	Ø			Blow Counts: 4-5-5-6 Recov.: 13"
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-166

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

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11	Clay A/A (CL)	ϕ PPM			Blow Counts: 7-6-6-8 Recov.: 16"
	12	Clay A/A, slightly ~~less~~ firm, sat.	ϕ			Blow Counts: 7-6-6-7 Recov.: 18"
	13					
	14	Clay A/A, firm, Saturated.	ϕ			Blow Counts: 2-3-5-4 Recov.: 18"
	15					
	16					
	17					
	18					
	19					
	20					

T.D. 10-05-03

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-166

INSTALLATION START: DATE: 10/8/03 TIME: 10:30

INSTALLATION FINISH: DATE: 10/8/03 TIME: 11:30

ANNULAR SPACE MATERIALS INVENTORY:

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

BENTONITE SEAL: TYPE: Bentonite Pellets (Coarse Volclay / Pure Gold) QUANTITY: 3/4 bucket

GROUT: TYPE: Portland / Bentonite QUANTITY: 1 X 92 lb / ½ X 50 lb bags

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): 0.01 (1/4) SLOT CONFIGURATION: slotted

OUTSIDE DIAMETER: 2 1/4" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: n/a

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

Discussed shallow water table conditions w/ Connie McCambridge of OEPA. specifically, w/ re. to necessity to modify construction of mon. well from FSAP. It was agreed to place top of screen at estd. top of water (55' bgs), 2' of sand (vs. 3') + 1' of bent. pellets (vs. 2') + slurry to surface. TFC was held @ 10:15 today, 10/8/03. Connie will put a note to this effect in Agency files.

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

RECORDED BY: M.F. Deering (Signature and Date) 10-8-03

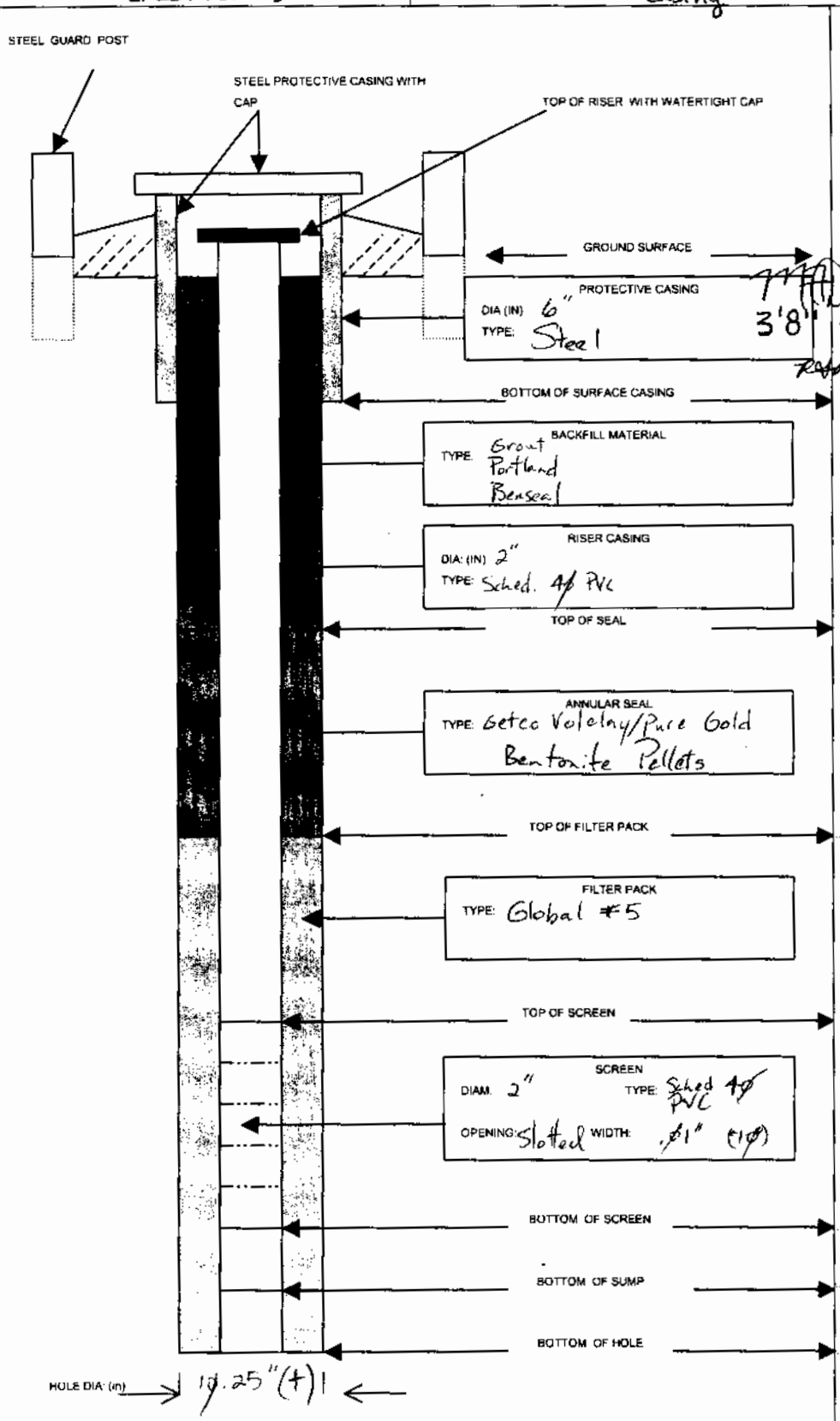
QA CHECK BY: Ronald Bly 12/30/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

10-8-03 10-8-03

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

WELL NUMBER: FBQ-11d	**BEGIN:** 10:30	**END:** 11:30
COORDINATES: N: 553123.42 E: 234986.83	**REFERENCE POINT:** Top Inner Casing	**ELEVATION:** 1108.86 ft.



	DEPTH	ELEV
GROUND SURFACE	0	
PROTECTIVE CASING	3'8"	
BOTTOM OF SURFACE CASING	8'	
TOP OF SEAL	2.5'	
TOP OF FILTER PACK	3.5'	
TOP OF SCREEN	5.5'	screen 10ft
BOTTOM OF SCREEN	15.5'	
BOTTOM OF SUMP	16'	
BOTTOM OF HOLE	16'	

WELL VOLUME CALCULATION SHEET

Date: 10-28-03 Time: 1545

Well ID: FBQ-166

Well Location: FBQ

Total Depth of Well (ft BTOC) ~~4.18~~ 15.70
Depth to Water (ft BTOC) 4.18
Height of water column (ft) (Hc) 15.52

Well Volume Calculation:

Vc = $3.142(Rc^2)*Hc$ .31 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
= .94 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.) 9.45 = 46.8 gal
= 9.35 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 15.52 (ft)
Rf = Radius of filter pack (0.33 ft)
Rc = Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

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

Date: 10/28/03

Well Number and Location: FBQ-1606

Development Crew: Ronda Bailey
Andre Leon

Driller (if applicable): N/A

Water Levels/Time: Initial: 4.18 / 1547 Pumping: /

Final: 14.51 / 1115

Total Well Depth: Initial: 19.70 Ft BTOC Final: 19.69 Ft BTOC

Date and Time: Begin: 10/28/03 / 1547 Completed: 10/29/03 / 1115

Development Method(s): Whaler & bailer

Total Quantity of Water Removed: 47 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	10 30 03
Specific Conductivity	YSI 85	10 30 03
pH	pH test 3'	10 30 03
Turbidity	~~Hach~~ Hach Pocket Turbidimeter	10 30 03

GROUNDWATER PURGE SHEET

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

DATE (mm/dd/yy): 11 / 19 / 03 TIME: 10:10

WELL ID NUMBER: FBQ 166 WELL LOCATION: FBQ

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

INNER CASING: TYPE: _____ ID: _____ inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ .33

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2]$ (TD-S or H) (P) .94

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

$Vt = (Vc + Vf)\ (7.48)$ 9.52

WHERE:

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

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 28.55 GAL.

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

SITE CONDITIONS DURING PURGING: Rain, Low 50's.

FIELD OBSERVATIONS: _____

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

RECORDED BY: [signature] 11/19/03
(Signature and Date)

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

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ 166 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/19/03	1010	Initial	12.2	702	7.31	29.4			DO=4.68
	1030	7gal	12.9	737	7.52	>99.9	7		DO=4.21
	±10		± 1.29	± 73.7	± .752				± .421
	1046	7gal	13.0	879	7.48	>99.9	14		DO = 2.88
	1105	4 gal							5 bailers < 6" DOW: 19.7 DO. H2O - 18.7 / cc. "well dry"
11/20/03	0905	Initial	9.9	695	7.65	20.7			DO 7.20

RECORDED BY: [signature] 11/19/03 (Signature and Date)

QA CHECK BY: [signature] 12.05.03 (Signature and Date)

SLUG TEST RECORD

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

WELL NO.: 166 | DATE STARTED: 12-03-03 | DATE COMPLETED: 12-04-03

LOCATION: FBQ | RECORDED BY: B. BAILEY

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

REFERENCE POINT: TOC PVC | REFERENCE POINT ELEVATION | RISER CASING I.D. (IN)

SCREEN OR OPEN HOLE I.D. (IN): 2 | DIAMETER OF BOREHOLE (IF SCREENED): 10.25"

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	19.69		TOP OF FILTER PACK	3.5	
DEPTH TO WATER	4.52		TOP OF SCREEN OR OPEN HOLE	5.5	
HEIGHT OF WATER COLUMN	15.17		SCREEN LENGTH	10 FEET	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
FBQ166	SLUG IN	12/3	12/4/03	16:54	10:46	9.50	4.520	4.584	15.17	15.11
FBQ166	SLUG OUT	12/4	12/4/03	10:49	13:14	9.50	4.520	4.170	15.17	15.52

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY | DATE | QA CHECK BY | DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/15/03 Su M Tu (W) Th F Sa PAGE 1 OF 2

Task Team Members:

Mark Deering — John Moore (Tol Test)
Tony Brister (Tol Test) — Steve King (MKM)
Chris White (")

Narrative (include time and location):

1615: Mob to location FBQ-167
1625: Location cleared by S. King
1630: Set-up drlg. rig
1635: Push Shelby tube: Ø-2' bgs
1640: Begin SS samp'g.
1655: Push Shelby tube: 6-8' bgs
1700: Resume split-spoon samp'g./auger drl'g.
1800 Cease " " " "

(Note: in effort to encounter bedrock + core sample in this downgradient [as discussed w/ OEPA (E. Mohr) + ACoE (P. Zorko) today at the site], drlg. was advanced somewhat beyond the depth required to install the mon. well at this location [i.e., SS to 22' bgs + augering to 18.5' bgs vs. 15.5' bgs necess. for well construction]; in order to infill borehole w/ natural formation [vs. adding sand (+ therefore undesirably extending the open interval beyond the ~~desired~~ specified length) or adding bentonite

MTD

Daily Weather Conditions: A.M. _____

P.M. Most Cloudy, Windy, 55°F

Recorded By Mark Deering QA Checked By [signature]

Shelby tubes used. 2

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/15/03 Su M Tu W Th F Sa PAGE 2 OF 6

Task Team Members:

Mark Deering — John Moore
Tony Brister (Tol Test) — Steve King (MKM)
Chris White (")

Narrative (include time and location):

pellets (which, through swelling, would likely push the well installation upward [or otherwise possibly cause problems in the lower portion of the well]). the bottom of the augers were raised to approximately 16' bgs, & the borehole will remain this way overnight.)

← to allow for caving of the bore-hole from 16-22' bgs]

1630: Departed location

Daily Weather Conditions: A.M. _____

P.M. Most cloudy, windy, 55° F

Recorded By Mark Deering QA Checked By [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/16/03 Su M Tu W (Th) F Sa PAGE 3 OF 6

Task Team Members:

Mark Deering — John Moore (Tol Test)

Tony Brister (Tol Test)

Chris White (")

Narrative (include time and location):

0745 : Travel to location (drillers) + decision to backfill extra depth w/ caved material

0800 : Discuss attempt to core borehole w/ E. Mohr of options - OEPA at site (i.e., per reasoning / discussion plan described in the Team Activity Log Sheet for this location on 10/15/03). Ms. Mohr concurred w/ this plan. (Note: at the start of well construction, the borehole had caved (from 18-22').)

0830 : Begin to construct mon. well.

0950 : Completed mon. well construction (w/ exception of pro. csg., pad, + protect. posts)

10/20/03

Daily Weather Conditions: A.M. Cloudy / light sprinkle of rain / 50°F

P.M.

Recorded By Mark Deering QA Checked By Randall Bly

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): _____ Su M Tu W Th F Sa PAGE 4 OF 6

Task Team Members:

Narrative (include time and location):

1600 - Arrive @ FBQ 167. Begin development
Initial Reading @ 1620
DO .76 Cond 346.7 Turb >999 pH: 6.87 temp 14.1
3 gal + 2.5 gal
1625 - Resume development
1631 - 4 gal
DO 1.14 Cond. 383 Turb 99% pH 6.85 temp 13.3
1645 - 3.5 GAL
DO 2.10 COND 247.8 TURB >999 pH 6.89 TEMP 13.6
1650 - WIRE SHORT ON PUMP, DOWN
FOR REPAIR
1725 - RESTART PUMP
1730 - 4 GAL
DO 1.54 COND 236.1 TURB 399 pH 6.95 TEMP 13.5
1740 - 4 GAL + 2.5 GAL
DO 3.53 COND 250.7 TURB 988 pH 7.01 TEMP 13.7
1745 - WELL WENT DRY

Daily Weather Conditions: A.M. _____

P.M. Sunny - Mid 50

Recorded By _____ QA Checked By _____

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10 30 03 Su M Tu W (Th) F Sa PAGE 6 OF 6

Task Team Members:

Ronda Bailey

Andrea Lau

Chantelle Carroll

Narrative (include time and location):

1330 Arrive @ FBQ 10?, V calculations. Initial reading from ? of well. Temp 15.4° pH 6.16 turb >99.9% cond. 522 DO .67

1340 12 gal removed: pH 6.40 temp 14.4, turb >99.9% cond. 563, DO .77

1345 3 gal removed, whale stopped, hit bottom of well, allow recharge.

1355 Restarted pump

1400 7 gal removed: pH 6.33, temp 14.5°, turb >99.9% cond. 539 DO 2.38

1402 Whale stopped, hit bottom, well recharging 2" in less than one minute

1405 Depth to H_2O - 12' & rising, depth of well 18.96

1410 Restarted whale

1415 Whale stopped @ 11 gal. removed, pH 6.26, temp 15.5, turb >99.9 Cond. 534 DO 2.24

1420 1 gal removed w/ bailer

1435 Depth to H_2O 8.5' & rising. Restart whale.

1450 12 gal removed: pH 6.41, temp 15.4°, turb >99.9% Cond. 577, DO 3.43 RAB

subtotal - 48 gal removed of 68 for V_t.

1515 12 gal removed pH 6.56, temp 14.5, turb >99.9 cond 572 DO 3.64

1530 12 gal removed: pH 6.44, temp 14.3, turb >99.9 cond 583, DO ~~3.55~~ 3.41 RAB

1555 Stopped well development @ 82 gal removed in 6 1/2 turb didn't clear. Final readings: pH 6.52 Temp 14.0, Turb >99.9, Cond 580, DO 3.55.

Daily Weather Conditions: A.M. ______

P.M. Partly cloudy, high 60s

Recorded By RAB QA Checked By Amy Thernauer

* See back of pg 35 for activity log of purge & slug test. ("35a")

35a

Randa Bailey
Andre Leon

11/18/03 Tues.

FBQ mw-167 @ 3060 metals filtered

0935 - Arrive @ FBQ 167. Begin purge & sampling.
1016 - Take initial Readings. Depth of well 18.97' H_2O 15.25'
1200 - Leave well.

12-04-03 Thurs

1204p3 - 1220 - Arrive @ FBQ 167 3.79'
1238 - Slug in - Error - Pull slug out. Reset PC
1242 - Slug in and leave - For 24/74
1549 - Arrive @ FBQ 167 check test
1555 - Slug out & leave for day
12-05-03 0920 - Arrive @ FBQ 167. Extract data
0926 Test complete, return to 169

AG
12-08-03

RECORDED BY Randa L Bailey

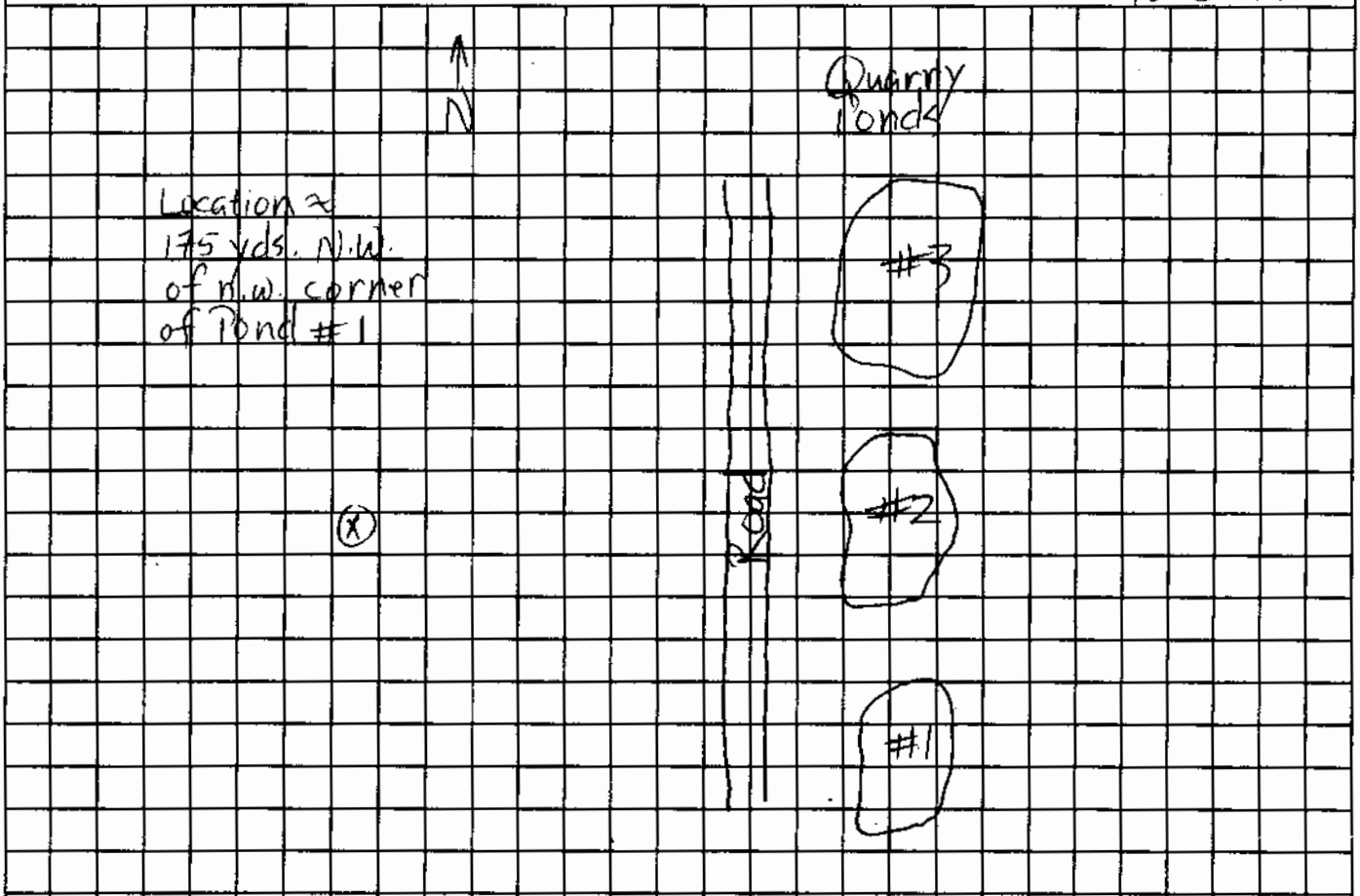
OA Amy Heerman

HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER: FBQ-167
1. COMPANY NAME: SpecPro, Inc.	2. DRILL SUBCONTRACTOR: Tol Test	SHEET 1 OF 1
3. PROJECT: Fuze & Booster/RVAAP	4. LOCATION: Fuze & Booster Quarry Landfill/Pond	
5. NAME OF DRILLER: Tony Brister	6. MANUFACTURERS DESIGNATION OF DRILL: CME-550	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-550 ATV Aug Rig / 10.25" O.D. / 6.25" I.D.	8. HOLE LOCATION: FBQ-167	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/15/03	11. DATE COMPLETED: 10/15/03
12. OVERBURDEN THICKNESS: 22'	15. DEPTH GROUNDWATER ENCOUNTERED: 5' bgs / SS / 10-15-03	
13. DEPTH DRILLED INTO ROCK: N/A	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: +0.7 ags / 44 hr 30 min	
14. TOTAL DEPTH OF HOLE: 22' bgs (M.W. to 15' bgs)	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

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

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-167

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 1 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Med brn silty Topsoil tr-ltl fn-cse grv, mdist-wet, loose-dense to ≈ 6-9"; change to yel brn clayey Silt (ML) damp, dense	Ø PID	FBQ-167 ST-1		Push Shelby tube: Ø-2' bgs Recov.: 24"
	1					
	2	Yel brn, med-cse Sand (SW) w/some fn grv, grading to med Sand, grading to fn Sand, grading to v. fn Sand, below grv (≈2.5' bgs) clayey throughout, loose-dense, wet-saturated	Ø			Blow Counts: 4-2-5-7 Recov.: 19"
↓	3					
	4	Yel brn silty Clay (CL) grading to yel brn Clay, saturated, (grading soft to med. stiff) to stiff to v. stiff	Ø			Blow Counts: 3-5-7-7 Recov.: 19"
	5					
	6	Yel brn Clay A/A (as above)	Ø	FBQ-167 ST-2		Push Shelby tube: 6-8' bgs
	7					
	8	Yel brn Clay A/A, (by 8.5' bgs) grading to yel brn Silty Clay, grading to yel brn Sandy Clay (by 9.5' bgs), saturated throughout, mdsr stiff to stiff to v. stiff	Ø			Blow Counts: 2-4-2-2 Recov.: 15"
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-167

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 2 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11	Olv brn Clay (CL) tr fn-med sand, tr fn grv, saturated, stiff-v.stiff	Ø PPM			Blow Counts: 3-4-4-4 Recov.: 18"
	12	Dk olv brn Clay A/A to 13.8' bgs; change to tan Sand (med.), saturated	Ø			Blow Counts: 1-2-3-5 Recov.: 12"
	13					
	14	Tan Sand (SW) A/A to 15.75' bgs; change to tan SS, med gr, saturated	Ø			Blow Counts: 3-8-12-20 Recov.: 11"
	15					
	16	Tan Sand (med-cse) (fn-med), some grv, saturated	Ø			Blow Counts: 8-4-4-10 Recov.: 15" (May be slough, to some degree, from above)
	17					
	18	Tan Sand (med-cse) and Gravel (fn-med) (GP) saturated (likely possible weathered bedrock)	Ø			Blow Counts: 3-4-6-4 Recov.: 12"
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER FBQ-167

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21	Tan Sand and Gravel, A/A (saturated, some ~~black~~ (organic) thin, black layers (~~likely~~ possible weathered bedrock fragments)	0 PPM 0			Blow Counts: 3-4-18-22 Recov.: 12"
	22	T.D.				
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					

EB-S-21

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-167

INSTALLATION START: DATE: 10/16/03 TIME: 0830

INSTALLATION FINISH: DATE: 10/16/03 TIME: 0950

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #5, Getco Volclay PureGold QUANTITY: 12 bags

BENTONITE SEAL: TYPE: Bentonite Pellets QUANTITY: ½ bucket

GROUT: TYPE: Portland/Bentonite (Baroid Perseal) QUANTITY: 1 X 92lb/½ x 50lb bags

DESCRIPTION OF WELL SCREEN: 0.01" ("10")

MW SLOT SIZE (inches): 2" SLOT CONFIGURATION: Slotted

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

See Team Activity Log Sheet for discussion / OEPA approval (on 10/16/03) to allow some backfill (by caving) of borehole prior to well construction. Also, sand above screen + bentonite pellets above sand shortened (to 2'+1", respectively) due to shallowness of well (i.e., due to the shallow water table), consistent w/ tf discussion w/ C. McCambridge-OEPA on 10/8/03.

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

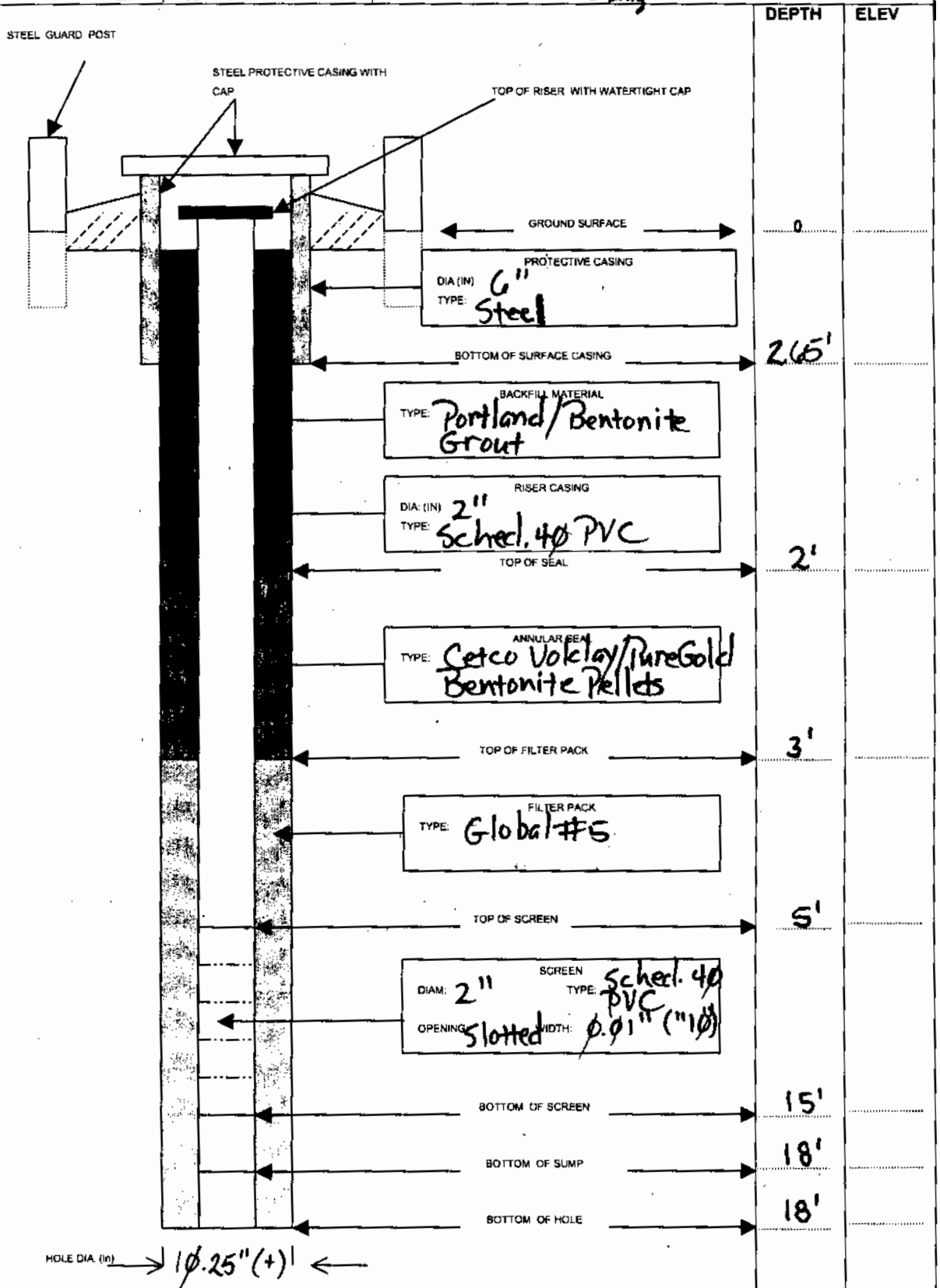
RECORDED BY: M.T. Werling / 10-16-03 (Signature and Date)

QA CHECK BY: Ron [illegible] 12/3/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

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

WELL NUMBER: FBQ-167	**BEGIN:** 10-16-03/0830	**END:** 10-16-03/0950
COORDINATES: N: 553554.09 E: 2349674.57	**REFERENCE POINT:** Top Inner casing	**ELEVATION:** 1115.90 ft.



WELL VOLUME CALCULATION SHEET

Date: ~~102403~~ 1/30/93 Time: ~~1545~~ 1330

Well ID: ~~FBQ167~~ ~~FBQ 169~~ FBQ 167

Well Location: ______________________

Total Depth of Well (ft BTOC) ~~15.35~~ 18.95
Depth to Water (ft BTOC) ~~8.475~~ 2.94
Height of water column (ft) (Hc) ~~6.875~~ 16.01

216" - 31.8 = 184.2
133.5" - 31.8" = 101.7 'surf casing

Well Volume Calculation:

Vc = $3.142(Rc^2)*Hc$ (34) cc ~~.148~~ cu. ft.

Vf = $3.142[(Rf^2)-(Ro^2)]*(Hc\ or\ length\ of\ screen)*(0.30)$

Note use length of screen if Hc>length of screen

= ~~149~~ ~~.035~~ cu. ft. (.94) cc

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

= ~~136~~ ~~5.85~~ gal. 9.6

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 16.01 (ft)
Rf	=	Radius of filter pack (0.33 ft) - .108
Rc	=	Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

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

Date: 1Ø / 28 / Ø3

Well Number and Location: FBQ ~~166~~ ~~100~~ 167 ~~RAB~~

Development Crew: Ronda Bailey
Andre Leon ~~Chantelle Carroll~~ Chantelle Carroll ~~RAB~~

Driller (if applicable): ______

Water Levels/Time: Initial: ~~18.95~~ 2.94 / 133Ø Pumping: 12' ~~+~~ 14Ø5 ~~RAB~~

Final: ___ / ___

Total Well Depth: Initial: 18.95 Ft BTOC Final: ______ Ft BTOC

Date and Time: Begin: ___ / ___ Completed: ___ / ___

Development Method(s): Whale pump & bailer

Total Quantity of Water Removed: 82 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	1Ø-3Ø-Ø3
Specific Conductivity	YSI 85	"
pH	pH tester 3+	"
Turbidity	Hach Pocket Turbidimeter	"

GROUNDWATER PURGE SHEET

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

DATE (mm/dd/yy): 11 / 18 / 03 TIME: 09 : 35

WELL ID NUMBER: FBQ 167 WELL LOCATION: FBQ

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

INNER CASING: TYPE: _____ ID: _____ inches

WELL VOLUME CALCULATION Vc = 3.142 X $(di/2)^2$ x (TD-H) .34

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

Vt = (Vc + Vf) (7.48) 7.36

WHERE:

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

dH = diameter of borehole, ft.
TD = total depth of well from top of well casing, ft. - 18.97
H = depth of water, ft., from top of well casing - 5.49
S = depth to base of seal, ft., from top of well casing

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 22.08 GAL.

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

SITE CONDITIONS DURING PURGING: Overcast high 50's

FIELD OBSERVATIONS: _____

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

RECORDED BY: _____ 111803
(Signature and Date)

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

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ167

PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/18/03	1016	Initial	19.4	534	6.32	101 ~~121~~			DO=4.58
	1034	7	12.1	559	6.32	>99.9	7		DO=2.37
	1056	6	12.2	558	6.27	>99.9	13		DO 1.93
	1131	7	12.2	568	6.31	>99.9	20		DO 1.62
	1152	3	12.3	572	6.23	>99.9	23		DO 1.91

RECORDED BY: [signature] 11/18/03
(Signature and Date)

QA CHECK BY: [signature] 12/5/03
(Signature and Date)

SLUG TEST RECORD

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

WELL NO.: 167	DATE STARTED: 12-05-03	DATE COMPLETED: 12-05-03
LOCATION: FBQ	RECORDED BY: R. BAILEY	

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

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

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	18.97		TOP OF FILTER PACK	3.0	
DEPTH TO WATER	15.25		TOP OF SCREEN OR OPEN HOLE	5.0	
HEIGHT OF WATER COLUMN	3.72		SCREEN LENGTH	10	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
~~12-05-03~~ AC	SLUG IN	12/5	12/04/03	13:42	16:48	14.0	3.790	3.605	15.18	15.30
~~12-05-03~~ AC	SLUG OUT	12/5	12/05/03	16:51	10:25	14.0	3.790	3.687	15.18	15.28

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS: _____

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/7/03 Su M (Tu) W Th F Sa PAGE 1 OF 6

Task Team Members:

Mark Deering — Chris White (TulTest)
Steve King (MKM) — John Moore (")
Neil ~~Witkor~~ Wiktor (TulTest)

Narrative (include time and location):

1338: Mob to location FBQ-168; cleared by S King
1342: Push Shelby tube from 0-2' bgs
1345: " " " " 2-4' bgs
1350: Begin cont. SS samplg.
1430: Attempted Shelby tube in sat. zone; however, tube crushed
1440: Resume cont. SS samplg.
1530: Completed drilling; begin well construction
1645: Completed well construction

10/9/03

Daily Weather Conditions: A.M. _____

P.M. Sunny, 65°F

Recorded By Mark Deering QA Checked By [signature]

Shelby tubes used - 2

FBQ-169

50

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/24/03 Su M Tu W Th (F) Sa PAGE 2 OF 6

Task Team Members:

Andee Leon

Randa Bailey

Narrative (include time and location):

1600 - Arrive @ FBQ 168. Begin Development.

1620 - Initial reading: DO .76 Cond. 386.7

Turb: >99.9% pH 6.87 temp 14.1

5.5 gal pumped w/ water

1625 Resume

1631 - 4 gal.

DO - 1.14 cond. 388.3 turb >99% pH 6.85 temp 13.3

1645 - 3.5 gal

DO 2.5 % Cond 257.8 Turb >99% pH 6.87 Temp 13.6

1650 - Wire short on pump, down for repair.

1725 - Resume.

1730 - 4 gal

DO 1.54 Cond 236.5 turb >99% pH 6.95 temp 13.5

1740 - 4 gal + 2.5 gal

DO 3.53 cond 258.7 Turb > 99% pH 7.01 Temp 13.7

1745 - well went dry

Daily Weather Conditions: A.M. _____

P.M. Sunny - mid 50

Recorded By RLB QA Checked By Amy Greenwell

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 1/24/03 Su M Tu W Th F Sa PAGE 3 OF 6

Task Team Members:

Andre Lean

Randi Baly

Narrative (include time and location):

1811 - Depth of well 21'3" = 255" - 31.8" = 223.2 = 18.6'

Depth to water 11'3" = 135" - 31.8" = 103.2 - 8.6'

1805 - Leave site

* 1/28/03 Spoke w/ Todd Fisher and Connie Cambridge regarding well. I did not think this well was complete. They recommended to go back to well and if goes dry again it is complete. If does not go dry, parameters must be stabilized and addit. 5 well volumes removed.

1/28/03 1318 - 10'8" 22'1.5"

1330 Initial Reading:

pH 6.96 temp 13.3 Turb > 99.9% Cond 307.0 DO 1.86

1340 - 12'2" H_2O level 21'4" - well depth

1400 - 12 Gal removal

pH 6.95 temp 14.0 Turb > 999 Cond 299.5 DO 2.98

1430 12 gal removal

pH 6.82 temp 14.0 Turb 124.0 Cond 293.0 DO 3.40

Daily Weather Conditions: A.M.

P.M.

Recorded By [signature] [signature] QA Checked By [signature]

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TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 112803 Su M Tu W Th F Sa PAGE 4 OF 6

Task Team Members:

Ronda Hardy

Andre Lee

Narrative (include time and location):

1445 - 6 gal removed

pH 6.77 Temp 13.7 Turb 99.9 Cond 294.4 DO 2.9%

1449 leave site 3 parameters within 10%, 30 gal removed

12/4/03

Daily Weather Conditions: A.M. _____

P.M. _____

Recorded By Ronda Hardy QA Checked By Amy Howard

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11 19 03 Su M Tu (W) Th F Sa PAGE 5 OF 6

Task Team Members:

Ronda Bailey

Narrative (include time and location):

1415 - Arrive @ FBQ 168. Take initial readings. Depth of water 10.8' Depth of well 21.34' Samples Taken FBQT08 03 GW Field Filtered

~~1610 Leave~~

1700 - Leave site.

RB 12/24/03

Daily Weather Conditions: A.M.

P.M. Overcast, low 50s

Recorded By [signature] QA Checked By [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/01/03 Su M Tu W Th F Sa PAGE 6 OF 6

Task Team Members:

Ronda Bailey

Chantalle Carroll

Narrative (include time and location):

1738 - Arrive @ FBQ 168 Set up slug test a pc

1750 - Slug In

1757 - Leave site

12/02/03 0900 - Arrive @ FBQ168 Set up pc

a extract Data

0910 - Slug out

0915 - Leave for FBQ 171

1150 - Arrive @ FBQ168 Extract data

1155 Leave site

AG 12/4/03

Daily Weather Conditions: A.M. Cloudy low 30s

P.M. Overcast 34°

Recorded By [signature] QA Checked By [signature]

HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: FBQ-168

1. COMPANY NAME: SpecPro, Inc.

2. DRILL SUBCONTRACTOR: Tol Test

SHEET 1 OF 1

3. PROJECT: Fuze & Booster/RVAAP

4. LOCATION: Fuze & Booster Quarry Landfill/Pond

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

6. MANUFACTURERS DESIGNATION OF DRILL: CME-75

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

8. HOLE LOCATION: FBQ-168

9. SURFACE ELEVATION:

10. DATE STARTED: 10/7/03

11. DATE COMPLETED: 10/7/03

12. OVERBURDEN THICKNESS: 17'

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

13. DEPTH DRILLED INTO ROCK: + 2.5' MH

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

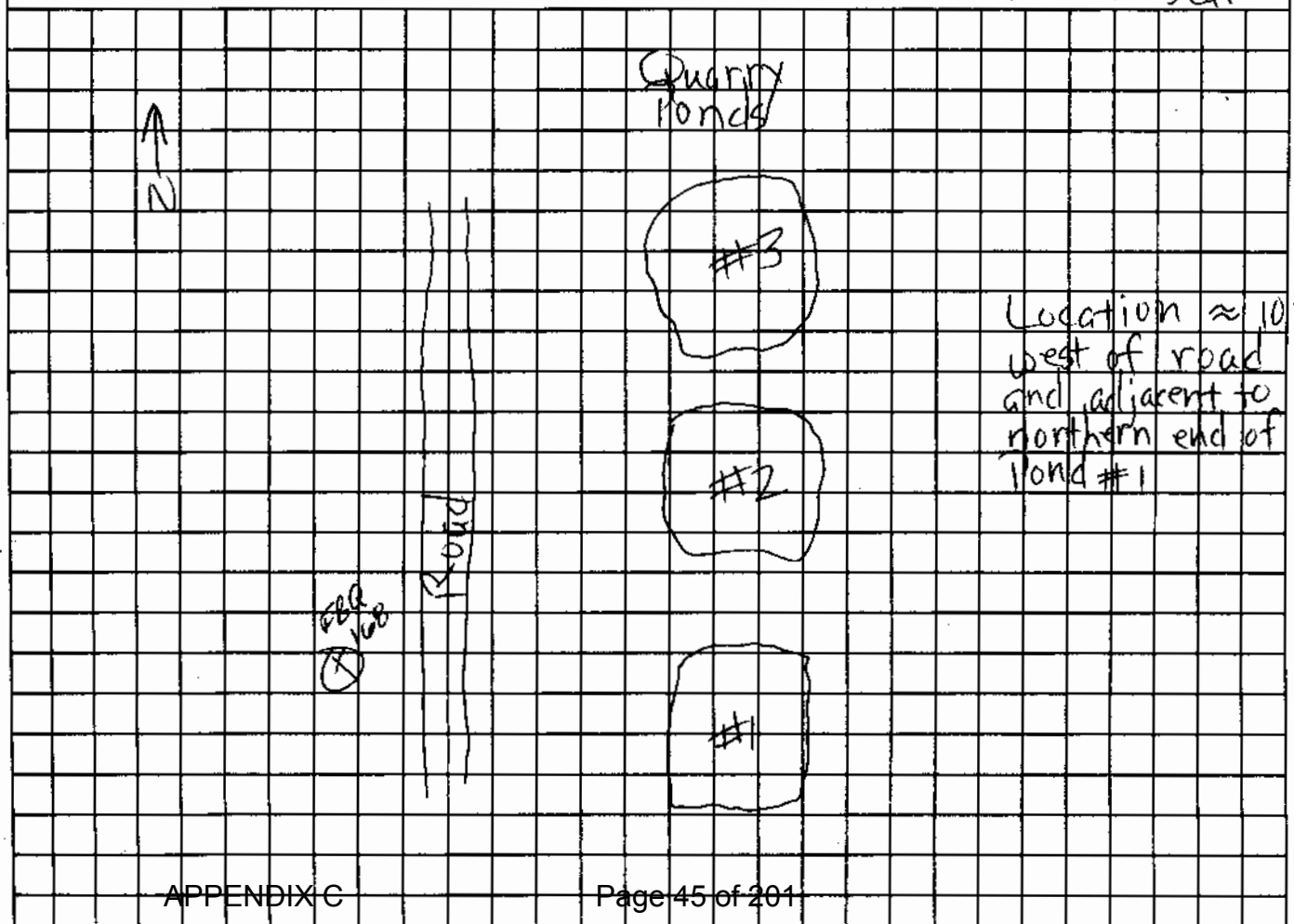
14. TOTAL DEPTH OF HOLE: 19.5' bgs

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

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

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-168

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

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

HTRW DRILLING LOG

HOLE NUMBER FBQ-168

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

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

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-168

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

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

ANNULAR SPACE MATERIALS INVENTORY:

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

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

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

DESCRIPTION OF WELL SCREEN:

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

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 8 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

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

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

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

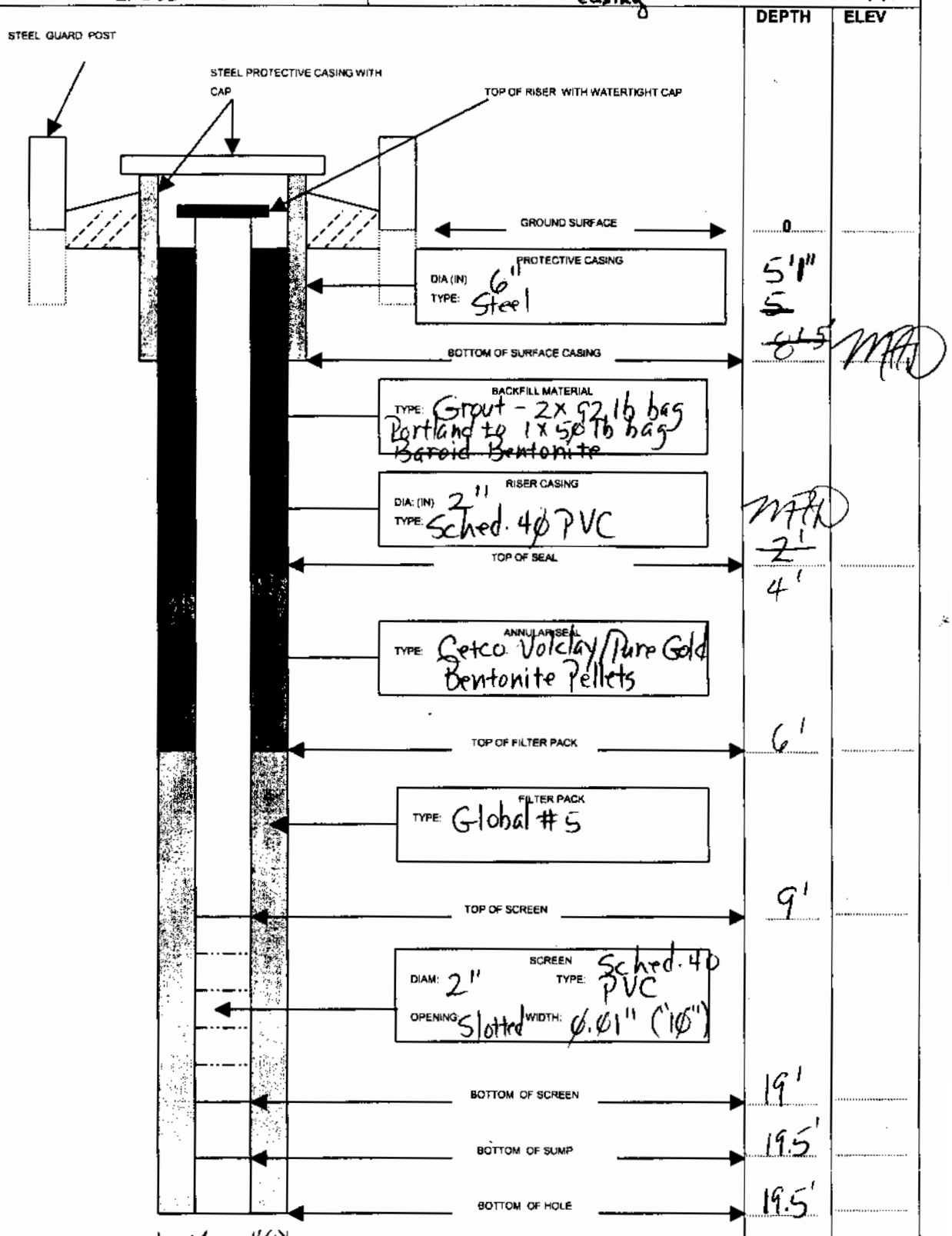
QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

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

MONITORING WELL CONSTRUCTION DIAGRAM

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

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



WELL VOLUME CALCULATION SHEET

Date: 10243 Time: 1545

Well ID: FBQ 168

Well Location: _____

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

Well Volume Calculation:

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

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

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

Where:

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

WELL DEVELOPMENT FORM

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

Date: 10/24/03

Well Number and Location: FBQ 168

Development Crew: Andre Leon
Ronda Bailey

Driller (if applicable): _____

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

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

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

Development Method(s): Bailer & whale pump

Total Quantity of Water Removed: 53.5 gals

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

GROUNDWATER PURGE SHEET

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

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

WELL ID NUMBER: FBQ 168 WELL LOCATION: FBQ

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

INNER CASING: TYPE: _____ ID: _____ inches

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

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

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

WHERE:

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

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

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

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

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

SITE CONDITIONS DURING PURGING: Overcast high 40s

FIELD OBSERVATIONS: _____

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

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

APPENDIX C

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ168 PAGE 1 OF 1

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

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

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

APPENDIX C

SLUG TEST RECORD

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

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

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

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

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

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

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

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/13/03 Su (M) Tu W Th F Sa PAGE 1 OF 2

Task Team Members:

Mark Deering — John Moore (TolTest)

Tony Brister (TolTest) — Steve King (MKM)

Chris White (") —

Narrative (include time and location):

11:15 : Location FBQ-169 final cleared by S. King

11:25 : Rig begins to set-up on location

11:35 : Push Shelby tube 0-2' bgs

11:40 : Begin cont. SS sampling

MAD ~~12:05~~ : Push Shelby tube from ~~12-14~~ 10-12' bgs MAD (no recov.)

MAD ~~12:30~~ : Cont. SS sampling

12:30 : Clean-out borehole to 16' bgs and prep. to construct mon. well

12:45 : Begin to construct mon. well

1:45 : Complete construction of monitoring well -- w/ exception of grouting & pro. csg

12/30/3

Shelby tubes used - 2

Daily Weather Conditions: (A.M.) Sunny, 60°F

P.M.

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10-30-03 Su M Tu W (Th) F Sa PAGE 4 OF 6

Task Team Members:

Chantelle Carroll

Narrative (include time and location):

13:40 Arrive at well FBQ-109 - take initial water reading

1345 Initial (1st water) water out of whaler 10.1 Turb Temp 67.8F cond 0.64 pH 5.95

1400 after 8 gallon removed

334 Turb Temp 65.5F Cond 0.68 pH 6.20

1417 8 gal removed

>999 Turb Temp 68.1 Cond 0.67 pH 6.20

1441 15 gal removed

>999 Turb Temp 65.8 Cond 0.63 pH 6.20

1510 15 gal removed

409 Turb Temp 66.2 Cond 0.65 pH 6.20

1518 Whaler Battery died - so got another Do water. 1600 (3 gal removed no reading)

16:00 Two other batteries - no success, whaler non functioning decon different pump

16:03 Start over

1615 9 gallon removed

350 Turb Temp 65.9 Cond 0.60 pH 6.30

1618 Whaler on bottom 17.1 Dist to Water, 17.95 DTBottom

1620 Cleanup and finish (tubing) - 58 gallons removed

Daily Weather Conditions: A.M. ______

P.M. Sunny, warm, 60's

Recorded By Chantelle Carroll QA Checked By [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11 18 Ø3 Su M (Tu) W Th F Sa PAGE 5 OF 6

Task Team Members:

Andrelea

Randa Bailey

Narrative (include time and location):

Ø935 - Arrive @ FBQ 169. Take initial readings: DOW: 18.1Ø', DOH_2O - 4.7Ø'. (samples taken FBQ-mw-169Ø312GW Metals filtered)
114Ø DOW: 18.Ø; DOH_2O 9.Ø'. Leave site

[signature] 12-9-03

Daily Weather Conditions: A.M.

P.M. Sunny, low 50s

Recorded By [signature] QA Checked By Amy Leonard

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TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/4/03 Su M Tu W (Th) F Sa PAGE 6 OF 6

Task Team Members:

Ronda Bailey

Narrative (include time and location):

1520 - Arrive @ FBQ 169 Set up slug test

Depth to H_2O = 4.74'

1545 - Slug in Leave for FBQ 167.

12/05/03 0900 - Arrive @ FBQ169.

0910 - Extract data "Test Aborted", Leave site for 167

0928 - Return to well, change probes. Set up

4.80'

0945 - Slug in

0954 - Leave

1149 - Arrive check data

1205 - Slug out

1210 - Leave

RB 12-05-03

Daily Weather Conditions: A.M.

P.M. Overcast 34°, 1205 Snow 32°

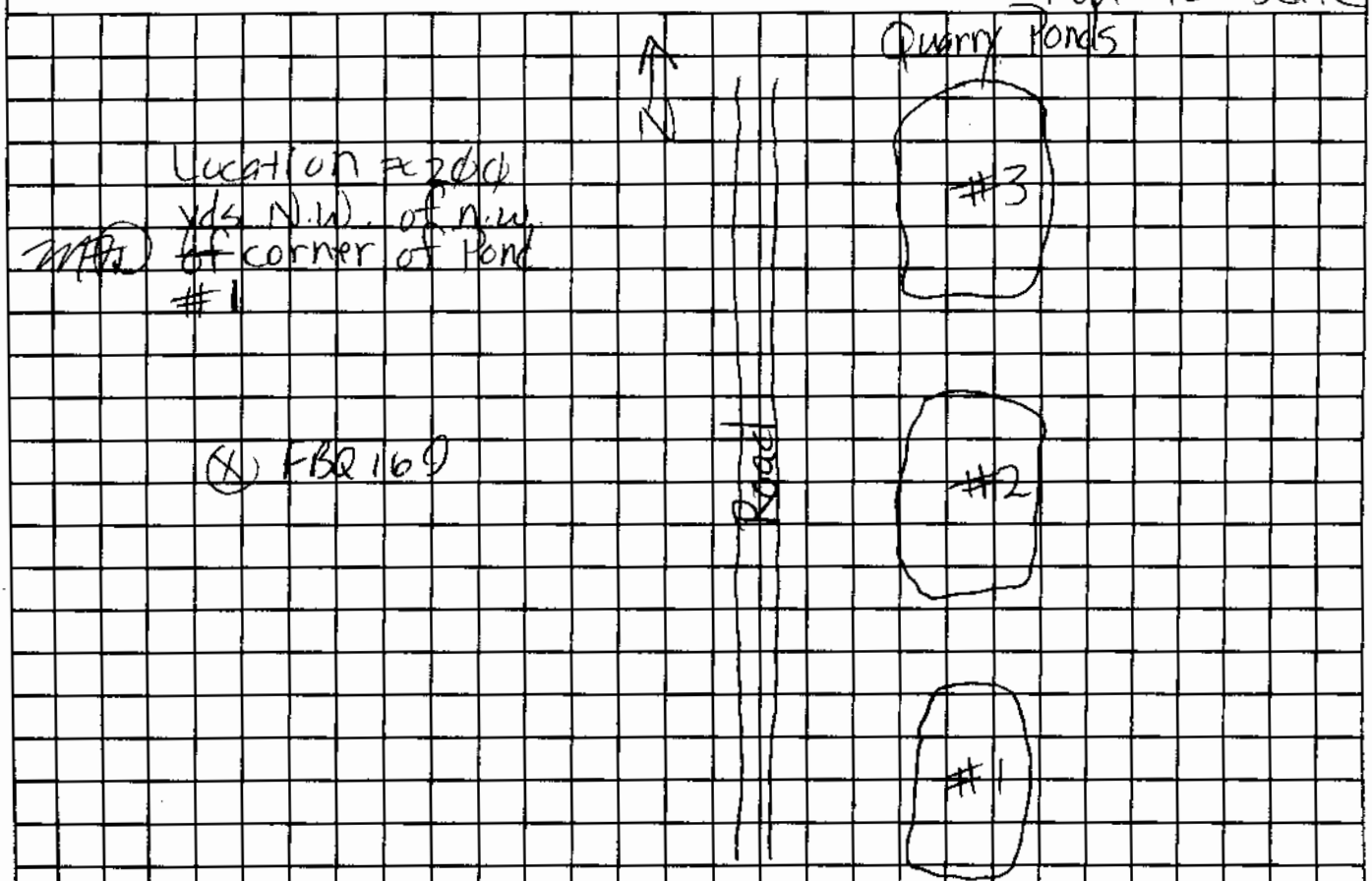
Recorded By RB QA Checked By Amy Hannah

HTRW DRILLING LOG

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

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

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-169

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

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

HTRW DRILLING LOG

HOLE NUMBER FBQ-169

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

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

12-05-03

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-169

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

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

ANNULAR SPACE MATERIALS INVENTORY:

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

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

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

DESCRIPTION OF WELL SCREEN:

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

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

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

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

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

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

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

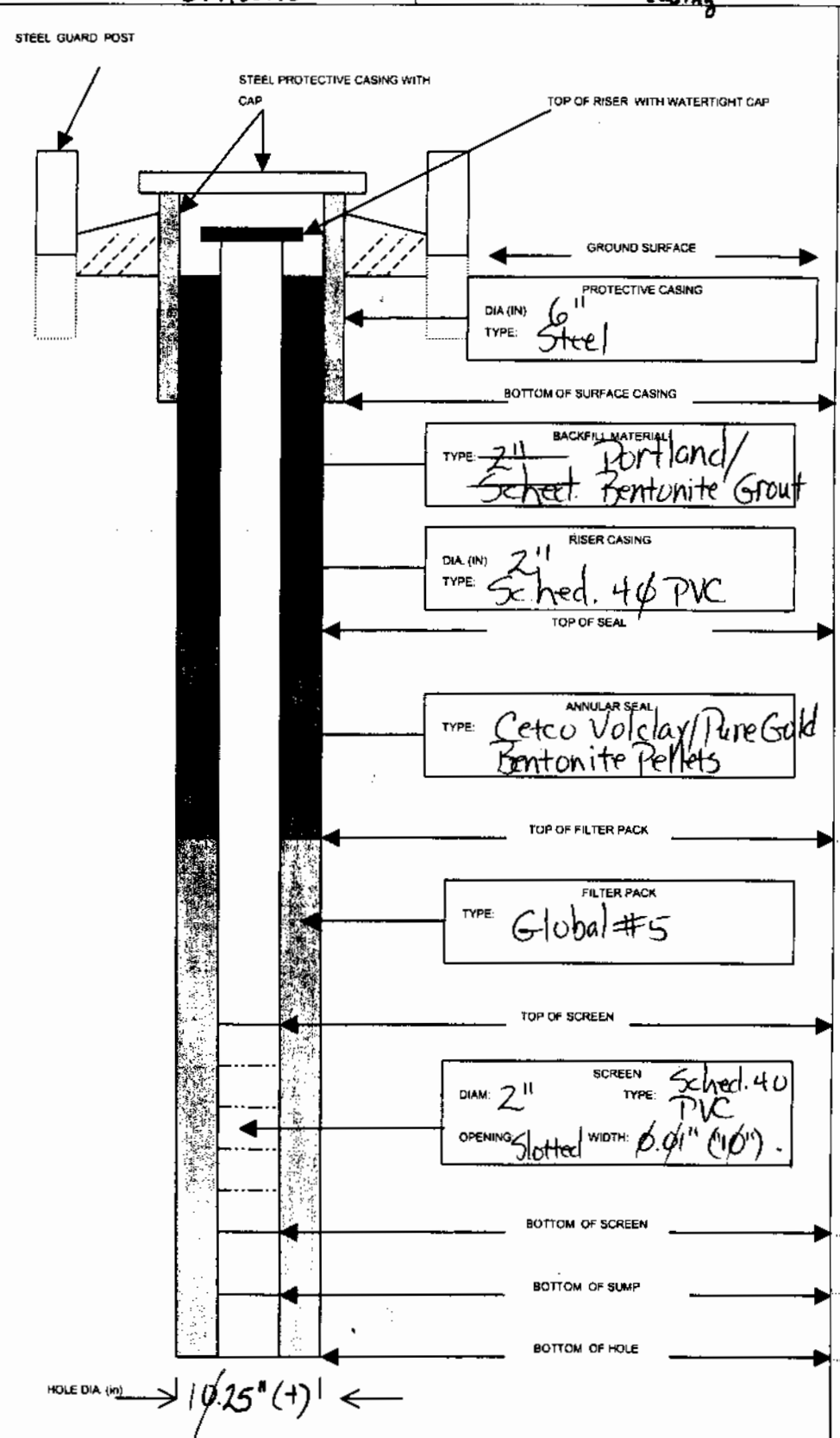
RECORDED BY: M. F. Duering 10-13-03 (Signature and Date)

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

MONITORING WELL CONSTRUCTION DIAGRAM

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

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



WELL VOLUME CALCULATION SHEET

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

Well ID: FBQ 169

Well Location: _____

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

Well Volume Calculation:

.0668

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

.1089 - .01

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

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

Where:

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

WELL DEVELOPMENT FORM

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

Date: 10 / 30 / 03

Well Number and Location: FBQ 169

Development Crew: Chantelle Carroll

Driller (if applicable): _____

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

Final: 17.1 / 1620

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

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

Development Method(s): Whale

Total Quantity of Water Removed: 58 gals

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

GROUNDWATER PURGE SHEET

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

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

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

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

INNER CASING: TYPE: _____ ID: _____ inches

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

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

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

WHERE:

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

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

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

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

SITE CONDITIONS DURING PURGING: Overcast, high 50s

FIELD OBSERVATIONS: _____

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

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

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

APPENDIX

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ 109

PAGE 1 OF 1

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

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

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

SLUG TEST RECORD

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

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

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

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

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

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

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

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/9/03 Su M Tu W (Th) F Sa PAGE 1 OF 6

Task Team Members:

Mark Deering — Chris White (To/Test)

Steve King (HHKM) — John Moore (")

Neil Wiktor (To/Test)

Narrative (include time and location): (Note: no Shelby tube sampling to conserve limited number of tubes.)

15:00 : Location FBQ-170 cleared by S. King

15:05 : Mob rig to location

15:10 : Clear brush for rig

15:22 : Begin to set rig up

15:34 : Begin to SS sample

16:10 : Auger refusal @ 8' bgs ; prep. to air rotary drill

16:30 : Begin air rot. drl'g.

17:50 : Complete " " " ; begin well construction

18:20 : Well construct complete (except for grouting & concrete work -- protect. csg. & protect. posts)

12/5/05

Shelby tubes used - 0

Daily Weather Conditions: A.M. _____

P.M. Cloudy, 72°F

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/27/03 Su M Tu W Th F Sa PAGE 2 OF 6

Task Team Members:

Randi Bailey

Andrea Leon

Narrative (include time and location):

0910 - Arrival @ FBQ 17P. need total 60 gal at. Take reading @ 6 gal.

0940 - Begin development.

pH 5.44 TEMP 13.4 COND 171.1 TURB > 750 DO 5.50

0955 - 6 GAL REMOVED

pH 5.66 TEMP 13.5 COND 214.5 TURB > 750 DO 4.34

1017 - 6 GAL REMOVED

pH 5.68 TEMP 13.1 COND 223.8 TURB > 750 DO 4.12

1025 - 6 GAL REMOVED // BAILER @ QT & DISTURBED SEDIMENT

pH 5.79 TEMP 13.1 COND 224.1 TURB > 850 DO 4.05

1034 - Adjust readings to 12 gal

1056 - 12 GAL REM.

pH 5.74 TEMP 13.2 COND 245.2 TURB > 850 DO 3.50

1125 - 12 GAL REM

pH 5.84 TEMP 13.6 COND 263.9 TURB > 850 DO 4.79

27 gal total

Daily Weather Conditions: A.M. Overcast, Low 40's F

P.M.

Recorded By Randi Bailey QA Checked By Amy Steenwerth

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 102703 Su (M) Tu W Th F Sa PAGE 3 OF 6

Task Team Members:

Randi Bailey

Andrea Leon

Narrative (include time and location):

1147 - 1/2 GAL RINSE

pH 5.78 TEMP 13.0 COND 269.8 TURB 999 DO 5.79

1213 - 1/2 GAL RINSE

pH 6.00 TEMP 13.5 COND 288.2 TURB 999 DO 5.12

1214 - 6 GAL PRODUCT

TOTAL: 7 1/2 GAL RINSATE

1218 - Leave well.

10/27/03

Daily Weather Conditions: A.M. Overcast mid 40s

P.M.

Recorded By Randi Bailey QA Checked By Amy Leonard

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11-12-03 Su M Tu (W) Th F Sa PAGE 4 OF 6

Task Team Members:

Chantelle Carroll

Narrative (include time and location):

11:20 Arrive at FBQ-0170 and setup for sampling/purging 16.99 DTW 32.95 FBQmw170 03,4GW and metals Filtered

13:25 Finishing Purging 3 vol. in well

13:38 Began sampling - take a split for explo/TAL metals (filtered), SVOC, VOC, PCB/Pestic, Propellants

13:48 17.93 DTW after sampling; pack up, go to next well

SC 11/20/03

Daily Weather Conditions: A.M. Sunny, 50-60's

P.M.

Recorded By Chantelle Carroll QA Checked By [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/02/03 Su M (Tu) W Th F Sa PAGE 5 OF 6

Task Team Members:

Randy Bailey

Narrative (include time and location):

1200 - Arrive @ FBQ 176. Set up slug test & PC, DTH2O - 17.32'

1220 - Slug in - Error on PC - Abort test go to FBQ 173

12/3/03 1253 - Arrive @ FBQ 170. Set up slug test, 17.30'

1310 Slug in

1315 Leave well go to FBQ 176

1500 Return to FBQ 170. Check slug test

1506 - Extract Data - "Slug out"

1510 Leave for FBQ 176

12/4/03 0955 - Arrive @ FBQ 176. Extract data

1005 - Leave site - Slug test complete

AC

12/8/03

Daily Weather Conditions: A.M. _____

P.M. Overcast 31°F

Recorded By Randy Bailey QA Checked By Amy Greenwald

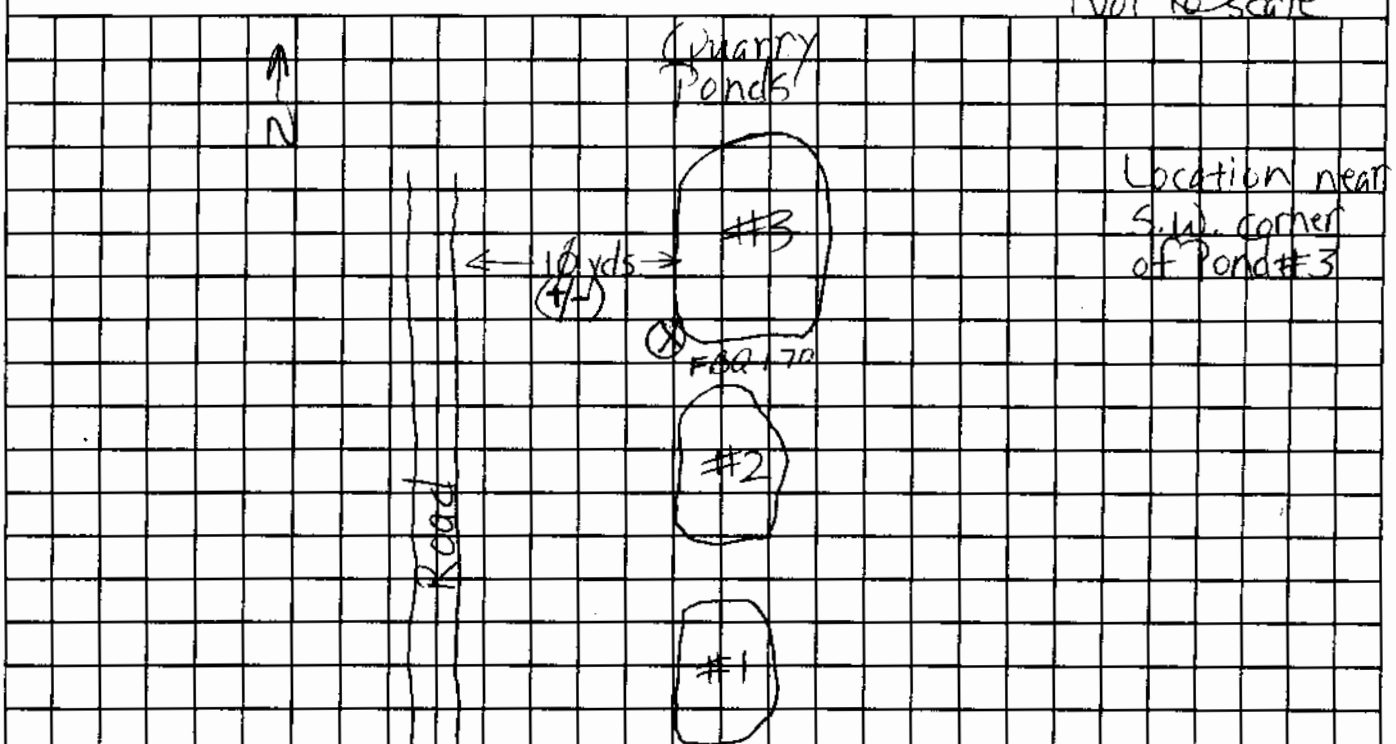
HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER: FBQ-170
1. COMPANY NAME: SpecPro, Inc.	2. DRILL SUBCONTRACTOR: Tol Test	SHEET 1 OF 1
3. PROJECT: Fuze & Booster/RVAAP	4. LOCATION: Fuze & Booster Quarry Landfill/Pond	
5. NAME OF DRILLER: Neil Wiktor	6. MANUFACTURERS DESIGNATION OF DRILL: CME-75	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-75 10.25" O.D./6.25" I.D.	8. HOLE LOCATION: FBQ-170	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/9/03	11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: 8'	15. DEPTH GROUNDWATER ENCOUNTERED: 22-23' bgs (A.R./10-9-03)	
13. DEPTH DRILLED INTO ROCK: 22.5'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 14.1' bgs / 162hr/5 min.	
14. TOTAL DEPTH OF HOLE: 30.5' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

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

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-170

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | 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)
		Med-dk brn silty, clayey Topsoil, tr sand & grv, roots, damp-moist to 0.5' bgs, (ML) change to dk red Ss frags	Ø PPM			Blow Counts: 3-7-7-7 Recov.: 16"
	1					
	2	Ss frags to ≈ 3' bgs, dry, change to yel brn clayey Sand (fn) (SC), tr-l+l fn grv, damp to moist	Ø			Blow Counts: 2-4-4-3 Recov.: 12"
MAD 4.6'	3	A/A to 4.5' bgs, change to tan med Sand (SW) fn-fn grv, damp -moist, loose ↓				
	4		Ø			Blow Counts: 8-7-8-24 Recov.: 12"
	5					
	6	Sand A/A to 7'9" bgs, change to dk red Sand, tr-l+l fn-cse grv, loose, moist	Ø			Blow Counts: 10-15-22-30 Recov.: 14"
	7				MAD	~~Auger~~ SS refusal @ 8' bgs; auger refusal seated to 8.5' bgs
	8	Dk red Ss, dry	Ø			~~Blow Counts: Recov.:~~ MAD
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-170

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 2 OF 3 4

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
			ϕ PPM			Air rotary began @ 8.5' bgs
	11	Tan Ss, dry				
	12		ϕ			
	13	Dk red Ss, dry				
	14		ϕ			
	15	A/A				
	16		ϕ			
	17					
	18	Dk red Ss A/A, dry	ϕ			
	19	A/A, moist - wet				

HTRW DRILLING LOG

HOLE NUMBER FBQ-170

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 34

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21	Dk red Ss A/A, moist	ϕ PPM			Air rotary began @ 8.5' bgs (Air rot. drl'd. 22'/≈75 min)
↓	22	Tan Ss, moist	ϕ			
	23	Ss A/A, wet-sat.				
	24	Ss A/A, sat.	ϕ			
	25					
	26		ϕ			
	27					
	28	Red Ss, saturated	ϕ			
	29					
	30					

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-170

INSTALLATION START: DATE: 10/9/03 TIME: 17:50

INSTALLATION FINISH: DATE: ~~10/9/03~~ 10/10/03 MFD TIME: 10:30

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #5 QUANTITY: 6 bags

BENTONITE SEAL: TYPE: Cetco Volclay/Puregold ~~Bentonite Pellets~~ QUANTITY: 2X 92lb/1X 50lb bags MFD

GROUT: TYPE: Portland/Bentonite QUANTITY: 1 bucket

DESCRIPTION OF WELL SCREEN:

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

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: ~~PV~~ MFD Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

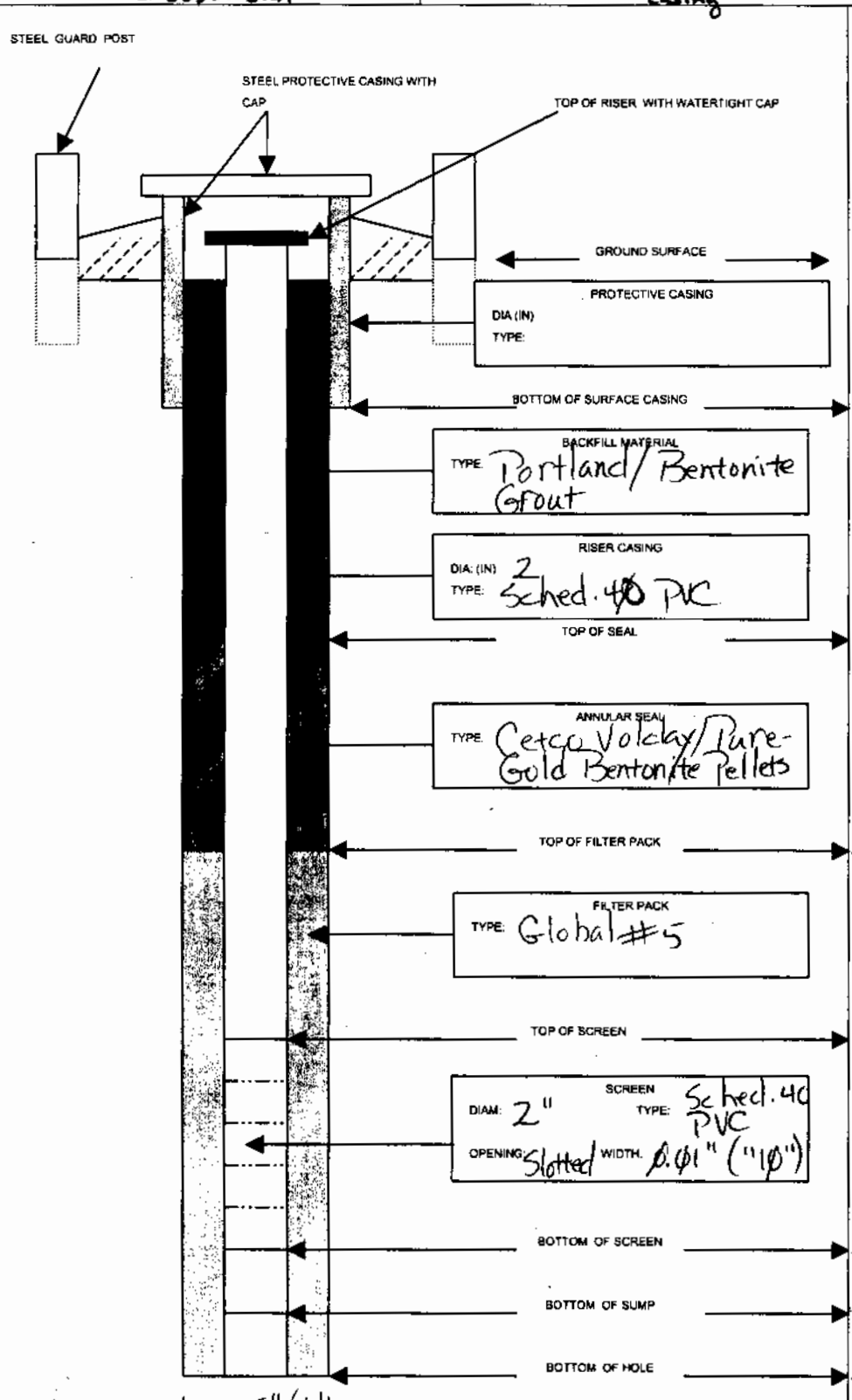
RECORDED BY: M.F. Deering 10/10/03 (Signature and Date) QA CHECK BY: [signature] 12/3/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

@17:50 @10:30

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

WELL NUMBER: FBQ-17D	**BEGIN:** 10/9/03	**END:** 10/9/03
COORDINATES: N: 553175.40 E: 2350102.41	**REFERENCE POINT:** top inner casing	**ELEVATION:** MSL 1142.26 feet



DEPTH	ELEV
0	
5'2"	
15'	
17'	
20'	
30'	
30.5	
36.5'	

WELL VOLUME CALCULATION SHEET

Date: 162703 Time: 0910

Well ID: FBQ 170

Well Location: SW of N. Pond

Total Depth of Well (ft BTOC) 30.5'
Depth to Water (ft BTOC) 17'
Height of water column (ft) (Hc) 13.5'

Well Volume Calculation:

Vc = $3.142(Rc^2)*Hc$ 346 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
= 94 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.)
= 13.7 gal. x 5 = 68.72 ≈ 69 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 _____ (ft)
Rf = Radius of filter pack (0.33 ft)
Rc = Radius of inside casing (0.083 ft)

Take reading every 6gal

WELL DEVELOPMENT FORM

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

Date: 10/27/03

Well Number and Location: FBQ 17D, SW Corner N. Pond

Development Crew: Randi Bailey
Andre Leon

Driller (if applicable): _____

Water Levels/Time: Initial: 14.5' / _____ Pumping: 15.8' / _____
Final: 30.9" / _____

Total Well Depth: Initial: 30.5' Ft BTOC Final: 32.9 Ft BTOC

Date and Time: Begin: 10/27/03 0910 Completed: 10/27-03 / 1218

Development Method(s): Whaler, bailer

Total Quantity of Water Removed: 72 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	10-30-03
Specific Conductivity	YSI 85	"
pH	pH meter 3+	"
Turbidity	Lamotte	"

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

DATE (mm/dd/yy): 11 / 12 / 03 TIME: 11 :00

WELL ID NUMBER: FBQ-17S WELL LOCATION: Fuze Booster

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

DTW 16.99
BTOC 32.95
Watered 15.96

INNER CASING: TYPE: _____ ID: 15.96 inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ ~~1.50~~ .35

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

$Vt = (Vc + Vf)$ (7.48) 9.65

WHERE:

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

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

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 28.9 ~ 29 GAL.

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

SITE CONDITIONS DURING PURGING: Dry, Sunny

FIELD OBSERVATIONS: _____

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

RECORDED BY: Randall Carroll 11-12-03
(Signature and Date)

QA CHECK BY: Randall Carroll 12/3/03
(Signature and Date)

APPENDIX C

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ-17Ø

PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/12	1130	initial	16.4	97.6	5.45	3.67	—	—	initial reading DO. 7.68
11/12	1210	6	14.5	146.5	3.53	25.6	6 gal		DO 7.69
11/12	1230	6	14.1	~~97.7~~ 142.3	5.70	81.9	12 gal		DO 6.70
11/12	1250	6	14.2	146.4	5.59	22.6	18 gal		DO 7.34
11/12	1305	~~6~~ 6	14.0	151.9	5.61	18.8	24 gal		DO 5.98
11/12	1319	5	13.9	150.4	5.59	18.6	29 gal	29 gal	Final DO 5.24

RECORDED BY: [signature] 11/12/03
(Signature and Date)

QA CHECK BY: [signature] 12/3/03
(Signature and Date)

APPENDIX A Page 83 of 201

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SLUG TEST RECORD

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

WELL NO.: 170	DATE STARTED: 12-03-03	DATE COMPLETED: 12-04-03	
LOCATION: FBQ	RECORDED BY: R. BAILEY		

EQUIPMENT INFORMATION SUMMARY

EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NO.	RANGE (PSI)	LAST CALIB.
DATA LOGGER	INSITU MINI	TROLL			
TRANSDUCER					
WATER LEVEL	HERON	DIPPER-T	Ø1512		

PRETEST DATA

REFERENCE POINT TOC/BGS	REFERENCE POINT ELEVATION	RISER CASING I.D. (IN)
SCREEN OR OPEN HOLE I.D. (IN) 2	DIAMETER OF BOREHOLE (IF SCREENED) 6"	

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	32.9		TOP OF FILTER PACK	17'	
DEPTH TO WATER	17.30'		TOP OF SCREEN OR OPEN HOLE	20'	
HEIGHT OF WATER COLUMN	15.6		SCREEN LENGTH	10	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
FBQ170	SLUG IN	12/3	12-03-03	1310	15:04	27.9	17.300	17.046	15.60	15.804
FBQ170	SLUG OUT	12/4	12-04-03	955	1005	27.9	17.300	17.243	15.60	15.657

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/9/03 Su M Tu W (Th) F Sa PAGE 1 OF 5

Task Team Members:

Mark Deering — John Moore (TolTest)

Neil Wiktor (TolTest) —

Chris White (") —

Narrative (include time and location): (Note: no Shelby tube sampling to conserve limited number of tubes)

1037: Setup on location FBQ-171 (Location pre-cleared by S. King)

1042: Begin SS sampling & augering

1135: Auger refusal @ 9.5' bgs; prep to air rotary drill

1200: Begin air rotary drilling

1233: Detected wet to saturated conditions (≈ 20-22' bgs)

MFD 1315 ~~1322~~: Complete air rotary drlg. to 30' bgs; prep. to construct mon. well (blew well for ≈ 5 min.-- good yield)

1415: Completed well construction, w/ exception of protect. csg. & concrete pad

10/9/03

Shelby tubes used - 0

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

P.M.

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/9/03 Su M Tu W Th F Sa PAGE 2 OF 5

Task Team Members:

Andre Leon

Randi Bixby

Narrative (include time and location):

1314 - Arrive @ FBQ 171. Calc well volume need 12.16 gal or 60.8 gal or 85.12 gal
1 well Volume 5 wv 7 wv

1334 Begin development

1400 - INITIAL READINGS

pH 5.72 TEMP 13.0 Turb 80.5 Cond 181.8 DO 10.13

1415 - 6 GAL REMOVED

pH 5.58 TEMP 12.9 Turb >400 Cond 175.8 DO 5.03
Error with Turb meter

1420 - 6 gal removed

pH 5.80 temp 12.9 turb 79 ftu Cond. 174.5 DO 5.44
Error with Turb Meter

1430 - 1st Total well Volume removed,
pH, Temp, Cond. within 10%.
Leave FBQ 171

12/9/03

Daily Weather Conditions: A.M. _____

P.M. Partly Sunny; Mid 40's

Recorded By Randi Bixby QA Checked By Amy Greenwald

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11-12-03 Su M Tu (W) Th F Sa PAGE 3 OF 5

Task Team Members:

Charlie Carroll

Narrative (include time and location):

14:00 Arrive at Well FBQ-171

take readings 17.18 DTW 31.87 DTB

14:25 Take initial reading to begin purge (after 2 purge calls)

16:00 Take final reading from purging & set up to sample for explos/TAL metals (filtered)/VOC/SVOC/PCB/Pestic/Propell. and take a split

16:15 Start Sampling FBQmw-171-031606W

16:30 18.55 DTW 31.82 DTB at completion of sampling

Pack up & Back to building

FBQmw-171-031606 metals filtered

12/04/03

Daily Weather Conditions: A.M. _____

P.M. Sunny & overcast 50's°F, breezy

Recorded By Charlie Carroll QA Checked By Randy Bly

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12 01 03 Su (M) Tu W Th F Sa PAGE 4 OF 5

Task Team Members:

Randa Bailey

Chantelle Carroll

Narrative (include time and location):

1335-arrive FBQ 171. Set up slug test & computer.

1345- Technical difficulties, return to office.

1515- Return to FBQ 171 set up slug test and computer

1535- Slug in, DTW 17.45

1538- Leave for FBQ 172

1719 - Return & Extract data, Time on PC - "1228 / 1412" Date 3-29-99"

1725 Slug out

1728- Leave for FBQ 172

AB 12-8-03

Daily Weather Conditions: A.M.

P.M. Overcast 38°F

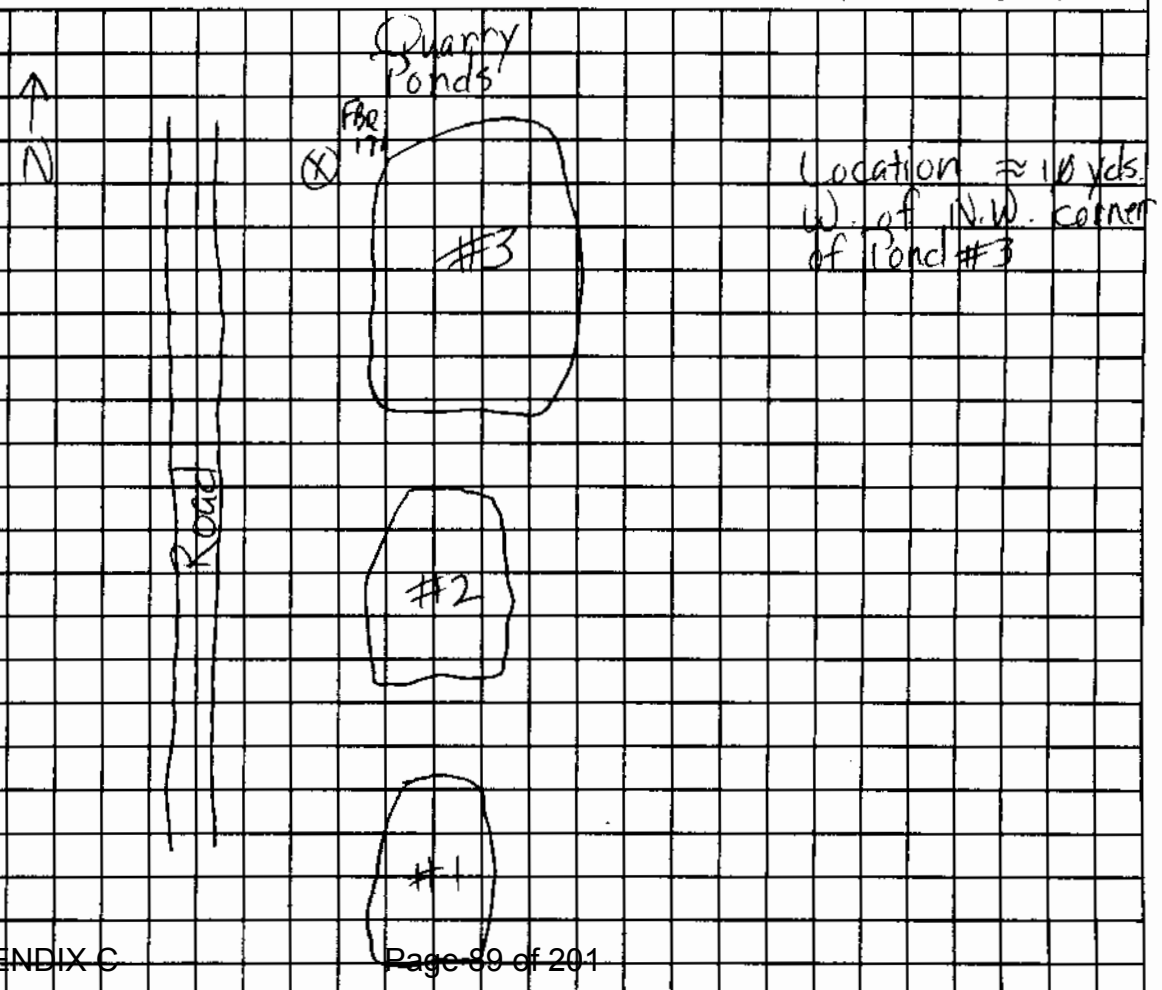
Recorded By [signature] QA Checked By [signature]

HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER: FBQ-171
1. COMPANY NAME: SpecPro, Inc.	2. DRILL SUBCONTRACTOR: Tol Test	SHEET 1 OF 1
3. PROJECT: Fuze & Booster/RVAAP	4. LOCATION: Fuze & Booster Quarry Landfill/Pond	
5. NAME OF DRILLER: Neil Wiktor	6. MANUFACTURERS DESIGNATION OF DRILL: CME	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-75 Auger Rig 10.25" Ø.D. / 6.25" I.D.	8. HOLE LOCATION: FBQ-171	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/9/03	11. DATE COMPLETED: 10/9/03
12. OVERBURDEN THICKNESS: 9.5'	15. DEPTH GROUNDWATER ENCOUNTERED: ≈20' bgs (A.R. drlg.) 10-9-03	
13. DEPTH DRILLED INTO ROCK: 20.5'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 13.75' / 166 hr 40 min	
14. TOTAL DEPTH OF HOLE: 30' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

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

LOCATION SKETCH/COMMENTS — SCALE: Not to scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-171

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 1 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Dk olv brn silty top soil, tr fn-med sand & fn grv, loose to ≈ 6" bgs, change to yel brn sdy Silt, tr-ltl fn-med grv, dry-damp (SM) ML	Ø PPM			Blow Counts: 3-4-6-5 Recov.: 11"
	2	Yel brn sdy Silt grading to yel brn Silty Sand (fn) (SM), fn grv to ≈ 3' bgs; change to tan Sand (med), damp, ltl-some tan & dk red red Ss frags	Ø			Blow Counts: 2-4-7-5 Recov.: 10"
	4	Tan & red sand and Ss frags. A/A (SP-GP), damp - moist	Ø			Blow Counts: Ø-Ø-Ø-1 (≈ 1.5' void) Recov.: 3"
	6	Red Sand & Ss A/A (poss. weathered fracture bedrock), damp - moist	Ø			Blow Counts: 6-10-17-20 Recov.: 12"
	8	Red Sand & Ss frags. A/A to ≈ 9.5' bgs; change to tan Ss, med gr, well sorted, hard damp	Ø			Blow Counts: 10-15-50/6 Recov.: 11" (seated) Auger refusal @ 9.5' bgs
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-171

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 2 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11	Red Ss, dry ~~damp~~ MH	ϕ PPM			Air rotary drlg. began @ 11.5' bgs
	12		ϕ			
	13	Tan Ss, dry (poss. damp @ 14' bgs)				
	14		ϕ			
	15					
	16	Red Ss, dry	ϕ			
	17					
	18		ϕ			
	19	Tan Ss, dry				
	20	(Wet @ 20' bgs)	ϕ			

HTRW DRILLING LOG

HOLE NUMBER FBQ-171

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Red Ss, wet	ϕ PPM			Air rotary drlg. began @ 9.5' bgs
	21	Red Ss, wet-sat.				
	22		ϕ			
	23					
	24		ϕ			
	25	Tan Ss, sat.; occas. red Ss				
	26		ϕ			
	27					
	28		ϕ			
	29					Air rotary drilled 20.5' in ≈ 65 min. (≈ 20-25'/hr.)
T.1	30		ϕ			

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-171

INSTALLATION START: DATE: 10/9/03 TIME: 13:15

INSTALLATION FINISH: DATE: 10/9/03 TIME: 14:45

ANNULAR SPACE MATERIALS INVENTORY:

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

BENTONITE SEAL: TYPE: Cetco Volclay/Pureguld Bentonite Pellets QUANTITY: 1 bucket

GROUT: TYPE: Portland/Baroid Benseal QUANTITY: 2X92lb/1X50lb bags

DESCRIPTION OF WELL SCREEN:

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

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

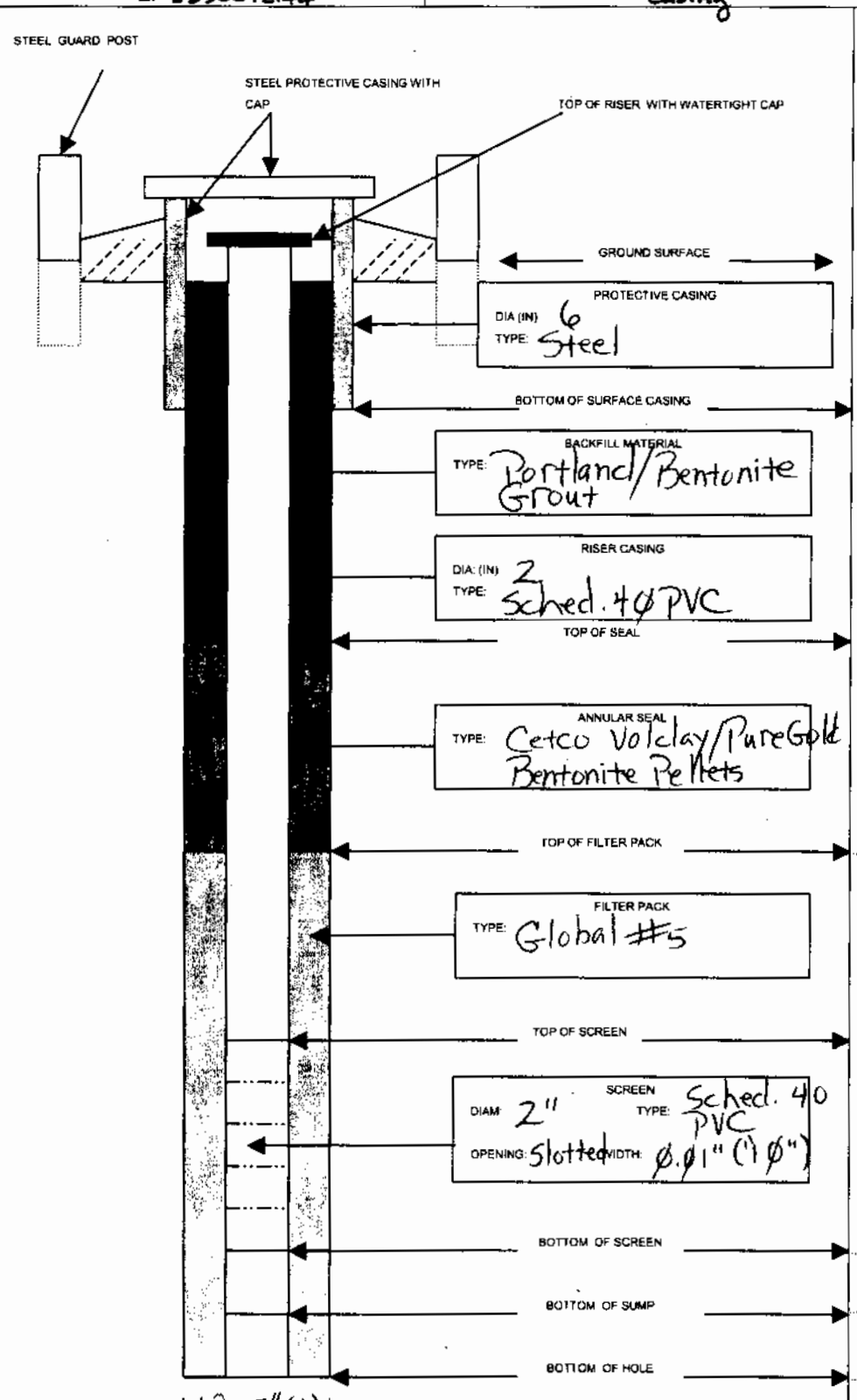
RECORDED BY: M.T. Duering (Signature and Date) 10-9-03

QA CHECK BY: Randall Bailey 12/30/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

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

WELL NUMBER: FBQ-171	**BEGIN:** 13:15 10/9/03@	**END:** 10/9/03@ 14:45
COORDINATES: N: 554230.93 E: 2350072.44	**REFERENCE POINT:** top inner casing	**ELEVATION:** 1143.55



WELL VOLUME CALCULATION SHEET

Date: 1/27/03 Time: 1350

Well ID: FBQ171

Well Location: NW Corner of N. Pond FBQ

Total Depth of Well (ft BTOC) 31.33

Depth to Water (ft BTOC) 17'

Height of water column (ft) (Hc) 14.3'

Well Volume Calculation:

Vc = 3.142(Rc^2)*Hc .0068 .345 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30) .1089 - .01 = .098

Note use length of screen if Hc>length of screen

= 1.32 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.) .345+1.32

= 12.16 gal. * 5 = 60.8

* 7 = 85.12

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 14.3' (ft)
Rf = Radius of filter pack (0.33 ft) - .1089
Rc = Radius of inside casing (0.083 ft)

18' 1"

WELL DEVELOPMENT FORM

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

Date: 10 / 27 / 03

Well Number and Location: FBQ 171

Development Crew: Andre Leon
Rinde Baly

Driller (if applicable): ______

Water Levels/Time: Initial: 16.4' / 1330 Pumping: ___ / ___

Final: 29' / 1800

Total Well Depth: Initial: 28' Ft BTOC Final: 31.81 Ft BTOC

Date and Time: Begin: 10/27/03 / 1330 Completed: 10/27/03 / 1430

Development Method(s): 1st Bailer (1gl) remaining used Whaler Pump

Total Quantity of Water Removed: 12.25 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	10 30 03
Specific Conductivity	YSI 85	"
pH	pH meter 3+	"
Turbidity	Lamotte	"

GROUNDWATER PURGE SHEET

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

DATE (mm/dd/yy): 11 / 12 / 03 TIME: 14 : 20

WELL ID NUMBER: FBQ - 171 WELL LOCATION: Fuze Booster

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

INNER CASING: TYPE: _____ ID: _____ inches

DTW - 17.18
BTOC 31.81
Wat column - 14.63

WELL VOLUME CALCULATION Vc = 3.142 X $(di/2)^2$ x (TD-H) .32

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

Vt = (Vc + Vf) (7.48) 9.42

WHERE:

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

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

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 28.3 GAL.

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

SITE CONDITIONS DURING PURGING: Sunny to overcloud coming in

FIELD OBSERVATIONS: _____

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

RECORDED BY: Mandelle Caudell 11-12-03
(Signature and Date)

QA CHECK BY: 12/3/03
(Signature and Date)

APPENDIX C

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ-171 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/12	1405	initial	14.7	150.7	5.70	~~14.2~~ 1.62	initial	—	DO 9.91
11/12	1446	6	14.1	165.4	5.93	290.0	6		DO 5.20
11/12	15:04	6	13.4	160.7	5.09	139.2	12		DO 5.75
11/12	15:21	6	13.3	160.4	5.82	61.2	18		DO 4.64
11/12	15:39	6	13.3	160.9	5.85	60.0	24		DO 5.29
11/12	1559	5	13.3	161.4	5.85	60.7	29		Final reading DO 4.28

RECORDED BY: [signature] 11-12-03 (Signature and Date)

QA CHECK BY: [signature] 12/3/03 (Signature and Date)

SLUG TEST RECORD

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

WELL NO.: FBQ 171	DATE STARTED: 12/01/03	DATE COMPLETED: 12-02-03
LOCATION: FBQ	RECORDED BY: B BARLEY	

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

REFERENCE POINT TOC/BGS	REFERENCE POINT ELEVATION	RISER CASING I.D. (IN)
SCREEN OR OPEN HOLE I.D. (IN) 2	DIAMETER OF BOREHOLE (IF SCREENED) 6"	

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	31.82		TOP OF FILTER PACK	15'	
DEPTH TO WATER	17.45		TOP OF SCREEN OR OPEN HOLE	18'	
HEIGHT OF WATER COLUMN	14.37		SCREEN LENGTH	10'	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
FBQ 171	SLUG IN	12/1	12/1/03	1535	1725	26.82	17.450	17.455	14.37	14.365
FBQ171	SLUG OUT	12/1	12/02/03	1725	0925	26.82	17.450	15.129	14.37	16.691

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS: _____

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/8/03 Su M Tu (W) Th F Sa PAGE 1 OF 6

Task Team Members:

Mark Deering	Neil Wiktor (TolTest)
Ronda Bailey	Chris White (")
Steve King	John Moore (")

Narrative (include time and location):

1230 : Mob to location FBQ-172, cleared by S. King
1240 : Push Shelby tube from 0-2' bgs
1245 : Begin SS sampling
1405 : SS + auger refusal, will switch to roller bit for a foot or two, & then, possibly, core barrel
1500 : (Begin) Air rotary/roller bit 4' (18-22' bgs) MD to confirm bedrock
1525 : Complete air rotary drilling & begin to set-up for bedrock coring (NX-WL)
1540 : Begin coring @ 22' bgs
1645 : Coring completed to 33' bgs.

RAB 12/3/03

Shelby tubes used - 1

Daily Weather Conditions: A.M. ______

P.M. Sunny, 65°F

Recorded By Mark Deering QA Checked By Ronda Bailey 12/3/03

FBQ-176 FBQ-177 FBQ-173 FBQ-174 FBQ-175

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/9/03 Su M Tu W (Th) F Sa PAGE 2 OF 6

Task Team Members:

Mark Deering — John Moore (Tol Test)

Neil Wiktor (Tol Test)

Chris White (")

Narrative (include time and location):

0730: Tol Test back to location (FBQ-172); warm-up rig

0745: Begin to cleanout (ream) borehole (w/ roller bit) from 22-30' bgs (will backfill w/ sand -- 30-33' bgs)

0915: Complete reaming of borehole

0930: Begin to construct well

1045: Complete well construction (except for protect. csg. + concrete work)

MDB 10/20/03

Daily Weather Conditions: A.M. Sunny, 52°F

P.M.

Recorded By Mark Deering QA Checked By MDB

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/27/03 Su M Tu W Th F Sa PAGE 3 OF 6

Task Team Members:

Andrea Lax

Randi Bailey

Chantelle Cassell

Narrative (include time and location):

1447 - Arrive @ FBQ172. Begin Vt. = 15.96 gal
*5 = 79.8 gal *7 = 111.7 gal.
1455 - Initial Reading
pH 6.52 temp 11.4 cond. 621 Turb 999 DO. 95
need ± .652 ± 14 ± 62.7
Turb meter in error
1515 - 5 GAL REMOVAL
pH 6.68 TEMP 11.1 COND 680 TURB 999 DO 2.20
1525 - 5 GAL REMOVAL
pH 6.80 Temp 11.1 COND 490 TURB 999 DO 4.40
1530 - water pump ineffective. Begin bailing
1550 - RESTARTED PUMP
1555 - 6 GAL REMOVAL
pH 6.78 TEMP 10.7 COND 696 TURB 999 DO 5.50
1645 - 6 GAL REMOVAL
pH 6.79 TEMP 10.8 COND 680 TURB 999 DO 3.54

Daily Weather Conditions: A.M. _____

P.M. Partly Sunny low 40's

Recorded By Randi Bailey QA Checked By Amy Steward

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/27/03 Su (M) Tu W Th F Sa PAGE 4 OF 6

Task Team Members:

Andrea Leon

Randy Bell

Chantelle Carroll

Narrative (include time and location):

1055 - 5 GAL REMOVAL // FINAL READING

PH 6.6 Temp 11.0 COND 678 TURB 131.1 DO 2.73

Leave for the day - 22 gal total (day)

→ 10/28/03 - 0834 - Arrive @ FBR 172. Take H2O level readings, begin development

0 gal - 22 - 50 gal to go.

0910 Initial Reading: pH 6.71 temp 11.8 Cond 681 Turb 49.1 DO 2.58

0920 12 gal Removed: pH 6.77, temp 11.3, Cond 675, Turb 58.0 DO 2.59

38 gal to remove

1000 - Turb. check 32.0

1015 - 12 gal Removed: pH 6.83, temp 11.7, Cond 676, Turb 7.4 DO 2.08

1110 12 gal removed: pH 6.58 temp 11.5 Cond 675 Turb 2.2 DO 2.85

parameters within 10%, turb 2.2. left site

12/4/03

Daily Weather Conditions: A.M. Overcast low 40s

P.M.

Recorded By [signature] QA Checked By Amy Brennan

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11 19 03 Su M Tu (W) Th F Sa PAGE 5 OF 6

Task Team Members:

Andre Leon

Narrative (include time and location):

1345 - Arrive @ FBQ 172. Take initial readings: DOW 34.39'; DOH_2O: 23.66'

1700 - DOW ≈ 34.62'; DOH_2O - 25.37'

Leave well after sampling.

FBQmw172-0318GW metals-filtered.

RLB 12/4/03

Daily Weather Conditions: A.M.

P.M. Overcast, some rain, low 50's

Recorded By RLB QA Checked By Amy Greenwald

FBQ-176 FBQ-177 FBQ-175 FBQ-174 FBQ-173

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12 01 03 Su (M) Tu W Th F Sa PAGE 6 OF 6

Task Team Members:

Ronda Bailey

Narrative (include time and location):

1300 - Arrive @ FBQ 172. Set up slug test + computer

1315 - Slug in

1330 - Proceed to FBQ 171

1540 - Return to FBQ 172

1545 - Slug out

1730 - Return to FBQ 172.

1732 - Extract data + leave

AC
12-5-03

Daily Weather Conditions: A.M. _____

P.M. Overcast, 38°F

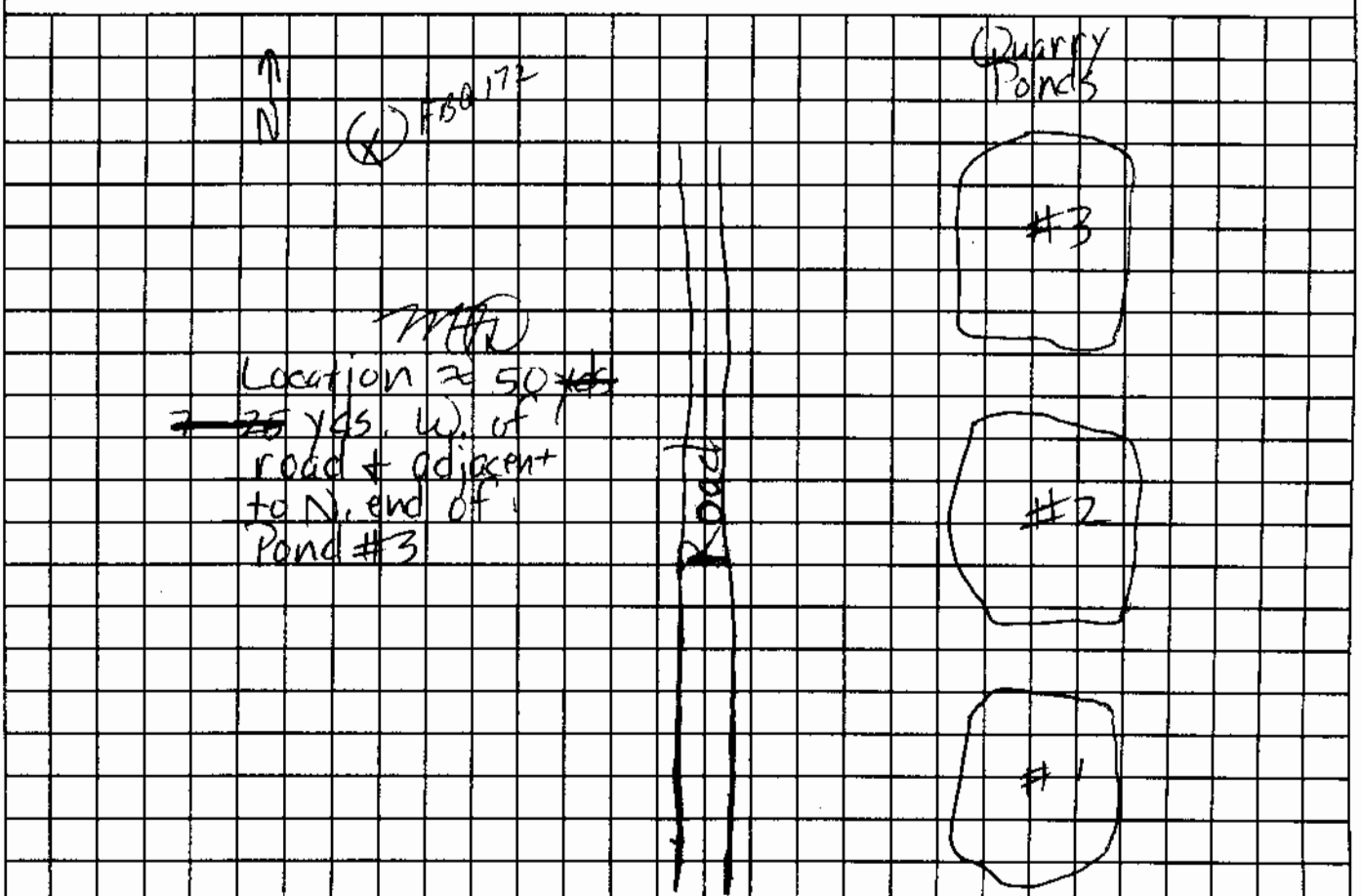
Recorded By Ronda Bailey QA Checked By Amy Greenawalt

HTRW DRILLING LOG

1. COMPANY NAME: SpecPro, Inc.	DISTRICT: Louisville	HOLE NUMBER: FBQ-172
	2. DRILL SUBCONTRACTOR: To/Test	SHEET 1 OF 1
3. PROJECT: Fuze & Booster/RVAAP	4. LOCATION: Fuze & Booster Quarry Landfill/Pond	
5. NAME OF DRILLER: Neil Wiktor	6. MANUFACTURERS DESIGNATION OF DRILL: CME-75	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-75 10.25" O.D. / 6.25" I.D.	8. HOLE LOCATION: FBQ-172	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/8/03	11. DATE COMPLETED: 10/9/03
12. OVERBURDEN THICKNESS: 22'	15. DEPTH GROUNDWATER ENCOUNTERED: ≈ 22' bgs (10/8/03)	
13. DEPTH DRILLED INTO ROCK: 11'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 19.75' bgs / 24hr 5min	
14. TOTAL DEPTH OF HOLE: 33' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES			
20. SAMPLES FOR CHEMICAL ANALYSIS: N/A	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY: 100%
22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: M. Fleming		

LOCATION SKETCH/COMMENTS — SCALE: Not to scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-172

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 1 OF 4

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0–1	~~Yel br~~ Med brn silty, sandy Topsoil, loose, dry to ≈ 6" (ML), change to yel brn clayey Sand (v. fn. sd), lt some fn-~~med~~ cse grv, dense, dry MFW (SM)	∅ PPM	FBQ-172 ST-1	~~FBQ-172 (ST-1)~~ MFW	Push Shelby tube: ∅-2' bgs
	2–3	Lt olv brn sdy Silt, tr clay + grv (fn-~~med~~ cse), damp, loose MFW	∅			Blow Counts: 4-5-5-7 Recov.: 11"
MFW ~~4-6'~~ ~~6-8'~~ ~~bgs~~ (O.K.) 4-6'	4–6	Dk olv brn silty clay (CL), damp, tr sand, soft, plastic to 5'2", change to lt brn + dk red fn-med sand (SW) damp-moist to 5'4", change to tan Ss (GW) med gr, hard, well sorted, damp-moist (likely cse grv or boulder) MFW	∅ ∅			Blow Counts: 3-5-8-4 Recov.: 18"
	6–8	6-8': No Recovery (w/ the exception of a 1" piece of Ss, A/A)				Blow Counts: 4-4-4-3 Recov.: ~~18.5"~~ 1"
	8–10	Tan med Sand (SW), wet, well sorted to 9', change to gry brn clayey Silt, tr grv, tr sd, damp	∅			Blow Counts: 5-5-4-5 Recov.: 18.5"

HTRW DRILLING LOG

HOLE NUMBER FBQ-172

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

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)
	10	~~Reddish~~ ~~Yel~~ brn clayey Silt (ML) Slv A/A, damp, dense-v. dense	0 PPM			Blow Counts: 16-12-12-12 Recov.: 15"
	11					
	12	Dk olv brn Silt, dry, v. dense, tan mottling	ϕ			Blow Counts: 14-12-18-18 Recov.: 17"
	13					
	14	Silt A/A to 15'; change to tan, med Sand (ML) damp, ltl fn-~~med~~ cse grv	ϕ			Blow Counts: 7-8-12-8 Recov.: 18.5"
	15					
	16	~~Dk red Ss to 17', change to~~ Dk olv brn sdy Silt, damp, dense, some tan sand and dk red med gr Ss cse grv (slough?)	ϕ			Blow Counts: 7-8-8-23 Recov.: 13"
	17					
	18	Dk red Ss frags. A/A, dry	ϕ			Blow Counts: 50/3 Recov.: 3" Auger refusal @ 18' bgs Air rotary/roller bit drlg. @ 18'
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER FBQ-172

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering/Ronda Bailey

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)
		Dk red Ss, dry	Ø PPM			Air rotary/roller bit drlg. to 22' bgs
	21	(Wet @ ≈ 21.5')				
	22	~~Ss A/A - Dk r~~ Dk red med gr Ss, well sorted, wet, massive ~~22'~~	MAD Ø	FBQ-172		~~Air rotary/roller bit drlg~~
		~~(Possibly moist @ 23' bgs)~~		~~EB+ MAD~~ C-1 (22'-33' bgs)		
	23	Tan med gr Ss, well sorted, occasional natural fractures (@ 30° to horizontal), massive				Bedrock coring @ ~~23'~~ 22' bgs (Core barrel: NX-WL)
	24	Ss A/A - saturated	Ø			
	25					
	26	SsA/A - saturated	Ø			
	27					
	28	Dk red SS A/A Saturated	Ø			
	29	Gray tan SS A/A Saturated				
	30	Dk red SS A/A				

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HTRW DRILLING LOG

HOLE NUMBER FBQ-172

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering/Ronda Bailey

SHEET 4 OF 4

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSAPCE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	31	Dk red SS, med grain, well sorted, wet, massive, occasional natural fractures 30° to horizontal. Saturated	0/11M			
	32					
	33					
		T.D.				
	34					
	35					
	36					
	37					
	38					
	39					
	40					

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-172

INSTALLATION START: DATE: 10/9/03 TIME: 09:30

INSTALLATION FINISH: DATE: ~~10/9/03~~ 10/10 TIME: 10:45 MH O.K. → MH

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #5 QUANTITY: 6 bags

BENTONITE SEAL: TYPE: Pure Gold Bent. Pellets (Cetco Volclay) QUANTITY: 1 bucket

GROUT: TYPE: Portland/Baroid Benseal QUANTITY: 2 x 92 lb / 1 x 50 lb bags

DESCRIPTION OF WELL SCREEN:

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

OUTSIDE DIAMETER: 2.25" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2.25" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

RECORDED BY: Mark Deering (Signature and Date) QA CHECK BY: [signature] 12/3/03 (Signature and Date)

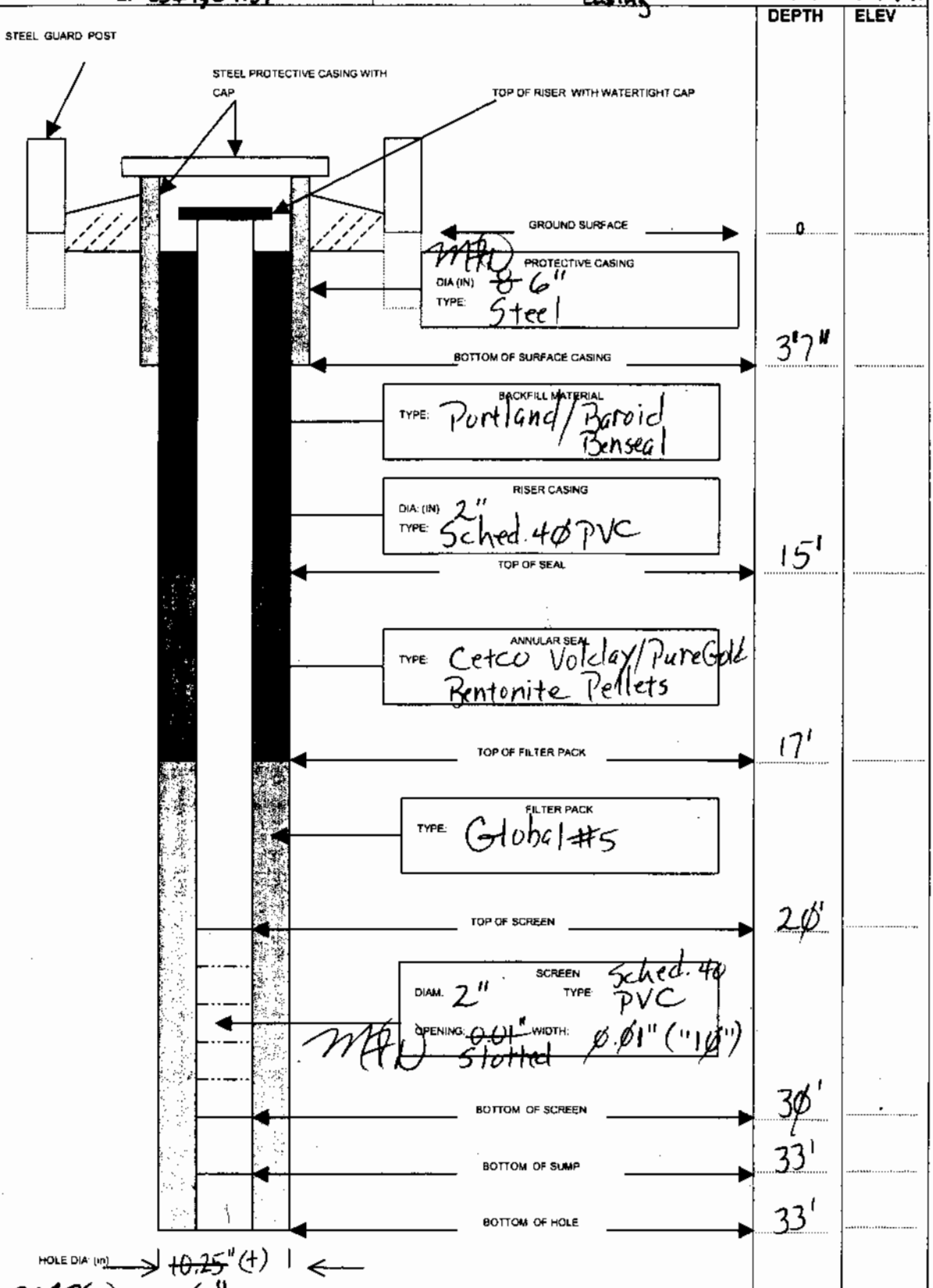
M.T. Deering 10-9-03

MONITORING WELL CONSTRUCTION DIAGRAM

10/9/03@ 10/9/03@

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

WELL NUMBER: FBQ-172	**BEGIN:** 09:30	**END:** 10:45
COORDINATES: N: 554522.17 E: 2349907.37	**REFERENCE POINT:** top inner casing	**ELEVATION:** 1150.09 ft.



WELL VOLUME CALCULATION SHEET

Date: 10/22/03 Time: 1447

Well ID: EBQ 172

Well Location: ≈ 75 yds NW of NW corner N Pond

Total Depth of Well (ft BTOC) ~~46" 51" 36.4" 30.3'~~ 34.58

Depth to Water (ft BTOC) ~~29.2" 8.." 24.." 20.04~~ 24.33

Height of water column (ft) (Hc) ~~17.3" 10.25'~~ 10.24

Well Volume Calculation:

Vc = 3.142(Rc²)*Hc .222 cu. ft.

Vf = 3.142[(Rf²)-(Ro²)]*(Hc or length of screen)*(0.30)

Note use length of screen if Hc>length of screen

= ~~1.91~~ cu. ft. .94

.222 + 1.91

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

= ~~15.96~~ 8.7 gal. x 5 = ~~79.8~~ 43.5

x 7 = ~~111.7~~ 60.9

Where:

Vc	=	Volume of casing (ft³)
Vf	=	Volume of filter pack (ft³)
Vt	=	Total Volume
Ro	=	Outside radius of casing (0.10 ft)
Hc	=	Height of water column 10.25' (ft)
Rf	=	Radius of filter pack (0.33 ft)
Rc	=	Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

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

Date: 10/27/03

Well Number and Location: FBQ 172

Development Crew: Andre Lacy, Randy Bailey, Chantelle Condiff

Driller (if applicable): _____

Water Levels/Time: Initial: 24'3" / Pumping: _____ / _____

Final: 24'1" / _____

Total Well Depth: Initial: 30.1' Ft BTOC Final: 34.39 Ft BTOC

Date and Time: Begin: 10/27/03 / 1447 Completed: 10/28/03 / 1110

Development Method(s): Whale pump & bailer

Total Quantity of Water Removed: 22 + 36 = 58 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	10/30/03
Specific Conductivity	YSI 85	"
pH	pH meter 3+	"
Turbidity	Lamotte	"

GROUNDWATER PURGE SHEET

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

DATE (mm/dd/yy): 11/19/03 TIME: 13:45

WELL ID NUMBER: FBQ172 WELL LOCATION: FBQ

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

INNER CASING: TYPE: _____ ID: _____ inches

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

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2]$ (TD-S or H) (P) .92
NOTE: If S>H use S, if S<H use H

$Vt = (Vc + Vf)(7.48)$ 8.6

WHERE:

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

dH = diameter of borehole, ft.
TD = total depth of well from top of well casing, ft. ~~34.50~~ 34.39; 34.62
H = depth of water, ft., from top of well casing 23.46; 25.37
S = depth to base of seal, ft., from top of well casing

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 25.8 GAL.

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

SITE CONDITIONS DURING PURGING: Overcast, rain off + on, low 40's

FIELD OBSERVATIONS: _____

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

RECORDED BY: [signature] 11/19/03
(Signature and Date)

QA CHECK BY: [signature] 12/08/03
(Signature and Date)

APPENDIX C

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ 172 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/19	1345	Initial	12.1	660	6.87	53.8			DO = 2.57
↓	1430	6	11.2	692	6.80	269	6		DO = 1.24
	1500	6	11.4	693	6.90	281	12		DO = 1.54
	1535	6	11.1	692	6.88	152	18		DO = 3.08
	1615	8	11.1	694	6.90	124	26		D.O = 333

RECORDED BY: [signature] 11/19/03
(Signature and Date)

QA CHECK BY: [signature] 12/08/03
(Signature and Date)

SLUG TEST RECORD

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

WELL NO.: FBQ 172	DATE STARTED: 12 01 03	DATE COMPLETED: 12 01 03
LOCATION: FBQ	RECORDED BY: R BAILEY	

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

REFERENCE POINT TOC / BGS	REFERENCE POINT ELEVATION	RISER CASING I.D. (IN)
SCREEN OR OPEN HOLE I.D. (IN) 2	DIAMETER OF BOREHOLE (IF SCREENED) 6"	

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	34.62		TOP OF FILTER PACK	17'	
DEPTH TO WATER	23.95		TOP OF SCREEN OR OPEN HOLE	20'	
HEIGHT OF WATER COLUMN	10.67		SCREEN LENGTH	10'	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY)		TIME (HH:MM:SS)		DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP)		HEIGHT OF WATER COLUMN (FT)	
		BEGIN	END	BEGIN	END		BEGIN	END	BEGIN	END
FBQ172	SLUG IN	12/01/03	12/01/03	1315	1545	29.62	23.950	23.890	10.67	10.73
FBQ172	SLUG OUT	12/01/03	12/1/03	1545	1732	29.62	23.950	23.912	10.67	10.708

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS: _____

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/13/03 Su (M) Tu W Th F Sa PAGE 1 OF 6

Task Team Members:

Mark Deering
Tony Brister (Tol Test)
Chris White (")
John Moore (Tol Test)
Steve King (MKM)

Narrative (include time and location):

1415: Begin to set-up on FBQ-173
1430: Push Shelby tube: Ø-2' bgs
1440: Begin cont. SS samp'g.
1500: SS refusal @ 5' bgs; clean-out w/ augers; prep. to core
1530: Begin to core bedrock (Christenson NX core barrel)
1615: First core run completed (4.7-14.7' bgs)
1645: Begin 2nd core run
1700: Second core run completed (14.7-23.7' bgs)
1715: Begin 3rd core run
1800: Third core run completed (23.7-32.2' bgs)
1815: Cleanup & leave location for the night

12/3/03

Shelby tubes used - 1

Daily Weather Conditions: A.M. _____

P.M. Sunny, 65°F

Recorded By Mark Deering QA Checked By 12/3/03

150

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/14/03 Su M (Tu) W Th F Sa PAGE 2 OF 6

Task Team Members:

Mark Deering — John Moore (Tol Test)
Tony Brister (Tol Test) — Steve King (IMKM)
Chris White (")

Narrative (include time and location):

800: Arrive @ location, meas W.L. in borehole (17.9' bgs), + warm-up equip.
816: Blew water from borehole
821: Let borehole recover for 20 min. -- W.L. @ 27' bgs (±) (±5'/20 min.) → (≈0.2-0.4 gpm)
850: Begin to ream borehole (to T.D.) w/ roller bit
1045: Complete reaming of borehole to 33' bgs; let borehole sit to determine approx. g.w. yield; drillers leave drill site to obtain fuel for compressor
1115: Blew well dry -- v. min. yield -- ≤ ≈ 0.05'/min.
1200: Tfc w/ C. McCambridge - OEPA re. low yield situat. + recommend. to add potable water due to poss. of "rock flour" sealing off perm. to borehole; we discussed, she checked OEPA guidance + agreed w/ recommend. w/ caveat to remove all

Daily Weather Conditions: A.M. Cloudy, 50°F

P.M.

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/14/03 Su M Tu W Th F Sa PAGE 2 OF 6

Task Team Members:

Mark Deering — John Moore (Tol Test)
Tony Brister (Tol Test) — Steve King (MKM)
Chris White (")

Narrative (include time and location):

added water
1215: Discussed / obtained concur. of C. Carroll (S. Levinger of MKM also part of discuss. -- concurred)
1315: Poured 25 gals. of potable water (obtained from potable poly tank behind Bldg. 1036) into borehole; agitated water introduced to borehole w/ drill stem tools via rotating roller bit + surging for a total time of twenty mins + then blew borehole dry (nominally -- some G.W. recharge) w/ a series of four blasts of air from the drilling compressor; W.L. consistently @ 31.9' bgs (±) during air evaduation of borehole
1435: W.L. @ 31.9' bgs + T.D. @ 33.6' bgs (after cleaning-out bottom of hole)

Daily Weather Conditions: A.M. _____

P.M. Light-mod.-heavy rain

Recorded By Mark Deering QA Checked By

152

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/14/03 Su M Tu W Th F Sa PAGE 4 OF 6

Task Team Members:

Mark Deering
John Moore (Tol Test)
Tony Bristed (Tol Test)
Steve King (MKM)
Chris White (")

Narrative (include time and location):

1450 : Began to advance hole to 38.6' bgs (wtr. tab. suspected @ 30' bgs ±)

1520 : At 38.6' bgs - blew borehole -- apparently little or no yield

1530 : Due to heavy rain + blow compressor gasket, ceasing ops. for the day

1545 : Team members left dr'lg. locat. for today

10303

Daily Weather Conditions: A.M. _____

P.M. Mod. - heavy rain, 55°F

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/15/03 Su M Tu (W) Th F Sa PAGE 5 OF 6

Task Team Members:

Mark Deering — John Moore (Tol Test)

Tony Brister (Tol Test)

Chris White (")

Narrative (include time and location):

0730: Mob to drl'g. locat. + warm equip. up

0745: Meas. d.t.w. = 29.35' bgs; T.D. = 36.5' bgs (cave/muck from overnight)

0800: Begin drl'g. to 43.6' bgs

0845: Confer w/ C. Carroll, E. Mohr (OEPA/DERR/NEDO), + P. Zorko (ACoE) re. status of drl'g./borehole condits.

0930: Drl'g. to 43.6' bgs completed (@ ~0845); borehole blown to 0945 -- hole apparently dry (or v. little yield)

0945: Confer again w/ C. Carroll, E. Mohr, + P. Zorko - agreed to drill to 50' bgs (max. per FSAP) + build mon. well: 20' of screen / 3' of sand (vs. standard of 10' screen) -- in order to maximize anticipated low yield in this gradient position (O.K.'d per E. Mohr on this day w/out change order)

1100: Drillers trip out of hole (@ 47' bgs) to replace worn-out tricone roller bit

Daily Weather Conditions: A.M. Partly cloudy/partly sunny, windy, 50° F

P.M.

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/15/03 Su M Tu (W) Th F Sa PAGE 6 OF 6

Task Team Members:

Mark I. Deering — John Moore (TolTest)

Tony Brister (TolTest)

Chris White (")

1150 : Drillers resume drlg. from 47-50' bgs

Narrative (include time and location):

~~1055~~ 1230 : Complete drlg. to T.D. (50' bgs) + begin to prep. to construct mon. well

1255 : Begin mon. well construction (D.T.W. = 42.2' bgs)

: Complete " " " (ATV rig used to gather water for grout: 1400)

See pg "155a" (back of 155) for development ~~purge & sampling~~ + sds log.

See pg "168a" (back of 168) for purge a sampling log.

12/02/03 0945 Arrive @ FBQ 173 Dt H2O - 41.5 - slug in — Randa Bailey, Chantelle Carroll — overcast 31°F

1000 - Leave well

1240 - Arrive for slug out.

1500 - Extract Data Leave for FBQ 175

RBB 12/4/03

Daily Weather Conditions: A.M.

P.M.

Recorded By: [signature] 12/4/03 QA Checked By: Amy Greenawalt

HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: FBQ-173

1. COMPANY NAME: SpecPro, Inc.

2. DRILL SUBCONTRACTOR: Tol Test

SHEET 1 OF 1

3. PROJECT: Fuze & Booster/RVAAP

4. LOCATION: Fuze & Booster Quarry Landfill/Pond

5. NAME OF DRILLER: Tony Brister (ATV)

6. MANUFACTURERS DESIGNATION OF DRILL: CME-550

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-550 Auger Rig 10.25" O.D.; 6.25" I.D.

8. HOLE LOCATION: FBQ-173

9. SURFACE ELEVATION:

10. DATE STARTED: 10/13/03

11. DATE COMPLETED: 10/15/03

12. OVERBURDEN THICKNESS: 3'

15. DEPTH GROUNDWATER ENCOUNTERED: ~~26.5' bgs w/in augers 10/13/03 @ 1810~~ 17.9' " " " 10/14/03 @ 0805 31.9' " " " " @ 1435

13. DEPTH DRILLED INTO ROCK: 47'

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: ~~29.35~~ 37.85' bgs/47hr 5min ~~48.9~~ 49.22 10/15/03 @ 0750 " @ 1290

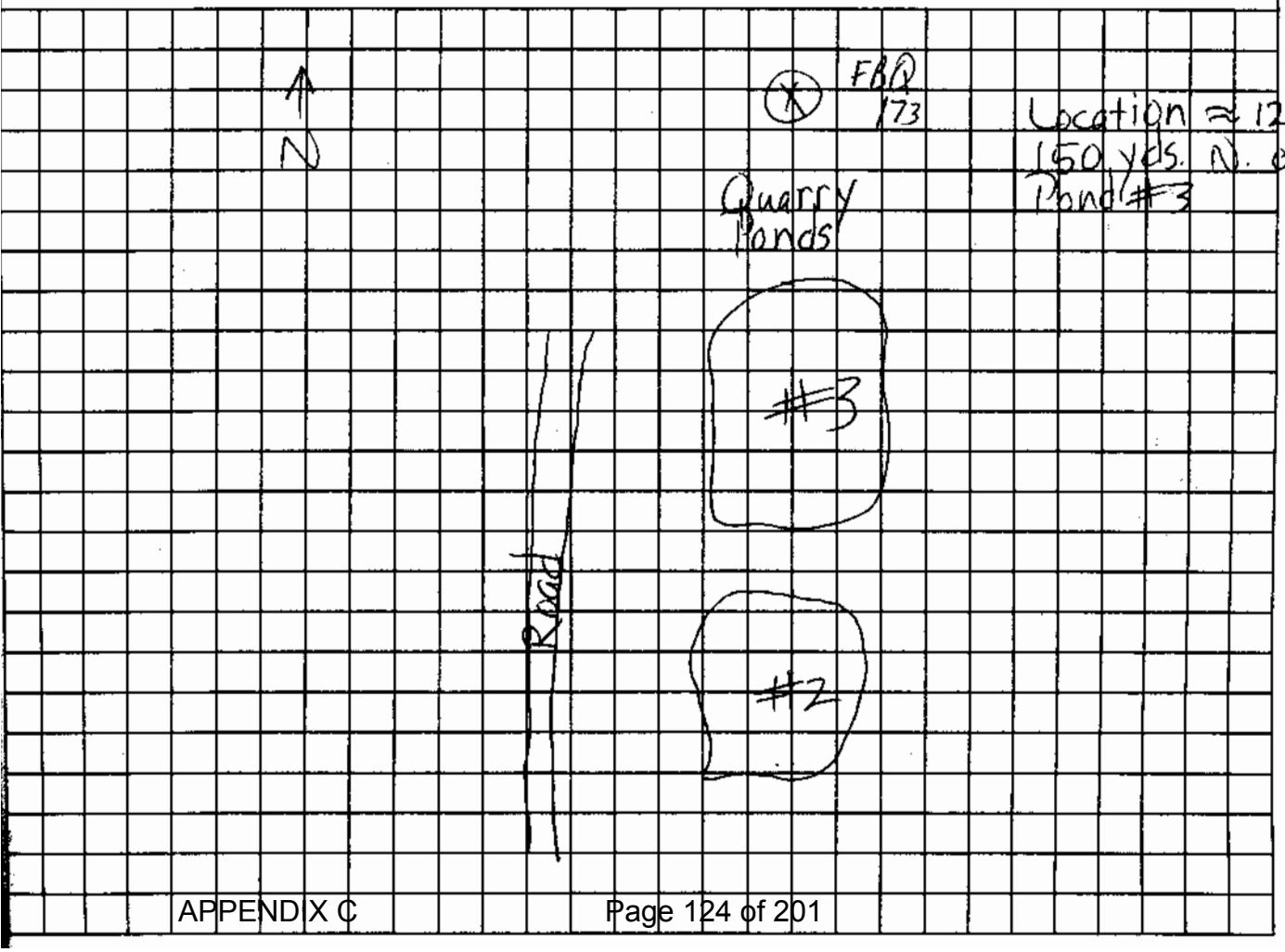
14. TOTAL DEPTH OF HOLE: 50' bgs

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	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: 85%
22. DISPOSITION OF HOLE: Mon. well constructed	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: [signature]		

LOCATION SKETCH/COMMENTS

SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-173

PROJECT: Fuze & Booster/RVAAP | INSPECTOR: Mark Deering | SHEET 1 OF 5

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0–1	Med brn sdy ~~Silt~~ silty topsoil, damp, |+| some fn grv to ≈ 9-12" bgs; change to yel brn sdy Silt, |+| some grv, damp (ML)	Ø PPM			Push Shelby tube: Ø-2' bgs Recov.:
	2–3	Silt A/A to 3' bgs; change to red Sand (med) (weath./fract. bdrk.?), damp (GW-GP)	Ø			Blow Counts: 17-22-27-30 Recov.: 18"
	4–6	Tan med Ss damp-~~dry~~; grading to red Ss; grading to dk red med Ss, damp to 5.7' bgs; weathered/fractured then change to tan Ss, med grn, hard, damp-wet, fractured occasionally, darker color banding occasionally	Ø	FBQ-173 C-1		Blow Counts: 10-~~6~~ Recov.: ~~14"~~ 12" (SS refusal on bd-rk @ 5', clean-out w/augers, prep. to core) Begin coring @ 4.7' bgs; core to 14.7' bgs; recov. = 7.25', missing ftg. = 2.75' (likely due to jamming of fractured bed-rock w/in core barrel)
	8	Tan Ss A/A				
	10		Ø			

HTRW DRILLING LOG

HOLE NUMBER FBQ-173

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

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)
	11	Tan Ss, clamp-wet A/A	ϕ TPPM			
	12	Ss A/A to ≈ 13.7' bgs, then dk red, med gr, hard Ss, moist-wet (depth of change approx. due to jamming/missing section w/in core barrel)				
	15	Dk red Ss A/A, med, hard, occasionally darker banding, dry-clamp, somewhat less fractured than tan Ss above				Second core barrel run begins @ 14.7' bgs to 23.7' bgs; recov. = 9' (100%) /9'
	18	Dk red Ss A/A				
	19		ϕ			
	20					

HTRW DRILLING LOG

HOLE NUMBER FBQ-173

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 45

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21	Dk red Ss A/A, dry-damp	Ø PPM			
	22	Ss A/A				
	23					
	24	Dk red Ss, damp A/A				End of 2nd core run @ 23.7' bgs, third run begins
	25					
	26					
	27	A/A, however Ss becoming lt org-brn and more shaly and micaceous at 26.5-27' bgs (mica predominantly light in color, although some dark); change to light to med gray shaly, micaceous, finer gr, softer Ss by 27.5' bgs				
	28					
	29					
	30					

HTRW DRILLING LOG

HOLE NUMBER FBQ-173

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET ~~3~~ OF 5

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSAPCE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	31	Gray, shaly, micaceous Ss A/A, dry	0 PPM			
	32					
	33	Dk red Ss, damp-moist, hard (A/A) once again at ~~33~~ bgs	0			End of third core run @ 32.2' bgs; recov. = 8.5' / 10' due to jamming in core barrel; water in borehole to ≈ 26.5' bgs; borehole reamed to 32' bgs. Roller bit drlg. from 32' - ~~50~~' bgs.
	34					
	35					
	36	Dk red Ss A/A				See Activity Log Sheet re. adding 25 gal. potable water @ 33.6' bgs, per OEPA concur.
	37		0			
	38	Ss A/A, damp			MF12	Borehole advanced from 38.6 to 38.6' bgs at end of day 10/14/03.
	39					
	40					

HTRW DRILLING LOG

HOLE NUMBER FBQ-173

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET ~~4~~ OF ~~4~~ 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)
	41	Dk red Ss, damp-moist, hard (A/A)	Ø PPM			Borehole advanced from 38.6 - 43.6' bgs on 10/15/03, then from 43.6 - 50' bgs (per discuss./ concur. w/ OEPA [ETM] & ACoE [TZ] also on 10/15/03)
	42	Dk red Ss A/A				
	43					
	44	Ss A/A, damp				
	45		Ø			
	46	Ss A/A				
	47	Dk red Ss, saturated, hard				Yield appears to have significantly increased (≈ Ø.5 - 1.Ø gpm ?)
	48	A/A				
	49					
	50	Dk red Ss A/A, saturated	Ø			

T.D.

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-173

INSTALLATION START: DATE: 10/15/03 TIME: 12:55

INSTALLATION FINISH: DATE: 10/15/03 TIME: 15:50 ←

ANNULAR SPACE MATERIALS INVENTORY:

GRANULAR FILTER PACK: TYPE: Global #5 QUANTITY: 9 bags

BENTONITE SEAL: TYPE: Coteo Volclay Pure Gold Bent. Pellets QUANTITY: 1 bucket

GROUT: TYPE: Portland/Bentonite Baroid Bensecl QUANTITY: 4X92 lb / 2X50 lb bags

DESCRIPTION OF WELL SCREEN:

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

OUTSIDE DIAMETER: 2 1/4" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2 1/4" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

In concurrence w/ (USEPA (E. Mohr) + ACoE (P. Zorko), in discussions at the site on 10/15/03, it was decided to construct this upgrad. mon. well w/ a 20' long screen (vs. the FSAP standard of 10') to maximize the anticipated low yield of this mon. well (based on observations during drlg. of this borehole -- including v. low-blown yields)

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

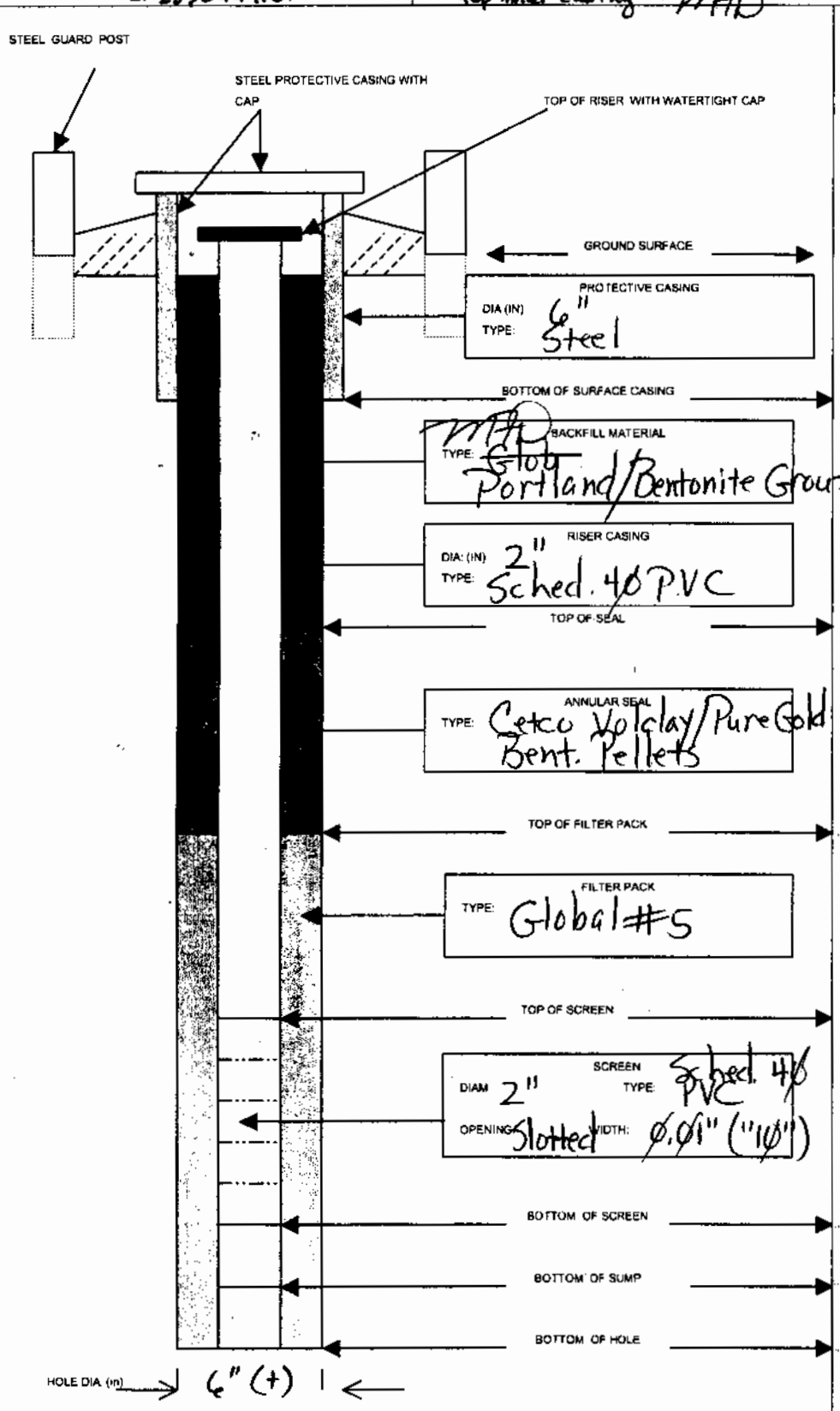
RECORDED BY: M. F. Duerring 10-15-03 (Signature and Date) QA CHECK BY: [signature] 12/30/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

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

WELL NUMBER: FBQ-173 **BEGIN:** 10/15/03@1250 1255 **END:** 10/15/03@1550

COORDINATES: N: 554491.35 E: 2850449.01 **REFERENCE POINT:** top inner casing MP **ELEVATION:** 1165.94 ft.



DEPTH	ELEV
0	
4.55'	
24.5'	
26.5'	
29.5'	
49.5'	
50'	
50'	

20' Screen

WELL VOLUME CALCULATION SHEET

Date: 10313 Time: 0930

Well ID: FBQ 173

Well Location: FBQ

Total Depth of Well (ft BTOC) 53.15
Depth to Water (ft BTOC) 40.95
Height of water column (ft) (Hc) 12.20

Well Volume Calculation:

Vc = 3.142(Rc^2)*Hc .264 cu. ft.
.089 .01 .089 12.20

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
Note use length of screen if Hc>length of screen
= 1,127.cc / 94 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.)
= 1048cc / 9.0 gal.

45
*5 = 52.53 gal
*6 = 59.63 gal
*7 = 74 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 12.24 (ft)
Rf = Radius of filter pack (0.33 ft)
Rc = Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

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

Date: 10/31/03

Well Number and Location: FBQ-173

Development Crew: Randy Bailey

Andre Leon Chantelle Carroll

Driller (if applicable): _____

Water Levels/Time: Initial: 40.95 / 9:30 Pumping: _____ / _____

Final: 15.40 / 1420

Total Well Depth: Initial: 53.15 Ft BTOC Final: 52.21 Ft BTOC

Date and Time: Begin: 10/31/03 / 9:30 Completed: 10/31/03 1540

Development Method(s): bailer

Total Quantity of Water Removed: 58 gals

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

GROUNDWATER PURGE SHEET

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

DATE (mm/dd/yy): 11/20/03 TIME: 10:20

WELL ID NUMBER: FBQ 173 WELL LOCATION: FBQ

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

INNER CASING: TYPE: _____ ID: _____ inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ .236

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2]$ (TD-S or H) (P) .839
NOTE: If S>H use S, if S<H use H

$Vt = (Vc + Vf)$ (7.48) 8.04

WHERE:

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

dH = diameter of borehole, ft.
TD = total depth of well from top of well casing, ft. - 52.08; 52.75
H = depth of water, ft., from top of well casing - 41.19; 42.31
S = depth to base of seal, ft., from top of well casing

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 24 GAL.

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

SITE CONDITIONS DURING PURGING: Sunny high 50s

FIELD OBSERVATIONS: _____

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

RECORDED BY: _____ 11/20/03
(Signature and Date)

QA CHECK BY: _____ 12/8/03
(Signature and Date)

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

WELL NUMBER AND LOCATION: FBQ 173 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/24/03	1620	Initial	10.8	172.7	6.59	254			DO 3.61
	1105	6	10.0	184.8	6.35	>99.9	6		DO 3.77
	1215	6	11.2	184.2	6.55	>99.9	12		DO 4.09
	1238	6	11.1	190.1	6.56	>99.9	18		DO 7.21
	1340	6	11.1	197.7	6.58	>99.9	24		DO 3.89

RECORDED BY: [signature] 11/24/03 (Signature and Date)

QA CHECK BY: Amy Freeman 12/8/03 (Signature and Date)

APPENDIX C

SLUG TEST RECORD

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

WELL NO.:	173	DATE STARTED:	12-02-03	DATE COMPLETED:	12-02-03
LOCATION:	FBQ	RECORDED BY:	B BAILEY		

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

REFERENCE POINT TOC/BGS	REFERENCE POINT ELEVATION	RISER CASING I.D. (IN)
SCREEN OR OPEN HOLE I.D. (IN) 2	DIAMETER OF BOREHOLE (IF SCREENED) 6"	

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	52.21		TOP OF FILTER PACK	26.5'	
DEPTH TO WATER	41.5		TOP OF SCREEN OR OPEN HOLE	29.5'	
HEIGHT OF WATER COLUMN	10.71		SCREEN LENGTH	20'	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
FBQ 173	SLUG IN	12/02/03	12/02/03	0945	1240	42.21	41.500	41.521	10.71	10.689
FBQ173	SLUG OUT	12/02/03	12/02/03	1240	1500	42.21	41.500	41.475	10.71	10.735

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/10/03 Su M Tu W Th (F) Sa PAGE 1 OF 5

Task Team Members:

Mark Deering
Steve King (MKM)
Neil Wiktor (TolTest)
Chris White (TolTest)
John Moore (")

Narrative (include time and location):

0915: Mob to location FBQ-174 + set-up
0945: Push Shelby tube from 0-2' bgs
1015: Auger refusal @ 3.5' bgs (SS samp'g. not poss.)
1030: Truck + compressor trailer stuck in mud; wait on tow
1115: Begin air rotary drl'g.
1202: Complete " " "
1237: " installation of screen, riser, sand, + bentonite pellets, remove augers from borehole and begin to de-mob from location

KAB
12/3/03

Shelby tubes used - 1

Daily Weather Conditions: A.M. Cloudy, 65°F

P.M.

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/29/03 Su M Tu (W) Th F Sa PAGE 2 OF 5

Task Team Members:

Randc Bailey

Andre Lear

Chantelle Carroll

Narrative (include time and location):

1540 - Arrive @ FBQ 174. Bail out

initial reading 140.8 8.20

pH 7.11 Temp 12.1 Turb 999 COND ~~1480~~ DO ~~14.80~~

1610 - 6 Gal rem. + 3 gal

pH 6.38 Temp 12.6 Turb 999 COND 111.4 DO 7.42

1613 - Pump to bottom of well, begin bailing

1630 Slow recharge - 1 inch/minute - 10 Gall removed

pH 6.40 temp 12.2 Turb >999 Cond 105.4 DO 7.54

Checked water column - 8.9 ft. water column - Return to Whaler

1640 6 Gall Removed

ph 6.36 temp 12.4 Turb >999 (but noticeable clearer) cond 94.5 DO 9.65

1655 6 Gal rem

pH 6.23 Temp 12.1 Turb 129.8 COND 105.1 DO 7.70

1700 6 Gal rem

pH 6.36 Temp 12.5 Turb 168.0 COND 97.3 DO 6.30

RLB 12/4/03

Daily Weather Conditions: A.M.

P.M.

Recorded By [signature] QA Checked By [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/29/03 Su M Tu (W) Th F Sa PAGE 3 OF 5

Task Team Members:

RONDA BAILEY

ANDRE LEON

CHANTELLE CARROLL

Narrative (include time and location):

1720 - 12 GAL REMOVAL

pH 6.00 TEMP 11.8 TURB 54.5 COND 96.4 DO 7.24

TRACES OF SAND FROM THE SAND PACK

1730 - 3 GAL REMOVAL

pH 6.06 TEMP 11.0 TURB 8.2 COND 96.8 DO 6.75

1740 - 6 GAL REMOVAL // FINAL READING

pH 6.04 TEMP 11.9 TURB 4.6 COND 99.4 DO 6.98

WELL COMPLETED

1745 - DIST. TO WATER 19' 2" // DIST. TO BOTTOM 26' 06"

RB 12/04/03

Daily Weather Conditions: A.M.

P.M.

Recorded By: Rond [signature] QA Checked By: Amy [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11/18/03 Su M (Tu) W Th F Sa PAGE 4 OF 5

Task Team Members:

Andre Leon

Ronda Bailey

Narrative (include time and location):

14ØØ - Arrive @ FBQ 174: for Purge + Sampling. DOW - 26.1Ø' DO H_2O - 15.13' (FBQmw174/3226W metals filtered)

162Ø - Depth of Well. 26.Ø8', Depth of H_2O 15.82'. Leave well.

[signature] 12/?/03

Daily Weather Conditions: A.M. ______

P.M. Overcast and 50s

Recorded By [signature] QA Checked By [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/01/03 Su M Tu W Th F Sa PAGE 5 OF 5

Task Team Members:

Ronda Bailey

Chantelle Carroll

Narrative (include time and location):

1249 - Arrive @ FBQ 174. Take depth of water measurement. Top of riser casing became detached. Appx. 4½" of fine gravel fell into the well. Left well for advisement.

1515 - Return to FBQ174. screwed top of riser casing in place. Paul Zorko advised 'slug test to be continued as planned, provided 3/4 of screen is uneffected'.

12/04/03 - 1000 - Arrive @ FBQ 174. Set up slug test equip.

DOH$_2$O - 14.74'

1030 - Slug in - pc & troll error. Reboot & redo setup

1040 - Slug in

1246 - Arrive check test

1255 - Slug out - leave

1510 - Arrive check "slug out"

1515 - Extract data & leave, complete test.

Daily Weather Conditions: A.M.

P.M. Overcast, mid 30s

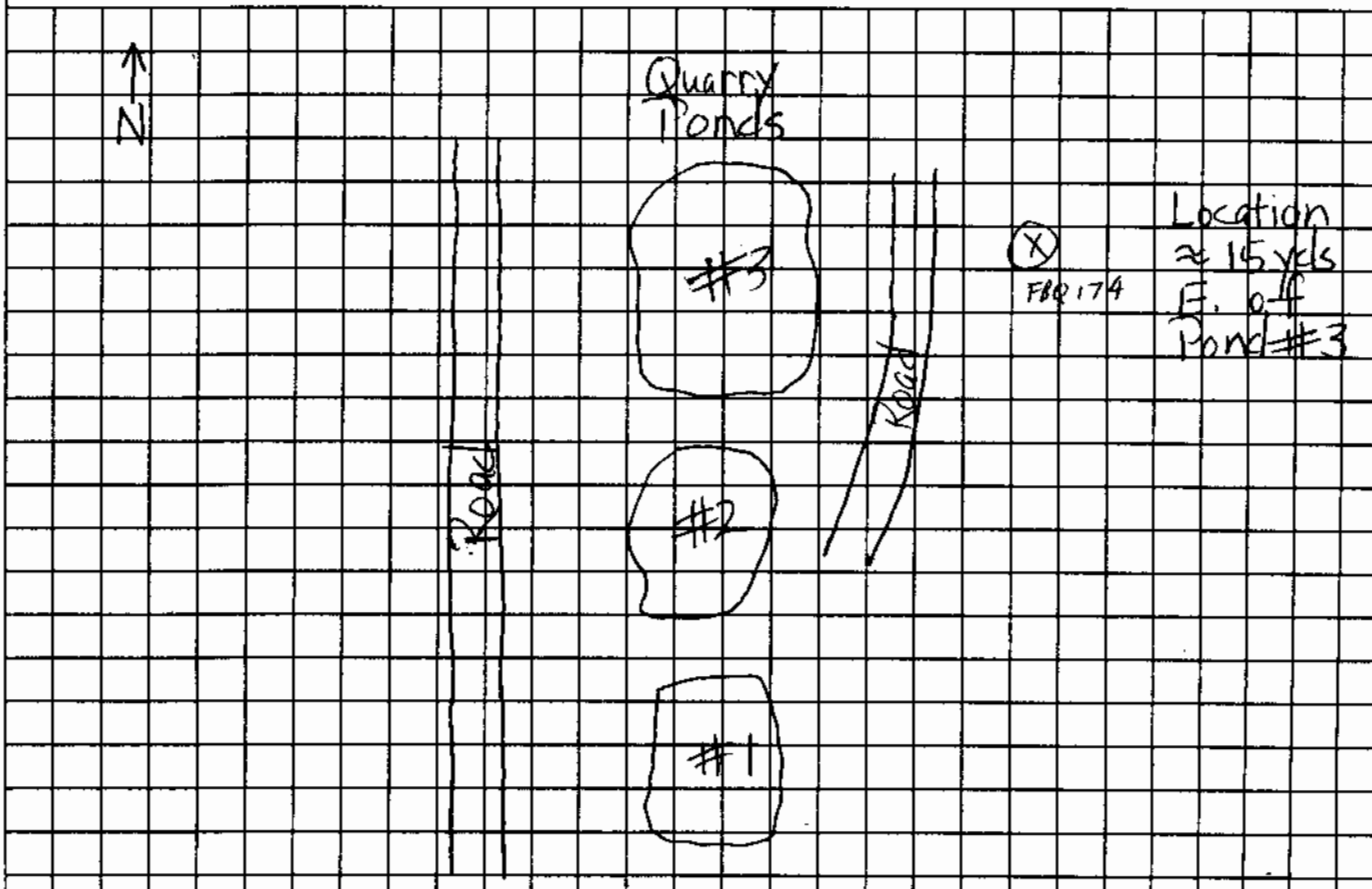
Recorded By [signature] QA Checked By [signature]

HTRW DRILLING LOG

DISTRICT: Louisville		HOLE NUMBER: FBQ-174
1. COMPANY NAME: SpecPro, Inc.	2. DRILL SUBCONTRACTOR: Tol Test	SHEET 1 OF 1
3. PROJECT: Fuze & Booster/RVAAP	4. LOCATION: Fuze & Booster Quarry Landfill/Pond	
5. NAME OF DRILLER: Neil Wiktor	6. MANUFACTURERS DESIGNATION OF DRILL: CME-75	
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: CME-75 10.25" O.D. / 6.25" I.D.	8. HOLE LOCATION: FBQ-174	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/10/03	11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: 1'	15. DEPTH GROUNDWATER ENCOUNTERED: ≈14' bgs (A.R./10-10-03)	
13. DEPTH DRILLED INTO ROCK: 21.5'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10.7' bgs / 142 hr 45 min	
14. TOTAL DEPTH OF HOLE: 22.5' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

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

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-174

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 1 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (D)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Dk olv brn silty Top-soil (Ml) moist, tr fn grv w/ roots to ≈1' bgs change to d'k red Ss, hard, dry	Ø PPM	FBQ-174 (ST-1)		
	1					
	2	Dk red Ss A/A, hard, dry	Ø			
	3					Auger refusal/ augers seated @ 3.5' bgs; began air rotary drlg. here
	4	A/A				
	5					
	6	A/A				
	7	Change to tan Ss, hard, dry	Ø			
	8					
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-174

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 2 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Tan Ss A/A, dry, hard	ϕ PPM			Air rotary drlg.
	11					
	12	A/A	ϕ			
	13					
	14	Ss A/A, wet-saturated	ϕ			
	15					
	16	A/A, wet	ϕ			
	17					
	18	Ss A/A	ϕ			
	19	A/A, sat.				
	20					

HTRW DRILLING LOG

HOLE NUMBER FBQ-174

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21	Tan Ss A/A, saturated, hard	ϕ PPM			Air rotary drilled 19'/~~40~~ 47 min MFD indicated Good g.w. yield from blow
	22	Ss A/A, sat.	ϕ			
		T.D				
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-174

INSTALLATION START: DATE: 10/10/03 TIME: 12:02

INSTALLATION FINISH: DATE: 10/10/03 TIME: 12:37

ANNULAR SPACE MATERIALS INVENTORY:

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

BENTONITE SEAL: TYPE: Cetco Volclay/PureGold Bentonite Pellets QUANTITY: 2X92 lb/ 1X50 lb bags 2

GROUT: TYPE: Portland/Baroid Bensea1 QUANTITY: 1 bucket

DESCRIPTION OF WELL SCREEN: MTD 0.01" ("10")

SLOT SIZE (inches): 2" SLOT CONFIGURATION: Slotted

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

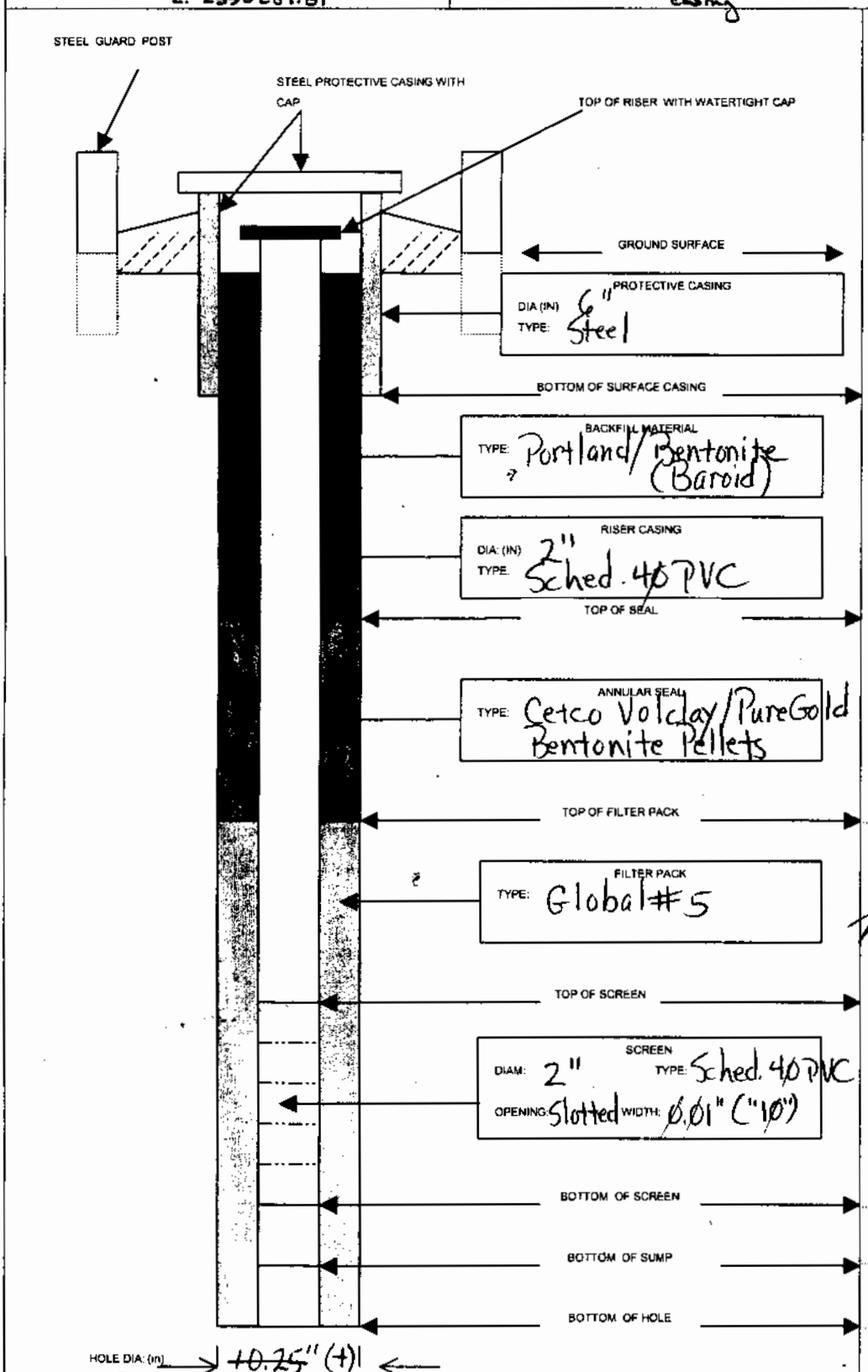
RECORDED BY: M. F. Deering (Signature and Date) 10-10-03

QA CHECK BY: [signature] 12/3/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

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

WELL NUMBER: FBQ-174	**BEGIN:** 10-10-03/12:02	**END:** 10-10-03/12:37
COORDINATES: N: 554142.44 E: 2350289.81	**REFERENCE POINT:** ~~top inner casing~~	**ELEVATION:** 1139.97 ft.



DEPTH	ELEV
0	
3'8"	
7'	
9'	
~~10~~ 12	
22'	
22.5'	
22.5'	

WELL VOLUME CALCULATION SHEET

Date: 1/29/93 Time: 1540

Well ID: FBQ174

Well Location: FBQ 174 E of N Pond

Total Depth of Well (ft BTOC) 26'
Depth to Water (ft BTOC) 14.97'
Height of water column (ft) (Hc) 11.03

Well Volume Calculation:

Vc = 3.142(Rc^2)*Hc .0289 .238 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30) .1089 .0983
Note use length of screen if Hc>length of screen
= ~~1.528~~ .94 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.) 44.1 cc
= ~~9.47~~ 8.8 gal. x 5 = ~~47.35~~ gal
x 7 = ~~66.29~~ cc gal
61.6

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 11.03 (ft)
Rf = Radius of filter pack (0.33 ft)
Rc = Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

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

Date: 10/29/03

Well Number and Location: FBQ ~~+75~~ /74

Development Crew: Andre Leon
Randy Bailey

Driller (if applicable): _____

Water Levels/Time: Initial: 14.99 / 1540 Pumping: _____/_____
Final: 19.29 / 1745

Total Well Depth: Initial: 20.0 Ft BTOC Final: 20.00 Ft BTOC

Date and Time: Begin: 10/29/03 / 1540 Completed: 10/29/03 / 1745

Development Method(s): ~~WAT~~ WHALER & BAILER

Total Quantity of Water Removed: 55 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	10 30 03
Specific Conductivity	YSI 85	"
pH	pH meter 3+	"
Turbidity	Hamotte	"

GROUNDWATER PURGE SHEET

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

DATE (mm/dd/yy): 11/18/03 TIME: 14:00

WELL ID NUMBER: FBQ 174 WELL LOCATION: FBQ

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

INNER CASING: TYPE: _____ ID: _____ inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ .237

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2]$ (TD-S or H) (P) .93
NOTE: If S>H use S, if S<H use H

$Vt = (Vc + Vf)\ (7.48)$ 8.72

WHERE:

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

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

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 27 GAL.

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

SITE CONDITIONS DURING PURGING: Overcast, Low 60's.

FIELD OBSERVATIONS: _____

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

RECORDED BY: Ronald A Bly 11/18/03
(Signature and Date)

QA CHECK BY: Amy Greenwald 12/08/03
(Signature and Date)

APPENDIX C

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ 174 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/18	1400	Initial	14.1	98.4	5.96	6.8			DO = 5.88
	1445	7.0	13.5	96.6	5.87	19.4	7.0		DO = 7.12
	1515	7.5	13.7	95.3	5.88	11.8	14.0		DO = 6.51
	1550	7.0	13.5	96.7	5.81	39.3	21.0		DO = 5.30
	1620	7.0	13.5	96.0	5.91	46.6	28.0		DO = 5.61

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

QA CHECK BY: Amy Leonard 12/08/03
(Signature and Date)

SLUG TEST RECORD

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

WELL NO.: 174	DATE STARTED: 12-04-03	DATE COMPLETED: 12-04-03	
LOCATION: FBQ	RECORDED BY: R BAILEY		

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

REFERENCE POINT TOC/BGS	REFERENCE POINT ELEVATION	RISER CASING I.D. (IN)
SCREEN OR OPEN HOLE I.D. (IN) 2	DIAMETER OF BOREHOLE (IF SCREENED) 6"	

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	26.06		TOP OF FILTER PACK	9'	
DEPTH TO WATER	14.74		TOP OF SCREEN OR OPEN HOLE	12"	
HEIGHT OF WATER COLUMN	11.32		SCREEN LENGTH	10'	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
FBQ 174	SLUG IN	12/04/03	12/04/03	1040	1255	21.06	14.74	14.221	11.32	11.839
FBQ174	SLUG OUT	12/04/03	12/04/03	1255	1510	21.06	14.74	14.771	11.32	11.289

STORAGE LOCATION OF DATA: 1) 2)

FILE STRUCTURES	DATA TYPE	FORMAT (1)	UNITS	TEST TIME INTERVAL: LOG SCALE	TEST TIME INTERVAL: ARITH. SCALE	COMMENTS
COLUMN B	TIME	CL	HH:MM:SS	✓		
COLUMN C	TIME	ET	~~HH:MM:SS~~ MIN			
COLUMN E	DEPTH	H	~~FT~~ M20			

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY DATE QA CHECK BY DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/16/03 Su M Tu W (Th) F Sa PAGE 1 OF 6

Task Team Members:

Mark Deering
Tony Brister (Tol Test)
Chris White (")
John Moore (Tol Test)
Steve King (MKM)

Narrative (include time and location): FBQ-175

1030: Mob to location (pre-cleared by S. King)
1040: Set-up
1050: Begin to SS sample (Note: too hard to push a Shelby tube -- would crush)
1112: SS refusal encountered @ 4'3"; auger seated to 4'8" bgs (nominal auger refusal); prep. to rock core (Christenson NX core barrel)
1200: Begin rock coring @ 4'8" bgs
1220: End 1st core run
1229: Begin 2nd " "
1246: End " " "
1314: Check D.T.W. in augers -- 14.2' bgs (+ rising); set-up to ream borehole (to 22' bgs) in prep. of mon. well construction
1322: Begin reaming borehole w/ tricone roller bit
1530: Ended day @ 16' bgs w/ reaming -- " " worn-out (won't advance). drillers will obtain another one by tomor. A.M. from their shop in Toledo

Daily Weather Conditions: A.M. Cloudy, sprinkling rain, 55°F

P.M.

Recorded By Mark Deering QA Checked By

Shelby tubes used - 0

190

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/17/03 Su M Tu W Th (F) Sa PAGE 1 OF 6

Task Team Members:

Mark Deering (Spec Pro) Chris White (Tol Test)
Steve King (MKM) John Moore (")
Tony Brister (Tol Test)

Narrative (include time and location):

0900: Drillers begin to ream borehole, in prep. for mon. well construct., 14-22.5' bgs
1005: Reaming complete; let borehole sit to evaluate apparent yield
1030: Blow-out borehole -- yield looks more than sufficient for mon. well purposes; let sit another 15 mins. to allow more g.w. recov., then to blow-out again to clean-out more cuttings (in particular, in consideration of yesterday's "dull-bit" drlg.)
1045: Blow-out borehole -- apparent good yield again; prep. to construct mon. well
1050: Begin to construct mon. well
1130: Completed well construct. (w/ exception of pro. csg., protect. posts, + concrete pad); begin to de-mob. from location
1330: Pro. csg., protect. posts, concrete pad completed; W.L. measured (13:50); prep. to leave location

Daily Weather Conditions: A.M. Sunny, 45° F

P.M.

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12-29-03 Su M Tu W Th F Sa PAGE 3 OF 4

Task Team Members:

ANDRE LEON

THONDA BAILEY

Narrative (include time and location):

1245 - ARRIVED AT FBQ-176
DIST TO WATER = 15.'05" // DIST TO BOTTOM - 25.'77
1300 - IDITIAL READING W/ BAILER
pH 7.68 TEMP 12.1 TURB >999 COND 165.4 DO 10.18
need 44 gal for 5 Vt, or 61 gal for 7 Vt
1340 - 6 GAL REMOVAL, Pump quit, Start Bailing
pH 7.51 TEMP 11.4 TURB 999 COND 199.7 DO 0.24
1430 - 5 GAL REMOVAL - 2nd Pump quit - reached bottom got reading of 25.2'
pH 7.34 TEMP 11.1 TURB 999 COND 186.7 DO 4.13
Began bailing. ~~Pump~~ Whaler running.
1506 - 2 gal removed whaled & bailed
1507 Well dry. Depth of Well - 25.8
Depth of H2O - 25.8
1512 - Stopped and moved on to FBQ-17A.
Total of 13 gal removed, 31 gal need for 5 Vt
12/4/03

Daily Weather Conditions: A.M. _____

P.M. _____

Recorded By Randall Bailey QA Checked By Amy Greenwood

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/4/13 Su M Tu W Th F Sa PAGE 4 OF 6

Task Team Members:

Andrea Lee

Kenda Bailey

Narrative (include time and location):

0910 - Arrive @ FTR 175.

0920 - ~~Begin to~~ Resume development of H_2O Dpth 16.29', 25.76'. Well depth

0930 - INITIAL READING

pH 7.11 TEMP 12.9 TURB >999 COND 1829 DO 8.55

0935 - STARTED WHALER

0940 - 3 GALLON REMOVAL, Whaler @ bottom - siphon stops

21.6 DEPTH TO WATER & PURGING due to recharge. Water still turbid

0950 - 2 GALLON REMOVAL

pH 7.22 TEMP 11.9 TURB >999 COND 1867 DO 4.23

1005 - RESTARTED WHALER 1 GAL REMOVAL

24.7 - DEPTH TO WATER & PURGING

1006 Begin bailing, ~~3 bails~~

1009 3 bails / depth to H_2O 24.92' .84'

1012 2 bails depth to H_2O 24.96' .84'

1017 2 bails depth to H_2O 24.68' 1.98'

Daily Weather Conditions: A.M. Sunny. 60's

P.M.

Recorded By Kenda Bailey QA Checked By Amy Greenawald

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10 30 03 Su M Tu W (Th) F Sa PAGE 5 OF 6

Task Team Members:

Andre Leon

Randy Bailey

Narrative (include time and location):

1018 2 bails depth to H_2O 25.23' - .53'

1020 3 bails depth to H_2O 25.31' - .45'

1022 2 bails 25.32

1030 FINAL READINGS

pH 7.10 TEMP 12.5 TURB 999 COND 1992 DO 6.62

25.1 - DEPTH TO WATER

25.76 - DEPTH TO GROUND

1035 - Removed 1.5 gal. Stop development ~~of~~ of well. Above depth to H_2O readings and rate of recharge constitutes dry well. As per EPA advisement of FBR 166, "Well has gone dry twice, Cease development.

1040. Leave and proceed to another well.

KAB

12/04/03

Daily Weather Conditions: A.M. Sunny, 50's

P.M.

Recorded By KAB QA Checked By Amy Greenawalt

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11 18 03 Su M (Tu) W Th F Sa PAGE 6 OF 6

Task Team Members:

Ronda Bailey

Andre Leon

Narrative (include time and location):

1430 - Arrive @ FBQ 175. Begin purge and well sampling. Take initial Reading: DOW: 25.78' DOH$_2$O 16.2'.

1520 - Bailed 6 gal: well dry "/facility will return within 24 hrs. DOW - 25.8' DOH$_2$O - 25.19'

11 19 03 - 0900 - Arrive @ FBQ 175, Depth of well 25.78' DOH$_2$O - 16.02 Begin sampling FBQmw175 0524GW metals filtered

0940 DOW - 25.78 DOH$_2$O - 17.38, Leave well

12 02 03 1530 Arrive @ FBQ 175 for Slug in. 16.73'

1549 Slug in Leave well

12 03 03 0925 - Arrive @ FBQ 175. Extract data

0930 - Slug out. Leave well

1240 - Arrive @ FBQ 175. Extract data. Complete test

1250 - Leave well for FBQ 176

Daily Weather Conditions: A.M. 0

P.M. Overcast, Low 50s

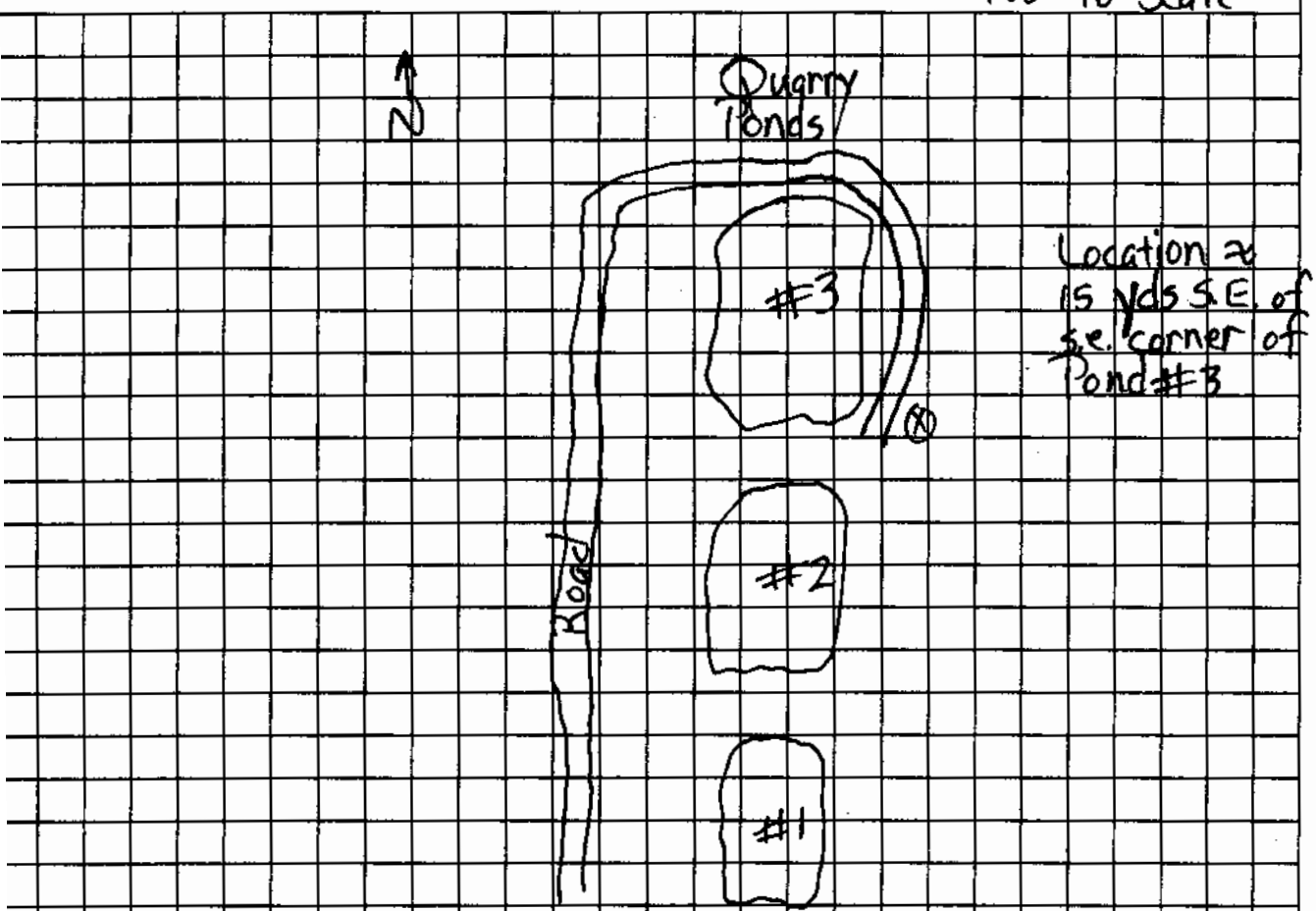
Recorded By [signature] QA Checked By Amy Greenawalt

TRW DRILLING LOG

COMPANY NAME: SpecPro, Inc.	DISTRICT: Louisville	HOLE NUMBER FBQ-175
	2. DRILL SUBCONTRACTOR: Tol Test	SHEET 1 OF 1
PROJECT: Fuze & Booster/RVAAP	4. LOCATION: Fuze & Booster Quarry Landfill/Pond	
NAME OF DRILLER: Tony Brister	5. MANUFACTURERS DESIGNATION OF DRILL: CME-550	
TYPES AND TYPES OF DRILLING & SAMPLING EQUIPMENT: CME-550 ATV Aug Rig 10.25" (O.D.) / 6.25" I.D.	8. HOLE LOCATION: FBQ-175	
	9. SURFACE ELEVATION:	
	10. DATE STARTED: 10/16/03	11. DATE COMPLETED: 10/17/03
OVERBURDEN THICKNESS: 4'	15. DEPTH GROUNDWATER ENCOUNTERED: 14.2' bgs (& rising) in augers v on 10-16-03	
DEPTH DRILLED INTO ROCK: 18'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 13.1' bgs / 3 hr 45 min	
TOTAL DEPTH OF HOLE: 22' bgs	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):	

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES: 2			
SAMPLES FOR CHEMICAL ANALYSIS: N/A	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY: 100%
DISPOSITION OF HOLE: Mon. well constructed	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR: M.T. Koering		

LOCATION SKETCH/COMMENTS — SCALE: Not to Scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-175

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 1 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS ©	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	1	Dk brn silty Topsoil, damp, organic (roots, grass), tr fn grv to 5" bgs; change to yel brn (SM) silty fn-med Sand (SW) damp, tr-ltl fn grv, loose-dense to 1' bgs; change to yel brn, fn-med Sand, damp, loose	∅ PPM			Blow Counts: 3-7-10-12 Recov.: 18"
	2		∅			Blow Counts: 8-12-17-5~~6~~ Recov.: 12"
	3	Yel brn Sand A/A (SW) ltl-some fn-med grv, damp (2-4' bgs SS)				
	4					
	5	Dk red Ss (med gr) frags, dry-damp (top of weathered bedrock)	∅			Blow Counts: 50/3 Recov.: ~~6~~" 3" ~~mtrx~~
	6	Dk red Ss A/A, damp to 6'8" bgs; change to org-red Ss (med gr), damp to 7'3", then return to dk red Ss A/A, damp to 8'4"; change to org-red Ss A/A, grading to tan Ss (med gr), damp-moist to 10'9" bgs; change to dk red A/A once again (note: throughout this whole interval, the Ss is hard, well sorted, w/ apparent good poros., & is occasionally fractured -- although this is likely the result of the coring stresses		FBQ-175 C-1		Begin coring @ 4'8" bgs
	7					
	8		∅			
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-175

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 2 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11	Dk red med Ss, damp to moist, well sorted, hard, occasional fractures (however, likely mechanical from coring) to 15'11" bgs, 20 RQD, appears to be good	0 PPM			
	12					(100% recov. -- 7'5")
↓	13					End 1st core run @ 12'1" bgs, begin 2nd run here; some water @ begin. of 2nd run (wet)
	14					
	15					
	16	@ 15'11" change to Ss A/A, except, org- → red grading to tan in color (by ≈ 18' bgs), wet				Ream to 16' bgs on 10-16-03
MW-11	17		ϕ			
	18					
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER FBQ-175

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21	Tan Ss A/A, wet	Ø PPM			
	22					End of 2nd core run @ 21'10" -- 100% recov. (9'9") Ream to 22.5' bgs (from 16') on 10-17-03
	T.D.					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-175 MW

INSTALLATION START: DATE: 10/17/03 TIME: ~~10/17~~ 10:50

INSTALLATION FINISH: DATE: 10/17/03 TIME: 11:30

ANNULAR SPACE MATERIALS INVENTORY:

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

BENTONITE SEAL: TYPE: Cetco Volclay/Pure Gold Bentonite Pellets QUANTITY: 1 bucket

GROUT: TYPE: Portland/Bentonite (Baroid Benseal) QUANTITY: 2X 92lb/1X50lb bags

DESCRIPTION OF WELL SCREEN:

SLOT SIZE (inches): 0.01" 2" ("10") SLOT CONFIGURATION: Slotted MW

OUTSIDE DIAMETER: 2" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson w/

JOINT DESIGN AND COMPOSITION: Flush joint ("O" rings)

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

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

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

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

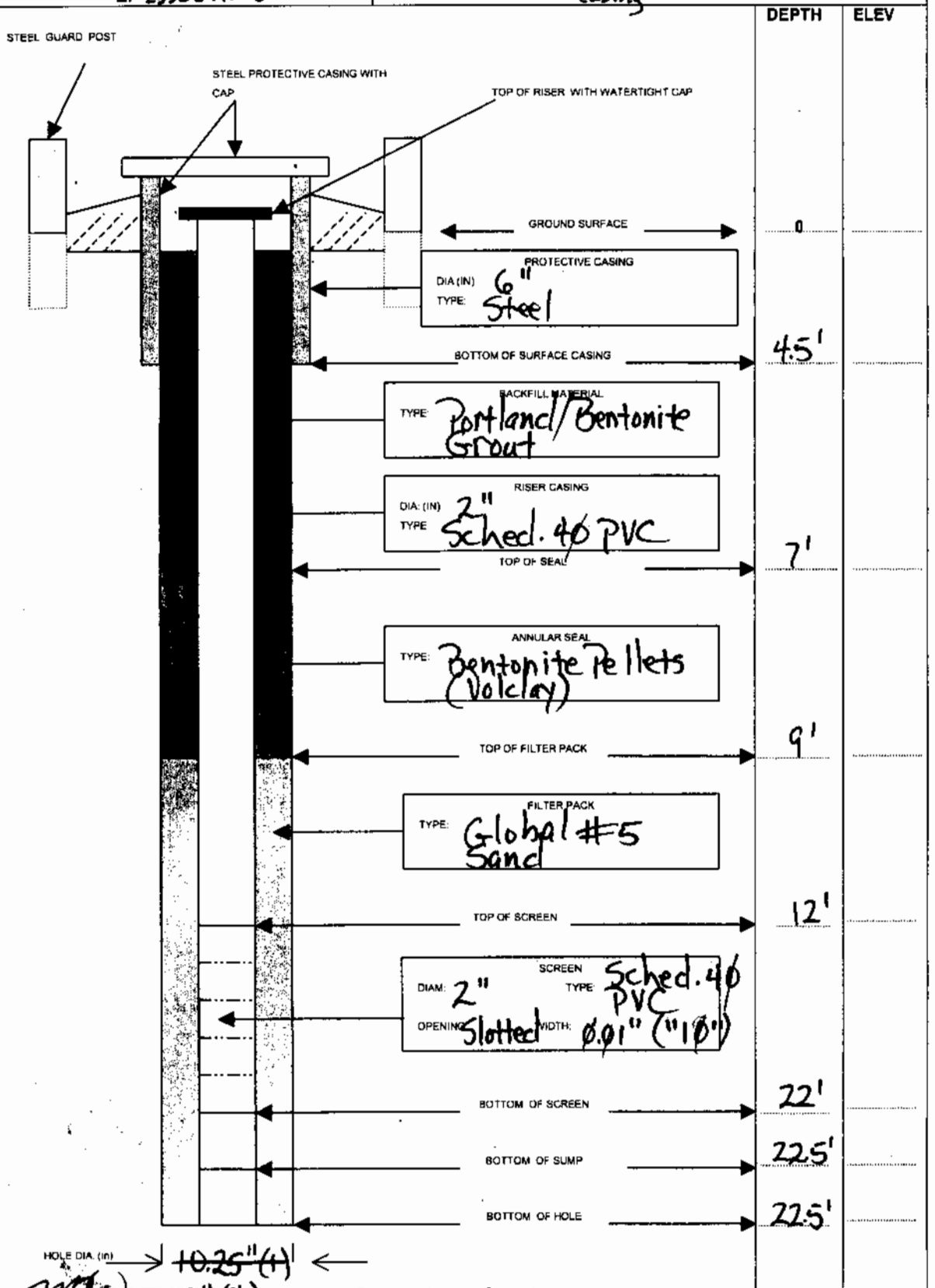
QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

RECORDED BY: M.J. Deering 10-17-03 (Signature and Date) QA CHECK BY: [signature] 12/3/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

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

WELL NUMBER: FBQ-175	**BEGIN:** 10-17-03/10:50 **END:** 10-17-03/11:30
COORDINATES: N: 553989.24 E: 2350297.98	**REFERENCE POINT:** ~~top~~ inner casing **ELEVATION:** 1140.75 ft.



WELL VOLUME CALCULATION SHEET

Date: 1/29/03 Time: 1245

Well ID: FBQ 175

Well Location: _____

Total Depth of Well (ft BTOC) 25.77'
Depth to Water (ft BTOC) 15.65'
Height of water column (ft) (Hc) 10.12'

Well Volume Calculation:

Vc = $3.142(Rc^2)*Hc$ .219 cu. ft.
.1089 .01 10.12'

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

Vt = (Vc+Vf)*(7.48 gal/cu. ft.)
= 8.69 gal. x 5 = 43.47 gal ≈ 44
x 7 = 60.83

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 10.12' (ft)
Rf = Radius of filter pack (0.33 ft) .1089
Rc = Radius of inside casing (0.083 ft) - .0689

WELL DEVELOPMENT FORM

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

Date: 10/29/03 RSK

Well Number and Location: FBQ 175

Development Crew: Andrea Lee
Randi Bailey

Driller (if applicable): _____

Water Levels/Time: Initial: 15.65 / _____ Pumping: _____ / _____

Final: _____ / _____

Total Well Depth: Initial: 25.77 Ft BTOC Final: _____ Ft BTOC

Date and Time: Begin: _____ / _____ Completed: _____ / _____

Development Method(s): Bailer + Whaler

Total Quantity of Water Removed: 13+6.5 = 19.5 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85	10 30 03
Specific Conductivity	YSI 85	"
pH	pH meter 3+	"
Turbidity	Lamotte 2008	"

GROUNDWATER PURGE SHEET

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

DATE (mm/dd/yy): 11/18/03 TIME: 14:30

WELL ID NUMBER: FBQ 175 WELL LOCATION: FBQ

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

INNER CASING: TYPE: _____ ID: _____ inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ .207

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2]$ (TD-S or H) (P) .89

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

$Vt = (Vc + Vf)\ (7.48)$ 8.22

WHERE:

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

dH = diameter of borehole, ft.
TD = total depth of well from top of well casing, ft. - 25.78; 25.80
H = depth of water, ft., from top of well casing - 16.2; 25.19
S = depth to base of seal, ft., from top of well casing

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 25 GAL.

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

SITE CONDITIONS DURING PURGING: Overcast low 60s

FIELD OBSERVATIONS: _____

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

RECORDED BY: _____ 11/18/03 (Signature and Date) QA CHECK BY: Amy Greenawald 12-08-03

APPENDIX C

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ 175 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/18	1438	Initial	13.1	147.4	5.81	42.5			DO-6.16
↓	1529	6	13.1	163.4	6.16	>99.9			DO-7.48

RECORDED BY: [signature] 11/18/03 (Signature and Date)

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

APPENDIX C

SLUG TEST RECORD

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

WELL NO.:	175	DATE STARTED:	12-02-03	DATE COMPLETED:	12-03-03
LOCATION:	FBQ	RECORDED BY:	R. BAILEY		

EQUIPMENT INFORMATION SUMMARY

EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NO.	RANGE (PSI)	LAST CALIB.
DATA LOGGER	INSITU MINI	TROLL			
TRANSDUCER					
WATER LEVEL	HERON	DIPPER-T	61512		

PRETEST DATA

REFERENCE POINT	TOC/BGS	REFERENCE POINT ELEVATION		RISER CASING I.D. (IN)	
SCREEN OR OPEN HOLE I.D. (IN)	2		DIAMETER OF BOREHOLE (IF SCREENED)		6"

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	25.77		TOP OF FILTER PACK	9'	
DEPTH TO WATER	16.73'		TOP OF SCREEN OR OPEN HOLE	12'	
HEIGHT OF WATER COLUMN	9.04		SCREEN LENGTH	10'	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
FBQ 175	SLUG IN	12/02/03	12/03/03	1549	0930	20.77	16.730	16.817	9.04	8.953
FBQ 175	SLUG OUT	12/03/03	12/03/03	0930	1240	20.77	16.730	16.746	9.04	9.024

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/7/03 Su M Tu W Th F Sa PAGE 1 OF 5

Task Team Members:

Mark Deering — John Moore (TolTest)

Steve King (MKM) — Chris White (")

MPH Neil Wikstor (TolTest)

Narrative (include time and location):

0745: Begin to setup on FB4-17A; location re-cleared by S. King (moved ≈ 10' from orig.)

0810: Push Shelby tube ½-2' bgs

0815: Begin to SS sample

1030: Complete SS sampling and cleaning-out borehole

1050: Begin to construct monitoring well

1300: Complete well construction and pull-off location (Note: well-pad and protector post collars will be completed later) MPH

12/03

Shelby Tubes used: 1

Daily Weather Conditions: A.M. Foggy, 40°F

P.M. Sunny, 60°F

Recorded By Mark Deering QA Checked By

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10-24-03 Su M Tu W Th (F) Sa   PAGE 2 OF 5

Task Team Members:

Chandler Carroll

Andre Leon

Randa Bailey

Narrative (include time and location):

9:00 Arrive on Well FBQ-176 to begin development

initial ~~ph~~ reading

ph 7.3 DO 3.94 Cond 110.1 turb. 104.4 Temp 11.7

9:15 Whaler very slow, pumped out 1½ gal and then went backwards and began to bail instead

10:00 5 Gal removed

ph 6.61 DO 4.67 Cond ~~[illegible]~~ 104.3 turb >999 temp 11.9

10:30 5 GAL REMOVED

pH 6.41 DO 3.80 COND 107.9 TURB >999 TEMP 12.8

1056 5 Gal Removed

~~ph~~ 6.35 DO 4.58 Cond 105.6 Turb >999 Temp 12.4

11:15 5 GAL REM

pH 6.45 DO 3.39 COND 103.1 TURB >999 TEMP 12.7

11:40 5 GAL REM

pH 6.45 DO 3.61 COND 99.2 TURB >999 TEMP 12.0

12:00 5 Gal Removed

pH 6.36 DO 2.85 COND 132.0 Turb >999 Temp 12.4

Daily Weather Conditions: A.M. Sunny, cool, lt. breeze, 40-50's

P.M.

Recorded By Chandler Carroll   QA Checked By [signature]

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11/24/03 Su M Tu W Th F Sa PAGE 3 OF 5

Task Team Members:

Chantelle Carroll

Andre Leon

Randi Bixby

Narrative (include time and location): (Removed 3 add'l gal)

12:18 Stopped bailing, Returned to Whaler

Whaler pumped 2 gallons and stopped

12:25 Returned to bailing

12:40 pH 6.23 DO 3.98 Cond 131.1 Turb >999 Temp 12.4

(35 gal rem) ~~3~~ gallons removed (Reading taken when 5 gallons was reached)

~~pH~~ 13:10 5 Gallons removed

ph 6.41 DO 2.80 Cond ~~[illegible]~~ 130.4 Turb >999 Temp 12.4

1335

ph ~~[illegible]~~ 6.44 DO 2.13 Cond ~~[illegible]~~ 130.1 Turb >999 Temp 12.4

1400 Stopped development – 58 gallons removed

* 10-28-03 Because turb was so inconsistant – Spoke w/ Todd Fisher and Connie Cambridge (Telephone) regarding this well. They both confirmed this well is developed due to all avenues tried.

RB 12/4/03

Daily Weather Conditions: A.M.

P.M. Sunny High 50s

Recorded By: Chantelle Carroll QA Checked By: Randi Bixby

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11 10 03 Su (M) Tu W Th F Sa PAGE 4 OF 5

Task Team Members:

[signature]

[signature]

Narrative (include time and location):

1220 - Arrive @ FBQ 176 9.6g = V_t ; 5V_t = 48g
V_t = 38.4 bailers
Initial reading: DOW. = 24.1' D.O. H_2O = 8.98'
pH 6.69, Temp 14.0, COND 129.0, TURB 999, DO 2.39
1250 - 2ND READING AFTER 6 GAL REMOVAL
pH 6.48, Temp 13.4, COND 128.5, TURB 999, DO .76
1310 - 3RD READING AFTER 6 GAL REMOVAL
pH 6.40, Temp 12.7, COND 125.2 TURB 999 DO 1.44
10% = pH ± .64 Temp ± 1.34, Cond ± 12.8, DO ± 1.5 (≈ Avg)
1329 - 6 gal removal
pH 6.37 Temp 12.4 Cond 126.9, DO 2.05
1340 - 6gal removal
pH. 6.42 Temp 12.5 Cond 123.4 Do. 2.41 Turb > 99.9
1400 - 6 gal removal. Retrieve samples. FBQmw 176 0326 GW. metals Filtered.
pH 6.39 Temp 12.1 Cond 124.6 DO 1.25 Turb > 99.9
1410 Leave Well

[initials] 12/04/03

Daily Weather Conditions: A.M. Sunny 45°

P.M.

Recorded By [signature] QA Checked By Amy Freeman

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/3/03 Su M Tu (W) Th F Sa PAGE 5 OF 5

Task Team Members:

Narrative (include time and location):

1217 - Arrive @ FBQ176. Depth to H2O - 9.72'
Set up slug test.
1230 Slug in
1235 - Leave well for FBQ175
1315 - Arrive to check "slug in"
1320 - Extract data - recovery ± 10%
1325 - Slug out & leave well
1514 - Arrive @ well check slug out test.
1530 - Extract data, Leave site, Complete test.

AG
12-08-03

Daily Weather Conditions: A.M. _____

P.M. Sunny 37°

Recorded By [signature] QA Checked By Amy Greenwald

HTRW DRILLING LOG

DISTRICT: Louisville

HOLE NUMBER: FBQ-176

1. COMPANY NAME: SpecPro, Inc.

2. DRILL SUBCONTRACTOR: TCI Test

SHEET 1 OF 1

3. PROJECT: Fuze & Booster/RVAAP MAD

4. LOCATION: Fuze & Booster Quarry Landfill/Pond

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

6. MANUFACTURERS DESIGNATION OF DRILL: CME-75

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

8. HOLE LOCATION: FBQ-~~177~~ 176 MAD

9. SURFACE ELEVATION:

10. DATE STARTED: 10/7/03

11. DATE COMPLETED: 10/7/03

12. OVERBURDEN THICKNESS: 17' ~~bgs~~ MAD

15. DEPTH GROUNDWATER ENCOUNTERED: ≈ 14' bgs (10/7/03)

13. DEPTH DRILLED INTO ROCK: 4.5' bgs MAD

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: ~~6.4" (GS)~~ 6.4' ~~bgs~~ MAD / 25 hr 30 min

14. TOTAL DEPTH OF HOLE: 21.5' bgs

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

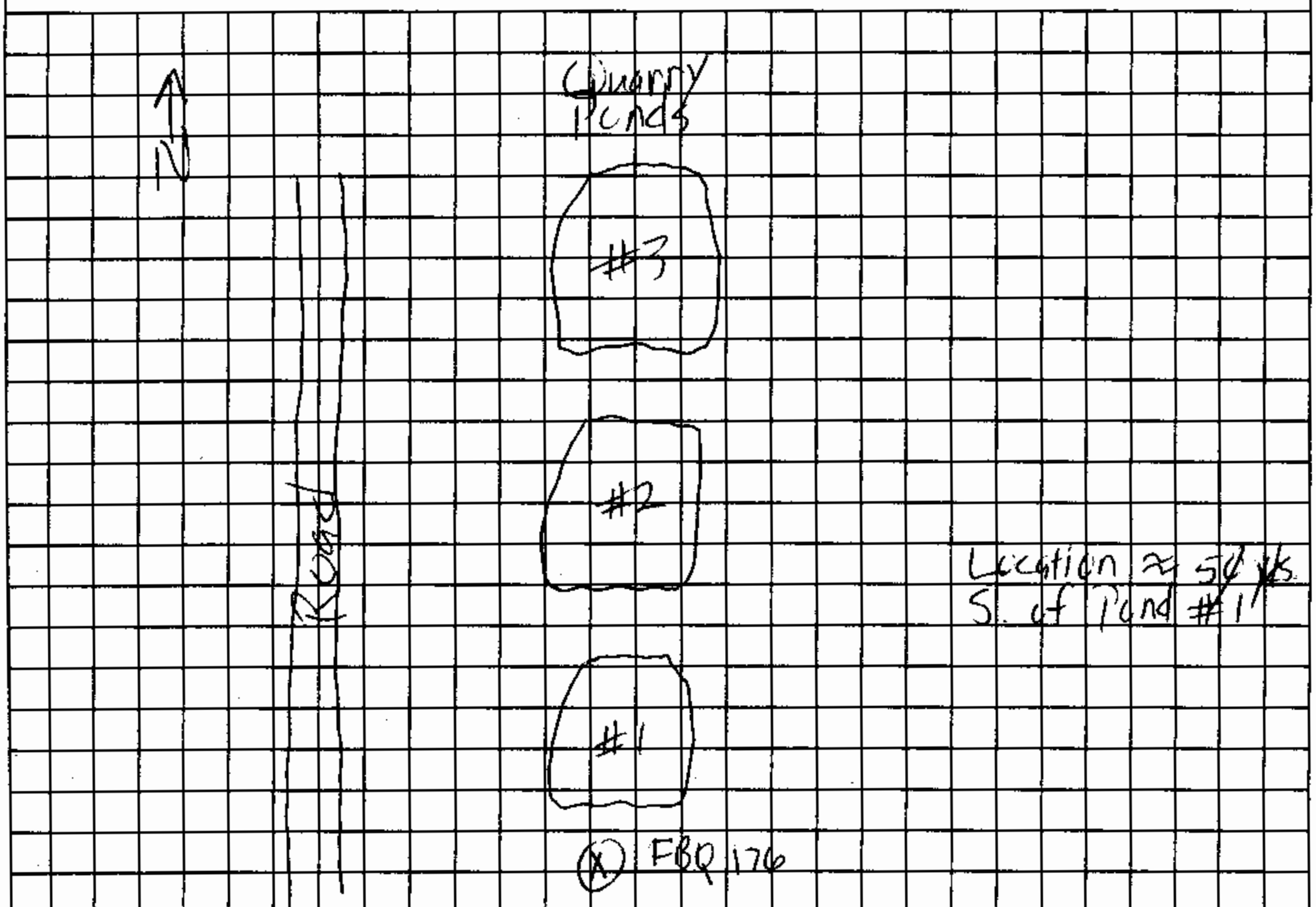
18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES N/A

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

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Mon. well constructed				M. A. Deering

LOCATION SKETCH/COMMENTS

SCALE: Not to scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-176

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 1 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS ©	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	Yel brn silty Clay, (CL) damp - moist, soft, plastic	ϕ PPM	FBQ-176 (ST-1)		Push Shelby tube: ϕ-2' bgs; recov. 16"
	1					
	2	Silty Clay A/A	ϕ			Blow Counts: 4-4-5-5 Recov.: 6"
	3					
	4	Silty Clay A/A; broken dk red Ss in SS + TP (quarry spoil?)	ϕ			Blow Counts: 8-15-14-12 Recov.: 6"
	5					
MW	6	Yel brn clayey Silt (ML) tr fn-~~med~~ Sse gr'l, dry, dense, tr dk brn-blk org. mater.	ϕ			Blow Counts: 22-24-25-22 Recov.: 18"
	7					
	8	Clayey Silt A/A, w/ dk red Ss frags. A/A, dry - damp	ϕ			Blow Counts: 17-14-8-10 Recov.: 14"
	9					
	10					

HTRW DRILLING LOG

HOLE NUMBER FBQ-176

PROJECT: Fuze & Booster/RVAAP | INSPECTOR Mark Deering | SHEET 2 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	11	(ML) Olv brn Silt, tr-ltl fn-med grv, dry-wet (top of SS), ltl dk organic material A/A	ϕ PPM			Blow Counts: 12-14-19-22 Recov.: 14"
	12	v.fn.-fn. Med gry to ltl olv brn silty Sand, some org-brn mottling, tr dk organic matter., layered (thin/fine), dry, dense (SM)	ϕ			Blow Counts: 15-25-32-32 Recov.: 18"
	13					
	14	(SW) -SM Med gry v.fn. Sand, layered (thin/fine -- shaly), org-brn mottling, wet-sat. (Water table est. @ ≈ 14' bgs)	ϕ			Blow Counts: 22-25-50/4 Recov.: 13"
	15					
	16	(SW-SM) Shaly Sand A/A grading to med gry sandy Shale, fissile, soft-med/hard, some org mottling, sat. @ 17' bgs	ϕ			Blow Counts: 27-40-50/6 Recov.: 11½"
	17					
	18	Dk gry Shale, med hard, v. fissile, sat.	ϕ			Blow Counts: 9-50/6 Recov.: 10"
	19					
	20					

HTRW DRILLING LOG

HOLE NUMBER FBQ-176

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 3

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	21	Med - dk gry Shale AA	0 PPM			Blow Counts: 5/5/5 Recov.: 5"
		T.D.				
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-176

INSTALLATION START: DATE: 10-7-03 TIME: 10:50

INSTALLATION FINISH: DATE: 10-7-03 TIME: 13:00

ANNULAR SPACE MATERIALS INVENTORY:

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

BENTONITE SEAL: TYPE: Enviro-Clay Pure Gold Bentonite Pellets QUANTITY: 1 bucket

GROUT: TYPE: Portland/Bentonite QUANTITY: 2x92 lb bag / 1x50 lb bag

DESCRIPTION OF WELL SCREEN:

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

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

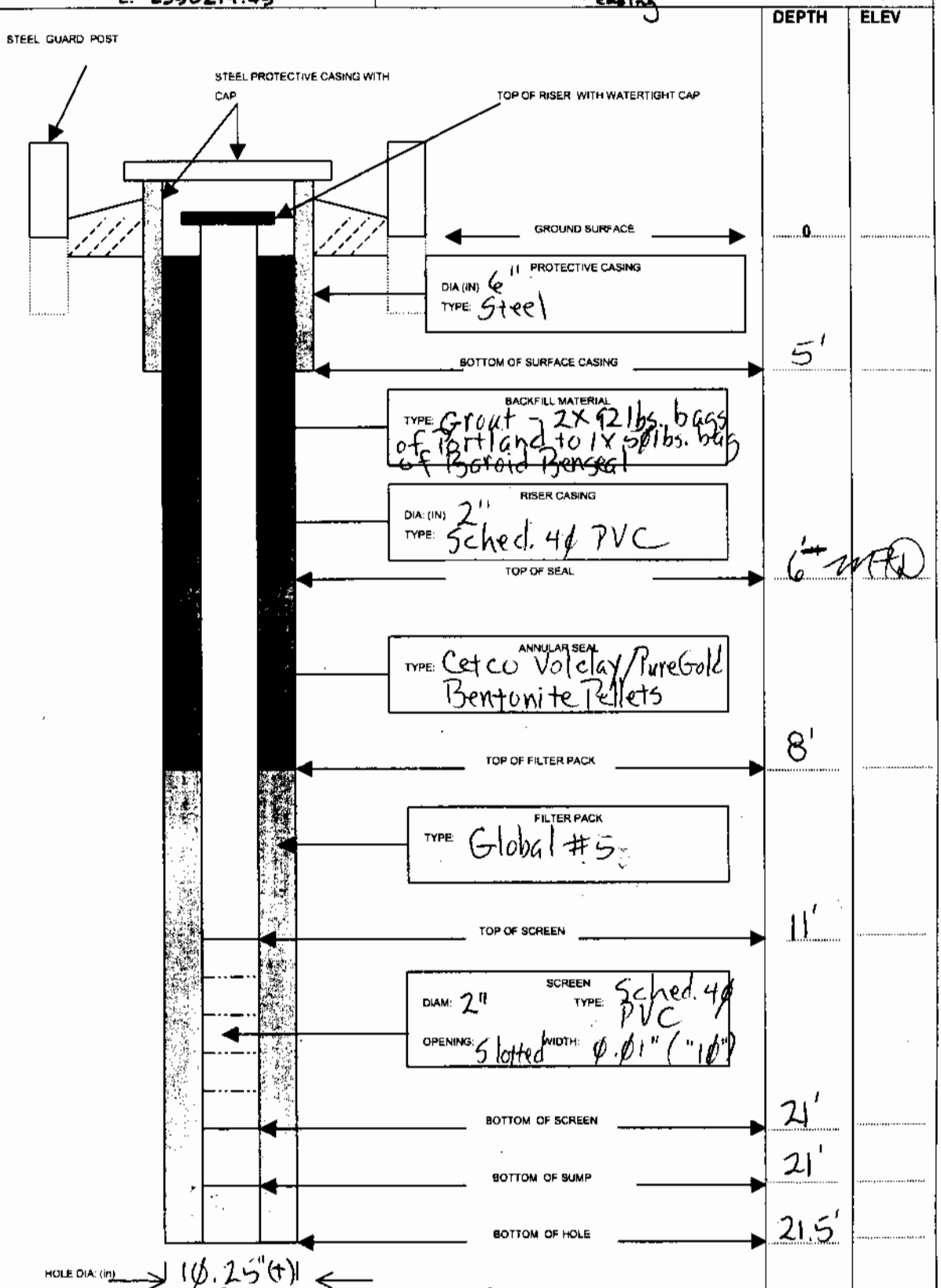
RECORDED BY: M.T. Deering 10-7-03 (Signature and Date) QA CHECK BY: [signature] 12/8/03 (Signature and Date)

MONITORING WELL CONSTRUCTION DIAGRAM

MPD

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

WELL NUMBER: FBQ-17e	**BEGIN:** 10-07-03/1050	**END:** 10-7-03/1300
COORDINATES: N: 559273.33 E: 2350219.45	**REFERENCE POINT:** top inner casing	**ELEVATION:** 1131.91 ft.



WELL VOLUME CALCULATION SHEET

Date: 10-24-03 Time: 9:00

Well ID: FBO-176

Well Location: Fuze Booster

Total Depth of Well (ft BTOC) 24.15
Depth to Water (ft BTOC) 8.40
Height of water column (ft) (Hc) 15.75

Well Volume Calculation:

Vc = $3.142(Rc^2)*Hc$ .34 cu. ft.

Vf = $3.142[(Rf^2)-(Ro^2)]$*(Hc or length of screen)*(0.30) .11 − .01
Note use length of screen if Hc>length of screen
= .94 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu. ft.)
= 9.6 gal. 9.6 * 5 = 48 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 15.75 (ft)
Rf = Radius of filter pack (0.33 ft)
Rc = Radius of inside casing (0.083 ft)

WELL DEVELOPMENT FORM

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

Date: 10 24 03

Well Number and Location: FBQ-176

Development Crew: Andre Leon
Chantelle Carroll

Driller (if applicable): n/a

Water Levels/Time: Initial: 8.40 (level) / 9:00 (time) Pumping: ____ / ____
Final: 8.9 / 14:00

Total Well Depth: Initial: 24.15 Ft BTOC ~~24.15~~ Final: 24.15 Ft BTOC

Date and Time: Begin: 10/24/03 9:00 Completed: 10/24/03 / 1400

Development Method(s): whale pump & bailer

Total Quantity of Water Removed: 58 gals

FIELD MEASUREMENT	SERIAL NUMBER	DATE OF LAST CALIBRATION
Temperature	YSI 85 98C0754	10-24-03
Specific Conductivity	YSI 85/98C0754	10-24-03
pH	pH Testr 3+	10-24-03
Turbidity	LaMotte model 2008	10-24-03

GROUNDWATER PURGE SHEET

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

DATE (mm/dd/yy): 11/10/03 TIME: 12:20

WELL ID NUMBER: FBQ 17U WELL LOCATION: FBQ, SE of S. Pond

DEPTH OF SCREENED INTERVAL (BTOC): ~~24.1~~ ft to 24.1 ft

INNER CASING: TYPE: PVC ID: 2" inches

WELL VOLUME CALCULATION $Vc = 3.142 \times (di/2)^2 \times (TD-H)$ ~~8.51~~

$Vf = 3.142 \times [(dH/2)^2 - (do/2)^2]$ (TD-S or H) (P) .94

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

$Vt = (Vc + Vf)$ (7.48) 10.8

WHERE:

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

dH = diameter of borehole, ft.
TD = total depth of well from top of well casing, ft. 24.1
H = depth of water, ft., from top of well casing ~ 8.08
S = depth to base of seal, ft., from top of well casing

24.1
8.5

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

MINIMUM PURGE VOLUME = Vt x 3 PURGE VOLUME: 32.4 GAL.

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

SITE CONDITIONS DURING PURGING: _____

FIELD OBSERVATIONS: Water is very silty.

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

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

QA CHECK BY: [signature] 12-08-03 (Signature and Date)

APPENDIX C

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ-176 PAGE 1 OF 1

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (Standard Units)	TURBIDITY	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
11/10/03	1220	Init.	14.0	129.0	6.69	>99.9			D.O = 2.30
	1250	6	13.4	128.5	6.42	>99.9	6		DO = .76
	1310	6	12.7	125.2	6.46	>99.9	12		DO = 1.44
	1320	6	12.4	126.9	6.37	~~>99.9 126.9~~	18		DO = 2.05
	1340	6	12.5	123.4	6.42	>99.9	24		DO = 2.41
	1400	6	12.1	124.6	6.39	>99.9	30		DO = 1.25

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

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

SLUG TEST RECORD

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

WELL NO.:	176	DATE STARTED:	12-03-03	DATE COMPLETED:	12-03-03
LOCATION:	FBQ	RECORDED BY:	R BAILEY		

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

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

	FT BRP	MSL		FT BRP	MSL
TOTAL WELL DEPTH	24.15		TOP OF FILTER PACK	8'	
DEPTH TO WATER	7.72'		TOP OF SCREEN OR OPEN HOLE	11'	
HEIGHT OF WATER COLUMN	16.43'		SCREEN LENGTH	10	
TEST INTERVAL TYPE	LOG				

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

DATA LOGGER TEST NO.	FILE NAME	DATE (MM/DD/YY) BEGIN	DATE (MM/DD/YY) END	TIME (HH:MM:SS) BEGIN	TIME (HH:MM:SS) END	DEPTH TO TRANSDUCER (FT BRP)	DEPTH TO WATER (FT BRP) BEGIN	DEPTH TO WATER (FT BRP) END	HEIGHT OF WATER COLUMN (FT) BEGIN	HEIGHT OF WATER COLUMN (FT) END
FBQ 176	SLUG IN	12/03/03	12/03/03	13:33	14:22	19.15	7.720	7.698	16.43	16.452
FBQ 176	SLUG OUT	12/03/03	12/03/03	14:24	16:19	19.15	7.720	7.292	16.43	16.858

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY	DATE	QA CHECK BY	DATE

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10/16/03 Su (M) Tu W Th F Sa PAGE 1 OF 5

Task Team Members:

Mark Deering | ~~Neal~~ Niel Wiktor (TolTest)
Chris White (TolTest) | Steve King (MKM)
John Moore (") |

Narrative (include time and location):

* Note: ~~Tfc/ C. McCambridge - OEPA re~~ @ 845 AM today curing freq.; will core 3 boreholes (upgrad., mid-grd., + downgrad.) + as otherwise necess., i.e., only if signif. ~~geologi~~ geologic changes (i.e. contam. not issue)

0950: Mob to 1-BQ-177 and set-up on hole; location cleared for UXO by S. King

1022: Push first Shelby tube from 0-2.5'

1035: Begin cont SS samp'g

1206: Ceased SS samp'g.

1226: Ceased cleaning-out hole to 22'6" bgs

1236: Broke for lunch + to gather supplies for well construction

1305: Begin well construction

1330: Tfc w/ C. McCambridge - OEPA: reviewed drlg. results + well construct. plan

1445: Drlg. rig became stuck while installing protector posts

1615: Well installation complete (w/ exception of surf. concrete) (Note: will measure D.T.W. after well construction set-ups; est. W.L. today only)

Shelby tubes used - 1

Daily Weather Conditions: A.M. Sunny, 50°F

P.M. " , 55°F

Recorded By Mark Deering QA Checked By [signature]

230

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10-23-03 Su M Tu W (Th) F Sa PAGE 2 OF 5

Task Team Members:

Christelle Candi

Ronda Baley

Narrative (include time and location):

1500 Arrive: Set up to develop

1550: DO 13.4% Turb 54.7 ph 7.7 Cond 541 temp 12.1

initial reading, 3 g 1 gal + 2 gal = 3 gal removed.

(after 1 gal removed had to began bailing)

1608 DO 580 Turb 99.7% ph 7.9 Cond 238 temp 13.1

3 gal removed

1712. D.O 3.70 Turb 99% ph 7.74 Cond 257 temp 13.1

3 gal Removed

1810 3 gal Removed

1817 DO 3.63 Turb 99% ph 7.67 cond 254 temp 12.9

at total of 14 gal or 5 well volumes.

Continuing due to heavy silt in

suspension

1826 DO 3.79 Turb 99% ph 7.61 cond 260 temp 12.9

Daily Weather Conditions: A.M. _____

P.M. overcast, light snow intermit.

Recorded By Christelle Candi QA Checked By Ronda Baley

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 10-23-07 Su M Tu W (Th) F Sa PAGE 3 OF 5

Task Team Members:

Chandler Carroll

Randa Baby

Narrative (include time and location):

stopped bailing @ 12'9". Parameters stabilized. } 3gal removed + .5 + 1gal

19:10 Total gal removed = 13 gal - stopped

10/24 8:00 ~~Stopped~~ after a 12 hour period (Friday) Turb (avg) 34.8 in Mason jar reading with a 2" silt bottom

* 10/29 Due to turb again - discussed if well was completely developed w/ Todd Fisher & Connie Cambridge. They said yes due to consistant reading.

RB 12/04/07

Daily Weather Conditions: A.M.

P.M. Overcast, snow

Recorded By Chandler Carroll QA Checked By Randa Baby

Photos Jars ..

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 11/04/03 Su M Tu W Th F Sa PAGE 4 OF 5

Task Team Members:

Andrea Leon
Randi Bailey

Narrative (include time and location):

0915. Arrive @ FBQ 177. Review log for V_t. V_t = 2.8 gal $5V_t$ = 0 Hgal

0936 - Initial Readings: D.O.W = 24.9' D.O. H_2O = 11.9'
pH 7.32, Temp 13.5, COND 25p.p, Turb 140, DO 2.23
1000 - SECOND READING
pH 7.05 TEMP 14.3, COND 330.6 TURB 1999, DO 2.01
10% - ± .73pH, Temp ± 1.35 Cond ± ~~33.06~~ 25.06, Turb ± 14, D.O. ± .22 mg/l
One V_t taken
1006 - 2nd V_t 3rd reading
pH 7.19, TEMP 14.0 cond 332.6, Turb 1999, DO 1.53
1020 - AFTER 3RD V_t
pH 7.05, TEMP 13.9, COND 388, Turb 1999, DO 1.55
1055 - DOH_2O = 12.3', DOW 24.9. Retrieved samples
Depart Well. FBQ mw 177 0328 GW. Metals were filtered.

12/4/03

Daily Weather Conditions: A.M. Sunny, 28°

P.M.

Recorded By _____ QA Checked By Amy Steinwand

TASK TEAM ACTIVITY LOG SHEET

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

Date (mm/dd/yy): 12/2/03 Su M Tu W Th F Sa PAGE 5 OF 5

Task Team Members:

Ronda Baily

Narrative (include time and location):

1315 - Arrive @ FBQ 177. Set up slug test

10.72'

1318 - Slug in

1400 - Arrive for slug out. Not recovered within 120m. Return to office

12/3/03

0920 Arrive @ FBQ 177. H_2O displacement ≈ 1.2' - stable > 12 hrs. Extract data

0915 Slug out. go to FBQ 175

1200 Arrive to extract data

1211 - Pull out transducer, leave for FBQ 176. Test complete

Daily Weather Conditions: A.M. Sunny 26°F

P.M.

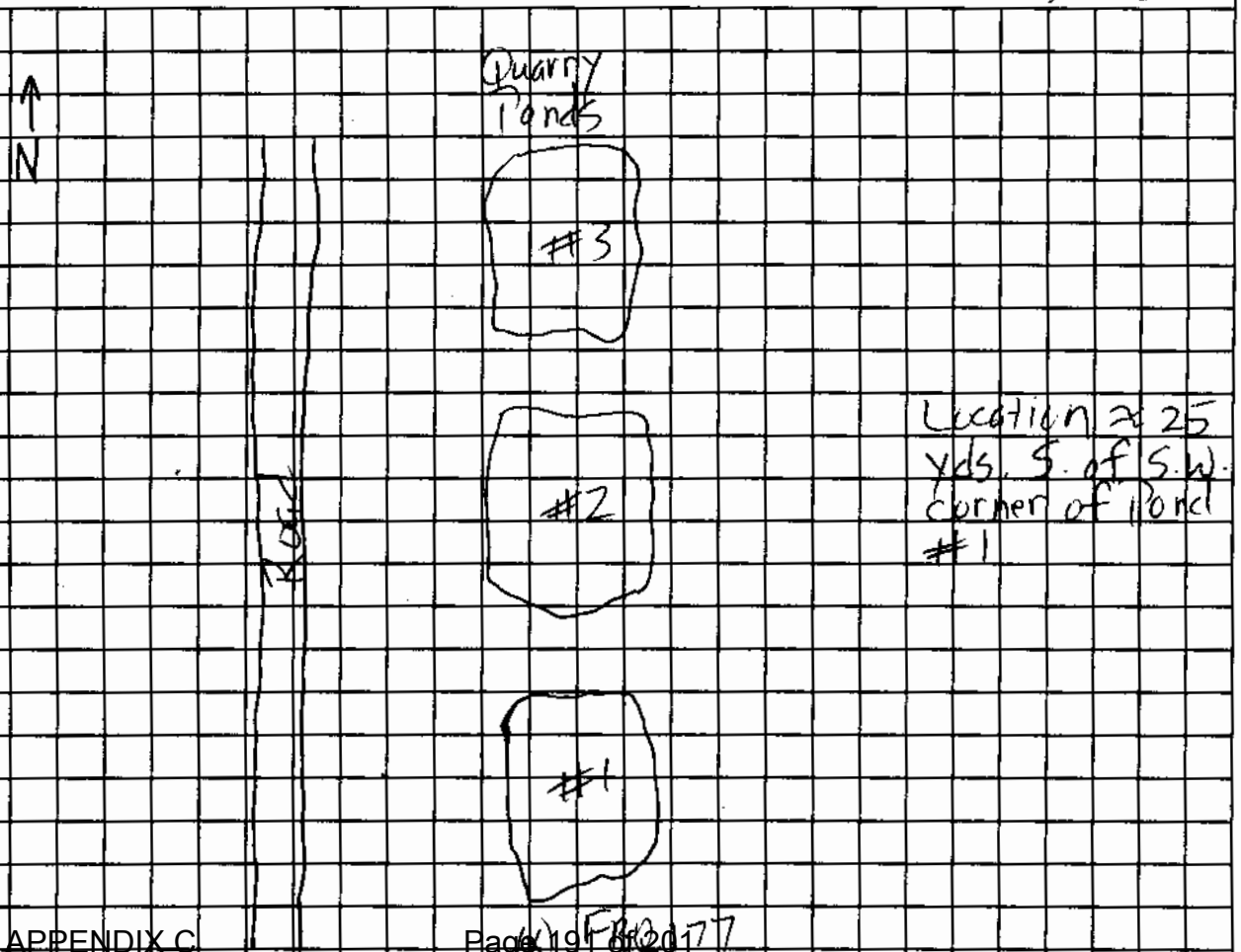
Recorded By Ronda Baily QA Checked By Amy Townsend

HTRW DRILLING LOG

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

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

LOCATION SKETCH/COMMENTS — SCALE: Not to scale



HTRW DRILLING LOG

HOLE NUMBER: FBQ-177

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 1 OF 3

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

HTRW DRILLING LOG

HOLE NUMBER FBQ-177

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 2 OF 3

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

HTRW DRILLING LOG

HOLE NUMBER FBQ-177

PROJECT: Fuze & Booster/RVAAP

INSPECTOR Mark Deering

SHEET 3 OF 3

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

MONITORING WELL INSTALLATION LOG

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

MONITORING WELL ID: FBQ-177

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

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

ANNULAR SPACE MATERIALS INVENTORY:

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

BENTONITE SEAL: TYPE: Petro Wyoming PureGold Bentonite Pellets QUANTITY: 1 bucket

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

DESCRIPTION OF WELL SCREEN:

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

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

DESCRIPTION OF WELL CASING:

OUTSIDE DIAMETER: 2¼" NOMINAL INSIDE DIAMETER: 2"

SCHEDULE/THICKNESS: Sched. 40 COMPOSITION: PVC

MANUFACTURER: Johnson

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

CENTRALIZERS DESIGN AND COMPOSITION: N/A

DESCRIPTION OF PROTECTIVE CASING:

NOMINAL INSIDE DIAMETER: 6" COMPOSITION: Steel

SPECIAL PROBLEMS ENCOUNTERED DURING WELL CONSTRUCTION AND THEIR RESOLUTION:

None

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

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

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

QUANTITY OF APPROVED WATER USED FOR FILTER PACK EMPLACEMENT: None

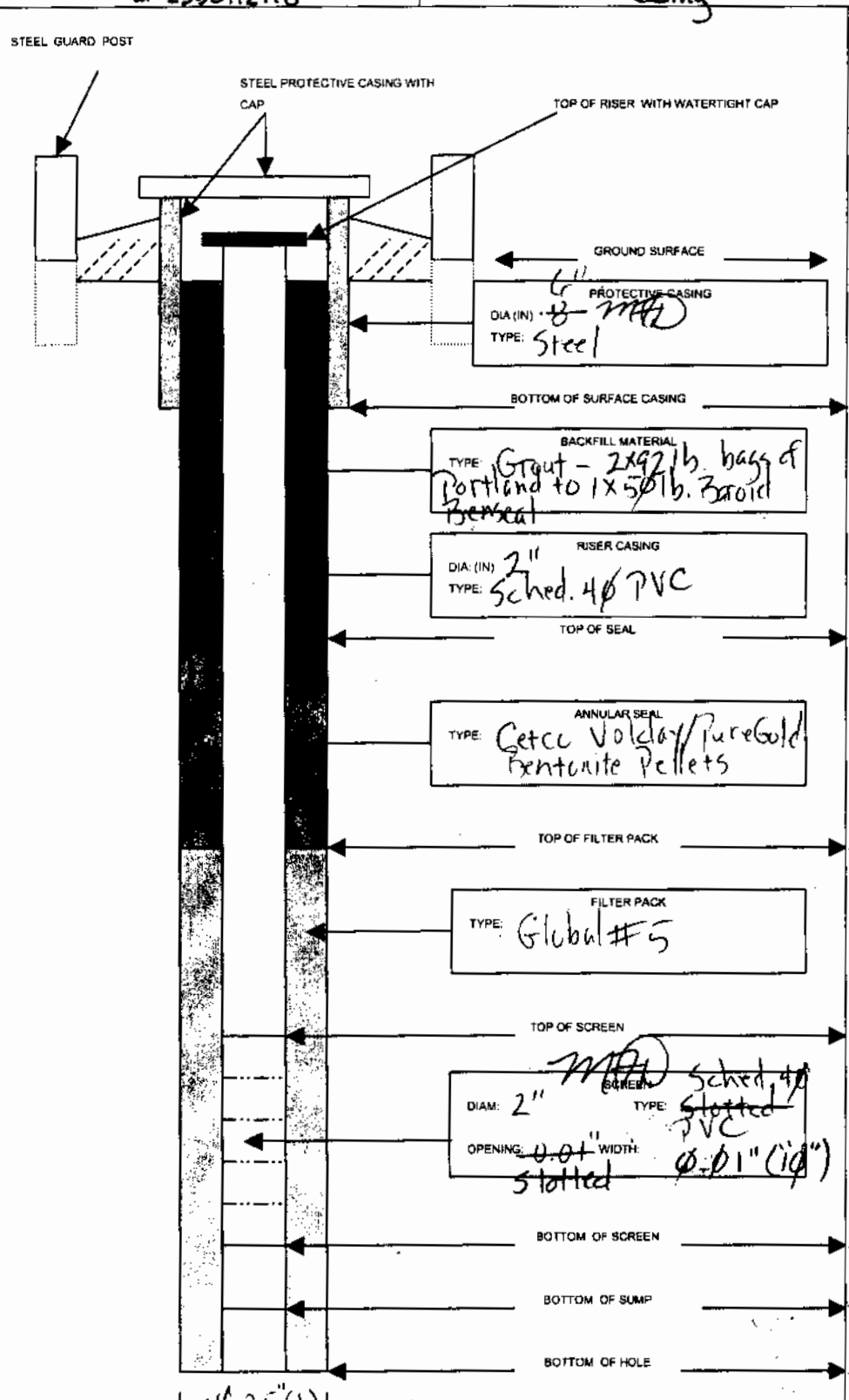
RECORDED BY: M.J. Deering (Signature and Date) 10-6-03

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

MONITORING WELL CONSTRUCTION DIAGRAM

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

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



WELL VOLUME CALCULATION SHEET

Date: 10-23-03 Time: 1500

Well ID: FBQ-177

Well Location: Fuze / Booster

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

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

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

10 - .01 = .3142

Vf = $3.142[(Rf^2)-(Ro^2)]*$(Hc or length of screen)$*(0.30)$

Note use length of screen if Hc>length of screen

= .09 cu. ft.

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

2.8*5 = 14 gal

= 2.8 gal.

Where:

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

WELL DEVELOPMENT FORM

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

Date: 10 / 23 / 03

Well Number and Location: FBQ-177

Development Crew: Chantelle Cotton

Driller (if applicable): n/a

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

Final: 12.18 / _____

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

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

Development Method(s): whale pump and bailer

Total Quantity of Water Removed: 18 gals

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

GROUNDWATER PURGE SHEET

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

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

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

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

INNER CASING: TYPE: PVC ID: 2 inches

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

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

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

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

WHERE:

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

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

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

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

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

SITE CONDITIONS DURING PURGING: _____

FIELD OBSERVATIONS: _____

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

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

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

APPENDIX C

WELL PURGE RECORD

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

WELL NUMBER AND LOCATION: FBQ 177 PAGE 1 OF 1

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

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

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

SLUG TEST RECORD

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

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

EQUIPMENT INFORMATION SUMMARY

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

PRETEST DATA

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

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

TEST METHODS SUMMARY

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

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

DATA LOGGER RECORDS

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

STORAGE LOCATION OF DATA: 1) 2)

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

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

DATA CHECK RESULTS:

REMARKS:

DATA RECORDED BY	DATE	QA CHECK BY	DATE