## APPENDIX B

**Monitoring Well Installation Forms** 







TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Facility-wide Groundwater PROJECT NO: October 2018 Sampling Event RVAAP-66
Jate: (mm/dd/yy): 10/23/18 Page 1 of 2
Task Team Members:
Charles Spur (Leidos) Andreas Van Dalen (Frontz)
John Herbert (Leidos)
Ricky Shanks (Frontz)
Narrative (include time and location):
Narrative (include time and location):  0810 Brilling team on site at electric Sub-station to
Setup for drilling activities. (ES3)
0825 Complete drill rig operational checklist.
0840 Frontz sets up on ES3+w-003
0848 Take initial 4-gas reading CO: Oppor H, S: Oppor LEL: 00%
02: 20.4° 10 VOC: 0.0ppm
0903 UXO cleared to 2-4in 003
0913 UXO cleared to 4'-6
0925 UXO cleared to 6-8'
0935 water encountered in ES3+w-003 @ 7.0' bgs UXO to 8-16
1008 Begin Setting well - 9.0' bgs
1108 ES3tw-003 installation complete: 3x 5016. Sidley #5 silica
Sand: 1 x 50 16. 3/8" course grade Wyoming bentonite chip Holeplug
Bentonite hydrated w ~ 3 gallons of approved water.
1130 Drill team sets up on ES3+w-001 a takes lunch.
1150 Resume work at ES3+w-001
1158 UXO clear to 2-4in ES3tw-001
1206 UXO clear to 4-6
1215 UXO clear to 6-8' water encountered @ 5.5'B6S
1242 UXO cieor to 8-10'
1300 Begin Setting well ES3+w-001 - 8.0' BGS
ES 10/23/18
Daily Weather Condition: A.M. Sunry; 40°F
P.M. Portly cloudy, winds, 53°F
ecorded By: (Signature) QC Checked by: (Signature)
07-162(NE)/102507 FTP-1215, Revision 0, 4/07/99

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Facility-wide Groundwater PROJECT NO: October 2018 Sampling Event
Jate: (mm/dd/yy): 10/23/18 Page 2 of 2
Task Team Members:
See page
cf 10/23/18
Narrative (include time and location): 1330 ES3+w-001 installation complete. 4×5016 Sidley #5 Silica Sund
1x 5016. 318" course grade Wyoning bentonite chips Holerlug.
1350 Setup on location ES3 tw 002 3 gallons approved water
1403 UXO cleared 2-4'
1413 UXO cleared 4-6'
1425 UXD cleared 6-8' water encountered at 6' BGS
1434 UXO cleared 8-10'
1525 For ES3+W-002 installation complete. 3 x 5016.
Sidley = 5 Silica Sand, 1x 5016. 3/8" course grade
Wyoming bentonite chips Holeplug, hydrated
w/ 3 gallons approved water.
1545 Orill team transports equipment to NACA area
1555 Return to 1036
<u>CS</u>
10/23/18
Daily Weather Condition: A.M CS 10/23/18
P.M. Partly Cloudy; windy; 53°F
ecorded By: Company 10/23/18 QC Checked by: Heliand (Signature)
07-162(NE)/102507 FTP-1215, Revision 0, 4/07/99

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Facility-wide Groundwater PROJECT NO: October 2018 Sampling Event
Date: (mm/dd/yy): 19/24/18 Page of
Task Team Members:  Charles Spur (Leidos) Andreas Van Balen (Frontz)
John Herbert (Leidos)
Ricky Shanks (Frontz) Cs 10/24/12
Narrative (include time and location):
0820 Drill crew on site at NACA test facility. Open demolition area #1 (ODAI)
demolition area #1 (OBAI)
0840 location DAI tw-001 is moved north out of brush
s UXO cleared by John (0-2") *Approved by Kevin Sedlak
0850 Daily rig inspection of Kill switch checks
0900 Conmence drilling of DAI+w-001
0907 UXO cleared 2'-4'
0917 UXO cleared 4'-6'
0928 UXO cleared 6'-8'
0936 UXO cleared 8'-10'
4-925: CO: Oppm H25: Oppm LEL: 090 03: 20.990 VOC: 0.0ppm
0945 water encountered @ 12.0' BGS. John Herbert Offsite.
1020 OEPA onsite
1025 Begin setting DAITW-001. Section Set @ 17' BOS
1135 Installation of DALtw-001 complete. 6×5016. Sidley #5
Silica Gand. 2 × 5016. 3/8" coarse grade Wyoming bentonite thip Holeplug.
Hydrated w/ 5 gallons approved water.
1152 Leave ODA1 & return to 1036.
1220 Depart to collect bottles/samples at DETMW-004
1535 Finish sample collection at DETraw-004
1545 Return to 1036
<u>cs 10/24/18</u>
Daily Weather Condition: A.M. Partly Cloudy . 34° F
P.M. Cloudy; 46° F
ecorded By: Cel for 10/24/18 QC Checked by: Sul for ille/18
(Signature) (Signature)
07-162(NE)/102507 FTP-1215. Revision 0. 4/07/99

X

TASK TEAM A	CTIVITY LOG SHEET
PROJECT NAME: Facility-wide Groundwater RVAAP-66	PROJECT NO: October 2018 Sampling Event
Jate: (mm/dd/yy): 10/25/18	Page of
Task Team Members:	
Charles Spur (Leidos)	Andreas Van Dalen (Frontz)
John Herbert (Leidos)	Jed Thomas (Leidos)
Ricky Shonks (Frontz)	J1 11 11 11 120
Narrative (include time and location):	at Sand Creek Land Fill (SCL)
0930 Perform rig inspection	of Geoprobe 6620DT.
10950 Setup at locatio	n SCL mw-00Z
10940 UXO cleared 0'-2	
1007 UXO cleared 2-4	
1003 UXO cleared 4'-6	water encountered @-5.1'865
1027 UXO cleared 6-8'	
1050 Begin using hollow stem	augors. Setting well @ 8'BGS
	- Adams regarding setting well. A
	d cover the shallow screen in SCLMW-402
(3'-8' BGS). Possibility -	for flush mount completion to be a
	a Sedlak is ok w/ bentonite chips
to surface at these.	shallow wells.
	U-002 complete 0.5 x 5016. Holeplug
1140 Setup at location S	CL mw - 001 UXO cleared 0:-2'
1149 UXO cleared 2'-4'	
1149 UXO cleared 2'-4' 1153 UXO cleared 4'-6' 1157 UXO cleared 6-8'	
1157 UXO cleared 6-8	
1235 No standing water in hole	to 8'. UXO cleared 8'-10' e @ 7.5' BGS coming from upper Bedrock encountered w/ direct
1250 Standing water in hole	e @ 7.5' BOS coming from upper
unconsolidated material	· Bedrock encountered w/ direct
push @ ~ 10.5' C	3 65,
Daily Weather Condition: A.M. Suncy	; some clouds; 340F
P.M. <u>Cloudy</u>	83.E
ecorded By: Clu 1 10/25/18	QC Checked by: 15. 95 16 16 18 (Signature)
(Signature)	(Signature)
07-162(NE)/102507	FTP-1215, Revision 0, 4/07/99

TASK TEAM ACTIVITY	LOG SHEET
RVAAP-66	DJECT NO: October 2018 Sampling Event
Date: (mm/dd/yy): 10/25/18	Page of
Task Team Members:	
See pg. 1	
cs 10/25/18-	
Narrative (include time and location):	
1300 Drillers take lunch.	
1330 Resume work at SCLMW-00	DI. setup to use howen stem
ougers.	1 - 1
1340 Stop Work: A bolt has	
geoprobe that spins the au	
the driller immediately c	
	a no other damage. The
geoprobe cannot spin ouger	
Crew will stop at SCLmw-	DOI for the day and move
1434 Location SCLMW-001 UX	0 1) - 1 0'-3'
	of CME SSICE 4
1443 SCLmw-001 water @ 3' BGS.	A 31: 15 15/15/16
1443 SCLmw-001 water @ 3' BGS. 1452 UXO cleared Z'-4'	Augest sitting at 10 15 03
1505 UXO cleared 4'-6' 1514 UXO cleared 6'-8'	
1525 UXO cleared 8'-10'	
1545 Augurs @ 10'. Crew is clear	red in de sati me to 1036
•	1270013 10 1030
	5/18
Daily Weather Condition: A.M C.s	5 10/25/18
P.M. Cloudy;  ecorded By: Check (Signature)	53°F
P.IVI. COURTY,	2) 01
ecorded By: QC Chec	ked by: Sulfa lile (18
(Signature)	(Signature) <sup>1</sup>
07-162(NE)/102507	FTP-1215, Revision 0, 4/07/99

TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Facility-wide Groundwater PROJECT NO: October 2018 Sampling Event RVAAP-66
Date: (mm/dd/yy): 10/29/18 Page of
Task Team Members:
Charles Spur (Leidus)
Ricky Shanks (Frontz) CS 10/29/18
Andreas Van Dalen (Frontz)
Narrative (include time and location):
0810 Drill crew on site at Sand Creek Landfill (SCL) to
Setup and complete well installation for SCLmw-003
a Schmu- 001. Perform daily rig inspection/Killswitch to
0905 Drillers begin growting SCLMW-003.
(1 × 9416. Type I/II coment, 6 gallons water, a
2 20 bentonite pouder)
0925 Growling complete. Wait for growt to set and move
to location SCLmw-001 for well installation.
1045 Installation of SCLmw-001 complete, 4 x 50.16 #55and.
1 x 5016. Bentonite ship Holeplug. Bedrock shale war sealed
w/ 2 ft. of bentonite (10-12') & 1 ft. sand above (90'-10')
- Drill team begins cleanup activities (remove augus, rigs, etc.)
1145 Return to 1036 for decon & to go pickup additional
concrete.
1345 Return to SCL, Drillers set well pads a guard posts.
leidos begins well development activities.
1530 Pause development of SCLmw-203 18 gallons bailed
* Well pad and quard posts are set for Schmw-2003-
*Well pad and guard posts are set for SCLmw-DO3-
Team departs for 1036.
es 10/29/18
Daily Weather Condition: A.M. Cloudy; rain; 43° F
P.M. Cloudy; 46°F
ecorded By: Cer for 10/24/18 QC Checked by: Signature)  (Signature)
(Signature)
07-162(NE)/102507 FTP-1215, Revision 0, 4/07/99

TASK TEAM AC	TIVITY LOG SHEET
PROJECT NAME: Facility-wide Groundwater RVAAP-66	PROJECT NO: October 2018 Sampling Event
Jate: (mm/dd/yy): 10/14/18	Page of
Task Team Members:	
Eli Rogetz (Leidos)	
Bryan (Frontz)	West of
Narrative (include time and location):	
0200 Ell departs field office	to develop wells of substation,
weed to pickup driller from	
	electric substation for well development
0937 Begin development of	ES3TW -003 using whater mult-
Stage pump. Well is contin	ously pumped dry ad allowed to
recharge.	
1052 Remove whater pump from	n well and replace with peristaltie to
continue hell development.	
1130 Decon whaler pump and is	e it to start development of
	usly allowed to pump dry and recharge.
1400 Consolite development of E	S3TW DOI. 50 gallons of water
have been purged from the well	<u> </u>
1401 End purge on # ESSTW-	DOB3 after purging la gallons from
well Parameters have stubilitied	
1415 Install submersible pump at	ESSTW-OPI Using the Eguponent
Rinse" marked submarsible pump.	
1425 Install submersible pump a	+ ESSTW-pass. Top of pump
is at 10,15' btou.	
	at ES3TW- DOZ to begin development.
well is continuously pumped day	
1556 End duelopment on ES3TW-	on. Il gallons here purged from
well ad parameters stabilized, Any	
Daily Weather Condition: A.M	, cloudy, light wind
P.M	<u> </u>
ecorded By: (Character 15/21/18)	QC Checked by: 11/12/19
(Signature)	(Signature)
07-162(NE)/102507	FTP-1215 Revision 0 4/07/99

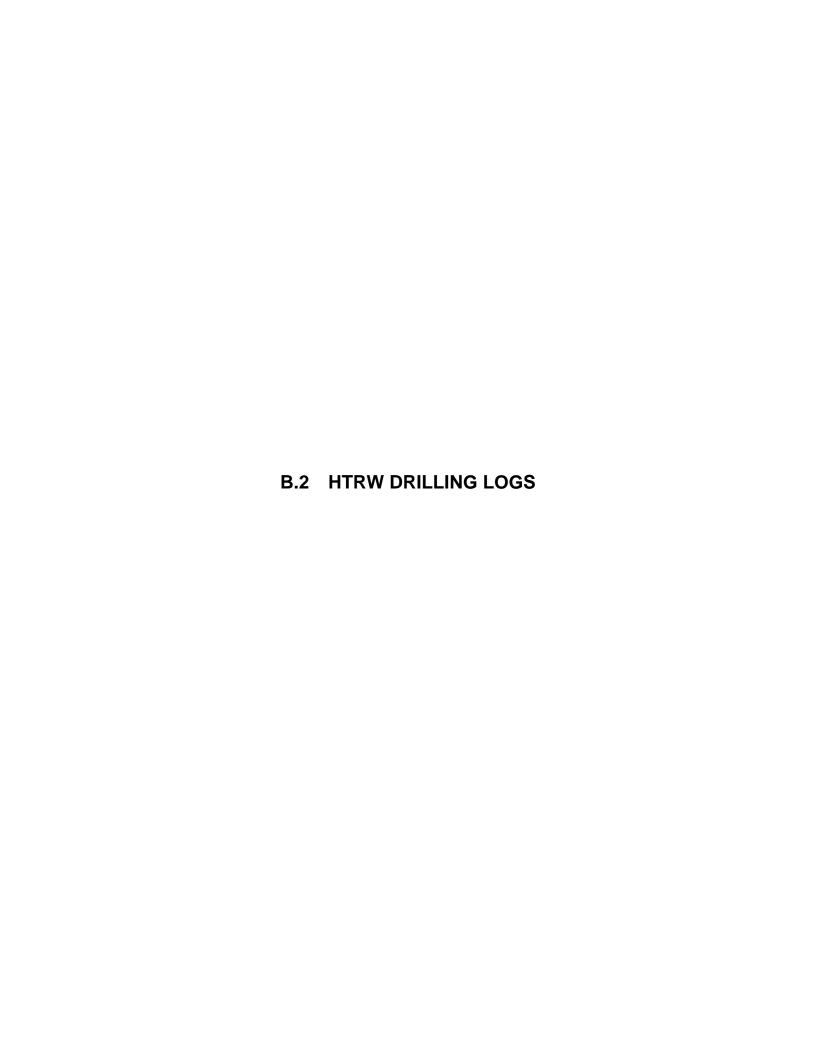
10 M

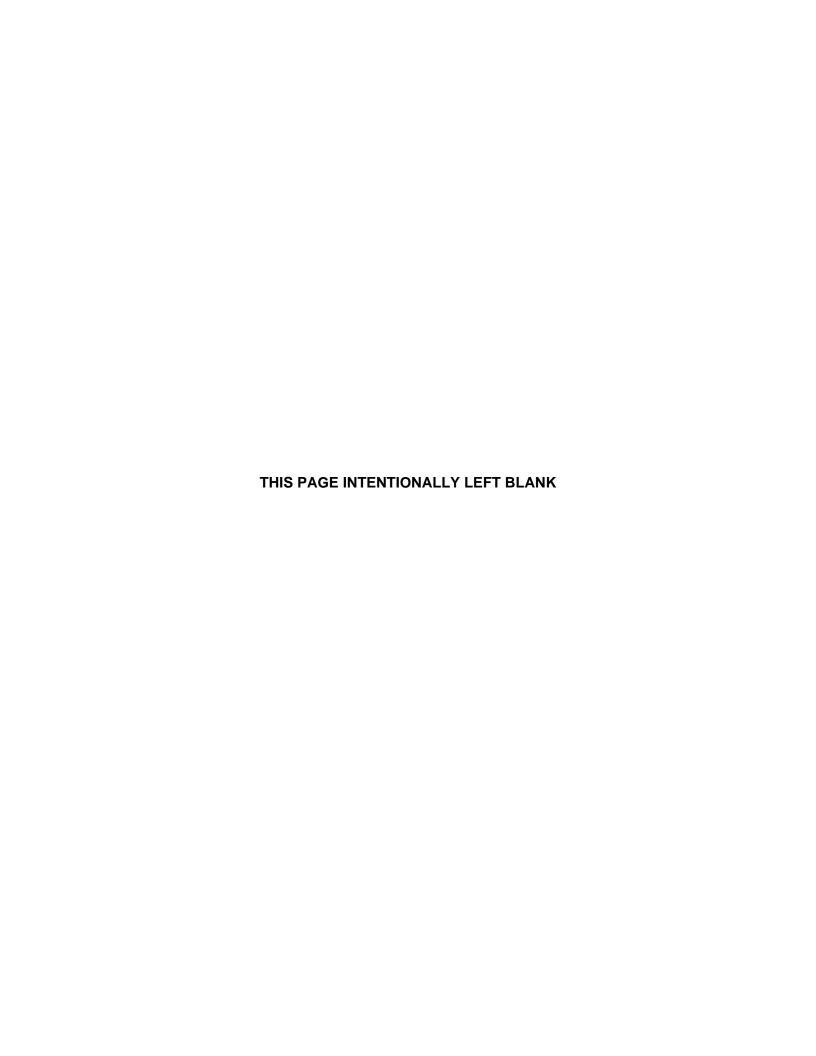
TASK TEAM	ACTIVITY LOG SHEET
PROJECT NAME: Facility-wide Groundwater RVAAP-66	PROJECT NO: October 2018 Sampling Event
Date: (mm/dd/yy): 10/30/18	Page of
Task Team Members:	
Rich Sprinz	
Charles Spur	15/20/0
Ricky Sharks	
Narrative (include time and location):	
08/5 Crew on site to	continue development d finish
well pads/gu	continue development d finish and posts. Continue on SCLMW-003
1045 Ohio EPA on six	•
1130 Ohio EPA offsix	
	t of SCLMW-00Z
1230 Development of	SCLMW-002. 25 gallons removed
* Begin assisting	with land restoration,
* Note SCLmw-00	D3 pumping dry. Development is
	ended amount of time.
1430 Dedicated bladde	er pump (well wizard) is set
	2. Intake set ~ 1.8' off
bottom of well.	
the contract of the contract o	NY OF SCLMW-003
Dedicated bladder	pump (well wizard) is set
	of well, TD: 26.40'
1010 Return to 1034	P 1
	<b>8.5</b> 16/30d 0
Daily Weather Condition: A.M	oudy; 42°F
P.M	unry: 55°F
Gecorded By: Cle for 10/30/1	18 OC Checked by:
(Signature)	(Signature)
, ,	
07-162(NE)/102507	FTP-1215, Revision 0, 4/07/99

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TASK TEAM ACTIVITY LOG SHEET
PROJECT NAME: Facility-wide Groundwater PROJECT NO: October 2018 Sampling Event RVAAP-66
Jate: (mm/dd/yy): 10/31 /18 Page of
Task Team Members:
Eli Rogatz
Charles four Cs 10/31/18
CS
Narrative (include time and location):
0800 On site at Sand Creek Landfill (SCL) to complete
development activities.
0835 Begin development of SCLMW-001
1995 Mair Recharge is slow. Wait 2 hours. Assist
1005 others with land rectoration at SCL.
1205 Resume pumping/development. Well is pumped
dry every 30 minutes and reading is taken.
20.5 gallons removed at each 30 minute pumping
interval.
1505 > 4 hours has passed and only 10.8 gallons removed
of required 23.5, consult Houther Adams.
* Decision made to finish development & set pump.
1550 Pump is set in SCLmw-001. 27' BTOC-
- intake set. Bladder pump (Well Wizard)
1610 Return to 1036
10/31/18
CS
Daily Weather Condition: A.M. Cloudy; Rain; 53°F
P.M. Cloudy: Rain: 61° F
ecorded By: Clh a. 10/31/18 Checked by: 2 2 16/2/19
(Signature) (Signature) (Signature)
07-162(NE)/102507 FTP-1215, Revision 0, 4/07/99







ITRW DRILLING LOG	DISTRICT	- Louisville	DAI tw - 001		
COMPANY NAME		G SUBCONTRACTOR			
EIDOS	Frontz		SHEET 1 OF 3		
PROJECT Facility-wide Groundwater RVAAP-66	te Route 5 Ravenna OH 44266				
NAME OF DRILLER RICKY Shanks			ME ST LC		
SIZES AND TYPES OF SAMPLING EQUIPMENT		8. BOREHOLE LOCATION			
2'x 1.5" split spoon			ition Area # 1		
		9. DRILL DATE/TIME START	10/24/18 1135		
OVERRIJINDEN THICKNESS	30782	10. DEPTH GROUNDWATER EI	12.10		
DEPTH DRILLED INTO BEDROCK		14. CHEMICAL SAMPLES (circle	ED TIME AFTER BOREHOLE COMPLETION NA		
TOTAL DEPTH OF BOREHOLE 18.0			TOO STOCS PARS POS		
DISPOSITION OF BOREHOLE		Pesticides Explos	ives TAL Metals Propellants		
CKFILL TYPE: GROUT BENTONITE	Х тем	PORARY WELL POINT	MONITORING WELL		
NOTES BKG: ≤ Background BGS: Below Ground		PPM: Parts per Million			
: First Water Encountered	: Static Water L	,	plicable		
DCATION SKETCH/COMMENTS					
OCATION SKETCH/COMMENTS			SCALE: None		
	Wavats		Demolition Rd. 4		
	4				
9 /	Long a	tion Area 1			
		ļ			
			0-NTA mw-110		
	41 1				
		DA1+w-001			
OLOGIST SIGNATURE/DATE		9	GODELIGIE SUN GER		
COLOGIST SIGNATURE/DATE COLOGI	QA/QC SIGNATU	9	BOREHOLE NUMBER  DAITW-001		

HTRW [	RILLII	NG LOG	USACE- Louisville		BOREHOLE NUMI	1 - 001	
COMPANY NAM	Ē	p e	2. DRILLING SUBCONTRACT	OR		211555	
EIDOS			Frontz			SHEET 2	OF 3
PROJECT		lity-wide Groundwater RVAAP-		I.Y	VERTICAL	INCLINED	DEGREE
MOLES PID M	AKE/MODEL:	Rae systems Multik	LILE T PID SERIAL#; Pin	e 13589	Colors from	Munsell Soil Color Ch. 2000 Revised Editi	
ELEVATION	DEPTH	USCS CLASSIFICA	ATION OF MATERIALS	RECOVERY	MONITORING	REMAR	
	(Feel)		, little organics	(ft)	(PPM)	(Sample IDs/D	
•		0'-0.25' N	little organics ledium sand	1	Abient	Blow c	cunts
		4 Clay 10	over 13 Brown wist, medium	1.0	0.0	<u> </u>	
	1	Very soft; ~	ors , , oppositions	2.0		1	
		0.25'-2.0'	Clay some silt			1	
		104R516	the med- day			,	
	2	very soft, m	vist, mediasticity	<i>i</i>		2	
		2.0'-40'	Clay little sit				
		18425 6 m	clay little silt whiled w/ 18486/1 sist, med plasticit	1.0'	212	1	
	3	very soft, m	MENT WARRENT			l_1	
				2.0		'	
						1	
4		<u> </u>	V	-		3	
	4						
		4.0-4.5	S.A.A.	101		2	
		4.5'- 6.0	Clay title	1.8			
	5	CIT 10YRS	5/4 motiled w/	130		7	
	—	104R7/1 S	Some Some Some Some Some Some Some Some			6	
		low plast	ascal plasticity ascal sist content (11 HIZ)	*,		١,	
		5.5' incre	ased plasticity	1		6	
	·—	decree	red silt content		<del>                                     </del>		
	1			2		3	
		CILL IAV	Clay some R5/4 nottled	12.0		_	
	7	3117 109	10/5/ 100/100	501		>	
		of lotter!	land India			7	
		Soft, dany	, low plasticity				
	8					11	
		8.0-10.0'	5. A.A.		<del>                                     </del>	Li	
		1	1	2.0'		17	
				1		5	
	9			2.0'			
						8	
ÿ.		J V	y			9	
EOLOGIST SIGN	10	= 10/24/18	Touros cross-services			1	
	- 1	- 10/24/18	CAVOC SIGNATURE/DATE	14/75	110	DA) tw-	
		· · · · · · · · · · · · · · · · · · ·	//	10102	110		
			U U				

		DISTRICT			BOREHOLE NUMBER						
HTRW DRILLING LOG			USACE- Louisville			DAIt		N-001			
1. COMPANY NAME			2, DR	2. DRILLING SUBCONTRACTOR				SHEET 3 OF 3			
LEIDOS			122 32	Fro					SHEET	3 Or	3
3. PROJECT			Groundwater RVAAP-66		4 DIRECTION OF BORE	<u> </u>	VERTIC		INC.		DEGREES
5. NOTES PID M	IAKE/MODEL:	pg. 2	2		PID SERIAL#: P3	2	C	olors from i		il Color Chart,	Rev
ELEVATION	DEPTH	USCS	CLASSIFICATION	OF MAT	TERIALS	RECOVERY	MONI	TORING	2000 Revised Edition  REMARKS		
	(Feet)					(ft)		PM)	(Sa	mple (Ds/Dep	-
			10.0'- 11.75' CI 1048514 mothed	ay C	110001	1.75	Ani	oiert O.	3	Blow	coun
	11		Soft, damp,			2.0'			4		
		ķ	11.75'-17 0' 50 med & fine) so 1146 clay: 111	ome the	gravel Siltyry				7		
	12 🔽		med a fine) si little clay: lit 10 YR5/Lo yellow ranoist to wet,	0م ع 11	n-plastic				11	wat	
	13		12.0'- 14.0' wet to sa			1.5			8	@ 12. B6	01
	13	ř				2.0			5	satur	atal
	14		J		v	<u></u>			5	12-	18'
)			14.0'-16.0' satu	, _	s.A.A.	1.0			2		
	15					2.0			3		
	16			,			1		3		
			16.0'- 18.0'	5.	A.A.				3		
ļ	17					Ü			3		
						1			2		
	18		V		√		,		7		
		*	terminated a BGS	+	18.0'						
	19	F			cs_	10/24	118				
)	20										
GEOLOGIST SIGN	ATURE/DATE		10/24/18		NATUREDATE	lans)	18			ENUMBER	001
	0		16	سلا	original .	igris	10_			.(100	

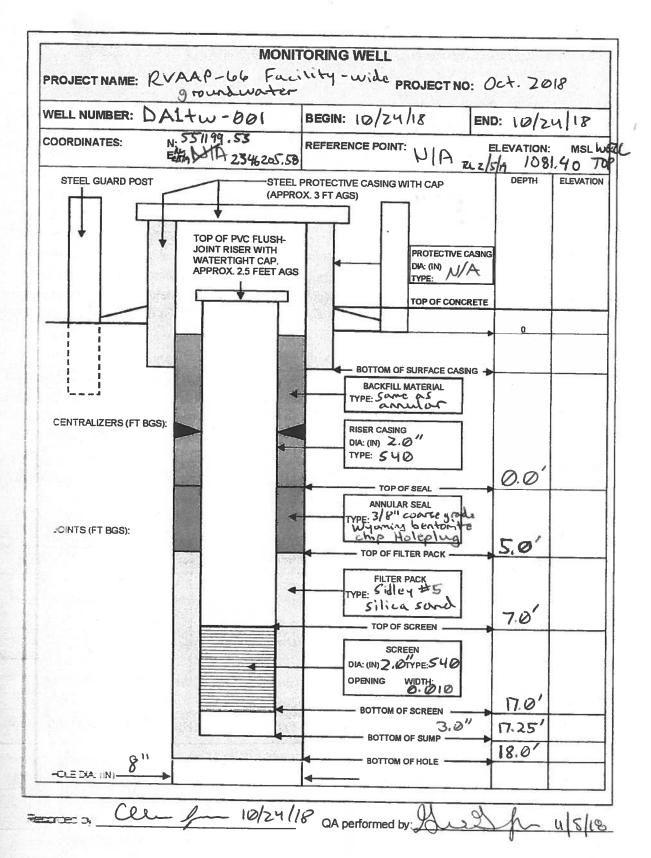


Figure 5-10. Example of Well Construction Diagram Used in Logbooks

	DISTRICT		BOREHOLE NUM	BER
HTRW DRILLING LOG	USACE- I		SCLN	w-001
1. COMPANY NAME	2. DRILLING	SUBCONTRACTOR		
LEIDOS	Frontz			SHEET 1 OF 3
3. PROJECT Facility-wide Groundwater RVAAP-66			loute 5 Raveni	
5. NAME OF DRILLER /Licky Shanks	•	6. MAKE MODEL OF DRILL GC	oprobe	6620DT
7, SIZES AND TYPES OF SAMPLING EQUIPMENT	8	B. BOREHOLE LOCATION		
1.5" × 4' acetate liner		Sand Cree	k Land	
direct push dual tube 2.2	L	P DRILL DATE/TIME STARTED	212	COMPLETED: 10 /29 / 18
		10. DEPTH GROUNDWATER ENCO	J.	5'
11. OVERBURDEN THICKNESS		12. DEPTH TO WATER/ELAPSED TI	ME AFTER BOREH	OLE COMPLETION NA
13. DEPTH DRILLED INTO BEDROCK UIA		14, CHEMICAL SAMPLES (circle)	voc svoc	s PAHs PCBs
15. TOTAL DEPTH OF BOREHOLE 12.0		Pesticides Explosives	TAL Metals	Propellants
16. DISPOSITION OF BOREHOLE	_	4		
BACKFILL TYPE: GROUT BENTONITE  17. NOTES BKG: < Background BCS: Balance Ground Surface.			MONITORING WE	LL
DIVO 3 Dackground BG3, Below Ground Stills		PPM: Parts per Million		
: First Water Encountered	Static Water Le	vel NA: Not Applica	ble	
LOCATION SKETCH/COMMENTS	, , , , ,		SCALE:	None
/	/ -	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Historyal	
	/	- Court	howshill a creek	L NI
	/ /			structure
	1	1		~
/e <sup>-</sup> /,	Steel			
(Rech )	Steep Slope			
4/0	7 ,			
gos sermi-opi				
/7/30/	1			
	/	C 1 C		
		Sand C	A SAK	
		Landf	AL .	
Schmw-0021		Calco		
/ Schart				
1/1/1				
			The state of the s	
			Promotoroma scour	
			1 1 1	
			ler mendemmer kritises.	
GEOLOGIST SIGNATURE/DATE	VOC SIGNATURE			BOREHOLE NUMBER
Ce for 10/29/18	The	- 7 1/29	115	SCLmw-001

HTRW [	RILLI	NG L	OG	USACE- Louisvi	وا:	SCL		1
COMPANY NAM	IE .			2. DRILLING SUBCON				
EIDOS				Frontz			SHEET 2 OF	3
PROJECT	Faci	lity-wide	Groundwater RVAAP-6	4. DIRECTION O	F BOREHOLE (V	VERTICAL	INCLINED	DEGREES
NOTES PID M	IAKE/MODEL:	Mu	ultikae t	PID SERIAL#:	'ine 13389	Colors from		Rev
ELEVATION	DEPTH	USCS	CLASSIFICA	TION OF MATERIALS	BECOVERY	MONITORING		
LLLVATION	(Feet)	0000			(ft)	(PPM)	1	
	1_ 0-2.0' Sil 10YR313 danp to moist non-plasti			trace organ trace organ trace organ	2.0	Ambient 0.0		
		fine cond the clay exed with very soft	1.3'	,				
3.			moist to	s.A.A.	a, n c		met but not satu	rated Line d
	4 4 4.0'-  5 5.0'-5  d Cla  10YR  Very so  7 Very so	Very soft,	" Coarse so wet, med. pla ! Clay son fine sand	thaty	,	water to	» 8'	
	7 <b>Y</b>		104R5/1 Very soft, 6 6.0'- 6.5'	vet, low place	RACTOR  SHEET 2 OF 3  BOREHOLE IF VERTICAL INCLINED DEGREES  Colors from Munsell Soil Color Chart, Rev 2000 Revised Edition  RECOVERY MONITORING (Sample IDS/Depths/Etc.)  Ambient  0.0  2.0  1.3  2.0  Let but 2.0  No standing down water to 8  Matterly  Let 1.3  Standing water  0.7.5' B GS			
	9		Soft, mois	F, non-plast S. A.A. growel cont				
		10	129/18	QA/QC SIGNATURE/DATE	7 1/2/	1/10		DO)
GEOLOGIST SIGN		(0	1/29/18		2 1/20	l'f		_ D(

<u> </u>				DISTRICT		BOREHOLE NUMB	
HTRW D	RILLI	NG LO	OG :	USACE- Louisville		SCL	mw-001
1, COMPANY NAME				2, DRILLING SUBCONTRACTO	R		
LEIDOS				Frontz			SHEET 3 OF 3
3. PROJECT			Groundwater RVAAP-66	4. DIRECTION OF BORE	HOLE 🔽	VERTICAL	INCLINED DEGREES
5. NOTES PID MA	AKE/MODEL:	IJ'	2	PID SERIAL# P9	2	Colors from I	Munsell Soil Color Chart, Rev
ELEVATION	DEPTH	USCS	CLASSIFICATION	OF MATERIALS	RECOVERY	MONITORING	2000 Revised Edition REMARKS
	(Feet)				(ft)	(PPM)	(Sample IDs/Depths/Etc.)
			10-10.5' S.A	V.A.		Ambient	Holeplug
			10.5'- 12.0' 1	was the and	1.81	0.0	placed
	11		10.5 - 12.0	with the same			placed 10'-12'
			Shale bedr damp to de 104R4/1	8CM	2.01		to seal
			Lava VI	` '	4.0'		bedrock interface
	12		16467/1				interface
	·~—		<del></del>				
						,	
	13						
	14						
	15						
	15—						
				CS/10/25	118		
	16			/10/23	(		
	17						
	"—						
	18						
				i i			
	19/						
						15	
GEOLOGIST SIGNA	20 ATURE/DATE		I IQAK	QC SIGNATURE/DATE			BOREHOLE NUMBER
Cen	- 1	١	0/29/18	OR TV	- 11/16/	'ie	SCLmw-001

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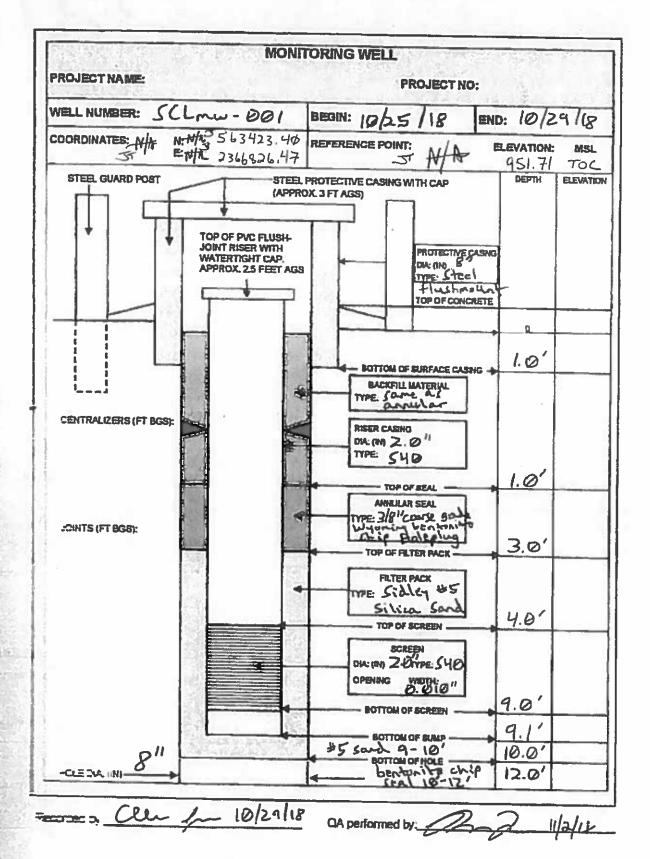


Figure 5-10. Example of Well Construction Diagram Used in Logbooks

HTDW DBILLING LOC	DISTRICT BOREHOLE NUMBER
HTRW DRILLING LOG	USACE- Louisville SCL MW - 6
1, COMPANY NAME	2 DRILLING SUBCONTRACTOR SHEET 1
LEIDOS	Frontz
3 PROJECT Facility-wide Groundwater RVAAP-66	4. LOCATION 8451 State Route 5 Ravenna OH 44266
5. NAME OF DRILLER Q: LLY Shon LLS 7. SIZES AND TYPES OF SAMPLING EDUIPMENT	6. MAKE/MODEL OF DRILL Geopole 6620 AT
1.5" × 4.0' acetate liner direct push dual tube:	2.25" 9 DRILL DATE/TIME STARTED COMPLETED:
action of the second	10/25/18 0950 10/25/18
11. OVERBURDEN THICKNESS	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION
13. DEPTH DRILLED INTO BEDROCK NA	14. CHEMICAL SAMPLES (circle) VOC SVDCs PAHs
15. TOTAL DEPTH OF BOREHOLE 8.01	Pesticides Explosives TAL Metals Propellants
16. DISPOSITION OF BÖREHÖLE	
BACKFILL TYPE: GROUT BENTONITE	TEMPORARY WELL POINT MONITORING WELL
17, NOTES BKG: ≤ Background BGS: Below Ground	_
: First Water Encountered	: Static Water Level NA; Not Applicable
LOCATION SKETCH/COMMENTS	SCALE: None
	// road downhill to creek
The state of the s	
	(xell /
(Little )	cheer /
/2//	
O SCL MW.	.001
/3/	Sand Creek
/45/	Landfill
( 0 1   SCLMW-002	
/ SCLAW-DOZ	

HTRW D	DRILL II	NGI		DISTRICT		BOREHOLE NUME		
1. COMPANY NAM		TO E		USACE- Louisville	DR	SCL	mw-002	
LEIDOS				Frontz	3 V		SHEET 2 OF 2	
3. PROJECT			Groundwater RVAAP-66	4. DIRECTION OF BORE		VERTICAL	INCLINED DEC	
5. NOTES PID M	AKE/MODEL:	Rue	MultiRae +	PID SERIAL#: Pine	13389	Colors from I	Munsell Soil Color Chart, Rev 2000 Revised Edition	
ELEVATION	DEPTH (Feet)	uscs	CLASSIFICATION	OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS	
	(1 601)		0'-0"5' Sand	Course, med.	(4)	Ambient	(Sample IDs/Depths/Etc	
	9		& Fine) and some sit 11	gravel	0.6	0.0		
	1		some silt 10	04R716	150			
- "	150		0.5'-2.0' 5	14 come Clay	2.0	200		
			104R5/4 VE damp, non	ry soft		5.0		
1.5	2		damp, non	- plastic				
			2.0'-3.0'	A.A.				
					1.0		AP Same	
	3				2.0		41	
			3.0'-4.0'	ilt & fine Sand	†			
			IDVR516	د درمم	*			
	4		3.0'-4.0' Si little 10 YR5 16 very soft, mois	+ non-plastic				
)			4.0'-5.75' f some sit 16	tine sound	10'		First water	
			some silt 16	34R516 mixed	1.0		@ 51	
	5 🔽		W/ 104R51Z	aturated	2.0			
		13	5.75'- 6.0' f Sand little s 104R5/1 Saturat	ine a medium	-			
			Sand little s	114				
	6							
			6.0'-7.0' 5	· A. A.	00'			
					0.9' 2.0'			
	7				201			
			7.0'8.0' Son	coarse,				
			med., + fine) little silt 10' saturated	1R4/1				
	8		Saturated					
				-				
							1 000	
	9			CS	0		*	
				10/25/	8			

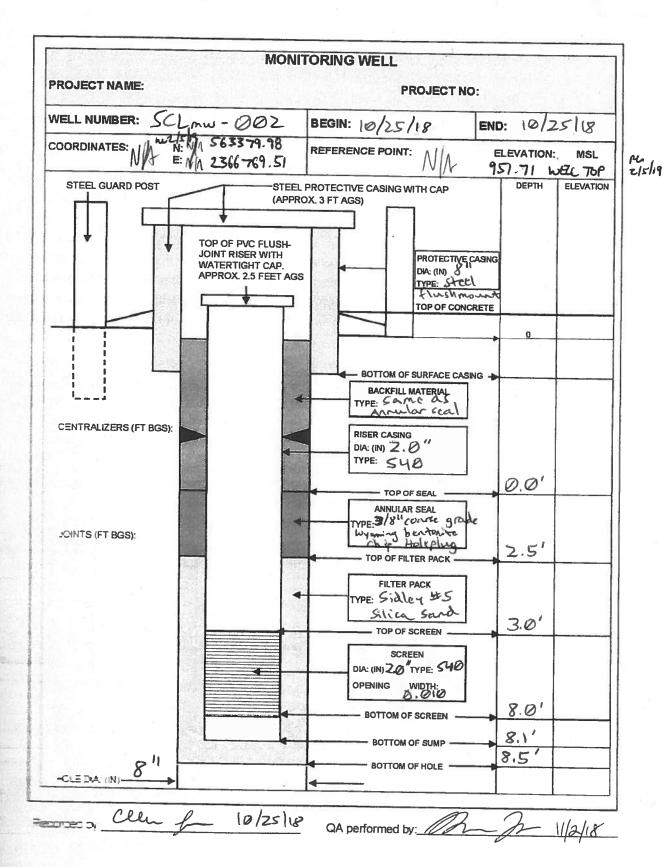


Figure 5-10. Example of Well Construction Diagram Used in Logbooks

	DISTRICT		BOREHOLE NUME	BER	
HTRW DRILLING LOG	USACE- Louisville		SCLA	w - E	203
1, COMPANY NAME	2. DRILLING SUBCONT	RACTOR		SHEET 1	OF L
LEIDOS	Frontz	yr-			51 9
3. PROJECT Facility-wide Groundwater RVAAP-66	4. LOCATIO	0401 Otate IV	oute 5 Ravenr		i
5. NAME OF DRILLER Ricky Shanks			1E55	LC	
7. SIZES AND TYPES OF SAMPLING EQUIPMENT CS 10/2=/19	ح ا	and Creek	1.15	11	
2'x 1.5" split spoon	DRILL DA	ATE/TIME STARTED:	Lanar	COMPLETED:	
7/ 15" (1) 5000	3 BRILLE B	10/25/18	1	126 L	a
2 × 1.3 Sp(17 spoore	10, DEPTH	GROUNDWATER ENCO			υ
11, OVERBURDEN THICKNESS	786	TO WATER/ELAPSED TI			NA NA
13, DEPTH DRILLED INTO BEDROCK	14, CHEMIC	CAL SAMPLES (circle)	VOC SVOC	PAHs	PCBs
15. TOTAL DEPTH OF BOREHOLE Z6.0	Pesti	cides Explosives	TAL Metals	Propellant	s
16, DISPOSITION OF BOREHOLE	1				
BACKFILL TYPE: GROUT BENTONITE	TEMPORARY WE	LL POINT	MONITORING WE	LL	
17, NOTES BKG: ≤ Background BGS: Below Ground Su	face PPM; Part	s per Million			
; First Water Encountered	Static Water Level	NA; Not Applica	ble		
LOCATION SKETCH/COMMENTS			SCALE:	None	
				Phas	
	/		roof dom	rck	N
	/ /	「 ブ 、 ` `			
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/ / SCLAND	////				
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		ļlll			
/ Schow-007					
/ Letrus -					.
	0 SCL MW	-003			
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GEOLOGIST SIGNATURE/DATE . : IC	100 00014710000			DODE: ICI T	1 1
Clu In 10/25/18	ANGC SIGNATURE/DATE	. 1. 1 .		BOREHOLE NUI	u - 003
10 100 118	MCZYM	> 14/8/16		JUL170	

ITRW [	PRILLII	NG LO	OG	USACE- Louisville		SCL	w -	003
OMPANY NAM	E			2 DRILLING SUBCONTRACTO	DR		SHE	ET 2 OF 4
ROJECT	Faci	litv_wida	Groundwater RVAAP-66	Frontz  14. DIRECTION OF BORE	HOLE 67	VERTICAL		NCLINED DEGREE
NOTES PID M			Multi Rue t	354541				Soil Color Chart, Rev
34.		~bc	) TOTAL POLE (	Settle	- 1330 /		2000	Revised Edition
ELEVATION	DEPTH	USCS	CLASSIFICATIO	N OF MATERIALS	RECOVERY	MONITORING		REMARKS
	(Feet)		101-1051 Cla	u little course	(ft)	Ambient	<del>                                     </del>	Sample IDs/Depths/Etc.)  Rlow count
	3/5		card little o	manics	1.0'	0.0	3	
			1048312	y little course yanics med. plasticity	/	1	6	
	1		very cott, mois	Mean plasmen	2.0	- 3	6	possible
			0.5 - 2.0	Highly shale fragments	,		I _	'erratic sl
			10 YR411	shorte 11. June			5	,
	2		Dry			<del> </del>		by split spool
			7.0-35	"S. A.A.	0.01		3	clays beneath
	- A		25/		0.8		7	
	3		3.5'-4.0' ( 10 YR516	lay a silt	2.0'		٦	
			10 YR516	Very sort		1 /	2	
			damp, lou	plasticity			3	
	4							
	1		4.0'-50'	S.A.A.	1.0'		5	
					0.81	=	3	
	_ =				/		5	
	5		E 12- 12- 10'	Clay some silt	2.0'		,	
			trace fine s	Clay some sitted and a growel			6	
			104RS 14 mo	HILD W/			10	
	6		10 7 11					
			Soft, damp	, non - plastic		}	7	
			6.0-6.51 5		1.5'		3	
	7		6.51-8.01	Clay a Silt	1.5		3	
	· —		track organ	ics a gravel	2.0'		5	
			104R 6/4	soft ining throughout	· ·			
			damp non-pla	is throughout			8	
	8		8.0-9.0'	CAA				
			10,000,000	Liffin ( med )			6	
			Bru No	tiffness (med.) organies	1.8			
	9				2.0'		11	
			9.0-10'5		2.0			
0.			increased g.	rovel content			15	
	10						14	
EOLOGIST SIGN	ATURE/DATE	- 1 -	2/2/ [1]	AOC SIGNATURE/DATE	110		_	OLE NUMBER
Cle	- 1/	- 19	0/26/18	-y cours	11/18/18		70	1 mw - 003

HTRW D		NG L	OG	USACE- Louisville		SCL N	nu - 003
COMPANY NAMI	E			2. DRILLING SUBCONTRACTO Frontz	DR		SHEET 3 OF L
3. PROJECT	Faci	ility-wide	Groundwater RVAAP-66	4. DIRECTION OF BORE	HOLE	VERTICAL	INCLINED DE
5. NOTES PID MA	AKE/MODEL:	see p	9.2	PID SERIAL# SEE	19.2	Colors from	Munsell Soil Color Chart, Rev
		,			<u> </u>		2000 Revised Edition
ELEVATION	DEPTH (Feet)	USCS	CLASSIFICATION	OF MATERIALS	RECOVERY (ft)	MONITORING (PPM)	REMARKS (Samp e IDs/Depths/E
100	(. 550)		18'-17 B' Clay	some sitt	107	Amhient	771
		F	10-12.0' Clay Frace grave 104R6/4 moth 104R7/6 a 18		,	0.0	7
			104R6/4 moH	led w/	1.5	0.0	9
	11		104R7/6 0 18	7/L7/1	1.5	/ <sub>e</sub>	69
			Hard, dom,	Low - plasticut			8
101			med. Stiffness	•	f		12
	12						13
			12.0- 13.0	CAA			10
			wi trace fir	a coad	1.75		10
			& organic	c sauc	1.10		16
	13		a organic		2.0'		
		U.S.	13.0-14.0	Clay some Silt	2.0		14
		120	13.0'-14.0' trace gravel	184R5/1			
			med. stiffness,	damp, 16m			19
	14			plasticity	3		
			14.0-16.01	S, A.A.	12		4
			coft + m	oist	1.3		4.2
	15				2.0'		5
	_	1			2.0	! !	7
							ľ
							10
8 8	16						
			16.01-17.01 5	, A, A.			3
					1.5'		>
	47						
	17		17.0-18.0' C	land Sit	2.0'		3
	20		1046/1	7			1-
			very soft, dam	) and alastic			<b>G</b>
	18						10
	-		18.0'-20.0'	Silt little			
							4
			Clay	1800	1.5		1
	19	1	10 YR 5/1 Very 60 Fx, r	Said A	2.0'		13
		- 3	very cott,	(0151)	2.0		17
			non-plastic			9	
)	20	2.5				3	20

		_OG	USACE- Louisville		SC	1 mw - 00	3
COMPANY NAME			2. DRILLING SUBCONTRACTO	R		SHEET 4 O	F 4
LEIDOS			Frontz				ı
B. PROJECT			4. DIRECTION OF BORE	IV.	VERTICAL	INCLINED	DEGR
MOICS PID MA	KEWODEL: 3 6	pg.2	PID SERIAL# SEE	9,2	Color	rs from Munsell Soil Color Char 2000 Revised Edition	
ELEVATION	DEPTH USCS	CLASSIFICATIO	IN OF MATERIALS	RECOVERY	MONITOR		_
	S  CT Facility-wide Groundwa  PID MAKE/MODEL: SCE P3.2  ATION DEPTH (Feet) V  20  Z0.0  Fine 10YR Very 21.3  Con 22  23  23  23  24  24  24	'		(ft)	(PPM/CF	PM) (Sample IDs/Depths/	Core Box/
	20	20.0 - 21.3	silt some	,	Ambia		مده
		Fine sand, 1	ittle clay	1.7	(D. 6	o 7 we	· <b> -</b>
i	21 🐨	IDYRSII	Je a Sight		ſ		enn e
	21	Very soft, wi	et, non- plastic	2.0		14 20-	21.
		21.3 - 22.0	decreasing Sand			(3)	
		CONTENT ME	TO MOIST			13	
	22	23.01	A ** A = -				
	10 YR 3	22.0" 5:14	little Clay	1.75		3	
	Facility-wide Groundwater RVAAP-6 PID MAKE/MODEL: SCE FY. 2  TION DEPTH USCS CLASSIFICA  FINE SOND, 104R 511 Very soft, w 21.3'- 22.0' Content w 22.0' 511 TOYR 511 Very sofx, w 23.0 - 24.0 104R 511 Soft, moist 24 24 24 24 25 26					3	
			16 moist	2.0		4	
	22	לת על הייק	CIL, die			-	
		10 40 5/1	3111 some crowd			1	
		coft moist	ro damp,			114	
	24	non-p	lastic				
)		24.0- 26.5	1 S.A.A.	,		5	
		trace go	-avel	1.8		ا ع	
	25			,		9	
	25			2.0'		40	
						10	
1						10	
	26						
	27						
			/				
	28		CS 10/24/1	8			
			10/241				
	29						
		1					
GEOLOGIST SIGNA	30 ATURE/DATE		A/QC SIGNATURE/DATE		i i	BOREHOLE NUMBER	
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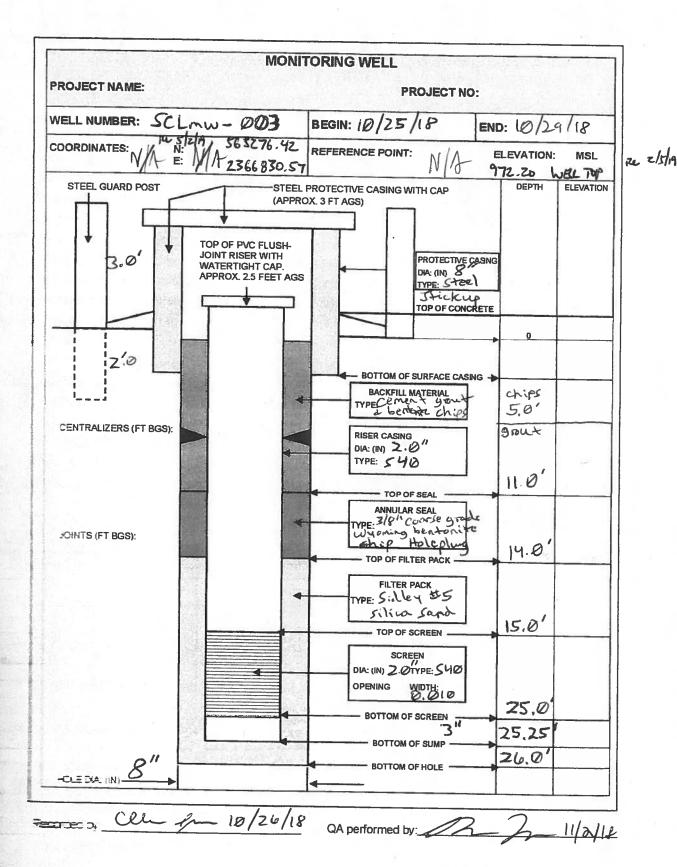


Figure 5-10. Example of Well Construction Diagram Used in Logbooks

HTRW DRILLING LOG	USACE- Louisville ES3 tw-001
COMPANY NAME	2. DRILLING SUBCONTRACTOR
EIDOS	Frontz SHEET 1 OF Z
PROJECT Facility-wide Groundwater RVAAF	P-66 4.LOCATION 8451 State Route 5 Ravenna OH 44266
NAME OF DRILLER Ricky Shorks	
SIZES AND TYPES OF SAMPLING EQUIPMENT	8. BOREHOLE LOCATION
2' x 1.5" split spoon	Electric Sub-Station No. 3
	9. DRILL DATE/TIME STARTED: COMPLETED:
	10/23/18 1150 10/23/18 1330
OVERBURDENTURANCE	10. DEPTH GROUNDWATER ENCOUNTERED 5.5
3. DEPTH DRILLED INTO BEDROCK	12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION NA  14. CHEMICAL SAMPLES (circle) VOC. SVOCs RAME PCRe
5. TOTAL DEPTH OF BOREHOLE	vec steel rais reas
S. DISPOSITION OF BOREHOLE	Pesticides Explosives TAL Metals Propellants
ACKFILL TYPE: GROUT BENTOI	NITE X TEMPORARY WELL POINT MONITORING WELL
	Ground Surface PPM: Parts per Million
: First Water Encountered	: Static Water Level NA: Not Applicable
OCATION SKETCH/COMMENTS	SCALE: None
Ek3+w-w	
673	
	E53tw-001
	and the control of th
TO COLOT COMPTION CO.	
SEOLOGIST SIGNATURE/DATE  Celly 1 10/23/1	8 El Mugga 14/25/18 ES3+w-001

<b>ITRW</b>	DRILLIN	G LOG	USACE- Louisville		ES3 †	-w-001
COMPANY NA	ME.		2. DRILLING SUBCONTRA	ACTOR		- •
EIDOS			Frontz		30	SHEET 2 OF $\geq$
PROJECT	Facilit	y-wide Groundwater RVAAF	-66 4. DIRECTION OF E	OREHOLE 🔽	VERTICAL	INCLINED DEGREE
NOTES PID	MAKE/MODEL: R	ae Systems Mult	120e + PID SERIAL# P	ne 13389	Colors from	Munsell Soil Color Chart, Rev
ELEVATION	DEPTH	USCS CLASSIFIC	CATION OF MATERIALS	RECOVERY	MONITORING	2000 Revised Edition REMARKS
	(Feet)			(ft)	(PPM)	(Sample IDs/Depths/Etc.)
		0'-025' A	ledium Sand		Ambient	blow counts
		1. His growel	at organics	075	0.0	l t
		104RE14 4	ellowish park	0.75	ا ا	2
	1 1—	moist	Clay trace gra	2.0		
		0.13 = 2.0	Hed al loyabl	1	]	4
		C-EL Dan	p, med plusticit	գ		3
	2			`		3
		2.0'-3.0'	S.A.A.			i .
		i	1	1.0		4
		<u> </u>				8
	3	201101	<b>√</b> ⁄	2.0		8
		30-40	Clay some silt sand a gravel			8
		INTLE MOD.	swel & graver			7
	4	Soft, dum	p, non-plastic	.		
	1,7					
	A	4.0'- 50'		1.41		3
		VE1-4 20	ft; moist wasticity	/_/		1
	5	ים שפו	ia: ficting	20'		water
		5.0-5.5 F	the sand some			water 10 @ 5.5'
	I V	SILT ! LIH	(/ E C (C)-			5.5
		1848516				10
	6—	wet non	Sond (fine			<u> </u>
		me) & 000	er) some arows	A		5
		little cloy	a silt	1.51		
	7	18485/6 VE	ysoft, wet Hed, non-plast	c /2.0'		7 Saturated Zonc
		to sortura	ted non- prose	2.0		1 2
		6.0'-7.5'	S. A. A.			5.5-7.5
		75'-8.0'	Silt some clas			10
	8	104R6/4	NELL SOLL			
		moisk no	n-plastic			5
		8.0'-8.5'	5 · A · A	10'		
	9	85'-10'C	lay some sitt	12.0		9
	"-	Title you	iel '			10
		11th & grave 104R 5/1 9	Carry James			
		1	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			9
	10	terinina	DAVIGE SIGNATURE/DATE			
	SNATURE/DATE	10/23/18	QA/QC SIGNATURE/DATE			BOREHOLE NUMBER
رور	m for		El Roges	14/25)	B	ES3+w-001

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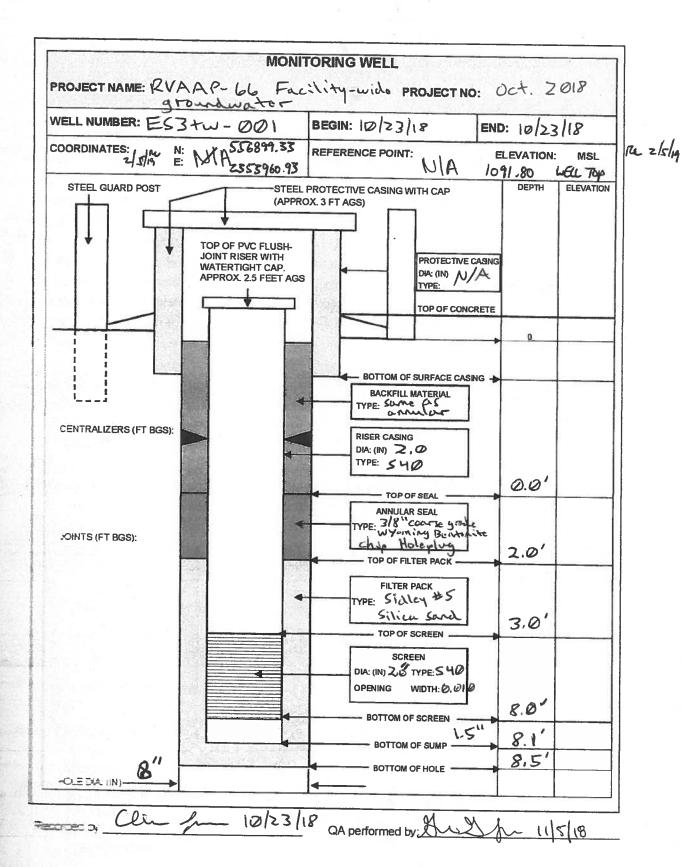


Figure 5-10. Example of Well Construction Diagram Used in Logbooks

HTRW DRILLING LOG	DISTRICT		114				EHOLE N		- MM	_
1 COMPANY NAME	USACE-			TOO			-> 3	τω	- 00	<u> </u>
©qui →		LING SUBCONTRACTOR SHEET 1 OF								
LEIDOS  3 PROJECT Facility-wide Groundwater RVAAR 66	Frontz	Luiaa								
Tacinty-wide Gloulidwater KVAAF-00			ATION	845 L OF DR				enna Ol	1 44266	
5. NAME OF DRILLER RICKY ShowES  7. SIZES AND TYPES OF SAMPLING EQUIPMENT	- 20			LOCATIO	_	me.	55	LC		_
2'x 1.5" split spoon						اعطم	tatio	on A	10.3	
2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			L DATE		STARTE			COMP	LETED:	
				10/2	2/18	15	350	101	81/52	-1
		707			TER ENC			2 2		
11. OVERBURDEN THICKNESS  13. DEPTH DRILLED INTO BEDROCK		12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION  14. CHEMICAL SAMPLES (dicie) VOC SVOCE PARE DERE								
		-				VOC			PAHs PC	CBs
15. TOTAL DEPTH OF BOREHOLE 10.0		<u> </u>	Pesticide	<u> </u>	Explosive	es	TAL Met	als	Propellants	
BACKFILL TYPE GROUT BENTÔNITE	▼ TEM#	PORARY	'WELL F	MIO	г	MON	IITORING	WELL		
17. NOTES BKG: ≤ Background BGS: Below Ground Surfa				r Million		-				
: First Water Encountered	Static Water L	evel		NA: N	Vot Appli	cable				
LOCATION SKETCH/COMMENTS						sc	ALE:	None	3	
		\$ OF	141						10. 141	1
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GEOLOGIST SIGNATURE/DATE QAN	QC SIGNATUR	Ę/DATE	- 11	T/	_ !	1		BOREH	OLE NUMBER	-
Cen for 10/23/18 /	-0. W			ik Lo	1/2	ń			53 tw.	

HTRW [	DRILLI	NG L	OG	USACE- Louis	ville			S34		002	
. COMPANY NAM	4E			2. DRILLING SUBCO			1				
EIDOS				Frontz	Frontz				SHEET	2 OF 3	2
PROJECT			Groundwater RVAAP-6	,0	OF BOREHOLE		VERTIC	AL	[ INC	LINED DE	EGREE
. NOTES PID M	AKE/MODEL:	Rae !	Systems Multis	200 + PID SERIAL#	Pine 133	389	C	olors from	Munsell Soil	Color Chart, Rev	
ELEVATION	DEPTH	uscs	1 01.00(5)01.				1		2000 Re	vised Edition	
ELEVATION	(Feet)	USCS	CDASSIFICA	TION OF MATERIALS	RE	COVERY (ft)	1	TORING 'PM)	(San	REMARKS  nple IDs/Depths/E	ie i
	^		0-0.25 Coors	e Sand & Grav	18 V	1.4		oi ent		-pic (D3/DCPRI3/E)	10.7
			10-0.25 Coors	trace orga	مزدs   1,12	) /	0		3		
			moist		"	/ ,			10		
	1		0.25 - 2.0' ( d Grove) le	Course sand	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	2.0			7		
			d Gavel 10	VK-//				1	<i>l</i>		
			damp (possi	Pla till water	ר ואר				3		
	2				_						
		1	2.0-3.0°C	lay some Si	1+			1	2		
			104R6/1 mois	+la\/ 100Y%	26/6 1.7	2'/			<		
			1017.611 mos	ned to have	icity /	20'	1.4		7		
	3		3.5	b mes. bes.	1	2.0		==	J		
			3.0 - 4.00 i	nercosed	ام		l .		4		
			Silt cont	~~~~ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	#				•		
	4		3,5'-40' (	lay soll love	10/1				6		
			Soft, damy	low plasti	city -						_
			4.0-4.5	CAA.	1 1	8'			2		
	-5				- 1	/ 1			9		
	5		4.5'-6.0'	Sova (med 1	Fine!	2.0			· I		
			Some silt	trace clo	ኅ				9		
			record one	10415 316	20				0		
	- 2-7		POLY I WOUS	Na Par	(4,(				8 4	where	6'
	<sub>0</sub> 6∑		5.5' increase	ed mediums	and						
			content,	wet no cla	$\sim$	~ 3			2	Sutura	467
			6.0 - 8.0	Sand	,   i.	0			_	FORE	
	7		I / A - WATE CAPIL	4 4206 7 20	~   /	.0			3	6'-8'	
	_		silt & grain	المائي المائد د		, • •					
			very soft	054 40 20:10	0366	1,852			8		
			non-plasti	ت					8		
	8		8.0'- 8.5' 5	ilt some cl	سا ہیں						
			trace grave	1 10 YR 6/L					4		
			very soft, moi	st, non - plu	SHE IN						
	9		8,5'- 10.0'		1 14 "				5		
	9		COL LOVE	S/L Cocal	7	.0'			6		
			Silt 104R moist, non	SOFT	-						
			moist, non	- plastic					7		
	10		Terminate	0 10' logs				<u> </u>			
			0/23/18						BOREHOLE	NUMBER - O	0>
EOLOGIST SIGN	D				-		_				
CUL	- 1-		0/23/18	El: Rogo	4 101	25)19	<u> </u>			7,50	
Clu-	- f~		0/2-118	(1) Hose	10!	25/19	<u>8</u>			,,,,,,	

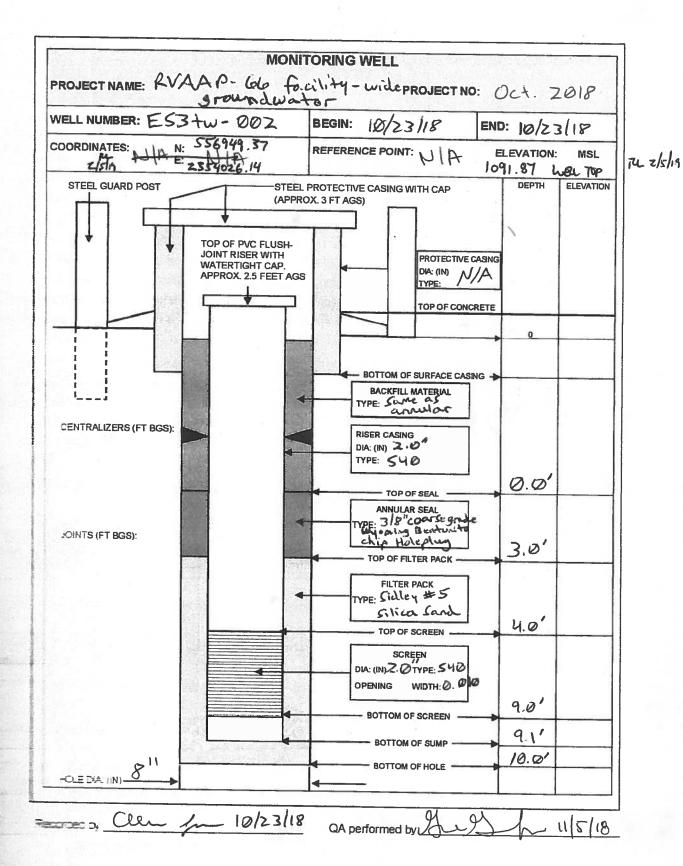


Figure 5-10. Example of Well Construction Diagram Used in Logbooks

ITRW DRILLING LOG	USACE- Louisville  BOREHOLE NUMBER  ES3+w-003
COMPANY NAME	2. DRILLING SUBCONTRACTOR SHEET 1 OF Z
EIDOS	Frontz SHEET 1 OF 2
PROJECT Facility-wide Groundwater RVAAP-6	
NAME OF DRILLER RICKY ShowKS	6. MAKE/MODEL OF DRILL CME 55 LC
SIZES AND TYPES OF SAMPLING EQUIPMENT  2'X 1.5" Split Spoon	Electric Sub-station No. 3
2 x 1.3 3 3 114 2 50011	9 DRILL DATE/TIME STARTED: COMPLETED:
	10/23/18 0840 10/23/18 1108
OVERBURDEN THICKNESS NIP	10. DEPTH GROUNDWATER ENCOUNTERED 7. 0 1  12. DEPTH TO WATER/ELAPSED TIME AFTER BOREHOLE COMPLETION N.
DEPTH DRILLED INTO BEDROCK	14. CHEMICAL SAMPLES (circle) VOC SVOCS PAHS PCBs
TOTAL DEPTH OF BOREHOLE 10.0 1865	Pesticides Explosives TAL Metals Propellants
DISPOSITION OF BOREHOLE	
CKFILL TYPE: GROUT BENTONITE	▼ TEMPORARY WELL POINT
NOTES BKG: ≤ Background BGS: Below Gro	nd Surface PPM: Parts per Million
: First Water Encountered	: Static Water Level NA: Not Applicable
DCATION SKETCH/COMMENTS	SCALE: None
003	
E53+w-003	
/0	
DLOGIST SIGNATURE/DATE	QA/QC SIGNATURE/DATE BOREHOLE NUMBER
ce lu 10/23/18	Eli Rugust 10/25)18 E53+w-003

HIRWL	RILLING	LOG	USACE- Louisville	ES3+w-003			
1. COMPANY NAMI	E		2 DRILLING SUBCONTRACTO	R		1	
LEIDOS			Frontz			SHEET 2 C	DF 2
3. PROJECT	Facility-w	ide Groundwater RVAAP-66	4. DIRECTION OF BORE	HOLE	VERTICAL	INCLINED	DEG
5. NOTES PID M		e Systems Multir		189	Colors from	Munsell Soil Color Cha	irt, Rev
						2000 Revised Edition	ın
ELEVATION	DEPTH USO	CS CLASSIFICATIO	ON OF MATERIALS	RECOVERY	MONITORING	REMAR	KS
	(Feet)	-1 1	1	(ft)	(PPM)	(Sample IDs/De	
		0-0.25 M	which promu	1.1/	Ambient 0.0	Blow cou	~~
		some grove	much promu	2.0	0.0	2	
1	1	mex mex			l i	2	
			4112 01461 111			4	
		little gravel 1	ey little silt eyr 616 eyr 611 dany			_	
	2	mothled w/10	YR 6/1 dany			/	
	4—	Coff low p	la Chr. idea			4 4	19
.2		70-40'0	lay Some Sift any soft	100		4	
		102051	ray some sitt	1.8		5	
	3	10 TRS 16 a	any soft	2.0			
		1000 plas Hick	74			7	
		1				<u>                                     </u>	
						17	
1	4		V		-		
		4.0'-6.0' S. most; tro	, A.A.	١,		3	
		most + tro	Le gravel	1.5	1 2		
	5	1 1	1	l / .	1	14	
	-			26		1	
				,		6	
						6	
	6	-   🗸	1				
		60-7.0' C	lay some sit			2 water	-, ,
		trace grovel	104R5/4	1.7			/
	7.77	very soft, m	lore 5/4 placticity	15.01		3 sati	ton u
	<sup>7</sup>					20	,Vc
		1.0 - 1.3 A	Medium Sand	i i		5 27-	7.5
		Joine Clay 16	1100 [7			10	
	88		+, non-plastic				
2.		7.3 - 8.0'				3	
- 12		clay 10 YRG	14	08'		2	
		moist to dam	p very sott	70		3	
	9	non-plastic		2.0	200	-	
		8.0'-10.0'	S. A. A.			5	
7:			rist			5	
	10	terminate	2 loft bac			7777 N. J. W.	
GEOLOGIST SIGN	ATURE/DATE	10/23/18	AVOC SIGNATURE/DATE			BOREHOLE NUMBER	
LULL	1	.21-2110	El Hough	1118/25	118	ES3tw-	· W

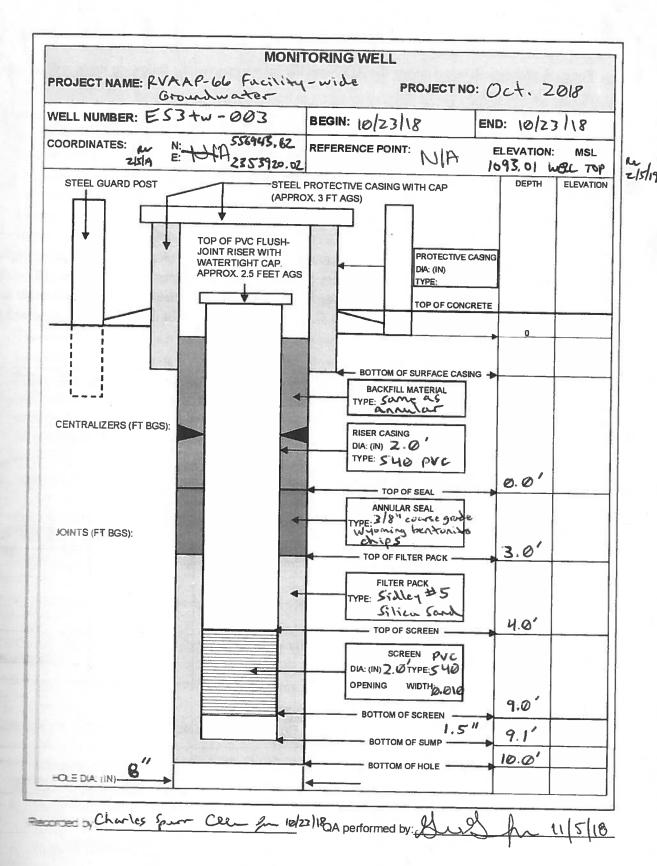


Figure 5-10. Example of Well Construction Diagram Used in Logbooks



B.3	MONITORING WELL DEVELOPMENT FORMS



<del></del>		<del>_</del>								
MONITORING WELL DEVELOPMENT FORM										
Project: RVAAP	Location ID:	Date Developed:								
KVHTLP	DATW-001	10/30/18								
Personnel Conducting Development:	Date Installed:									
Ell Rogatz	14/36/18									
Development Method Used (circle one):	Pump / Bailor Type	Pumping Rate (gal/min) =								
Bailer Submersible Pump Peristalti	c Pump (size/model):									
	whater multi-Sta	ac 0.75 gal min								
Development Criteria:		01								
(1) Turbidity >10 NTU. or if natural Turbidity	/ >10 NTU, water is clear to the unaided eye	and turbidity ± 10%								
(2) Sediment thickness < 0.1 ft. <u>or</u> Sediment	thickness < 1% well screen Top of poblebow.	Mars - 17-31 Litar								
(3) Removal 5X well volume. See calculation	below.	mp=1713 0100								
(4) 3 consecutive readings of development (	parameters Pump set at 1	314 on 10/30/18								
DEVELOPMENT CONFIRMA	TION MEASURMENTS (minimum 24 ho	ours after development)								
Date / Time: 82	Total Depth	Depth to water								
1440	(ft btoc): A2 4/2/6	(ft btoc):								

		PURGE VOLUME CALCULATION		<u> </u>	
Well Total Depth before development (ft btoc)=	20.13	Length of screen = (ft)	101	Diameter of	Gallons per foot
Depth to Water before	14.54	Saturated thickness of filter	II.	casing (in) (circle one)	of depth (V) (circle one)
development (ft btoc)=		pack /screen (Hfp) (ft toc) =	'''	2	0.163
Total water column (H)( ft)=	5.59	Assumed porosity (-) = 11 x 1.46 x.3 = 4.84	0.3	4	0.653
Volume of Riser Casing	Ø.91 gal	Volume of Filter Pack (gal) =	2 9-2	6	1.469
(gal) = (H) x (V) =		(Hfp x V x 0.3) (Hfp x V)=	3.93	8	2.611
Total Well Volu	me = (Volume of	Riser Casing) + (Volume of Filter Pack) =	4.849	9	3.305
Min	imum purge vol	ume = 5 x (Total Well Volume) =	24.290	10	4.080
Height of casing above ground surface (ft) =	2.54'	Estimated Rate of Recharge (gal/min) =	1/2 gal min	12	5.875

			Į.	NDICATOR	PARAMETE	RS		20.		
	Volume purged (gal)	Temp (°C)	pH (s.u.)	Cond. (mS/cm)	Turb. (NTU)	ORP (mV)	DO (mg/L)	1		]
Date / Time	Min. 5X Total Volume	(±0.5°C)	(±0.2)	(±3%)	(<10 NTU or ±10%)	(±20mV)	whichever is greater: (±10% or < 0.2mg/L)		mments or, odor)	
1447	12	12.4	7:41	0.782	59710	136.4	5.52	vem to	had wellive	ht du
1148	4	12.6	6.99	0.729	1226.9	58.8	4.84			
1124	6	12.9	6.90	0.635	2250,7	104.8	4.55			]
1143	8	13.0	6,94	0.634	1495.8	153,0	5,41		¥/	]
1205	10	12.9	6.91		2616.8	114.3	5,51			]
1210	ાર્ય	13.1	6.92	0.564	5428,1	[03.]	5.27			]
1230	18	12.9	6.99	0.527	4618.5	184.5	6.50			}
1235	22	12.9	6.90	0517	18344	178,7	4.42			]
1240	27	12.9	6.74	<b>ምት</b>	1176,6	178.7	5.15	\	/	}
1255	32	13.3	7:02	0.429	195.7	186.0	6.12	clear u	1 Slight by	wasdor
1300	35	12.9	6.90	0.481	187.6	130.7	5.72	clear 4	istialt b	an cdo

14734118

QCIB 3 11/12/18

MONITORING WI	ELL DEVELOPMENT FORM	* .
Project: RVARP-66 Location	10: SCL mw - 601	Date Developed:
Personnel Conducting Development:	Date Installed:	
Development Method Used (circle one):  Bailer Submersible Pump Peristaltic Pump	Pump / Bailor Type (size/model): whaler	Pumping Rate (gal/min) =
Oevelopment Criteria: (1) Turbidity >10 NTU. or if natural Turbidity >10 NTU, v (2) Sediment thickness < 0.1 ft. or Sediment thickness < (3) Removal 5X well volume. See calculation below. (4) 3 consecutive readings of development parameters	< 1% well screen	
DEVELOPMENT CONFIRMATION MEA	SURMENTS (minimum 24 hours af	ter development)
Date / Time: WA	Total Depth (ft btoc): N/A	Depth to water // (ft btoc):
		,

N					
	*	PURGE VOLUME CALCULATION	ő 🛮 🖠	10	
Well Total Depth before	0 07	Length of screen = (ft)		I	
development (ft btoc)=	8.87		50	Diameter of casing (in)	Gallons per foot of depth (V)
Depth to Water before	3 96 Saturated thickness of filter		1 12	(circle one)	(circle one)
development (ft btoc)=	3, 10	pack /screen (Hfp) (ft toc) =	6.0	2	0.163
Total water column (H)(	111 01	Assumed porosity (-) =	0.3		0.103
ft)=	4.91			4	0.653
Volume of Riser Casing	0.80	Volume of Filter Pack (gal) =	478	S 24 16 6	1,469
$(gal) = (H) \times (V) =$	0.00	(Hfp x V x 0.3) (Hfp x V)=	3.40	434.0	
Total Well Volu	me = (Volume of	Riser Casing) + (Volume of Filter		8	2.611
313	8	Pack) =	4.70	9	3.305
Min	imum purge volu	ume = 5 x (Total Well Volume) =	23.5	10 -	4.080
Height of casing above	Flush	Estimated Rate of Recharge	-0.015	12	5.875
ground surface (ft) =	mount	(gal/min) =	20.013	E %	<i>p</i> .*

		8	18	NDICATOR I	PARAMETEI	RS	(a)	*
0835	Volume purged (gal)	Temp (°C)	pH ' (s.u.)	Cond. (mS/cm)	Turb. (NTU)	ORP (mV)	DO (mg/t)	
Date / Time	Min. 5X Total Valume	(±0.5°C)	(±0.2)	(±3%)	(<10 NTU or ±10%)	(±20mV)	whichever is greater: (±10% or < 0.2mg/L)	Comments (color, ador)
0/31/18		0	-					
0839	14	13.44	6.66	0.592	>1000	119	7.24	turbid grayish
0849	~ 5	13.78	7.19	0.510	>1000	88	11.17	+same
0904	~ 5.25	12.84	7.34	0.568	71000	91	11,70	101 **
2925	2 <b>5</b> . <b>5</b>	12.87	7.53	0.327	>1000	95	13.65	4
0945	45.75	12.67	7.50	0.569	>1000	100	13.06	¥
005	~5.9	13.03	7.50	0.580	615	104	13.61	1
205	~ 7.15	12.87	7.82	0.564	>1000	105	12.89	4
1235	28	12.71	7.67	0.572	71000	111	12.76	1
305	~ 8.7	12.93	7.62		> 1000	115	13.45.	13.45
335	29.3	13.04	7.60	0.582	>1000	116	13.19	14

QC Bn Jn 11/2/08

	MON	IITORIN	G WELL	DEVELO	OPMENT	FORM (	CONTINUE	:D)	
Project: R	VAAP	- 106			Location I	D: (C)	CONTINUE	301	
		0.0			PARAMET				
<u> </u>	Volume,	Temp	рН	Cond.	Turb.	ORP	DO		
	purged (gal)	(°C)	(ร.น.)	(mS/cm)	(NTU)	(mV)	(mg/L)		
10/31/18	Min. 5X Total		33		(<10 NTU or		whichever is	Comments	:
Date / Time	Volume	(±0.5°C)	(±0.2)	(±3%)	±10%)	(±20mV)	greater: (±10% or < 0.2mg/L)	(color oder)	
405	9.8	13.01	7.55	0.579		11 00	12.96	turtid gran	ich brown
435	10.3	13.07	7.63	0573	983	114	13.00		bromber ge
505	10:8	13.11	7.58	0.578	>1000	112_	1310		] [
	Develop	nent	compl	ete	2110	allors	total	removed	
	1	1 1	1	, 1	=(1)				
				,		4 . 4			]
		-				<u>.</u>			]
					1	W. III			=
87.			-						-
									2000
							/		
***									
.0					1,				4.
		-					4.		
						ė			]
			((2))	CS,					
				10/	31/18	^	Yes		
			<u></u>	- 1			lia		<u>.</u> .
:				1 /= 11					
			/						
	•						-	- 17	
								1	
ii c			750	И					3.45
*		1	,						*
		<u> </u>			1.00				- 7
	/		-				6.70		
					_				
				for a		100	0		
/	1	948	<b>P</b>	a .			-		
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	-		. 221	y Fa					
/					1	丝			
,	==				25				Ι,

QCBn 2- 11/2/19

	MONITO	RING WI	ELL DEVELOPN	<b>TENT FOR</b>	M			
Project: RVAAP	ما س	Location ID: SCL MW-002 Date Developed: 10/30/12						
Personnel Conducting Dev	velopment:		10/25/	18				
Development Method Us	ed (circle one):		Pump / Bailor Type		Pumping R	ate (gal/min) =		
Bailer Submersible	Pump Peristal	tic Pump	(size/model): Z	stage	~ 0.8	3		
Development Criteria:								
(1) Turbidity >10 NTU.		•		iaided eye and	turbidity $\pm$ 10%			
l ''	s < 0.1 ft. <u>or</u> Sedime		< 1% well screen					
	olume. See calculatio							
(4) 3 consecutive read			SURMENTS (minim	um 24 hours	after develope	-antl		
D : /=:		ATION WEA	1 - 1 - 1		Dooth to u	nent)		
Date / Time: 10 / 30	18		(ft btoc):	. 85	(ft btoc):	rater 48		
			*	Taken	before	setting pur		
		PURGE VOL	UME CALCULATION					
Well Total Depth before development (ft btoc)=	7.80'	Ler	ngth of screen = (ft)	5.0	Diameter of casing (in)	Gallons per foot of depth (V)		
Depth to Water before	4.54'	Saturate	d thickness of filter		(circle one)	(circle one)		
development (ft btoc)=			reen (Hfp) (ft toc) =	11/20/12 0.3	2	0.163		
Total water column (H)( ft)=	3.26	ASS	umed porosity (-) =	0.3	4	0.653		
Volume of Riser Casing	12		of Filter Pack (gal) =	yaqi-	6	1.469		
(gal) = (H) x (V) =	IJAGILA OFF		/ x 0.3) – (Hfp x V)= + (Volume of Filter		8	2.611		
Total Well Volu	me = (volume oj n	iser Casing)	Pack) =	4.79	9	3.305		
Min	imum purge volui	ne = 5 x (To	tol Well Volume) =	23.9	10	4.080		
Height of casing above ground surface (ft) =	- 0.25	Estimated	d Rate of Recharge (gal/min) =	>0.8	12	5.875		

			H	NDICATOR	PARAMETE	RS			
story 1152	Volume purged (gal)	Temp (°C)	pH (s.u.)	Cond. (mS/cm)	Turb. (NTU)	ORP (mV)	DO (mg/L)		
Date /	Min. 5X Total Volume	(±0.5°C)	(±0.2)	(±3%)	(<10 NTU or ±10%)	(±20mV)	whichever is greater: (±10% or < 0.2mg/L)	Comments (color, odor)	
10/30/18			SEATON!						
1158	~3	11.29	6.60	0.686	> 000	-56	6.69	turbid gray	ho odor
1208	-8	11,44	6.60	0.697	168	-76e	6.63		
1213	212	11.86	6.61	0.692	36.5	-72	5.28		1
1218	ما ا م	11.95	6.66	0.706	8.0	-77	6,33		1
1223	+20	11.98		0.710	9.3	-79	5.94		1
1228	~24	12.09	6.77	0.718	4.3	-81	6.36	Visibly clear	no fin
				es	11/19/	R			ĺ
					1				1
							_		1

QC: 132 1/20/18

MONITORING WELL DEVELOPMENT FORM									
Project: NAAY-66 Location	ID: CAL 643	Date Developed:							
Facility-wide Groundwater	JCLMW-003	10/29-30/2618							
Personnel Conducting Development:	Date Installed:								
C. Spurr / R. Sprinzi	10/26/18 (Frontz Dall	ina)							
Development Method Used (circle one):	Pump / Bailor Type	Pumping Rate (gal/min) =							
Baller Submersible Pump Peristaltic Pump	(size/model) Tine on lellan	Q1->08							
	2) Multi-stage PVC Amps	1 1 4 2 3							
Development Criteria:									
(1) Turbidity >10 NTU. or if natural Turbidity >10 NTU,	water is clear to the unaided eye and tu	rbidity ± 10%							
(2) Sediment thickness < 0.1 ft. or Sediment thickness <	< 1% well screen								
(3) Removal 5X well volume. See calculation below.									
(4) 3 consecutive readings of development parameters									
DEVELOPMENT CONFIRMATION MEASURMENTS (minimum 24 hours after development)									
Date / Time:	Total Depth	Depth to water							
PI 1/9Qf UT	(ft btoc): A2 1/24/4	(ft btoc): ubol							

		PURGE VOLUME CALCULATION	×	<u> </u>	
Well Total Depth before development (ft btoc)=	26.40	Length of screen = (ft)	10	Diameter of	Gallons per foot
Depth to Water before development (ft btoc)=	17.71	Saturated thickness of filter pack /screen (Hfp) (ft toc) =	8.69	casing (in) (circle one)	of depth (V) (circle one)
Total water column (H)(	8.69	Assumed porosity (-) =	0.3	2	0.163
Volume of Riser Casing (gal) = (H) x (V) =	1.39	Volume of Filter Pack (gal) = (Hfp x V x 0.3) – (Hfp x V)=	5,38	6	0.653 1.469
	me = (Volume of	Riser Casing) + (Volume of Filter	6.7	8	2.611
Min	imum purge volu	Pack) = ume = 5 x (Total Well Volume) =	33.5	9	3.305 4.080
Height of casing above ground surface (ft) =		Estimated Rate of Recharge (gal/min) =	Ø.1	12	5.875

			- 1	NDICATOR	PARAMETE	RS		
	Volume	Temp	рН	Cond.	Turb.	ORP	DO	
	purged (gal)	(°C)	(s.u.)	(mS/cm)	(NTU)	(mV) =	(mg/L)	1
Date / Time	Min. 5X Total Volume	(±0.5°C)	(±0.2)	(±3%)	(<10 NTU or ±10%)	(±20mV)	whichever is greater: (±10% or < 0.2mg/L)	Comments (color, ador)
0/29/18/1520	<u>~8</u>	11.4	7.59	1.214	1426	96.4	3.27	verythetal grow, 1000 or 48a
03918/0858	-2.6	9.7	6.83	1.059	27/128	124.0	0 = 1	verytorbid gray ~ I L/min
0938	~1.8	11.1	7.12	1.078	2004.43	106.1	7.90	Flow In 700ml/men
	216	11.1	7.14	1.965	2393-75	68,5	5.38	~600m4/min
	10,5			_				No Flow-Check Pump Depth/tut
1015	<b>6</b>	10.8	7.17	0984	2578.18	104.7	460	~1100mL/min (DR)
1025	<u>~   </u>	_	_	_	~		~	Dry-Recharge
	~Ø	161	7.18	1,021	278567	81.4	5,63	~700mL/min
1048	-0.5		_			_		Dry-Recharge upto-21.16
[113]	0	11,4	7.20	0.852	145.90	68.0	3.76	-700 milmin, slightly less tur
1118	-6.5	11.4	7.16	1.004	2194.5	57.6	A	2500 allmin

Aspub 10/30/18

QC 12/20/10

oject: R	MAP-66	W GR	UNDWA	TER	Location I	D: SCL	πω-φφ.	3
			- II	NDICATOR	PARAMET	ERS		
	Volume purged (gal)	Temp	pH (s.u.)	Cond. (mS/cm)	Turb. (NTU)	ORP (mV)	DO (mg/L)	
	Min. 5X Total	\ -\-	(5.0.7)	(,	(<10 NTU or		whichever is	- Comments
te / Time	Volume	(±0.5°C)	(±0.2)	(±3%)	±10%)	(±20mV)	greater: (±10% or < 0.2mg/L)	
112 <u>3</u> 1128	~/	11.6	7.16	0.892	2262.70		3.60	Flord ~30m/min, WL Topofp
	MB5 Fa19	11.8	7.2/	0.907	2273.16	19.6	2.59	
1234		11.8	72./	5 Cr-+	1100	1-1	77-	Dry- Rechange
	15		7.36	0.857	1687.09	17.0	2.75	Wa20,45, ~ 1400ml/min
		11.5	7.10	1.042	1791,70	43.0	6.06	1/200 mlfmin
1243		//-		A C-20	1022-			DryRecharge
1336		11.7	7.18	0818	602.95	16.6	3.17	W120.6', ~ Town Line, ten
1341	~/	11.6	7.23	18934	1349.07	39.5	7.63	turbed 7.
1346	n/	11.6	7.10	1.067	13416,15	57.5	6.30	1500ml/min
1348	10.5						_	Dry-Rechange
1400	0							Charged Pump > No Flow
<u> 1410 </u>	_							Changed Battery > No Flow (WL-2
1425								Changedpump
1440	Φ	12.6	7.31	0.931	2466.32	99.5	8,15	WL-20.1' Flow 31/m 6.8 6A
1443	~3 (~27)	-	_	_	_	_		Dry > Acharge
1453	<u>^</u> _ ′	12.2	7.25	1,017	1648.50	90.9	7.50	NL 23 (10min Rechage)
1514	20,5	121	7.14	1.00%	2180.20		6.68	Very Turbid, ~ 20min Redaine
1516	4.		-		-			Dy > Recharge -1's Aint
1527	0	12.2	7.21	0.789	1080.20	51,5	2.54	~31/min (0.8 gal/min)
1528	~1		_		7 7 7 7 7 7			1. / = \ \ = \ \ - \ \ \
1539	Ø	11.9	7.22	D.869	2409.10	43.0	3.45	Dry-Rachago
	nas	~ 7						1)= = 0 = 1==
1548	ø	12.0	7.25	d.735	384.09	70.2	1.110	1714-12 Conavae
155h		-	7.63	W 133	7,01	1416	6,49	Dry-Rednige
7555	10	11.2	7.23	1.696	399.05	115	E 40	VIYTKermize
1557	اند	11.6	1.67		777.00	6115	5.00	D = 0 = /
	~075.	12./	7.28	0911	99501	5/17	/	Pry-Rechurge
		12-1	7280	4711	773.41	14.1	6.73	D CV1.1.11.C1
1645	~025(34)	TRI	4-4-6	Tyles				Dry; 5x Well Volune
								Removed -> Development
11					_			Completed.
1605						<u> </u>		NEW WELL WZARD AMP
(cont.)	-					-		INSTALLED BY C. SPURR.
						26/10-		
						1 1		

RSnobiol30/18
Photo Log: IMG-3801 (silt)

MONITORING WELL DEVELOPMENT FORM									
	on ID: -53TW - (DD)	Date Developed: 10/29/18							
Personnel Conducting Development:	Date Installed: UEAPPN	nent Rinse"							
Development Method Used (circle one):	Pump / Bailor Type U	Pumping Rate (gal/min) =							
Bailer Submersible Pump Peristaltic Pump	(size/model):	0.75 gallmin							
Development Criteria:		-							
(1) Turbidity >10 NTU. or if natural Turbidity >10 NT									
(2) Sediment thickness < 0.1 ft. or Sediment thickne	ss < 1% well screen () MAD 🖘 🕇	-at its on lot							
(3) Removal 5X well volume. See calculation below.		113000							
(4) 3 consecutive readings of development paramet	ers TOP of Pump= 7.5	$a_{\alpha}$							
DEVELOPMENT CONFIRMATION M	EASURMENTS (minimum 24 hours a	fter development)							
Date / Time:	Total Depth	Depth to water							
RIMPAIR	(ft btoc): Ranfulis	(ft btoc): RL W/2/5							

	- robale	PURGE VOLUME CALCULATION			·
Well Total Depth before development (ft btoc)=	5.75 (LIP	Length of screen = (ft)	5 <sup>1</sup>	Diameter of casing (in)	Gallons per foot of depth (V)
Depth to Water before	5,95		6121.469	(circle one)	(circle one)
development (ft btoc)=	2,13	pack /screen (Hfp) (ft toc) =	_	2	0.163
Total water column (H)( ft)=	5. 15'	Assumed porosity (-) =	0.3	4	0.653
Volume of Riser Casing	5.15x D.163_	Volume of Filter Pack (gal) =	881-	6	1.469
(gal) = (H) x (V) =		$(Hfp \times V \times 0.3) - (Hfp \times V) =$	0.839		2.611
Total Well Volu	me = (Volume of	Riser Casing) + (Volume of Filter	7.97	•	2.611
		Pack) =	1011	9	3.305
Min	imum purge volu	39.87	10	4.080	
Height of casing above ground surface (ft) =	3,45	Estimated Rate of Recharge (gal/min) =	4gal/m	12	5.875

	_		- 1	NDICATOR	PARAMETE	RS		
	Volume purged (gal)	Temp (°C)	pH = (s.u.)	Cond. (mS/cm)	Turb. (NTU)	ORP (mV)	DO (mg/L)	
Date / Time	Min. 5X Total Volume	(±0.5°C)	(±0.2)	(±3%)	(<10 NTU or ±10%)	(±20mV)	whichever is greater: (±10% or < 0.2mg/L)	Comments (color, odor)
1134	Fact	16.56	7.18	0.274	>1000	730	7.99	well went dus
114p	12961	12.13	7.13	0260	714000	231	9.90	wellwent duty
1152	Basil	12.13	7.15	Ø.181	>1000	200	8.71	well went dely
1223	25 941	12.42	7.50	0.265	70000	205	10.41	well went dut
1243	323al	12.44	7.56	Ø.267	>10000	a pl	9.25	wellwent day
324	38gr.1	12.12	7.56	D.262	>1000	all	9.14	well went the
343	1 28/11	13.02	7.52	0264	>10000	196	9.27	well went delle
354	47901	13.27	7.57	0.263	7000	192	0.919.12	wellwent due
140CP	50 dal	13,41	7.58	D.264	ZIOYD	191	9.10	well went his
	J		1737	TR 10/2	9/10		1	
			10					

QC B 2 11/12/18

MONITORING WELL DEVELOPMENT FORM									
Project: RUAAP	Location	nID: ES3TW-DDZ	Date Developed:						
Personnel Conducting Development:  Eli Zogata		Date Installed:	200						
Development Method Used (circle one):		Pump / Bailor Type	Pumping Rate (gal/min) =						
Bailer Submersible Pump Peristalti	c Pump	(size/model): Whaler Hulti-Stage	Q.75 gallinn						
Development Criteria:									
(1) Turbidity >10 NTU. or if natural Turbidity >10 NTU, water is clear to the unaided eye and turbidity ± 10% (2) Sediment thickness < 0.1 ft. or Sediment thickness < 1% well screen (3) Removal 5X well volume. See calculation below. (4) 3 consecutive readings of development parameters (4) 3 consecutive readings of development parameters									
(4) 3 consecutive readings of development		ASURMENTS (minimum 24 hours a	U 1,31 010						
	TIOIA IAIE								
Date / Time:		Total Depth	Depth to water						
Par Visit		(ft btoc): The upality	(ft btoc): RETHER						

		PURGE VOLUME CALCULATION			
Well Total Depth before development (ft btoc)=	11.69	Length of screen = (ft)	51	Diameter of casing (in)	Gallons per foot of depth (V)
Depth to Water before development (ft btoc)=	5.61	Saturated thickness of filter	6'	(circle one)	(circle one)
Total water column (H)(	3.01	pack /screen (Hfp) (ft toc) = Assumed porosity (-) =	0.3	2	0.163
ft)=	6.08			4	0.653
Volume of Riser Casing (gal) = (H) x (V) =	6.48x 163	Volume of Filter Pack (gal) = (Hfp x V x 0.3) – (Hfp x V)=	6x1.464	194 6	1.469
		Riser Casing) + (Volume of Filter Pack) =	1.64-	8	2.611
	-		H	9	3.305
	imum purge volu	18.15	10	4.080	
Height of casing above ground surface (ft) =	7, 2.50	Estimated Rate of Recharge (gal/min) =	Ø.25ac	12 Min.	5.875

			ll l	NDICATOR	PARAMETE	RS		
. —	Volume purged (gal)	Temp (°C)	pH (s.u.)	Cond. (mS/cm)	Turb. (NTU)	ORP (mV)	DO (mg/L)	
Date / Time	Min. 5X Total Valume	(±0.5°C)	(±0.2)	(±3%)	(<10 NTU or ±10%)	(±20mV)	whichever is greater: (±10% or < 0.2mg/L)	Comments (color, odor)
NSZ.	agal	12.56	7:02	0.308	ΝΦΦΦ	215	7.71	well went dry
1520	5acl	12.62	697	0230	>100006	210	8.52	well went dres
1533	Fall	12.93	6.81	0.217	フしめひむ	214	10.12	well went dest
1543	9801	12.96	6.89	(D.222	>10000	ZIID	10.24	well want dry
1556	llaal	13.77	6.81	D.Z18	71000	204	9.91	Well went des
	0							
2			ER,					
W.			1	129/18				
								-

thalle

QCM2 Water

MONITOR		ELL DEVELOPMEN		1			
Project: RVAAP	10: ES3TW-94	13	Date Developed:				
Personnel Conducting Development:		Date Installed: 10/20/18					
Development Method Used (circle one):		Pump / Bailor Type	1	Pumping Ra	te (gal/min) =		
Bailer Submersible Pump Peristaltic	Pump	(size/model): Whaler MultiSta	ac	Q.75 gallmin			
Development Criteria:		-			0		
(1) Turbidity >10 NTU. or if natural Turbidity	>10 NTU,	water is clear to the unaide	d eye and tu	rbidity ± 10%			
(2) Sediment thickness < 0.1 ft. or Sediment (3) Removal SX well volume. See calculation	thickness <	1% well screen DIALL	sata	+ lih t .	. Ithla a		
(3) Removal SX well volume. See calculation	below.	porns	sei a	1 14M 6	in this		
(4) 3 consecutive readings of development p	arameters	Top of pu	mp = 10	2.15° 6to	L		
DEVELOPMENT CONFIRMAT	TION MEA	SURMENTS (minimum 2	4 hours af	ter developm	ent)		
Date / Time:		Total Depth		Depth to wa	eter		
-112 H/12/13		(ft btoc): 12 1/1	Ir	(ft btoc):	1211/2/1-		
		100	000				

		PURGE VOLUME CALCULATION			· · · · · · · · · · · · · · · · · · ·
Well Total Depth before development (ft btoc)=	11.901	Length of screen = (ft)	5.01	Diameter of casing (in)	Gallons per foot of depth (V) (circle one)
Depth to Water before	S. 01'	Saturated thickness of filter	ام)	(circle one)	
development (ft btoc)= Total water column (H)(	3.ψι	>. Ol pack /screen (Hfp) (ft toc) = Assumed porosity (-) = 0.3		2	0.163
ft)=	6.891	Assumed porosity (-) =	0.5	4	0.653
Volume of Riser Casing	1.12gai	Volume of Filter Pack (gal) =	7.69	6	1.469
Total Well Volume = (Volume of Riser Casina) + (Volume of Filter				8	2.611
		8.81ga	9	3.305	
Min	imum purge vol	44.05	10	4.080	
Height of casing above ground surface (ft) =	2.90	Estimated Rate of Recharge (gal/min) =	4.25gellm	12	5.875

			I	NDICATOR	PARAMETE	RS		
	Volume purged (gal)	Temp (°C)	pH (s.u.)	Cond. (mS/cm)	Turb. (NTU)	ORP (mV)	DO (mg/L)	
Date / Time	Min. 5X Total Volume	(±0.5°C)	(±0.2)	(±3%)	(<10 NTU or ±10%)	(±20mV)	whichever is greater: (±10% or < 0.2mg/L)	Comments (color, odor)
0137	L.	13.51	6.61	0.363	>KKKKP	201	16.13	well want day
0942	2	13.42	7:14	0.361		211	10.58	day
095P	1.3	13.08	7.26	0.352		230	9.98	dry
1012	4	12.41	7:10	0.352		US	11.52	dry
1034	5	17.48	7.01	0.350		248	13.61	du
1052	6	11.34	7:52	0.350		239	8.60	du
1217	8	11.43	7.61	0.298		201	8.78	du
1257	LO	12-71	7-64	0.294		243	9.49	da
1324	12_	12.60	寸:58	9.294		201	9.32	dry
1354	14	1306	7:64	CD.296		148	9.30	der
<u>гчфі</u>	16	12.98	7.58	0.294	V	192	9.21	dn

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QC Mn2

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B.4	MONITORING WELL SURVEY REPORT	





## Technical Land Consultants, Inc.

11453 Market St. North Lima, Oh 44432 330-549-9261, 330-549-0738 Fax

## 20190201 Report: Positioning Camp James A. Garfield Monitoring Wells.

DA1tw-001, ES3tw-001, ES3tw-002, ES3tw-003, SCLmw-001, SCLmw-002, SCLmw-003

Horizontal Datum: Ohio State Plane North Zone (3401) NAD83 (2011) U.S. Survey Feet

Established with Ohio VRS (Virtual Reference System): +/- 1 ft.

Vertical Datum: NAVD 88 U.S. Survey Feet

Vertical Positions: Established by Differential Leveling from Values Provided by Online Positioning User Service (<a href="https://www.ngs.noaa.gov/OPUS/">https://www.ngs.noaa.gov/OPUS/</a>), Precise Ephemeris: +/- 0.01 ft. relative to Bench Marks.

Name	Northing	Easting	Elv 1 Well Top	Elv 2 Ground	Desc.
F011001	551199.53	2346205.58	1081.40	1078.49	DA1tw-001 PVC pipe
F011002	556949.37	2354026.14	1091.87	1089.57	ES3tw-002 PVC pipe
F011004	556899.33	2353960.93	1091.80	1089.30	ES3tw-001 PVC pipe
F011005	556943.62	2353920.02	1093.01	1089.71	ES3tw-003 PVC pipe
F011006	563276.42	2366830.57	972.20	969.70	SCLmw-003 Pipe in Housing
F011007	563423.40	2366826.47	951.37	952.06	SCLmw-001 Pipe in Housing
F011008	563379.98	2366769.51	951.71	952.14	*SCLmw-002 Pipe in Housing
F011009	563389.92	2367124.63	970.11	n/a	**PT 72_Trav Nail TBM
F011003	556938.30	2353999.91	1090.54	n/a	**TPES Top of Bolt TBM

<sup>\*</sup>SCLmw-002 was found to be completely inundated. Rather than risk contaminating the well Elevation was taken on the top of the plastic cap covering the well casing. The ground elevation is on the northerly edge of the metal housing.

OF

DANIEL

All "tw" wells positioned on Northerly Top Edge of PVC pipe and marked with Permanent marker.

All "mw" wells positioned on Northerly Tope Edge of pipe at "V" notch (found).

Daniel E. Susany Ohio PS 6927

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<sup>\*\*</sup> Two additional points positioned for Bench Marks.

