

**APPENDIX E**  
**SVE and AS Pilot Test Results**

**SVE-1 Test**  
**Extraction Well: SVE -1**

Time	Vacuum at wellhead (Inches of water)	VOCs (ppm)	Air Velocity (FPM)	Air Flow Rate (cf/m)	O2%	CO2%	Temperature (F)	Notes
945	5.6	2,400	4,333	94	2.9	>5	58.0	start low vacuum test
953	5.8	1,000	5,344	117	3.2	>5	65.5	
958	6.0	1,200	4,526	99	3.1	>5	58.4	
1005	6.0	1,600	7,545	165	5.2	>5	59.2	
1016	6.0	1,760	6,138	134	5.2	>5	59.8	
1026	6.0	1,130	6,608	144	5.1	>5	59.7	
1039	6.0	2,200	6,980	152	5.6	>5	60.7	
1046	8.2	1,600	9,600	209	2.7	>5	60.0	start high vacuum test
1056	8.4	2,300	11,000	240	2.8	>5	62.7	
1103	8.5	2,600	9,926	216	2.6	>5	60.9	
1116	8.4	2,500	9,500	207	2.8	>5	61.6	
1126	8.3	1,700	10,571	231	2.9	>5	62.5	
1150	8.3	-	8,724	190	-	-	59.8	

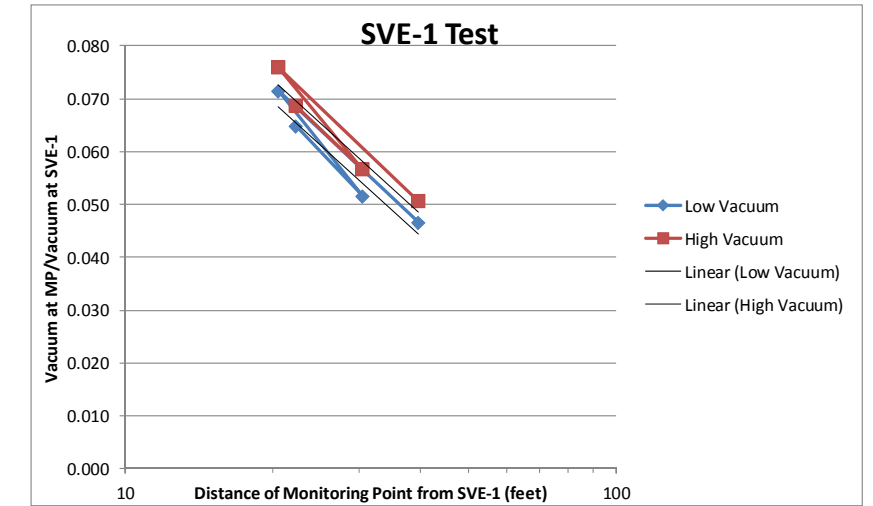
Time	Vacuum at blower (inches of water)	VOCs (ppm)	Air Velocity (FPM)	Air Flow Rate (cf/m)	O2%	CO2%	Temperature (F)	Notes
945	10	1,700	4,960	108	7.1	>5	88.5	start low vacuum test
953	10	2,900	4,838	105	7.1	>5	88.6	
958	10	3,000	4,944	108	7.1	>5	89.7	
1005	10	1,700	5,070	111	7.1	>5	89.2	
1016	10	3,200	5,004	109	7.1	>5	89.0	
1026	10	3,400	4,670	102	7.1	>5	88.8	
1039	10	3,300	4,797	105	7.1	>5	90.1	
1046	16	3,000	4,000	87	1.2	>5	92.1	start high vacuum test
1056	15	2,900	4,184	91	1.3	>5	94.2	
1103	15	2,800	4,737	103	1.3	>5	93.8	
1116	15	2,600	4,165	91	1.3	>5	95.7	
1126	15	2,400	4,175	91	1.4	>5	96.5	
1150	15	-	4,528	99	-	>5	91.7	


Time	Monitoring Points							
	MP-1		MP-2		SVE-2		MW-8	
	distance to SVE-1:	39.5 feet	distance to SVE-1:	20.5 feet	distance to SVE-1:	26.5 feet	distance to SVE-1:	12.5 feet
	distance from screen to SVE-1 screen:	39.5 feet	distance from screen to SVE-1 screen:	20.5 feet	distance from screen to SVE-1 screen:	30.5 feet	distance from screen to SVE-1 screen:	22.3 feet
	Vacuum (Inches of water)	MP/Extraction	Vacuum (Inches of water)	MP/Extraction	Vacuum (Inches of water)	MP/Extraction	Vacuum (Inches of water)	MP/Extraction
945	0.16		0.40		0.22		0.22	
955	0.22		0.42		0.28		0.35	
1010	0.28		0.43		0.32		0.40	
1020	0.24		0.40		0.28		0.36	
1030	0.24		0.41		0.29		0.37	
1040	0.28	0.047	0.43	0.072	0.31	0.052	0.39	0.065
1045	0.38		0.57		0.43		0.53	
1100	0.45		0.68		0.51		0.62	
1115	0.43		0.66		0.50		0.60	
1130	0.37		0.57		0.44		0.53	
1145	0.40		0.62		0.46		0.58	
1200	0.42	0.051	0.63	0.076	0.47	0.057	0.57	0.069

**Summary**

Low Vacuum		
Distance	MP/Extraction	
MP-1	39.5	0.047
MP-2	20.5	0.072
SVE-2	30.5	0.052
MW-8	22.3	0.065

High Vacuum		
Distance	MP/Extraction	
MP-1	39.5	0.051
MP-2	20.5	0.076
SVE-2	30.5	0.057
MW-8	22.3	0.069



<b>SVE- 1 Test Data</b>	
Airport Kwik Stop Site Ione, Washington	
	<b>Figure E-1</b>

**SVE-2 Test**  
**Extraction Well: SVE -2**

Time	Vacuum at wellhead (Inches of water)	VOCs (ppm)	Air Velocity (FPM)	Air Flow Rate (cf/m)	O2%	CO2%	Temperature (F)	Notes
1255	1.6	1,700	3,892	85	4.0	>5	60.1	start low vacuum test
1301	1.8	1,700	4,084	89	3.5	>5	61.1	
1309	1.8	-	4,178	91	-	-	62.5	
1313	1.8	1,800	4,550	99	3.5	>5	62.7	
1328	1.8	-	4,120	90	-	-	61.8	
1340	1.8	2,400	4,400	96	4.1	>5	66.2	
1355	3.3	1,900	6,758	147	4.1	>5	61.5	
1401	3.4	-	6,472	141	-	-	60.4	start medium vacuum test
1409	3.4	1,500	6,145	134	4.0	>5	60.0	
1419	3.4	-	6,801	148	-	-	60.9	
1430	3.4	1,900	6,624	144	4.3	>5	60.4	
1444	3.4	-	6,400	140	-	-	59.8	
1447	4.0	1,800	7,098	155	4.5	>5	59.8	start high vacuum test
1456	4.0	1,900	7,355	160	4.2	>5	60.2	
1509	4.0	-	7,324	160	-	-	59.8	
1522	4.1	2,400	7,305	159	2.8	>5	59.7	
1532	4.1	2,700	7,378	161	3.1	>5	59.8	

Time	Vacuum at blower (Inches of water)	VOCs (ppm)	Air Velocity (FPM)	Air Flow Rate (cf/m)	O2%	CO2%	Temperature (F)	Notes
1255	5	3,306	4,979	109	11.1	>5	89.7	start low vacuum test
1301	5	3,400	4,712	103	10.9	>5	88.8	
1309	5	-	5,787	126	-	-	92.4	
1313	5	3,300	5,184	113	10.9	>5	94.2	
1328	5	-	4,714	103	-	-	93.5	
1340	5	2,400	5,215	114	10.8	>5	92.9	
1355	10	2,600	4,900	107	4.1	>5	93.9	start medium vacuum test
1401	10	-	4,489	98	-	-	94.0	
1409	10	3,100	4,917	107	4.1	>5	94.0	
1419	10	-	4,454	97	-	-	94.0	
1430	10	3,900	4,431	97	5.7	>5	93.7	
1447	12	3,200	4,080	89	1.3	>5	93.7	start high vacuum test
1456	12	3,000	4,279	93	1.3	>5	94.2	
1509	12	-	4,656	102	-	-	93.9	
1522	12	3,400	4,300	94	3.4	>5	94.2	
1532	12	3,400	4,376	95	1.2	>5	92.4	

Time	Monitoring Points							
	MP-1		MP-2		SVE-1		MW-8	
	Vacuum (Inches of water)	MP/Extraction	Vacuum (Inches of water)	MP/Extraction	Vacuum (Inches of water)	MP/Extraction	Vacuum (Inches of water)	MP/Extraction
1255.00	0.30		0.18		0.22		0.28	
1305.00	0.40		0.21		0.27		0.37	
1315.00	0.38		0.17		0.24		0.32	
1330.00	0.38		0.21		0.26		0.35	
1340.00	0.42		0.23		0.31		0.39	
1350.00	0.42	0.233	0.24	0.133	0.30	0.167	0.39	0.217
1355.00	0.60		0.33		0.42		0.56	
1410.00	0.62		0.33		0.43		0.56	
1420.00	0.67		0.35		0.46		0.60	
1430.00	0.61		0.33		0.43		0.58	
1445.00	0.67	0.197	0.34	0.100	0.45	0.132	0.60	0.176
1450.00	0.71		0.38		0.48		0.65	
1500.00	0.72		0.39		0.51		0.68	
1510.00	0.77		0.40		0.53		0.70	
1525.00	0.72		0.43		0.56		0.70	
1535.00	0.78	0.190	0.42	0.102	0.53	0.129	0.69	0.168

**Summary**

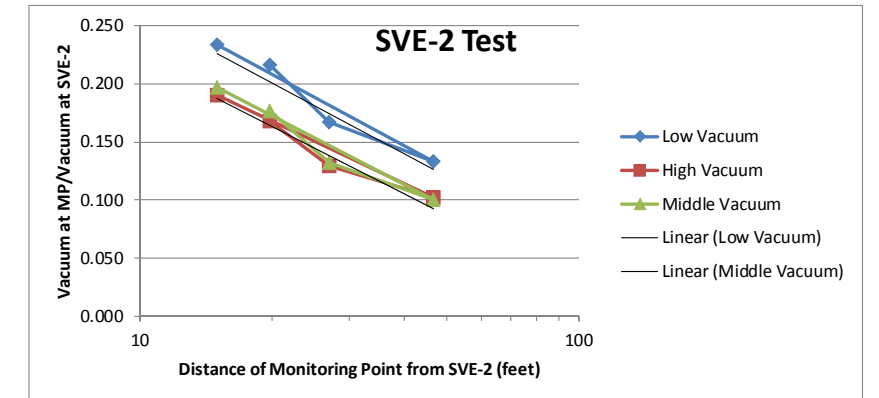
Distance	MP/Extraction
MP-1	15 0.233
MP-2	46.5 0.133
SVE-1	27 0.167
MW-8	19.8 0.217


  

Distance	MP/Extraction
MP-1	15 0.197
MP-2	46.5 0.100
SVE-1	27 0.132
MW-8	19.8 0.176

Distance	MP/Extraction
MP-1	15 0.190
MP-2	46.5 0.102
SVE-1	27 0.129
MW-8	19.8 0.168



<b>SVE-2 Test Data</b>	
Airport Kwik Stop Site Ione, Washington	
	<b>Figure E-2</b>

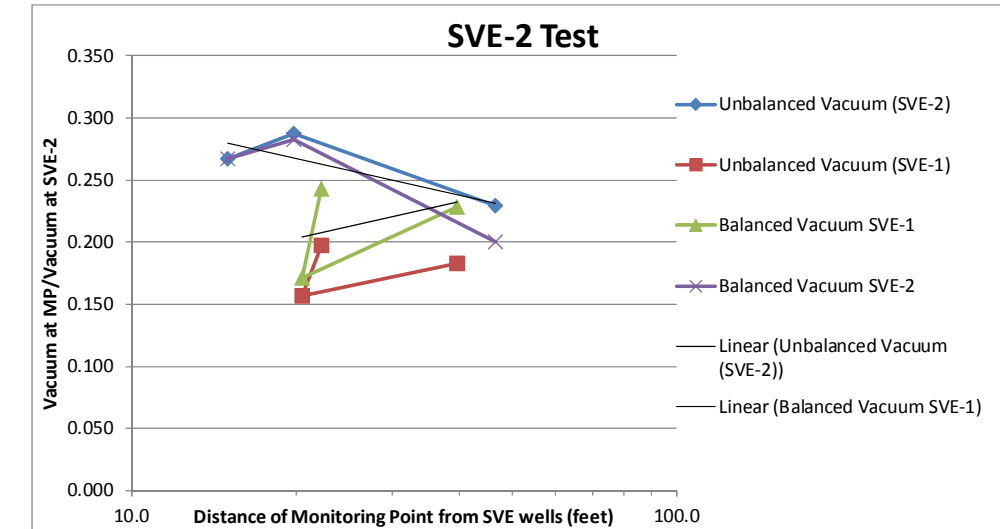
**SVE-1 and SVE-2 Test**  
**Extraction Well: SVE-1 & SVE-2**

Time	Vacuum at wellhead (SVE-1) (Inches of water)	VOCs (ppm)	Air Velocity (FPM)	Air Flow Rate (cf/m)	O2%	CO2%	Temperature (F)
1554	3.5	--	4070	89	--	--	64.0
1558	3.5	--	4350	95	--	--	64.3
1610	3.5	--	4473	98	--	--	64.7
1623	3.5	--	3700	81	--	--	64.5
1632	3.5	--	4995	109	--	--	65.4
1645	3.5	--	3700	81	--	--	61.3
1648	2.8	--	3000	65	--	--	65.8
1700	2.8	--	3084	67	--	--	64.8
1710	2.8	--	3271	71	--	--	64.7

Time	Vacuum at wellhead (SVE-2) (Inches of water)	VOCs (ppm)	Air Velocity (FPM)	Air Flow Rate (cf/m)	O2%	CO2%	Temperature (F)
1550	2.3	--	4,700	102	--	--	60.6
1558	2.4	--	4,721	103	--	--	60.9
1607	2.4	--	4,774	104	--	--	60.9
1620	2.4	--	4,668	102	--	--	60.9
1634	2.4	--	4,463	97	--	--	60.6
1642	2.4	--	4,496	98	--	--	60.0
1650	2.8	--	4,871	106	--	--	60.4
1658	2.8	--	5,100	111	--	--	59.5
1708	2.8	--	5,618	123	--	--	60.4

Time	Vacuum at blower (inches of water)	VOCs (ppm)	Air Velocity (FPM)	Air Flow Rate (cf/m)	O2%	CO2%	Temperature (F)
1556	8.5	--	4,228	92	--	--	91.2
1603	8.5	--	4,372	95	--	--	91.5
1612	8.5	--	4,255	93	--	--	90.6
1626	8.5	--	4,487	98	--	--	90.3
1637	8.5	--	4,319	94	--	--	89.2
1645	--	--	--	--	--	--	--
1648	10.0	--	--	--	--	--	--
1702	10.0	--	4,356	95	--	--	88.8
1712	10.0	--	4,166	91	--	--	89.0

Time	Monitoring Points										
	MP-1			MP-2			MW-8				
	distance to SVE-1:	39.5 feet			distance to SVE-1:	20.5 feet			distance to SVE-1:	12.5 feet	
	distance to SVE-2:	15 feet			distance to SVE-2:	46.5 feet			distance to SVE-2:	19.5 feet	
	distance from screen to SVE-1 screen:	39.5 feet			distance from screen to SVE-1 screen:	20.5 feet			distance from screen to SVE-1 screen:	22.3 feet	
	distance from screen to SVE-2 screen:	15 feet			distance from screen to SVE-2 screen:	46.5 feet			distance from screen to SVE-2 screen:	19.8 feet	
Time	Vacuum (Inches of water)	MP/Extraction (SVE-1)	MP/Extraction (SVE-2)	Vacuum (Inches of water)	MP/Extraction (SVE-1)	MP/Extraction (SVE-2)	Vacuum (Inches of water)	MP/Extraction (SVE-1)	MP/Extraction (SVE-2)		
1550	0.62			0.50			0.65				
1600	0.63			0.51			0.69				
1610	0.65			0.55			0.71				
1620	0.70			0.56			0.71				
1630	0.67			0.59			0.73				
1640	0.64	0.183	0.267	0.55	0.157	0.229	0.69	0.197	0.288		
1650	0.67			0.52			0.71				
1700	0.65			0.50			0.68				
1710	0.63			0.48			0.66				
1720	0.64	0.229	0.267	0.48	0.171	0.200	0.68	0.243	0.283		



Summary

Unbalanced Vacuums (AVE-1 and SVE-2 at different vacuums)

	Distance - SVE-2	MP/Extraction	Distance - SVE-1	MP/Extraction
MP-1	15.0	0.267	MW-8 22.3	0.197
MW-8	19.8	0.288	MP-2 20.5	0.157
MP-2	46.5	0.229	MP-1 39.5	0.183

Balanced Vacuums (Equal vacuum applied to SVE-1 and SVE-2)

	Distance - SVE-1	MP/Extraction	Distance - SVE-2	MP/Extraction
MW-8	<b>22.3</b>	<b>0.243</b>	MP-1 15.0	<b>0.267</b>
MP-2	<b>20.5</b>	<b>0.171</b>	MW-8 19.8	0.283
MP-1	39.5	0.229	MP-2 46.5	0.200

**SVE-1 and SVE-2 Combined Test Data**

Airport Kwik Stop Site  
 Lone, Washington


Figure E-3

Air Sparge Test 1

Time	Pressure at wellhead (psi)	Air Velocity (FPM)	Air Flow Rate (F <sup>3</sup> /M)	SCFM	Pressure at remediation system (psi)	Depth to Water (ft)
8:30	0.00	0	0	0	0	34.75
9:10	1.00	350	8	<5	2	--
9:27	1.00	318	7	<5	2	--
9:31	1.50	2900	63	>25	2.5	--
9:45	1.50	--	--	>25	2.5	--
10:03	0.75	3900	85	>25	2.5	--
10:10	off					34.9
10:11			0		--	34.85
10:11			0		--	34.83
10:25			0		--	34.75

<- Background  
 Test Start  
 Increased Pressure  
 Test End

Initial Values  
 Temperature (deg C) 9  
 DO (mg/L) 2.15  
 ORP 284  
 pH 7.84

MP-1

Time	Pressure (psi)	ORP	DO	pH	Temperature	Depth to Water (ft)
9:00		280	1.64	7.33	9.7	34.65
9:21	0.02	283	0.09	6.97	9.5	34.75
9:35	0.02	--	--	--	--	34.64
9:40	0.12	273	0.64	6.84	9.5	34.65
9:52	0.15	254	0.88	6.82	9.7	34.64

<- Background

MP-2

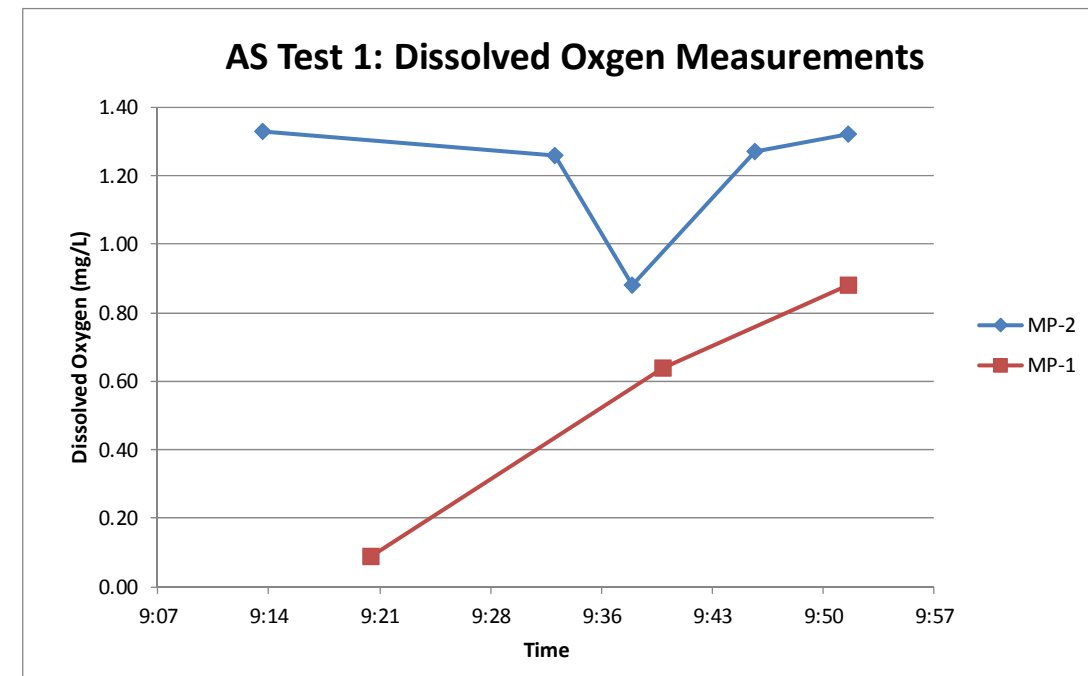
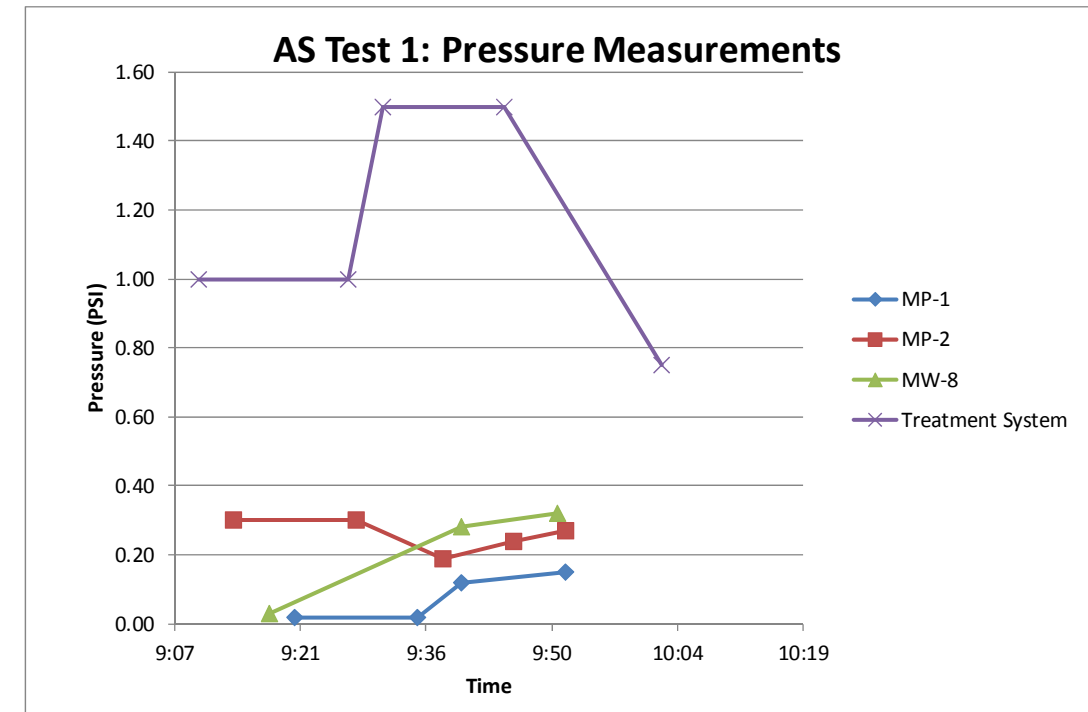
Time	Pressure (psi)	ORP	DO	pH	Temperature	Depth to Water (ft)
8:44		313	1.23	7.16	8.8	34.53
9:14	0.30	285	1.33	7.20	9.7	34.52
9:28	0.30	--	--	--	--	34.53
9:33		265	1.26	7.00	9.6	34.46
9:38	0.19	254	0.88	6.82	9.7	34.5
9:46	0.24	255	1.27	6.78	9	34.51
9:52	0.27	201	1.32	6.72	9.5	34.52


<- Background

MW-8

Time	Pressure (psi)	ORP	DO	pH	Temperature	Depth to Water (ft)
8:50	0.01	--	--	--	--	34.76
9:18	0.03	--	--	--	--	34.76
9:34	--	--	--	--	--	34.71
9:40	0.28	--	--	--	--	34.75
9:51	0.32	--	--	--	--	34.75
10:39	--	284	1.10	7.44	10.1	--

<- Background



<b>AS-1 Test Data</b>	
Airport Kwik Stop Site Ione, Washington	
	<b>Figure E-4</b>

Air Sparge Test 2

Time	Pressure at wellhead (psi)	Air Velocity (FPM)	Air Flow Rate (F <sup>3</sup> /M)	SCFM	Pressure at remediation system (psi)	Depth to Water (ft)	Temperature (deg F)
11:08	1.00	1600	35	15	2		
11:12	1.20	--	--	>25	4		
11:17	1.00	--	--	>25	4		
11:20	1.00	3806	83	>25	4		
11:38	0.60	3500	76	>25	3		
11:40	0.80	3600	79	>25	3		
12:15	1	3300	72	>25	3		
12:35	1	3300	72	>25	3		
13:00	1	3300	72	>25	3		70.8
13:30	0.5	3500	76	>25	2.5		81.4
14:12	0.5	4000	87	>25	3		76.8
15:10	0.6	1600	35	>25	3.5		73.9
15:15	off					34.82	
15:16	off					34.8	
15:17	off					34.79	
15:18	off					34.77	

<- Test End  
<- Recovery

Background @ MW-19

Time	Pressure (psi)	ORP	DO	pH	Temperature (deg C)	Depth to Water (ft)
9:44	0.20					
9:51	0.20					
11:23	0.20					
11:35	0.11					
12:10	0.18					
13:00	0.20					
13:35	0.20					
14:10	0.14					
15:00	0.16					
1100	0.0	289	0.56	7.04	9.5	34.73
1445	0.1	236	1.70	7.10	9.3	34.73

Time	Pressure at SVE-1 (psi)	Pressure at SVE-2 (psi)
9:44	0.20	0.16
9:51	0.20	0.18
11:23	0.20	0.18
11:35	0.11	0.19
12:10	0.18	0.18
13:00	0.20	0.18
13:35	0.20	0.17
14:10	0.14	0.16
15:00	0.16	0.12

MP-1

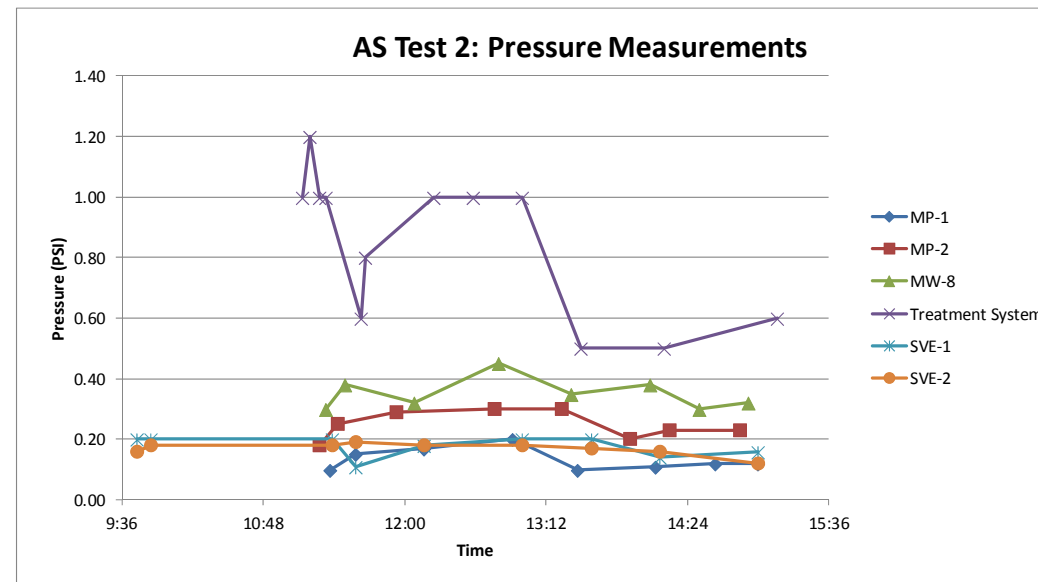
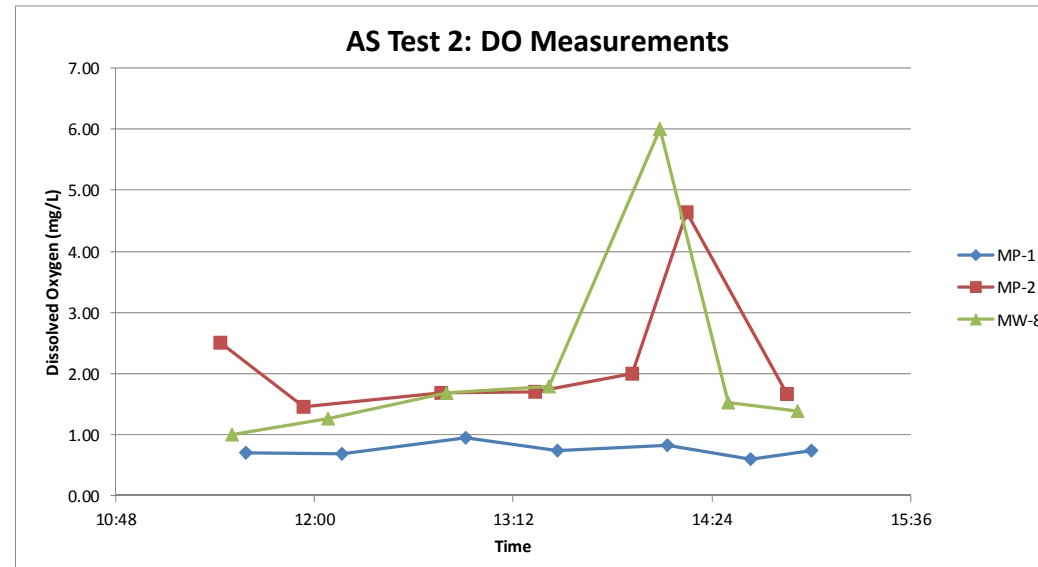
Time	Pressure (psi)	ORP	DO	pH	Temperature (deg C)	Depth to Water (ft)
11:10						34.65
11:22	0.10					34.62
11:35	0.15	284	0.70	6.77	9.2	34.65
12:10	0.17	266	0.69	6.82	9.3	34.65
12:55	0.20	271	0.94	6.71	9.3	34.65
13:28	0.10	262	0.74	6.85	9.4	34.65
14:08	0.11	266	0.83	6.98	9.3	34.65
14:38	0.12	250	0.60	6.87	9.2	34.65
15:00	0.12	239	0.74	7.02	9.4	34.65


MP-2

Time	Pressure (psi)	ORP	DO	pH	Temperature (deg C)	Depth to Water (ft)
11:09						34.48
11:17	0.18					34.50
11:26	0.25	311	2.5	7.00	9.7	34.51
11:56	0.29	290	1.45	6.86	9.2	34.52
12:46	0.30	289	1.68	6.67	9.4	34.52
13:20	0.30	284	1.70	6.74	9.7	34.53
13:55	0.20	284	2.00	6.93	9.2	34.53
14:15	0.23	266	4.64	7.00	9.5	34.53
14:51	0.23	248	1.67	6.98	9.1	34.53

MW-8

Time	Pressure (psi)	ORP	DO	pH	Temperature (deg C)	Depth to Water (ft)
11:10						34.73
11:18						34.70
11:20	0.30					34.73
11:30	0.38	297	1.00	6.74	9.2	34.73
12:05	0.32	274	1.26	6.94	9.2	34.75
12:48	0.45	276	1.69	6.87	9.1	34.76
13:25	0.35	271	1.79	6.81	9.2	34.76
14:05	0.38	277	6.00	6.93	9.2	34.77
14:30	0.30	265	1.53	6.88	9.3	34.76
14:55	0.32	252	1.38	6.89	9.4	34.76



<b>AS-2 Test Data</b>	
Airport Kwik Stop Site Ione, Washington	
	<b>Figure E-5</b>