



August 29, 2014

Mr. Mark Detterman
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

RECEIVED

By Alameda County Environmental Health at 11:00 am, Sep 02, 2014

Subject: Air Injection Pilot Testing and MPE Progress Report at 15101 Freedom Avenue, San Leandro, California

Dear Mr. Detterman:

As reported in our previous letter report dated August 21, 2014, SOMA Environmental Engineering, Inc. (SOMA) started multi-phase extraction (MPE) operation at 15101 Freedom Ave, San Leandro on July 24, 2014.

Approximately 506 pounds (lbs.) of contaminant (calculated as hexane) has been removed from the subsurface as of August 27, 2014 at an average of 15 lbs. /day (Table attached) using a combination of MPE and air injection. Approximately 153,691 gallons of groundwater has been extracted, treated, and discharged to the sanitary sewer system in this duration.

SOMA conducted an air injection pilot test during this MPE event. Air injection can enhance removal of volatile constituents in petroleum products that are adsorbed to sediments when used in combination with MPE operation. It involves injection of air into the subsurface through injection wells located in close vicinity to the extraction wells, enabling transfer of contaminants from a high pressure zone to a low pressure extraction point.

Objective of this pilot testing was to determine if air injection during MPE operation will increase mass removal efficiency. The air injection system consisted primarily of injection wells MW-3, MW4, and EX-2, an air compressor, and ancillary equipment which included a pressure relief valve and inlet filter.

Injection pipe or tubing was connected to the riser using threaded or air tight connections; care was taken to prevent air leakage at joints. The system was checked for leaks throughout the pilot test. During this process approximately 100 psi air pressure was maintained inside the injection well.

Air injection pilot testing began on August 18, 2014 at 15:00 pm and was paused on August 23, 2014 at 16:00 pm. The test was resumed on August 25 and 26, 2014 and continued on both days from 12:00 noon to 17:00 pm. VOC concentrations in the extracted soil vapor stream measured using PID increased significantly while injecting air. PID readings during air injection ranged from 522 ppmv as hexane to 1,243 ppmv and the mass removal rate ranged from 12 lbs/day to 55 lbs/day as shown in the highlighted sections of the attached table. This demonstrates the effectiveness of air injection along with MPE operation.

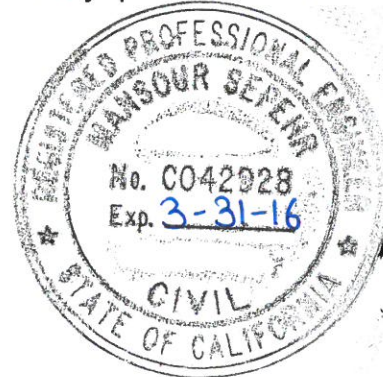
Based on the current mass removal rates and increased PID readings, SOMA proposes to use air injection at 100 psi into nearby monitoring wells during the MPE operation in order to improve mass removal rates.

Please feel free to call me at (925) 734-6400 if you have any questions or comments.

Sincerely,



Mansour Sepehr, Ph.D., PE
Principal Hydrogeologist



Attachments: Table 1-MPE Event Extraction Data and VOC Mass Removal Rate

PERJURY STATEMENT

Site Location: 15101 Freedom Avenue, San Leandro, California

"I declare under penalty of perjury, that the information and/or recommendations contained in the attached document or report is true and correct to the best of my knowledge".

A handwritten signature in black ink, appearing to read "M. Pazdel", written over a horizontal line.

Mohammad Pazdel
1770 Pistacia Court
Fairfield, California 94533
Responsible Party

Table 1
MPE Event
Extraction Data and VOC Mass Removal Rate
July-August 2014
15101 Freedom Avenue
San Leandro, California

MPE WELL	COMMENT	DATE	CLOCK TIME	INCREMENTAL TIME	ELAPSED TIME	Q			PID		MASS REMOVAL					
						SCFM	ft ³ of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %	lb VOC mass removal as hexane	lbs/min	lbs/day			
				minutes	minutes											
MPE-1	START	7/24/2014	1000	0	0											
			1100	60	60	98	5,884	15.5244	550	0.0006	0.7360	0.0123	18			
			1200	60	120	96	5,789	15.2732	575	0.0006	0.7570	0.0126	18			
			1300	60	180	98	5,884	15.5244	566	0.0006	0.7574	0.0126	18			
			1400	60	240	98	5,884	15.5244	553	0.0006	0.7400	0.0123	18			
			1500	60	300	96	5,789	15.2732	540	0.0005	0.7109	0.0118	17			
			1600	60	360	98	5,884	15.5244	523	0.0005	0.6999	0.0117	17			
			1700	60	420	96	5,789	15.2732	525	0.0005	0.6912	0.0115	17			
			MPE-1,MPE-2,MW-3		7/25/2014	800	900	1,320	109	98,253	259,2427	498	0.0005	11.1287	0.0124	18
						900	60	1,380	109	6,550	17.2828	474	0.0005	0.7062	0.0118	17
						1000	60	1,440	109	6,550	17.2828	456	0.0005	0.6793	0.0113	16
						1100	60	1,500	103	6,169	16.2780	447	0.0004	0.6272	0.0105	15
						1200	60	1,560	133	7,978	21.0510	1,076	0.0011	1.9525	0.0325	47
						1300	60	1,620	133	7,978	21.0510	890	0.0009	1.6150	0.0269	39
						1400	60	1,680	133	7,978	21.0510	743	0.0007	1.3482	0.0225	32
						1500	60	1,740	133	7,978	21.0510	626	0.0006	1.1359	0.0189	27
						1600	60	1,800	117	7,026	18.5389	678	0.0007	1.0835	0.0181	26
1700	60	1,860				104	6,265	16.5292	827	0.0008	1.1783	0.0196	28			
1800	60	1,920				109	6,550	17.2828	841	0.0008	1.2529	0.0209	30			
7/26/2014	2150	1670				3,590	162	269,762	711.7743	552	0.0006	33.8679	0.0203	29		
7/27/2014	1730	1180				4,770	147	173,759	458.4664	549	0.0005	21.6964	0.0184	26		
7/28/2014	830	900				5,670	149	133,956	353.4459	481	0.0005	14.6546	0.0163	23		
	930	60				5,730	149	8,930	23.5631	518	0.0005	1.0521	0.0175	25		
	1030	60				5,790	149	8,930	23.5631	624	0.0006	1.2674	0.0211	30		
	1130	60				5,850	149	8,930	23.5631	785	0.0008	1.5944	0.0266	38		
	1230	60	5,910	112	6,741	17.7853	811	0.0008	1.2433	0.0207	30					
	1330	60	5,970	109	6,550	17.2828	773	0.0008	1.1516	0.0192	28					
	1430	60	6,030	109	6,550	17.2828	767	0.0008	1.1427	0.0190	27					
	1530	60	6,090	109	6,550	17.2828	754	0.0008	1.1233	0.0187	27					
	1630	60	6,150	108	6,455	17.0316	712	0.0007	1.0453	0.0174	25					
	1730	60	6,210	106	6,360	16.7804	687	0.0007	0.9937	0.0166	24					
7/29/2014	800	870	7,080	109	94,978	250.6013	659	0.0007	14.2356	0.0164	24					
	900	60	7,140	109	6,550	17.2828	698	0.0007	1.0399	0.0173	25					
	1000	60	7,200	109	6,550	17.2828	709	0.0007	1.0563	0.0176	25					
	1100	60	7,260	61	3,678	9.7039	701	0.0007	0.5864	0.0098	14					
	1200	60	7,320	87	5,192	13.7002	695	0.0007	0.8208	0.0137	20					
	1300	60	7,380	87	5,192	13.7002	693	0.0007	0.8184	0.0136	20					

Table 1
MPE Event
Extraction Data and VOC Mass Removal Rate
July-August 2014
15101 Freedom Avenue
San Leandro, California

MPE WELL	COMMENT	DATE	CLOCK TIME	INCREMENTAL TIME	ELAPSED TIME	Q			PID		MASS REMOVAL		
						minutes	minutes	minutes	SCFM	ft ³ of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %
			1400	60	7,440	119	7,145	18.8527	684	0.0007	1.1116	0.0185	27
			1500	60	7,500	105	6,327	16.6949	673	0.0007	0.9685	0.0161	23
			1600	60	7,560	112	6,747	17.8029	659	0.0007	1.0113	0.0169	24
			1700	60	7,620	61	3,653	9.6388	538	0.0005	0.4470	0.0075	11
			1800	60	7,680	136	8,189	21.6073	622	0.0006	1.1585	0.0193	28
		7/30/2014	800	840	8,520	89	74,742	197.2073	587	0.0006	9.9786	0.0119	17
			900	60	8,580	94	5,650	14.9075	608	0.0006	0.7813	0.0130	19
			1000	60	8,640	125	7,484	19.7454	631	0.0006	1.0740	0.0179	26
			1100	60	8,700	124	7,451	19.6594	636	0.0006	1.0778	0.0180	26
			1200	60	8,760	123	7,406	19.5408	628	0.0006	1.0578	0.0176	25
			1300	60	8,820	138	8,280	21.8473	618	0.0006	1.1638	0.0194	28
			1400	60	8,880	123	7,406	19.5408	598	0.0006	1.0073	0.0168	24
			1500	60	8,940	137	8,238	21.7355	610	0.0006	1.1429	0.0190	27
			1600	60	9,000	137	8,210	21.6620	604	0.0006	1.1278	0.0188	27
			1700	60	9,060	122	7,331	19.3424	610	0.0006	1.0171	0.0170	24
		7/31/2014	800	900	9,960	87	78,552	207.2615	589	0.0006	10.5230	0.0117	17
			900	60	10,020	87	5,237	13.8174	575	0.0006	0.6849	0.0114	16
			1000	60	10,080	123	7,406	19.5408	495	0.0005	0.8338	0.0139	20
			1100	60	10,140	123	7,406	19.5408	495	0.0005	0.8338	0.0139	20
			1200	60	10,200	123	7,356	19.4079	481	0.0005	0.8047	0.0134	19
			1300	60	10,260	122	7,349	19.3914	465	0.0005	0.7773	0.0130	19
			1400	60	10,320	122	7,349	19.3914	489	0.0005	0.8174	0.0136	20
			1500	60	10,380	133	7,990	21.0823	449	0.0004	0.8160	0.0136	20
			1600	60	10,440	127	7,602	20.0579	423	0.0004	0.7314	0.0122	18
			1700	60	10,500	125	7,505	19.8034	457	0.0005	0.7801	0.0130	19
			1800	60	10,560	128	7,695	20.3036	457	0.0005	0.7998	0.0133	19
		8/1/2014	1000	960	11,520	128	123,225	325.1317	440	0.0004	12.3316	0.0128	18
			1130	90	11,610	128	11,562	30.5069	433	0.0004	1.1387	0.0127	18
			1230	60	11,670	125	7,524	19.8535	489	0.0005	0.8369	0.0139	20
			1330	60	11,730	136	8,169	21.5530	496	0.0005	0.9215	0.0154	22
			1430	60	11,790	122	7,306	19.2776	495	0.0005	0.8226	0.0137	20
			1530	60	11,850	112	6,725	17.7434	494	0.0005	0.7556	0.0126	18
			1630	60	11,910	162	9,731	25.6742	482	0.0005	1.0667	0.0178	26
			1730	60	11,970	106	6,343	16.7369	491	0.0005	0.7084	0.0118	17

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						SCFM	ft ³ of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %	lb VOC mass removal as hexane	lbs/min	lbs/day
				minutes	minutes								
		8/2/2014	1400	1230	13,200	114	139,733	368.6895	421	0.0004	13.3798	0.0109	16
			1500	60	13,260	114	6,810	17.9695	428	0.0004	0.6630	0.0110	16
			1600	60	13,320	116	6,990	18.4432	451	0.0005	0.7170	0.0120	17
			1700	60	13,380	123	7,356	19.4079	448	0.0004	0.7495	0.0125	18
			1800	60	13,440	106	6,370	16.8077	432	0.0004	0.6259	0.0104	15
			1900	60	13,500	106	6,381	16.8363	445	0.0004	0.6458	0.0108	15
		8/4/2014	730	2190	15,690	62	135,159	356.6196	389	0.0004	11.9581	0.0055	8
			800	30	15,720	62	1,848	4.8768	376	0.0004	0.1581	0.0053	8
			900	60	15,780	73	4,370	11.5308	372	0.0004	0.3698	0.0062	9
			1000	60	15,840	95	5,707	15.0588	384	0.0004	0.4985	0.0083	12
			1100	60	15,900	113	6,793	17.9236	388	0.0004	0.5995	0.0100	14
			1200	60	15,960	116	6,972	18.3963	393	0.0004	0.6232	0.0104	15
			1300	60	16,020	122	7,349	19.3914	409	0.0004	0.6837	0.0114	16
			1400	60	16,080	122	7,325	19.3262	399	0.0004	0.6647	0.0111	16
			1500	60	16,140	122	7,325	19.3262	382	0.0004	0.6364	0.0106	15
			1600	60	16,200	125	7,505	19.8034	389	0.0004	0.6640	0.0111	16
			1700	60	16,260	106	6,365	16.7935	420	0.0004	0.6080	0.0101	15
			1730	30	16,290	106	3,185	8.4039	418	0.0004	0.3028	0.0101	15
		8/5/2014	730	840	17,130	55	46,449	122.5555	385	0.0004	4.0673	0.0048	7
			800	30	17,160	55	1,656	4.3695	393	0.0004	0.1480	0.0049	7
			900	60	17,220	62	3,703	9.7704	414	0.0004	0.3487	0.0058	8
			1000	60	17,280	62	3,690	9.7370	411	0.0004	0.3450	0.0057	8
			1100	60	17,340	87	5,210	13.7468	392	0.0004	0.4645	0.0077	11
			1200	60	17,400	106	6,370	16.8077	415	0.0004	0.6013	0.0100	14
			1300	60	17,460	126	7,537	19.8871	385	0.0004	0.6600	0.0110	16
			1400	60	17,520	119	7,169	18.9165	409	0.0004	0.6669	0.0111	16
			1500	60	17,580	120	7,218	19.0460	403	0.0004	0.6616	0.0110	16
			1600	60	17,640	113	6,759	17.8328	404	0.0004	0.6210	0.0104	15
			1700	60	17,700	128	7,689	20.2865	409	0.0004	0.7152	0.0119	17
			8/6/2014	730	870	18,570	99	86,135	227.2688	397	0.0004	7.7775	0.0089
		800		30	18,600	99	2,970	7.8369	394	0.0004	0.2662	0.0089	13
		900		60	18,660	103	6,154	16.2378	395	0.0004	0.5529	0.0092	13
		1000		60	18,720	122	7,343	19.3751	399	0.0004	0.6664	0.0111	16
		1100		60	18,780	122	7,343	19.3751	388	0.0004	0.6480	0.0108	16

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						SCFM	ft ³ of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %	lb VOC mass removal as hexane	lbs/min	lbs/day
				minutes	minutes								
			1200	60	18,840	122	7,343	19.3751	392	0.0004	0.6547	0.0109	16
			1300	60	18,900	116	6,966	18.3808	395	0.0004	0.6258	0.0104	15
			1400	60	18,960	105	6,317	16.6671	392	0.0004	0.5632	0.0094	14
			1500	60	19,020	112	6,725	17.7434	390	0.0004	0.5965	0.0099	14
			1600	60	19,080	122	7,325	19.3262	386	0.0004	0.6430	0.0107	15
			1700	60	19,140	122	7,343	19.3751	406	0.0004	0.6781	0.0113	16
		8/7/2014	730	870	20,010	87	75,417	198.9898	407	0.0004	6.9812	0.0080	12
			800	30	20,040	62	1,847	4.8727	415	0.0004	0.1743	0.0058	8
			900	60	20,100	87	5,210	13.7468	402	0.0004	0.4764	0.0079	11
			1000	60	20,160	132	7,901	20.8480	407	0.0004	0.7314	0.0122	18
			1100	60	20,220	107	6,397	16.8794	409	0.0004	0.5951	0.0099	14
			1200	60	20,280	107	6,403	16.8938	405	0.0004	0.5898	0.0098	14
			1300	60	20,340	114	6,816	17.9849	414	0.0004	0.6418	0.0107	15
			1400	60	20,400	163	9,780	25.8057	408	0.0004	0.9076	0.0151	22
			1500	60	20,460	107	6,397	16.8794	400	0.0004	0.5820	0.0097	14
			1600	60	20,520	123	7,393	19.5073	398	0.0004	0.6692	0.0112	16
		8/8/2014	1700	60	20,580	137	8,224	21.6987	365	0.0004	0.6827	0.0114	16
			1000	1020	21,600	73	74,613	196.8670	225	0.0002	3.8182	0.0037	5
			1100	60	21,660	78	4,708	12.4229	260	0.0003	0.2784	0.0046	7
			1200	60	21,720	73	4,397	11.6004	265	0.0003	0.2650	0.0044	6
			1300	60	21,780	92	5,502	14.5168	278	0.0003	0.3479	0.0058	8
			1400	60	21,840	107	6,425	16.9520	274	0.0003	0.4004	0.0067	10
			1500	60	21,900	117	7,037	18.5668	270	0.0003	0.4321	0.0072	10
			1600	60	21,960	124	7,417	19.5711	274	0.0003	0.4622	0.0077	11
			1700	60	22,020	124	7,416	19.5677	279	0.0003	0.4706	0.0078	11
		8/9/2014	2200	300	22,320	73	21,907	57.8025	378	0.0004	1.8834	0.0063	9
			1400	960	23,280	119	114,226	301.3889	372	0.0004	9.6645	0.0101	14
			1500	60	23,340	119	7,133	18.8210	365	0.0004	0.5922	0.0099	14
			1600	60	23,400	116	6,966	18.3808	359	0.0004	0.5688	0.0095	14
			1700	60	23,460	106	6,370	16.8077	361	0.0004	0.5230	0.0087	13
			1800	60	23,520	95	5,707	15.0588	365	0.0004	0.4738	0.0079	11
		8/10/2014	1400	1200	24,720	128	153,513	405.0486	362	0.0004	12.6393	0.0105	15
			1500	60	24,780	122	7,331	19.3424	358	0.0004	0.5969	0.0099	14
			1600	60	24,840	122	7,343	19.3751	351	0.0004	0.5862	0.0098	14

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MPE WELL	COMMENT	DATE	CLOCK TIME	INCREMENTAL TIME	ELAPSED TIME	Q			PID		MASS REMOVAL			
						SCFM	ft ³ of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %	lb VOC mass removal as hexane	lbs/min	lbs/day	
				minutes	minutes									
MPE-1,2; MW-3,6		8/11/2014	730	930	25,770	61	57,151	150.7949	362	0.0004	4.7055	0.0051	7	
			800	30	25,800	61	1,842	4.8602	374	0.0004	0.1567	0.0052	8	
			900	60	25,860	92	5,502	14.5168	384	0.0004	0.4805	0.0080	12	
			1000	60	25,920	124	7,419	19.5745	400	0.0004	0.6749	0.0112	16	
			1100	60	25,980	55	3,318	8.7540	303	0.0003	0.2286	0.0038	5	
			1200	60	26,040	87	5,219	13.7702	415	0.0004	0.4926	0.0082	12	
			1300	60	26,100	100	5,980	15.7787	403	0.0004	0.5481	0.0091	13	
			1400	60	26,160	100	5,980	15.7787	416	0.0004	0.5658	0.0094	14	
			1500	60	26,220	107	6,424	16.9491	408	0.0004	0.5961	0.0099	14	
			1600	60	26,280	111	6,634	17.5049	416	0.0004	0.6277	0.0105	15	
			1700	60	26,340	138	8,293	21.8811	410	0.0004	0.7733	0.0129	19	
			8/12/2014	800	900	27,240	87	78,687	207.6185	391	0.0004	6.9976	0.0078	11
				900	60	27,300	87	5,246	13.8412	398	0.0004	0.4749	0.0079	11
				1000	60	27,360	124	7,419	19.5745	405	0.0004	0.6834	0.0114	16
				1100	60	27,420	87	5,246	13.8412	819	0.0008	0.9772	0.0163	23
				1200	60	27,480	92	5,501	14.5143	784	0.0008	0.9809	0.0163	24
				1300	60	27,540	78	4,692	12.3800	803	0.0008	0.8569	0.0143	21
		1400		60	27,600	73	4,359	11.5014	687	0.0007	0.6811	0.0114	16	
		8/13/2014	1500	60	27,660	83	4,977	13.1309	628	0.0006	0.7108	0.0118	17	
			800	1020	28,680	39	39,610	104.5115	329	0.0003	2.9639	0.0029	4	
			900	60	28,740	39	2,326	6.1373	337	0.0003	0.1783	0.0030	4	
			1000	60	28,800	99	5,930	15.6471	395	0.0004	0.5328	0.0089	13	
			1100	60	28,860	99	5,930	15.6471	338	0.0003	0.4559	0.0076	11	
			1200	60	28,920	61	3,672	9.6875	438	0.0004	0.3658	0.0061	9	
			1300	60	28,980	61	3,687	9.7287	431	0.0004	0.3614	0.0060	9	
			1400	60	29,040	73	4,359	11.5014	446	0.0004	0.4422	0.0074	11	
			1500	60	29,100	91	5,455	14.3933	442	0.0004	0.5484	0.0091	13	
			1600	60	29,160	91	5,455	14.3933	428	0.0004	0.5310	0.0089	13	
		8/14/2014	1700	60	29,220	137	8,224	21.6987	426	0.0004	0.7968	0.0133	19	
			1800	60	29,280	82	4,947	13.0524	432	0.0004	0.4861	0.0081	12	
			800	840	30,120	61	51,577	136.0859	345	0.0003	4.0471	0.0048	7	
			900	60	30,180	61	3,681	9.7122	315	0.0003	0.2637	0.0044	6	
			1000	60	30,240	82	4,934	13.0192	288	0.0003	0.3232	0.0054	8	
			1100	60	30,300	67	4,029	10.6301	298	0.0003	0.2731	0.0046	7	
			1200	60	30,360	39	2,342	6.1793	318	0.0003	0.1694	0.0028	4	
			1300	60	30,420	55	3,281	8.6575	337	0.0003	0.2515	0.0042	6	
			1400	60	30,480	61	3,647	9.6227	333	0.0003	0.2762	0.0046	7	
			1500	60	30,540	86	5,175	13.6542	328	0.0003	0.3861	0.0064	9	
			1600	60	30,600	86	5,175	13.6542	337	0.0003	0.3966	0.0066	10	
			1700	60	30,660	122	7,294	19.2455	325	0.0003	0.5392	0.0090	13	

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San Leandro, California

MPE WELL	COMMENT	DATE	CLOCK TIME	INCREMENTAL TIME	ELAPSED TIME	Q			PID		MASS REMOVAL			
						SCFM	ft ³ of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %	lb VOC mass removal as hexane	lbs/min	lbs/day	
				minutes	minutes									
MPE-1, MW-6 MPE-1,2; MW-3,6		8/15/2014	800	900	31,560	55	49,469	130.5242	331	0.0003	3.7241	0.0041	6	
			900	60	31,620	55	3,295	8.6942	348	0.0003	0.2608	0.0043	6	
			1000	60	31,680	99	5,956	15.7139	350	0.0004	0.4741	0.0079	11	
			1100	60	31,740	64	3,816	10.0676	348	0.0003	0.3020	0.0050	7	
			1200	60	31,800	61	3,668	9.6794	358	0.0004	0.2987	0.0050	7	
			1300	60	31,860	67	4,008	10.5765	376	0.0004	0.3428	0.0057	8	
			1400	60	31,920	77	4,629	12.2127	362	0.0004	0.3811	0.0064	9	
			1500	60	31,980	86	5,166	13.6313	368	0.0004	0.4324	0.0072	10	
			1600	60	32,040	98	5,890	15.5421	379	0.0004	0.5078	0.0085	12	
			1700	60	32,100	122	7,294	19.2455	349	0.0003	0.5790	0.0096	14	
			8/16/2014	1500	1320	33,420	99	130,026	343.0757	408	0.0004	12.0658	0.0091	13
				1600	60	33,480	106	6,338	16.7229	417	0.0004	0.6011	0.0100	14
			8/17/2014	1700	60	33,540	116	6,949	18.3344	401	0.0004	0.6338	0.0106	15
				1400	1260	34,800	72	91,230	240.7112	361	0.0004	7.4905	0.0059	9
		8/18/2014	1500	60	34,860	72	4,341	11.4528	368	0.0004	0.3633	0.0061	9	
			1600	60	34,920	67	4,036	10.6482	352	0.0004	0.3231	0.0054	8	
			800	960	35,880	48	45,893	121.0899	258	0.0003	2.6930	0.0028	4	
			900	60	35,940	39	2,342	6.1793	255	0.0003	0.1358	0.0023	3	
			1000	60	36,000	28	1,656	4.3695	252	0.0003	0.0949	0.0016	2	
			1100	60	36,060	30	1,813	4.7824	404	0.0004	0.1665	0.0028	4	
			1200	60	36,120	39	2,322	6.1269	384	0.0004	0.2028	0.0034	5	
			1300	60	36,180	61	3,678	9.7039	377	0.0004	0.3154	0.0053	8	
		1400	60	36,240	47	2,849	7.5166	375	0.0004	0.2430	0.0040	6		
		8/19/2014	Begin air injection	1500	60	36,300	61	3,662	9.6631	595	0.0006	0.4956	0.0083	12
				1600	60	36,360	87	5,201	13.7234	632	0.0006	0.7476	0.0125	18
				1700	60	36,420	87	5,228	13.7938	640	0.0006	0.7610	0.0127	18
				800	900	37,320	61	55,308	145.9305	1,010	0.0010	12.7050	0.0141	20
				900	60	37,380	67	4,029	10.6301	1,023	0.0010	0.9374	0.0156	22
				1000	60	37,440	73	4,352	11.4819	1,026	0.0010	1.0155	0.0169	24
				1100	60	37,500	67	4,043	10.6663	1,021	0.0010	0.9387	0.0156	23
				1200	60	37,560	87	5,210	13.7468	1,005	0.0010	1.1909	0.0198	29
				1300	60	37,620	73	4,352	11.4819	1,001	0.0010	0.9907	0.0165	24
				1400	60	37,680	73	4,352	11.4819	965	0.0010	0.9551	0.0159	23
1500	60			37,740	61	3,678	9.7039	921	0.0009	0.7704	0.0128	18		
1600	60			37,800	106	6,338	16.7229	967	0.0010	1.3939	0.0232	33		
1700	60			37,860	105	6,327	16.6949	966	0.0010	1.3902	0.0232	33		
8/20/2014	800			900	38,760	73	65,385	172.5204	917	0.0009	13.6369	0.0152	22	
	900			60	38,820	67	4,036	10.6482	895	0.0009	0.8215	0.0137	20	
	1000			60	38,880	61	3,687	9.7287	892	0.0009	0.7480	0.0125	18	
	1100			60	38,940	87	5,223	13.7820	875	0.0009	1.0395	0.0173	25	
	1200			60	39,000	73	4,374	11.5407	820	0.0008	0.8157	0.0136	20	
	1300			60	39,060	67	4,043	10.6663	868	0.0009	0.7981	0.0133	19	
	1400			60	39,120	82	4,943	13.0413	843	0.0008	0.9477	0.0158	23	
	1500	60	39,180	48	2,854	7.5294	837	0.0008	0.5432	0.0091	13			

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						SCFM	ft ³ of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %	lb VOC mass removal as hexane	lbs/min	lbs/day
				minutes	minutes								
		8/21/2014	1600	60	39,240	103	6,175	16.2931	808	0.0008	1.1348	0.0189	27
			1700	60	39,300	123	7,387	19.4906	785	0.0008	1.3189	0.0220	32
			800	900	40,200	61	55,261	145.8064	751	0.0008	9.4390	0.0105	15
			900	60	40,260	61	3,678	9.7039	720	0.0007	0.6023	0.0100	14
			1000	60	40,320	61	3,672	9.6875	681	0.0007	0.5687	0.0095	14
			1100	60	40,380	67	4,025	10.6211	632	0.0006	0.5786	0.0096	14
			1200	60	40,440	72	4,344	11.4624	668	0.0007	0.6600	0.0110	16
			1300	60	40,500	90	5,428	14.3206	774	0.0008	0.9555	0.0159	23
			1400	60	40,560	72	4,326	11.4143	988	0.0010	0.9721	0.0162	23
			1500	60	40,620	86	5,162	13.6199	1,090	0.0011	1.2797	0.0213	31
			1600	60	40,680	122	7,306	19.2776	1,182	0.0012	1.9642	0.0327	47
			1700	60	40,740	136	8,155	21.5171	1,243	0.0012	2.3055	0.0384	55
			800	900	41,640	55	49,301	130.0818	985	0.0010	11.0449	0.0123	18
			900	60	41,700	55	3,287	8.6721	962	0.0010	0.7191	0.0120	17
		1000	60	41,760	61	3,678	9.7039	946	0.0009	0.7913	0.0132	19	
		1100	60	41,820	61	3,678	9.7039	927	0.0009	0.7754	0.0129	19	
		1200	60	41,880	67	4,029	10.6301	917	0.0009	0.8403	0.0140	20	
		1300	60	41,940	91	5,464	14.4177	986	0.0010	1.2254	0.0204	29	
		1400	60	42,000	61	3,681	9.7122	762	0.0008	0.6379	0.0106	15	
		1500	60	42,060	61	3,672	9.6875	679	0.0007	0.5670	0.0095	14	
		1600	60	42,120	119	7,157	18.8845	740	0.0007	1.2046	0.0201	29	
		1700	60	42,180	87	5,201	13.7234	806	0.0008	0.9535	0.0159	23	
		8/23/2014	1400	1260	43,440	116	146,046	385.3463	551	0.0006	18.3025	0.0145	21
	Air injection paused		1500	60	43,500	116	6,955	18.3498	535	0.0005	0.8462	0.0141	20
			1600	60	43,560	116	6,960	18.3653	522	0.0005	0.8264	0.0138	20
		8/24/2014	1700	60	43,620	113	6,759	17.8328	498	0.0005	0.7655	0.0128	18
			1400	1260	44,880	98	123,596	326.1117	365	0.0004	10.2605	0.0081	12
		8/25/2014	1500	60	44,940	98	5,905	15.5812	382	0.0004	0.5131	0.0086	12
			1600	60	45,000	102	6,139	16.1967	401	0.0004	0.5599	0.0093	13
		800	960	45,960	73	70,163	185.1270	417	0.0004	6.6545	0.0069	10	
		900	60	46,020	55	3,315	8.7464	429	0.0004	0.3234	0.0054	8	
		1000	60	46,080	48	2,873	7.5812	454	0.0005	0.2967	0.0049	7	
		1100	60	46,140	88	5,255	13.8652	504	0.0005	0.6024	0.0100	14	
	Resume air injection		1200	60	46,200	55	3,295	8.6942	643	0.0006	0.4819	0.0080	12
			1300	60	46,260	120	7,182	18.9486	611	0.0006	0.9980	0.0166	24
			1400	60	46,320	82	4,934	13.0192	688	0.0007	0.7721	0.0129	19
			1500	60	46,380	55	3,284	8.6648	686	0.0007	0.5124	0.0085	12
			1600	60	46,440	67	4,022	10.6122	705	0.0007	0.6449	0.0107	15
	Air injection paused		1700	60	46,500	62	3,690	9.7370	621	0.0006	0.5212	0.0087	13
		8/26/2014	800	900	47,400	61	55,261	145.8064	291	0.0003	3.6574	0.0041	6
			900	60	47,460	61	3,684	9.7204	284	0.0003	0.2380	0.0040	6
			1000	60	47,520	55	3,301	8.7090	349	0.0003	0.2620	0.0044	6
			1100	60	47,580	39	2,338	6.1688	493	0.0005	0.2622	0.0044	6

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						SCFM	ft ³ of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %	lb VOC mass removal as hexane	lbs/min	lbs/day
	Resume air injection		1200	60	47,640	67	4,029	10.6301	615	0.0006	0.5635	0.0094	14
			1300	60	47,700	61	3,672	9.6875	758	0.0008	0.6330	0.0105	15
			1400	60	47,760	61	3,659	9.6550	831	0.0008	0.6916	0.0115	17
			1500	60	47,820	77	4,621	12.1922	896	0.0009	0.9417	0.0157	23
			1600	60	47,880	90	5,418	14.2967	916	0.0009	1.1289	0.0188	27
	Air injection paused		1700	60	47,940	61	3,653	9.6388	926	0.0009	0.7694	0.0128	18
		8/27/2014	1000	1020	48,960	55	55,827	147.3014	295	0.0003	3.7457	0.0037	5
			1100	60	49,020	91	5,446	14.3689	316	0.0003	0.3914	0.0065	9
			1200	60	49,080	82	4,909	12.9535	322	0.0003	0.3595	0.0060	9
			1300	60	49,140	67	3,995	10.5412	331	0.0003	0.3008	0.0050	7
			1400	60	49,200	90	5,400	14.2491	300	0.0003	0.3685	0.0061	9
			1500	60	49,260	115	6,908	18.2275	323	0.0003	0.5075	0.0085	12
			1600	60	49,320	130	7,822	20.6385	312	0.0003	0.5551	0.0093	13
			1700	60	49,380	90	5,409	14.2728	325	0.0003	0.3999	0.0067	10
	TOTAL				49,380		4,514,536	11,912	440	0.0004	506	0.0102	15
	MEDIAN					98							

Notes

Q volumetric flow rate
 SCFM standard cubic feet per minute
 ft³ cubic feet per minute
 VOC volatile organic compounds
 PID photo-ionization detector
 ppmv parts per million vapor

DERIVATION OF MASS REMOVAL RATE

ppmv as hexane/1,000,000 = VOC mole %
 ft³ of extracted air/(379 ft³ air/lb-mole air) = moles of extracted air
 (moles of extracted air)(VOC mole %)(86.2 lb/lb-mole hexane) = lbs of VOC removed as hexane
 (lbs of VOC mass removed as hexane)(elapsed time) = lbs/min of VOC removed as hexane
 (lbs/min of VOC removed as hexane)(60 min/1 hour)(24 hours/1 day) = lbs/day of VOC removed as hexane