

## Detterman, Mark, Env. Health

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**From:** Ruchi Mathur [rmathur@somaenv.com]  
**Sent:** Tuesday, October 22, 2013 1:46 PM  
**To:** Detterman, Mark, Env. Health  
**Subject:** Weekly Status Update\_MPE\_RO0000473\_15101 Freedom Ave  
**Attachments:** Table 2\_Mass Removal.pdf; Table 1\_Operational data.pdf

Dear Mr. Detterman:

Based on your directive dated October 10, 2013, SOMA started operation of Multi-Phase Extraction (MPE) treatment system at 15101 Freedom Ave, San Leandro on October 15, 2013. Please find attached MPE tables for the operation from October 15<sup>th</sup> to October 20<sup>th</sup>, 2013. Please feel free to call us if you have any questions or concerns.

Thank You,

**Ruchi Mathur**

*Staff Engineer*

*SOMA Environmental Engineering, Inc.*

*Phone: 925-734-6400*

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**Table 1**  
**MPE Event**  
**Operational Data : October-November 2013**

15101 Freedom Ave.  
San Leandro, California

DATE	TIME	PID (ppmv)	WELL MANIFOLD VACUUM (In of Hg)	OXIDIZER TEMPERATURE (°F)	WELL FIELD FLOW VAPOR RATE (scfm)	TOTAL SYSTEM VAPOR FLOW RATE (scfm)	DILUTION AIR FLOW RATE (scfm)	SYSTEM (BLOWER) VACUUM (In of Hg)	SYSTEM TOTALIZER READING (gallons)	COMMENTS	
10/15/2013	1130								0	begin extraction from MPE-1, MPE-2, and MW-6	
	1200	1,030	13.7	1498	149	149	0	20			
	1230	1,011	13.7	1499	149	149	0	20			
	1300	989	13.7	1501	149	149	0	20			
	1330	956	13.7	1498	149	149	0	20			
	1400	928	13.6	1500	149	149	0	20			
	1430	907	13.6	1497	150	150	0	19.9			
	1500	885	13.6	1501	150	150	0	19.9			
	1600	852	13.6	1498	150	150	0	19.9			
	1700	823	13.7	1499	149	149	0	20			
	1800	796	13.7	1501	149	149	0	20			
	10/16/2013	800	738	13.7	1500	149	149	0	20		Extracting from MPE-1 and MW-6
		900	706	13.6	1498	149	149	0	20		
		1000	697	13.7	1501	149	149	0	20		
		1100	671	13.7	1499	149	149	0	20		
		1200	783	9.5	1498	192	192	0	17.3		
		1300	751	9.5	1500	193	193	0	17.2		
1400		740	9.4	1501	193	193	0	17.2			
1500		731	9.4	1498	193	193	0	17.2			
10/17/2013	1600	706	9.5	1499	192	192	0	17.3	Extracting from MPE-1, MPE-2, and MW-6		
	1700	681	9.5	1501	192	192	0	17.3			
	800	547	9.8	1499	192	192	0	17.3			
	900	539	9.8	1500	192	192	0	17.3			
	1000	530	9.8	1499	192	192	0	17.3			
	1100	559	9.7	1501	192	192	0	17.3			
	1200	551	9.7	1500	192	192	0	17.3			
	1300	558	9.7	1499	192	192	0	17.3			
	1400	554	9.7	1501	192	192	0	17.3			
	1500	549	9.7	1499	192	192	0	17.3			
10/18/2013	1600	545	9.7	1501	192	192	0	17.3	15,972		
	1700	544	9.7	1500	192	192	0	17.3			
	800	595	9.8	1501	192	192	0	17.3			
	900	594	9.8	1499	192	192	0	17.3			
	1000	592	9.8	1501	192	192	0	17.3			
	1100	588	9.8	1500	192	192	0	17.3			
	1200	581	9.8	1498	192	192	0	17.3			
	1300	568	9.7	1501	192	192	0	17.3			
	1400	577	9.7	1499	192	192	0	17.3			
	1500	582	9.7	1500	192	192	0	17.3			
10/18/2013	1600	571	9.7	1498	192	192	0	17.3			
	1700	560	9.7	1500	192	192	0	17.3			

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DATE	TIME	PID (ppmv)	WELL MANIFOLD VACUUM (In of Hg)	OXIDIZER TEMPERATURE (°F)	WELL FIELD FLOW VAPOR RATE (scfm)	TOTAL SYSTEM VAPOR FLOW RATE (scfm)	DILUTION AIR FLOW RATE (scfm)	SYSTEM (BLOWER) VACUUM (In of Hg)	SYSTEM TOTALIZER READING (gallons)	COMMENTS
10/19/2013	800	542	10	1500	158	158	0	19.4	28,239	
	1000	549	10	1499	165	165	0	19		
	1130	656	10	1500	196	196	0	17		
	1400	650	9.4	1501	193	193	0	17.2		
	1600	672	9.6	1503	193	193	0	17.2		
10/20/2013	800	609	9.6	1498	192	192	0	17.3	33,593	
	900	621	9.6	1500	192	192	0	17.3		
	1000	647	10.1	1499	189	189	0	17.5		
	1100	653	10	1500	189	189	0	17.5		
	1200	659	10	1498	189	189	0	17.5		
	1300	655	10	1501	189	189	0	17.5		
	1400	688	9.9	1500	190	190	0	17.4		
	1500	703	10	1498	190	190	0	17.4		
	1600	694	9.9	1499	192	192	0	17.3		
	1700	687	9.9	1498	192	192	0	17.3		

**Table 2**

**MPE Event  
Extraction Data and VOC Mass Removal Rate  
October-November 2013**  
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 <sup>3</sup> of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %	lb VOC mass removal as hexane	lbs/min	lbs/day
MPE-1,MPE-2,MW-6	START	10/15/2013	1130	0	0											
			1200	30	30	149	4,465	11.7815	1,030	0.0010	1.0460	0.0349	50			
			1230	30	60	149	4,465	11.7815	1,011	0.0010	1.0267	0.0342	49			
			1300	30	90	149	4,465	11.7815	989	0.0010	1.0044	0.0335	48			
			1330	30	120	149	4,465	11.7815	956	0.0010	0.9709	0.0324	47			
			1400	30	150	149	4,465	11.7815	928	0.0009	0.9424	0.0314	45			
			1430	30	180	150	4,513	11.9071	907	0.0009	0.9309	0.0310	45			
			1500	30	210	150	4,513	11.9071	885	0.0009	0.9084	0.0303	44			
			1600	60	270	150	9,026	23.8143	852	0.0009	1.7490	0.0291	42			
			1700	60	330	149	8,930	23.5631	823	0.0008	1.6716	0.0279	40			
			1800	60	390	149	8,930	23.5631	796	0.0008	1.6168	0.0269	39			
			MPE-1, MW-6		10/16/2013	800	840	1,230	149	125,026	329.8828	738	0.0007	20.9857	0.0250	36
						900	60	1,290	149	8,930	23.5631	706	0.0007	1.4340	0.0239	34
			1000	60	1,350	149	8,930	23.5631	697	0.0007	1.4157	0.0236	34			
			1100	60	1,410	149	8,930	23.5631	671	0.0007	1.3629	0.0227	33			
MPE-1,MPE-2,MW-6			1200	60	1,470	192	11,501	30.3457	783	0.0008	2.0482	0.0341	49			
			1300	60	1,530	193	11,596	30.5969	751	0.0008	1.9807	0.0330	48			
			1400	60	1,590	193	11,596	30.5969	740	0.0007	1.9517	0.0325	47			
			1500	60	1,650	193	11,596	30.5969	731	0.0007	1.9280	0.0321	46			
			1600	60	1,710	192	11,501	30.3457	706	0.0007	1.8468	0.0308	44			
			1700	60	1,770	192	11,501	30.3457	681	0.0007	1.7814	0.0297	43			
		10/17/2013	800	900	2,670	192	172,515	455.1853	547	0.0005	21.4626	0.0238	34			
			900	60	2,730	192	11,501	30.3457	539	0.0005	1.4099	0.0235	34			
			1000	60	2,790	192	11,501	30.3457	530	0.0005	1.3864	0.0231	33			
			1100	60	2,850	192	11,501	30.3457	559	0.0006	1.4622	0.0244	35			
			1200	60	2,910	192	11,501	30.3457	551	0.0006	1.4413	0.0240	35			
			1300	60	2,970	192	11,501	30.3457	558	0.0006	1.4596	0.0243	35			
			1400	60	3,030	192	11,501	30.3457	554	0.0006	1.4492	0.0242	35			
			1500	60	3,090	192	11,501	30.3457	549	0.0005	1.4361	0.0239	34			
			1600	60	3,150	192	11,501	30.3457	545	0.0005	1.4256	0.0238	34			
			1700	60	3,210	192	11,501	30.3457	544	0.0005	1.4230	0.0237	34			
		10/18/2013	800	900	4,110	192	172,515	455.1853	595	0.0006	23.3460	0.0259	37			
			900	60	4,170	192	11,501	30.3457	594	0.0006	1.5538	0.0259	37			
			1000	60	4,230	192	11,501	30.3457	592	0.0006	1.5486	0.0258	37			
			1100	60	4,290	192	11,501	30.3457	588	0.0006	1.5381	0.0256	37			
			1200	60	4,350	192	11,501	30.3457	581	0.0006	1.5198	0.0253	36			
			1300	60	4,410	192	11,501	30.3457	568	0.0006	1.4858	0.0248	36			

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MPE WELL	COMMENT	DATE	CLOCK TIME	INCREMENTAL TIME	ELAPSED TIME	Q			PID		MASS REMOVAL		
						minutes	minutes	minutes	SCFM	ft <sup>3</sup> of extracted air	Moles of extracted air	ppmv as hexane	VOC mole %
		10/19/2013	1400	60	4,470	192	11,501	30.3457	577	0.0006	1.5093	0.0252	36
			1500	60	4,530	192	11,501	30.3457	582	0.0006	1.5224	0.0254	37
			1600	60	4,590	192	11,501	30.3457	571	0.0006	1.4936	0.0249	36
			1700	60	4,650	192	11,501	30.3457	560	0.0006	1.4648	0.0244	35
			800	900	5,550	158	142,525	376.0547	542	0.0005	17.5694	0.0195	28
			1000	120	5,670	165	19,765	52.1503	549	0.0005	2.4679	0.0206	30
			1130	90	5,760	196	17,680	46.6490	656	0.0007	2.6379	0.0293	42
		10/20/2013	1400	150	5,910	193	28,991	76.4922	650	0.0007	4.2859	0.0286	41
			1600	120	6,030	193	23,192	61.1938	672	0.0007	3.5447	0.0295	43
			800	960	6,990	192	184,016	485.5310	609	0.0006	25.4883	0.0266	38
			900	60	7,050	192	11,501	30.3457	621	0.0006	1.6244	0.0271	39
			1000	60	7,110	189	11,311	29.8433	647	0.0006	1.6644	0.0277	40
			1100	60	7,170	189	11,311	29.8433	653	0.0007	1.6798	0.0280	40
			1200	60	7,230	189	11,311	29.8433	659	0.0007	1.6953	0.0283	41
			1300	60	7,290	189	11,311	29.8433	655	0.0007	1.6850	0.0281	40
			1400	60	7,350	190	11,406	30.0945	688	0.0007	1.7848	0.0297	43
			1500	60	7,410	190	11,406	30.0945	703	0.0007	1.8237	0.0304	44
		1600	60	7,470	192	11,501	30.3457	694	0.0007	1.8154	0.0303	44	
		1700	60	7,530	192	11,501	30.3457	687	0.0007	1.7971	0.0300	43	
	<b>TOTAL</b>				<b>7,530</b>		<b>1,350,121</b>	<b>3562</b>			<b>192</b>	<b>0.0254</b>	<b>37</b>
	<b>MEDIAN</b>					<b>192</b>			<b>655</b>	<b>0.0007</b>			

Notes

Q volumetric flow rate  
SCFM standard cubic feet per minute  
ft<sup>3</sup> 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 %  
ft<sup>3</sup> of extracted air/(379 ft<sup>3</sup> 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