Update on ExxonMobil Torrance Refinery Incident

Asbestos Related Activities

(February 25, 2015)

This report supplements previous SCAQMD Incident Reports on the ExxonMobil Torrance Refinery and describes SCAQMD efforts to identify and mitigate on-site asbestos. It is important to emphasize that none of the samples taken outside of the refinery by SCAQMD or by the Certified Asbestos Contractor hired by ExxonMobil and provided to SCAQMD have shown the presence of asbestos. The only samples obtained or provided to date showing asbestos in the fallout debris are immediately adjacent to the ESP unit and Pre-Treater within the refinery.

On the day of the explosion, February 18, SCAQMD Staff was not allowed by the Torrance Fire Department to enter the area within the refinery designated as the "Hot Zone", which was adjacent to the Electrostatic Precipitator (ESP) unit. However, on February 20 SCAQMD compliance staff was given clearance to enter the area immediately west of the ESP unit and immediately south of the Pre-Treater Unit (#20) involved in the incident. SCAQMD Staff utilized proper protective clothing and respirators to be able to safely collect additional bulk samples from these areas which were to be tested for asbestos fallout. The laboratory results from these samples showed that no Asbestos was present.

In addition, SCAQMD Staff received information and copies of the reports from samples collected by a third party Certified Asbestos Contractor (CAC) hired by ExxonMobil. The reports contained information from 30 samples collected on Saturday, February 21 and Sunday, February 22, at areas immediately around the ESP unit and Pre-Treater Unit (#20). This area was sampled because these units had suffered significant damage as a result of the ESP explosion. Some of the samples were collected in an area that was inaccessible to SCAQMD Staff due to safety concerns. The results from the CAC samples showed the presence of Asbestos Containing Material in two locations on the ground level on-site at the refinery due to fallen pipe insulation located in the Pre-Treater Unit (#20) area and insulation debris in the tunnel under the overpass near the ESP. All locations where asbestos has been identified are on-site at the refinery.

As a result, on Tuesday evening, February 24, ExxonMobil's contractor submitted a compliance plan (Procedure 5) required by local and federal regulations for SCAQMD review and approval. The Procedure 5 Plan is for stabilization, removal, clean-up, and disposal of approximately 900 square feet of asbestos-containing Thermal System Insulation materials and associated cross-contaminated debris that was dislodged near the Pre-Treater Unit (#20), as a result of the ESP explosion and associated emergency response. SCAQMD is in the process of reviewing this plan and will shortly notify ExxonMobil's contractor of the adequacy of the plan and make such information available to the public.

Report on ExxonMobil Torrance Refinery Incident of February 18, 2015

SCAQMD Response and Sampling & Analysis Efforts

Description of the Incident

(Based on information obtained by SCAQMD and provided by ExxonMobil)

At around 9 a.m. on February 18, 2015, there was an explosion at the ExxonMobil Torrance Refinery which blew off sections of the Electrostatic Precipitator (ESP), venting the Fluid Catalytic Cracking Unit (FCCU), and released spent catalyst into the air which deposited it in the neighborhood on top of cars and homes and other areas around the refinery. The explosion was reported to be due to over pressurization in the ESP unit. The ESP is a piece of air pollution control equipment which controls particulate matter (PM) emissions from the FCCU and is a relatively new unit, permitted in December 2008 and has been in operation since 2009/2010. The FCCU was not in operation and was not being vented to the ESP at the time of the incident. ExxonMobil was planning to restart the FCCU this week, therefore, the FCCU was not hydrocarbon freed. The ESP unit did not have any vent gas from FCCU going through the unit at the time of the incident. The cause of over pressure and explosion of the ESP is not yet provided and is under investigation.

The explosion caused collateral damage to the nearby units including a Pre-Treater and a water De-mineralizing unit (which removes minerals from feed water for the refinery Boilers). The damage to the Pre-Treater unit resulted in a hydrocarbon leak that caused the unit to be vented to the flares, causing significant flaring and smoke. At this time, ExxonMobil started to shutdown other units, such as the Hydrogen Unit, which also contributed to additional flaring, and initiated reducing the refinery throughput.

Notifications

At 9:17 a.m. ExxonMobil filed a breakdown notification regarding the incident with SCAQMD via telephone. At 9:24 a.m., ExxonMobil also filed a Hazardous Material Spill Report with the Governor's Office of Emergency Services, indicating that the refinery has released more than 500 lbs of SOx, has visible smoke and closure of Del Amo Blvd due to flaring. Also by this time, SCAQMD had received over a dozen air quality complaints about smoke, flaring and ash fall out.

SCAQMD Response

Upon receipt of breakdown notification and complaints, SCAQMD immediately dispatched 3 Inspectors from the Long Beach Compliance office to investigate the incident and respond to the complaints. The SCAQMD Emergency Response Team was also put on high alert and dispatched into the field. The SCAQMD staff observed fall out in an area downwind of the

refinery and collected samples from the material deposited on top of cars and on the ground in the area. Also SCAQMD staff took air samples using portable analyzers (GC/MS and DustTracks). In addition, canister grab samples were also taken around the refinery. SCAQMD Inspectors were on-site at the refinery until around 8:30 p.m. on February 18th and returned back to the refinery the following days to continue our sampling and investigations.

Sampling & Analysis

SCAQMD compliance and monitoring staff responded to reports of an explosion at the ExxonMobil refinery on Wednesday morning, February 18, 2015. SCAQMD monitoring staff arrived on scene with monitoring instrumentation within an hour and a half of the incident, however, measurements did not proceed immediately upon arrival due to safety precautions related to reports about the potential release of radioactive materials at the scene. When confirmed that the radiation concern was indeed **unfounded** shortly before noon, near real time monitoring around the refinery began immediately for hydrocarbons, particulate matter (PM), and sulfur compounds. In addition, canister and fallout samples were collected and analyzed for metals, hexavalent chromium (CrVI), and asbestos. Included in this report are four technical appendices. Appendix I include a map of the locations where air monitoring was conducted and where samples were collected. Appendices II through IV include detailed results of the samples.

Overall findings of the near real time measurements indicated that hydrocarbons, PM, and sulfur compound levels were consistent with level that are typically seen in outdoor air. Bulk samples of fallout found on automobiles and at Mansel Avenue and Delthorne Park contained metals consistent with those used in the refinery's FCCU catalyst and as collected by ESP. No asbestos was found in the fallout samples, however those samples did contain fiberglass and glass wool. Fallout samples contained less than 60 parts per billion (ppb) CrVI, which is over 250 times **below** the California state (OEHHA) Residential Soil Screening level.

Near Real Time Measurements

1. Portable gas chromatograph/mass spectrometers (GC/MSs) were used to measure hydrocarbons in the air at seven (7) locations around the refinery. All readings were below the instrument's detection limit of 100 ppb. Details providing sampling locations, times and results are shown in Appendix II.

2. Two Jerome portable hydrogen sulfide (H_2S) analyzers were used to measure sulfur compounds in the air at locations around the refinery. All readings showed 11 ppb or less total reduced sulfur, with no distinction between upwind and downwind locations. These values are below the level of the California Ambient Air Quality Standard of 30 ppb.

3. DustTrack portable particulate monitors provided continuous PM measurements. These devices provide an indication of PM levels and are used to compare PM concentration at upwind and downwind locations of the incident. The PM levels observed with the

DustTrack showed levels of PM that were similar upwind and downwind, showing no gradient from the incident. Also the levels were consistent with PM measurements from SCAQMD's South Long Beach monitoring site and also consistent with typical ambient PM levels.

4. To monitor potential impacts of on-going flaring at the refinery, two (2) E-BAM stationary PM monitors were deployed downwind of the refinery on Thursday, February 19, 2015. The E-BAMs are based upon PM measurement principles used with instrumentation at the fully equipped air monitoring stations. Results of the E-BAM monitoring have shown that PM levels in the area downwind of the refinery have been consistent with typical Basin levels and those observed at other SCAQMD air monitoring stations located throughout the Basin.

Sampling and Analysis

Canister Samples

To determine levels of gaseous air toxics, one upwind and three downwind canisters samples were collected between 1:36 pm and 3:34 pm on February 18th. These samples are considered instantaneous or grab samples. These were returned to the SCAQMD laboratory and analyzed for total hydrocarbons as well as detailed analysis to identify individual air toxic compounds on a GC/MS. The canister analysis targets over 50 compounds, however, other compounds can be found, identified and levels estimated if present. Samples were analyzed using SCAQMD's Standard Operating Procedures (SOP), following EPA Methods TO-14, including rigorous quality assurance (QA) measures. The results were within the range of concentrations typically measured in the Los Angeles general area and are shown in Appendix III.

Bulk Fallout Samples

Scrapings were collected from two vehicles on Mansel Street and one on Hawthorne Blvd. Additional bulk fallout samples were collected at Delthorne Park. These samples were analyzed at the SCAQMD laboratory for asbestos, hexavalent chromium (CrVI) and other metals.

Microscopic analysis of fallout samples for asbestos and other materials was determined by polarized light microscopy and followed NIST and NVLAP SOPs. No asbestos was found in the fallout samples; however those samples did contain fiberglass and glass wool used in typical commercial insulation material.

Fallout samples were analyzed for hexavalent chromium (CrVI) using SCAQMD's SOP for the determination of CrVI by Ion Chromatograph (IC). Fallout samples contained less than 60 ppb CrVI, which is over 250 times **below** the California state Office of Environmental Health Hazard Assessment (OEHHA) Residential Soil Screening level.

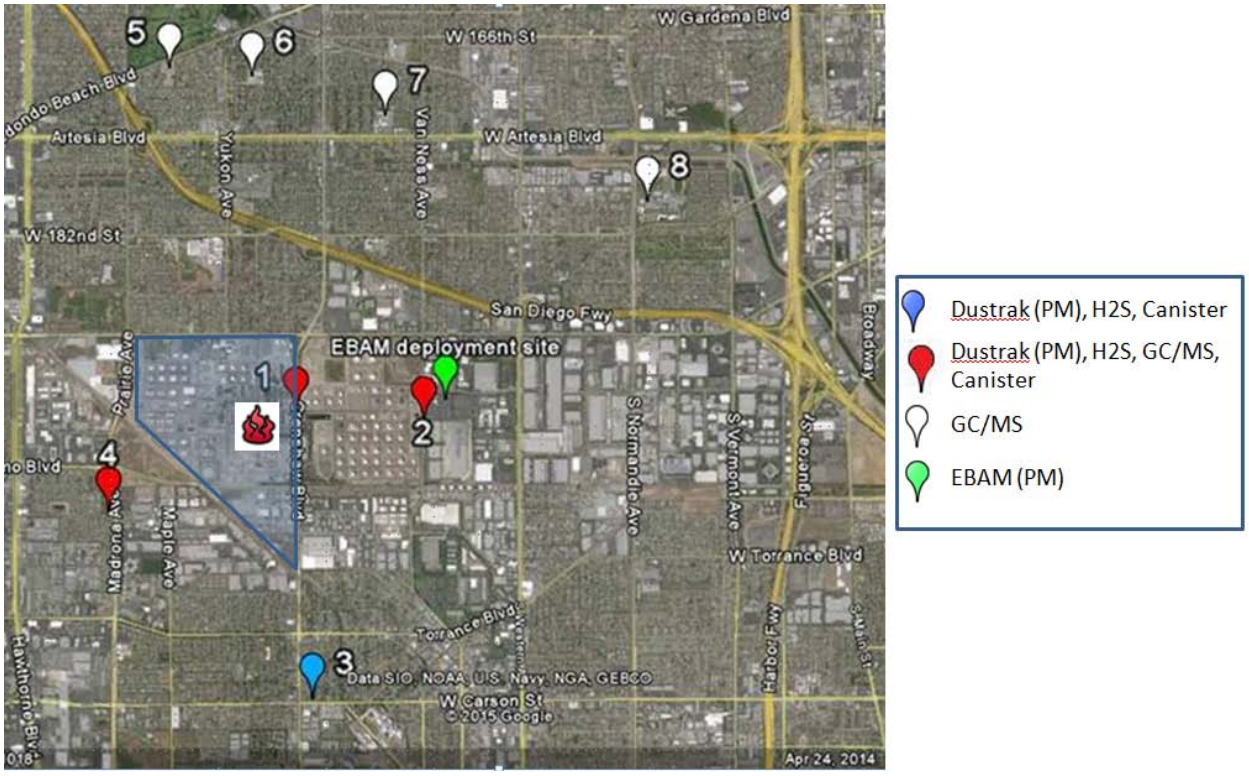
Fallout sample's metal content was compared to levels found in OEHHA's Soil Screening Table which can be found at: http://www.oehha.ca.gov/risk/chhsltable.html , as well as compared to

typical soil levels as found in the literature. Samples were extracted following a slight modification to SCAQMD SOP #00096 which utilizes a nitric acid and microwave digestion/extraction of the sample followed by ICP/MS analysis. The ICP/MS targets over 40 metals. Results are shown in Appendix IV.

Appendices

The attached appendices include supplemental information for the report. The appendices include:

I. Map of sampling locations
II. Results for the portable GC/MS
III. Results for the canister samples by the lab-based GC/MS
IV. Results for fallout sample metals analysis by ICP/MS and IC



1. 19500 Crenshaw Blvd
2. Van Ness and Prologis Way
3. Torrance Blvd/ Crenshaw Blvd
4. Del Thorne Park
5. St. Catherine's Laboure Elementary School
6. Carr Elementary School
7. Casimir Middle School
8. Gardena High School

Appendix 2

Metals Analysis by ICP/MS
CrVI by IC
Samples Collected February 18, 2015

Metal	Sample #			Residential Soil Screening level	Mean Conc. Soil Western U.S.	Range Conc. Soil Western U.S.		
	1504910-01	**1504910-02**	**1505009-01**					
	ug/g			ug/g				
Be	2.7	1.8	1.9	0.16	1	<1 - 150000		
Al	200000	200000	200000		58000	5000 - >100000		
Si	200000	100000	100000		300000	150000 - 440000		
Ti	1370	1100	800		2200	500 - 20000		
V	65	67	60	530	70	7 - 500		
Cr	170	130	110	100000	41	3 - 2000		
CrVI			0.06	17				
Mn	700	890	250		380	30 - 5000		
Fe	20000	15000	14000		21000	1000 - >100000		
Co	13	11	9.1	660	7	<3 - 50		
Ni	120	110	74	1600	15	<5 - 500		
Cu	98	83	75	3000	21	2 - 300		
Zn	830	700	590	23000	55	10 - 2100		
As	6.8	6.1	4.2	0.07	5.5	<0.10 - 97		
Se	1.0	0.3	3.3	380	0.23	<0.1 - 4.3		
***Rb**	12	11	9.6		69	<20 - 210		
Sr	71	74	64		100	10 - 3000		
Zr	33	28	15		160	<20 - 1500		
Mo	13	11	9.3	380	1	<3 - 7		
***Ag**	0.3	0.2	ND	380	0.8	0.1 - 8.3		
***Cd**	1.5	0.6	0.4	1.7	0.36	0.05 - 1.7		
Sn	5.6	6.5	ND		0.9	<0.1 - 7.4		
Sb	3.6	2.8	1.2		0.47	<1 - 2.6		
***Cs**	0.5	0.6	ND		3.1	1 - 8.7		
Ba	180	190	140		580	70 - 5000		
La	9800	10100	8800		30	<30 - 200		
Ce	5380	5640	5100		65	<150 - 300		
***Tl**	0.1	0.1	ND		0.56	0.17 - 1.1		
Pb	53	50	38	80	17	<10 - 700		
U	1.9	2.0	ND		2.5	0.68 - 7.9		

NOTES:

Samples were collected from two separate vehicles on Mansel Street in Torrance and one on Hawthorne Blvd.

Samples were extracted in Nitric acid and run by ICP/MS

All values are preliminary, they have not been fully quality assured

Appendix 2

Metals Analysis by ICP/MS
CrVI by IC
Samples Collected February 18, 2015

Aluminum and Silicon values are estimated; the concentrations of these elements was well above the calibration range of the instrument		
Chromium (Cr) results are for total chrome		
All values are in ug/g which is equal to ppm. To convert ppm to % multiply by 10,000		
SOIL REFERENCES:		
Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States		
U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1270, 1984: http://pubs.usgs.gov/pp/1270/pdf/PP1270_508.pdf		
*Background Concentrations of Trace and Major Elements in California Soils		
Kearney Foundation of Soil Science Division of Agriculture And Natural Resources, University of California, March 1996		
http://envisci.ucr.edu/downloads/chang/kearney_special_report_1996.pdf		
The soil screening level for arsenic comes with the following footnote: The screening numbers for arsenic are for contamination resulting from human activity. Concentrations of naturally occurring arsenic may be far above the screening number. When levels of arsenic at a site are a concern, the agency with authority over remediation decisions should be consulted.		
http://www.oehha.ca.gov/risk/chhsltable.html		

Appendix 3

Portable GC/MS Results
Samples Collected February 18, 2015

Sample Location	Sampling Time	Sampling Results
Del Thorne Park, 3401 Spencer Street	11:33 AM, 11:54 AM & 1:02 PM	ND
Downwind of refinery 19500 Crenshaw Blvd.	2:05 PM	ND
Downwind of refinery 19800 Prologis Way & Van Ness Avenue	2:28 PM	ND
St. Catherines Laboure Elementary, 3846 W. Redondo Beach Blvd.	3:28 PM	ND
Carr Elementary, 3404 W. 168th Street	3:54 PM	ND
Casimir Middle School, 17220 Casimir Avenue	4:13 PM	ND
Gardena High School, 1301 W. 182nd Street	5:11 PM	ND

ND = Not Detected. Detection limit is approximately 100 ppb

Appendix 4

Lab GC/MS Canister Samples

Samples Collected February 18, 2015

Canister	22490	54677	54051	54674	Typical
Sampling Time	1:36 PM	2:06 PM	2:19 PM	3:34 PM	Ambient Air *
	Concentrations in parts per billion by volume (ppbv)				
acetylene+ethylene	3.1	20.6	3.3	1.7	
ethane	7.8	20.1	9.3	7.1	
propylene	0.2	3.3	0.3	0.2	
propane	4.2	8.7	8.2	3.0	
isobutane	1.5	4.3	2.2	0.9	
vinyl chloride	ND	ND	ND	ND	<0.1
1-butene	ND	0.3	<0.1	<0.1	
1,3-butadiene	ND	0.1	ND	ND	<0.1-0.2
n-butane	3.5	4.8	6.5	2.2	
ethanol	1.3	2.8	1.2	1.3	
2-propenal	0.1	0.3	ND	0.1	0.1-0.4
isopentane	1.5	2.9	12.3	1.0	
acetone	5.3	4.3	4.3	5.2	3.7-13.7
isopropylalcohol	ND	ND	ND	ND	
n-pentane	0.9	1.7	5.2	0.5	
isoprene	0.2	<0.1	0.1	0.2	
methylene chloride	0.1	0.1	0.2	0.1	<0.1
carbon disulfide	ND	ND	<0.1	ND	
methyl tert butyl ether	ND	ND	ND	ND	
vinyl acetate	ND	0.2	ND	0.3	
2-Butanone MEK	0.5	0.5	0.7	0.6	0.3-0.8
1-hexene	ND	ND	<0.1	ND	
n-hexane	0.2	0.3	0.6	0.1	
chloroform	<0.1	<0.1	ND	<0.1	<0.1
ethylacetate	ND	ND	ND	ND	
1,2-dichloroethane	ND	ND	ND	ND	<0.1
1,1,1-trichloroethane	ND	ND	<0.1	ND	
benzene	0.2	0.2	0.3	0.2	0.3-1.3
carbon tetrachloride	<0.1	<0.1	<0.1	<0.1	0.1
1,2-dichloropropane	ND	ND	ND	ND	<0.1
trichloroethylene	ND	ND	ND	ND	<0.1-0.1
n-heptane	<0.1	0.1	0.3	<0.1	
methyl isobutyl ketone	ND	ND	ND	ND	
1,1,2-trichloroethane	ND	ND	ND	ND	
toluene	0.3	0.4	0.7	0.3	0.8-4.1
1,2-dibromoethane	ND	ND	ND	ND	<0.1-0.1
n-octane	<0.1	0.1	0.2	ND	
tetrachloroethylene	<0.1	ND	ND	ND	
ethylbenzene	<0.1	<0.1	<0.1	<0.1	0.1-0.5
m+p-xylene	0.1	0.2	0.3	0.1	0.3-1.5
styrene	ND	ND	ND	ND	<0.1-0.2
o-xylene	<0.1	<0.1	<0.1	<0.1	0.1-0.6
n-nonane	ND	<0.1	<0.1	ND	
n-decane	ND	<0.1	<0.1	ND	
1,4-dichlorobenzene	ND	ND	ND	ND	<0.1
1,2-dichlorobenzene	ND	ND	ND	ND	<0.1
n-undecane	ND	ND	ND	ND	
n-dodecane	ND	ND	ND	ND	
NMOC (ppbC)	117	258	323	94	100-700

NMOC = Non-Methane Organic Compounds
ND = Not Detected

* Typical ambient air concentrations measured and reported under federal National Air Toxics Trends Stations (NATTS) and Photochemical Assessment Monitoring Stations (PAMS) programs