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Air Quality Management District
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Sunshine Canyon Landfill: Summary of 2012-2013 Air Monitoring Study and Evaluation of Health Risks

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Introduction

Sunshine Canyon Landfill (SCL), owned and operated by Browning-Ferris Industries of California, Incorporated (a subsidiary of Republic Services, Incorporated) is a large municipal waste landfill located at the border of the City of Los Angeles and the unincorporated area of Los Angeles County. The facility is located approximately one mile north of the Granada Hills North neighborhood.

Since 2008, the South Coast Air Quality Management District (SCAQMD) has received a large number of odor complaints from residents near this landfill. SCAQMD staff have responded to these complaints and have issued numerous Notices of Violation (NOVs) for public nuisance to the landfill operator. In December 2011, the SCAQMD Hearing Board issued an Order for Abatement that required Browning-Ferris Industries to perform specific measures to help mitigate the odors from this landfill. The Order also required the landfill owners to conduct an air monitoring study to assess long-term community exposure to air toxics from the landfill. This study was conducted by a third party contract with the landfill owners, with monitoring conducted during the years 2012-2013 for approximately 12 months.

The following report presents a brief summary of the air monitoring study results, interpretation of the results in terms of health risks, and the periodic reporting of emissions from the landfill. This report is not intended to be a comprehensive review of the data, but a summary of the key findings from the 2012-2013 air monitoring results, and the activities related to the AB2588 Air Toxics “Hot Spots” program regarding this facility.

In addition to the activities conducted by SCAQMD, the City of Los Angeles and the County of Los Angeles and Local Enforcement Agency (LEA) have also issued requirements for the landfill operators. SCAQMD continues to work with City, County, and LEA officials to coordinate actions to mitigate the odors from this landfill.

Summary of the 2012-2013 Air Monitoring Study (SCL Study)

The 2012-2013 air monitoring study (“SCL Study”) was conducted by Roberts Environmental Services (field services) and Columbia Analytical Services (laboratory analysis). As required by the SCAQMD Hearing Board’s Order for Abatement, these contractors were selected by and

paid for by Browning-Ferris Industries, owners of the Sunshine Canyon Landfill. SCAQMD staff approved the sampling protocol.

In the SCL Study, air toxics were monitored at the Sunshine Canyon Landfill facility ("landfill") from 12/17/2011 to 4/28/2013 and at the Van Gogh Elementary School ("school") from 4/15/2012 to 4/28/2013. The data from this study were reviewed by the consulting firm of CH2MHill, and additionally reviewed by another consultant, Sonoma Technologies, Incorporated, which identified certain data quality issues; in other words, some of the data should not be included in our analysis because the data from certain samples is likely to be incorrect. SCAQMD staff conducted additional quality assurance reviews to identify which of the data would be usable. The initial quality assurance assessment concluded that the majority of these data were of acceptable quality for use, with the exception of a handful of samples that clearly exhibited laboratory analysis issues; those problematic samples were excluded from our analysis. We are continuing to investigate data quality to be able to provide a better evaluation of the data.

Analysis conducted by SCAQMD staff shows that the concentrations of many of the air toxic pollutants, including vinyl chloride, were lower than or very close to the lowest level detectable by the analysis methods. For those pollutants that could be measured, SCAQMD staff compared the measurements to the Multiple Air Toxics Exposure Study IV (MATES IV) conducted by SCAQMD, where monitoring was conducted at 10 locations across the South Coast Air Basin between 2012 and 2013. The MATES IV study provides an estimate of the expected levels of air toxic pollution in the region. The monitoring station used in MATES IV that was located closest to the Sunshine Canyon Landfill facility was in Burbank, so staff also compared the SCL Study data specifically to the Burbank MATES IV measurements. The purpose of these comparisons are to check whether the levels measured during the SCL Study were relatively consistent with air toxics monitoring data across the region. The results of these comparisons show that the concentrations of the majority of air toxics measured in the landfill study were either within the range or lower than what was measured in MATES IV. Thus, for these pollutants and notwithstanding the landfill odors, the

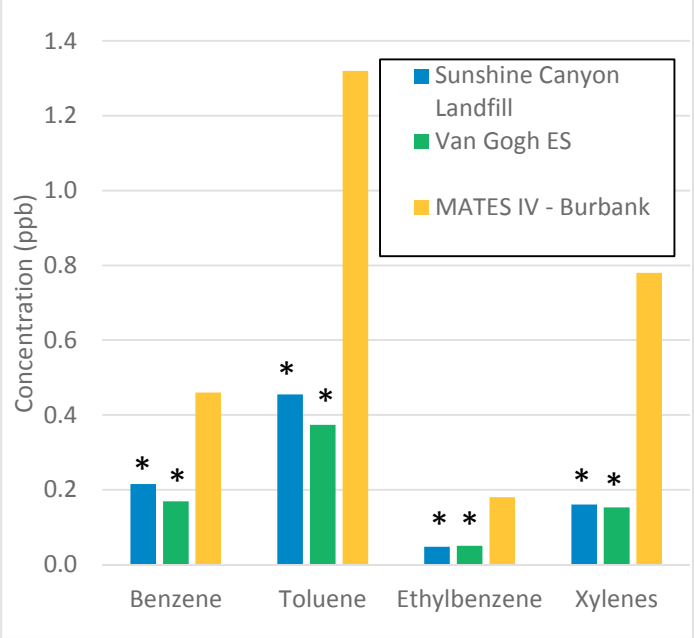

Figure 1. Average benzene, toluene, ethylbenzene, and xylenes from the SCL Study (preliminary data), compared to MATES IV Burbank station. *Data quality review is continuing and results will be updated

study did not find that emissions from the landfill affected the nearby community's air quality beyond what is generally found on average in the region.

As stated above, the majority of air toxics measured at the landfill and school sites were either too low to be measured, very close to the lowest levels that could be measured, or were not higher than what is generally found in the region. However, there were three pollutants found to have concentrations slightly higher than what was measured in the MATES IV study: acrolein, formaldehyde, and acetaldehyde. Acrolein is well known to be difficult to measure with current techniques, and therefore, there is considerable uncertainty and data quality issues associated with these measurements.[1] At best, acrolein monitoring data should be considered as a rough indicator, not accurate enough to be compared to health benchmarks. Acrolein emissions can better be estimated using computer modeling methods and are reported by the facility every four years, as required by SCAQMD. All air toxics emissions, including acrolein, are assessed for health risks as part of the Air Toxics "Hot Spots" program, which is described briefly below.

SCAQMD staff are continuing to evaluate the data for acetaldehyde and formaldehyde to assess data quality. The data quality review thus far has found that several of the measurements of these two pollutants, including several samples that showed higher concentrations, were of questionable quality as indicated by the laboratory conducting the analysis. After excluding these questionable samples, and accounting for the differences in concentrations measured by duplicate samples, then the estimated range for average formaldehyde concentrations was 2.27-3.21 ppb at the landfill and 2.58-3.78 ppb at the school, and the estimated range for acetaldehyde concentrations was 1.07-1.55 ppb at the landfill and 1.21-1.64 ppb at the school. These levels of formaldehyde and acetaldehyde are slightly higher than the average concentrations in the region and the Burbank MATES IV station. Further data quality review has found indications of changes in laboratory methodology during the study, which affected many of the measurements of these two pollutants. These estimates may change, and the concentrations of these pollutants at the landfill and school may, in fact, be consistent with MATES IV levels. Additional data quality assurance is ongoing, and we will update the results when the analysis is complete.

Using these preliminary estimates, we can compare the levels at the school (as an indicator of community exposures) to health benchmarks established by the California Office of Environmental Health Hazard Assessment (OEHHA). OEHHA establishes Chronic Reference Exposure Levels (REL's) at the pollutant concentration at or below which adverse, non-cancer

[1] R. Schulte-Ladbeck, et al. "Characterization of chemical interferences in the determination of unsaturated aldehydes using aromatic hydrazine reagents and liquid chromatography." J. Environ. Monit., 2001, 3, 306–310.
Ho, S.S.H., et al. "Unsuitability of using the DNPH-coated solid sorbent cartridge for determination of airborne unsaturated carbonyls." Atmospheric Environment. 2011 45, 261-265.
Herrington, J.S., et al. "Concerns regarding 24-h sampling for formaldehyde, acetaldehyde, and acrolein using 2,4-dinitrophenylhydrazine (DNPH)-coated solid sorbents." Atmospheric Environment 2012, 55, 179-184.
Grosjean, D., "Ambient Levels of Formaldehyde, Acetaldehyde, and Formic Acid in Southern California: Results of a One-Year Base-Line Study," Environmental Science & Technology, Vol 25, 1991, pp. 710–715.

health effects are not expected to occur. The chronic REL is 80 ppb for acetaldehyde and 7 ppb for formaldehyde, and the measured levels were well below these levels, meaning that the long-term exposure at the levels found in the SCL Study are not expected to cause long-term non-cancer health effects. Formaldehyde is a known human carcinogen, and acetaldehyde is a suspected human carcinogen, so we examined cancer risks in this neighborhood from all air toxics, including these two pollutants, using the MATES IV data. The MATES IV study calculated cancer risks based on both monitoring and emissions data, including emissions from stationary sources such as this landfill. Based on the MATES IV study, total cancer risks from all sources in the neighborhood near Van Gogh Elementary School are estimated to be 400-600 chances in one million, which is lower than the average estimated cancer risk in the region (900 chances in one million). Formaldehyde and acetaldehyde exposure at the levels measured contribute a small fraction of this total risk. The calculations of the cancer risks and health benchmarks (REL's) take into account that young children are generally more sensitive to air pollution than are adults.

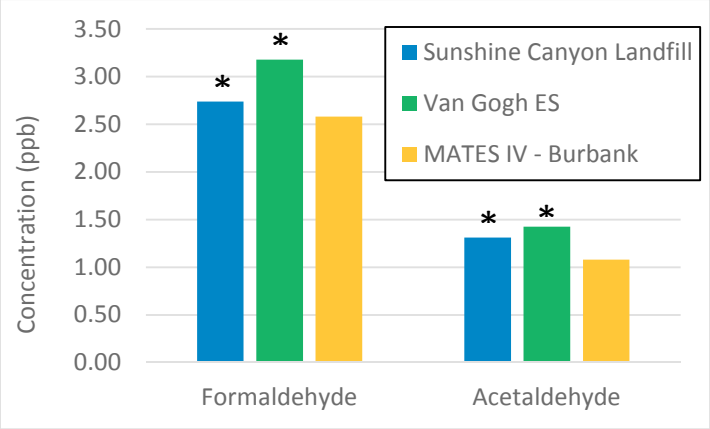

Figure 2. Average formaldehyde and acetaldehyde concentrations from the SCL Study (preliminary data) compared to MATES IV Burbank station. *Data quality review is continuing, and results will be updated.

Notably, the preliminary estimates of formaldehyde and acetaldehyde levels show slightly higher levels at the school compared to the landfill. Because air monitoring measures pollutants from all sources, these data suggest that there may be another source of these pollutants at or near the school. There are many outdoor sources of these pollutants, although indoor sources can contribute substantially to an individual's total exposure.[2,3]

The 2012-2013 monitoring efforts focused on measuring long-term air toxic exposure, which are pollutants known to have effects on health. The monitoring study was not intended to measure odors, because often, the human nose is more sensitive than our best monitoring instruments. Strong unpleasant odors have been known to evoke physiological responses, such as headaches and nausea.

Browning-Ferris Industries is also required by SCAQMD, the City of Los Angeles, and the County of Los Angeles to conduct other air pollution monitoring on a regular basis, including continuous particulate and black carbon monitoring, as well as periodic landfill gas samples. The City of Los Angeles is requiring the landfill operators to conduct another year-long air toxics

[2] California Air Resources Board. (1993). Acetaldehyde as a Toxic Air Contaminant. http://www.arb.ca.gov/toxics/id/summary/acetalde.pdf (web). Accessed Mar 2, 2016.
[3]California Air Resources Board. (2004). Reducing Your Exposure to Formaldehyde (Fact Sheet). http://www.arb.ca.gov/research/indoor/formaldfs08-04.pdf (web). Accessed Mar 2, 2016.

monitoring study, beginning in the next couple of months, and SCAQMD staff will assess those data as they become available. The data from the upcoming study can provide more current estimates of air toxics at the landfill and community sites.

Summary of the Annual Emissions Report data from Sunshine Canyon Landfill

Sunshine Canyon Landfill and hundreds of other facilities in the SCAQMD are subject to the AB 2588 Air Toxics "Hot Spots" Act, and SCAQMD's regulation implementing this law, Rule 1402. Facilities in the AB2588 program must report a comprehensive list of toxic emissions to SCAQMD every four years. In addition, annual emission reports are required pursuant to SCAQMD Rule 301, including a shorter list of toxic compounds. All of the reported data is available in Facility INformational Detail (FIND): http://www.aqmd.gov/home/tools/public/find. The attached tables summarize self-reported emissions from Sunshine Canyon Landfill since 2010 (as reported through FIND). NOx, PM and CO emissions are primarily due to combustion equipment such as flares or generators. Please note that the 2012-2015 Sunshine Canyon Landfill reported data are currently being audited by SCAQMD staff because there appears to be some inconsistencies in the methods used to self-report VOC and some toxic emissions from this facility.

Based on the AB 2588 emissions reported, and the distance of those emission sources to the public (homes, schools, businesses, etc.), SCAQMD staff uses a screening procedure approved by its Governing Board to determine if a facility is required to conduct a detailed Health Risk Assessment (HRA). For Sunshine Canyon Landfill, the screening done in 2010 determined that an HRA was not required because expected health risk levels based on the reported emissions were below the established health risk threshold for public notification (maximum individual cancer risk of 10 in-a-million and non-cancer Hazard Index of 1) for the Sunshine Canyon Landfill facility. This is largely due to the dispersion of pollutants as they travel the large distance between the facility's primary emission sources and nearby homes and school. The 2014 emissions report, which included the full list of toxic compounds, is currently being audited and the facility emissions will go through the screening procedure again once the audit is complete.

In addition to air toxics rules, SCAQMD also regulates certain equipment used at facilities, requiring facilities to demonstrate that emissions from that equipment will not exceed risk thresholds to any receptor such as nearby homes. The reported HRA's related to equipment permitting can be obtained by request.

Summary of evaluation of health impacts based on the monitoring study and annual emissions reports

- Based on the 2012-2013 monitoring study, most air toxics measured at the landfill and school sites were either too low to be measured, or similar to or below levels that are typical in the region. The estimated range of concentrations of formaldehyde and acetaldehyde were found to be slightly higher at both the school and landfill sites compared to levels typically found in the region, although there are many potential sources of these pollutants in both outdoor and indoor environments. The higher measurements at the school compared to measurements at the landfill suggest the possibility of another source of these air toxics. The levels of formaldehyde and acetaldehyde detected in the study are not expected to cause chronic non-cancer health effects. Staff continues to evaluate data quality issues from the SCL Study related to formaldehyde and acetaldehyde, and will update results when the analysis is complete.

- Strong unpleasant odors have been known to evoke physiological responses, such as headaches and nausea.

- In 2010, based on the annual emissions reported for the Sunshine Canyon Landfill, the risks from air toxics emitted from this facility were low enough not to require a health risk assessment. SCAQMD staff are currently auditing the 2014 reported emissions, to determine whether risks are high enough to require such an assessment.

- SCAQMD staff is continuing to conduct data quality assurance activities, and will assess the data from the upcoming air toxics monitoring efforts that the City of Los Angeles is requiring of the landfill owners.

Appendix:

1. Sunshine Canyon Landfill (facility #49111) annual emissions data (partial list)

ATTACHMENT:

Sunshine Canyon Landfill (facility #49111) annual emissions data (partial list)

Sunshine Canyon Landfill – Criteria Pollutants

tons per year

Year	NOx	PM	VOCs	SOx	CO
2010	26.0	4.8	6.0	25.7	23.8
2011	33.1	6.2	15.5	33.6	44.4
2012	48.8	6.0	2.3	33.1	32.5
2013	54.9	13.7	3.5	53.6	32.1
2014	27.5	5.7	41.8	46.0	30.3
2015	14.5	3.9	16.4	23.6	18.3

Sunshine Canyon Landfill – Toxic Pollutants (partial list)

pounds per year

Year	Benzene	Formaldehyde	Acetaldehyde
2010	1,063	654	29
2011	1,419	866	**
*2012	23	177	**
*2013	34	271	**
*2014	1721	6,464	274
*2015	858	3,465	**

*Staff is auditing the 2012-2015 reports

** Pursuant to SCAQMD Rules 301 and 1402, all facilities must report emissions for 24 different air toxic pollutants (like Benzene and Formaldehyde) every year, while emissions of other air toxics (like Acetaldehyde) must be reported every four years

Notes:
NOx = nitrogen oxides
PM = particulate matter
VOCs = volatile organic compounds
SOx = sulfur oxides
CO = carbon monoxide