Testing Services For:

TOXIC AND ODOROUS COMPOUNDS EMANATING FROM LANDFILLS

AAC has been recently involved with several large projects that aimed to identify Toxic and Odorous compounds emanating from landfills and possibly impacting nearby residences or schools as well as landfill workers. While Ammonia and H_2S are typically the most common malodorous compounds emitted from landfills, there are hundreds of other chemicals that could contribute to odor problems. Working with other air quality labs, we have come up with a comprehensive list of air quality services that includes many of these pollutants using cost effective and easy to use sampling methods (see Table 1). These methods have been used to collect samples in nearby residences, at the fence line of landfills, from landfill areas that are known to be malodorous (wells, sumps, etc) and with some modification under the liners of capped landfills.

The data results along with nearby meteorological data have been used to determine which compounds are causing odor problems, which areas of the landfills are causing the odor problems, and to determine if exposures to nearby communities are within acceptable health limits based on EPA Regional Screening Levels (RSLs) for Residential chronic exposure.

Some of the compounds listed below have odor thresholds significantly lower than their RSLs so proper odor sampling may require significant modifications in order to achieve acceptable reporting limits. The OSHA and NIOSH methods listed below were developed for higher level occupational exposure limits but we have been successful in modifying these methods to achieve lower reporting limits by increasing the flow rates and/or the total sampling time. Low analytical reporting limits and certified canisters and flow controllers also contribute to our very low reporting limits.

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The landfills on average emitted large amounts of C2-C6 Organic Acids (Butyric dominated), C2-C6 Carbonyls (Acetone and MEK dominated), Sulfur compounds (mostly DMS, DMDS, MM, and H2S), VOCs (mainly Propene, Acetone, Methanol, Ethanol, IPA, THF, Ethyl Acetate, and BTEX), while most of the other compounds were found at low concentrations or not detected.

The compounds that were identified in samples collected near or downwind of the landfills typically were VOCs, Carbonyls and sulfur compounds with similar profiles as those samples collected directly from the landfill but at much lower levels (ppbv).Odorous compounds found in some of the downwind samples included Butyric and Acetic Acid, H2S and DMS, and C3-C6 alkanals.

Table 1. Landfill Testing Methods for Toxic and Odorous Compounds

Analytes	Method	Media	Reporting Limits
VOCS and TICs	EPA TO-15	Silonite Canister	1-5ppbv SCAN, ppt SIM
Fixed Gases (CH4, O2, N2, CO, CO2, H2)	EPA 3C	Silonite Canister	.1% except H2 at 1.0%
H2S and Reduced Sulfur Compounds	ASTM D-5504	Silonite Canister	10ppbv
Carbonyls	EPA TO-11A	DNPH Tube	.08ug/sample
Carboxylic Acids	In-house GC-MS	NaOH SG Tube	2 ug/sample
HCL , Inorganic Acids	NIOSH 7903	SG Tube	1ug/sample
Phenols and Cresols	OSHA 32	XAD Tube	.2ug/sample
Ammonia	OSHA ID-188	Acidic Carbon Tube	2ug/sample
Amines	NIOSH 2010M	SG Tube	5ug/sample
Sulfur Dioxide	OSHA ID-200	IABC Tube	1ug/sample
HCN	NIOSH 6010	Soda Lime Tube	.2ug/sample
Mercury	NIOSH 6009	Anasorb Tube	.01ug/sample
PAHs	EPA TO-13/NIOSH 5506	PUF/XAD	.2ng/sample
Dioxans/Furans	EPA TO-9A	PUF/XAD	100pg/sample
Odor	ASTM E679-04	Tedlar Bag	

Please contact AAC for additional sampling information such as media, flow rates, sampling times, etc.
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