

ADEQ UST Program Analytical Data Information July 2014

Soil and Groundwater

Volatile Organic Compounds

Twenty four (24) compounds found in petroleum products are included in the 8260B target analyte list for both soil and groundwater. The Arizona Department of Health Services (ADHS) issued Information Update #119 on May 15, 2014 (<http://www.azdhs.gov/lab/documents/license/resources/updates/information-update-119.pdf>). The standard 8260B compounds need to be reported besides the target analyte list.

1,3-Butadiene	<i>Benzene</i>	<i>1,2-4-Trimethylbenzene</i>
<i>n-butyl benzene</i>	<i>Toluene</i>	<i>1,3,5-Trimethylbenzene</i>
<i>Sec-butyl benzene</i>	<i>Ethyl benzene</i>	<i>MTBE (methyl tert butyl ether)</i>
<i>Tert-butyl benzene</i>	<i>Xylenes</i>	<i>1,2-DCA (1,2-dichloroethane)</i>
<i>Carbon disulfide</i>	Methyl cyclohexane	Dicyclopentadiene
<i>Cumene (Isopropyl benzene)</i>	<i>Naphthalene</i>	<i>n-Hexane</i>
Cyclohexane	<i>n-propylbenzene</i>	<i>p-isopropyl toluene</i>
4-ethyltoluene	Propylene (Propene)	<i>EDB (1,2-dibromoethane/ ethylene dibromide)</i>

Soil Remediation Levels were established in 1997 and include the *italicized* chemicals of concern. These chemicals of concern should have been part of any UST investigation once the Soil Remediation Levels were adopted. The six compounds identified by **bold** can be reported as a tentatively identified compound (TIC) and are for diagnostic and future risk assessment purposes. 1,3-butadiene and biphenyl are compounds found in diesel fuel. Dicyclopentadiene is found in premium and super grades of unleaded gasoline.

Ethylene dibromide/1,2-dibromoethane (EDB)

EDB is a lead scavenger in gasoline. EDB analysis in groundwater (source well and any wells with detections of EDB by EPA Method 8260B or EPA Method 504.1) need to be analyzed using EPA Method 504.1 to reach a reporting limit below the Aquifer Water Quality Standard of 0.05 µg/L. Soil samples can be analyzed using EPA Method 8260B if the reporting limit for EDB is less than residential Soil Remediation Level of 0.29 mg/Kg. Otherwise, EPA Method 8011 should be used to reach this reporting limit.

Methyl tertiary butyl ether (MTBE)

MTBE was first used in 1979 in some gasoline blends, but in exceedingly small concentrations. In Arizona, MTBE was primarily used between 1997 and 2004 to satisfy the 1990 Clean Air Act amendments, which required oxygenated additives to reduce pollution from vehicle exhaust systems. By 2003, California banned MTBE using ethanol as the oxygenated additive. By 2004, Arizona was receiving over 60% of its gasoline from California.

Ethanol

Ethanol, the current oxygenated additive in gasoline, can be analyzed as part of 8260B but the laboratory detection limit in groundwater may be too high to give consistent, quantitative results. Dissolved gases like oxygen, carbon dioxide and methane can be analyzed in groundwater by method RSK-175. This data provides additional information to support the presence of ethanol in the groundwater.

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Polycyclic aromatic hydrocarbons (PAHs)

Sites with releases of diesel, jet fuel, waste oil and unknown contaminant sources should analyze for polycyclic aromatic hydrocarbons (PAHs) using EPA Method 8310 or Method 8270SIM. Many of the PAHs may or may not be present at detectable levels in gasoline or diesel. As mentioned in the ADHS' Information Update #119, the following PAHs have a Soil Remediation Level, so they are to be reported.

Acenaphthalene	Dibenz[ah]anthracene	Pyrene	Benzo(k)fluoranthene
Benzo(b)fluoranthene	Indeno [1,2,3-cd] pyrene	Anthracene	
Chrysene	Benz(a)anthracene	Napthalene	
Fluorene	Fluoranthene	Benzo(a)pyrene	

Tetraethyl lead

Leaded gasoline was sold from the 1920s until the early 1990s. The first ban of leaded gasoline occurred in 1985. Leaded gasoline was sold until approximately 1995 but it made up only 0.6% of total gasoline sales. Tetraethyl lead (a species of organic lead) analysis is required for leaded gasoline and aviation fuel sites. Tetraethyl lead has had a Soil Remediation Level since 1997 and should have been included in UST investigations for releases that occurred prior to the early 1990s. The laboratory reporting limit target is the Soil Remediation Level which is 0.0061 mg/Kg. McCampbell Analytical has a reporting limit of 0.0060 mg/Kg. McCampbell uses their in-house method (MAI-Organic Lead instead of California HML-939M) and reports two species of organic lead. The Accutest forensic laboratory has a reporting limit of 0.0040 mg/Kg. Accutest reports five species of organic lead in their analyses. Inorganic lead or TCLP lead data is not acceptable to evaluate tetraethyl lead. There is no Aquifer Water Quality Standard for tetraethyl lead.

Metals

Waste oil sites, or sites with unknown sources of petroleum should also include the RCRA metals by EPA Method 6010.

Note: The petroleum product stored in USTs may have changed over the systems lifetime.

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Soil Vapor

Volatile Organic Compounds

ADHS issued information updates in July 2010 and November 2011 for compounds to be added to the TO-15 (July 1999) for ADEQ. The compounds listed need to be included on the EPA Method TO-15 target compound list. The laboratory may need to report some of the compounds as a TIC (tentatively identified compound). All TO-15 target compounds need to be reported. All TICs need to be reported which will include the leak detection tracer compound (1,1-DFA).

Acetone	4-Ethyltoluene	Trichlorotrifluoroethane (F-113)
Dichlorodifluoromethane (F-12)	Bromodichloromethane	Methyl cyclohexane
Dichlorotetrafluoroethane (F-114)	Cis-1,2-Dichloroethene	n-octane
Isopropyl alcohol (2-propanol)	Cyclohexane	Nonane
Propene (Propylene)	Dibromochloromethane	Isopropyl benzene (Cumene)
1,2-4-Trimethylbenzene	Ethyl Acetate	n-propyl benzene
1,2-Dichlorobenzene	Heptane	Tert-butyl benzene
1,3,5-Trimethylbenzene	Tetrahydrofuran	Sec-butyl benzene
1,3-Dichlorobenzene	Trans-1,2-Dichloroethene	n-butyl benzene
Trans-1,3-Dichloropropene	Trichlorofluoromethane (F-11)	Naphthalene
		Ethanol (most unreported analyte)

Field Protocols

Soil

Soil samples must be field preserved with methanol using laboratory provided aliquot devices and pre-weighed methanol VOA vials or subsampled using an Encore, Terracore or equivalent per EPA Method 5035.

Groundwater

Groundwater wells must be purged and sampled using low-flow collection techniques (compliance sampling). Compliance sampling may not be required during the monitoring phase of a project which also includes the analyte list needed for that sampling event. This decision is site specific and should be discussed with ADEQ.

Compliance sampling is required for LUST case closure. Each sample matrix set should include duplicate samples (10% of total sample number). The appropriate blank sample should be collected as appropriate for the project.

Soil Vapor

ADEQ's Soil Vapor Guidance document dated 2011 is available for reference. The document is only guidance and each project should be discussed with ADEQ to ensure appropriate data quality objectives are met.

<http://www.azdeq.gov/environ/waste/download/svsg.pdf>

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Laboratory Related Information

Chain of Custody forms

The chain of custody form should indicate 8260B plus TICs or the target analyte list should be submitted along with the chain of custody form so the laboratory reports the correct data set.

Detection limits

For all data sets, the laboratory needs to be reminded to report both the reporting level (RL) and the method detection limit (MDL). If the compound is present below the RL but above the MDL, the laboratory should report the concentration as estimated and use the (J) data qualifier.

The laboratory detection limits and the reporting limits need to be below the lowest applicable regulatory standard. If data is reported as less than the laboratory detection limit and the laboratory detection limit is higher than the applicable regulatory standard, then the concentration exceeds the applicable standard and should be reported accordingly and not as 'Non Detect'. The Tier 1 Cleanup Standards- Petroleum Products table lists Aquifer Water Quality Standards, Soil Remediation Levels and Groundwater Protection Limits. <http://www.azdeq.gov/environ/waste/ust/outreach/download/cleanup.pdf>

NOTE: The previous guidance of a "standardized required minimum laboratory detection limit" for certain VOCs and PAHs is outdated and does not comply with soil rule requirements. To ensure adequate data collection for risk evaluation purposes, laboratories should provide the lowest reporting level achievable for non-diluted and diluted samples.

Laboratory certification

The laboratory performing analyses must be certified by ADHS for the applicable method and laboratory certification must be valid on the analysis date.