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OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Recommendation for States, Tribes and EPA Regions to Investigate and Clean Up Lead Scavengers When Present at Leaking Underground Storage Tank (LUST) Sites

FROM: Carolyn Hoskinson, Director
Office of Underground Storage Tanks

TO: UST/LUST Regional Division Directors, Regions 1-10
State UST/LUST Program Managers
Tribal UST/LUST Managers and Staff

The U.S. EPA Office of Underground Storage Tanks (OUST) has become aware that certain, sometimes significant, risks at some LUST sites may not be adequately assessed or analyzed under current practice. Lead scavengers, common additives in leaded gasoline, can pose risks particularly at LUST sites affecting drinking water. Monitoring for lead scavengers at LUST sites is not currently routine in all areas of the country. Therefore, in this memorandum, OUST is encouraging the following actions for situations in which EPA, states, and tribes are either undertaking investigations and corrective action at LUST sites where leaded motor fuels are or were stored, or where they are requiring UST owners and operators to do so:

- Begin (or continue) to monitor and report the presence of lead scavengers in groundwater at appropriate LUST sites (see Table 1);
- Analyze EDB (1,2-dibromoethane or ethylene dibromide) and 1,2-DCA (1,2-dichloroethane) using EPA Methods with the appropriate detection limits (see Table 2);
- Remediate lead scavengers, aggressively when such constituents could threaten a source of drinking water; and
- Share information on the presence and remediation of these constituents.

Because the primary threat posed by lead scavengers at LUST sites is to drinking water sources, OUST recommends particular attention be paid at sites where the presence of lead scavengers could threaten sources of drinking water. If lead scavengers are present and could threaten a source of drinking water, EPA strongly advises that states, tribes, and EPA Regions take or require UST owners and operators to take aggressive

remedial action to address the contamination and prevent human consumption of contaminated drinking water.

OUST recognizes the rather limited information available regarding the efficacy of remediation technologies for EDB. As our programs begin to collect data on the presence of lead scavengers at LUST sites and on the efficacy of remediation technologies, OUST encourages the sharing of this information to more effectively address the threat posed to drinking water sources. Such information can be forwarded to Hal White of my staff at *white.hal@epa.gov*. Our data sharing efforts will increase awareness and improve public understanding of activities underway by EPA, states, and tribes to protect human health and the environment from all chemicals of concern.

Background

Although leaded automotive gasoline was largely phased out by 1986, and banned by 1996, work conducted by EPA in cooperation with ASTSWMO has revealed that significant concentrations of lead scavengers continue to persist at many old leaded gasoline spill sites. Both EDB and 1,2-DCA were present in groundwater at concentrations above their respective maximum contaminant levels (MCLs) at a significant number of sites. EDB was detected above its MCL at 42% of the sites sampled and 1,2-DCA was detected above its MCL at 15% of the sites sampled. EDB was the primary risk driver at 25% of the sites investigated. In other words, the risks from EDB were greater at 25% of sites than risks from BTEX or other chemicals of concern. Despite previous assumptions that these constituents would biodegrade, analysis of product collected from monitoring wells showed further evidence of persistence as 55% of the samples contained EDB and 40% contained 1,2-DCA.

Under federal regulations, owners and operators must investigate contaminants released into the environment from their leaking USTs. 40 CFR 280.52(b) states: *Owners and operators must measure for the presence of a release where contamination is most likely to be present at the UST site. In selecting sample types, sample locations, and measurement methods, owners and operators must consider the nature of the stored substance, the type of initial alarm or cause for suspicion, the type of backfill, the depth of groundwater, and other factors appropriate for identifying the presence and source of the release.*

Similar requirements for owners and operators are found at 40 CFR 280.62(a)(5), 280.65(a), and 280.66(b).

Based on these regulations, it is reasonable for states, tribes, and EPA to require UST owners and operators, in considering the nature of the regulated substance in the UST, to conduct the appropriate investigations of lead scavengers at LUST sites that store or have stored leaded motor fuels. Depending upon site-specific conditions, it may be appropriate to sample soil, groundwater, and non-aqueous phase liquid (NAPL) for lead scavengers. EPA recommends that states, tribes, and EPA Regions, like owners and

operators, take similar action when they undertake their own investigations at such LUST sites.

Appropriate Sites for Investigation

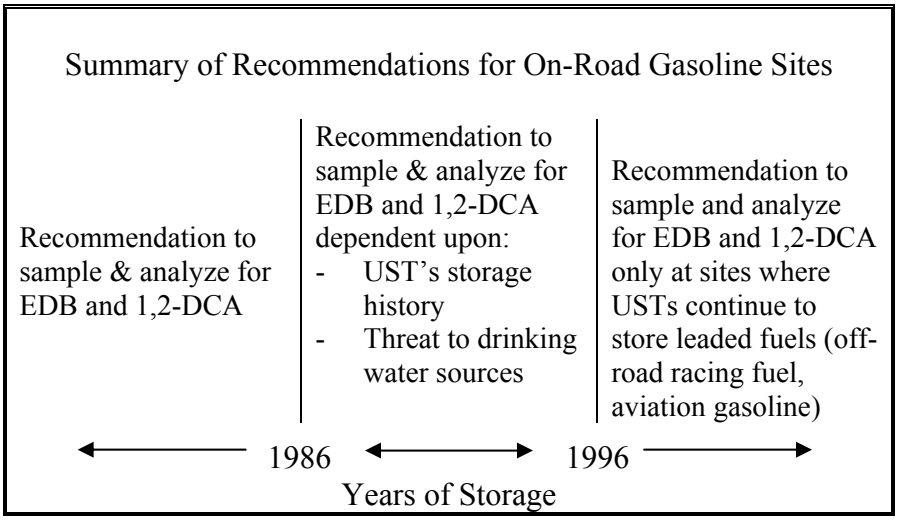
Not all LUST sites are potential candidates for lead scavenger investigation. Only those sites at which leaded motor fuels were or are currently stored are appropriate candidate sites. Both off-road racing fuel and aviation gasoline (Avgas) are leaded fuels. LUST sites where these fuels have been or are still stored should generally be investigated for EDB and 1,2 DCA.

For investigations at LUST sites having stored on-road automotive gasoline, OUST recommends the consideration of when such gasoline was stored and whether the site presents a threat to drinking water. The 1990 Clean Air Act Amendments banned the sale of on-road automotive gasoline containing more than 0.05 gm lead/gallon ("leaded gasoline") by January 1, 1996; therefore, LUST sites where on-road automotive gasoline was stored only after this date would generally not be candidates for sampling for EDB or 1,2 DCA.

The phase-out of lead was achieved over a period of more than a decade. In the early 1970s, the average lead concentration was 4 gm/gallon, and in 1973 EPA mandated a reduction program designed to bring the levels of lead down to 0.5 gm/gallon by 1980 in large refineries and by 1982 in small refineries. Because the standard had not been met by these dates, in 1982 EPA adopted an interim standard of 1.10 gm/gallon with a further reduction to 0.10 gm/gallon to be achieved by 1986. USTs storing gasoline prior to 1986 would be expected to have contained leaded gasoline and these sites should be analyzed for EDB and 1,2 DCA.

The sale of leaded gasoline dropped precipitously after 1986; therefore, some USTs after the mid/late 1980s would not necessarily have been used for the storage of leaded gasoline. Investigators may use their knowledge of a site's history to assess the likelihood of whether leaded gasoline was stored in USTs on the premises between 1986 and 1996. Because the primary threat posed by lead scavengers at LUST sites is to drinking water sources, OUST recommends particular attention be paid at sites where the presence of lead scavengers could threaten sources of drinking water.

TABLE 1



Analytical Methods

The federal MCL for EDB is 0.05 µg/L and 5.0 µg/L for 1,2-DCA .[a] The EPA method most commonly used to analyze for organic gasoline constituents in groundwater is Method 8260B, which is a gas chromatograph/mass spectrometry method. In the EPA/ASTSWMO study discussed in the Background section, the operational method detection limit (MDL) achieved for Method 8260B for both EDB and 1,2-DCA was 3.0 µg/L.[b] While this level is sufficiently low to detect 1,2-DCA at its MCL, Method 8260B is not sensitive enough to detect EDB at its MCL even in a laboratory sample. The results of the EPA/ASTSWMO investigation showed that Method 8260B would have discovered only 40% of the survey sites with concentrations of EDB above its MCL.

In contrast to Method 8260B, the MDL for EDB using Method 8011 is approximately 0.01 µg/L; therefore, it is sufficiently sensitive to measure EDB at its MCL.[c] At sites that have not been previously sampled for EDB, it is necessary to use Method 8011 to determine if EDB is present above its MCL.

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[a] The maximum contaminant level goal (MCLG) for EDB is zero. However, EPA set the MCL at 0.05 µg/L because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to remove this contaminant should it occur in drinking water.

[b] Using Method 8260B the method detection limit (MDL) for EDB is 0.06 µg/L for a wide bore column and 0.10 µg/L for a capillary column. The MDL for 1,2-DCA is 0.06 µg/L for a wide bore column and 0.02 µg/L for a capillary column. Note that these MDLs are based on laboratory-prepared samples of a single compound in distilled water. Several factors reduce sensitivity of the analytical method such that the operational MDL for environmental samples is typically higher (*i.e.*, not as sensitive) than that achievable for laboratory-prepared samples. Environmental samples (*e.g.*, groundwater, soil) typically contain many different contaminants, some of which can interfere with detection of the target compound(s) such that higher concentrations of EDB may be necessary to detect EDB above the background of natural petroleum hydrocarbons. Furthermore, high concentrations require that a sample be diluted prior to analysis.

[c] Furthermore, EPA Method 8011 is not subject to interference from non-halogenated compounds in petroleum fuels (although samples with high concentrations of contaminants may still require dilution prior to analysis)

At sites where benzene is the primary risk driver, Method 8260B may be appropriate to monitor the quality of groundwater during active remediation. For example, in the EPA/ASTSWMO study Method 8260B would have been appropriate for monitoring remedial progress at sites where the concentration of EDB was greater than 3.0 µg/L. Once the concentration of benzene is reduced to below the MCL (or applicable remediation goal) it would be necessary to switch to Method 8011 (or its equivalent[d]) for monitoring the concentration of EDB to determine whether additional remediation was required in order to reach the MCL for EDB.

TABLE 2

	MCL (ug/L)	8260B	8011*
EDB	0.05	Use limited by sample MDL	Recommended for use
1,2-DCA	5.0	Recommended for use	Not Applicable**

*Though Method 8011 protocol does not specify preservation (acidification) of groundwater samples, preservation of samples may be necessary to prevent biodegradation if the samples are not continuously refrigerated after collection or if the samples are not analyzed within the 14 day holding time. Not all laboratories routinely conduct analyses using 8011, so laboratory capability and capacity should be confirmed during the planning stages of site investigation for lead scavengers.
** Method 8011 does not determine 1,2-DCA; it is only applicable for EDB and 1,2-dibromo-3-chloropentane, DBCP.

Additional Information

Additional information about lead scavengers can be found in the following EPA publications:

- **Lead Scavengers Compendium: Overview of Properties, Occurrence, and Remedial Technologies** (EPA, 2006) accessible at *http://www.epa.gov/oust/cat/PBCOMPND.HTM*

- **Natural Attenuation of the Lead Scavengers 1,2-Dibromoethane (EDB) and 1,2-Dichloroethane (1,2-DCA) at Motor Fuel Release Sites and Implications for Risk Management** (EPA/600/R-08/107, September 2008) accessible at *http://www.epa.gov/ada/download/reports/600R08107/600r08107.pdf*

[d] EPA Method 504.2 for drinking water is an equivalent method.

If you have policy questions about work OUST is undertaking regarding lead scavengers, please contact Adam Klinger of my staff at (703) 603-7167; for more technical information, contact Hal White at (703) 630-7177.

cc: UST/LUST Regional Deputy Division Directors, Regions 1-10
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