Sampling Procedure for EDB & 1, 2-DCA in Drinking Water Supply Wells and Ground Water

Effective Date: June 1, 2010

Introduction

In response to an increasing body of information regarding the lead scavengers, ethylene dibromide (EDB) and 1,2 dichoroethane (1,2 DCA), contaminating ground water and drinking water supply wells located near gasoline discharge sites, we will start testing for these compounds in drinking water supply wells and ground water under limited circumstances. This will increase our analytical costs at such sites, but the health risk from consumption of these compounds and obtaining a better understanding of the extent of these contaminants in Maine justifies the added cost. This is an interim step until we, our counterparts in other states, and EPA learn more about lead scavengers in ground water and soil, and how to most cost effectively remediate EDB and 1,2 DCA in the environment .

Background

Compounds previously added to leaded gasoline (starting in 1926) as lead scavengers are increasingly being found in ground water by other state petroleum remediation programs across the U.S, including in Vermont and New Hampshire . These are ethylene dibromide (EDB) and 1,2 dichoroethane (1,2 DCA). Lead scavengers along with lead in on-road gasoline were phased out by 1987 in Maine. Leaded gasoline is still used as aviation gasoline and racing fuel. A 2008 study by EPA and 19 participating states found EDB and 1,2 DCA often to be mobile and quite persistent in the environment. This study frequently found these two compounds in the ground water near older UST leaded gasoline discharge sites above their respective MCLs. Of the 102 old gasoline station locations where ground water was sampled, EDB was found at 42% of these sites at concentrations above the MCL of 0.05 ppb and 15% of these sites had 1,2 DCA results above its MCL of 5 ppb. EDB was the principle risk driver at approximately 25% of these sites. The study also points out that the use of traditional laboratory methods for BTEX and VOCs often miss EDB contamination above the MCL because of their higher PQL. To date, EDB or 1,2 DCA have only been tested in ground water at several gasoline discharge sites in Maine under our auspices. Both compounds have fairly low MCLs, which raises concerns for a state like Maine so heavily dependent on ground water for drinking water supplies. Both EDB and 1,2 DCA are suspected human carcinogens. To date no good correlation has been found between EDB concentrations and BTEX, lead or MTBE concentrations which could be used in screening sites.

We need to recognize that EDB was also widely used as an agricultural pesticide in some parts of the U.S.. In some states large numbers of drinking water wells have been contaminated as a result of agricultural activities (e.g. Florida). It has also been used as a

fumigant and in some industrial processes. It appears it is only now used in the manufacture of vinyl chloride. According to staff of the Maine Department of Agriculture's Pesticide Control Board, EDB was not used in Maine as an agricultural pesticide.

Applicability

The sampling and remediation procedures outlined here apply to sites meeting the following circumstances and are effective June 1, 2010:

1. Water samples collected by staff from the Divisions of Remediation and Technical Services, or by Department consultants[1];
2. Gasoline discharges associated with UST and AST facilities AND,
3. On-going and future investigation and remediation sites where leaded gasoline is likely to have been discharged. These include UST and AST facilities storing on-road gasoline before 1987, and facilities previously or currently storing leaded aviation gasoline or gasoline for racing vehicles. If there is doubt or a lack of reliable information on a facility's history, we will operate on a rebuttable assumption that all UST and AST gasoline storage facilities in Maine operating and storing on-road gasoline before 1987 had at least one discharge reaching ground water and these procedures should be followed.[2]

Sampling of Drinking Water Supply Wells

Public and private drinking water supply wells deemed at risk from gasoline contamination are to be sampled for EDB and 1,2 DCA as well as the other constituents for which we test. To ensure EDB is detected when present, two separate samples and laboratory analyses are required – one for EBD and a second for 1,2 DCA. EPA Method 504.1 has a PQL of approximately 0.01 ppb, allowing a comparison of the results against the EPA MCL for EDB. However, this method is not suitable for 1,2 DCA. Method 524.2 is more appropriate for 1,2 DCA, but is unable to detect EDB at the drinking water standard.

When initially sampling a well suspected to be at risk of leaded gasoline contamination, during the first two sampling events, collect samples for the following different laboratory analyses:

1. VPH and EPH;
2. GRO and DRO

[1] Responders may also sample for EDB and 1,2 DCA when practical, however, are not required to do so. If doing so, Responders should follow this procedure.

[2] The State Fire Marshal's Office did not isuue permits for gasoline storage in ASTs at retail facilities prior to 1987. Contamination from leaded on-road gasoline at a AST retail facility is consequently unlikely. Leaded gasoline was, however, stored at AST bulk plants.

3. Lead using EPA Method 200.7, 200.8, 200.9, 6020 or 7010[3];
4. EDB using EPA Method 504.1 (the drinking water equivalent of Method 8011); and,
5. 1,2 DCA using EPA Method 524.2 .

Subsequent water testing parameters should be dictated by these initial results.

Evaluation of EDB and 1,2 DCA Laboratory Results in Drinking Water Supply Wells

Federal MCLs and Maine CDC MEGs differ for EDB and 1,2 DCA as shown below.

	MCL (ppb /µg/l)	MEG (ppb/µg/l)
EDB	0.05	0.2
1,2 DCA	5	4

Use the lower of the MCL and MEG to evaluate whether a drinking water supply well is unacceptably contaminated and remedial action is needed. **For EDB use 0.05 ppb as the guideline and use 4 ppb for 1,2 DCA to make remedial decisions.** Unless the suspected source is a recent discharge of leaded aviation gasoline or racing fuel, most sources will be old leaded gasoline discharges and ground water concentrations should be fairly stable, making an action level to protect against quickly increasing concentrations between quarterly sampling events unnecessary. If an action level is needed because of fluctuating concentrations, use 75% of the .05ppb for EDB and 4ppb for 1,2 DCA, or 0.04 ppb DCA and 3 ppb 1,2 DCA.

Interim Treatment of EDB or 1,2 DCA Contaminated Drinking Water

Private drinking water supply wells exceeding the guidelines above should be provided with our standard GAC interim treatment system consisting of two 2-cu. ft. GAC canisters installed in series with sampling ports before, in-between and after treatment. GAC is considered best available treatment by EPA for contaminated public water systems and has been used successfully in states like Kansas. This configuration combined with quarterly monitoring for EDB and 1,2 DCA in addition to VHP should provide adequate protection against undue human exposure by water consumption. Consistent with our current operating procedures, GAC should be replaced as breakthrough of the first canister and in-between sampling results dictate.

[3] Do not collect water sample from household tap to test for lead if sampling an old home with lead piping. Homes with copper pipes constructed before 1987 federal ban probably have lead solder. Newer homes still have lead sources in their plumbing, including brass fixtures. Ensure water is run for 20 minutes prior to collecting sample to ensure sampling well water and not lead in plumbing. Only collect samples from cold water. Collection of water sample from well where feasible best way to eliminate background contamination from home's plumbing system.

Whenever feasible, DEP project staff should collect quarterly samples rather than the home owner to ensure good data and to ensure data is entered into EGAD. If a large number of EDB/1,2 DCA contaminated wells are discovered over time, we will need to re-evaluate this procedure.

If a public drinking water supply well is found contaminated, as with all other contaminated public drinking water supplies, inform the Maine Drinking Water Program and coordinate installation of a mutually acceptable treatment system for that particular public well.

Long-term Remediation of Contaminated Drinking Water Supplies

For contaminated private wells, long-term remediation options are the same as wells contaminated with other gasoline constituents:

1. POET treatment and monitoring until the effect of source remediation is realized;
2. Replace well;
3. Connect to public drinking water system; and,
4. As a last option, permanent POET treatment combined with a third party damage claim for assistance with the O&M costs.

Long-term remediation of a public well contaminated above drinking water standards will be decided in coordination with the Drinking Water Program.

Ground Water Sampling at the Contamination Source

Our objectives in sampling for EDB and 1,2 DCA near the contamination source is to determine the extent of these contaminants in Maine ground water, and to look at their association with other gasoline contaminants.

When sampling ground water in accordance with the Department's December 1, 2010 Remediation Guidelines for Petroleum Contamination Sites in Maine on or near the site of a possible leaded gasoline discharge for other gasoline constituents, also collect samples for analysis of EDB and 1,2 DCA from 1-3 locations most likely to be contaminated by gasoline. This may be one-time samples from geoprobes or part of a routine monitoring regime of monitoring wells (when already present). If sampling existing ground water monitoring wells, collect samples from wells that historically have been most heavily contaminated by other gasoline constituents. A minimum of two (2) sampling rounds for EDB and 1,2 DCA is recommended for sites with monitoring wells. Continued sampling for EDB and 1,2 DCA should be dictated by initial results and the remediation objectives of a particular site.

Ground water samples are to be collected and tested for the following laboratory methods:

VPH
Lead using EPA Methods 200.7, 200.8, 200.9, 6020, or 7010
EDB using EPA Method 8011
1,2 DCA using EPA Method 8260B

Data Management

All EDB and 1,2 DCA water sampling results, along with associated VPH/EPH, GRO/DRO and lead lab results are to be included in EGAD to allow for compilation and analysis to determine future sampling and remedial procedures. Contact Diana McKenzie (287-5767) to arrange for the entry of your results into EGAD. Non-detect EDB and 1,2 DCA results should be entered as well as positive results.

Sources of Information

1. Falta, Ronald; The Potential for Ground Water Contamination by the Gasoline Lead Scavengers Ethylene Dibromide and 1,2 Dichloroethane,; Ground Water Monitoring & Remediation, Vol. 24, no. 3, 2004; p. 76.
2. U.S. EPA, Office of Research and Development, National Risk Management Research Laboratory; 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; Sept. 2008. (http://www.epa.gov/oust/cat/LEADSCAV.HTM)
3. U.S. EPA, Office of Underground Storage Tanks; Lead Scavengers Compedium: Overview of Properties, Occurrence and Remedial Technologies, May 2006; (http://www.epa.gov/oust/cat/PBCOMPND.HTM)