

7.0 PRESENCE AT LUST SITES

PRINCIPAL FINDINGS

- Few states require sampling for EDB at sites where EDB may be present, such as LUST sites or sites contaminated with petroleum products
- At seven sites in Kansas, EDB concentrations ranged from not detected to 8,200 µg/L. Five sites reported EDB concentrations above the MCL
- At 31 sites in South Carolina, EDB concentrations ranging from 0.013 to 1,140 µg/L, and each site reported EDB concentrations above the MCL
- Of approximately 7,100 sites in South Carolina that reported petroleum releases from 1974 to 2003, more than 1,200 of these sites reported EDB detections, and nearly 300 had EDB concentrations higher than the MCL .
- At eight LUST sites in Santa Barbara County, California, EDB concentrations ranged from 0.084 to 65 µg/L. Five of the eight sites reported EDB concentrations above the MCL
- No relationship was apparent between the presence of EDB and either EDC, benzene, toluene, ethylbenzene, xylene, methyl tert-butyl ether, or lead.

Available information suggests that only limited data exist relating to the presence of EDB and EDC in groundwater at LUST sites. Three states that indicated that they had readily accessible EDB and EDC data were contacted. These states are Kansas, South Carolina, and Santa Barbara County in California. The data gathered and provided in this section are relevant only to their respective states and cannot be extrapolated to other states.

7.1 MONITORING OF EDB AND EDC BY STATE ENVIRONMENTAL AGENCIES

The Association for Environmental Health and Sciences (AEHS) conducts a bi-annual survey of states' cleanup standards for hydrocarbon-contaminated soil and groundwater and posts the results on their web site (<http://aehs.com/surveys.htm>). Table 7-1 summarizes this data collected in 2003. Only eight states specified an analytical method or detection limit for EDB, and seven states specified an analytical method or detection limit for EDC. Based on the detection limits presented in Table 7-1, four of them reported detection limits equal to or less than the federal MCL for EDB, and three reported detection limits equal to or less than the federal MCL for EDC.

Table 7-1: Summary of AEHS Survey Data for States' Action/Cleanup Levels for EDB and EDC

| State | Type of Product | EDB | | | EDC | | |
|-------|-----------------------------------------------|-------------------|------------------------|-----------------------------|---------------------------------|------------------------|-------------------------------|
| | | EPA Method Number | Method Detection Limit | Action/Cleanup Level | EPA Method Number | Method Detection Limit | Action/Cleanup Level |
| AZ | Petroleum-derived products | 601, 504 | 0.05 µg/L | Not reported | 601, 624, 8260B | <5 µg/L | Not reported |
| DE | Gasoline/aviation gasoline, jet fuel/kerosene | Not reported | Not reported | 0.05 µg/L (screening level) | Not reported | Not reported | 0.0094 mg/L (screening level) |
| FL | Not reported | 601, 504, 8011 | Not reported | 0.02 µg/L | 601, 624, 8021, 8260 | Not reported | 3 µg/L |
| KS | Gasoline | 504, 504.1 | 0.01 µg/L | 0.05 µg/L | 8020, 8021, 8240, 8260 | 0.5 µg/L | 5 µg/L |
| NM | Leaded gasoline and aviation gas | 8021, 8260, 504.1 | 0.01 µg/L | 0.1 mg/L | 8021, 8260 | 1.0 µg/L | 10 mg/L |
| OR | Gasoline | SW-846 | Not reported | Site specific | SW-846 | Not reported | Site specific |
| PA | Leaded gasoline, aviation gasoline, jet fuel | 8011, 504.1 | Not reported | 0.05 µg/L | 5030B/8021B, 5030B/8260B, 524.2 | Not reported | 5 µg/L |
| SC | Gasoline, diesel, kerosene | 8011 | 0.02 µg/L | 0.05 µg/L | Not reported | Not reported | Not reported |

Source: Ref. 7-6

7.2 SELECTED STATE DATA

State staff from three states (Kansas, South Carolina, and California-Santa Barbara County) provided information for some sites where groundwater samples had been analyzed for the presence of lead scavengers. Also, EPA Region 8 had previously compiled data for federal-lead corrective action sites on tribal land. The information collected for Kansas, South Carolina, Santa Barbara County in California, and EPA Region 8 is summarized in the following sections.

7.2.1 Kansas Department of Health and Environment (KDHE)

Maximum concentrations for various contaminants, including EDB and EDC, were available for LUST sites in Kansas. Of the 170 LUST sites being remediated and for which data were available, only 7 sites reported EDB and EDC data (however, in some cases the analytical results were reported as nondetect [ND]). Additional LUST sites in Kansas monitor for EDB and EDC; however, data was available only for these seven sites. EDB is analyzed using EPA Method 504.1 with a method detection limit of 0.01 µg/L. EPA Methods 8021 and 8260 are used for analysis for EDC, with most sites using Method 8260 with a detection limit of 1 µg/L (although the detection limit has varied based on the concentration in each sample). Maximum concentration ranges of EDB, EDC, and BTEX at these seven sites are summarized in Table 7-2. The data provided for the sites include the maximum concentration of each contaminant for a particular site and monitoring event from 1996 through 2004. Five of the seven sites reported EDB concentrations above the MCL (0.05 µg/L). Additional data from these sites are presented in Appendix A-1. Free product was observed at four sites. Of these seven sites, six are using SVE and air sparging to treat the contamination present, and one is using SVE with product recovery.

Table 7-2: Concentrations of EDB, EDC, and BTEX at Seven Sites in Kansas (1996 to 2004)

| | EDB | EDC | BTEX |
|-----------------------------|--------------|------------|----------------|
| Concentration ranges (µg/L) | 0.05 – 8,200 | 11 – 1,310 | 1,736 -175,050 |

Source: Ref. 7-3

7.2.2 South Carolina Department of Health and Environmental Control (SCDHEC)

SCDHEC provided EDB and BTEX data from 1993 to 2004 for 31 LUST sites being monitored for natural attenuation. These 31 sites had readily accessible data and do not represent all LUST sites in South Carolina. EDB concentrations for the 31 sites ranged from 0.013 to 1,140 µg/L, and each of the 31 sites reported EDB concentrations above the MCL (0.05 µg/L). Additional monitoring data and UST release information for these sites are available in Appendix A-2. Data for the five sites with the highest EDB concentrations are presented in Table 7-3; data are provided only for sites with the highest EDB concentrations (at least one EDB concentration greater than 330 µg/L).

Table 7-3: Summary of Analytical Data for South Carolina LUST Sites with Highest EDB Concentrations

| UST Permit No. | No. of Wells | No. of Wells with EDB Concentrations | Contaminant Concentration (µg/L) | | | | |
|----------------|--------------|--------------------------------------|----------------------------------|--------------|--------------|--------------|--------------|
| | | | EDB | Benzene | Toluene | Ethylbenzene | Xylenes |
| 08484 | 10 | 4 | 0.45-1,140 | 23,000 (max) | 36,000 (max) | 14,400 (max) | 99,000 (max) |
| 18523 | 8 | 1 | 450-890 | 10,000 (max) | 44,000 (max) | 5,900 (max) | 33,000 (max) |
| 17641 | 14 | 6 | 0.3-731 | 9,250 (max) | 9,900 (max) | 3,800 (max) | 32,000 (max) |
| 15656 | 19 | 4 | 0.077-330 | 5-2,030 | 36-3,100 | 64-2,500 | 101-15,000 |
| 11369 | 13 | 2 | 0.58-463 | 11-9200 | 47-32,000 | 61-3,400 | 320-20,300 |

Source: Ref. 7-4

Only 3 of the 31 sites reported EDC data, and one of those sites did not report any EDC detections. The two sites with EDC detections had concentrations ranging from 49 to 840 µg/L. EDB concentrations at these two sites ranged from 0.27 to 41 µg/L.

7.2.3 South Carolina Data Provided by Dr. Falta of Clemson University

Additional data for South Carolina were obtained from Dr. Ron Falta of Clemson University. Ms. Nimeesha Bulsara, a graduate student under the guidance of Dr. Falta, gathered data about EDB in South Carolina. Approximately 19,000 UST sites are located in South Carolina, and nearly 7,100 of them reported petroleum releases from 1974 to 2003. Data from these 7,100 sites are summarized in Table 7-4. The data reported for these sites include maximum values for each contaminant during the most recent monitoring event.

Table 7-4: Summary of South Carolina UST Site Data (1974 to 2003)

| | |
|-------------------------------------------------------------|--------------|
| EDB concentrations | 1,230 |
| Non-zero EDB concentrations | 366 |
| EDB concentrations equal to or greater than MCL (0.05 µg/L) | 282 |
| Range of EDB concentrations (µg/L) | 0.01 – 6,550 |

Source: Ref. 7-2

7.2.4 Santa Barbara County (California) Data Available from California Environmental Protection Agency, State Water Resources Control Board

Groundwater monitoring data are available through California's "Geotracker" website at <https://geotracker.swrcb.ca.gov/>, where specific contaminant data for each county can be downloaded. Eight LUST sites in Santa Barbara County were identified that have numerical

values for EDB concentrations (as opposed to ND) from 2001 to 2004. Five of the eight sites reported EDB concentrations above the MCL (0.05 µg/L). The other three sites did not clearly indicate if EDB concentrations exceeded the MCL. Seventeen additional sites reported EDB as ND. Additional information, such as site geology, release history, and remediation information, was not available for any sites with EDB data. Additional EDB data for these sites are provided in Appendix A-3. A summary of the data is presented below.

- The highest and lowest concentrations reported for EDB were 65 and 0.084 µg/L, respectively. However, concentrations reported for EDB ranged from ND to <100 µg/L.
- The highest and lowest concentrations reported for EDC were 101 and 0.4 µg/L, respectively. However, some results were reported as ND.
- Two sites that have EDB concentrations (3.3 and 65 µg/L) did not detect EDC in the same wells where the EDB was found.
- The site with the highest EDC concentration (101 µg/L) reported EDB values of 1.04 µg/L and ND for the well where the EDC was found.

7.2.5 EPA Region 8 – Federal-lead Corrective Action Sites on Tribal Land

Eight sites in EPA Region 8 have data for EDB and EDC from 2004. These sites are all federal-lead corrective action sites on tribal land. USTs at these sites were installed as long ago as 1926 and have been closed as recently as 1999. Two of the eight sites (both in South Dakota) reported EDB concentrations at or above the MCL ranging from 0.05 to 0.09 µg/L. The other six sites reported EDB concentrations less than the MCL (0.05 µg/L). Five sites had EDC concentrations ranging between 1.0 and 13.1 µg/L, with four of these sites having concentrations above the MCL (5 µg/L). Additional data for these sites are provided in Appendix A-4.

7.3 DATA ANALYSIS

The data collected for South Carolina and Santa Barbara County in California were evaluated, and an attempt was made to find potential correlations between EDB and other contaminant concentrations. Based on the limited information available, no relationship between EDB, EDC, benzene, MTBE, and lead concentrations could be identified at the South Carolina and Santa Barbara County sites. Table 7-5 summarizes the evaluation performed.

Table 7-5: Summary of Data Available

| State (and Source of Data) | Contaminants | Sample Data |
|-----------------------------------------------------------------|--------------------------|------------------|
| South Carolina (Department of Health and Environmental Control) | EDB, EDC, MTBE | see Appendix A-5 |
| South Carolina (Clemson University) | EDB, benzene, MTBE, lead | see Appendix A-6 |
| California (Santa Barbara County) | EDB, EDC, MTBE | see Appendix A-5 |

7.4 REFERENCES

- 7-1 State Water Resources Control Board. 2004. Analytical Data for Sites in California. Accessed on August 26, 2004. On-Line Address: <https://geotracker.swrcb.ca.gov/> (also see Appendix A-3)
- 7-2 Clemson University. 2004. Data for Underground Storage Tank Sites in South Carolina. (also see Appendix A-6)
- 7-3 Kansas Department of Health and Environment (KDHE). 2004. Analytical Data for Sites in Kansas. (also see Appendix A-1)
- 7-4 South Carolina Department of Health and Environmental Control (SCDHEC). 2004. Analytical Data for Sites in South Carolina. (also see Appendices A-2 and A-5)
- 7-5 EPA, 2004. Analytical Data for Region 8 Federal-Lead Corrective Action Leaking Underground Storage Tank Sites. (also see Appendix A-4)
- 7-6 Association for Environmental Health and Sciences (AEHS). 2003. State Summary of Cleanup Standards. Accessed on July 6, 2005. <http://aehs.com/surveys.htm>
- 7-7 Delaware Department of Natural Resources and Environmental Control (DNREC). 2005.

LIST OF APPENDICES

| Appendix No. | Title | Figure No. | Data Source | Number of Data Points | Type of Monitoring Data |
|---------------------|----------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| A-1 | Kansas EDB and EDC Data (1996-2004) | None | Kansas Department of Health and Environment (Ref. 7-3) | 29 | Each data point represents the maximum contaminant concentration for each site during a particular monitoring event. |
| A-2 | South Carolina EDB and EDC Data (1993-2004) | None | South Carolina Department of Health and Environmental Control (Ref. 7-4) | 1,630 | Each data point represents an individual groundwater monitoring sample collected from a particular well on a specific date. |
| A-3 | Santa Barbara County, California, EDB and EDC Data (2001-2004) | None | California's Geotracker website (Ref. 7-1) | 17 | Each data point represents an individual groundwater monitoring sample collected from a particular well on a specific date. |
| A-4 | EPA Region 8 Federal-Lead Corrective Action Site EDB and EDC Data (2004) | None | EPA Region 8 (Ref. 7-5) | 21 | Not specified |
| A-5 | Groundwater Monitoring Results for South Carolina and Santa Barbara County, California | 1 to 7 | South Carolina Department of Health and Environmental Control (Ref. 7-4) and California's Geotracker website (Ref. 7-1) | 163 | Each data point represents an individual groundwater monitoring sample collected from a particular well on a specific date. |
| A-6 | Groundwater Monitoring Results for South Carolina | 1 to 12 | Clemson University (Ref. 7-2) | 750 | Each data point represents the maximum concentration for each contaminant during the most recent monitoring event (fall 2003 or spring 2004). |