Public Health Assessment

Lisle Residential Wells

Lisle, DuPage County, Illinois

EPA Facility ID: ILN000508135

Prepared by

Illinois Department of Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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Purpose

The Illinois Department of Public Health (IDPH), at the request of the Illinois Environmental Protection Agency (Illinois EPA), evaluated data collected during an investigation of residential wells south of the Lockformer Company property in Lisle, DuPage County, Illinois, to determine whether current conditions pose a public health hazard.

Background and Statement of Issues

The Lockformer Company property is located at 711 Ogden Avenue in Lisle, Illinois. The property is approximately 1,500 feet west of Interstate 355 and is approximately 12 acres in size. Residences are north of the property, across Ogden Avenue; southeast of Lockformer, along Chicago and Elm Avenues; approximately 2,500 feet south of the Lockformer property, across the Metra rail line and St. Joseph Creek; and approximately 1,500 feet west of Lockformer, south of Ogden Avenue (Attachment 1).

The Lockformer Company is a metal-fabricating facility. Releases of trichloroethylene (TCE) had allegedly occurred on the Lockformer property beginning in 1968 and continuing for an undetermined period. The company used TCE in the past as a degreaser to clean metal parts. Contamination at the Lockformer site is presently under investigation by the U.S. Environmental Protection Agency (USEPA) and Illinois EPA. In 1992, Lockformer conducted soil sampling on their property and found TCE in the soil at levels as high as 680 parts per million (ppm).

During the summer of 2000, a group of residents hired legal counsel, and on October 11, 2000, these residents had their private well water tested by a private environmental consultant. The group owned homes south of the Lockformer property in the suspected path of groundwater flow. The consultant collected a second round of well water samples on November 10, 2000, and TCE was detected in some of the wells sampled. Beginning in December 2000, Illinois EPA collected about 350 more private well water samples north and south of the Lockformer property *(1)*.

TCE was not detected in water samples collected from private wells north of Ogden Avenue, which is upgradient of the site. Including private and Illinois EPA sampling, approximately 175 private wells south of the Lockformer property contain TCE. Low levels of tetrachloroethylene (PCE), 1,1,1-trichloroethane (TCA), and methyl tert-butyl ether (MTBE) also have been detected at elevated levels in a few of the private wells south of the Lockformer property. The highest level of TCE was 19.5 micrograms per liter (Fg/L) of water. The USEPA drinking water standard or maximum contaminant level (MCL) for TCE in public water supplies is 5 Fg/L. Traces of TCE have been detected as far away as Southcrest Drive, approximately 2.5 miles south-southeast of the Lockformer property (Attachment 2) *(1)*. IDPH mailed letters to residents containing a health interpretation of the laboratory results and explaining ways to reduce exposure to chemicals in their well water.

IDPH staff first visited the area on October 28, 2000, and most recently on October 17, 2001. The Lockformer parking lot was easily accessible from Ogden Avenue. From the parking lot, monitoring wells were observed on the southern portion of the property. The land south of Lockformer slopes downward to the Metra rail line and St. Joseph Creek (Attachment 1). The wells closest to Lockformer on the south are along Elm Avenue, north of St. Joseph Creek; however, TCE has not been detected in these wells. South of the creek, contamination has been found in wells along Front Street, Riedy Road, Hitchcock Avenue, and Gamble Avenue. Residents along these streets now have access to public water.

The Illinois Attorney General filed suit against the Lockformer Company on January 19, 2001, for alleged infractions of environmental law. A subsequent preliminary injunction called for Lockformer to provide bottled water to residents of affected homes, to conduct an environmental investigation (EI) with Illinois EPA oversight, and to devise a remedial action plan to resolve problems identified in the EI. The Lockformer Company has been providing bottled water to affected homes since that time *(1)*.

Staff from IDPH, Illinois EPA, and the Illinois Attorney General's Office attended the Village of Lisle Trustees' meeting on February 5, 2001. The Attorney General assured the mayor, trustees, and citizens in attendance that the state would work with the Lockformer Company, the village, and area residents to resolve the issue of contamination of private well water.

On October 31, 2001, USEPA issued a Unilateral Administrative Order to Lockformer, requiring the company to submit a Removal Action Work Plan (RAWP) for the site for USEPA approval. A RAWP provides for the immediate removal of the source material (i.e., TCE) or hot spots, with the goal of mitigating the continuing release of TCE into the groundwater from contaminated soils at the Lockformer facility.

In February 2002, USEPA announced that clean-up activities at Lockformer would begin in the spring of 2002. The removal of TCE from soil would involve using several techniques including electrical resistive heating. This method heats the soil with electricity and creates steam. TCE and other contaminants volatilize and the vapors are carried to the surface as the steam rises. The vapors are collected and passed through activated carbon filters which remove TCE and other similar contaminants *(2)*. This process may require at least 2 years to completely cleanup TCE at this site. USEPA has successfully used this technology at other sites in Illinois.

In May 2002, the owners of Lockformer agreed to pay the cost of connecting residents of the blocks immediately south of the facility to the Lisle public water supply, after water from several private wells was found to contain TCE at levels that exceed the USEPA drinking water standard. This settlement, made in response to the Attorney General's lawsuit of January 2001, will provide a long-term solution and reduce exposure to TCE.

In May 2002, the owners of Lockformer responded to a private civil lawsuit by agreeing to pay $10 million to a group of 186 homeowners residing in the blocks immediately south of the facility (Attachment 1). Another civil lawsuit, filed on behalf of approximately 1,500 residents living further south in unincorporated areas of Lisle, Woodridge, and Downers Grove, Illinois, is currently pending.

Discussion

Chemicals of Interest

IDPH compared the results of each groundwater sample collected with the appropriate comparison values to select chemicals for further evaluation of exposure and possible carcinogenic and noncarcinogenic health effects. Chemicals found at levels greater than comparison values, or those for which no comparison values exist, were selected for further evaluation. Attachment 3 contains a brief discussion of the two types of comparison values for drinking water used in this health assessment, i.e., Maximum Contaminant Levels (MCLs) and Lifetime Health Advisories (LTHAs). IDPH assumed that the laboratory samples were collected and handled properly and that appropriate analytical techniques were used. TCE is the only chemical that exceeded comparison values and therefore is the one chemical of interest.

Exposure Evaluation

Residents who use private well water containing TCE are exposed by drinking the water, inhaling TCE during household water use (such as showering or bathing), and by skin contact with the water. The potential for exposed persons to experience adverse health effects depends upon the following:

< the specific chemical(s) to which a person is exposed,
< how much of each chemical a person contacts,
< the duration of a person's exposure, and
< the condition of the exposed person's health.

IDPH used exposure scenarios that assumed adults drink 2 liters of water per day and children drink 1 liter of water per day. IDPH also assumed that residents would be exposed to TCE during bathing and showering.

Trichloroethylene

The highest level of TCE detected in a private well near the Lockformer property was 19.5 Fg/L. The maximum contaminant level (MCL) for TCE is 5 Fg/L. MCLs have been established by USEPA for public water supplies to reduce the chances of adverse health effects from drinking

contaminated drinking water. These standards are well below levels at which health effects have been observed. MCLs are enforceable limits that public water supplies must meet.

IDPH estimated the dose of TCE for children and adults through ingestion of groundwater containing 19.5 Fg/L of TCE and found that exposure to that level of TCE would pose a very low increased risk of cancer.

The estimated exposure to children and adults is less than the no-observed-adverse-effect levels (NOAELs) for TCE in animals. NOAELs, established by USEPA, reflect doses used in animal studies that did not result in observable non-cancer health effects.

The updated Toxicological Profile for TCE *(3)* included studies of humans exposed to low levels of TCE in drinking water that suggested adverse health effects may include skin rashes, liver problems, urinary disorders, anemia and other blood disorders, and diabetes. While none of these symptoms were reported by persons exposed to the highest level (19.5 Fg/L) of TCE found in the private drinking water wells, the concentrations that cause these effects are not well established.

Recent studies in Massachusetts and New Jersey suggest elevations in childhood leukemia, neural tube defects, oral cleft defects, respiratory defects, eye defects, and small for gestational age effects associated with TCE in drinking water. The Massachusetts studies have several limitations including the presence of other contaminants and small sample size *(3)*. Studies in Tucson, Arizona suggest an elevation in heart defects and low birth weights associated with TCE in drinking water. A study at Camp LeJeune, North Carolina suggested an elevation in males small for gestational age associated with TCE in drinking water. The levels of TCE in drinking water in these studies were several times greater than the levels detected in Lisle *(4,5,6)*.

In the mid-1990s, USEPA withdrew the reference dose and cancer potency factor for TCE for review. To evaluate the potential health hazards of exposure to TCE in Lisle, IDPH used information from human and animal studies, the former cancer potency factor, and the current MCL (5 Fg/L) for TCE. In August 2001, USEPA released a draft toxicological reassessment of TCE for public comment. The data proposed in this reassessment have not yet become USEPA policy. However, if adopted, the proposed cancer potency factor would be greater than before *(7)*. Using the proposed cancer potency factor, IDPH estimated that persons exposed to TCE at levels greater than the current MCL could experience a low increased risk for liver and kidney cancer (Attachment 4). If USEPA adopts the proposed cancer potency factor, it also may re-evaluate the MCL for TCE.

At the time this health assessment was completed, laboratory tests to determine the levels of TCE present on the site had not been completed. Thus, it cannot be evaluated at this time whether the TCE concentrations migrating toward private wells could increase with time; however, IDPH will continue to review data as it becomes available.

Community Health Concerns and Activism

Area residents have expressed concern that Lockformer Company officials knew about the spilled TCE since, at least, 1992 and did not notify persons with private wells until 2000. Residents with private wells are concerned that they might have been drinking contaminated water for more than a decade. Some residents have filed suit in federal court against the Lockformer Company, citing health concerns and diminished property values in the complaint.

Citizens present at the February 5, 2001, village trustees meeting expressed concerns about the high cost of connecting to the public water system. Depending on the home, the cost could be up to $20,000. As a result of the legal settlements in May 2002, residents in the blocks immediately south of Lockformer will be connected to Lisle public water at no cost to the homeowners. Many of these same residents will receive a portion of the $10 million civil suit settlement.

On October 16 and 17, 2001, IDPH participated in public availability sessions in Lisle and Woodridge to answer health-related questions about Lisle groundwater contamination. IDPH staff answered questions about the health effects of exposure to low levels of TCE and shared ways to reduce exposure. About 150 persons attended the two availability sessions.

Health Outcome Data

The IDPH Division of Epidemiologic Studies reviewed the incidence of all cancer types reported for the Lisle, Illinois zip code 60532 for the years 1989 to 1997 *(8)*. They found that the rate of kidney cancer reported in males (20 cases observed) was greater than the expected number of cases (10 cases expected) at a statistically significant level. The rate of kidney cancer was not elevated in females. No other biologically plausible types of cancer related to TCE exposure were statistically significant.

IDPH plotted the cancer cases on a map. The cases did not appear to cluster in any particular neighborhood, but rather were distributed among population within the entire zip code. Based on the analysis done by state epidemiologists and the Division of Environmental Health, no apparent clustering was noted near the contaminated wells. If the nature and extent of TCE contamination is found to extend beyond this zip code, then an additional evaluation will be considered.

Child Health Initiative

IDPH recognizes that children are especially sensitive to some contaminants. Children get a larger dose from drinking contaminated water because they drink more water per kilogram of body weight than do adults. IDPH includes children when evaluating exposures to contaminants and considers children the most sensitive population evaluated in this public health assessment.

The doses that children experienced by drinking contaminated well water were not at levels known to cause noncarcinogic health effects. Carcinogenic effects are unlikely to occur. The findings of studies done in Massachusetts and New Jersey suggested that childhood leukemia and adverse birth outcomes were associated with exposure to TCE during gestation *(4,5,6)*. The TCE concentrations found in drinking water in these studies were several times greater than what was found at Lisle.

Conclusions

As a result of the Attorney General's initial lawsuit, bottled water is being provided to reduce the exposure of residents to TCE in the groundwater, and Lockformer has agreed to connect homes in the area found to have the highest levels of contamination to the public water supply. This will provide a long-term solution and reduce exposure to TCE. The MCL of 5 Fg/L for TCE in drinking water is protective of public health; therefore, prudent public health practice supports the decision to provide alternative water to affected residences. Exposure has been reduced through the use of bottled water and will be reduced further by providing connections to public water; therefore, this site poses no apparent public health hazard.

A review of cancer incidence data indicated that kidney cancer has occurred more often than would be expected among males residing within the zip code area. The cases of kidney cancer are distributed throughout the zip code area and are not clustered near the Lockformer Company site.

Data are not yet available to help evaluate whether levels of TCE in private wells is increasing over time. Should TCE concentrations increase, then long-term use of contaminated groundwater could result in a slightly increased cancer risk. No studies were found that definitively associated an adverse health effect in animals or humans exposed to the levels of TCE found in the drinking water, but the human studies found were limited. For these reasons, and because other health effects from long-term use of low-level TCE-contaminated drinking water are not well studied, IDPH offers the following recommendation and public health action plan.

Recommendations and Public Health Action Plan

IDPH recommends the following:

- USEPA and Illinois EPA should seek a remedy to prevent future exposure to contaminated groundwater from the site. Either municipal water or a water treatment unit that meets the National Sanitation Foundation Standard Number 53 for the removal of VOCs are alternatives for persons with contaminated wells. As a result of the Attorney General's lawsuit, the Lockformer Company has agreed to connect homes to public water in the area found to have the highest levels of contamination. USEPA and Illinois EPA should

continue field activities, including data gathering and evaluation of alternative technologies for the immediate removal plan.

- Illinois EPA should sample other private wells in the area to find the extent of contamination and to ensure that exposures do not present a health hazard. Illinois EPA has completed this recommendation. Sampling by Illinois EPA has determined that the southern boundary of the detectable TCE contamination in private wells is near Southcrest Drive. As Illinois EPA sampled eastward into Downers Grove, it found another area of contamination that it considers to be unrelated to Lisle. Illinois EPA is sampling the Downer's Grove area under a separate investigation, and IDPH is conducting a separate public health assessment for Downer's Grove.

- Area citizens should be provided with information about ways to reduce or prevent exposure to contaminated groundwater. IDPH has met this recommendation through information sent in letters to area private well owners and provided to participants at the October 2001 public availability sessions.

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References

1. Illinois Environmental Protection Agency. Files concerning contamination at the Lockformer Company site in Lisle, Illinois. June 1999 - May 2002.

2. U.S. Environmental Protection Agency. Fact Sheet: Cleanup to Begin at Lockformer. Chicago: USEPA Region 5. February 2002.

3. Agency for Toxic Substances and Disease Registry. ATSDR Update Toxicological Profile for Trichloroethylene. Atlanta: U.S. Department of Health and Human Services; 1997 September.

4. Costas K.S. A case-control study of childhood leukemia in Woburn, MA: the relationship between leukemia incidence and exposure to public drinking water. The Science of the Total Environment (in press, 2002).

5. Cohn P. Klotz J., Bove F., et al. Drinking water contamination and the incidence of leukemia and non-Hodgkin's lymphoma. Environmental Health Perspectives. 1994, 102:556-561.

6. Bove F. Shim Y. Zeitz P. Drinking water contamination and adverse pregnancy outcomes: a review. Environmental Health Perspectives. 110 (supplement 1):61-74. 2002.

7. U.S. Environmental Protection Agency. Trichloroethylene Health Risk Assessment: Synthesis and Characterization. External Review Draft. Washington D.C. 2001 August.

8. Division of Epidemiologic Studies. Incidence of Cancer in ZIP Code 60532 of Lisle, Illinois, 1989-1997. Chicago: Illinois Department of Public Health; 2000 Nov. 22.

Certification

This Lisle Residential Wells Public Health Assessment was prepared by the Illinois Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was begun.

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The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation and concurs with its findings.

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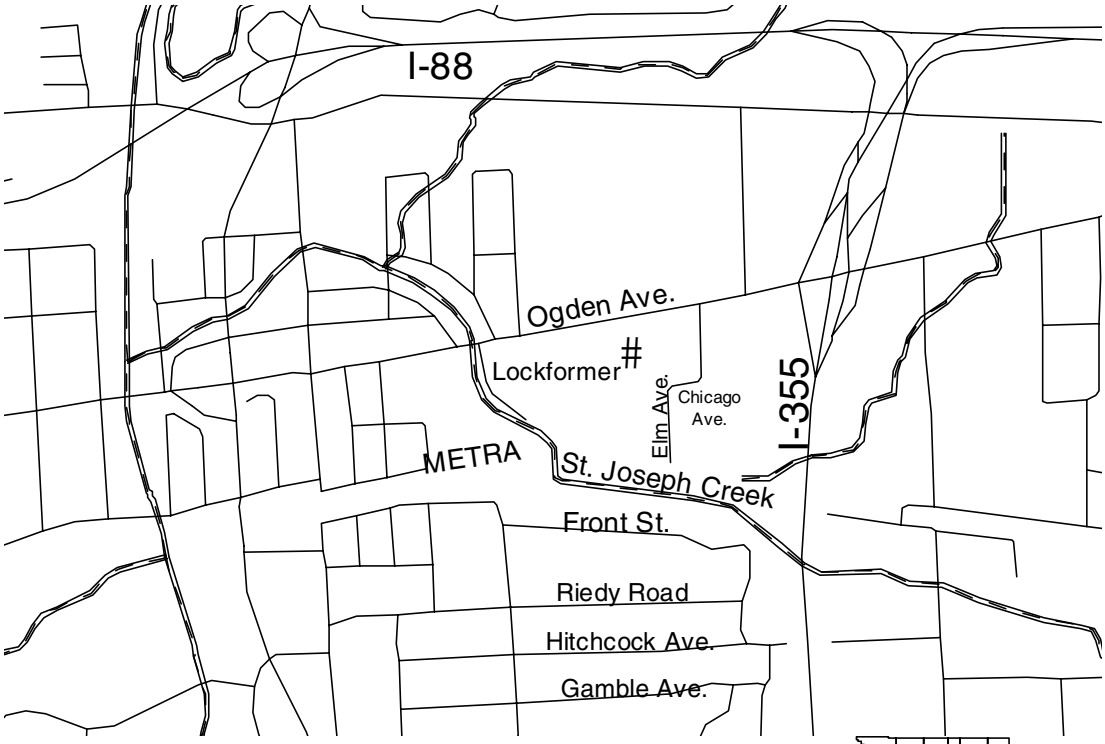
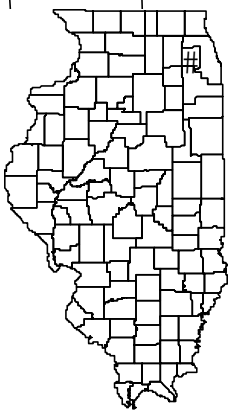
Attachment 1

Area of Lisle, Illinois Near Lockformer Co.





Source: IDPH GIS

Attachment 2

Map Showing Expanded Area of Lisle, IL Groundwater Investigation and Adjacent Areas

Roads
Rails

Source: IDPH GIS

Attachment 3

Comparison Values Used in Screening Contaminants for Further Evaluation

Maximum Contaminant Levels (MCLs) have been established by USEPA for U.S. public water supplies to reduce the chances of adverse health effects occurring from exposure to contaminated drinking water. MCLs are enforceable limits that public water supplies must meet. These standards are well below levels at which health effects have been observed and take into account the financial feasibility of achieving specified contaminant levels.

USEPA also has established Lifetime Health Advisories (LTHAs) for drinking water. A LTHA represents the concentration of a chemical in drinking water that is considered safe; i.e., it is not expected to cause any adverse non-carcinogenic effects over a lifetime (70 years) of exposure. LTHAs are conservative values that incorporate a margin of safety.

Attachment 4

Cancer Slope Factors Used and Lifetime Cancer Risks Calculated for this Public Health Assessment

1986 EPA Cancer Slope Factor: 1.1×10^{-2} (per milligram dose/kg/day)

Draft EPA Slope Factor Range: 2.0×10^{-2} (per milligram dose/kg/day)
4.0×10^{-1} (per milligram dose/kg/day)

Using the maximum TCE concentration found (19.7 ppb) and the slope factors given above, the following lifetime cancer risk estimates were calculated, respectively:

6.0×10^{-6} (using the 1986 EPA Cancer Slope Factor)

1.2×10^{-6} and 2.6×10^{-4} (using the draft EPA Cancer Slope Factor Range values)