

HEALTH CONSULTATION

LAKE HIGHLAND - TCE

ORLANDO, ORANGE COUNTY, FLORIDA

Prepared by:

Florida Department of Health
Bureau of Environmental Toxicology
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Background and Statement of Issues

The Florida Department of Health (Florida DOH), through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia, evaluates the public health significance of hazardous waste sites in Florida. The Florida Department of Environmental Protection (FDEP) has requested that Florida DOH evaluate the health effects of exposure to trichloroethylene (TCE) in groundwater near Lake Highland in Orlando, Orange County, Florida. The contractor for FDEP collected groundwater samples from public, private, and monitoring wells on and off of the site. These samples were analyzed for volatile organic compounds (VOCs) and chlorinated hydrocarbons. Florida DOH has determined that a health consultation is an appropriate response to evaluate the groundwater sampling data. The interpretation, advice, and recommendations presented in this report are site-specific and should not be considered applicable to any other sites.

The Lake Highland - TCE site occupies about 16 acres immediately north of Lake Highland in Orlando, Orange County, Florida (Figs. 1, 2, 3). The site is a former maintenance facility operated by the Orlando Utilities Commission (OUC). The facility was used mainly for equipment storage and vehicle fleet parking from the mid 1950s to 1993. Fourteen fuel tanks, removed in 1993, dispensed diesel fuel or gasoline. The site is currently inactive and all buildings and other structures have been demolished and removed (1).

According to 1990 census data (2), about 1800 people live within one mile of the site. Households near the site are middle to upper-middle income. The population is about 92% white, 2% black, and 6% hispanic. There is a private school south of Lake Highland about 1/4 mile from the site. Five public supply wells are within 1/4 mile of the site. There are no private drinking water wells in the area. About 10 private irrigation wells, however, are within one mile of the site (1).

On May 13, 1997 Bruce Tuovila from Florida DOH, Bureau of Environmental Toxicology, visited the site. The Lake Highland - TCE site is in an area of mixed land use with a number of light industrial businesses to the north and residential neighborhoods to the east, west, and south. The site is secured by a fence with locked gates. Immediately south of the site is Lake Highland. South of the lake is a private school and additional residences (Fig. 3). Earthmoving equipment and work personnel were on the site at the time of the visit. The site is bordered by Brookhaven Drive to the north, Ferris Avenue to the east, Lake Highland Drive to the south, and Alden Road to the west. Lake Ivanhoe is less than 1/4 mile west of the site (1).

In 1992, Orlando Utilities Commission (OUC) contractors detected trichloroethylene (TCE) in groundwater during a petroleum-related contamination assessment. Contaminated soil containing petroleum products was excavated and removed to a permitted processing facility. In 1993, the OUC contractors sampled monitoring wells on and off the site for TCE. The maximum on-site TCE concentration was 10,200 micrograms per liter ($\mu\text{g/L}$), the maximum off-site was 188,000 $\mu\text{g/L}$. Since this off-site well was hydraulically upgradient of the OUC property, the contractors concluded that the TCE contamination originated from a source or sources off-site (3).

In 1996, contractors for Florida DEP installed and sampled new monitoring wells to determine the source of the TCE. They sampled 34 monitoring wells on and around the site. They also sampled 5 public supply wells and 10 private irrigation wells (Fig. 3). Monitoring wells were 15 to 55 feet deep and the public supply wells were 1159 to 1500 feet deep. Irrigation well depths were not specified.

Florida DEP contractors analyzed monitoring well samples for volatile organic compounds (VOCs) and chlorinated hydrocarbons. They found bromodichloromethane, trichloroethylene (TCE), and tetrachloroethylene (PCE) in on-site and off-site samples at levels of potential health concern. Table 1, below, presents the highest level of each contaminant of concern found in the monitoring well samples.

Table 1. Maximum Level of Contaminants in Groundwater

CONTAMINANT	MAX. CONTAMINANT CONCENTRATION ($\mu\text{g/L}$)
	GROUNDWATER
BROMODICHLOROMETHANE	144
TETRACHLOROETHYLENE	100
TRICHLOROETHYLENE	759,000

$\mu\text{g/L}$ - micrograms per liter

Source: 1

Water samples from public supply wells and private irrigation wells were analyzed for TCE. No contamination at a level of health concern was found in any of these samples. However, six of the ten irrigation wells are within 400 feet of the edge of the contamination plume downgradient from the source. TCE migrating from the edge of the plume may contaminate these wells in the future.

Discussion

To evaluate health effects, ATSDR has developed Minimal Risk Levels (MRLs) for contaminants commonly found at hazardous waste sites. The MRL is an estimate of daily human exposure to a contaminant below which non-cancer, adverse health effects are unlikely to occur. ATSDR developed MRLs for each route of exposure, such as ingestion, inhalation, and dermal contact, and for the length of exposure, such as acute (less than 14 days), intermediate (15 to 365 days), and chronic (greater than 365 days). ATSDR presents these MRLs in Toxicological Profiles. These chemical-specific profiles provide information on health effects, environmental transport, human exposure, and regulatory status.

The compounds bromodichloromethane, tetrachloroethylene, and trichloroethylene were all detected in monitoring wells at levels of potential health concern. No compounds were detected in public supply or irrigation wells at health concern levels. Therefore, discussion of contaminants will focus on those from the monitoring wells. ATSDR has developed MRLs for bromodichloromethane, tetrachloroethylene, and trichloroethylene. To evaluate possible adverse health effects from ingestion of water containing these chemicals, we used a standard ingestion rate for water of 1 liter per day (L/day) for children and 2 L/day for adults, and a standard body weight of 15 kilograms (kg) for children and 70 kg for adults.

Bromodichloromethane

The maximum estimated daily dose of bromodichloromethane from ingestion of contaminated groundwater does not exceed ATSDR's oral MRL for children or adults (4). Therefore, we do not expect any adverse health effects from incidental ingestion of groundwater containing bromodichloromethane.

Bromodichloromethane is a probable human carcinogen based on animal studies showing increases in liver and kidney cancer (4). However, cancer effects in humans are unlikely at the levels found in the groundwater.

Tetrachloroethylene

The maximum estimated daily dose of tetrachloroethylene (PCE) from ingestion of contaminated groundwater does not exceed ATSDR's oral MRL for children or adults(5). Therefore, we do not expect any adverse health effects from incidental ingestion of groundwater containing PCE.

Tetrachloroethylene may be a human carcinogen based on controversial evidence in animals. The U.S. Environmental Protection Agency (EPA) is currently reviewing studies on PCE to determine its carcinogenicity. Because the levels of PCE in groundwater are very low, we do not expect any increase in cancer risk from incidental ingestion of this chemical.

Trichloroethylene

The maximum estimated daily dose of trichloroethylene (TCE) from ingestion of contaminated groundwater exceeds ATSDR's oral MRL for both children and adults (6). Exposure to TCE at the maximum level found in groundwater could affect the liver, cause skin rashes and impair the immune system. However, no TCE at a level of health concern has been found in either public supply wells or private irrigation wells near the site. Therefore, we do not currently expect any adverse health effects from ingestion of groundwater containing TCE.

Trichloroethylene may be a human carcinogen based on controversial evidence in animals. EPA is currently reviewing studies on TCE to determine its carcinogenicity. Because the levels of TCE in groundwater are high, exposure to this amount of TCE occurring in well water used for human consumption in the future could increase the risk of cancer.

Conclusions

Based upon the information reviewed, Florida DOH concludes that adverse, non-carcinogenic and carcinogenic health effects are not currently likely from exposure to groundwater containing bromodichloromethane, tetrachloroethylene, or trichloroethylene near this site. None of these chemicals has been found at a level of health concern in wells used for human consumption. If additional information becomes available indicating exposures at levels of concern, Florida DOH will evaluate that information to determine what actions, if any, are necessary.

Recommendations

We recommend the Orlando Utilities Commission periodically monitor public water supply and private irrigation wells near the site to ensure that any future contamination is detected in a timely manner.

References

1. Professional Service Industries, Inc. Revised Contamination Assessment, Lake Highland Drive, FDEP Site No. 235, Orlando, Orange County, Florida. February 12, 1997.
2. Bureau of the Census. 1990 Census Data Files. U.S. Department of Commerce, Washington, DC.
3. I.T. Corporation. Contamination Assessment Report, Orlando Utilities Commission - Lake Highland Service Area, August 27, 1993.
4. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Bromodichloromethane. ATSDR: Atlanta. December 1989.
5. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Tetrachloroethylene (Update). ATSDR: Atlanta. April 1993.
6. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Trichloroethylene (Update). ATSDR: Atlanta. August 1995.

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CERTIFICATION

This Lake Highland - TCE Health Consultation was prepared by the Florida Department of 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 health consultation was begun.


Technical Project Officer

Superfund Site assessment Branch (SSAB)
Division of Health Assessment and Consultation (DHAC)
ATSDR

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


Chief, SPS, SSAB, DHAC, ATSDR

Figure State Map Showing Location Orange County

Map of Florida



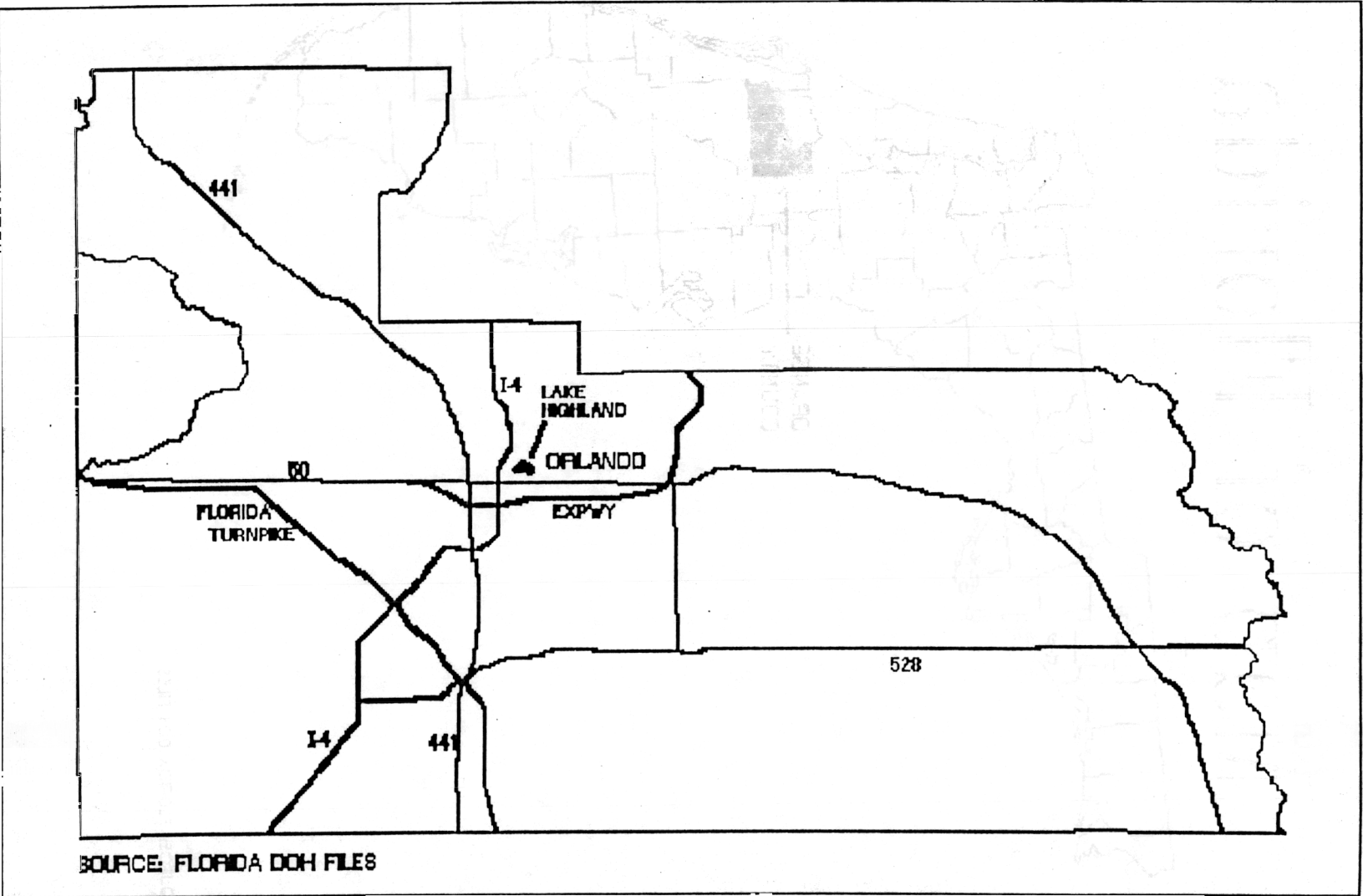


Figure 2. Location of Orlando in Orange County

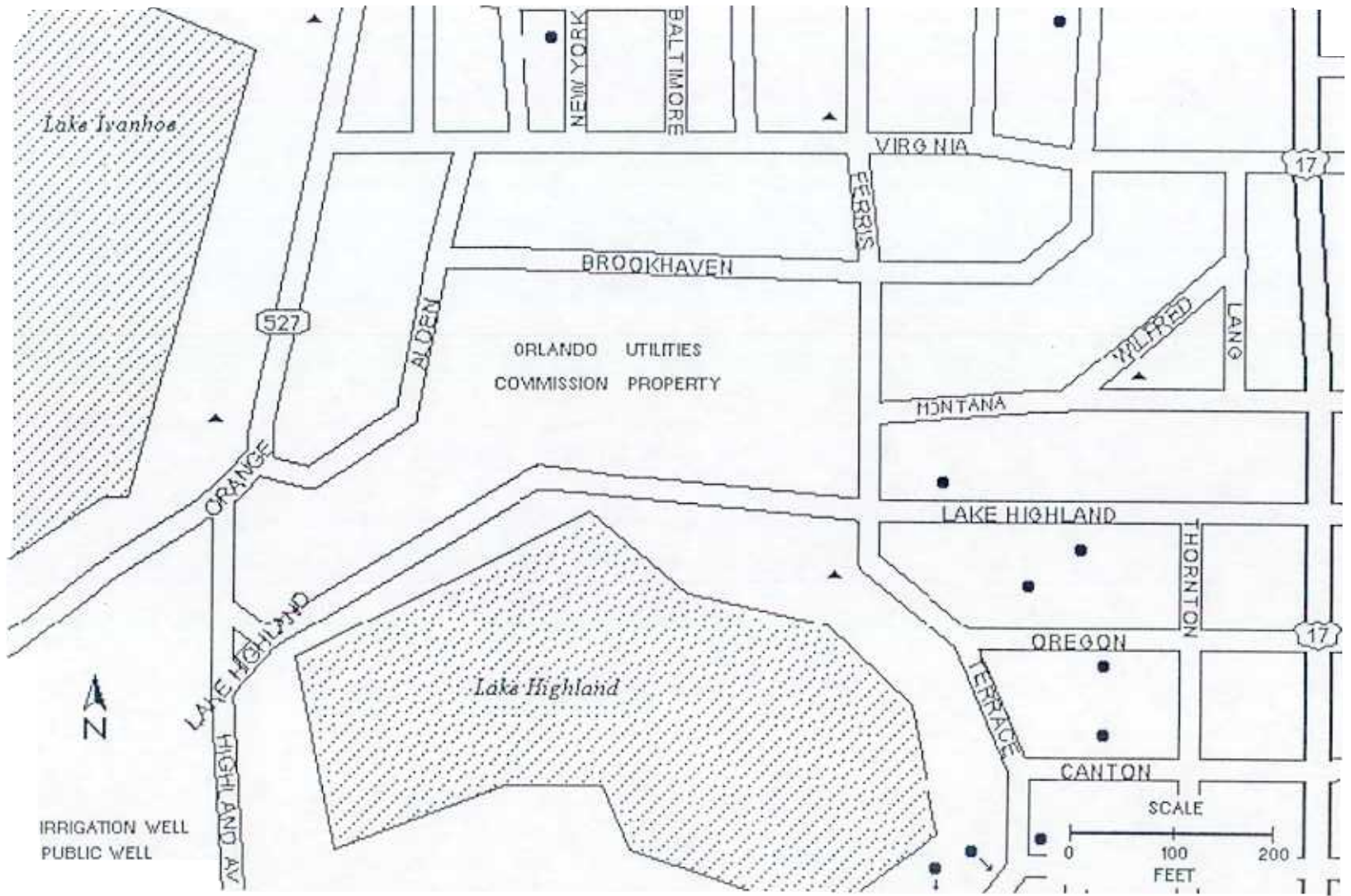


Figure Detail of Lake Highland TCE Site Orlando