HEALTH CONSULTATION

BARKER CHEMICAL SITE

INGLIS, LEVY COUNTY, FLORIDA

CERCLIS NO. - FL0001275627

August 8, 1996

Prepared by

Florida Department of Health and Rehabilitative Services
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Background and Statement of Issues

The U.S. Environmental Protection Agency (EPA) has requested that the Florida Department of Health and Rehabilitative Services (Florida HRS) evaluate the health effects of exposure to contaminants detected in soil and private well water samples collected in the neighborhood near the Barker Chemical site. EPA collected these samples from the area of the former Barker Chemical plant and throughout the City of Inglis, Florida (1). EPA analyzed the soil samples for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), pesticides, and metals. The well water samples were analyzed for metals.

The Florida Department of Health and Rehabilitative Services (Florida HRS), 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. We have determined that a health consultation to evaluate the sampling data is an appropriate response to the request. The interpretation, advice, and recommendations presented in this report are situation-specific and should not be considered applicable to any other situations.

The Barker Chemical site is in the Garden Mall subdivision of the City of Inglis, Levy County, Florida (Figs. 1 - 3). The site is bounded by the Withlacoochee River on the south and west, by Inglis Avenue on the north, and by a wooded area on the east. A separate area is on Florida Power Company (FPC) property about one-quarter mile west of the main site (Fig. 3). Except for the FPC property, the area on and around the site is residential. About a dozen homes are on the site.

The contamination was discovered in March 1995 when a local resident had a soil sample analyzed to determine why plants would not grow in areas with an unusual reddish-colored soil. The results of the analysis indicated high levels of lead and arsenic (2). Investigation by the Florida Department of Environmental Protection (FDEP) revealed an extensive area containing high levels of lead and arsenic (3, 4, 5). As a result of the finding of elevated lead in surface soil, the Levy CPHU tested the blood lead levels of eight children and twenty-two adults. All were below 10 micrograms per deciliter (ug/dL) (6, 7).

The site is the location of the former Barker Chemical plant. The plant operated from about 1904 to about 1924 producing superphosphate by sulfuric acid reaction with phosphate rock. To produce sulfuric acid, Barker roasted pyrite imported from Spain to release sulfur which was then burned and reacted with water in lead-lined chambers. The sulfuric acid was then mixed with phosphate ore to produce superphosphate. All chambers and pipes containing sulfuric acid or for producing superphosphate were lined with lead. FDEP has determined that the imported pyrite had a high arsenic content. The pyrite slag was used for roadbed material in and around Inglis, indicating there may be lead and arsenic contamination in places other than just at the plant site. In December 1995, the U.S. Environmental Protection Agency (EPA) collected and analyzed 251 surface soil samples and 16 private well samples throughout Inglis. EPA used the test results to determine which residential yards

required clean-up to remove high levels of lead and arsenic. Currently EPA is removing contaminated soil from residential yards on the site and and at a number of other residences in Inglis. Removal activities are expected to be completed by the end of 1996.

The plant closed about 1925 and FPC purchased the portion of the property containing the phosphate drying plant for the construction and operation of an electric power plant. FPC closed this plant in 1993 and demolished all power plant buildings. This portion of the site is now a training center for power utility linemen. The property containing the main phosphate processing plant was developed for residential use. The homes appear to have been built in the mid 1970's.

On October 19, 1995, the mayor of Inglis held a public meeting to inform local residents about ongoing activities at the site. Representatives from ATSDR, FDEP and its contractor, the Florida Department of Health and Rehabilitative Services (Florida HRS), the Levy CPHU, the city council, and about 80 members of the community attended the meeting. Agency personnel provided the community with information about the results of environmental sampling and the potential health effects from exposure to the contaminants found. Community members expressed concerns about the impacts of the warning signs posted by FDEP, the effects on their property values, and the health of their children.

According to 1990 census data (8), about 2,960 people live within the census tract closest to the site. The neighborhood closest to the site is lower-middle income. The population within the census tract closest to the site is 99% White, 0.1% African-American, and 0.9% Hispanic. There is one daycare center within one mile of the site.

The area within one mile of the site is residential with some commercial businesses. The Withlacoochee River is on the southern and western borders of the former plant site. Inglis Avenue bounds the site to the north and a wooded area bounds the site to the east. Since pyrite cinder from the plant was used as fill throughout the town, the site study area extends from the Withlacoochee River on the south and west to County Road 40 and US Highway 19 on the north and east (Fig. 3).

In December 1995, contractors for EPA collected and analyzed 251 composite surface soil (0 - 1 foot) samples from the former plant site and the nearby neighborhood (Fig. 4). They analyzed the samples for VOCs, PAHs, pesticides, and metals. EPA contractors also collected 11 water samples from private wells near the site and analyzed them for metals (Fig. 4). Table 1, below, presents the highest level of each contaminant of concern found in the surface soil samples and private well water. We evaluated those contaminants that are known or suspected human carcinogens for both carcinogenic and non-carcinogenic adverse health effects.

Table 1. Maximum Concentrations in Surface Soil and Private Well Water Samples

Contaminants of Concern	Maximum Soil Concentration (mg/kg)	Maximum Water Concentration (ug/L)
Antimony	88.8	ND
Arsenic	687	113
Beryllium	0.598	2
Lead	19,500	16

ND - not detected
mg/kg - milligrams per kilogram
ug/L - micrograms per liter
Source: (1)

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 364 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.

When an ATSDR MRL is not available, the EPA Reference Dose (RfD) is used. The RfD is an estimate of daily human exposure to a contaminant below which non-cancer, adverse health effeacts are unlikely to occur.

To estimate the maximum likely daily exposure to each contaminant of concern in surface soil, we used the maximum level of each contaminant, a standard incidental soil ingestion rate of 200 mg/day for children and 100 mg/day for adults, and a standard body weight of 15 kg for children and 70 kg for adults. To estimate the maximum likely daily exposure from private well water, we used the maximum level of each contaminant, a standard water ingestion rate of 1 liter per day (L/day) for children and 2 L/day for adults, and a standard body weight of 15 kg for children and 70 kg for adults.

There is no ATSDR MRL or EPA RfD available for lead (9). The estimated likely maximum daily dose of lead from surface soil, however, is in the same range as the daily dose at which learning deficits, impairment of the blood-forming system, and changes in the reproductive sytem have been observed in animals. Exposure at this level can decrease intelligence scores and reduce the growth of young children (9).

Test results of blood lead levels in children (6) and adults (7) near the site indicate that people are not currently exposed to lead in surface soil at a level that could represent a health threat. Because we do not have information about past exposure to lead, we can only estimate the possible health effects. It is also possible that future exposure to lead could result in the health effects described above.

Although exposure to lead has been shown to cause cancer in animals, there is inadequate evidence for the carcinogenicity of lead in humans (9). Therefore, we do not have enough toxicological information to estimate what, if any, cancer risk may exist from exposure to lead at the levels found in surface soil on or near the Barker Chemical site.

There is an ATSDR MRL and an EPA RfD available for arsenic (10). The estimated likely maximum daily dose of arsenic in surface soil and private well water for children and adults exceeds the MRL and RfD. Exposure to arsenic at this level may cause changes in the skin, such as darkening, and the appearance of corns or warts. Arsenic is a known human carcinogen. Lifetime incidental ingestion of arsenic-contaminated soil or water could lead to a moderate increase in the risk of skin cancer.

Test results of arsenic levels in the urine and hair of children and adults near the site indicate that people are not currently exposed to arsenic in surface soil or private well water at a level that could represent a health threat. Because we do not have information about past exposure to arsenic, we can only estimate the possible health effects. It is also possible that future exposure to arsenic could result in the health effects described above.

ATSDR has not developed an MRL for antimony (11). However, an EPA oral RfD is available. The estimated maximum daily dose of antimony in surface soil slightly exceeds the RfD for children, but not for adults. Because very few of the surface soil samples had elevated levels of antimony, we do not expect exposure to occur at this maximum level. No antimony was detected in private well water. Therefore, adverse health effects from exposure to antimony are unlikely. Antimony has not been classified for cancer effects in humans. Therefore, we do not know if lifetime exposure would result in any increased cancer risk.

ATSDR has not developed an MRL for beryllium (12). However, an EPA oral RfD is available. The estimated likely maximum daily dose of beryllium from surface soil and private well water is less than the RfD. Therefore, we do not expect any adverse health effects from exposure to beryllium in surface soil or private well water. Beryllium is a probable human carcinogen, primarily by inhalation. However, lifetime exposure to beryllium at this site would result in an insignificant increase in the risk of cancer.

Conclusions

Based upon the results of blood lead levels and tests of arsenic in urine and hair, Florida HRS concludes that adverse, non-carcinogenic health effects are not likely from current exposure to lead and arsenic in surface soil and private well water. Because we do not have information about past exposures to lead and arsenic, we conclude that adverse health effects are possible from past exposure to these contaminants. Lifetime exposure to arsenic in surface soil and private well water may also increase the risk of skin cancer. There is insufficient toxicological information for us to determine if there is any cancer risk from exposure to antimony and lead in the surface soil. If additional information becomes available indicating exposure at levels of concern, Florida HRS will evaluate that information to determine what actions, if any, are necessary.

Recommendations

Florida HRS recommends that EPA limit exposure of community members to lead and arsenic in surface soil in the residential yards on and near the Barker Chemical site.

Florida HRS recommends that ATSDR develop guidance for assessing the cancer risk to humans from exposure to antimony and lead.

The analytical results of the biological testing performed at this site, is being evaluated and discussed in a seperate health consultation. Should any additional sampling of environmental media be performed, Florida HRS will evaluate those data.

References

1. Roy F. Weston. Extent of Contamination Survey at the Barker Chemical Company Site - Inglis, Florida. February 27, 1996.

2. PSI Environmental. Site Investigation Work Plan, Garden Mall Subdivision and FPC Plant Site. June 15, 1995.

3. FDEP. Chemical Analysis Report, Inglis. April 6, 1995.

4. FDEP. Chemical Analysis Report, Inglis. May 3, 1995.

5. PSI Environmental. Summary Chemical Analysis Report. September 25, 1995

6. Florida Department of Health and Rehabilitative Services. Letter to Roger Inman from S. Samtinoranont regarding blood lead levels of children in Inglis. September 21, 1995.

7. Florida Department of Health and Rehabilitative Services. Letter to Bruce Tuovila

from S. Sarntinoranont regarding blood lead levels of adults in Inglis. October 27, 1995.

8. Bureau of the Census. 1990 Census Data Files. U.S. Department of Commerce, Washington, DC.

9. Agency for Toxic Substances and Disease Registry Toxicological Profile for Lead (Update). Atlanta. ATSDR, April 1993.

10. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Arsenic (Update). Atlanta. ATSDR, April 1993.

11. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Antimony and Compounds. Atlanta. ATSDR, September 1992.

12. Agency for Toxic Substances and Disease Registry Toxicological Profile for Beryllium. Atlanta. ATSDR, April 1993.

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CERTIFICATION

This Barker Chemical Site Health Consultation was prepared by the Florida Department of Health and Rehabilitative Services 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.

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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.

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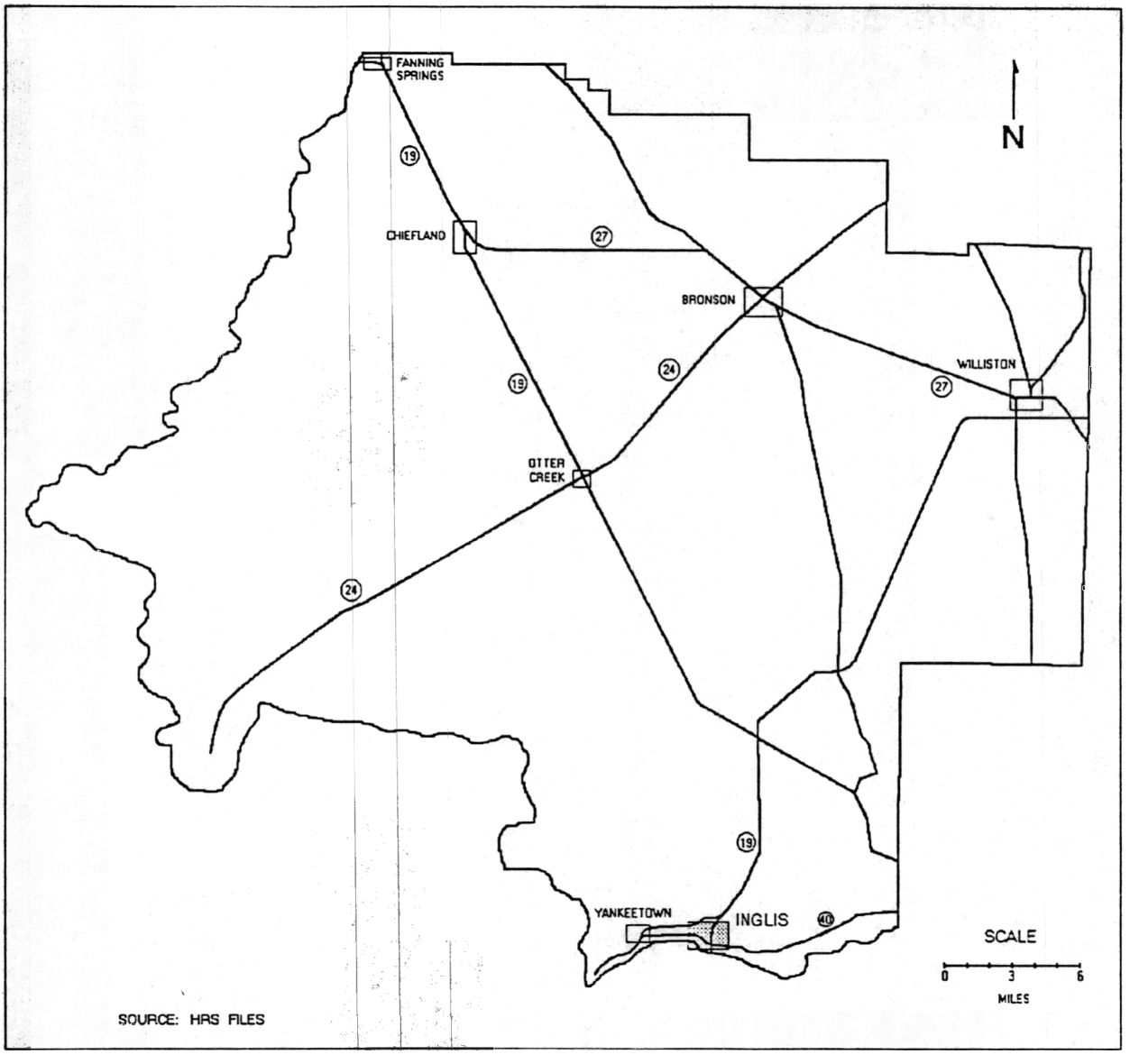
Chief, SPS, SSAB, DHAC, ATSDR

Figure 1. Map of Florida Showing Location of Levy County

Figure 2. Location of Inglis in Levy County



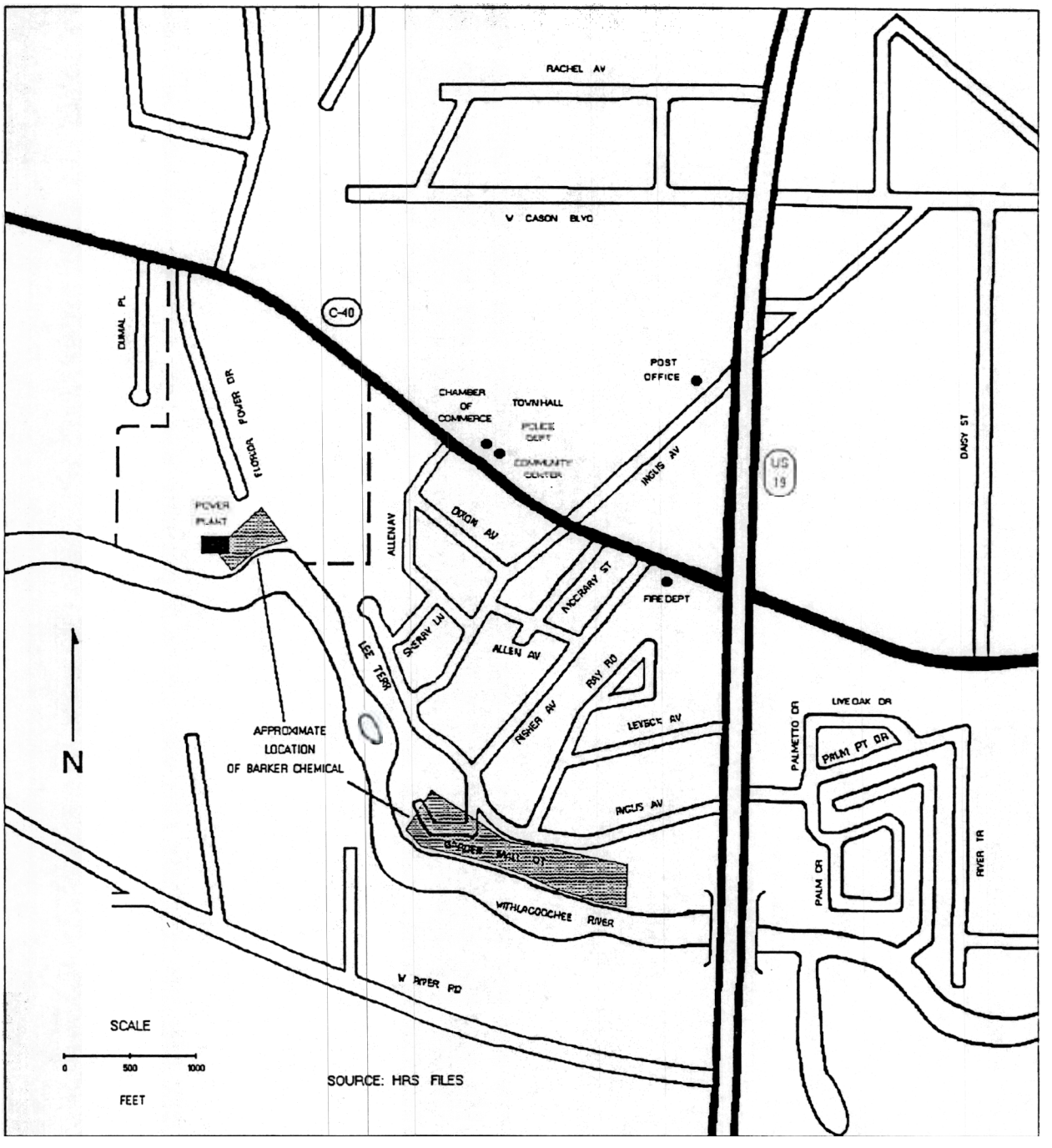

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Figure 4. Surface Soil and Private Well Sample Locations

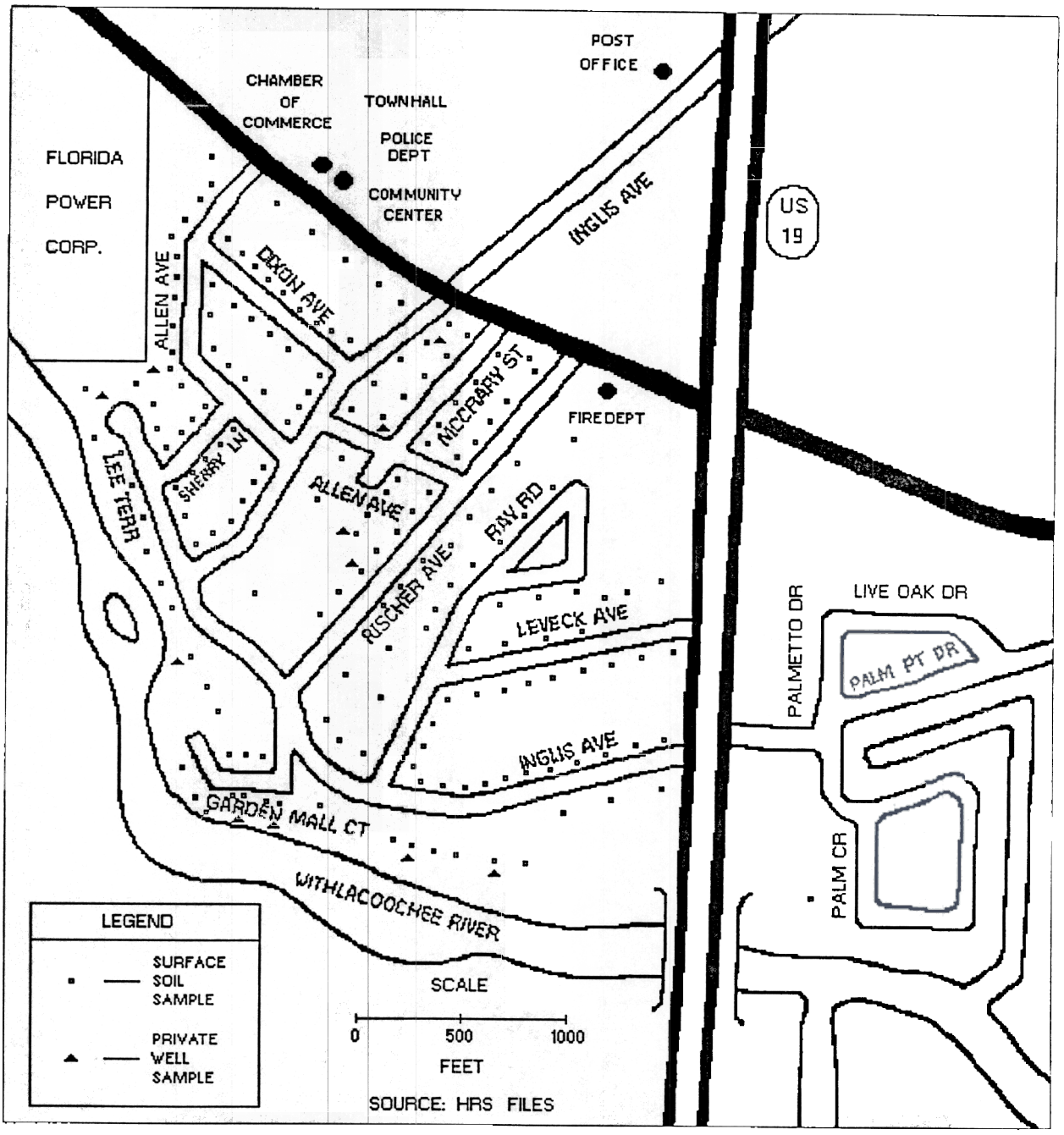

Figure 4. Surface Soil and Private Well Sample Locations