Health Consultation

BAKER WOOD CREOSOTING

MARION, MARION COUNTY, OHIO

CERCLIS NO. OH0001326610

SEPTEMBER 28, 2000

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR TOLL FREE at
1-888-42ATSDR
or
Visit our Home Page at: http://atsdr1.atsdr.cdc.gov:8080/

HEALTH CONSULTATION

BAKER WOOD CREOSOTING

MARION, MARION COUNTY, OHIO

CERCLIS NO. OH0001326610

Prepared by:

Ohio Department of Health
Health Assessment Section
Bureau of Environmental Health & Toxicology
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

STATEMENT OF ISSUES AND BACKGROUND

The United States Environmental Protection Agency (USEPA) Region V Office requested that the Health Assessment Section (HAS) of the Ohio Department of Health (ODH) evaluate environmental sampling data for the Baker Wood Creosoting site in Marion, Ohio. Specifically, HAS was asked to evaluate whether contaminants detected at the Baker Wood Creosoting site pose a potential public health concern. Verbal recommendations were provided to USEPA in April 1999. This health consultation documents the evaluation results and recommendations.

Site Visit

The 100-acre Baker Wood Creosoting site (BWC) is a former wood treatment facility on the west edge of the city of Marion, Ohio, at the northwest corner of Holland Road and Kenton Avenue (State Route 309). The site is bounded on the south by Holland Road and the Union Tank Car facility, on the east by State Route 309, on the north by overgrown agricultural fields, and on the west by a farm with agricultural fields (Figure 1).

HAS, Ohio EPA, and USEPA staff made a site visit on March 12, 1999. The former process area at the east end of the BWC site currently consists of a graded, level area with the concrete foundations of several process buildings and the hardened floors of at least four former creosote storage tanks (Figures 2 and 3). An open sump pit is at the former pump house and is filled with creosote products. A 10 to 12-inch diameter, water-filled pipe, covered with a piece of scrap metal, is in the same area. Dense wooded areas currently surround the site where former railroad tie drying yards were on the west and north. Scattered piles of scrap metal and slag from area steel plants occur across the site, especially along its northern and eastern boundaries.

The land in the vicinity of the BWC site is flat and level. Surface water drains westward. Storm sewer lines parallel Holland Road and empty into the south-flowing North Rockswale Ditch 0.5 miles west of the site. The Ditch turns abruptly west south of Holland Road and flows west, parallel to the road, until emptying into the south-flowing Little Scioto River south of the Holland Road bridge, one mile west of the BWC site (Figure 1).

History of Facility

The BWC site operated as a wood treatment facility from the 1890s until the 1960s. Railroad ties were treated with creosote in the process area on the east side of the property and then stacked to dry on the western portion of the property (Ohio EPA, 1998). Creosote is a complex mixture of hydrocarbons prepared from coal tar to form a thick, viscous, oily liquid which is amber to black in color. Creosote has a sharp, smoky odor. Major chemical constituents include polycyclic aromatic hydrocarbons (PAHs), phenol, and cresols (ATSDR, 1996). Coal tar creosote is highly flammable and does not dissolve readily in water. Creosote wastes consist of up to 75% PAHs and often occur as black, semi-solid sludges that typically fix to soils.

ODH cited the former BWC facility operator on numerous occasions in the 1940s and 1950s for discharging creosote wastes to Rockswale Ditch (Ohio EPA, 1998). Wood-treatment activities ceased at the site in the 1960s. The eastern half of the site was used as a metals salvage yard, which primarily salvaged metal railroad tank cars, until the early 1990s (Ohio EPA, 1998).

EPA Actions

The Northwest District Office of Ohio EPA collected environmental samples at the BWC site in October 1996. Data collected formed the basis of an integrated assessment of the BWC site which was released in March 1998. Soil samples were collected from nine sample localities in the former process area at BWC (Figure 3). Three of those samples were taken using a geoprobe at depths of 6.5 to 12 feet. In addition, four surface water samples were taken. These included three samples from the storm sewer line paralleling Holland Road adjacent to the site (two downstream and one upstream sample), and a sample from North Rockswale Ditch downstream of the sewer outfall (Figure 2). Significant concentrations of a number of semi-volatile chemicals characteristic of creosote wastes were detected in surface and shallow subsurface soils (0-12 inches below the ground surface) in the former process area on-site (Tables1-2). Low levels of phenol were detected in both downstream and upstream surface water samples taken from the storm sewer adjacent to the site (Table 3). No chemicals were detected above comparison values in the downstream water sample from the North Rockswale Ditch.

US EPA conducted a geophysical study of the BWC site in January 1999, using ground-penetrating radar and electromagnetic conductivity technologies. These data indicate pervasive creosote contamination in the upper six feet of soil in the vicinity of the former creosote tank storage area at the site. HAS received geophysical data for the former process area (Figure 4).

DISCUSSION OF ISSUES

Nearby Population

Residential portions of the city of Marion are 1,000 feet northeast of the site, east of State Route 309 and north of Silver Street. The Silver Street School is about one-half mile east of the site.

Potential Exposure Pathways

Currently, no people reside on the site, and no workers are present at the site. No trespassing was observed during the site visit in April. However, because there is no fence around the site, potential exposure pathways exist. Potential pathways of concern include contact with surface and shallow subsurface soils by on-site trespassers or people who might work on the site in the future. Other potential pathways of concern include ingestion of dust and inhalation to volatile organic compounds (VOCs) in ambient air on-site. However, no data currently are available on VOC concentrations in on-site or down-wind ambient air.

Potential Physical Hazards

Physical hazards noted at the site included an open, creosote-filled sump pit, scattered scrap metal, and other solid waste. Currently, access at the site is not restricted because the area is not fenced.

Contaminants of Concern

Table 1 summarizes the concentrations of chemicals detected in on-site surface soils. The concentration of total PAHs was 1,079 parts of PAH per million parts of soil (ppm). The maximum concentration of benzo(a)pyrene detected was 110 ppm. Table 2 lists the levels detected in shallow subsurface soils (6-12 inches below the ground surface). The concentration of total PAHs in the shallow subsurface soils was 105,575 ppm. The maximum level of benzo(a)pyrene detected was 130 ppm. Arsenic was detected at 239 ppm. Naphthalene was detected in both the surface and subsurface soils. The highest level of naphthalene in the subsurface soil is 13,000 ppm.

Contaminants in on-site soils

Polycyclic Aromatic Hydrocarbons (PAHs)

ATSDR does not have PAH Environmental Media Evaluation Guide (EMEG) comparison values. However, the ATSDR PAH Toxicological Profile provides information about the "background levels" for these compounds. Because the combustion of hydrocarbons is a major source of PAHs in soils, concentrations of PAHs in soils are higher in urban areas where large quantities of petroleum and coal are burned for energy. In general, background concentrations of PAHs in urban areas are greater than in agricultural areas, and concentrations of PAHs in agricultural areas are greater than in rural areas. The background levels of several other PAHs for rural, agricultural, and urban soils have also been determined. Because a typical exposure is to a mixture of PAHs, the total concentration of all PAHs present in soils at a site is also important. The highest concentrations of total PAHs in rural, agricultural, and urban soils are 1.7 ppm, 2.4 ppm, and 582 ppm, respectively (ATSDR, 1995). In comparison, the concentration of total PAHs in surface soils at the BWC site was 1,079 ppm. This level is nearly twice the value for total PAHs found in typical urban soils.

Background levels of benzo(a)pyrene found in rural, agricultural, and urban soils are 0.002 to 1.3 ppm, 0.005 to 0.90 ppm, and 0.17 to 0.22, respectively (ATSDR, 1995). The levels of benzo(a)pyrene in surface soil at the Baker Wood Creosoting site was 110 ppm. This level is much higher than typical soil background levels (see Tables 2 and 3).

The total concentration of all PAHs in the shallow subsurface soils (6-12 inches below the ground surface) at the BWC site was 105,575 ppm. This level is almost 180 times the highest level of total PAHs tabulated for typical urban soils by ATSDR (582 ppm).

Levels of all of the PAH compounds found in the surface soil at BWC site are above USEPA Region 9 Preliminary Remedial Goals (PRGs) for residential soils.

PAHs are a group of over 100 different chemicals that are structurally related. Some PAHs are manufactured. Pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides. PAHs typically occur as chemical mixtures and some individual compounds may enhance the reactivity of others. Benzo(a)pyrene may enhance the carcinogenicity of other PAH compounds. Non-carcinogenic PAHs (such as naphthalene) have exhibited co-carcinogenic potential and tumor-initiation and promotion when applied with benzo(a)pyrene to the skin of laboratory animals.

Animal studies also have shown that, after both short- and long-term exposure, PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease. These effects have not been seen in people. Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Epidemiologic studies of workers occupationally exposed to PAHs have provided limited evidence th at PAH exposure may contribute to increased incidence of cancer. The most likely exposure routes in the occupational settings were though inhalation and skin contact with those compounds.

Exposure to PAHs through incidental ingestion and dermal contact with contaminated soils at the Baker Wood Creosoting site may have occurred in workers, trespassers, and children. A lifetime's incidental ingestion of soil containing the maximum PAH concentrations found on the property might result in an increased risk of contracting cancer.

Arsenic

Arsenic was detected in shallow subsurface soils at the BWC site at levels up to 239 ppm. The Minimum Risk Level (MRL) for an oral exposure to arsenic is 0.003 milligrams/kilogram/day (mg/kg/day). This is based on a No-Observed-Adverse-Effect-Level (NOAEL) of 0.0008 mg/kg/day oral exposure to arsenic. The corresponding ATSDR chronic EMEG comparison value is 20 ppm for children and 200 ppm for adults.

Arsenic was detected in on-site surface soils at levels that were a cause for health concern. Arsenic is a known human carcinogen. Arsenic ingestion has also been reported to increase the risk of cancer in the liver, bladder, kidney, and lung. Because of this fact, there may have been a slightly increased risk of cancer for employees who worked on-site for several years. Also, a lifetime of incidental ingestion of the soil on the Baker Wood Creosoting property might result in an increased risk of skin cancer from the arsenic present.

Children's Health

Children are at a greater risk than adults from certain kinds of exposure to hazardous substances emitted from waste sites. They are more likely to be exposed for several reasons (e.g., they play outdoors more often than adults which increases the likelihood that they will come into contact with chemicals in the environment). Children are also smaller, resulting in higher doses of chemical exposure per body weight. As a part of this health consultation, HAS compared all sample results against comparison values set for exposure to children and investigated any exposure pathways. The on-site contaminant levels could potentially pose health hazards to children if no removal action is taken at the site, and children constantly get in contact with contaminants for more than one year.

CONCLUSIONS

The surface and subsurface soils at the Baker Wood Creosoting site pose a public health hazard because of the potential exposure from the elevated concentrations of creosote-derived hydrocarbons and arsenic identified in the on-site soils. Since the site is not fenced, people are able to trespass and possibly come into contact with contaminants in the soil. In addition, people might also be injured by the physical hazards at the site.

RECOMMENDATIONS

1. Secure the former process area on the east side of the Baker Wood Creosoting site to prevent trespass and possible contact with contaminants in surface soils or injury from physical hazards.

2. Further delineate the extent of creosote contamination (horizontally and vertically) at the Baker Wood Creosoting site.

3. Identify and contain, mitigate, or remove on site contaminants.

4. Sample ambient air on site to determine if creosote wastes are adversely impacting air quality on site, posing a potential concern to on-site workers or downwind residents.

PUBLIC HEALTH ACTION PLAN (PHAP)

The Public Health Action Plan (PHAP) for the BWC site contains a description of action taken, and those to be taken, by ODH, ATSDR, Ohio EPA and/or USEPA at, and in, the vicinity of the site. The PHAP is designed to ensure that this health consultation not only identifies public health hazards, but provides a plan of action designed to prevent exposure and mitigate adverse human health effects resulting from exposure to site-related contaminants. The public health actions for the BWC site are as follows:

Public Health Actions Completed:

1. HAS staff visited the BWC site on March 12, 1999, accompanied by USEPA and Ohio EPA personnel. Physical hazards on-site were noted as well as the unrestricted access to the site and the proximity to nearby residential areas.

2. At the request of USEPA, HAS reviewed all available environmental sampling and demographic data and concluded that the BWC site poses a potential public health threat to area residents who might come into contact with creosote-contaminated soils on-site. These conclusions and a number of recommendations were communicated to USEPA's Region V Office in April 1999.

3. In April 1999, HAS recommended that a) the former process area at the site be fenced to prevent or limit trespass onto the site, contact with contaminated soils, or injury from physical hazards at the site; b) further delineate the extent (horizontally and vertically) of creosote-contaminated soils on-site; c) contain, mitigate, or remove contaminants identified in on-site soils; and, d) sample on-site ambient air to determine if creosote wastes were adversely-impacting on-site air quality posing a concern to on-site workers or downgradient residents.

4. As of May 1999, critical waste containing areas of the site were fenced. From early April to mid-May, USEPA excavated and treated 3,565 tons of creosote-contaminated soil from the creosote process area at the site. USEPA backfilled, graded, and seeded these excavated areas to restore the property to its more natural, original appearance. An additional 2,000 tons of contaminated soil was removed from four smaller areas of creosote contamination identified along the eastern edge of the BWC property. On-site ambient air continued to be monitored for VOCs and naphthalene to insure that levels of these chemicals released to the air during site excavation actions do not pose a threat to nearby homes or businesses.

5. HAS reviewed and commented on several USEPA site fact sheets describing the removal action at the BWC site which were distributed in April and July to area residents by USEPA.

6. As of 11/19/99, USEPA finished the removal action at the site and demobilized personnel and equipment from the site. Five shallow monitoring wells have been established to monitor the effectiveness of the bioremediation activity. All HAS's recommendations were fulfilled.

PREPARED BY

Health Assessment Section

Ying Feng
Bob Frey
Irena Scott
Beverly Henderson

REFERENCES

AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ATSDR). 1994. Toxicological Profile for Toluene. U.S. Department of Health & Human Services, 221p. + appendices.

ATSDR. 1995. Toxicological Profile for Naphthalene. U.S. Department of Health & Human Services, 200 p. + appendices.

ATSDR. 1995. Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs). U.S. Department of Health & Human Services, 458 p. + appendices.

ATSDR. 1996. Toxicological Profile for Creosote. U.S. Department of Health & Human Services, 241 p + appendices.

ATSDR. 1998. Toxicological Profile for Arsenic. U.S. Department of Health & Human Services, 349 p. + appendices.

ATSDR. 1998. Toxicological Profile for Phenol. U.S. Department of Health & Human Services, 205 p. + appendices.

OHIO ENVIRONMENTAL PROTECTION AGENCY (Ohio EPA). 1992. Bottom Sediment Evaluation, Little Scioto River, Marion, Ohio, February 4, 1992. Division of Water Quality Planning & Assessment, Ecological Assessment Section. 15 p + appendices.

OHIO EPA. 1998. Integrated Assessment Report for Baker Wood Creosoting Site, Marion, Marion County, Ohio, March 5, 1998. Division of Emergency & Remedial Response. 21 p + appendices.

OHIO EPA. 1999. Inter-Office Communication regarding review of the Ohio America Water Company water-sampling data, Marion well field, March 25, 1999. Letter from D. McLane (Division of Drinking and Ground Water) to J. Steers (Assistant District Chief, Northwest District Office). 10 p.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (US EPA). 1983. Hazardous Waste Land Treatment, USEPA SW-874.

TABLE 1
Chemicals detected in on-site surface soils (0-6 inches), Baker Wood Creosoting site (Ohio EPA, 1998)

Chemical	Maximum Concentration detected (ppm)	Background Levels in Agricultural Soils (ppm)*	Background Levels in Urban Soils (ppm)
Xylenes (total)	0.26 D	NA	NA
Naphthalene	1,300 D	ND - 0.003	NA
Acenaphthene	0.10 J	0.006	NA
Benzo(a)anthracene	270 D	0.06-0.11	0.17-59
Chrysene	260 D	0.08-0.12	0.25-0.64
Benzo(b)fluoranthene	220 D	0.06-0.22	15-62
Benzo(k)fluoranthene	200 D	0.06-0.25	0.30-26
Benzo(a)pyrene	110 D	0.005-0.90	0.17-0.22
Total PAHs	1,079	2.43	582

ppm =Parts per million
NA =Value not available
D =Compounds analyzed at a secondary dilution factor
J = Estimated value
PAHs = Polycyclic Aromatic Hydrocarbons
* = Source: ATSDR Toxicological Profiles

TABLE 2
Chemicals detected in shallow subsurface soils (6-12 inches), Baker Wood Creosoting Site
(Ohio EPA, 1998)

Chemical	Maximum Concentration detected (ppm)	Background Levels in Agricultural Soils (ppm)*	Background Levels in Urban Soils (ppm)
Benzene	9.5	NA	NA
Toluene	51	NA	NA
Ethylbenzene	37	NA	NA
Styrene	22	NA	NA
Xylenes (total)	170	NA	NA
Naphthalene	13,000 D	ND-0.003	NA
Acenaphthene	6.8 D	0.006	NA
Benzo(a)anthracene	1,200 D	0.06-0.11	0.17-59
Chrysene	1,100 D	0.08-0.12	0.25-0.64
Benzo(b)fluoranthene	780 D	0.06-0.22	15-62
Benzo(k)fluoranthene	720 D	0.06-0.25	0.30-26
Benzo(a)pyrene	130 D	0.005-0.90	0.17-0.22
Benzo(ghi)perylene	60 DJ	0.07	0.90-47
Indeno(1,2,3-cd) pyrene	51 DJ	0.06-0.10	8-61
Total PAHs	105,575	2.43	582
Metals		**Range (ppm)****	**Average (ppm)**
Arsenic	239	1-50	5
Lead	325	2-200	10
Mercury	22	0.01-0.30	0.03

ppm = Parts per million
NA = Value not available
D =Compounds analyzed at a secondary dilution factor

J =Estimated value
* =Source: ATSDR Toxicological Profiles
** =Background Levels for metals in the U.S., Source: US EPA (1983)

TABLE 3
Surface water sampling results for storm sewer along Holland Road
(Ohio EPA, 1998)

Chemical	Manhole #1 (ppb)	Manhole #2 (ppb)	Manhole #3 (ppb)	North Rockswale Ditch (ppb)
Acetone	180	110	40	12
Phenol	41	37	8 J	ND
4-methyl phenol	59	54	1 J	ND

ppb =Parts per billion
ND =Chemical not detected
J = Concentration is an estimated value

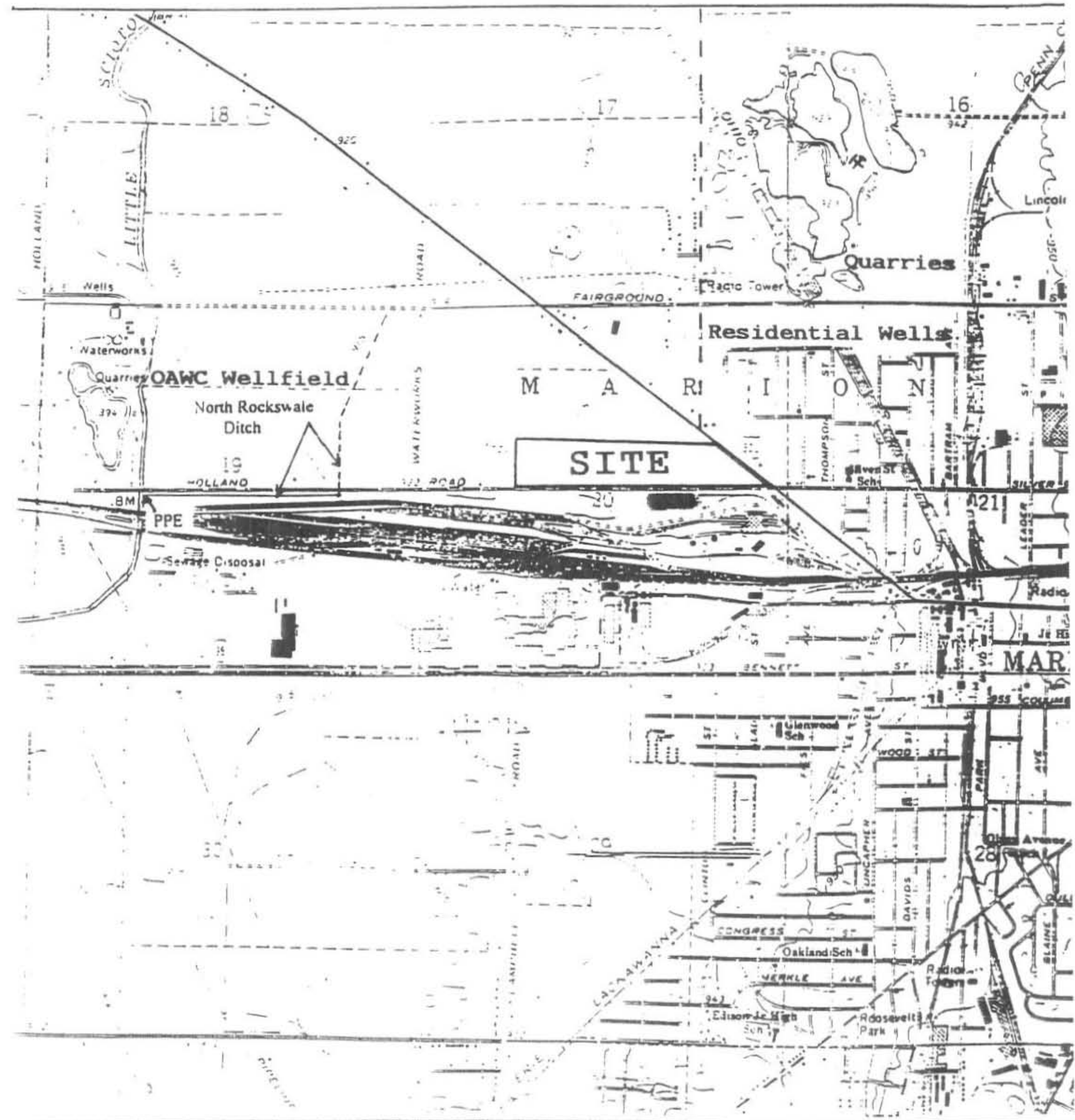
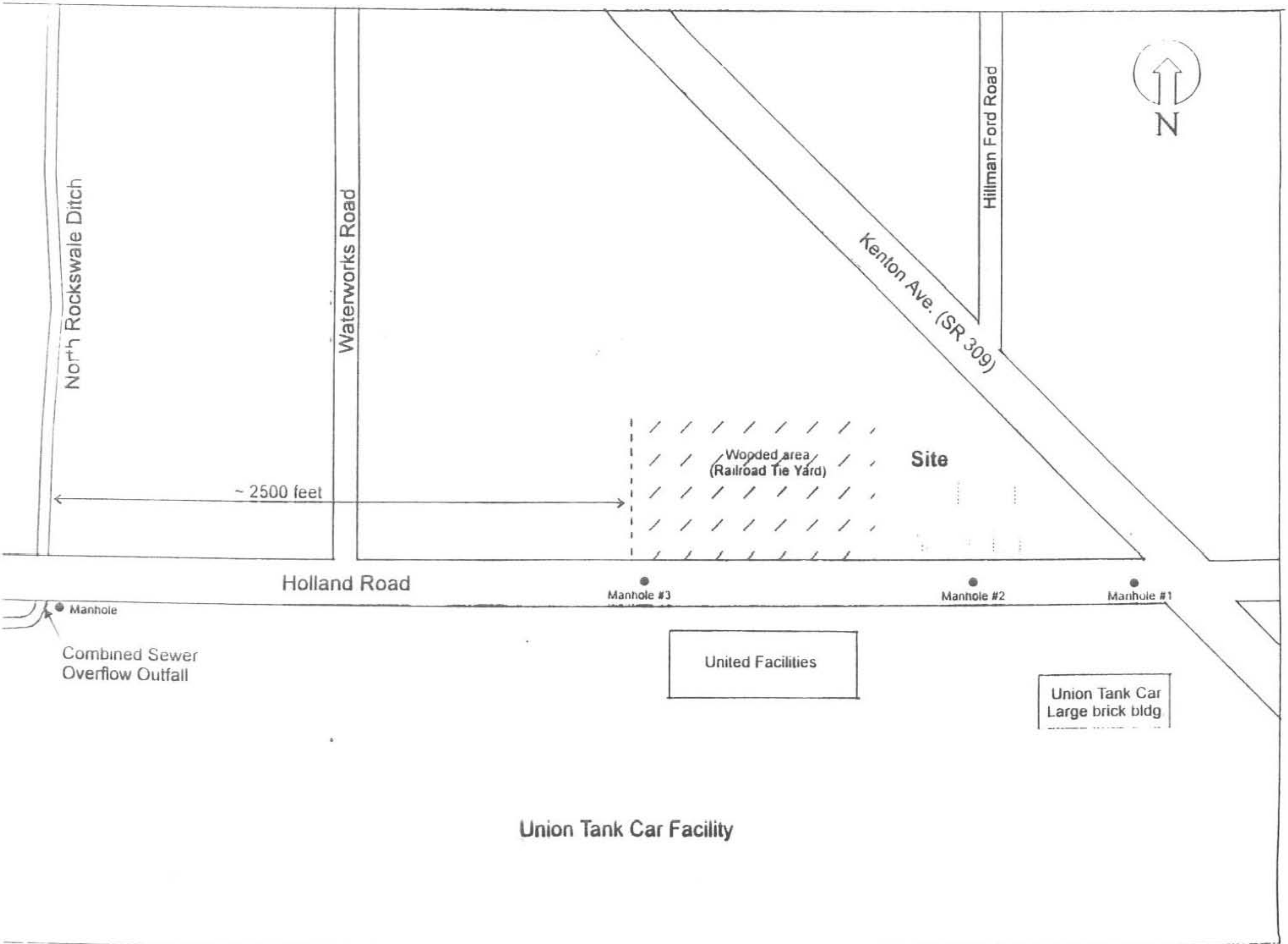
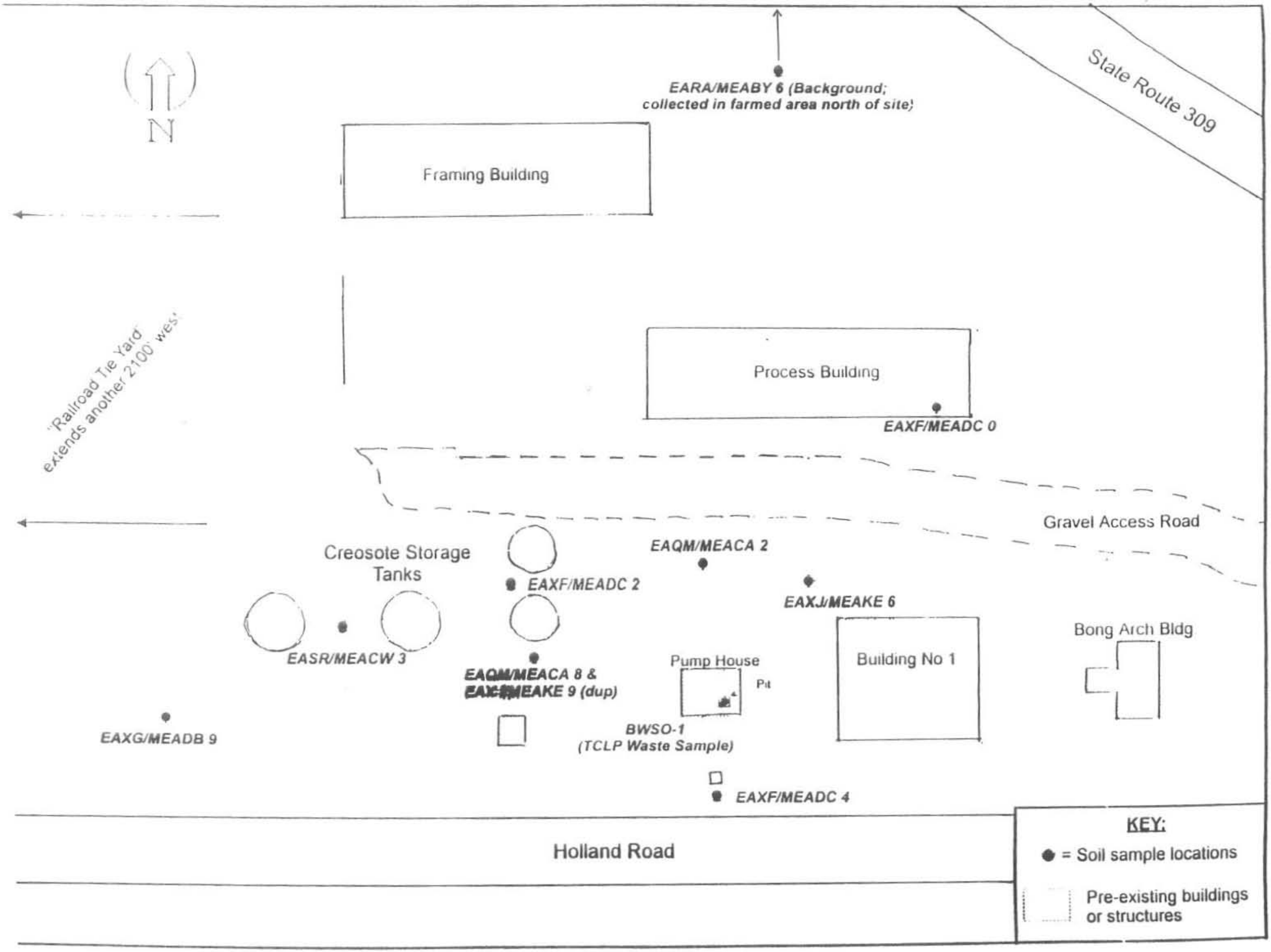


Figure 1: Baker Wood Creosoting - Site Location Map


N
North Rockswale Ditch
Waterworks Road
Kenton Ave. (SR 309)
Hillman Ford Road
Wooded area
(Railroad Tie Yard)
Site
~ 2500 feet
Holland Road
Manhole #3
Manhole #2
Manhole #1
Manhole
Combined Sewer
Overflow Outfall
United Facilities
Union Tank Car
Large brick bldg
Union Tank Car Facility



GURE 3 Baker Wood Creosoting Site - Soil Sample Location Ma

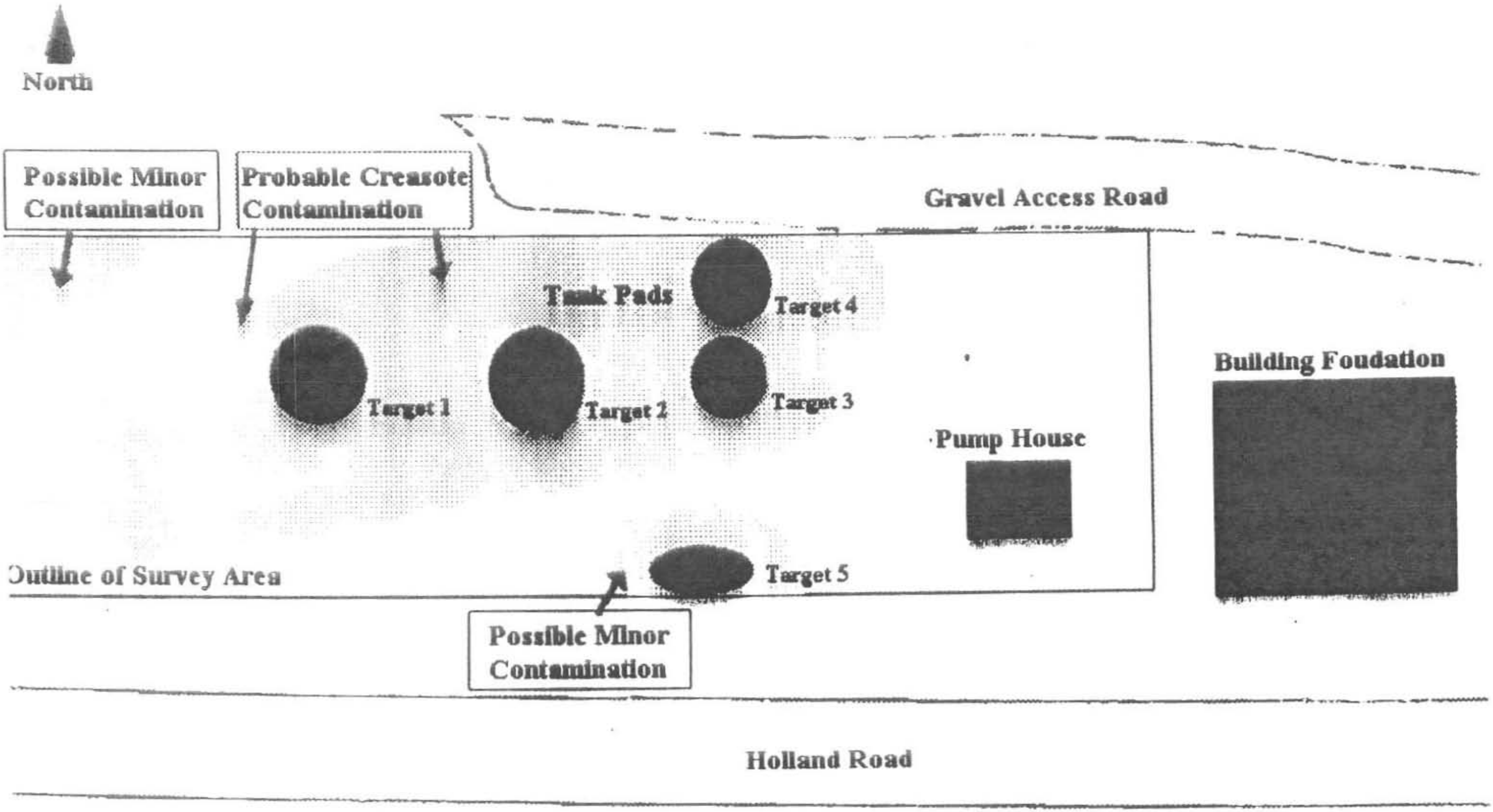


FIGURE 4 Distribution of creosote wastes (US EPA, 1999)

CERTIFICATION

This Baker Wood Creosoting Health Consultation was prepared by the Ohio 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.

Alan W. Yarbrough

Technical Project Officer, SPS, SSAB, DHAC, ATSDR

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

Richard Gillig

Chief, State Program Section, SSAB, DHAC, ATSDR