Public Health Assessment for

STARR PROPERTY
ENFIELD, HARTFORD COUNTY, CONNECTICUT
NOVEMBER 15, 1994

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104 (i) (6) (F) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risks assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

PUBLIC HEALTH ASSESSMENT

STARR PROPERTY

ENFIELD, HARTFORD COUNTY, CONNECTICUT

Prepared by

Connecticut Department of Public Health and Addiction Services
Under Cooperative Agreement With The
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6), and in accordance with our implementing regulations 42 C.F.R. Part 90). In preparing this document ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment 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.

Additional copies of this report are available from:
National Technical Information Service, Springfield, Virginia
(703) 487-4650

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, is an agency of the U.S. Public Health Service. It was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists then evaluate whether or not there will be any harmful effects from these exposures. The report focuses on public health, or the health impact on the community as a whole, rather than on individual risks. Again, ATSDR generally makes use of existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further research studies are needed.

Conclusions: The report presents conclusions about the level of health threat, if any, posed by a site and recommends ways to stop or reduce exposure in its public health action plan. ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions

of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

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SUMMARY

The Starr Property is a State designated Superfund site in the town of Enfield, Connecticut in Hartford County. The site represents an indeterminant public health hazard. Odors at the site and emanating from the site have been associated with headaches, however, ambient air testing has not identified contaminants at levels likely to elicit this response. Visible waste containing cyanide and polycyclic aromatic hydrocarbons is present at the surface. In addition, activities at the site including dirt bike riding may expose trespassers to levels of contamination not quantified during site investigations. (i.e. inhalation exposure to dust generated during dirt bike riding)

Investigations of the site were initiated by the Connecticut Department of Environmental Protection in 1989 following complaints about odors. It is believed that demolition debris from the destruction of a coal gasification plant were disposed of on-site in the 1960's resulting in site contamination. The site is a vacant parcel of land covering approximately 44 acres.

Surface soil, subsurface soil, ground water, surface water and sediments have been contaminated with cyanide as well as polycyclic aromatic hydrocarbons and some volatile organic compounds. The most significant exposures are occurring to people who trespass on the site and are involved in dirt bike riding that disturbs contaminated soils. Migration of contaminants off-site appears to be limited to ambient air, and surface water run-off. Groundwater may also be a potential route for migration of contaminants offsite.

The community has been very interested and concerned about the site. The nearest residential community is adjacent to the site. This area was developed in 1987.

In 1991, residents expressed concern about the site and cancer following the diagnosis of cancer in three residents near the site. A cancer investigation conducted by the Connecticut Department of Public Health and Addiction Services did not identify an overall increase of brain cancer or leukemia (the cancers of concern to the community) for the period 1979-1988.

We recommend that access to the site be restricted, private wells in East Windsor, south of the site be resampled and that remediation at the site occur as soon as possible to reduce the potential for exposure to the contaminants found at the site. Citizens living near the site should be informed of the site characteristics and the findings of this public health assessment.

ATSDR's Health Activities Recommendation Panel has reviewed the findings and conclusions of this Public Health Assessment. The panel has recommended that community health education occur and that the site be considered for inclusion in ATSDR's multi-site study of PAHs. The Connecticut Department of Public Health and Addition Services will conduct community health education for communities living near the site. A fact sheet on the site and the findings of this public health assessment will be developed and distributed to citizens living near the site.

BACKGROUND

A. SITE DESCRIPTION AND HISTORY

The Starr Property is a State designated Superfund site in the town of Enfield, Connecticut in Hartford County. The site covers approximately 44 acres of undeveloped land off Simon Road on the Enfield, East Windsor line. According to interviews with former employees, conducted by a private investigator, approximately 500-800 yards of coal gas filter wood chips were dumped at the site. Waste material and various demolition debris can be observed on approximately five acres of the site. This same area was reportedly used for sand quarrying prior to waste disposal.

Residential developments border the site to the north and northwest. A town right-of-way cuts across the site to allow access to a sewage pumping station located next to the Scantic River. The Scantic River is approximately 750 feet east of the site and flows southward. Steep gullies bound the site on the north and south edges. A central gully drains a small pond into a wetland near the Scantic River. (See Appendix A, Site Map)

The site includes both open and wooded areas. The perimeter of the site is heavily wooded. Areas of obvious contamination are not vegetated. These areas are primarily sand, dirt and debris.

Disposal of demolition debris occurred at the site during the late 1960's. Prior to this the site was used as a sand and gravel pit. It is believed that demolition debris from the destruction of a coal gasification plant was disposed of at the site.(17) This waste may have included coal tar holders made of cement and wood slats used to filter the gas.

The Connecticut Department of Environmental Protection (CT DEP) first investigated the site in June of 1989 following a citizen complaint.

Stained soil was identified at the site after an inspection by the CT DEP in June of 1989. Greenish slag deposits were also identified as the possible source of tar-like odors. In August of 1989, soil sampling indicated the presence of styrene, benzene, chromium, lead and barium. Mercury and cyanide were also detected during additional soil sampling.

The CT DEP issued an administrative order in July of 1990 requiring the owner to investigate the waste on-site and the potential impact of such wastes on human health and the environment.(17) The site is currently owned by Susan Starr and was privately owned by Enfield Road Construction during the 1960's when waste disposal was reported to have occurred. Ground Water, Inc., under contract to Ms. Starr, prepared a Preliminary Assessment dated February, 1991. The CT DEP prepared a scoring package in 1990 listing the site as a State Superfund Project. A Remedial Investigation for the site has been completed by Malcolm Pirnie, Inc..

The site is easily accessible by foot and all-terrain vehicles from the residential areas to the north. Trespassing at the site is evident. A locked gate prohibits vehicle access to the site from Simon Road.

B. SITE VISIT

On December 3, 1992, Jennifer Kertanis of the Connecticut Department of Public Health and Addiction Services, Division of Environmental Epidemiology and Occupational Health (CT DPHAS) conducted a site visit. Jennifer Kertanis was joined by staff from the CT DEP.

During an inspection of the site, Jennifer Kertanis made the following observations. These observations are not presented in order of significance.

-a strong odor similar to that of tar was evident as we approached the boundary of the property from the residential area, the air was still on this day
-a recent snow fall had coated the open areas
-dirt and sand had been dug up and exposed by dirt bikes and all-terrain vehicles
-exposed dirt was a blue-green color in some places
-the remains of wood slats and grates were evident throughout the barren areas of the site
-a mature forest surrounds the perimeter of the site, a younger forest is present within the Scantic River floodplain
-no growth or ground cover existed in areas where discolored soil was present or human activities (dirt bike riding) were evident
-odors were strong by the wetland area that drains the small on- site pond
-orange liquid was evident draining out of the central gully and into the wetland area

C. DEMOGRAPHICS, LAND USE, AND NATURAL RESOURCE USE

Approximately 350 people live in the residential area adjacent to the site which includes Patricia Circle, Kelly Drive, Celtic Court and Shannon Drive. This residential area was developed in 1987. A few homes also exist on Simon Road near the entrance to the Starr Property. Another nearby residential area is east of the Scantic River.

The residential areas near the site are predominantly white, middle class families. Many young children live in these homes.

The Starr Property is surrounded by woods. Deep gullies provide barriers on the northern and southern edges of the site. These gullies drain east to the Scantic River. Surface water run-off onto residential areas is not possible due to the drainage provided by these gullies. It is possible to pass over or through these gullies in many places.

Signs are posted around the perimeter of the site warning of the environmental contamination. A locked gate prohibits vehicle access to the site from Simon Road. The perimeter of the site is not fenced. It is evident that trespassing and recreational activities occur on site. Dirt bike tracks are apparent.

The Scantic River is approximately 750 feet east of the site and flows southward. This River is classified as Bc by the CT DEP. This means that the river is slightly degraded, not suitable for direct human consumption and supports a cold water fishery.

All of the homes in the residential neighborhoods in Enfield near the site are connected to the public water supply. There are a few homes, approximately 2,000 feet south of the site, in East Windsor, that have private wells.

There are three public water supplies within a one mile radius of the site.(14) They include the Hazardville Water Co. Neelan Park Well, the Hazardville Water Co. Grant Road Well, and the Hazardville Water Co. Town Farm Well. The nearest public water supply is the Grant Road Well approximately 3200 feet northeast of the site. All of these wells are on the east side of the Scantic River.

A shallow and a deep aquifer exist at the site. A 70-120 foot thick clay layer acts as an aquitard restricting groundwater between the two aquifers. Groundwater in the shallow aquifer on the west side of the site flows westward toward the northern gully. Groundwater in the shallow aquifer on the east side of the site flows northeast toward the pond and its tributaries. Groundwater discharges to the gullies and pond. The deep aquifer has not been thoroughly characterized.

D. HEALTH OUTCOME DATA

In April of 1991 residents living near the Starr property expressed concern about the recent diagnosis of three cases of cancer in residents near the property. In response, CT DPHAS gathered data from the Connecticut Tumor Registry for the town of Enfield.

The Connecticut Tumor Registry allows us to evaluate whether specific tumors have occurred more often than would be expected in a given town during a specific time period.

Information on the total number of tumors in Connecticut was collected for the years 1979-1988. The rates of new tumors occurring in individuals in specific age groups was calculated for brain cancer and leukemia (the cancers of concern to the citizens) for Enfield. These age-specific tumor rates for Enfield were compared with those for the State. The observed versus expected tumor incidence rates were compared to determine whether the number of tumors occurring in Enfield were more than would be expected. The results are discussed in the Public Health Implications section.

COMMUNITY HEALTH CONCERNS

Community health concerns have been gathered from a number of different sources. Since the initial site discovery and investigation, citizen concerns have been logged with the CT DEP. In addition, citizens have expressed concerns directly to CT DPHAS during CT DEP meetings and site visits. In addition, Jennifer Kertanis and Kenny Foscue of CT DPHAS delivered an introductory memo and fact sheet during the initial stages of the public health assessment process. (See Appendix B) This memo encouraged citizens to call with any health concerns or questions regarding the site. The following is a list of the citizens concerns that have been expressed to date.

1. What is causing the odors at the site and can this make us sick?

2. Should we be concerned about adverse effects the site might pose to pregnant women?

3. There are some cancers in the neighborhood, are these cancers caused by the site?

4. Are the contaminants that were found on the site on our properties?

5. Dirt bike riders stir up dust, is the inhalation of this dust harmful to people living in the nearby neighborhoods?

6. Headaches occur when odors from the site are evident, is it possible that the odors are causing the headaches?

Prior to this public health assessment, CT DPHAS was asked to review and comment on data collected by the CT DEP to address some of the citizens concerns early in the site investigation. Appendix C includes copies of correspondence addressing our review of early data and the potential health significance of contaminants found at the site.

The Connecticut Department of Public Health and Addiction Services placed a notice in the **Enfield Press**, the **Hartford Courant**, and the **Manchester Journal Inquirer** inviting comments on the Public Health Assessment for the Starr Property site. In addition to these newspaper notices, copies of the public health assessment were sent to the local public library, town hall, health district, and president of the local citizens group. During the comment period between April 15 to May 15, 1994, no public comments were received.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

Investigations of the Starr Property began in 1989 following complaints to CT DEP about odors. Soils, waste, soil gas, ground water, domestic wells, surface water, sediments and air have been sampled during these investigations.

The following discussion and data tables present the contaminants identified for further evaluation.

Contaminants are presented by the media in which they were found. The contamination is also broken into on-site and off-site. The listed contaminant does not mean that it will cause adverse health effects from exposures. The list indicates which contaminants will be discussed further in the public health assessment. These contaminants were selected based upon the following factors:

1. Comparison of on-site and off-site concentrations with public health assessment comparison values for noncarcinogenic and carcinogenic endpoints.
2. Community health concerns.
3. Concentrations of contaminants on and off site.
4. Comparison of on-site and off-site concentrations.
5. Field data quality, laboratory data quality and sample design.

We evaluate these contaminants in the subsequent sections of the public health assessment and determine whether exposure to them has public health significance.

Tables in Appendix E include the comparison values that were used to identify contaminants for further evaluation.

A. ON-SITE CONTAMINATION

Soil

In August of 1989, CT DEP collected surface soil (0-2 inch depth) and waste samples in five locations within the areas of obvious contamination. All five samples were tested for semivolatile organic compounds, four of the five samples were tested for metals and one of the five samples was tested for volatile organic compounds and cyanide. (See Appendix D, Sampling locations)

During the Remedial Investigation, soil and waste samples were collected at twenty locations. Samples were taken at varied depths including borings. These samples were analyzed for metals, semivolatile organic compounds, volatile organic compounds and cyanide. (See Appendix D, Sampling locations)

Tables 1 and 2 list the contaminants identified for further evaluation. Table 1 represents sampling of surface soil, 0-2 inches, and Table 2 represents sampling of soil and waste deeper than 2 inches.

Table 1
Concentrations of Contaminants
Identified for Further Evaluation
Surface Soil 0-2 inch depths
On-Site

CONTAMINANT	CONCENTRATION RANGE PPM*
naphthalene	ND-2700
2-methylnaphthalene	ND-90
acenaphthene	ND-72
dibenzofuran	ND-130
fluorene	ND-21
phenanthrene	ND-450
anthracene	ND-140
pyrene	ND-270
benzo(a)anthracene	ND-84
chrysene	ND-74
benzo(a)pyrene	ND-53
lead	37-1200
arsenic	0.8-3.5
cyanide (total)	180-640

*PPM-parts per million
*ND-not detected
See Appendix E for complete table with comparison values

Table 2
Concentrations of Contaminants
Identified for Further Evaluation
Subsurface Soil Deeper than 2 inches
On-Site

CONTAMINANT	CONCENTRATION RANGE PPM*
arsenic	0.8-86
lead	3.2-483
cyanide (total)	ND-582
cyanide (amenable)	ND-502

*PPM-parts per million
*ND-not detected
See Appendix E for complete table with comparison values

Because the use of dirt bikes and all terrain vehicles has disrupted soils in areas of obvious contamination, we looked at subsurface soil contamination as part of our exposure assessment. Polycyclic aromatic hydrocarbons, such as acenaphthene, fluorene, phenanthrene and benzo(a)pyrene, were detected at higher concentrations in surface soils as was lead and total cyanide. Arsenic was detected at higher concentrations in subsurface soil. There was no amenable cyanide detected in surface soil but it was detected in subsurface soil. Amenable cyanide is cyanide that is available for reaction within the human body if exposure were to occur.

Soil Gas Survey

A soil gas survey was done on-site to screen for the presence of volatile organic compounds in the subsurface soils and to determine whether coal gasification waste or other volatile organic compounds were in soil and groundwater. On May 29, 1992, Malcolm Pirnie, Inc. surveyed a 200 square foot area where obvious waste was present. Twenty-five samples were taken.

Volatile organic compounds were detected at very low levels in the southeastern corner of the survey area. These readings correlated with observable surface waste and did not indicate that substantial amounts of buried organic wastes were present.

Ground Water Monitoring Wells

Eleven ground water monitoring wells were sampled during the Remedial Investigation. (See Appendix D, Well locations) Eight shallow overburden wells and three deep wells were sampled in two rounds. During these two sampling rounds, ground water was sampled for volatile organic compounds, semivolatile compounds, metals and cyanide. Table 3 lists the contaminants identified for further evaluation.

Table 3
Concentrations of Contaminants
Identified for Further Evaluation
Ground Water Monitoring Wells
On-Site

CONTAMINANT	CONCENTRATION RANGE PPB*
arsenic	ND-31
lead	ND-50
cadmium	ND-40
mercury	ND-7
cyanide (total)	ND-230
cyanide (amenable)	ND-90

*PPB- parts per billion
*ND-not detected
See Appendix E for complete table with comparison values

Carbon disulfide was detected in one shallow well during the first round of sampling but was not detected in that same well during the second round of sampling. Xylene and toluene were detected in one shallow well during the second round of sampling. These contaminants were found at levels well below comparison values. The results of the deep groundwater samples indicate that waste disposal has not adversely affected deep groundwater quality.

Leachate

Leachate was sampled during the Remedial Investigation at three locations. (See Appendix D, Sampling locations) These samples were analyzed for volatile organic compounds, semivolatile organic compounds, cyanide and metals. Table 4 lists the contaminants identified for further evaluation.

Table 4
Concentrations of Contaminants
Identified for Further Evaluation
Leachate
On-Site

CONTAMINANT	CONCENTRATION RANGE PPB*
benzene	ND-43
naphthalene	ND-70
cyanide (total)	40-500
cyanide (amenable)	ND-500

*PPB-parts per billion
*ND-not detected
See Appendix E for complete table with comparison values

Toluene, xylene and carbon disulfide were also detected in leachate at concentrations below levels of health concern.

Sediment and Surface Water

In May 1990, CT DEP collected seven surface water samples and nine sediment samples on-site. (See Appendix D, Sampling locations) These samples were analyzed for volatile organic compounds, semivolatile organic compounds, cyanide and metals. Table 5 and 6 list the contaminants identified for further evaluation.

Table 5
Concentration of Contaminants
Identified for Further Evaluation
Sediment
On-Site

CONTAMINANT	CONCENTRATION RANGE PPM*
cyanide (total)	0.04-270
cyanide (amenable)	ND-240

*PPM-parts per million
*ND-not detected
See Appendix E for complete table with comparison values

Table 6
Concentration of Contaminants
Identified for Further Evaluation
Surface Water
On-Site

CONTAMINANT	CONCENTRATION RANGE PPM*
naphthalene	ND-0.057
cyanide (total)	ND-1.4
cyanide (amenable)	ND-1.1

*PPM-parts per million
*ND-not detected
See Appendix E for complete table with comparison values

No volatile or semivolatile organic compounds were detected in surface water except for naphthalene. Concentrations of volatile and semivolatile compounds were very low in sediments. The gullies and pond drain into a wetland area that feeds the Scantic River. Migration of contaminants from on-site surface water to off-site areas is possible.

Ambient Air

In October, 1990, CT DEP conducted one day of on-site air sampling at one upwind, two downwind, and two on-site locations with obvious soil contamination. (See Appendix D, Sampling locations) Sorbent tube samples were used during sampling events of thirty minutes each. The sampling included volatile organic compounds, cyanide, and petroleum distillates.

In December, 1991, CT DEP conducted one day of air screening tests in areas where odors were strong versus areas where odors were not evident. Nine test sites were sampled for phenol and hydrogen cyanide using detector tubes. There was only one positive sample of hydrogen cyanide however the detector tube had expired so the hydrogen cyanide concentration of 0.25 ppm was approximated. Hydrogen cyanide was not detected during any of the more thorough air sampling events therefore the result of 0.25 ppm is considered only qualitatively.

On February 22 and 23, 1992, two days of air sampling was performed. Volatile organic compounds, semivolatile organic compounds and hydrogen cyanide were sampled for. Three on-site locations were sampled for seven hour periods. (See Appendix D, Sampling locations) The three on-site sampling locations included areas of obvious soil contamination and a leachate outbreak area. Toluene and styrene were the only two contaminants detected at concentrations well below health comparison values.

In August, 1992, additional air sampling was conducted for one twenty-four hour period. High temperatures and low winds increased the likelihood of capturing a "worst case scenario" with respect to pollutant off-gassing from the soil. Samples were tested for forty-three volatile organic compounds and twenty polycyclic aromatic hydrocarbons. One on-site sample was taken in an area of obvious soil contamination. Seven VOC's and five PAH's were detected at concentrations similar to background and well below levels of public health concern.

The characteristic almond-like odor of cyanide has been identified at the site, however air sampling has not quantified cyanide either on-site or off-site.

Table 7 lists the contaminants identified for further evaluation detected in ambient air. The table includes contaminants detected during all of the ambient air sampling events. The sampling date indicates the date that the highest concentrations was detected.

Table 7
Concentration of Contaminants
Identified for Further Evaluation
Ambient Air
On-Site

CONTAMINANT	CONCENTRATION RANGE PPB*	SAMPLING DATE*
benzene	ND-7	10/1990
trichloroethylene	ND-68	10/1990

*PPB-parts per billion
*ND-not detected
See Appendix E for complete table with comparison values

B. OFF-SITE CONTAMINATION

Soil Gas Survey

Two phases of soil gas surveys were done in the residential areas northwest of the site in September of 1992 by Malcolm Pirnie, Inc. Phase one screened for the presence of volatile organic compounds and phase two was done to determine whether any volatile organic compounds detected were from buried waste.

Results of the soil gas survey indicate that while low levels of non-methane volatile organic compounds were detected in the residential soil gas survey, they are not related to coal gasification wastes and are likely due to background.

Sediment and Surface Water

Off-site surface water and sediment samples were taken in the Scantic River in September 1989 by the CT DEP and during the Remedial Investigation. CT DEP sampling in 1989 included three sampling locations, one upstream, one downstream and one adjacent to the site. (See Appendix D, Sampling locations) Sampling during the Remedial Investigation included ten locations. (See Appendix D, Sampling locations) Tables 8 and 9 list the contaminants identified for further evaluation.

Table 8
Concentration of Contaminants
Identified for Further Evaluation
Sediment Off-Site

CONTAMINANT	CONCENTRATION RANGE PPM*
arsenic	1.4-6.8
cyanide (total)	ND-10
cyanide (amenable)	ND-7.7

*PPM-parts per million
*ND-not detected
See Appendix E for complete table with comparison values

Table 9
Concentration of Contaminants
Identified for Further Evaluation
Surface Water Off-Site

CONTAMINANT	CONCENTRATION RANGE PPM
cyanide (total)	ND-.21
cyanide (amenable)	ND-0.03

*PPM-parts per million
*ND-not detected
See Appendix E for complete table with screening values

The highest concentrations of contaminants were found in samples adjacent to or down stream from the site indicating that migration of contaminants through surface water is occurring.

Ambient Air

During the February 22 and 23, 1992, air sampling event, four off-site sampling locations were located in the residential area. (See Appendix D, Sampling locations) Odors were present during these sampling events. Toluene and styrene were detected at two of the four homes. The highest concentrations of toluene and styrene, were well below levels of health concern.

Four off-site sampling locations were monitored during the August 1992 sampling event which occurred over one twenty-four hour period. Ten volatile organic compounds and five polycyclic aromatic hydrocarbons were detected in the residential areas. Four of the volatile organic compounds detected in the residential areas were not detected in the on-site sample. Driveway sealing was occurring in the residential neighborhood during the testing. This could explain the levels of PAHs found in residential areas and not on-site. Table 10 lists the contaminants identified for further evaluation in the off-site ambient air sampling.

Table 10
Concentration of Contaminants
Identified for Further Evaluation
Ambient Air Off-Site

CONTAMINANT	CONCENTRATION RANGE PPB*
benzene	ND-0.5
tetrachloroethylene	ND-5.5

*PPB-parts per billion
*ND-not detected
See Appendix E for complete table with comparison values

Private Wells

Private wells approximately 2,000 feet south of the site in East Windsor were sampled on several occasions in 1989 and 1990 by CT DEP.

In August of 1989 five homes on Melrose Place were sampled for physical parameters, hydrocarbons, organohalides, heavy metals and cyanide. During this sampling, no organics or hydrocarbons were detected in any of the five wells. Low concentrations of cyanide were detected in three of the wells, the highest concentration was 0.03 ppm. The Action Level for cyanide in water is 0.20 ppm.

In September of 1989, four homes on Yosky Road were sampled for physical parameters, hydrocarbons, organohalides, semivolatile organics, heavy metals and cyanide. During this

sampling, trace concentrations of 1,1,1-trichloroethane (< 1ppb) were detected in all four wells. Two wells also had trace levels of silver (0.008 ppm).

In October of 1989, three homes on Melrose, previously sampled during the August 1989 sampling and one home on Yosky, previously sampled in September of 1989 were again sampled. No cyanide or volatile organic compounds were detected in confirmatory sampling. All other parameters were well within acceptable water quality parameters.

In October of 1990 a deep and shallow well on Yosky were sampled. The resident complained about a sheen on water drawn from the shallow well. Acetone (220 ppb), toluene (370 ppb) and methyl ethyl ketone (470 ppb) were detected in the shallow well. Nothing was found above health comparison values in the deep well.

In November of 1990, two additional homes on Yosky were sampled. These homes were on either side of the property with the shallow and deep wells. Nothing was found above health comparison values in either of the wells.

C. QUALITY ASSURANCE AND QUALITY CONTROL

Environmental data was collected at the Starr property by CT DEP and Malcolm Pirnie, Inc.. The QA/QC procedures outlined as part of the Remedial Investigation Work Plan were reviewed and appeared to be satisfactory. QA/QC procedures for a variety of sampling activities conducted by CT DEP were not reviewed. Some data from these sampling events is questionable. Air sampling conducted by CT DEP in December of 1991 utilized sorbent tubes for hydrogen cyanide with expired dates. These results were approximated. In addition, one private well sample was high in acetone and methyl ethyl ketone suggesting laboratory contamination.

D. PHYSICAL AND OTHER HAZARDS

No physical hazards were identified.

PATHWAY ANALYSIS

In this section we evaluate whether residents were, are, or could be exposed to contamination on the site or migrating from the site. In order for an exposure to be complete five elements must be present: a source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure and an exposed population. A potential exposure pathway exists if one of the five elements is missing but could exist. An exposure pathway can be eliminated if at least one of the elements is missing and will never be present.

COMPLETED EXPOSURE PATHWAYS

Soil Pathway

Soil contamination has resulted from historic waste disposal practices. Past, present and future exposures are possible from contamination of surface and subsurface soils on-site. People who trespass on the site maybe exposed to contamination in the soil through incidental ingestion, inhalation of soil particles, and dermal contact. Individuals who ride dirt bikes and all-terrain vehicles are at greatest risk due to the disruption of the soil during these activities. The exposed, unvegetated areas on site are the most likely exposure points and also represent the areas where the most significant soil contamination was found. Surface and subsurface soils have been contaminated with naphthalene, polycyclic aromatic hydrocarbons and some metals including lead, arsenic and cyanide.

Ambient Air Pathway

Past, present and future exposures are possible from contamination of the ambient air. Inhalation of contaminants in the air may occur on-site and in nearby residential areas. Volatile organic compounds have been detected in the air both on-site and in the residential neighborhoods. Odors have also been evident in these areas. On-site activities including dirt bike riding in areas of obvious soil contamination, may cause soil contaminants to become airborne and dispersed into residential areas.

Ground Water Pathway -Private Wells

Past, present and future exposures to contaminated water are possible for residents drinking water from private wells on the Enfield, East Windsor line, south of the Starr property. Low concentrations of cyanide have been found in several private wells. In addition, acetone, toluene, and methyl ethyl ketone were detected in one shallow well. These results are questionable, however, due to possible laboratory contamination.

Surface Water and Sediment

Past, present and future exposure to contaminated sediment and surface water may occur for individuals who trespass on the site or recreate in the down stream areas of the Scantic River. Trespassers on the site may come in direct contact with leachate, surface water and sediment while engaging in recreational activities including dirt bike riding. Dermal contact with site contaminants is possible. Leachate, surface water and sediments have been contaminated with cyanide, benzene, naphthalene and arsenic.

The most significant contamination of sediments and surface water was found on-site, however, cyanide and arsenic were detected in off-site samples. This is likely the result of contaminant transport in surface water from the site to the Scantic River.

PUBLIC HEALTH IMPLICATIONS

A. Toxicological Evaluation

In this section, we discuss the adverse health effects that could occur in people exposed to site contaminants. To understand the health effects that might be caused by a specific chemical, it is helpful to review factors related to how the human body processes such a chemical. Those factors include the exposure concentration (how much), the duration of exposure (how long), the route of exposure (breathing, eating and drinking, or skin contact), and the multiplicity of exposure (environmental media, routes of exposure, and combinations of contaminants). Once exposure occurs, a person's individual characteristics such as age, sex, diet, general health, lifestyle, and genetics, influence how the body absorbs, distributes, metabolizes, and excretes the chemical. Together those factors determine health effects that exposed people might have.

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. MRLs are developed for oral and inhalation exposure routes, and for duration of exposure (acute: 14 days or fewer; intermediate: 15-364 days; chronic: 365 days or more).

Minimal Risk Levels are compared to human exposure doses. Exposure doses are calculated by making certain assumptions about contaminant concentration, duration of exposure and route of exposure based on site characteristics and human activities at the site. It is not always possible to calculate an exposure dose due to lack of information. Where possible, exposure doses have been calculated and reported in the following discussion of specific contaminants.

ATSDR publishes MRLs in its series of chemical-specific documents called Toxicological Profiles -- documents that describe health effects, environmental transport, human exposure, and regulatory status of a chemical. Preparers of this public health assessment have reviewed those profiles for the contaminants of concern at this site.

Arsenic

Arsenic was detected in soil (86 ppm), sediments (6.8 ppm) and ground water monitoring wells (31 ppb).

People may be exposed to arsenic in soil and sediment through dermal contact, inhalation of soil that may become airborne during site activities and incidental ingestion.

Dermal exposure to inorganic and organic arsenicals have not been studied extensively. No quantitative data on dermal exposure to organic arsenicals were located. Some studies of workers exposed to arsenic dust report that inorganic arsenic can cause contact dermatitis. Studies suggest that direct contact is of concern at high exposure doses but do not suggest a problem at lower exposure doses. It is not likely that dermal exposure to the arsenic at

concentration found at the site would cause contact dermatitis. No studies were found regarding neurological, developmental, reproductive, genotoxic, or cancer effects following dermal exposure to arsenic.

Workers who inhaled inorganic arsenic dusts in air experienced irritation of the nose and throat. These minor effects were absent at exposure levels around 0.1 - 1 mg/m3. No studies of respiratory effects following exposure to organic arsenic were found in humans. Other occupational studies of workers exposed to arsenic dusts indicate that arsenic dust can cause nausea, vomiting, and diarrhea at high concentrations.

Inhalation exposure to inorganic arsenic dust increases the risk of lung cancer. We do not know the concentrations that dirt bike riders may be exposed to, however, we do not feel that this type of incidental exposure is likely to significantly increase the risk of lung cancer in these individuals.

No adverse health effects would be expected from incidental ingestion of arsenic at the concentrations found at the site. Exposure doses of .000017 mg/kg/day for adults and .00049 mg/kg/day for children were calculated using conservative assumptions about exposure. The Minimal Risk Level established by ATSDR for ingestion is .0003 mg/kg/day.

Benzene

Benzene has been detected in leachate and ambient air both on-site and off-site.

Benzene was detected in on-site leachate at 43 ppb. Dermal exposure to leachate may occur to trespassers on-site. Benzene is slightly irritating to the skin and acts by defatting the keratin layer of the skin. Skin irritation is unlikely to occur in persons who may come in contact with the benzene in leachate at 43 ppb. Absorption of benzene through the skin is minimal.

Benzene was detected in ambient air samples. The highest concentration detected on-site was 7 ppb and the highest concentration detected off-site was 0.5 ppb. People are exposed to benzene on a daily basis primarily from benzene in the air. Background levels of benzene in the air range from 2.89-20 ppb. Chronic inhalation exposures to benzene have been studied in humans whose occupations include benzene exposure. Workers exposed to less than 1 ppm or 1,000 ppb for one to twenty-one years showed no changes in erythrocytes, leukocytes, thrombocytes, hemoglobin, or hematocrit. Benzene does cause leukemia. Studies documenting an increased risk of leukemia from benzene exposure involve benzene concentrations in the parts per million range, significantly higher than was found at the Starr property.

Cyanide

Amenable cyanide has been detected in subsurface soil (502 ppm), ground water monitoring wells (90 ppb), private wells (.03ppm), leachate (500 ppb), sediment (240 ppm) and surface water (1.1 ppm). Amenable cyanide is the more appropriate measure of cyanide toxicity.

People who trespass on the site may be exposed to cyanide through dermal contact with soil, sediment and surface water containing cyanide. Dermal exposure may also occur for people who are involved in recreation activities in and near the Scantic River. Incidental ingestion and inhalation exposure to cyanide may occur for people involved in dirt bike riding on-site. Private well users are exposed to cyanide through ingestion of water containing cyanide.

No studies were found regarding hematological, musculoskeletal or hepatic effects in humans or animals following dermal exposure to cyanide. Some cyanide compounds such as potassium cyanide have a corrosive effect on the skin which allows them to penetrate the skin rapidly. Sodium cyanide dust is reported to be irritating to the eyes. Skin irritation may also occur from contact with cyanide dust. Information regarding dermal exposure in the occupational setting identified significant neurological effects at concentrations much higher than was found at the site.

We cannot evaluate the exposure that may result from inhalation of soil dust generated during dirt bike riding. Respiratory changes are common in humans exposed to cyanide. Nasal irritation has been reported in humans exposed to 16 ppm cyanide for 6-8 minutes. No effects were reported after exposure to 8 ppm. Cardiovascular effects have been observed in persons accidentally poisoned with cyanide. Abdominal spasms have been reported after acute poisonings as well.

Exposure doses for adults and children were calculated assuming 0.03 ppm cyanide in water, an ingestion rate of 2 liter per day for adults and 1 liter per day for children. These exposure doses are well below the EPA Reference Dose of 0.02 mg/kg/day. No adverse health effects would be expected from drinking water containing cyanide at 0.03 ppm.

Lead

Lead was detected in surface soil and ground water monitoring wells above screening values. The concentration of lead in soil was 1200 ppm and the highest concentration in ground water was 50 ppb.

People who trespass at the site may be exposed to lead in soil through dermal contact, incidental ingestion and inhalation of soil dust.

Lead is not easily absorbed through the skin. No studies were found regarding adverse health effects following dermal exposure.

Ingestion and inhalation exposure to low levels of lead for long periods of time can cause lowered I.Q. and brain damage in children. It is unlikely that the concentrations of lead at the site would significantly change blood lead levels of people exposed. This assumes that both inhalation exposures and ingestion exposures are intermittent and incidental, like exposures that would occur during dirt biking activities.

Naphthalene

Naphthalene was detected on-site in soil (2,700 ppm), leachate (70 ppb) and surface water (57 ppb).

People who trespass on-site may be exposed to naphthalene through dermal contact and through inhalation of soil dust containing naphthalene.

There are very few studies describing dermal effects in humans or animals caused by exposures to naphthalene. No studies were found regarding respiratory, cardiovascular, gastrointestinal, or musculoskeletal effects in humans following dermal exposure. Jaundice was observed in infants exposed to naphthalene treated diapers. Naphthalene is a mild dermal irritant when directly applied to shaven skin of rabbits at 500 ppm for four hour duration. These effects were reversible within seven days after exposure. No studies were located regarding dermal effects in humans after exposure to naphthalene. It is not known whether the concentrations of naphthalene found at the site would cause skin irritation to people exposed to it.

Little information is available on the effects of breathing naphthalene on human health. Exposure to naphthalene in the home, primarily due to mothballs has been associated with headache, nausea, vomiting, abdominal pain, malaise, confusion, anemia, jaundice, and renal disease. Naphthalene was not detected during the air sampling events, however, naphthalene could become airborne during on-site activities including dirt biking. We do not know what concentrations people may be exposed to in air during these activities.

No adverse health effects would be expected from incidental ingestion of naphthalene at the concentrations found at the site. Exposure doses were calculated for adults, .000055 mg/kg/day, and children, .015 mg/kg/day using conservative assumptions about soil ingestion.

Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons (PAH's) were detected in on-site soils and waste. Benzo(a)pyrene, the most toxic of the PAH's was detected at concentrations as high as 53 ppm. Persons who trespass on-site, particularly those who engage in dirt-biking, may be exposed to PAH's through dermal contact and inhalation and incidental ingestion of soil particles.

Dermal exposure to a group of PAH's can cause skin disorders. Humans who received 120 dermal applications of 10,000 ppm benzo(a)pyrene over four months experienced reversible and apparently benign skin reactions. Adverse skin reactions in persons exposed to the PAH's in soil at the site are not likely.

Inhalation exposure to PAH's at the site may be possible due to activities at the site that could stir up and allow these contaminants to become airborne. No PAH's in air were detected during on-site or off-site sampling however, these sampling events did not occur when dirt bike riding on-site was occurring. No studies have been located regarding inhalation exposure to PAH's

and systemic, immunological, neurological, developmental, reproductive or genotoxic effects due to inhalation exposure to PAH's.

Epidemiological studies have shown increased death due to lung cancer in humans exposed to coke-oven emissions, roofing tar emissions, and cigarette smoke which all contain PAH's. Exposure from these activities are significantly higher and the duration longer than would occur at the site.

No adverse health effects would be expected from incidental ingestion of benzo (a) pyrene at the concentrations found at the site. Exposure doses were calculated for adults, .000011 mg/kg/day, and children, .00031 mg/kg/day using conservative assumptions about soil ingestion. The MRL for ingestion of benzo (a) pyrene is .01 mg/kg/day.

Tetrachloroethylene

Tetrachloroethylene was detected in ambient air in an off-site sample at 5.5 ppb. Intermittent exposure to tetrachloroethylene through inhalation may be occurring for residents in the nearby neighborhoods and trespassers on-site. At 5.5 ppb, the highest concentration detected at the site, no adverse health effects would be expected. ATSDR has set an Environmental Media Evaluation Guide of 9 ppb for inhalation of tetrachloroethylene for exposures lasting longer than 14 days but less than one year.

B. Health Outcome Data

Tumor incidence data was evaluated in an effort to address citizen concerns about cancer in the neighborhood around the Starr property. While this type of analysis may generate clues regarding the association between environmental exposures and disease outcomes, it must be stressed that such an association is not sufficient to establish a causal link. Many other factors may also contribute to the onset of disease, including diet, tobacco use, family history, age, race, occupation and socioeconomic factors.

Information on the total number of cancer cases in Connecticut and in Enfield was obtained from the CT DHS Tumor Registry. Since 1935 it has been required by law that all tumors diagnosed in Connecticut residents be reported to the Tumor Registry. Age specific cancer incidence rates were generated for Connecticut and Enfield for 1979-1988 by dividing the number of cases identified during the period in an age group by the population in that age group according to 1985 population statistics. We looked specifically at brain cancer and leukemia, the cancers of concern to citizens.

The standard incidence ratio (SIR) is an overall summary measure of the cancer risk. The SIR is calculated by multiplying the Connecticut cancer incidence rates by the population of the town to estimate an "expected" number of cancers in each age group. The actual (or observed) number of cases identified by the Tumor Registry are divided by the expected number to obtain the SIR. When the SIR is less than one the risk of cancer is less than expected. This method

allows for the inclusion of age as a risk factor in the analysis. Age is important to consider because generally speaking the risk of cancer varies with age.

Table 11 presents the standard incidence ratios for brain cancer and leukemia for Enfield.

Table 11
Standard Incidence Ratio of Selected Tumor Sites
Enfield, CT 1979-1988
1985 Population, 41,700

TUMOR SITE	OBSERVED / EXPECTED = SIR	95% CONFIDENCE INTERVAL
BRAIN	46 / 43.55 = 1.056	(0.75,1.36)
LEUKEMIA	30 / 38.56 = 0.77	(0.49,1.05)

* Confidence Interval: the range of values within which one can be 95% confident that the SIR is the true valued and has not occurred by chance.

The results of this analysis indicate that there was no overall increase of brain cancer or leukemia occurring in Enfield during the time period. We were only able to look at town statistics and could not look specifically at the area around the site. In addition, this type of study does not identify cause effect relationships between exposure and outcome. These issues limit the value of a negative study. We do believe that there is little biological plausibility of these cancers being caused by the site because exposure to carcinogens at levels and durations likely to cause cancer have not been documented at this site.

C. COMMUNITY HEALTH CONCERNS EVALUATION

We have addressed each of the community health concern as follows:

1. What is causing the odors at the site and can this make us sick?

The odors at the site have been described in two different ways, almond-like and coal tar-like. Cyanide has a characteristic almond-like odor. Polycyclic aromatic hydrocarbons may cause coal tar-like odors. Sampling events both on-site and off-site during periods when odors were strong have not identified cyanide or PAHs at levels of health concern. Hydrogen cyanide has an odor threshold of 0.58 ppm in air. (4) It is possible that these compounds can be smelled at levels lower than would cause an adverse health effect. People near the site have complained about headaches when odors

from the site are present. Based on the information about site contaminants and the concentrations of these contaminants in ambient air, we cannot explain why headaches are occurring from a toxicological standpoint. Investigations at similar sites with coal tar wastes have also identified strong odors however, aggressive air monitoring has not been successful in identifying or quantifying the causative agent(s).

2. **Should we be concerned about a pregnancy and the adverse effects the site might pose?**

   Ambient air sampling in the residential areas have not identified contaminants at concentrations likely to cause adverse health effects in residents, children, or pregnant women. Therefore, we do not feel pregnant women are at risk. Odors from the site have raised a number of concerns and may be contributing to headaches. Sampling data has not quantified levels of contamination likely to cause these headaches.

3. **There are some cancers in the neighborhood, are these cancers caused by the site?**

   After hearing concerns about brain cancer and leukemia in the neighborhoods surrounding the Starr property, we looked at cancer occurrence in Enfield. We did not find that brain cancer or leukemia were occurring at a greater rate than we would expect. The analysis used to look at cancer do have limitations. These studies do not identify cause effect relationships between exposure and outcomes. In addition, we were only able to look at town statistics and could not break that down to areas specifically surrounding the site. We do believe however that these tumors were not likely caused by exposure to the site. There is little known exposure occurring to carcinogens and the latency period for many tumors are longer than the potential exposure from site contamination. (The residential areas were developed in 1987.)

4. **Are the contaminants that were found on the site also on our properties?**

   Environmental sampling as well as historical information regarding past disposal practices at the site suggest that contamination is localized. The northern and southern gullies that border the site appear to have prohibited the dumping of waste in areas that later were developed into residential areas. In addition, soil gas sampling in residential areas did not reveal the presence of waste. Migration of site contaminants seems to be restricted to surface water and air emissions.

5. **Dirt bike riders stir up dust, is this harmful to people living in the nearby neighborhoods?**

   Ambient air sampling on-site and off-site have not been conducted during periods of dirt bike riding or invasive site activities. It is possible that dust generated during these activities could reach the nearest residential areas. We do not have enough information to assess the levels of contamination that might become airborne during these activities. We have considered the risk to dirt bike riders in a qualitative manner in the Toxicological Implication

Section and feel the risk to people in the residential areas would be significantly lower. However, we strongly recommend that dirt bike riding and other on-site activities be prohibited.

6. **Headaches seem to occur when odors from the site are evident, is it possible that the odors are causing headaches?**

   Ambient air sampling both on-site and in the residential neighborhoods have not identified contamination in the air at concentrations likely to cause adverse health effects. Some of the contaminants found at the site have very low odor thresholds which means you can smell them at concentrations lower than the levels in which harmful health effects might occur. It is possible that exposure to coal tar products may play a role in citizen complaints of headache through an odor-mediated mechanism.

CONCLUSIONS

1. This site represents an indeterminant public heath hazard. Odors present at the site have been associated with headaches, however, ambient air testing has not identified contaminants at levels likely to elicit this response. It is possible that headaches may be associated with an odor-mediated mechanism. In addition, activities at the site including dirt bike riding may expose trespassers to levels of contamination not quantified during site investigations. (i.e., inhalation exposure to dust generated during dirt bike riding)

2. Surface soils have been contaminated with PAHs, lead and cyanide.

3. The most significant exposures are to those who trespass on the site and disturb contaminated soils. These individuals are exposed to site contaminants through dermal contact, incidental ingestion and inhalation of dust.

4. Migration of contamination off-site appears to be limited to ambient air and surface water run-off. Groundwater may serve as a potential route for migration of contaminants offsite.

RECOMMENDATIONS

1. Site access should be restricted.

2. Additional well sampling should be done for homes located in East Windsor who had low levels of cyanide in their water.

3. Citizens living around the site should be educated about the site and the findings of this public health assessment.

4. Remediation should occur as soon as possible to further reduce the potential for exposure to the contamination found at the site.

Health Activities Recommendation Panel

The data and information evaluated in the public health assessment for the Starr Property, Enfield, Connecticut has been reviewed by ATSDR's Health Activities Recommendation Panel for appropriate follow-up with respect to health activities. The panel determined that community health education is indicated for this site. The panel also determined that this site should be considered for inclusion in ATSDR's multi-site study of PAHs. This study would evaluate rare health outcomes in populations that were exposed to PAHs.

PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan for the Starr site contains a description of actions to be taken by ATSDR and the Connecticut Department of Public Health and Addiction Services at and in the vicinity of the site subsequent to the completion of this public health assessment. The purpose of the Public Health Action Plan is to ensure that this public health assessment not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included, is a commitment on the part of ATSDR and CT DPHAS to follow up on this plan to ensure that it is implemented. The public health actions to be implemented are as follows:

1. The North Central Health District will sample private wells near the site in East Windsor. The results will be evaluated by the CT DPHAS.

2. The CT DPHAS will conduct community health education for communities living near the site. A fact sheet on the site and the findings of this public health assessment will be developed and distributed to citizens living near the site.

ATSDR will reevaluate and expand the Public Health Action Plan when needed. New environmental, toxicological, or health outcome data, or the results of implementing the above proposed actions may determine the need for additional actions at this site.

CERTIFICATION

The public health assessment for the Starr Property site was prepared by the Connecticut Department of Public Health and Addition 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 public health assessment was initiated.

Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this public health assessemnt and concurs with its findings.

Division Director, DHAC, ATSDR

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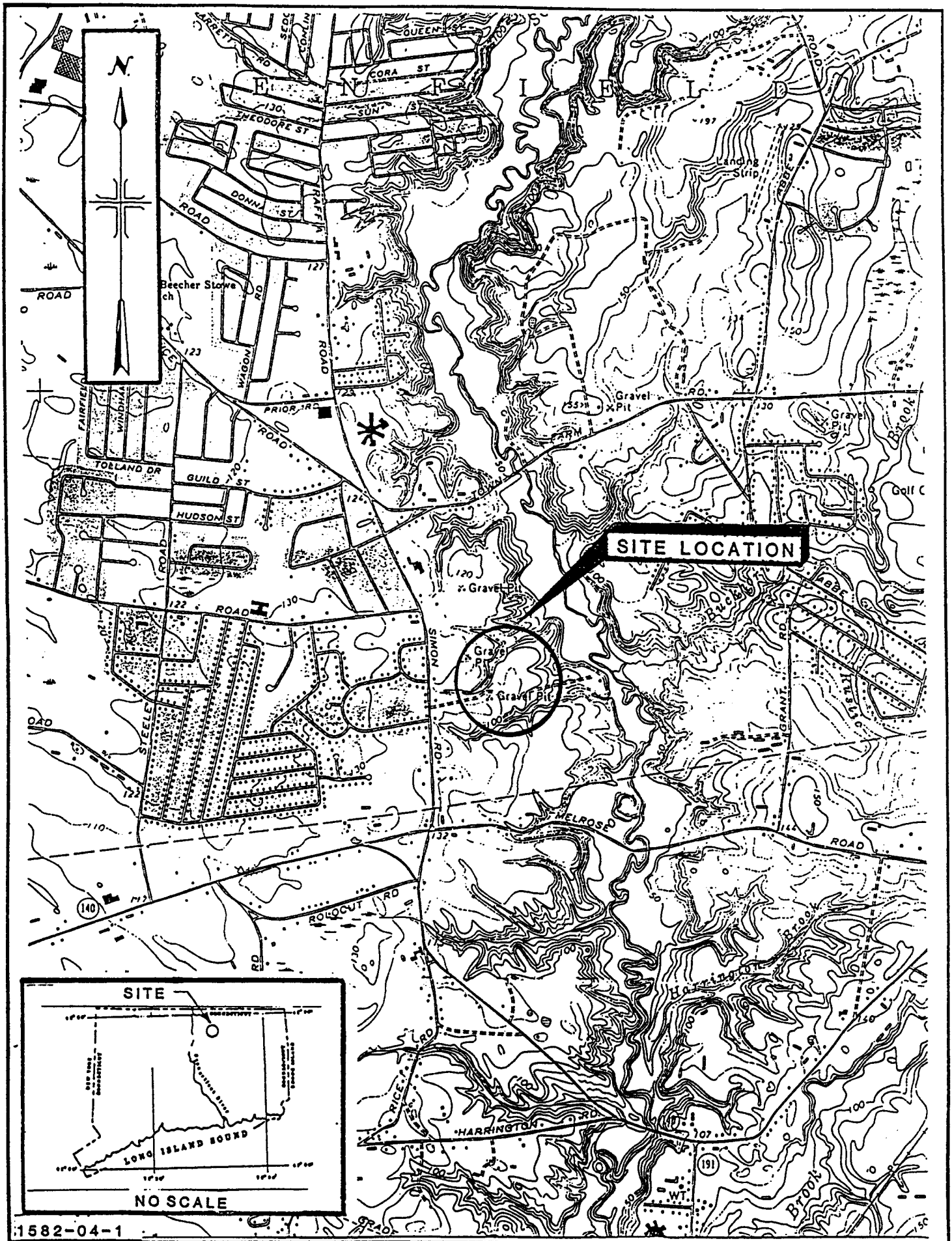
APPENDICES

APPENDIX A



MALCOLM PIRNIE

CTDEP-STARR PROPERTY SITE

SITE LOCATION MAP

SCALE: 1" = 2000'

MALCOLM PIRNIE, INC.

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APPENDIX B

STATE OF CONNECTICUT

DEPARTMENT OF HEALTH SERVICES

January 25, 1993

MEMO TO: Residents and Concerned Citizens Living Near the Starr Property
FROM: Jennifer C. Kertanis, Epidemiologist
Environmental Epidemiology and Occupational Health

For some time, the Department of Environmental Protection (CT DEP) has been investigating the environmental contamination at the Starr Property in Enfield. On a few occasions, our department has been asked to comment on the potential for adverse health effects based on some sampling data at the site. Our section is now working on a Health Assessment for the site. The enclosed fact sheet outlines what a Health Assessment is.

The Starr Property is a 44 acre piece of vacant land located off of Simon Road. Residential areas are located to the north and northwest of the site. Waste was disposed of at the site during the late 1960s. The initial discovery of the site by the CT DEP was made in June of 1989 following a complaint to the Hazardous Waste Section. Odor problems persist at the site. During the health assessment process, we will review all the sampling data conducted for the site including air, soil, groundwater, sediment and surface water to assess the potential for adverse health effects.

Our department did review air sampling data collected in February of 1992. Based on our review of this data, neither long term or short term adverse health effects are expected to occur from exposure to the air at the site. Trespassing on the site is evident. <u>We discourage any on site activities as the possible adverse health effects from contact with site contaminants has not been fully evaluated.</u>

As the fact sheet states, the community plays a key role in the Health Assessment. Throughout the process, we will ask you to share your health related concerns with us. We may hold informal meetings where you can drop in and talk to us or we may knock on your door during periodic site visits. The Health Assessment will address all your concerns in the context of what is known about the site. Once the Health Assessment is drafted, citizens will also have the opportunity to comment. Each comment received must be addressed in the final document.

If you have concerns, comments or questions please feel free to call me at 566-8167. I look forward to hearing from you.

Phone:
150 Washington Street • Hartford, Connecticut 06106

ATSDR Public Health Assessments

ATSDR developed this fact sheet to provide the public with information about its Public Health Assessments -- a term that can be confusing. A Public Health Assessment is not the same thing as a medical exam or a community health study. It can sometimes lead to those things, as well as other public health activities. ATSDR hopes this fact sheet is helpful to you in understanding what a Public Health Assessment is. You may have questions the fact sheet doesn't answer or need more information about the agency and its activities. A contact person is listed at the end of the fact sheet.

What is ATSDR?

ATSDR is the Agency for Toxic Substances and Disease Registry, a federal public health agency. ATSDR is part of the Public Health Service within the U.S. Department of Health and Human Services. ATSDR is not a regulatory agency like the U.S. Environmental Protection Agency. Created by Superfund legislation in 1980, ATSDR's mission is to prevent or mitigate adverse human health effects and diminished quality of life resulting from exposure to hazardous substances in the environment. Through its programs -- including surveillance, registries, health studies, environmental health education, and applied substance-specific research -- and by working with other federal, state, and local government agencies, ATSDR acts to protect public health.

What is a Public Health Assessment?

An ATSDR Public Health Assessment gathers available information about hazardous substances at a site and evaluates whether exposure to those substances might cause any harm to people. ATSDR conducts a Public Health Assessment for every site on or proposed for the National Priorities List (the NPL, also known as the Superfund list).

Public Health Assessments consider --

- what the levels (or "concentrations") of hazardous substances are
- whether people might be exposed to contamination and how (through "exposure pathways" such as breathing air, drinking or contacting water, contacting or eating soil, or eating food)
- what harm the substances might cause to people (or the contaminants' "toxicity")
- whether working or living nearby might affect people's health

To make those determinations, ATSDR looks at three primary sources of information --

- environmental data, such as information available on the contaminants and how people could come in contact with them
- health data, including available information on community-wide rates of illness, disease, and death compared with national and state rates
- community concerns, such as reports from the public about how the site

How Are Public Health Assessments Used?

ATSDR's Public Health Assessments are used to identify health studies or other public health actions -- such as environmental health education for the community and its health care providers -- that might be needed. They advise federal, state, and local agencies on actions to prevent or reduce people's exposure to hazardous substances. They are also used to develop Public Health Advisories and other recommendations to protect the public's health.

How Is the Community Involved in a Public Health Assessment?

The community has a key role to play in a Public Health Assessment and any activity that may follow. Throughout the Public Health Assessment, ATSDR talks with people living or working near the site -- community groups, local leaders, and health professionals, among other community members -- about what they know about the site and their site-related health concerns. Community health concerns are addressed in every Public Health Assessment for every site.

Two-way communication between the public and ATSDR is vital to a successful Public Health Assessment. For that reason, ATSDR has several mechanisms to keep the public informed and to solicit information from the community, such as --

- Public Availability Sessions where community members can meet individually with ATSDR staff.
- Public Meetings so community members can express ideas in a larger forum.
- Community Assistance Panels, or CAPs, which work to inform ATSDR about community concerns and health information and, in turn, to inform the community about ATSDR activities and the status of the Public Health Assessment.
- Other communication channels, such as contact with local community groups, political leaders, and health professionals, as well as articles in local newspapers and stories on television and radio stations.
- Before the Public Health Assessment is finished, it is available in the community during the Public Comment Period. The Public Comment Period gives the community the opportunity to tell ATSDR how well the Public Health Assessment addresses health concerns. To provide information back to the community, ATSDR responds to public comments in the final Public Health Assessment.

Fact sheets are available on Public Health Advisories, Health Consultations, and other ATSDR activities. If you want to know more about ATSDR, or if you have health concerns or information to share about ways people might have been or might now be exposed to hazardous substances, please contact the person listed below.

For more information, call or write:

JENNIFER KERTANIS
CT DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL EPIDEMIOLOGY AND OCCUPATIONAL HEALTH
150 WASHINGTON STREET
HARTFORD, CT 06106

APPENDIX C

STATE OF CONNECTICUT
DEPARTMENT OF HEALTH SERVICES

MEMORANDUM

TO: Michael Powers, Principal Sanitary Engineer
DEP, HMMU/Superfund

FROM: Hari Rao, Ph.D., Toxicologist HR
Toxic Hazards Section

DATE: August 17, 1989

SUBJECT: Property of Susan Starr - Simon Road, Enfield, CT

This memo is in response to your request to provide a health-based interpretation of the sample results from the Starr Property, Enfield, Connecticut.

As you are aware. the lab results from five samples are too limited to assess fully the potential health effects from exposure to the contaminants at the site. The limited analysis showed that total cyanides were present at levels ranging from 180 to 640 mg/kg, metallic lead from 37 to 1200 mg/kg, and a volatile organic compound, styrene at 250 ug/kg. At the levels reported, these constituents and more specifically the cyanides do not constitute an acute threat to human health. This conclusion is based on the fact that no free cyanides (the highly volatile hydrogen cyanide and cyanide ions) were detected in the soil samples. Free cyanide, not total cyanide, is the appropriate measure of cyanide toxicity. Moreover, free cyanide's acute toxic action via inhalation has been observed in closed atmospheres such as a chamber, a man-hole, or a garage and not in open spaces.*

We evaluated an exposure scenario that included (a) the particulate cyanides in the cloud of dust surrounding the dirt bike, (b) the potential receptor group namely, the kids riding the dirt bike, and (c) inhalation of particulate cyanides. We were not able to complete this exposure assessment since data on airborne particulate cyanides were not available. Since no free cyanides were found. an acute threat from this scenario is unlikely.

A dermal exposure scenario was qualitatively assessed. Some cyanide compounds such as potassium cyanide have a corrosive effect on the skin,

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* In World War I, the French dropped 4000 tons of hydrogen cyanide in artillery shells at once but this resulted in very few casualties - so volatile is the gas. On the other hand methyl isocyanate in ambient air killed 2000 people in India. This compound is heavier than air and relatively less volatile than hydrogen cyanide.

STATE OF CONNECTICUT

DEPARTMENT OF HEALTH SERVICES

MEMORANDUM

TO: Michael Powers
DEP - Site Remediation & Closure Division

FROM: Dr. Hari Rao HR
DHS - Division of Environmental Epidemiology & Occupational Health

DATE: March 30, 1992

SUBJECT: Starr Property State Superfund Site, Enfield, Connecticut

Dr. David Brown asked me to respond to your memo dated March 27, 1992.

I reviewed the results of the limited air sampling conducted on February 23, 1992 through February 24, 1992 at the above site (see attachment). The review shows that the on-site/home-site concentrations of toluene are below 5 ppb, xylenes are detected at masses less than 50% of method detection limit, and styrene is estimated at below 2 ppb. It is assumed that the reported values represent down-wind concentrations. The method detection limits for the above compounds are in the 3 ppb range.

The reported concentrations are close to or below the detection limits. At these low environmental concentrations, no acute or chronic health effects, on-site or off-site, are expected to occur. Although there is no information on background levels at this site, it may be noted that the reported analytical concentrations are similar to background concentrations reported in literature.

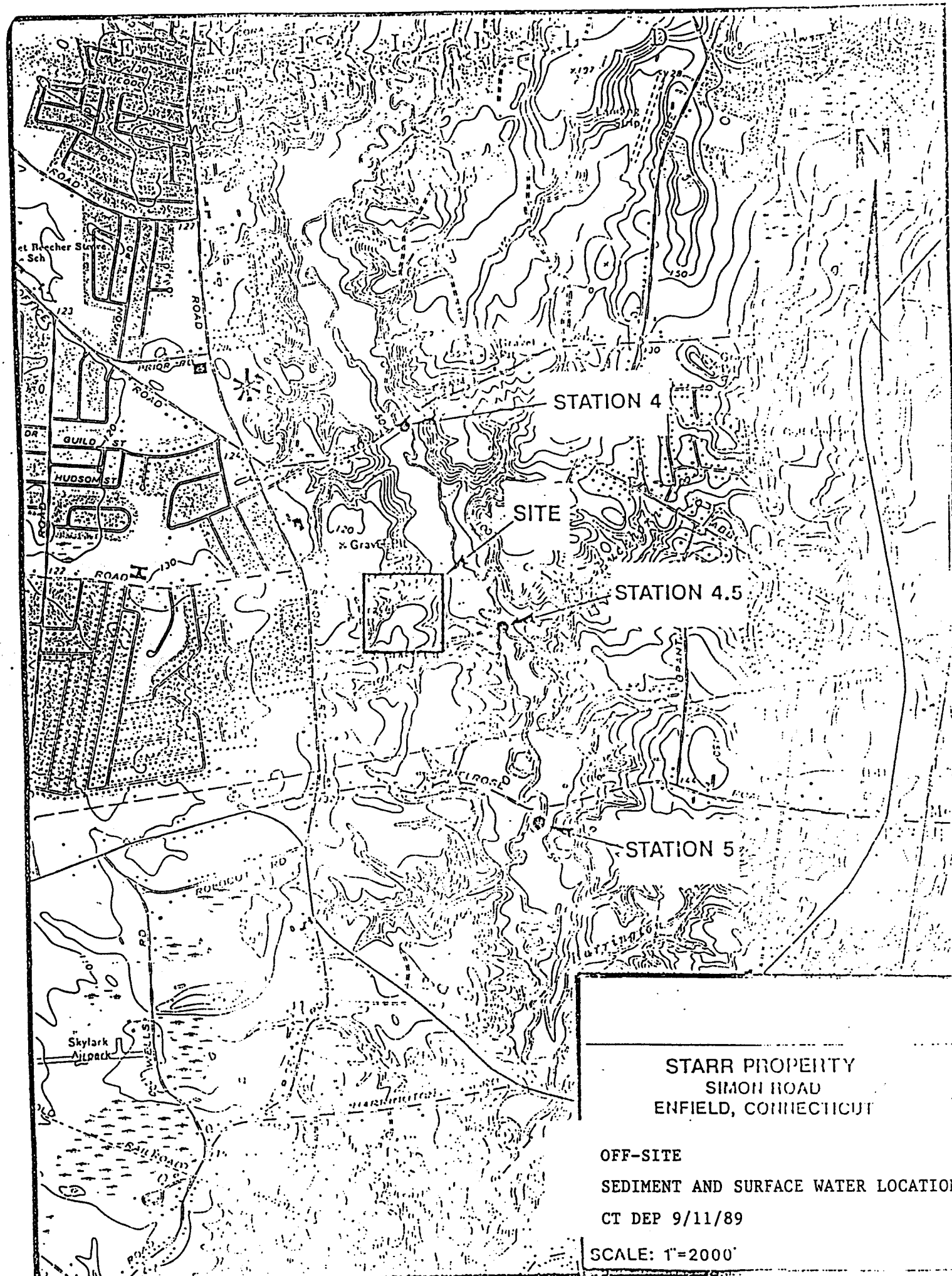
If you have any questions, please give me a call at 566-8167.

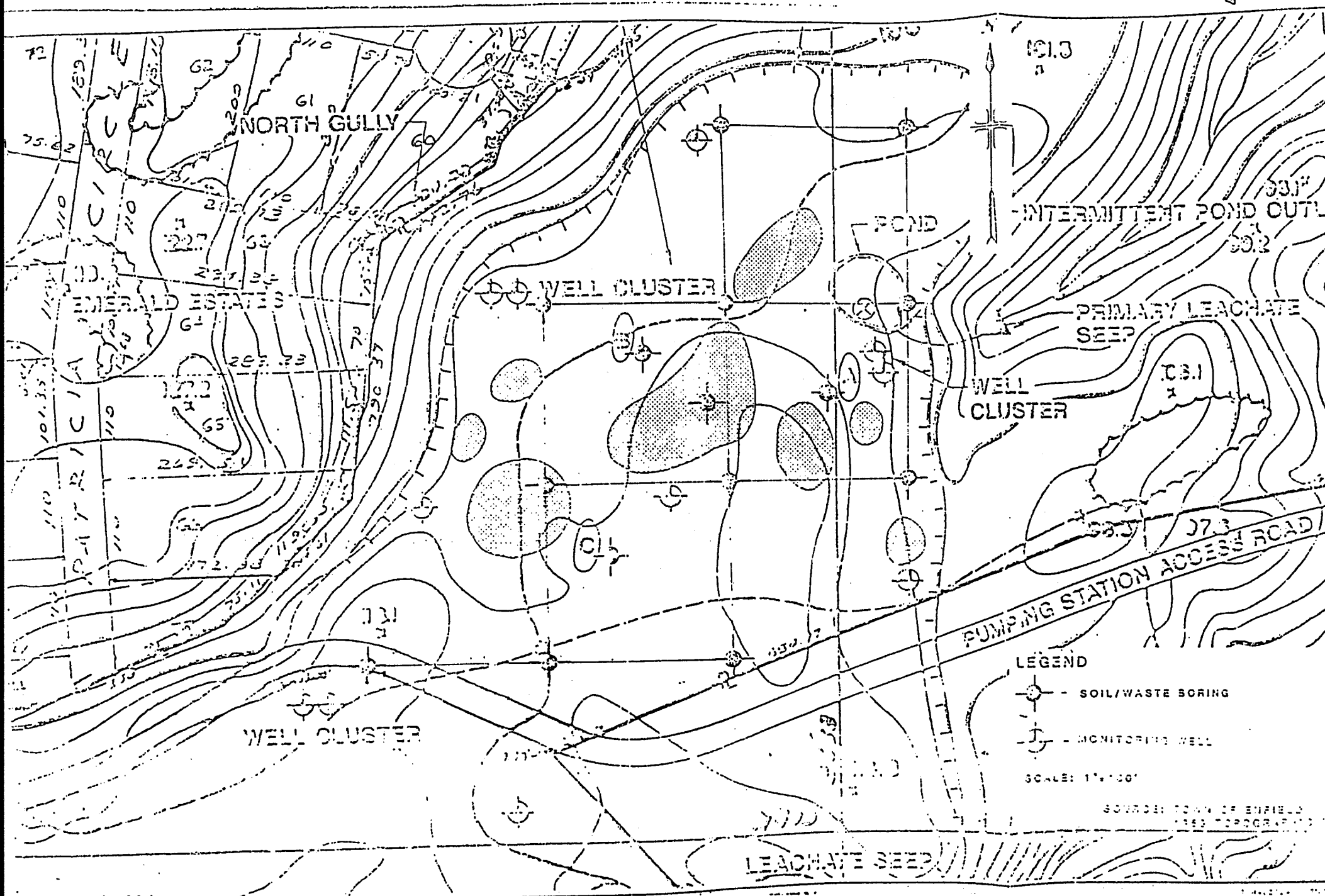
HR/aj
4856I

cc: Peter Galbraith
David Brown
Donna Bullard

Phone:

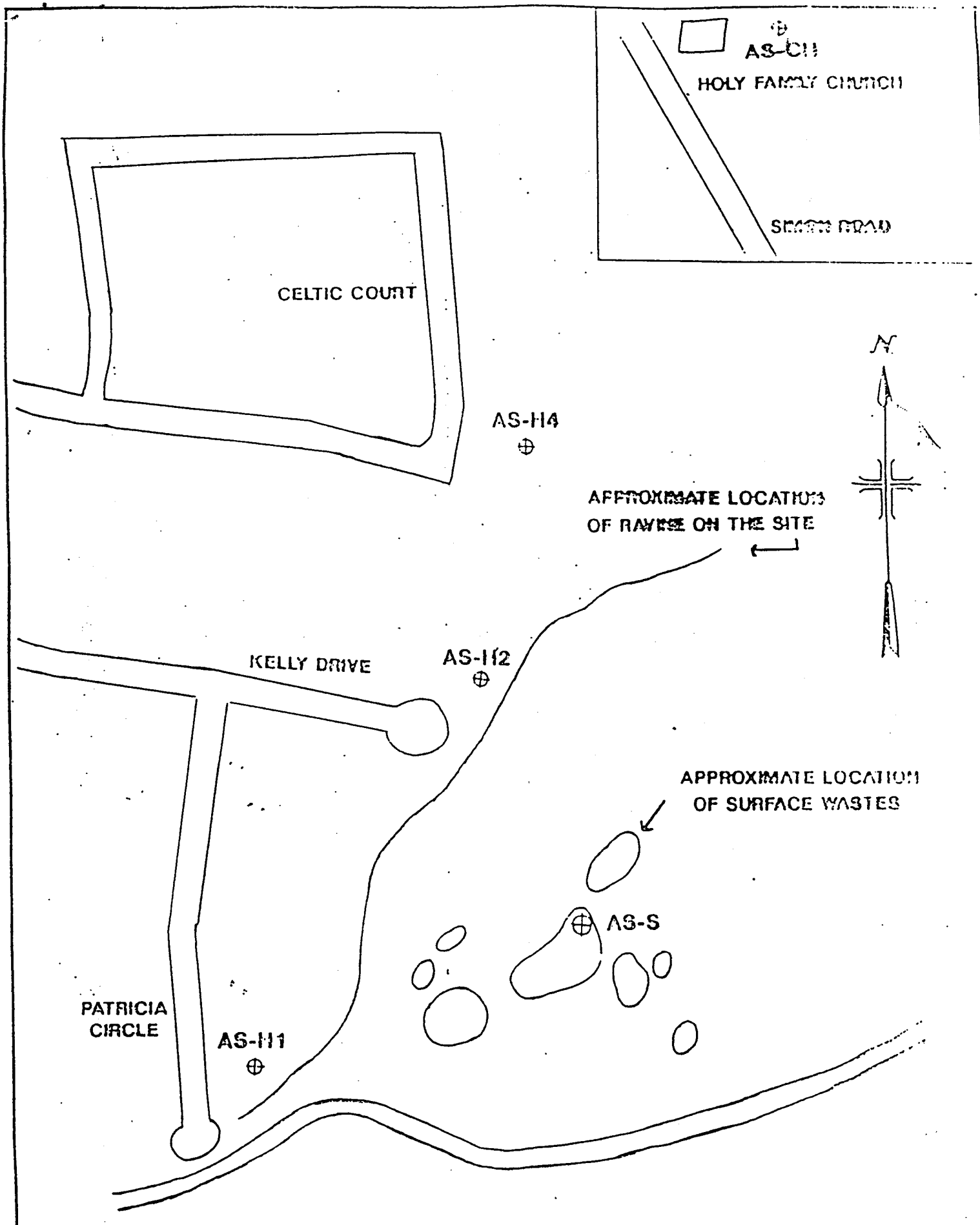
APPENDIX D


STATION 4
SITE
STATION 4.5
STATION 5
ROAD
GUILD ST
HUDSON ST
RAILROAD
Skylark Airpark
STARR PROPERTY
SIMON ROAD
ENFIELD, CONNECTICUT
OFF-SITE
SEDIMENT AND SURFACE WATER LOCATIONS
CT DEP 9/11/89
SCALE: 1"=2000'



GROUND WATER, SOIL, LEACHATE

SAMPLING LOCATIONS

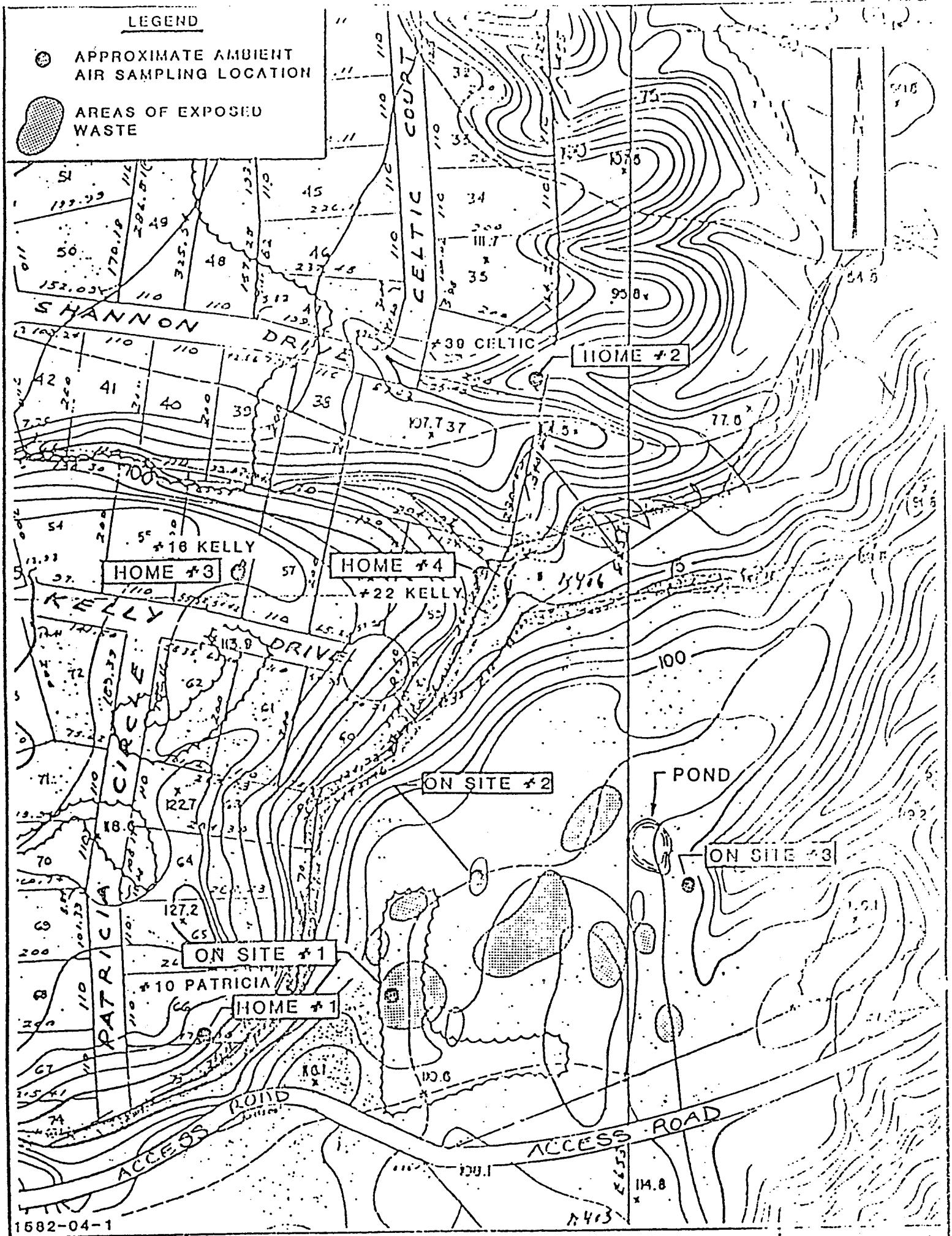


NOT TO SCALE

MALCOLM PIRNIE

AMBIENT AIR SAMPLING LOCATIONS

AUGUST 1991



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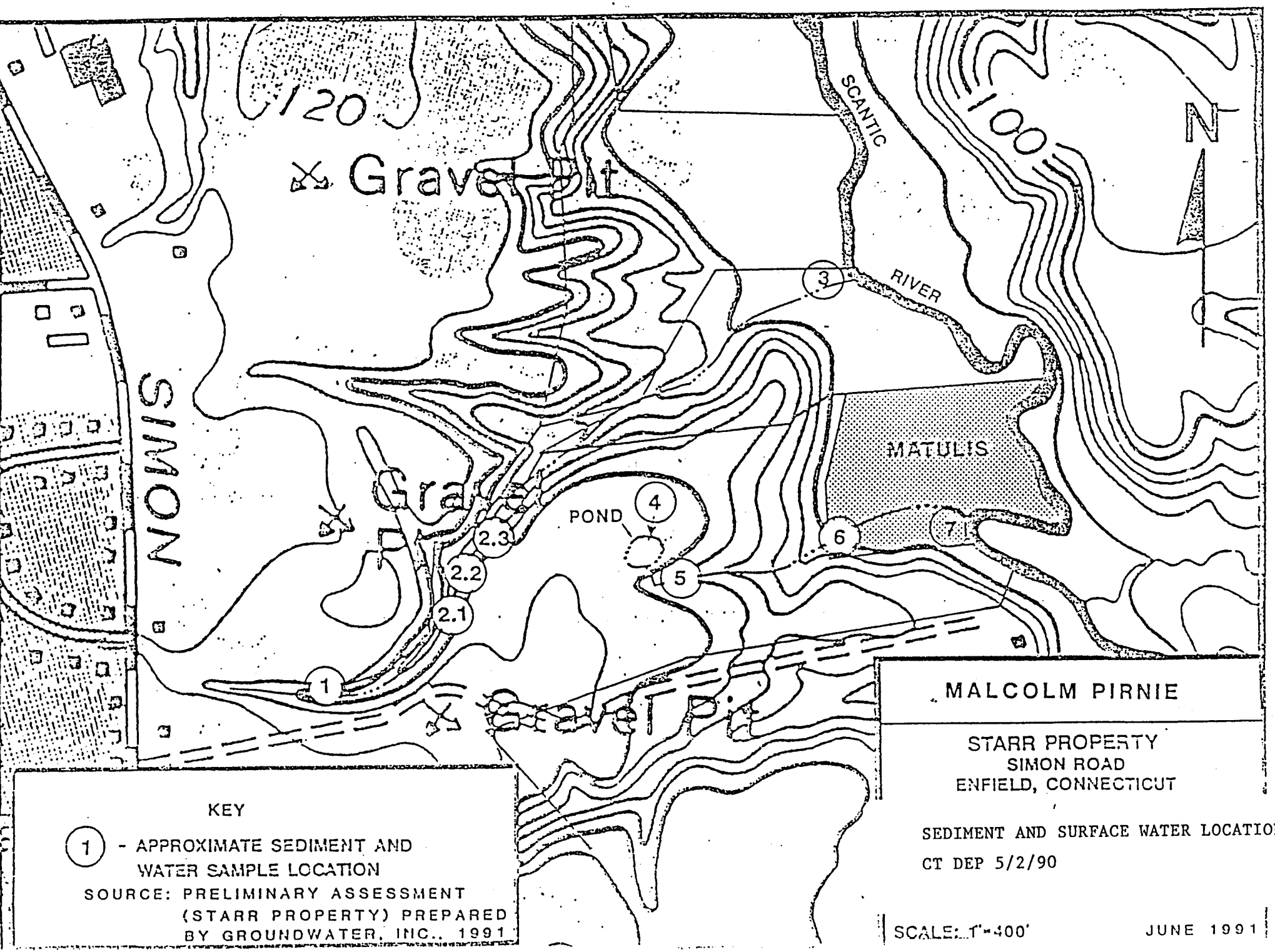
MALCOLM

AMBIENT AIR SAMPLING LOCATIONS



KEY

(1) - APPROXIMATE SEDIMENT AND WATER SAMPLE LOCATION

SOURCE: PRELIMINARY ASSESSMENT (STARR PROPERTY) PREPARED BY GROUNDWATER, INC., 1991

MALCOLM PIRNIE

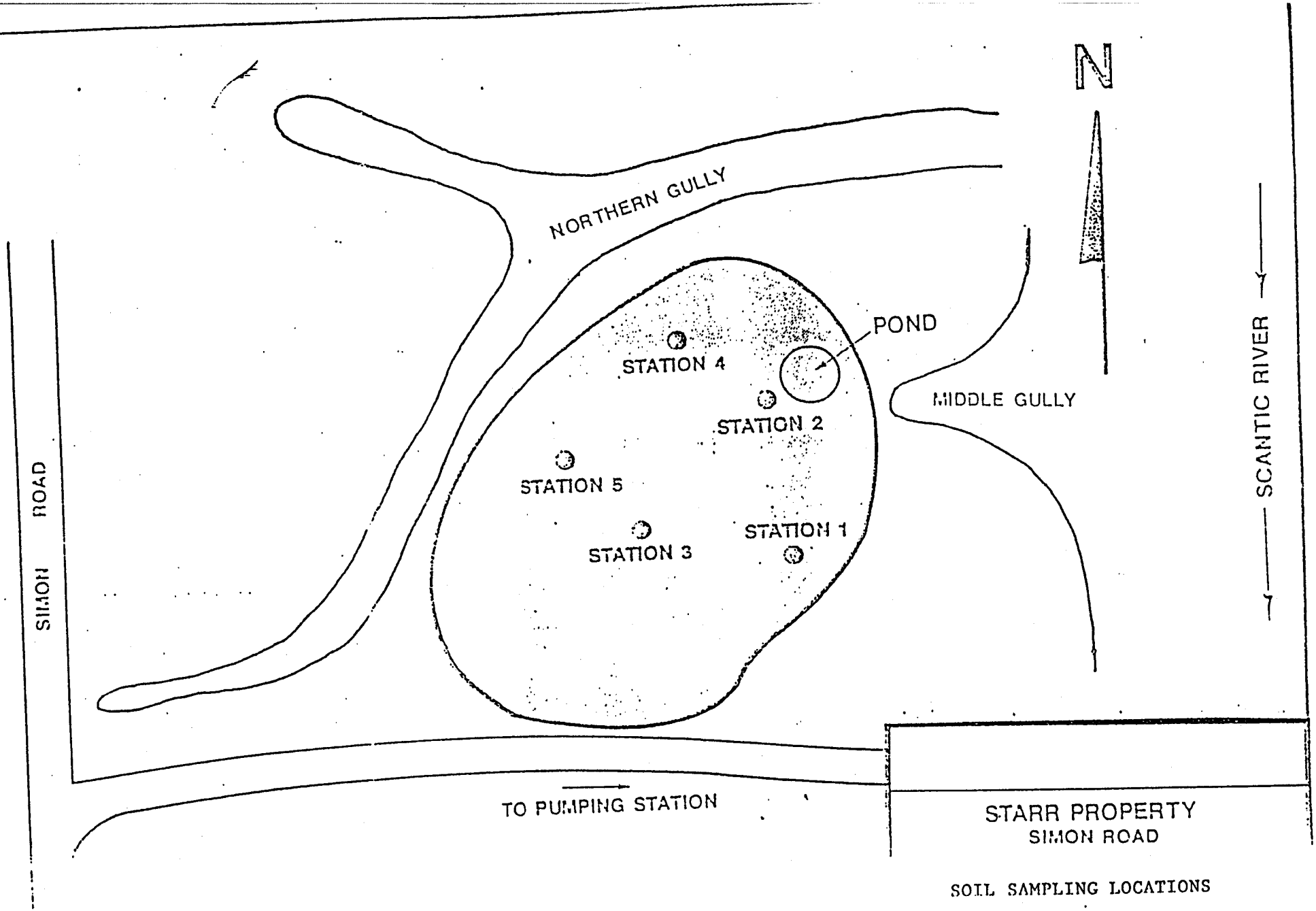
STARR PROPERTY
SIMON ROAD
ENFIELD, CONNECTICUT

SEDIMENT AND SURFACE WATER LOCATIONS

CT DEP 5/2/90

SCALE: 1"=400'

JUNE 1991



SOIL SAMPLING LOCATIONS

CT DEP 8/2/89

– APPROXIMATE AREA OF CONTAMINATION

NOT TO SCALE SEPTEMBER 1990

TE: TAKEN FROM MEMO FROM TOM BOTTI, HAZARDOUS WASTE MANAGEMENT, CT. DEP.

APPENDIX E

The following data tables include the following acronyms:

* CREG =Cancer Risk Evaluation Guide
* EMEG =Environmental Media Evaluation Guide
* MCL =Maximum Contaminant Level
* Rfd =Reference Dose
* LTHA =Lifetime Health Advisory

Comparison values for health assessments are contaminant concentrations in specific media that are used to select contaminants for further evaluation. These values include Environmental Media Evaluation Guides (EMEGs), Cancer Risk Evaluation Guides (CREGs), and other relevant guidelines. CREGs are calculated from EPA's cancer potency factors. Maximum Contaminant Levels (MCLs) represent drinking water contaminant concentration that EPA deems protective of public health (considering the availability and economics of water treatment technology) over a lifetime (70 years) at an exposure rate of 2 liters of water per day. EPA's Reference Dose (Rfd) is an estimate of the daily exposure to a contaminant that probably won't cause adverse health effects. Because the contaminants are listed by concentration in a media, RMEGs are included in the tables which represent a concentration in a media calculated from the Reference Dose.

Table 1
Concentrations of Contaminants
Identified for Further Evaluation
Surface Soil 0-2 inch depths

CONTAMINANT	CONCENTRATION RANGE PPM	COMPARISON VALUE
naphthalene	ND-2700	none
2 methylnaphthalene	ND-90	none
acenaphthene	ND-72	40,000 RMEG
dibenzofuran	ND-130	none
fluorene	ND-21	30,000 RMEG
anthracene	ND-450	200,000 RMEG
pyrene	ND-270	20,000 RMEG
benzo(a)anthracene	ND-84	none
chrysene	ND-74	none
benzo(a)pyrene	ND-53	0.1 CREG
lead	ND-1200	none
arsenic	0.8-3.5	0.4 CREG
cyanide (total)	180-640	none

*PPM-parts per million
*ND-not detected

Table 2
Concentration of Contaminants
Identified for Further Evaluation
Subsurface Soil Deeper than 2 inches

CONTAMINANT	CONCENTRATION RANGE PPM	COMPARISON VALUE
arsenic	0.8-86	0.4 CREG
lead	3.2-483	none
cyanide (total)	ND-582	none
cyanide (amenable)	ND-502	10,000 CREG

*PPM-parts per million
*ND-not detected

Table 3
Concentrations of Contaminants
Identified for Further Evaluation
Groundwater Monitoring Wells

CONTAMINANT	CONCENTRATION RANGE PPB	COMPARISON VALUE
arsenic	ND-31	0.02 CREG
lead	ND-50	50 MCL
cadmium	ND-40	5 MCL
mercury	ND-7	2 MCL
cyanide (total)	ND-230	none
cyanide (amenable)	ND-90	200 MCL

*PPB- parts per billion
*ND-not detected

Table 6
Concentration of Contaminants
Identified for Further Evaluation
Surface Water

CONTAMINANT	CONCENTRATION RANGE PPB	COMPARISON VALUE
naphthalene	ND-57	20 LTHA
cyanide (total)	ND-1400	none
cyanide (amenable)	ND-1100	200 MCL

*PPB-parts per billion
*ND-not detected

Table 7
Concentration of Contaminants
Identified for Further Evaluation
Ambient Air

CONTAMINANT	CONCENTRATION RANGE PPB*	COMPARISON VALUE
benzene	ND-7	0.03 CREG
trichloroethylene	ND-68	none

*PPB-parts per billion
*ND-not detected

Table 6
Concentration of Contaminants
Identified for Further Evaluation
Surface Water

CONTAMINANT	CONCENTRATION RANGE PPB	COMPARISON VALUE
naphthalene	ND-57	20 LTHA
cyanide (total)	ND-1400	none
cyanide (amenable)	ND-1100	200 MCL

*PPB-parts per billion
*ND-not detected

Table 7
Concentration of Contaminants
Identified for Further Evaluation
Ambient Air

CONTAMINANT	CONCENTRATION RANGE PPB*	COMPARISON VALUE
benzene	ND-7	0.03 CREG
trichloroethylene	ND-68	none

*PPB-parts per billion
*ND-not detected

Table 8
Concentration of Contaminants
Identified for Further Evaluation
Sediment

CONTAMINANT	CONCENTRATION RANGE PPM*	COMPARISON VALUE
arsenic	1.4-6.8	0.4 CREG
cyanide (total)	ND-10	none
cyanide (amenable)	ND-7.7	10,000 RMEG

*PPM-parts per million
*ND-not detected

Table 9
Concentration of Contaminants
Identified for Further Evaluation
Surface Water Off-Site

CONTAMINANT	CONCENTRATION RANGE PPB	COMPARISON VALUE
cyanide (total)	ND-210	none
cyanide (amenable)	ND-30	200 MCL

*PPB-parts per billion
*ND-not detected

Table 10
Concentration of Contaminants
Identified for Further Evaluation
Ambient Air Off-Site

CONTAMINANT	CONCENTRATION RANGE PPB*	COMPARISON VALUE
benzene	ND-0.5	0.03 CREG
tetrachloroethylene	ND-5.5	0.29 CREG

*PPB-parts per billion
*ND-not detected