

Public Health Assessment for

POMONA OAKS WELL CONTAMINATION
GALLOWAY TOWNSHIP, ATLANTIC COUNTY, NEW JERSEY
CERCLIS NO. NJD980769350
JANUARY 24, 1995

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
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.

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PUBLIC HEALTH ASSESSMENT

POMONA OAKS WELL CONTAMINATION

GALLOWAY TOWNSHIP, ATLANTIC COUNTY, NEW JERSEY

CERCLIS NO. NJD980769350

Prepared By:

**New Jersey State Department of Health
Under a Cooperative Agreement with
The Agency for Toxic Substances and Disease Registry**

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 Pomona Oaks Well Contamination site is a residential community consisting of approximately 200 single family homes. Prior to 1985, all of these homes depended upon the use of shallow (50-60 foot) domestic wells utilizing the Cohansey Formation (depth 0-205 feet) for potable water supply. In 1982, residents complained to the Atlantic County Health Department (ACHD) regarding foul tasting well water, and subsequent investigation by the ACHD, the New Jersey Department of Environmental Protection (NJDEP), and the United States Environmental Protection Agency (USEPA) confirmed ground-water contamination by volatile organic compounds (most notably; benzene, 1,2-dichloroethane) at concentrations exceeding standards for drinking water. In 1983, the NJDOH performed sampling identifying significant volatilization of organic groundwater contaminants into residential indoor air through showering. Contamination at the site is not associated with any environmental media other than groundwater. In August 1985, a municipal water supply was made available to residents of the Pomona Oaks subdivision and private wells were sealed. In 1989, a new production well for the sub-development came on-line. The USEPA conducted a Remedial Investigation and Feasibility Study (RI/FS) of the site from October 1988 to March 1989. Results of the remedial investigation have indicated that ground-water contamination at the site no longer exists at concentrations constituting a public health concern. USEPA has concluded the original contamination was the result of a singular or point source release, and the contaminants have dispersed and/or biodegraded over time. A September 1990 Record of Decision (ROD) has recommended the no action alternative for the Pomona Oaks site. Based upon past exposure to site contaminants, The New Jersey Department of Health (NJDOH) and the Agency for Toxic Substances and Disease Registry (ATSDR) consider the Pomona Oaks site to have presented a public health hazard based upon past exposure. Review of the New Jersey State Cancer Registry data for Galloway Township did not reveal an elevated incidence of cancer as compared to New Jersey State rates. Currently, the site is considered a no apparent public health hazard. Should ATSDR expand the benzene subregistry of the National Exposure Registry, the Pomona Oaks site will be considered for inclusion in that subregistry. The NJDOH will contact individuals who expressed health concerns regarding past exposures to contaminated groundwater. The NJDOH will coordinate with ATSDR to determine what follow-up or resources are available to address these individuals concerns.

BACKGROUND

In cooperation with the New Jersey Department of Health (NJDOH), the Agency for Toxic Substances and Disease Registry (ATSDR) will evaluate the public health significance of the Pomona Oaks Well Contamination site. More specifically, ATSDR will determine whether health effects are possible and will recommend actions to reduce or prevent possible health effects. ATSDR located in Atlanta, Georgia, is a Federal agency within the U.S. Department of Health and Human Services and is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) to conduct public health assessments at hazardous waste sites.

A. Site Description And History

The Pomona Oaks well contamination site is comprised of a group of approximately 200 privately owned single family homes and an adjacent shopping area in Galloway Township, Atlantic County, New Jersey (see figure 1). The site occupies approximately 354 acres and is bounded by N.J. Route 30 (White Horse Pike), Willow Ave., Jimmie Leeds Road, and Pomona Port Republic Road (see figure 2). Located within the New Jersey Pinelands Protection Area, the site is surrounded by mixed residential, limited agricultural, and undeveloped tracts. The Pomona Oaks subdivision was constructed in 1972. Residents initially relied upon private wells and septic systems, but were connected to municipal sewers in 1980 and municipal water in 1985. The Pomona Plaza shopping center is located to the northwest (along the White Horse Pike) of the site and contains various commercial establishments identified as potential responsible parties (PRP).

In June 1982, residents living on Terry Lane reported foul tasting well water to the Atlantic County Health Department (ACHD). In October 1982, the ACHD sampled water from two homes on Terry Lane and detected benzene and other volatile organic compounds (VOC's) at concentrations exceeding 100 ppb. From November 1982 to January 1983, the ACHD sampled potable wells from 81 homes in the Pomona Oaks subdivision. Data indicated fifteen wells exceeded the existing N.J. drinking water criteria and residents were advised to refrain from using well water for drinking or cooking purposes. Bottled water was provided at the local firehouse for those residents with contaminated wells. In total, twenty VOC's were identified in 50 domestic wells during various sampling events conducted between 1982 and 1985 by the ACHD, the NJDOH and the USEPA (see figure 3).

In December 1982 and January 1983, the NJDOH performed an exposure assessment of 37 households in the Pomona Oaks subdivision. This assessment included sampling of air from bathroom showers and potable wells. In February 1984, the NJDOH advised residents with contaminated wells to shower in an alternate water supply if/when possible.

In February 1983, the ACHD retained a contractor to perform a hydrogeologic investigation of the site and determined that groundwater was flowing to the south-east at the relatively high rate of 1 foot per day. In 1985, as part of a investigation to explore alternatives for providing a long term potable water supply, the USEPA and the NJDEPE initiated the design of a new large capacity production well screened in the lower Cohansey aquifer. In August 1985, 193 homes in the Pomona Oaks Study area were connected to the Absecon municipal water supply. The contaminated domestic wells were reported in the RI as being sealed and abandoned. The new production well for the Pomona Oaks subdivision came on-line in August 1989.

Field work for the Remedial Investigation/Feasibility Study (RI/FS) took place from October 1988 to March 1989 and included a soil gas survey, sediment sampling, and a groundwater (including domestic and monitoring wells) investigation. The Remedial Investigation (RI) report has concluded that the groundwater contamination associated with the site no longer exists at levels exceeding N.J. drinking water standards. Additionally the RI report concluded that contaminants identified in the 1982-1985 sampling were likely the result of a singular event and cited local gas stations (three retail gasoline stations are located upgradient of the site), septic tanks (commercial and residential), and spills as the probable source of contamination. It is believed that the plume which previously existed has dispersed and/or biodegraded over time. The Record of Decision for the Pomona Oaks Well Contamination site has concluded that no further remedial action at the site is necessary beyond continued groundwater monitoring.

B. Site Visit

An initial visit to the Pomona Oaks Well Contamination site was conducted by NJDOH personnel (J.Pasqualo, F. Bove) in the spring of 1989. An additional site visit by NJDOH personnel (J.Pasqualo) and the ACHD was conducted in May 1992. The site is a residential neighborhood of single family homes with no definitive site boundaries other than municipal streets. The Pomona Oaks subdivision is in close proximity to various commercial establishments located along N.J. Route 30, and to the Federal Aviation Administration training center, an active airport.

The site contained no apparent or discernable physical hazards. No environmental monitoring was conducted by the NJDOH during 1989 or 1992 site visits.

C. Demographics, Land Use, And Natural Resource Use

The Pomona Oaks subdivision was constructed in 1972 and presently contains approximately 200 single family homes. Assuming 3.8 persons per household, approximately 760 persons live in the study area. Prior to 1985 all homes in the subdivision relied upon

domestic wells for potable water supply. Available information from the 1982-1985 sampling events indicates 50 households experienced well contamination above N.J. drinking water criteria; thus, approximately 190 residents were potentially exposed to site contaminants. The population of Galloway Township is estimated to be approximately 13,000 according to 1980 U.S. census data. The subdivision is proximal to Atlantic City and continued residential and commercial development in the area is likely.

Land use in the area of the site is residential, light agricultural, and light commercial in nature. The nearest major surface water features are the Atlantic City reservoirs located 2.5 miles to the southeast of the site. These reservoirs were not threatened by site contaminants. Areas of swamp and fresh water marshlands occur in the environs of the site and serve as recharge/discharge areas for the unconfined shallow aquifer underlying the site. There are no surface water features (creeks, brooks, streams, etc.) within the Pomona Oaks Well Contamination study area. There are no recreational or park/refuge areas which have been adversely impacted by the site. There are no agricultural areas or enterprises in the environs of the Pomona Oaks subdivision which have been adversely impacted by the site. While there are schools proximal to the Pomona Oaks subdivision, sampling of potable supply wells (ACHD; January 21, 1983) indicated no site-related contamination and all results were <10 ppb total VOC's. No other sensitive populations exist within the environs of the site.

D. Health Outcome Data

There are multiple sources of health outcome data in New Jersey. State and local data for health outcome information include the New Jersey State Cancer registry, Adverse Pregnancy Outcomes Registry, Vital Statistics Records, Renal Dialysis Network, and hospital discharge reports. Federal databases such as those maintained by the Department of Health and Human Services (National Cancer Institute, National Institute of Occupational Safety and Health, and ATSDR) are not site-specific but may be used for comparison and evaluation purposes.

Cancer might be possible from long-term exposure to at least one site contaminant. Please reference the Toxicological Evaluation subsection of the Public Health Implications section for more information on potential carcinogenic effects. Cancer incidence data from the New Jersey Cancer Registry (NJCR) were analyzed for the Pomona Oaks site. A discussion of the results of the NJCR data is presented in the Health Outcome Data Evaluation subsection of the Public Health Implications section.

COMMUNITY HEALTH CONCERNS

A public meeting to discuss the proposed workplan for the Pomona Oaks Remedial Investigation was conducted by USEPA on September 20, 1988. Additionally, on July 31, 1990, a subsequent meeting was conducted by USEPA to discuss the results of the RI. NJDOH personnel attended both these sessions and summarized the concerns expressed by the community regarding the groundwater contamination situation in the Pomona Oaks sub-development. Both meetings were well attended (approximately 150 persons) and demonstrated an active interest on the part of the community. In addition, concerns of the community are documented in the final Community Relations Plan for the Pomona Oaks well contamination site (EBASCO; September 1988).

Community health concerns associated with the Pomona Oaks site have been documented since 1982 when residents first notified the ACHD of foul tasting domestic well water. The primary community health concerns associated with the Pomona Oaks site include:

- 1) The length of time that the community may have been potentially exposed to site related contaminants prior to 1982.
- 2) The potential for long term adverse health effects in the Pomona Oaks community and the need for follow-up health study and investigation. Concerns consistently expressed by residents pertain specifically to the possibility of increased incidence of cancer in the community, potential adverse pregnancy outcomes, and whether a program of long term medical monitoring was feasible.

Other concerns related to health issues at the site included questions regarding the source(s) of the contamination, the current status of the plume, and the status of State and Federal standards for drinking water contaminants.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

To identify possible facilities that could contribute to contamination of environmental media near the Pomona Oaks Well Contamination site, the ATSDR and the NJDOH searched the 1987, 1988, and 1989 Toxic Chemical Release Inventory (TRI). TRI is developed by the USEPA from chemical release (air, water, and soil) information provided by certain industries. Upon review and evaluation, TRI was not found to contain information on toxic chemical release in Galloway Township which was pertinent to the contaminants and pathways of concern at the Pomona Oaks Well Contamination site.

The tables in this section list the contaminants of concern for the Pomona Oaks Wells site. These contaminants are evaluated in subsequent sections of the Public Health Assessment to determine whether exposure to them has public health significance. ATSDR selects and discusses these contaminants based upon the following factors:

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

In the data tables that follow under the On-site Contamination subsection and the Off-site Contamination subsection, the listed contaminant does not mean that it will cause adverse health effects from exposures. Instead, the list indicates which contaminants will be evaluated further in the Public Health Assessment. When selected as a contaminant of concern in one medium, that contaminant will be reported in all media.

The data table may include one or more of the following acronyms:

- * CREG = ATSDR Cancer Risk Evaluation Guide
- * EMEG = ATSDR Environmental Media Evaluation Guide
- * MCLG = EPA Maximum Contaminant Level Goal
- * MCL = EPA Maximum Contaminant Level
- * PMCLG = EPA Proposed Maximum Contaminant Level Goal
- * ppm = Parts per million
- * ppb = Parts per billion
- * RfD = EPA Reference Dose
- * RfC = EPA Reference Concentration

Comparison values for public 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 estimated contaminant concentrations based on a one excess cancer in a million persons exposed over a lifetime. CREGs are calculated from USEPA's cancer slope factors. USEPA's Maximum Contaminant Level Goal (MCLG) is a drinking water health goal. USEPA believes that the MCLG represents a level that no known or anticipated adverse effect on the health of persons should occur which allows

an adequate margin of safety. Proposed Maximum Contaminant Level Goals (PMCLGs) are MCLGs which are being proposed. Maximum Contaminant Levels (MCLs) represent contaminant concentrations that USEPA deems protective of public health (considering the availability and economics of water treatment technology) over a lifetime of 70 years at an exposure rate of 2 liters of water per day. While MCLs are regulatory concentrations, PMCLGs and MCLGs are not. USEPA's reference dose (RfD) and Reference Concentration (RfC) are estimates of the daily exposure to a contaminant that is unlikely to cause health effects.

A. On-Site Contamination

The field work for the Pomona Oaks Remedial Investigation was performed from October 1988 to March 1989. Activities included a soil gas survey, deep subsurface soil sampling, sediment sampling, and groundwater sampling (domestic and monitoring wells). Air and shallow soil sampling was not conducted as part of the remedial investigation.

Groundwater; Residential wells

From 1982 to 1985, the domestic wells of the Pomona Oaks subdivision were sampled by the Atlantic County Health Department, the U.S. Environmental Protection Agency, the New Jersey Department of Health, and the New Jersey Department of Environmental Protection and Energy. Concentrations of VOC's exceeding N.J. drinking water criteria were detected in 50 wells. Contaminants of concern exceeding ATSDR comparison values which were detected in domestic wells are presented in Table 1.

Table 1 - Contaminants of concern detected in Pomona Oaks subdivision private wells; 1982 - 1985.

Compound	Maximum Concentration Detected (ppb)	Comparison Value	
		ppb	Source
Benzene	2,060.0	1.2	CREG
Chloroform	31.0	5.7	CREG
1,2-Dichloroethane	880.0	0.38	CREG
1,1-Dichloroethane	60.0	NA	NA
1,1-Dichloroethylene	4.4	0.058	CREG
1,1,2-Trichloroethane	46.0	0.61	CREG

NA = Not Available

Data from Pomona Oaks Subdivision Record of Decision: Sept 1990.

Residential wells were sampled as part of the Remedial Investigation in November and December 1988. Additionally USEPA's Emergency Response Team (ERT) conducted residential well sampling in August 1989. No contaminants were detected above ATSDR comparison values during these sampling events. The results of the Remedial Investigation have shown that the groundwater contamination previously identified at the Pomona Oaks site no longer exists at levels of public health concern. The report concluded that the source of the previously identified contamination was a singular event, with the resultant contamination dissipated via volatilization and natural attenuation.

Groundwater; Monitoring Wells

Groundwater samples from 19 monitoring wells were collected in February 1989 as part of the Remedial Investigation. Contaminants detected above ATSDR comparison values are presented in Table 2.

Table 2 - Contaminants of concern detected in Pomona Oaks Subdivision monitoring wells; February 1989.

Compound	Frequency of Detection	Conc. (ppb)	Monitoring Well	Comparison Value	
				ppb	Source
Benzene	1 of 20	8.0	MW-1S*	1.2	CREG
1,2-Dichloroethane	1 of 20	2.0	MW-6I**	0.38	CREG
Chloroform	2 of 20	2 - 6	MW-6S**	5.7	CREG

* = Well downgradient of Pomona Garage.

** = Well down gradient of Pomona Oaks Subdivision.

Data from Final Remedial Investigation report; May 1990.

Monitoring well MW-1S is adjacent to a gasoline station and its level of benzene is reported as an anomaly resulting from a spill. Likewise, while monitoring wells MW-6I and MW-6S each show a VOC above the ATSDR comparison value, these results are considered anomalous and not indicative of the presence of a contamination plume.

Soil Gas Survey

A soil gas survey was conducted as part of the Remedial Investigation to attempt to identify areas of shallow soil and groundwater contamination, as well as identify potential sources of contaminants. The soil gas survey included 142 locations. Generally soil gas concentrations of VOC's were highest in the vicinity of the Pomona Plaza area where commercial gasoline stations are located. Contaminants detected (i.e. benzene, toluene, ethylbenzene) are consistent with compounds associated with petroleum products. A soil gas contour map for total VOC concentration is presented in Figure 4.

Deep Soil Sampling

As part of the remedial investigation, deep soil samples were collected during installation of on-site monitoring wells. No contaminants of concern found in groundwater samples were detected.

Sediment Sampling

As part of the remedial investigation, three sediment samples were collected from a dry drainage basin within the Pomona Oaks subdivision. No contaminants of concern found in groundwater samples were detected.

Exposure Assessment

An exposure assessment of residents of the Pomona Oaks subdivision was conducted by the NJDOH in January 1983. This exposure assessment quantified exposure to benzene volatilizing from contaminated groundwater by sampling bathroom breathing zone air in the showers of residents. All samples exceeded the ATSDR air EMEG for acute exposure of 2 ppb for benzene. Additionally, all samples exceeded the ATSDR inhalation cancer risk concentration of 0.1 ug/m³ for benzene.

Table 3 - Benzene Levels in Residential Shower Air and Well Water; Pomona Oaks Well Contamination Site.

Household	Season/Year	Breathing Zone Shower Air		Well Water Concentration (ppb)
		Concentration* ppb mg/m ³		
A	Winter 1984	73.0	0.237	33.0
	Spring 1984	45.0	0.146	31.0
B	Summer 1983	1,170.0	3.814	210.0
	Winter 1984	201.0	0.655	90.0
	Spring 1984	184.0	0.599	56.0
C	Fall 1983	347.0	1.131	76.0
	Winter 1984	237.0	0.772	80.0
	Spring 1984	1,500.0	4.89	700.0
D	Winter 1984	620.0	2.02	113.0
	Spring 1984	33.0	0.107	48.0
E	Fall 1983	620.0	2.02	370.0
	Winter 1984	55.0	0.179	49.0
	Spring 1984	502.0	1.636	550.0
F	Fall 1983	91.0	0.296	27.0

Data from: "Pomona Oaks Exposure Assessment"; NJDOH, October 1984.

* 1 ppm = 3.26mg/m³ at 20 degrees C.

B. Off-Site Contamination

Off-site sampling at the Pomona Oaks Wells site has been limited to groundwater investigation in an attempt to determine whether a plume of contamination exists, determine its extent, and ascertain whether down-gradient groundwater quality has been impacted by the site.

As part of the RI, USEPA sampled residential wells (winter 1988, summer 1989) in the nearby Pinehurst area located to the south-east of the Pomona Oaks subdivision. Data from these sampling events indicate that groundwater quality in the Pinehurst area is not being impacted by the Pomona Oaks site. Off-site contamination associated with the Pomona Oaks site has not been identified in groundwater or any other environmental media.

C. Quality Assurance And Quality Control

In preparing this public health assessment, the ATSDR and the NJDOH rely on the information provided in the referenced documents and

assumes that adequate quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of analysis and conclusions drawn for this public health assessment is determined by the availability and reliability of the referenced information.

Data utilized in formulation of this public health assessment were subject to level 4 data quality objectives which require the greatest amount of analytical documentation and quality control/quality assurance methods. All sample results generated by a Contract Laboratory Program (CLP) laboratory underwent data validation by EBASCO according to USEPA Region II criteria.

D. Physical And Other Hazards

The Pomona Oaks Well Contamination site presents no apparent physical hazards. Since the contamination at the Pomona Oaks Well Contamination site is associated with subsurface groundwater, there is no discernable evidence of site-related contaminants. As a viable residential neighborhood, there are no physical site boundaries or restrictions.

PATHWAYS ANALYSIS

To determine whether nearby residents are exposed to contaminants associated with the site, ATSDR evaluates the environmental and human components that lead to human exposure. This pathways analysis consists of five elements: A source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure, and an exposed population.

ATSDR categorizes an exposure pathway as a completed or potential exposure pathway if the exposure pathway cannot be eliminated. In completed pathways, all five elements exist and indicate that exposure to a contaminant has occurred in the past, is currently occurring, or will occur in the future. Potential pathways, however, have at least one of the five elements missing, but could exist. Potential pathways indicate that exposure to a contaminant could have occurred in the past, could be occurring now, or could occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present.

A. Completed Exposure Pathways

Completed exposure pathways at the Pomona Oaks site are limited to those pathways associated with the domestic use of contaminated groundwater for a period of approximately 3 years (1982-1985) prior to the availability of a public water supply.

Residents of Pomona Oaks first filed complaints with the ACHD regarding foul tasting well water in June 1982. In January 1983, the ACHD advised sixteen households to discontinue use of groundwater for drinking and cooking, and began to provide bottled water to affected households. The wells in the households selected to receive bottled water exhibited total VOC's concentrations > 100 ug/l (or > 50 ug/l for a single contaminant). In addition to the 16 homes provided with bottled water, 34 homes exhibited well contamination above N.J. drinking water standards (MCL's) but less than the 100 ug/l total VOC's cutoff level. It is possible that residents ingested contaminated water prior to June 1982, since it is not known when the presumed contamination event occurred. It is likely that residents of approximately 50 identified households ingested contaminated groundwater prior to the time when the ACHD provided bottled water (a duration of approximately six months), although individual consumption practices and durations may have varied.

After the advisory by the ACHD to limit ingestion of well water, it is likely that residents with contaminated wells continued to utilize groundwater for non-potable domestic purposes (e.g.: showering/bathing, irrigation, laundry) for approximately three years until the public water supply was available. Sampling data from the 1983 NJDOH exposure assessment has demonstrated significant exposure to VOC's during showering activities probably occurred in households with contaminated wells. Similarly, it would be expected that other domestic activities such as laundering clothes and running dishwashers would also liberate VOC's into the residences of Pomona Oaks, although air data are limited to the breathing zone of residential showers. Table 4 summarizes the completed exposure pathways at the Pomona Oaks Wells site.

Table 4 - Completed Exposure Pathways

Name	Source	Media	Point of Exposure	Route of Exposure	Exposed Population	Time
Potable Water	PORW*	Ground Water	Residence	Ingestion	Residents	Past
Showers	PORW*	Ground Water	Residence	Inhalation	Residents	Past

* Pomona Oaks Residential Wells

By August 1985, connection of 193 homes within the subdivision to the Absecon water supply was completed. Current information indicates there are no residences presently utilizing domestic wells for any purpose.

B. Potential Exposure Pathways

Based upon current conditions, there are no potential exposure pathways associated with the Pomona Oaks site. Current site data indicate groundwater in the area of the site does not exhibit contamination above ATSDR comparison values or New Jersey drinking water standards. The availability of a public water supply for the Pomona Oaks sub-development has eliminated dependence upon domestic wells for potable water.

PUBLIC HEALTH IMPLICATIONS

A. Toxicological Evaluation

The toxicological evaluation of completed exposure pathways at the Pomona Oaks site is based upon the assumption of an exposure duration of one year for the ingestion pathway, and three years for the inhalation pathway associated with showering. A period of approximately six months elapsed between the time the contaminated water was reported to the ACHD and the initiation of supplying bottled water to affected (sampled) residences. It is impossible to accurately determine when groundwater first exhibited contamination above health based criteria, or exactly when all individuals began to utilize an alternate potable water supply. The use of a one year duration for the ingestion route is intended to compensate for these uncertainties. Additionally, although residents were advised by the NJDOH to shower in alternate water supplies if possible, it is realistic to assume that residents utilized contaminated wells for domestic purposes (particularly showering) for the period between the first report of contamination and the availability of a public water supply.

The toxicological effects of the contaminants detected in potable wells at the Pomona Oaks subdivision have been considered singly. The cumulative or synergistic effects of mixtures of contaminants may serve to enhance their public health significance. Additionally, individual or mixtures of contaminants may have the ability to produce greater adverse health effects in children as compared to adults. This situation depends upon the specific chemical being ingested or inhaled, its pharmacokinetics in children and adults, and its toxicity in children and adults.

Benzene

Site data indicate that exposure to benzene occurred in residences of the Pomona oaks subdivision through the ingestion and inhalation pathways. For a period of approximately one year, as many as fifty households were exposed daily to low doses of benzene by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink 2 liters of well water per day and individuals took, on the average, two fifteen minute showers per day.

Based upon maximum levels of benzene detected in potable wells at the site, exposure dosages approached and perhaps exceeded the "no observed adverse effect level" (NOAEL) for ingestion exposure of intermediate duration cited in the ATSDR Toxicological Profile for benzene. At such concentrations, there are animal data (human data are limited) which indicate hematological, immunological, and neurological effects are possible. Based upon the levels of benzene detected in shower stall air samples at the site, concentrations approached and perhaps exceeded the lowest observed adverse effect level (LOAEL) cited for acute inhalation exposure cited in the ATSDR toxicological profile for benzene. At such concentrations, there are animal data (human data are limited) which indicate hematological, immunological, neurological, developmental, and reproductive effects are possible.

Benzene is classified by the USEPA as a Class A (known human) carcinogen. The lifetime excess cancer risk (LECR) associated with the oral exposure route for benzene at the site would present no apparent increased risk of cancer. Levels of benzene detected in on site showers exceeded the ATSDR inhalation cancer risk concentration. Projected LECRs for the inhalation pathway associated with showering show a cancer risk ranging from no apparent increased risk to insignificant or no increased risk.

The cancer risk associated with benzene exposure at the site may be interpreted by the following scenario. If 100,000 persons were exposed through ingestion for one year to the maximum concentration of benzene detected in potable wells, or exposed through inhalation for three years to the maximum concentration of benzene detected in showers at the site, at most an additional 4 cases of cancer may occur in 70 years. For the approximately 200 persons in the Pomona Oaks subdivision exposed to benzene in their contaminated well-water, it is therefore unlikely that they will develop cancer as a result of their exposure. Nevertheless, because of this theoretical increase in the rate of cancer, ATSDR considers this exposure unacceptable.

Chloroform

Site data indicate that exposure to chloroform occurred in some residences of the Pomona Oaks subdivision through the ingestion pathway. There are no data describing chloroform concentrations in residential showers. For a period of approximately one year, as many as fifty households were exposed daily to low doses of chloroform by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink two liters of water per day.

Based upon maximum levels of chloroform detected in potable wells at the site, exposure doses were below the "no observed adverse effect level" (NOAEL) for ingestion exposures of intermediate duration cited in the ATSDR Toxicological Profile for chloroform. At such concentrations adverse health effects are not likely to occur.

Chloroform is classified by the USEPA as a Class B2 (suspected human) carcinogen. However, the lifetime excess cancer risk (LECR) associated with the oral exposure route for chloroform at the site would present an insignificant or no increased risk of cancer.

1,2-Dichloroethane

Site data indicate that exposure to 1,2-dichloroethane occurred in some residences of the Pomona Oaks subdivision through the ingestion pathway. There are no data describing 1,2-dichloroethane concentrations in residential showers. For a period of approximately one year, as many as fifty households were exposed daily to low doses of 1,2-dichloroethane by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink two liters of water a day.

Based upon maximum levels of 1,2-dichloroethane detected in potable wells at the site, exposure dosages were below the "no observed adverse effect level" for ingestion exposure of intermediate duration cited in the ATSDR Toxicological Profile for 1,2-dichloroethane. At such concentrations, adverse health effects are not likely to occur.

1,2-dichloroethane is classified by the USEPA as a Class B2 (suspected human) carcinogen. The lifetime excess cancer risk (LECR) associated with the oral exposure route for 1,2-dichloroethane at the site would present no apparent increased risk of cancer.

The cancer risk associated with 1,2-dichloroethane at the site may be interpreted by the following scenario. If 100,000 persons were exposed through ingestion for one year to the maximum levels of 1,2-dichloroethane detected in potable wells at the site, at most an additional four cases of cancer may occur in 70 years. For the

approximately 200 persons of the Pomona Oaks subdivision exposed to 1,2-dichloroethane in their well-water, it is therefore unlikely that they will develop cancer from their exposure. Nevertheless, because of this theoretical increase in cancer, ATSDR considers this exposure unacceptable.

1,1-Dichloroethane

Site data indicate that exposure to 1,1-dichloroethane occurred in some residences of the Pomona Oaks subdivision through the ingestion pathway. There are no data describing 1,1-dichloroethane concentrations in residential showers. For a period of approximately one year, as many as fifty households were exposed daily to low doses of 1,1-dichloroethane by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink two liters of water per day.

Based upon maximum levels of 1,2-dichloroethane detected in potable wells at the site, exposure dosages were below the "no observed adverse effect level" (NOAEL) for ingestion exposure of intermediate duration cited in the ATSDR Toxicological Profile for 1,1-dichloroethane. At such levels, adverse health effects are not likely to occur.

1,1-dichloroethane is classified by the USEPA as a Class C (inconclusive human evidence) carcinogen. There is presently no ATSDR CREG for 1,1-dichloroethane against which site data for the compound may be compared. The LECR associated with the oral exposure route for 1,1-dichloroethane was not estimated.

1,1-Dichloroethylene

Site data indicate that exposure to 1,1-dichloroethylene occurred in some of the residences of the Pomona Oaks subdivision through the ingestion pathway. There are no data describing 1,1-dichloroethylene concentrations in residential showers. For a period of approximately one year, as many as fifty households were exposed daily to low doses of 1,1-dichloroethylene by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink two liters of water per day.

Based upon maximum levels of 1,1-dichloroethylene detected in potable wells at the site, exposure dosages were below the "no observed adverse effect level" (NOAEL) for ingestion exposure of intermediate duration cited in the ATSDR Toxicological Profile for 1,1-dichloroethylene. At such concentrations, adverse health effects are not likely to occur.

1,1-dichloroethylene is classified as a Class C (inconclusive human evidence) carcinogen. The lifetime excess cancer risk (LECR) associated with the oral exposure route for 1,1-dichloroethylene at

the site would present insignificant or no increased risk of cancer.

1,1,2-Trichloroethane

Site data indicate that exposure to 1,1,2-trichloroethylene occurred in some of the residences of the Pomona Oaks subdivision through the ingestion pathway. There were no data describing 1,1,2-trichloroethane concentrations in residential showers. For a period of approximately one year, as many as fifty households were exposed daily to low levels of 1,1,2-trichloroethane by using contaminated groundwater for drinking and other domestic purposes. Exposure dose assessment assumes that adults drink two liters of water per day.

Based upon maximum levels of 1,1,2-trichloroethane detected in potable wells, exposure doses were below the "no observed adverse effect level" for ingestion exposure of intermediate duration cited in the ATSDR Toxicological Profile for 1,1,2-trichloroethane. At such concentrations, adverse health effects are not likely to occur.

1,1,2-trichloroethane is classified by the USEPA as a Class C (inconclusive human evidence) carcinogen. The lifetime excess cancer risk (LECR) associated with the oral exposure route for 1,1,2-trichloroethane at the site would present insignificant or no increased risk of cancer.

B. Health Outcome Data Evaluation

Because of the completed exposure pathways which existed at the site, and the community concern regarding the possibility of adverse health outcomes among households which experienced well contamination, review of appropriate health outcome data for this site was initiated.

The New Jersey Cancer Registry (NJCR) was used for the ascertainment of cancer cases. The Cancer Registry, operated by the New Jersey Department of Health, is a population based cancer incidence registry including the entire State of New Jersey. By law, all individuals with newly diagnosed cancers are reportable to the registry. In addition, the registry has reporting agreements with neighboring states, (New York, Pennsylvania, and Delaware) where information on New Jersey residents which is diagnosed in those states will be supplied to the NJCR. The NJCR has been operational since October 1, 1978.

The study period for this investigation was January 1, 1979 through December 31, 1988. A "case" was defined as an individual who resided in Galloway Township, New Jersey, and was diagnosed with a new primary malignant cancer during the study period. The information for each newly diagnosed case available from the NJCR

is limited. The basic source is documented information from the patient's medical record. The collected information includes demographic data regarding each patient and medical data on each cancer. Variables used to analyze the incidence of cancer in the study area include: name, address at time of diagnosis, state municipality code, census tract code, primary cancer site, histology type, date of diagnosis, age at diagnosis, date of birth, race, sex, and NJDOH registry identification number.

Information on other risk factors such as occupational exposures or personal lifestyle habits are not available in the abstracted medical information used in this evaluation. The potential risk factors that cannot be accounted for in the study design may vary significantly within the study area, or relative to the State as a whole.

Cancer analysis was completed for select cancer types within the study area. These types included bladder, brain and CNS, colon, pancreatic, lung, leukemia, lymphoma, rectal, stomach, kidney, female breast, and prostate. These cancer types were selected for review since State age-specific rates were available and published by the NJCR. Males and females were evaluated separately. All races were combined in the analysis.

Analysis of the cancer incidence was completed using standardized incidence ratios (SIRs). The SIR is calculated by dividing the observed number of cancer cases by the number of cases expected. The expected number of cases are determined on the presumption that the incidence rates for the entire state of New Jersey would prevail in the population surveyed. The study area age/sex specific population data was determined from the 1980 U.S. Census.

Evaluation of the observed and expected numbers is accomplished by interpreting the ratio of these numbers. If the observed number of cases equals the expected number of cases, the SIR will equal one (1.0). When the SIR is less than one it is concluded that fewer cases were observed than expected. Should the SIR be greater than one, it is concluded that more cases than expected were observed. Statistical significance in this investigation was evaluated using a 95% confidence interval (CI).

Table 5 presents the findings of the health outcome data (SIR) analysis. The observed number of total cancer cases in Galloway Twp. was not found to be elevated in comparison to the number of cases expected for this population based upon average incidence rates for the State. Limitations of SIR analysis for cancer incidence may include masking of the small potentially affected population by the greater overall population of Buena. However, the data indicate an overall status of incidence rates for the municipality. The lower than expected rates indicate that it is probable that incidence rates are at or below normal for the potentially affected population.

Table 5 - Geographic Cancer Analysis; Galloway Township, New Jersey, Using 1982 New Jersey State Rates. Period: 1979-1988.

All Females				All Males					
Age Range Years	Population N=6027	Incidence Rate Per 100,000		Age Range Years	Population N=6149	Incidence Rate Per 100,000			
0-4	444	24.53		0-4	450	17.51			
5-9	409	11.14		5-9	467	8.77			
10-14	441	8.00		10-14	460	10.90			
15-19	732	18.03		15-19	804	16.83			
20-24	637	60.77		20-24	720	29.52			
25-29	500	130.47		25-29	480	47.58			
30-34	483	169.01		30-34	504	54.93			
35-39	377	233.7		35-39	410	105.80			
40-44	301	324.15		40-44	290	144.86			
45-49	277	442.45		45-49	274	253.11			
50-54	267	577.97		50-54	315	487.32			
55-59	297	779.41		55-59	267	821.37			
60-64	267	1048.05		60-64	215	1398.47			
65-69	227	1335.29		65-69	207	2009.73			
70-74	132	1619.13		70-74	121	2917.90			
75-79	121	1769.95		75-79	84	3570.18			
80-84	76	2012.69		80-84	40	4053.44			
85+	39	1973.85		85+	41	4110.16			
Cases Expected	Cases Observed	SIR	95 % CI		Cases Expected	Cases Observed	SIR	95 % CI	
			Lower	Upper				Lower	Upper
215.26	109.00	0.51	0.47	0.61	233.01	87.00	0.37	0.30	0.46

C. Community Health Concerns Evaluation

The residents of the Pomona Oaks subdivision have expressed concern over the length of time that the community may have been exposed to contaminated groundwater prior to the initial complaint filed with the ACHD in 1982. Since the subdivision contains approximately 200 homes which all employed wells for potable water supply, and the contamination is thought to be the result of a singular spill or release event, it is likely that the groundwater contamination would have been noticed by residents fairly soon after entering the subdivision wellfield. However, its detection would depend upon the contaminants reaching a concentration which could be detected by an individuals odor and/or taste threshold. In addition, groundwater in the area is moving at a relatively fast rate. Although it is impossible to accurately determine when contamination first occurred, conditions at the site support the assumptions that long term low level contamination (prior to the initial report filed with ACHD) was possible although not probable, and that high level, long term contamination was not probable.

The communities concern regarding the potential for long term (carcinogenic) health effects were addressed by the review of the NJCR data. Cancer incidence was not found to be elevated and was found to be less than State averages. However, the susceptibility for a carcinogenic response may vary widely among individuals, and individual cases may not be apparent through statistical analysis of incidence data. Individual residents expressing concern regarding cancer will be extended the opportunity to discuss their concerns with NJDOH and the ATSDR on an individual basis (refer to the Public Health Actions section of the Health Assessment).

The communities concern regarding possible adverse pregnancy outcomes has been addressed in the Toxicological Evaluation Sub-section. Only for the household which experienced the maximum concentration of volatilized benzene would exposure doses approach those concentrations where adverse pregnancy outcomes might be possible.

At the time this public health assessment was completed, ATSDR and NJDOH do not have a program of routine medical monitoring. However, for those residents who may be concerned regarding benzene exposure in the past, it is recommended that they receive periodic blood counts. This is an effective method for early detection of Leukemia which is a possible outcome of exposure to benzene. If personal physicians have questions regarding the health effects of benzene exposure, Medical representatives of ATSDR will provide additional information.

Public Comment Period

The New Jersey Department of Health conducted a public comment period for the Public Health Assessment of the Pomona Oaks Well

Contamination site from March 28, through April 29, 1994. The Public Health Assessment was placed in local repositories to facilitate written commentary and reaction from the public at large. In addition, the document was circulated to the Atlantic County Health Department for the purpose of soliciting commentary by local Health Officials.

A summary of the commentary received by the NJDOH and associated responses is presented in Appendix 1.

CONCLUSIONS

From the information reviewed, the Pomona Oaks well contamination site is judged to have been be a public health hazard exclusively on the basis of past exposure of intermediate duration, through the ingestion pathway, to volatile organic compounds (VOCs) present in domestic well-water, and past exposure of acute duration, through the inhalation pathway, to VOCs present in domestic well water. Additionally, the site represents no apparent public health hazard under present conditions.

Remedial activities conducted at the site by the ACHD, NJDEPE, and USEPA, specifically the introduction of a public water supply to the area in 1985, and the construction of a new production well for the subdivision in 1989, have eliminated the human exposure pathways associated with the site. Additionally, current data indicate that groundwater in the Subdivision and immediate environs is not presently contaminated to a degree which would constitute a public health hazard. Furthermore, the selected remedial alternative recommended in the Record of Decision (no further remedial action) is consistent with preserving and maintaining the public health.

Analysis of New Jersey Cancer Registry data for Galloway Township indicated that the incidence rates for those cancers listed were below expected (State average) rates for the period 1979 through 1988.

Levels of benzene detected in domestic groundwater and the shower air data compiled by the NJDOH in 1983-4 imply exposure doses at the site may have posed a low theoretical increase in the projected lifetime excess cancer risk for the ingestion and inhalation pathways. Additionally, maximum levels of benzene detected in domestic wells imply exposure dosages which may have equaled or exceeded the "no observed adverse effect level" for oral exposure of intermediate duration.

Maximum levels of 1,2-dichloroethane detected in potable wells imply exposure doses at the site may have posed a low theoretical increase in the projected lifetime excess cancer risk for the ingestion pathway.

Oral exposure to contaminants of concern at the site other than benzene and 1,2-Dichloroethane would not be expected to produce adverse carcinogenic or noncarcinogenic health effects based upon concentration and exposure duration.

There are no data to quantify the exposure dosages associated with inhalation exposure to contaminants of concern volatilizing from well water during domestic activities other than showering which utilize water.

RECOMMENDATIONS

Health Activities Recommendation Panel (HARP) Statement

The Pomona Oaks Well Contamination site, Galloway Township, New Jersey has been reviewed by ATSDR's Health Activities Recommendation Panel for appropriate follow-up with respect to health activities. This site is being considered for follow-up health activities at this time. Specifically, should ATSDR decide to expand the benzene subregistry of the National Exposure Registry, this site will be considered for inclusion in that subregistry.

Public Health Actions

The Public Health Action Plan (PHAP) for the Pomona Oaks Well Contamination site contains a description of the actions to be taken by ATSDR and/or NJDOH at or in the vicinity of the site subsequent to the completion of this Public Health Assessment. The purpose of the PHAP is to ensure that this 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/NJDOH to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by ATSDR/NJDOH are as follows:

Public Health Actions Taken

1. Environmental data and proposed remedial activities have been evaluated within the context of human exposure pathways and relevant public health issues.
2. The NJDOH initiated the review of relevant health outcome databases with regard to the Pomona Oaks Subdivision (Galloway Township).

Public Health Actions Planned

1. Based upon past exposure and the concerns of the community, the NJDOH will transmit a letter to ATSDR nominating this site for physician health education follow-up.
2. Residents who expressed health concerns regarding past exposures at the Pomona Oaks site will be contacted and asked to provide additional specific information regarding their individual situations. Contact persons at the NJDOH and the ATSDR Regional Offices will be provided. ATSDR and/or the NJDOH will invite discussion with concerned residents to determine what follow-up or resources are applicable to individual concerns about their exposures.
3. ATSDR and the NJDOH will coordinate with the appropriate environmental agencies to develop plans to implement the cease/reduce exposure and site characterization recommendations contained in this health assessment.
4. ATSDR will provide an annual follow up to this PHAP, outlining the actions completed and those in progress. This report will be placed in repositories that contain copies of this health assessment, and will be provided to persons who request it.
5. The ATSDR and/or the NJDOH will reevaluate and expand the Public Health Action Plan (PHAP) when needed. New environmental, toxicological, 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 Pomona Oaks Well Contamination site was prepared by the New Jersey 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 public health assessment was initiated.



Technical Project Officer, SSAB, RPB, DHAC

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


Division Director, DHAC, ATSDR

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Appendices

APPENDIX - 1

Response Summary

This response summary represents those comments and reactions to the public health assessment for the Pomona Oaks Well Contamination site received by the New Jersey Department of Health during the public comment period which occurred from March 28, 1994 through April 29, 1994. Comments were received from residents of the Pomona Oaks Subdivision, and a legal office involved in litigation regarding the site. In some cases similar commentary was received from various sources, while other concerns were expressed by individuals or groups. Comments and concerns have been grouped by content where possible and are followed by the consequent response.

Comment

A resident asked where copies of references 1,3,4,5,6,and 7 could be obtained.

Response

References 1, 3, and 4 are USEPA documents. Copies of these are available in the repositories for the Pomona Oaks site. Residents will need to contact the USEPA to determine whether copies are available to individuals.

References 5,6,and 7 are ATSDR Toxicological Profiles and are available to the public. Persons wishing to procure these or any Toxicological Profile should contact the ATSDR Regional Office; 26 Federal Plaza, Room 3137C, New York, N.Y. 10278. Telephone (212) 264-7662.

Comment

Multiple comments were received expressing concern regarding the possibility of adverse health effects resulting from past exposures at the site.

Response

Although statistical review of health outcome data was performed for the Pomona Oaks site, such analysis has limitations, and effects to individuals may not be readily apparent. Those residents who expressed health concerns will be contacted in writing and asked to provide additional information directly to the ATSDR and the NJDOH regarding their situation (please refer to the

Public Health Actions section of this health assessment for specific follow-up activities regarding health effects comments).

Comment

A resident inquired as to why levels of compounds other than benzene in residential showers were not presented and evaluated in the Toxicological Evaluation section of the Health Assessment.

Response

As stated in the Health Assessment there were no data describing levels of contaminants other than benzene in the Pomona Oaks Exposure Assessment.

Comment

A legal office representing residents of Pomona Oaks questioned why a one year duration was used for toxicological evaluation, and maintained that groundwater flow rates cited in the Health Assessment were incorrect.

Response

The health Assessment is based upon data and information which is contained in the cited references. Both the health assessment and the references cited therein have been reviewed by the USEPA for accuracy of data, and with regard to site characterization information. The ATSDR and the NJDOH maintain that the information presented in the health Assessment accurately reflect the site conditions in question.

Comment

A legal office representing the residents of Pomona Oaks questioned the applicability of using life time excess cancer risk calculations and claimed that conclusions derived from such calculations were "scientifically invalid and highly misleading" with respect to small groups.

Response

The use of lifetime excess cancer risk calculations is an accepted protocol of the ATSDR and the NJDOH when attempting to quantify the potential for cancer incidence. The ATSDR and the NJDOH realize and state the limitations of this method as it applies to individuals and small groups in the Health Assessment. Individual concerns regarding carcinogenic and non-carcinogenic health effects will be addressed as noted in the Public Health Actions of this Health Assessment.

APPENDIX 2 - FIGURES

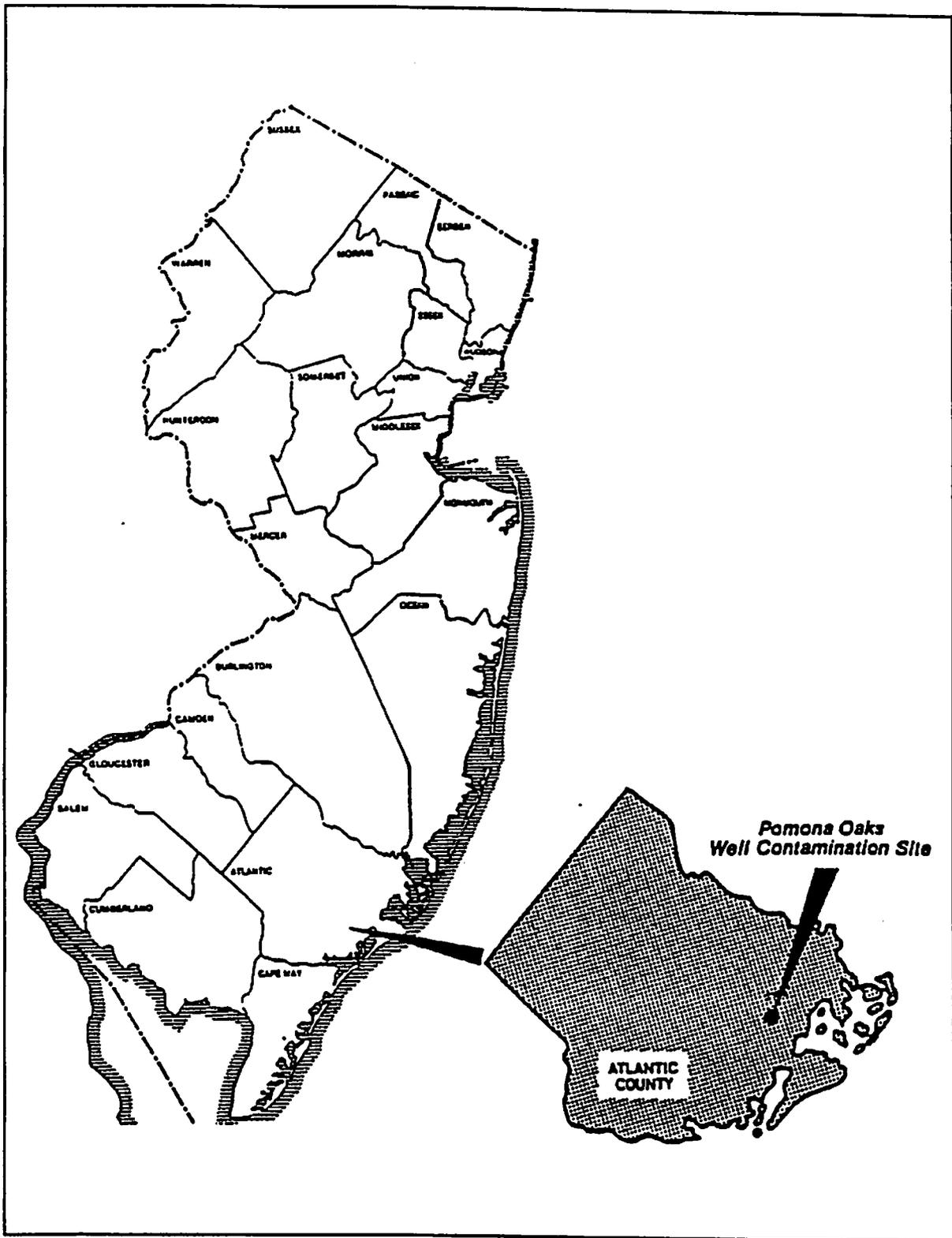


Figure 1 - General Site Location

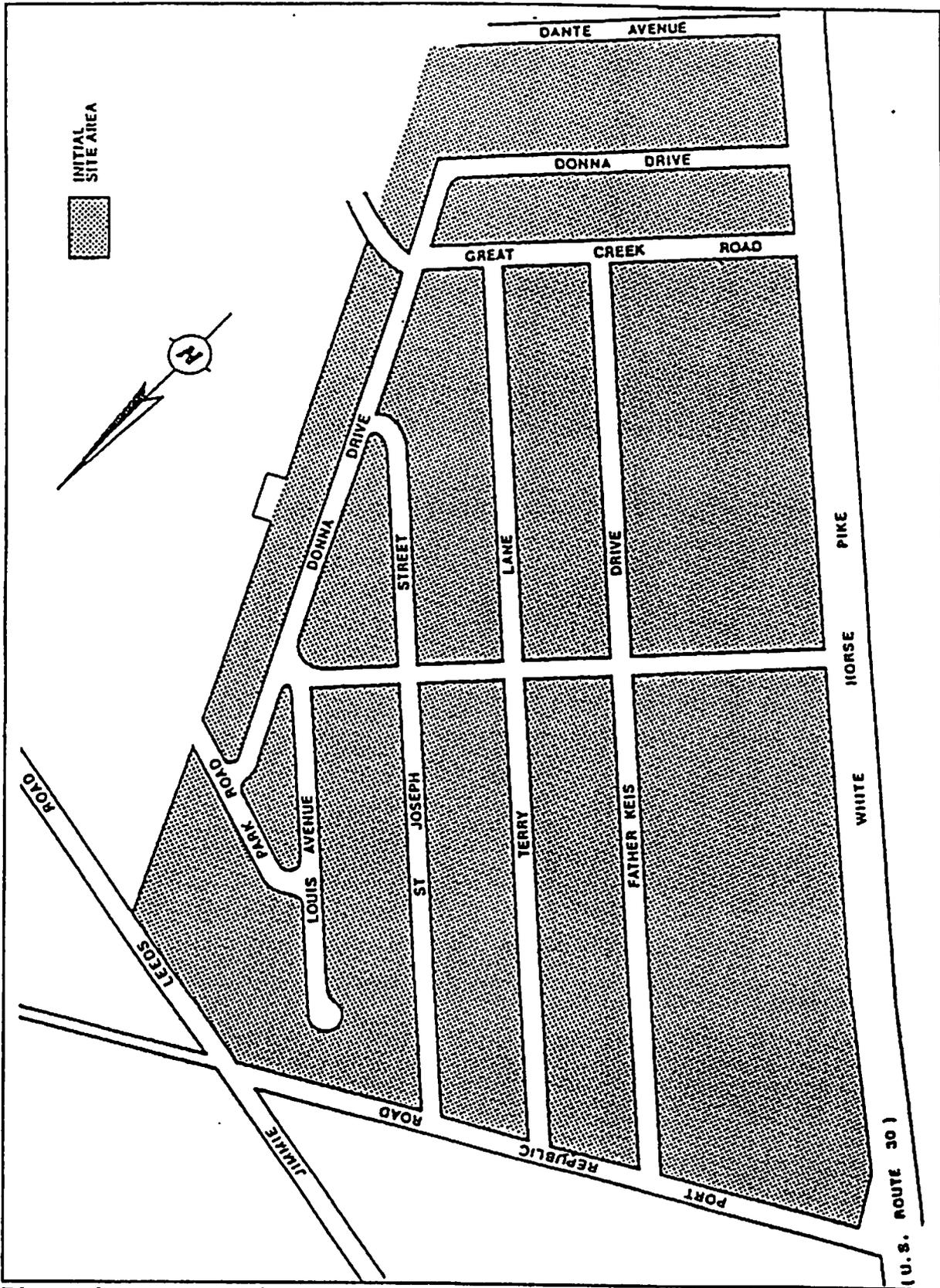


Figure 2 - Pomona Oaks Subdivision

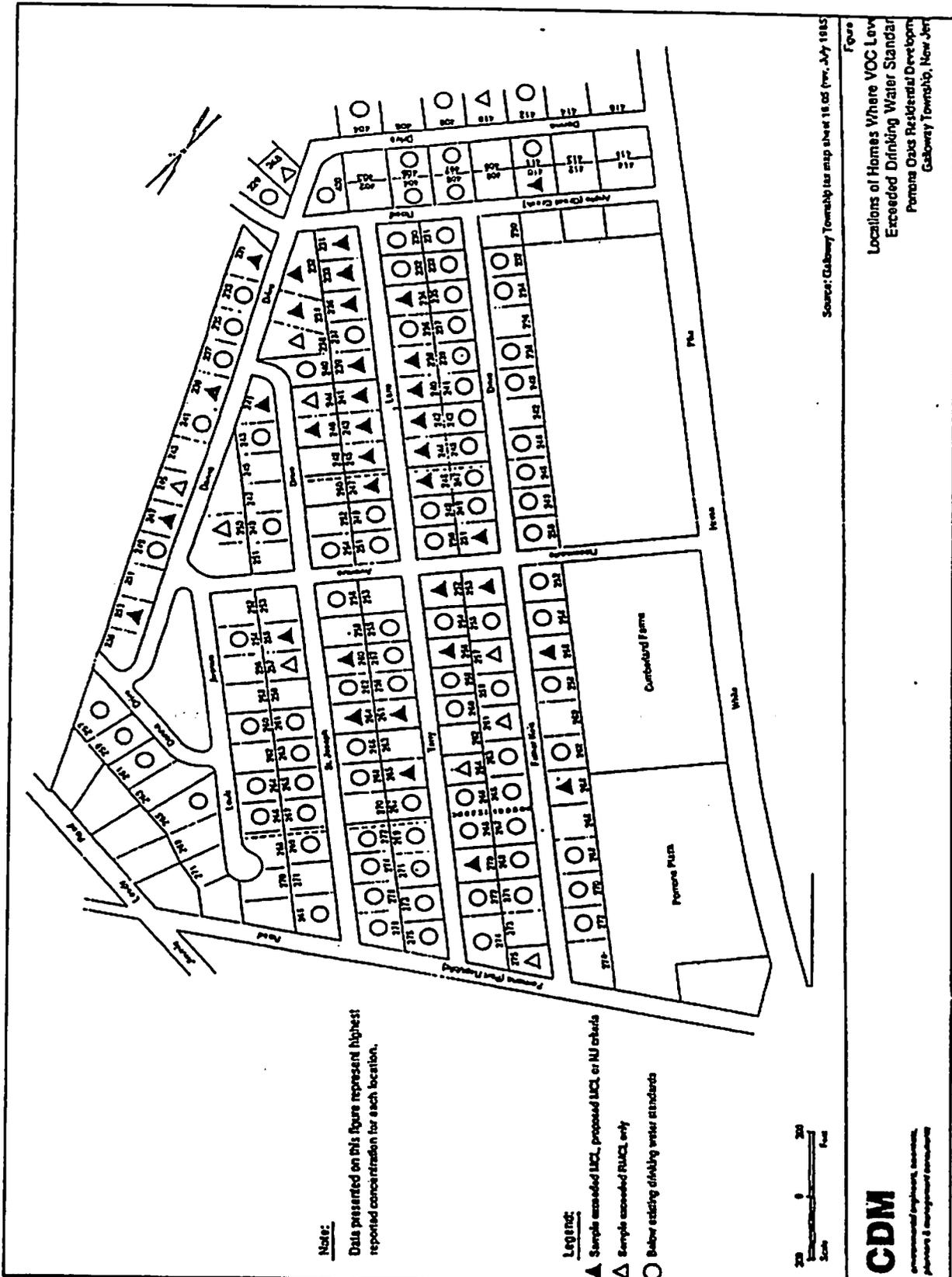
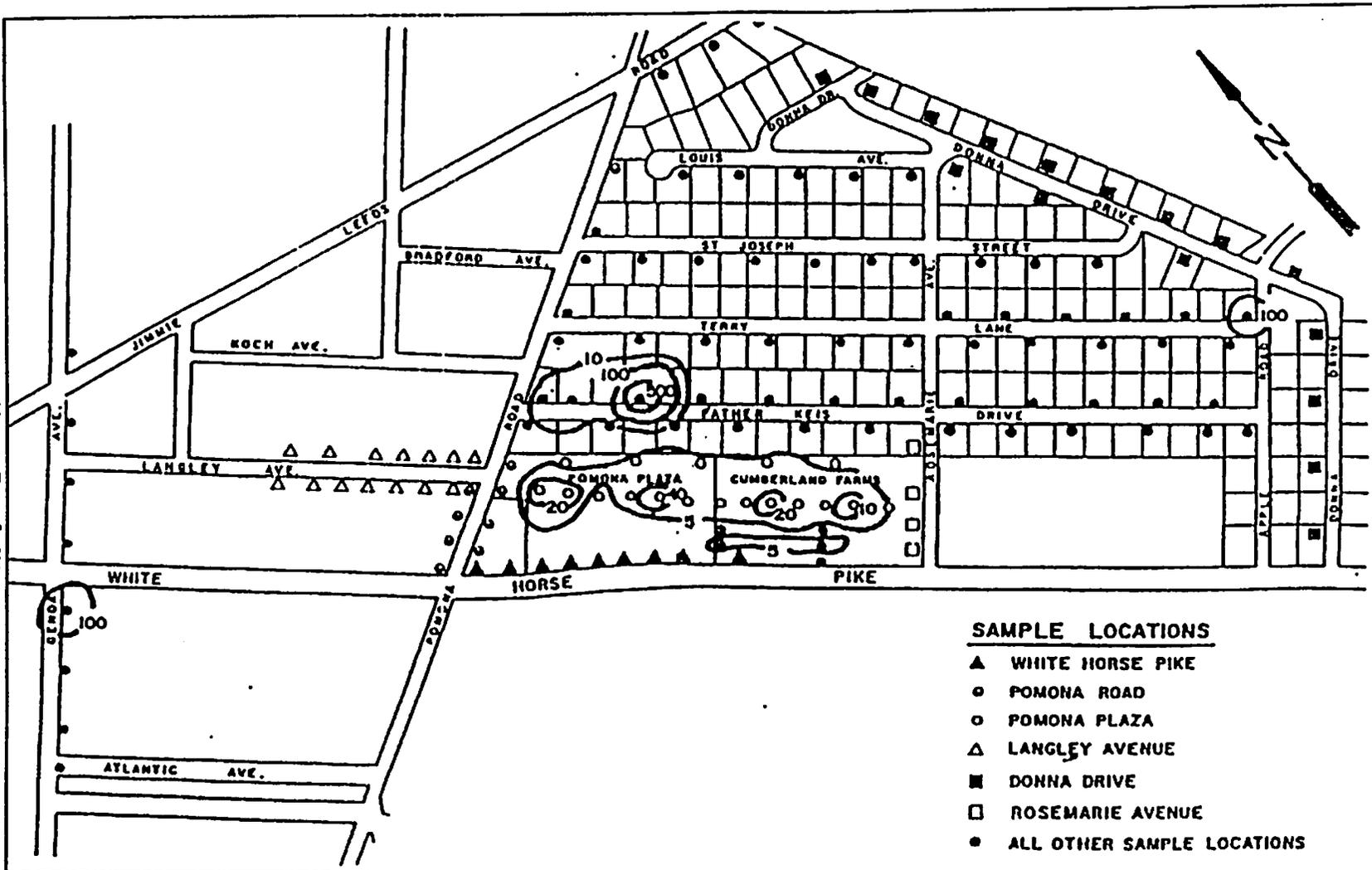


Figure 3 - Contaminated Potable Wells

FIGURE 4 - Soil Gas Contour Map: Total VOCs



SAMPLE LOCATIONS

- ▲ WHITE HORSE PIKE
- POMONA ROAD
- POMONA PLAZA
- △ LANGLEY AVENUE
- DONNA DRIVE
- ROSEMARIE AVENUE
- ALL OTHER SAMPLE LOCATIONS

SCALE
1: 5890

DATE
MAY, 1989

REM III
POMONA OAKS SITE
SOIL GAS CONTOUR MAP—TOTAL VOC's

FIGURE
4-2

Figure 5 - Monitor Well Locations

