

Public Health Assessment for

**PUBLIC HEALTH ASSESSMENT ADDENDUM
GARDEN STATE CLEANERS-CERCLIS NO. NJD053280160 AND
SOUTH JERSEY CLOTHING COMPANY-CERCLIS NO. NJD980766828
MINOTOLA, ATLANTIC COUNTY, NEW JERSEY
APRIL 21, 1995**

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Hazardous Waste



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GARDEN STATE CLEANERS

CERCLIS NO. NJD053280160

AND

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MINOTOLA, ATLANTIC COUNTY, NEW JERSEY

Prepared By:

**New Jersey Department of Health
Environmental Health Service
Under A 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.

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Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

FOREWARD

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.

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.

SUMMARY

The Garden State Cleaners (GSC) and South Jersey Clothing Company (SJCC) sites are located in Buena Borough, Atlantic County, New Jersey. The GSC is a dry cleaning facility in operation since 1966, while the SJCC facility, presently inactive, was a manufacturer of military uniforms. The two facilities are separated by approximately 500 feet, and are considered as one site. In the early 1980s, the SJCC routinely discharged contaminated wastewater and production wastes to on-site soils resulting in significant soil and groundwater contamination by trichloroethylene (TCE) and other volatile organic compounds. Until the mid-1980s, the GSC discharged wastewater containing tetrachloroethylene (PCE) to on-site soils, resulting in additional groundwater contamination. Plume migration has resulted in the closing of private wells downgradient (to the south) of the site. Municipal water supplies were made available to affected residents in 1984. The GSC was placed on the National Priority List in March 1989, and SJCC in October 1989. A Remedial Investigation and Feasibility Study (RI/FS) has been completed (Phase 1; 12/89 to 2/90, Phase 2; 1/91 to 4/91) by the United States Environmental Protection Agency (USEPA). Remedial Activities at the site have included groundwater treatment, and currently, the USEPA is facilitating installation of a soil vapor extraction system at the GSC site.

Completed human exposure pathways existed in the past at the site and were associated with groundwater, and ambient air (SJCC). Potential exposure pathways are associated with groundwater and on site soils (SJCC). Because of community concerns regarding site contaminants (TCE, PCE) a review and evaluation of New Jersey Cancer Registry (NJCR) data was conducted by the NJDOH. Cancer incidence rates were found to be less than State averages. Based upon the likelihood of past exposure, ATSDR and NJDOH consider this site to have posed a public health hazard. Community health education has been conducted by the USEPA; however, ATSDR's Health Activities Recommendation Panel determined that additional community health education should be considered if after an evaluation of, among other factors, comments received during the public comment period for this addendum indicate a need. The NJDOH and ATSDR will evaluate public comments and determine the need for additional community health education. The NJDOH conducted a public comment period for the Public Health Assessment Addendum from September 23, 1994 to October 28, 1994.

BACKGROUND

A. Site Description and History

Refer to the Site Description section in the Health Assessment(s). Additionally, the following adjuvant information is added:

The SJCC is a presently inactive manufacturer of military clothing which disposed of liquid process wastes and sludge containing trichloroethylene onto the grounds of its facility from 1972 until 1981. Additionally, 275 gallons of TCE were released from an on site storage tank during a fire at the facility in 1979. As a result, soils adjacent to the existing site structure, as well as groundwater below and downgradient from the site, have been contaminated with TCE and other volatile organic substances. In 1981, an investigation of the potable well of an immediately adjacent resident showed TCE concentrations of approximately 16,000 ppb. Subsequent on-site investigations (1982) revealed soil concentrations of TCE as high as 940,000 ppb. In 1981, the SJCC contracted the removal of 33 drums of contaminated soils. Under a 1984 Administrative Consent Order (ACO) the SJCC conducted a hydrogeological investigation and installed a groundwater extraction and treatment system (two air strippers in series; operating at 25 gallons/minute).

Located approximately 500 feet to the south of the SJCC is the GSC, a presently active dry cleaning facility in operation since 1966. Until 1985 the GSC discharged steam containing tetrachloroethylene directly onto on-site soils. As a result, soils adjacent to the existing structure, as well as groundwater below and downgradient from the site, have been contaminated with PCE. Initial soil samples obtained in 1984 revealed PCE concentrations of a maximum of approximately 24,000 ppb.

The sites are underlain by the Cohansey Sand aquifer. Soils in the region are an unconsolidated mixture of sand, silt, and clay. In 1982, as a result of the suspected PCE and TCE contamination of area groundwater, Buena Borough tested adjacent residential wells, and found 40% failed to meet USEPA's standards for VOCs. A plume of contamination is thought to extend approximately 3,000 feet downgradient of the site. As a result, a municipal water supply system with a supply well 2,000 feet upgradient of the site(s) was installed in 1984. Connection to this supply was elective and sealing of private contaminated wells was not mandatory.

The Remedial Investigation/Feasibility Study (RI/FS) was conducted by USEPA between November 1989 and July 1991. As the two sites are in proximity to each other, share similar processes, and their respective plumes intermingle, the GSC and the SJCC were addressed by one study. The USEPA in conjunction with the NJDEP, has selected air stripping and carbon adsorption for treatment of underlying groundwater, and vapor extraction for treatment of contaminated soils.

B. Site Visit

Refer to the Site Visit section of the Health Assessment(s). Additionally, the following adjuvant information is added:

Representatives of the NJDOH (James Pasqualo) and the USEPA conducted a site visit of both facilities on September 9, 1993. The SJCC facility was observed to be non-operational and was not fenced or marked as a NPL site. The GSC facility was observed to be in normal operation.

No overt physical hazards were apparent with regard to either facility.

C. Demographics, Land Use, and Natural Resource Use

Refer to the Demographics section of the Health Assessment(s). Additionally, the following adjuvant information is added:

Approximately 3,800 persons live in Buena Borough with less than half of these residing to the south (downgradient) of the site. The surrounding community is a mixture of residential and light commercial areas. The Cleary Junior High School is located approximately 2,000 feet to the south of the sites. A retirement community is located adjacent to the SJCC property. The sites are surrounded by residential dwellings and no restrictions are in place to prevent contact by trespassers with areas of soil contamination at either location.

Land use in the area of the site(s) is primarily agricultural and is irrigated by groundwater. There is an irrigation well located approximately 2,000 feet downgradient from the site. The closest residents known to be using groundwater for potable purposes are approximately 4,000 feet downgradient, although numerous private wells exist in proximity to the site(s). There are no surface water features associated with the sites or in the immediate environs. There are no wildlife refuges, wetlands or other sensitive environments within the immediate environs of the sites.

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, Birth Defects 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.

Using health data bases, it may be possible to determine whether certain health problems are higher than expected in Buena Borough. This section identifies the relevant, available data bases; their evaluation occurs in the Public Health Implications section.

Of relevance to this Public Health Assessment Addendum is the New Jersey Cancer Registry (NJCR). The New Jersey Cancer Registry is a population Based incidence registry that includes cancer cases among New Jersey residents diagnosed since October 1, 1978. New Jersey Administrative Code 8:57-6 requires the reporting of all newly diagnosed cancer cases to the registry within three months of hospital discharge or six months of diagnosis. The basic source of information is the patient's medical records. Demographic and medical data are abstracted from those records and do not contain information regarding modes of treatment or survival. The only follow-up information included is the date of death.

Cancer might be possible from long-term exposure to at least one of the site contaminants. Please refer to the Toxicological Implications subsection of the Public Health Implications section for more information on cancer.

COMMUNITY HEALTH CONCERNS

Refer to the Community Health Concerns section of the Health Assessment(s).

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

The tables in this section list the contaminants of concern for the GSC/SJCC 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 non-carcinogenic 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.

To identify possible facilities that could contribute to the groundwater contamination near the Garden State Cleaners and South Jersey Clothing Company site(s), ATSDR and NJDOH searched the 1987, 1988, and 1989 Toxic Release Inventory (TRI). TRI is developed by the USEPA from the 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 the vicinity of the Garden State Cleaners/South Jersey Clothing Company which was pertinent to the contaminants and pathways of concern at the site.

A. On-site Contamination

On-site disposal of process wastes was the source of soil contamination at the GSC and SJCC site(s). Although soil contamination has ceased (GSC in 1985, and SJCC in 1981), desorption of TCE and PCE from the soil remains as a source of groundwater contamination. Based upon the nature and extent of the contamination associated with the site(s) the remedial investigation focused upon soil and groundwater.

Surface and Subsurface Soils

Soil sampling conducted during Phase 1 and Phase 2 of the remedial investigation identified two areas of soil contamination:

The first is located at the SJCC, and is an area between the northwest corner of the building and a nearby railroad bed where SJCC disposed of process wastes and sludges (see Appendix 2). The predominant contaminant in this area is TCE. Table 1 summarizes the results of surface and sub-surface soil sampling associated with the SJCC.

The second area of soil contamination is located at the GSC, and is an area adjacent to the north wall of the facility underneath steam condensate and boiler blowdown pipes where contaminated steam and water had been discharged in the past (see Appendix 3). The predominant contaminant in this area is PCE. Table 2 summarizes the results of surface and sub-surface soil sampling associated with the GSC.

A soil gas survey of the vicinity of the sites was conducted by USEPA in January 1989 to provide information regarding sources of contamination and the extent of the ground-water contamination plume (see Appendix 4). TCE, the primary solvent used at the SJCC, was detected near that facility, while PCE was detected near the GSC. The results of the soil gas survey exhibited a high degree of correlation with historical information regarding contaminant source locations.

Groundwater

The GSC/SJCC site is situated over the Cohansey Sand aquifer, a component of the Kirkwood Cohansey formation which underlies approximately 3,000 square miles of New Jersey coastal plain. This aquifer sits atop a clay bed within the Kirkwood formation approximately 250 feet below grade (fbg). Groundwater flows to the south/southwest in the vicinity of the site(s). A permeable clay formation exists below the site at approximately 120 fbg., which does not restrict the downward flow of groundwater.

Desorption of TCE and PCE from the soil has been identified as the source of groundwater contamination. Predominant contaminants of concern in groundwater are TCE and PCE. Other VOCs (degradation products of TCE and PCE) are also present in groundwater.

Groundwater data have been collected from numerous monitoring wells. Twelve (12) shallow wells (< 50ft.) were installed by the SJCC in the early 1980s, while an additional 13 wells (4 shallow < 50 ft., 7 intermediate 50 - 150 ft., and 2 deep > 200 ft.) were installed during field activities of the RI/FS. Appendix 5 and Appendix 6 illustrate the TCE contamination plume associated with the SJCC in 1982 and in 1989 respectively, prior to the RI/FS. Table 3 summarizes the compounds detected in the Phase 1 ground-water investigation. Table 4 summarizes the compounds detected at concentrations greater than 1 ppb during the Phase 2 groundwater investigation. Appendix 7 illustrates Phase 2 TCE concentration contours, while Appendix 8 illustrates PCE contours.

Air

The USEPA conducted a flux chamber measurement survey in May 1990 to determine the levels of TCE and PCE which were being released from contaminated soils and groundwater. Flux chamber data were used to generate an area emission profile and a model of emission concentrations. Expected air concentrations of TCE and PCE modeled from soil emission rates are presented in Table 5.

Surface Water and Sediments

There are no on-site surface water features associated with the GSC or SJCC sites.

B. Off-site Contamination

Surface and Sub-surface Soils

Soil sampling of areas adjacent to and downgradient (to the south) of the site(s) did not indicate areas of off-site soil contamination. The soil gas investigation indicated areas of TCE and PCE associated with the estimated location of the plume of groundwater contamination (see Appendix 4).

Groundwater

Beginning in May 1981, NJDEP sampled potable wells in the vicinity of the SJCC and discovered TCE in concentrations exceeding levels recommended for drinking or consumptive purposes (up to 16,000 ppb for an immediately adjacent well). Further testing conducted by Buena Borough in 1982 identified 87 wells which failed to meet USEPA standards for VOCs. As a result, a municipal water supply was installed in late 1984.

In 1989, USEPA sampled seven domestic potable wells (50 - 71 feet deep) and an irrigation well (208 ft.), all located down gradient of the site (see Appendix 9). Residential well #1 (71 ft.) contained PCE at 13 ppb., while shallower (50 ft) adjacent wells exhibited no contamination. The deep irrigation well exhibited concentrations of 1,2,3 and 1,2,4 trichlorobenzene (0.9 ppb. total), and naphthalene (0.8 ppb.) which are evidently not site-related.

All residences in the area have a municipal potable water supply available. However, significant costs to residents were associated with utilization of this system. Additionally, use of public water and sealing or capping of the private wells was not mandatory. USEPA has conducted a groundwater usage survey of the area to identify potable wells threatened by the site, and is confident that residents are not currently using private wells for potable water supply within the study area.

Air

Levels of TCE in ambient air were modeled from soil emission rates of the SJCC facility (see Table 5). Levels of 7.97 ppb. were projected for a 1.5 meter high receptor located 100 meters downwind from the site, and 1.22 ppb at 500 meters.

Levels of PCE in ambient air were likewise modeled from emission rates associated with the GSC facility (see Table 5). Levels of 0.00036 ppb. were projected for a 1.5 meter high receptor located 100 meters downwind from the site. and 0.00015 at 500 meters.

Surfacewater and Sediments

There are no off-site surface water features associated with the SJCC or GSC sites.

C. Quality assurance and Quality Control

In preparing this addenda, the ATSDR and the NJDOH rely on the information provided in the referenced documents, and assume that adequate quality assurance and quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of the analysis and conclusions drawn for this addenda is determined by the availability and reliability of the referenced information.

D. Physical and Other Hazards

The Garden State Cleaners and South Jersey Clothing Company sites contain no discernible or suspected physical, radiological, or biological hazards.

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. Completed pathways require that the 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, require that at least one of the five elements is 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.

Based upon current site conditions and review of information describing the nature and extent of on-site and off-site contamination, completed and potential human exposure pathways may be identified. Tables 6 and 7 provide a summary of completed and potential human exposure pathways regarding the GSC/SJCC site.

A. Completed Exposure Pathways

Completed human exposure pathways at the GSC/SJCC site were associated with contaminated groundwater (both sites) and VOC's in the air (SJCC).

Groundwater

In the past, it is probable that area residents were exposed to TCE and PCE at the GSC/SJCC site through the domestic and potable use of contaminated groundwater. This exposure likely occurred through direct ingestion of contaminants in domestic wells, and inhalation of volatilized compounds. The availability of a public water supply to those residents whose wells were contaminated or threatened by the GSC/SJCC site has interrupted this exposure pathway. Presently there is no evidence or information indicating the use of private potable wells.

Contamination of the Cleary School well prompted the installation of point source charcoal filters to reduce VOC's. In addition, the school was the first to receive installation of a municipal water supply.

Air

Environmental data and modeling has shown that the inhalation of significant concentrations of TCE in ambient air by residents and trespassers at the SJCC was possible in the past. This pathway may have had maximum significance during the period when SJCC was an active facility and practiced on-site waste disposal. Removal of on-site sludges and the cessation of on-site disposal of VOCs has significantly reduced the public health concern regarding this exposure pathway.

B. Potential Exposure Pathways

Groundwater

Significant concentrations of contaminants remain in area groundwater. There is a potential for area residents to be exposed to TCE and PCE from the GSC/SJCC site through domestic and potable use of contaminated groundwater. It is implausible, however, that new private potable wells would be installed in an area where a public water supply is available. The probability that humans will be exposed to groundwater contaminants in the future is unlikely and improbable.

It is likely that in the past, on-site workers and trespassers at the SJCC were exposed to significant levels of TCE in the soils, especially during the period of on-site disposal of wastes. However there are no data or information from which an estimate of such past exposure may be made.

Eliminated Pathways

Although the GSC remains an active facility, and significant concentrations of tetrachloroethylene were detected in on site soils beneath the boiler blow-down pipe, this area

is covered by grass and is not readily accessible by employees and/or trespassers. It is unlikely that anyone would linger in or frequent this area for a sufficient duration of time to be exposed at levels of public health concern. The USEPA is currently implementing a soil vapor extraction system at the GSC site. When operational, this system will serve to minimize and/or eliminate potential exposures to VOCs from on-site soils.

PUBLIC HEALTH IMPLICATIONS

This section discusses the potential for health effects in persons exposed to specific contaminants, evaluate state and local databases, and address specific community health concerns. Health effects evaluations are accomplished by estimating the amount (or dose) of those contaminants that a person might come in contact with on a daily basis. This estimated exposure dose is then compared to established health guidelines. People who are exposed for some crucial length of time to contaminants of concern at levels above established guidelines are more likely to have associated illnesses or disease.

Health guidelines are developed for contaminants commonly found at hazardous waste sites. Examples of health guidelines are the ATSDRs Minimum Risk Level (MRL) and the USEPAs Reference Dose (RfD). When exposure (or dose) is below the MRL or RfD than non-cancer, adverse health effects are unlikely to occur.

MRLs are developed for each route of exposure, such as acute (less than 14 days), intermediate (15 to 364 days), and chronic (365 days and greater). ATSDR presents these MRLs in Toxicological Profiles. These chemical-specific profiles provide information on health effects, environmental transport, human exposure, and regulatory status.

A. Toxicological Evaluation

The contaminants of toxicological significance at the GSC/SJCC site are trichloroethylene (TCE) and tetrachloroethylene (PCE).

Trichloroethylene (TCE)

Trichloroethylene is a compound commonly used as a cleaning solvent or a degreasing agent. It is listed as a B2 agent (probable human carcinogen) by the USEPA. Target organs in humans are the liver and kidneys. TCE is metabolized by the liver and excreted in the urine. Animal studies indicate TCE, at levels higher than those associated with the GSC/SJCC site, causes liver and kidney damage in mice and rats, and hepatocellular carcinoma in mice exposed through ingestion and inhalation; human data is limited. TCE is not considered to be teratogenic or mutagenic. TCE is primarily absorbed by the body through inhalation (37-75 %), or through ingestion (91 - 98 %). Dermal absorption is not as great, but TCE is lipophilic and will act to defat skin tissue, thus increasing its absorption rate. Oral reference doses (RfD) and inhalation reference concentrations (RfC) have not been established for TCE. TCE has an oral cancer slope factor of 1.1 E^{-2} (mg/kg/day) , and an inhalation cancer slope factor of 1.7 E^{-2} (mg/kg/day) .

TCE was found in a private well immediately adjacent to the SJCC site at a maximum concentration of 16,000 ppb (160 mg/l). Calculated exposure doses for adult (body weight 70 kg.) and child (body weight 16 kg) receptors exceeded the oral intermediate duration minimal risk level for effects other than cancer cited in the ATSDR Toxicological Profile for Trichloroethylene. At such concentrations adverse effects to the hepatic and renal systems are possible.

Lifetime excess cancer risk may be estimated for TCE ingestion based upon calculated exposure doses. For the private potable well cited above, an exposure duration of ten years was assumed, representing the operational period SJCC disposed of TCE onsite. For an adult resident ingesting groundwater containing TCE at a concentration of 160 mg/l, a moderate increased risk of cancer existed. This risk may be interpreted as follows: If 1000 adults ingested well water containing the concentration of TCE cited above for ten years approximately five additional cases of cancer may occur in 70 years. Similarly, LECRs for children who may have ingested TCE in well water may be estimated based upon calculated exposure doses. This estimate includes the assumption that a 16 kg child resident was exposed for a duration of ten years. For a child resident, a high increased risk of cancer existed. This risk may be interpreted as follows: If 100 children were exposed for ten years to the concentration of TCE present in the well cited above, approximately one additional case of cancer may occur in 70 years.

Trichloroethylene concentrations volatilizing from the soils at SJCC were modeled during the remedial investigation and presented in Table 5. Projected concentrations ranged from a maximum of 7.97 ppb (44.32 ug/m³) at 100 meters from the site, to a projected minimum of 0.45 ppb (2.52 ug/m³) at 1000 meters from the site (for a receptor 1.5 meters above the ground). These concentrations were below the lowest NOAEL (no observed adverse effect level) for animals and the LOAEL (lowest observed adverse effect level) for humans cited in the ATSDR Toxicological Profile for Trichloroethylene. At such concentrations it is not likely that adverse non-carcinogenic health effects would occur.

Lifetime Excess Cancer Risk (LECR) may be estimated for TCE inhalation exposure based upon calculated exposure doses derived from modeled concentrations. A residency/exposure duration of 30 years was employed for this estimate to represent a maximum worst case exposure scenario. For adults residents living near the SJCC site, a low increased risk of cancer existed for residents at 100 meters, and an insignificant or no increased risk of cancer existed for residents at 1000 meters. This risk may be interpreted as follows: If 10,000 persons were exposed for 30 years to the maximum concentration of TCE modeled to be present in the air at a distance of 100 meters from the site, one additional case of cancer may occur in 70 years. Thus, for the adult residents in the vicinity of the SJCC site, most or all of whom live more than 100 meters from the site, it is unlikely that they would develop cancer as a result of their exposure.

Similarly, LECRs for children living in the vicinity of the SJCC site may be estimated based upon calculated exposure doses derived from modeled concentrations. This estimate includes the assumption that a 30 kg child was exposed for a duration of 10 years. For children living near the SJCC site, no apparent increased risk existed for residents at 100 meters, and insignificant or no increased risk existed for residents at 1000 meters. This risk may be interpreted as follows: If 100,000 children of grade school age were exposed for ten years to the maximum

concentration of TCE modeled to be present at a distance of 100 meters from the site, five additional cases of cancer may occur in 70 years. Thus, for child residents in the vicinity of the SJCC site, most or all of whom live more than 100 meters from the site, it is unlikely that they would develop cancer as a result of their exposure.

Tetrachloroethylene (PCE)

Tetrachloroethylene is a compound employed widely in the dry cleaning and apparel industries. It is listed as a B2 agent (probable human carcinogen) by the USEPA. Target organs in humans are the liver and kidneys. PCE is metabolized by the liver and excreted in the urine. Animal studies utilizing concentrations much higher than those found at the GSC site indicate PCE causes liver and kidney damage in mice and rats, and hepatocellular carcinoma in mice and rats exposed through ingestion and inhalation; human data is limited. PCE is not considered to be teratogenic or mutagenic. PCE is absorbed by the body primarily through ingestion and inhalation, and has a comparatively low dermal absorption rate. The oral RfD for PCE is 1.0 E^{-2} (mg/kg/day), an inhalation reference concentration (RfC) has not been established. PCE has an oral cancer slope factor of 5.2 E^{-2} (mg/kg/day)⁻¹, and an inhalation cancer slope factor of 1.8 E^{-3} (mg/kg/day) .

A tetrachloroethylene plume emanating from the GSC facility has been found to have contaminated private potable wells downgradient of the site (appendix 8 & 9). The toxicological significance of groundwater contamination was evaluated for a private well showing 13 ppb of PCE, and for the Cleary School Well which exhibited approximately 100 ppb or more total VOCs in six of 11 samples taken in May of 1982. For the purposes of this evaluation, it will be assumed that the concentration in the Cleary School well is entirely PCE as specific compounds detected in the sampling event were not available.

Exposure doses calculated for the maximum concentrations of PCE detected in both the private potable well cited above and the Cleary School well were at least two orders of magnitude below the minimal risk level for effects other than cancer cited in the ATSDR Toxicological Profile for Tetrachloroethylene. At such concentrations it is unlikely that adverse non-carcinogenic health effects would occur.

Lifetime Excess Cancer Risk may be estimated for PCE ingestion exposure based upon calculated exposure doses. For the private potable well cited above a residency/exposure duration of 30 years was employed for this estimate to represent a worst case exposure scenario. For an adult resident ingesting groundwater containing PCE at 13 ppm, an insignificant or no increased risk of cancer existed. This risk may be interpreted as follows: If 1,000,000 adults ingested well water containing the concentration of PCE cited above for 30 years, approximately eight additional cases of cancer may occur in 70 years. Thus for adult residents who experienced potable well contamination to a similar degree, it is unlikely that they would develop cancer as a result of their exposure.

Similarly, LECRs for children who may have ingested PCE in well water may be estimated based upon calculated exposure doses. This estimate includes the assumption that a 30 kg child was exposed for a duration of 10 years. For a child resident, an insignificant or no increased

risk of cancer existed. This risk may be interpreted as follows: If 1,000,000 children of grade school age were exposed for ten years to the concentration of PCE present in the well cited above, three additional cases of cancer may occur in 70 years. Thus for child residents who may have ingested contaminated groundwater, it is unlikely that they would develop cancer as a result of their exposure.

For those children who may have been exposed to tetrachloroethylene through ingestion of groundwater from the Cleary School well, the LECR may be estimated with the following assumptions: exposure occurred for a maximum of three years (5 days per week), each child ingested 1 liter of water per day, and an average body weight of 40 kg. Based upon calculated exposure doses an insignificant or no increased risk of cancer existed for students in the school. This risk may be interpreted as follows: If 1,000,000 junior high school students were exposed every schoolday for three years to 100 ppb of PCE in drinking water, approximately three additional cases of cancer may occur in 70 years. Thus, for those children who may have ingested contaminated groundwater at the Cleary School, it is unlikely that they would develop cancer as a result of their exposure.

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 in Buena Borough, New Jersey. 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 Buena Borough, 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 7 presents the findings of the health outcome data (SIR) analysis. The observed number of total cancer cases in Buena Borough 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. In addition 3 cases of childhood cancer were diagnosed during the study period. This incidence of childhood cancer is less than what would be expected based upon State rates.

C. Community Health Concerns Evaluation

The concerns of the community regarding the GSC/SJCC sites focus upon utilization of the public water supply made available in 1984, and the possible health effects of the domestic and potable use of contaminated groundwater.

Although use of the public water supply was mandated in 1984, utilization by some residents was complicated by the associated "hook-up" fees. Additionally, closure and sealing of domestic wells affected or threatened by the site was not mandatory. While the RI/FS indicates that a well use survey was conducted, response to the survey was voluntary.

Longtime residents of the community have expressed a belief that the groundwater in the area has been contaminated for many years before the problems associated with the GSC/SJCC site(s) were identified. The community was entirely dependant upon private potable wells prior to 1984 when public water became available. Environmental data do not conflict with a general community suspicion that other threats to the quality of groundwater existed in the past and may continue to exist. As a result the community has expressed concern as to the possible long-term health effects which may result. This concern will be directly addressed by the review of health outcome data for the community associated with the site. Exposure doses calculated from maximum contaminant levels detected in potable wells were not at levels where adverse health

effects would be expected, except for the exposure doses calculated for the residential well located immediately adjacent to the site (see Toxicological Evaluation Section above).

Public Comment Period

The New Jersey Department of Health (NJDOH) conducted a public comment period for the Public Health Assessment Addendum for the GSC/SJCC site from September 23, 1994 to October 28, 1994. The Public Health Assessment was placed in local repositories to facilitate commentary and reaction from the public at large. Additionally, the Public Health Assessment was circulated to the Atlantic County Health Department for the purpose of soliciting commentary by local health officials.

The NJDOH did not receive any comments regarding the GSC/SJCC site during this public comment period.

CONCLUSIONS

Refer to the Conclusions and Recommendations section of the Health Assessment documents. Additionally the following adjuvant information is added:

From the data and information reviewed, the Garden State Cleaners/South Jersey Clothing Company site is judged to have constituted a public health hazard on the basis of past exposure of chronic duration, through the ingestion pathway, to hazardous substances present in the potable well water of residents downgradient of the site. However as a result of the availability of a public water supply in 1984, and the fact that no private wells are currently exhibiting site-related contamination, the GSC/SJCC site is currently judged to present no apparent public health hazard:

During the period when the GSC/SJCC facilities were discharging TCE and PCE concentrations of these VOCs in area groundwater exceeded New Jersey Maximum Contaminant Levels. Private well data are limited. For those private wells where data are not available describing past water quality, it is possible, based upon the nature and extent of the contamination plume, that VOCs were present at levels where exposure doses were toxicologically significant.

For the private well immediately adjacent to the SJCC site which exhibited TCE at 160 mg/l exposure doses may have exceeded levels where adverse hepatic and renal effects are possible. Similarly, lifetime excess cancer risk associated with these exposure doses were estimated to range from moderate (adult receptor) to high (child receptor). It should be noted that these estimations assume a worst case scenario which may not be indicative of actual exposures within the one affected residence.

For the private wells where data exist and/or are available, exposure doses were not at a level where adverse health effects would be expected. Additionally, lifetime excess cancer risk associated with ingestion of groundwater from these wells ranged from no apparent to no increased risk.

Concentrations of TCE modeled to be emanating from the SJCC site are not at a level where adverse non-cancer health effects would be expected. Lifetime excess cancer risks associated with calculated exposure doses ranged from low increased risk for a maximally exposed adult to no apparent increased risk for a maximally exposed child.

A comprehensive survey of domestic well usage in the area impacted by the sites, or which may be impacted by the site in the future, has been conducted by USEPA. The results of this investigation may be the basis for appropriate actions by local health authorities to minimize the risk posed by site related ground-water contamination.

RECOMMENDATIONS

Refer to the Conclusions and Recommendations section of the Health Assessment documents. Additionally, the following adjuvant information is addended:

A. Recommendations and the Health Activities Recommendations Panel (HARP) Statement.

Cease/Reduce Exposure Recommendations

Private domestic use of groundwater within the current plume or within areas threatened by contamination should continue to be prohibited.

Site and Exposure Characterization Recommendations

Should additional data become available regarding characterization of off-site groundwater contamination and domestic well usage, ATSDR and NJDOH should review the public health significance of this information.

Health Activities Recommendation Panel Statement

The data and information developed in the Public Health Assessment for the Garden State Cleaners/South Jersey Clothing Company site in Buena Borough, New Jersey, has been evaluated by ATSDR's Health Activities Recommendation Panel (HARP) for appropriate follow-up with respect to health activities. Community health education has been conducted by the USEPA; however, the panel determined that additional community health education should be considered if after an evaluation of, among other factors, comments received during the public comment period for this addendum indicate a need.

B. Public Health Actions

The Public Health Action Plan (PHAP) for the GSC/SJCC 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

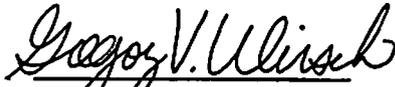
1. Environmental data and proposed remedial activities have been evaluated within the context of human exposure pathways and relevant public health issues.
2. The NJDOH has reviewed data from the New Jersey Cancer Registry with regard to the Borough of Buena.

Public Health Actions Planned

1. ATSDR and NJDOH did not receive public commentary indicating the need to perform additional community health education. Additional health education is not being considered for the GSC/SJCC site at this time.
2. 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.
3. 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.
4. 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.

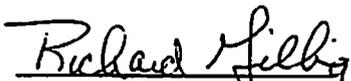
CERTIFICATION

The Public Health Assessment Addendum for the Garden State Cleaners/South Jersey Clothing Company sites 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 addendum was initiated.



Technical Project Officer, SPS, SSAB, DHAC

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


for Division Director, DHAC, ATSDR

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REFERENCES

The following citations are added to the "References" section.

- 1) Clayton, George D. and Florence E. (Eds.). "Patty's Industrial Hygiene and Toxicology", 3rd. Edition. New York: Wiley and Sons, 1981.
- 2) Agency For Toxic Substances and Disease Registry. "Toxicological Profile for Trichloroethylene". Atlanta: U.S. Public Health Service. October 1989.
- 3) Agency For Toxic Substances and Disease Registry. "Toxicological Profile for Tetrachloroethylene". Atlanta: U.S. Public Health Service. January 1990.
- 4) Draft Remedial Investigation Report, South Jersey Clothing Company/ Garden State Cleaners Sites. EBASCO Services Inc. USEPA Contract No.: 68-W8-0110. June 1991.
- 5) Final Draft Remedial Investigation Report, South Jersey Clothing Company/ Garden State Cleaners Sites. EBASCO Services Inc. USEPA Contract No.: 68-W8-0110. August 1991.
- 6) Draft Record of Decision, South Jersey Clothing Company and Garden State Cleaners Sites. Atlantic County, New Jersey. USEPA Region 2; July 1991.
- 7) Final Draft Feasibility Study Report, South Jersey Clothing Company and Garden State Cleaners Sites. Ebasco Services Inc. USEPA Contract No.: 68-W8-0110. August 1991.
- 8) Predesign Engineering Report South Jersey Clothing Company/Garden State Cleaners, Buena Borough, New Jersey. Dames and Moore; September 17, 1993.

TABLE 1 - South Jersey Clothing, Surface and Subsurface Soil Contamination. All concentrations in mg/kg (ppm).

PHASE 1 (43 Samples; 10 FBG Maximum depth)

Compound	Frequency Of Detection	Range
Methylene Chloride	14	0.011 - 0.520*
Acetone	4	0.210 - 2.0
1,2-Dichloroethene	7	0.001 - 0.022
Chloroform	1	0.008
2-Butanone	3	0.018 - 0.860
1,1,1-Trichloroethane	1	0.015
Trichloroethylene	28	0.003 - 5.9
1,1,2-Trichloroethane	2	0.002
Benzene	2	0.001
Tetrachloroethylene	19	0.001 - 0.820
1,1,2,2-Tetrachloroethane	1	0.017*
Toluene	1	0.002
Chlorobenzene	3	0.001 - 0.002

* = Possible Blank Contaminant

PHASE 2 (28 Samples; 10 FBG maximum depth)

1,2-Dichloroethene	2	0.010 - 0.640
Trichloroethylene ¹	27	0.002 - 68.0
Tetrachloroethylene	15	0.004 - 5.8
Toluene	10	0.001 - 0.023

1 = One phase 2 soil sample exhibited a concentration of trichloroethylene at 68.0 ppm which exceeded the ATSDR CREG of 60.0 ppm.

Data from Final Draft Remedial Investigation Report; EBASCO Services Inc.; August 1991.

TABLE 2 - Garden State Cleaners, Surface and Subsurface Soil Samples. All concentrations in mg/kg (ppm).

PHASE 1 (19 Samples; 10 FBG maximum depth)

Compound	Frequency Of Detection	Range
Methylene Chloride	1	0.018
Acetone	10	0.080 - 8.1
Trichloroethylene	1	0.084
Tetrachloroethylene	14	0.002 - 1,300
1,1,2,2-Tetrachloroethane	3	0.011 - 0.073
Toluene	1	0.002

PHASE 2 (7 Samples; 10 FBG maximum depth)

Trichloroethylene	6	0.003 - 6.1
Tetrachloroethylene*	5	0.025 - 1,100.0
Toluene	3	0.001 - 0.003

* = Two phase 2 soil samples exhibited a concentration of trichloroethylene at 1,100.0 ppm which exceeded the ATSDR CREG of 60.0 ppm.

Data from Final Draft Remedial Investigation Report. EBASCO Services Inc., August 1991.

TABLE 3 - Garden State Cleaners/South Jersey Clothing Phase 1 Ground-water Contamination. All concentrations in ug/l (ppb).

PHASE 1 (24 Samples)

Compound	Frequency Of Detection	Range	Comparison Value	Source
1,1-Dichloroethene	1	17	0.06	CREG
1,1-Dichloroethane	1	1	NA	NA
Cis-1,2-Dichloroethene	8	2 - 77	10	NJMCL
Bromodichloromethane	1	1	0.06	CREG
Chloroform	6	1 - 6	6.0	CREG
Carbon Tetrachloride	2	1 - 2	0.3	CREG
Trichloroethylene	14	0.8 - 13,000	1.0	NJMCL
Tetrachloroethylene	12	0.6 - 1,900	0.7	CREG
1,1,1,2-Tetrachloroethane	2	0.6 - 2	1.0	CREG

US MCL = USEPA Maximum Contaminant Level.

NJ MCL = NJDEP Maximum Contaminant Level.

CREG = ATSDR Cancer Risk Evaluation Guide.

Data from Final Draft Remedial Investigation report, EBASCO Services; August 1991.

TABLE 4 - Garden State Cleaners/South Jersey Clothing Phase 2 Ground-water Contamination; Contaminants Exceeding Screening Values. All Concentrations in ug/l (ppb).

Phase 2 (33 Samples)

Compound	Frequency Of Detection	Range	Value	Comparison Source
1,1-Dichloroethene	6	0.2 - 2	0.06	CREG
Cis-1,2-Dichloroethene	15	0.2 - 51	10	NJMCL
Chloroform	4	0.8 - 8*	6	CREG
1,1,1-Trichloroethane	5	4 - 27	26	NJMCL
Carbon Tetrachloride	2	0.6 - 3	0.03	CREG
Trichloroethylene	11	0.9 - 4,500	1	NJMCL
1,1,2-Trichloroethane	2	1 - 6	0.6	CREG
Benzene	2	0.6 - 12	1	CREG
Tetrachloroethylene	12	0.8 - 1,700	0.7	CREG
1,1,1,2-Tetrachloroethane	1	1	1	1 CREG

* = Possible Blank Contamination

US MCL = USEPA Maximum Contaminant Level.

NJ MCL = NJDEP Maximum Contaminant Level.

CREG = ATSDR Cancer Risk Evaluation Guide

Data from Draft Remedial Investigation report, EBASCO Services; June 1991.

TABLE 5 - Air Concentrations of TCE and PCE Modeled from Soil Emission; Rates For a Receptor at 1.5 Meters Above Ground.

Trichloroethylene - South Jersey Clothing Company

Distance From Site (Meters)	Concentration ug/m (ppb)	Comparison Value ug/m ³	Source ^{**}
100	44.32 7.97	0.6	CREG
500	6.79 1.22		
1,000	2.52 0.45		

* 1000 ug/m³ = 180 ppb @ 20 Degrees C.

** = CREG; ATSDR Cancer Risk Evaluation Guide

Tetrachloroethylene - Garden State Cleaners

Distance From Site (Meters)	Concentration ug/m ³	(ppb) [*]	Comparison Value ug/m ³	Source ^{**}
100	0.0024	0.00036	2.0	CREG
500	0.0010	0.00015		
1,000	0.00057	0.000086		

* 1000 ug/m³ = 150 ppb @ 20 Degrees C.

** = CREG; ATSDR Cancer Risk Evaluation Guide

Data From Final Draft Remedial Investigation Report, SJCC/GSC Sites, EBASCO; August 1991. Based upon the Report: "Flux Chamber Measurement Survey for Garden State Cleaners and South Jersey Clothing, Buena, New Jersey.", USEPA: Office of Emergency and Remedial Response.

Table 6 - Completed Human Exposure Pathways; GSC/SJCC Site.

Contaminant	Source	Media	Exposure Point	Exposure Route	Exposed Population	Time
TCE PCE	GSC/SJCC	Groundwater	Residences	Ingestion Inhalation	Residents	Past
TCE	SJCC	Air	Residences Facility	Inhalation	Workers Residents Trespassers	Past

Table 7 - Potential Human Exposure Pathways; GSC/SJCC Site

Contaminant	Source	Media	Exposure Point	Exposure Route	Exposed Population	Time
TCE	SJCC	Soils	Facility	Dermal	Workers Trespassers	Past
TCE PCE	GSC/SJCC	Groundwater	Residences	Ingestion Inhalation	Residents	Present Future

Table 8 - Cancer Incidence; Buena Borough, Atlantic County, New Jersey.

Cancer Type	Number of Cases		
	Male	Female	Total
Bladder	8	4	12
Brain C.N.S.	0	1	1
Breast	0	21	21
Cervix	-	2	2
Colon	5	15	20
Corpus Uteri	-	5	5
Esophagus	3	0	3
Hodgkin's Disease	0	1	1
Larynx	5	0	5
Leukemia	5	1	6
Liver	1	0	1
Lung/Pleura	16	8	24
Myeloma	1	0	1
Oro-pharynx	3	1	4
Other Digestive	1	0	1
Ovary	-	4	4
Non-Hodgkin's Lymphoma	6	5	11
Pancreas	3	3	6
Prostate	6	-	6
Rectal	1	8	9
Renal	2	0	2
Skin	1	1	2
Soft Tissue	1	0	1
Stomach	1	2	3
Testis	1	-	1
Other or Unknown Primary	1	4	5

Table 9 - Standardized Incidence Ratios (SIR) Comparison of Observed and Expected Cancer Incidence, All Cancers 1979 - 1988; Buena Borough, Atlantic County, New Jersey.

Sex	Observed	Expected	SIR*	95% C.I. -	
				Lower	Upper
Male	71.0	93.25	0.76@	0.59	0.96
Female	86.0	88.08	0.98	0.78	1.21

* = SIR: Standardized Incidence Ratio of Observed and Expected Number of Cancers (Age Standardized). Statistically elevated at the P < 0.05 level.

** = 95% Confidence Level (C.I.).

@ = Statistically Low at the P < 0.05 Level.

APPENDICES

Appendix 1 - Site location Map.

Appendix 2 - Facility map; South Jersey Clothing Company.

Appendix 3 - Facility Map; Garden State Cleaners.

Appendix 4 - Soil gas investigation.

Appendix 5 - TCE levels in groundwater; 1982.

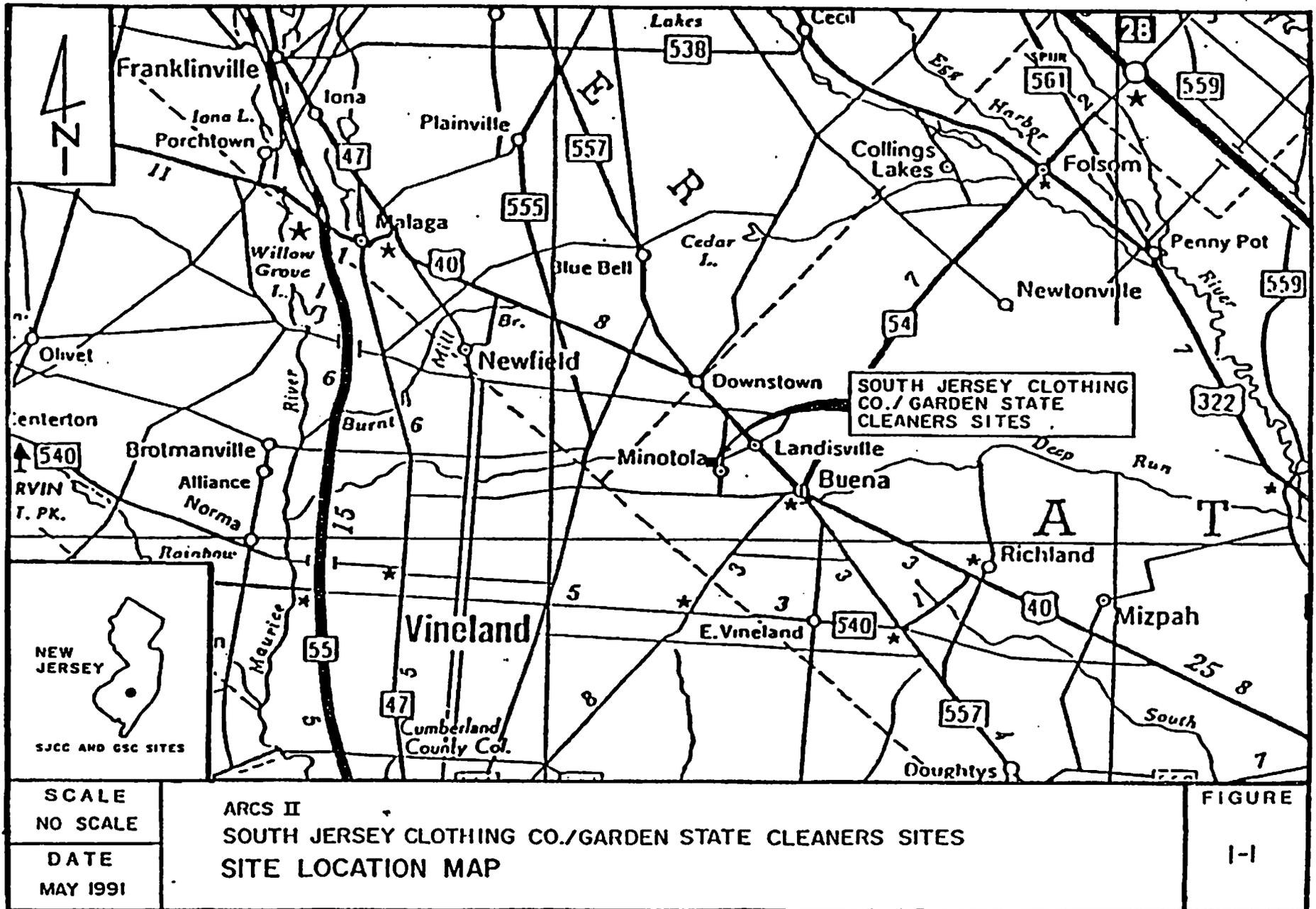
Appendix 6 - TCE levels in groundwater; 1989.

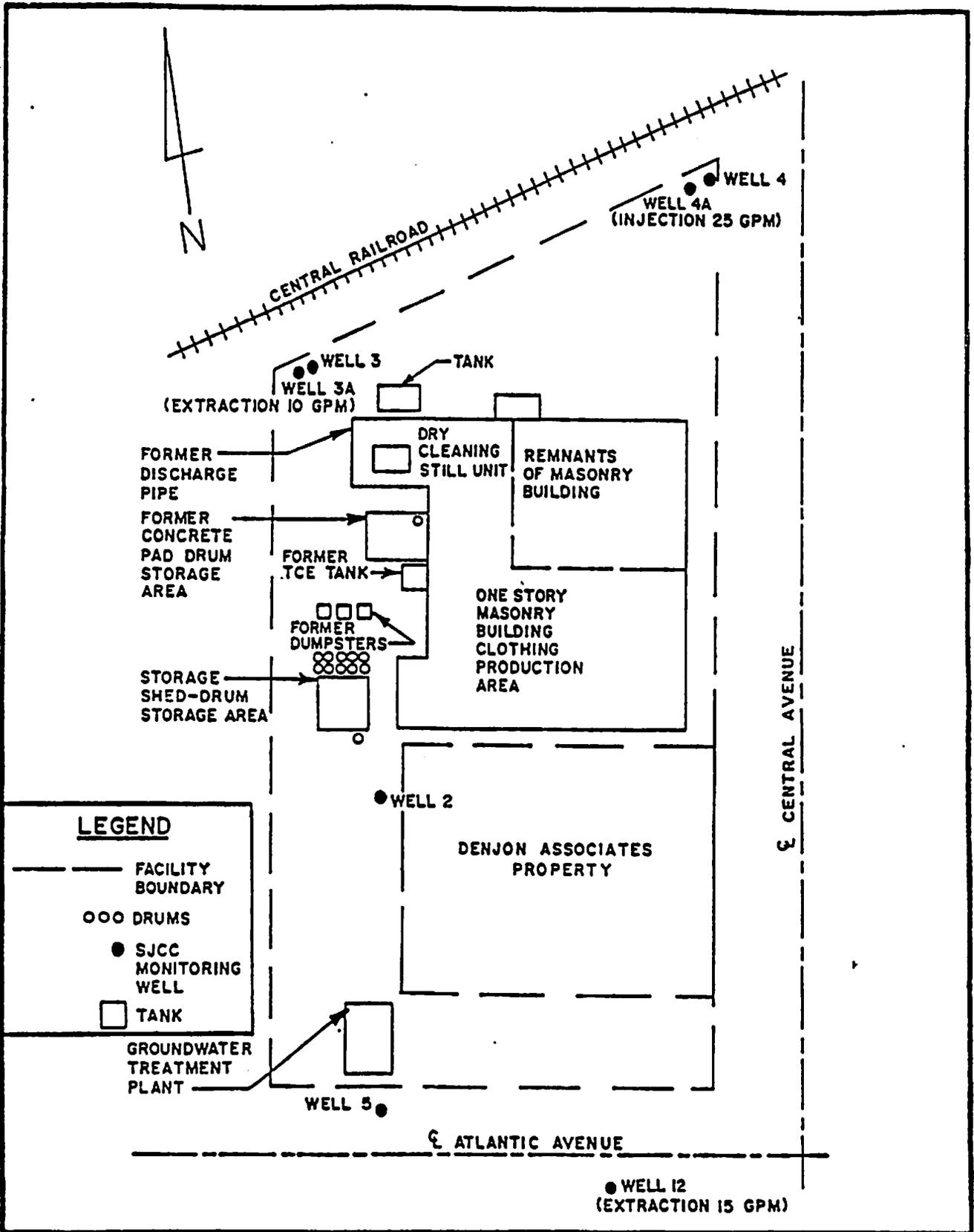
Appendix 7 - Phase 2 TCE concentrations in groundwater.

Appendix 8 - Phase 2 PCE concentrations in groundwater.

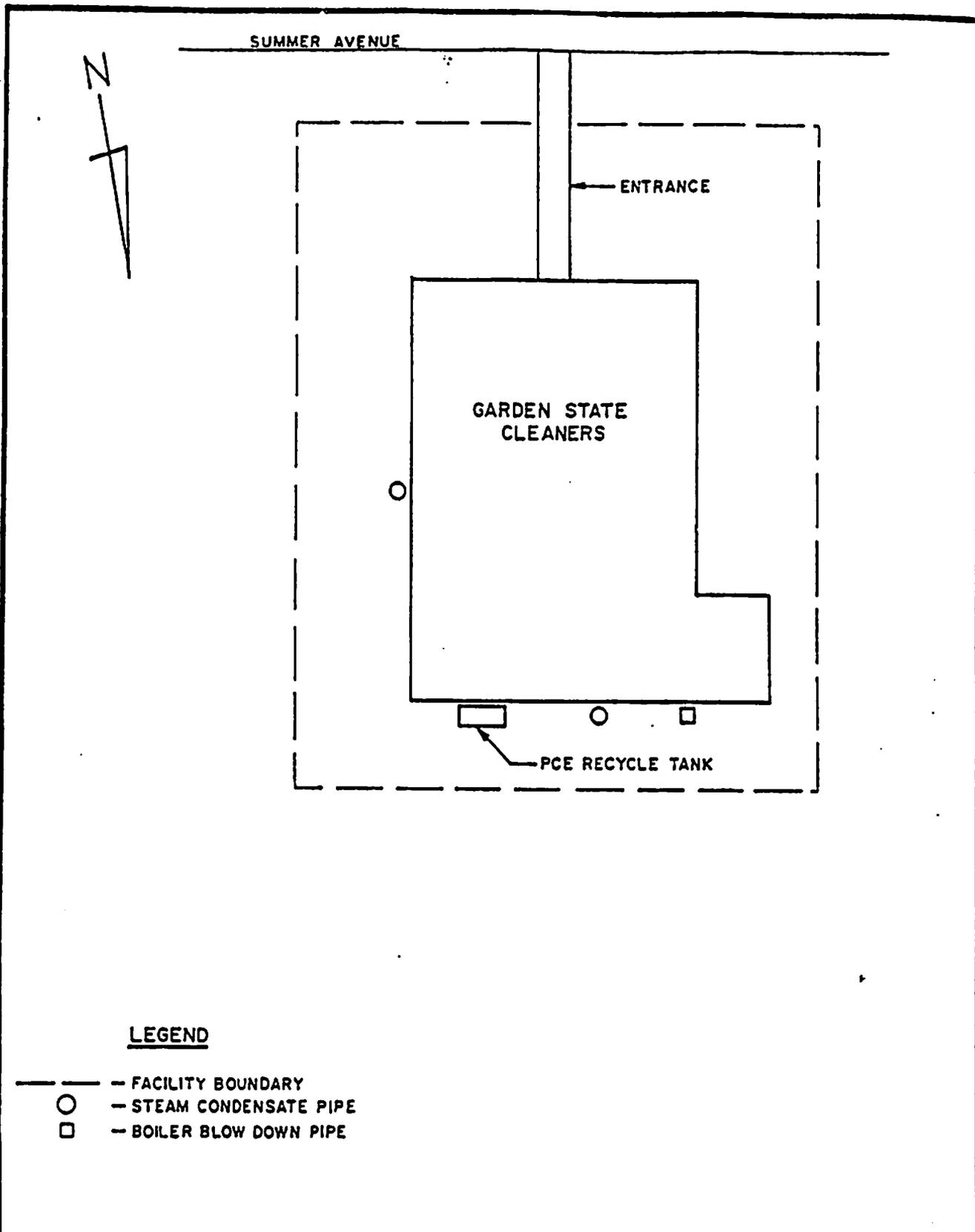
Appendix 9 - Private well sampling results.

Appendix 10 - 1990 Health Assessments for South Jersey Clothing Company and Garden State Cleaners.





<p>SCALE 1" = 60'</p>	<p>ARCS II SOUTH JERSEY CLOTHING CO./GARDEN STATE CLEANERS SITES FACILITY MAP - SJCC</p>	<p>FIGURE 1-3</p>
<p>DATE JUNE 1991</p>		

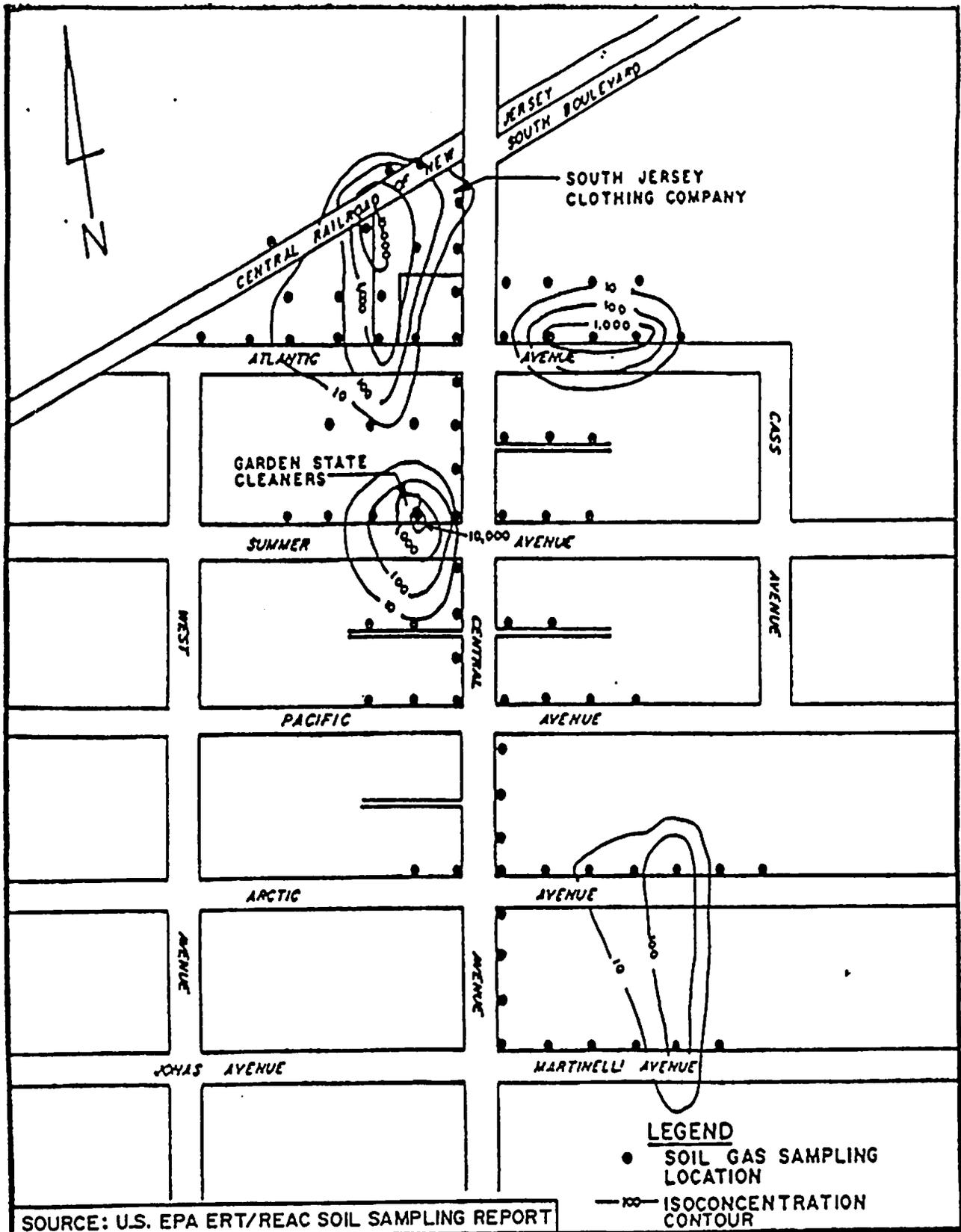


LEGEND

- — FACILITY BOUNDARY
- — STEAM CONDENSATE PIPE
- — BOILER BLOW DOWN PIPE

<p>SCALE 1" = 15'</p>	<p>ARCS II SOUTH JERSEY CLOTHING CO./GARDEN STATE CLEANERS SITES</p>	<p>FIGURE 1-4</p>
<p>DATE JUNE 1991</p>	<p>GARDEN STATE CLEANERS SITE</p>	

Appendix 4 - Soil gas investigation.

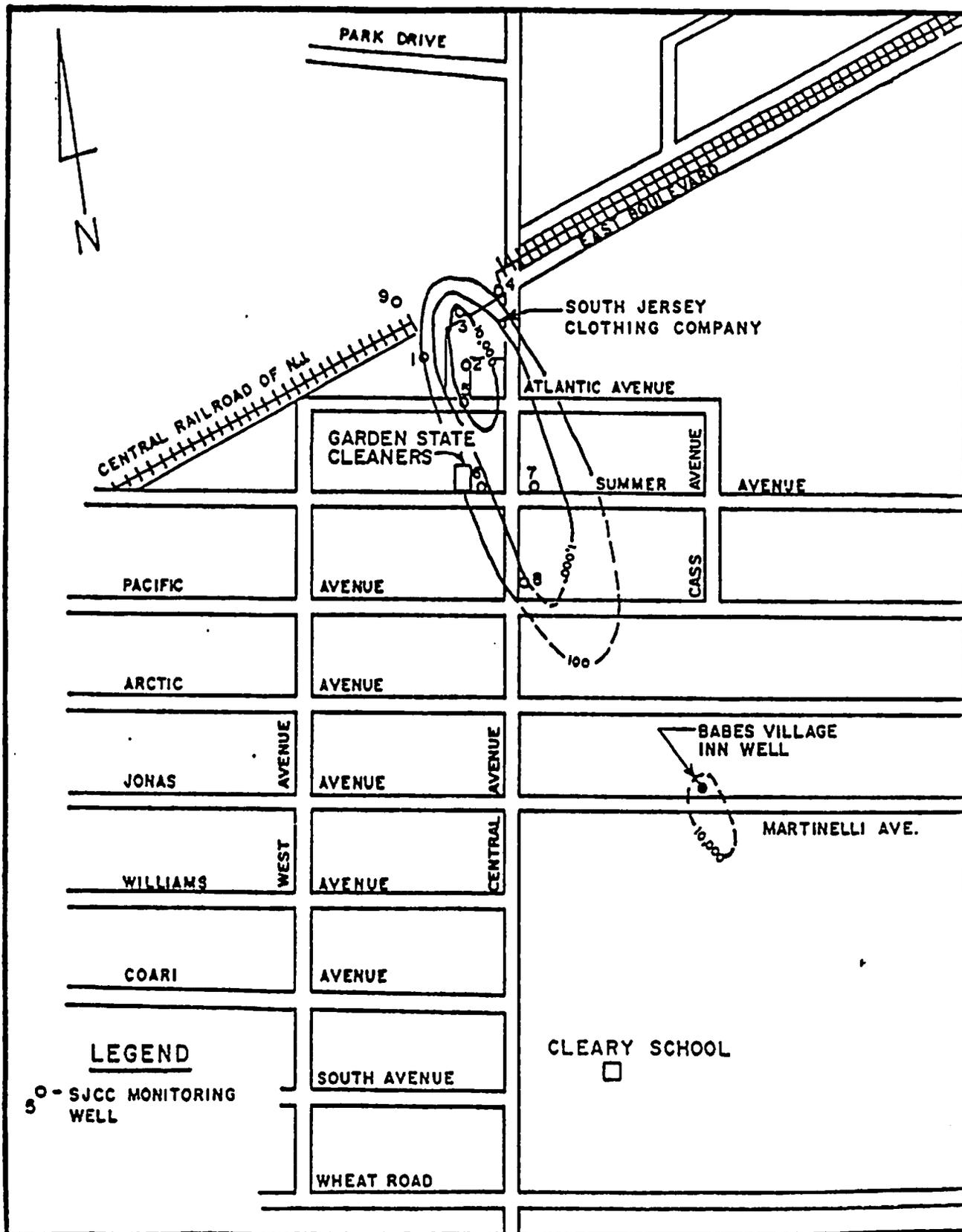


SOURCE: U.S. EPA ERT/REAC SOIL SAMPLING REPORT

<p>SCALE 1" = 300'</p>	<p>ARCS II SOUTH JERSEY CLOTHING CO./GARDEN STATE CLEANERS</p>	<p>FIGURE 4-3</p>
<p>DATE JULY 1991</p>	<p>SOIL GAS-SUM OF ORGANICS DETECTED (PPB)</p>	

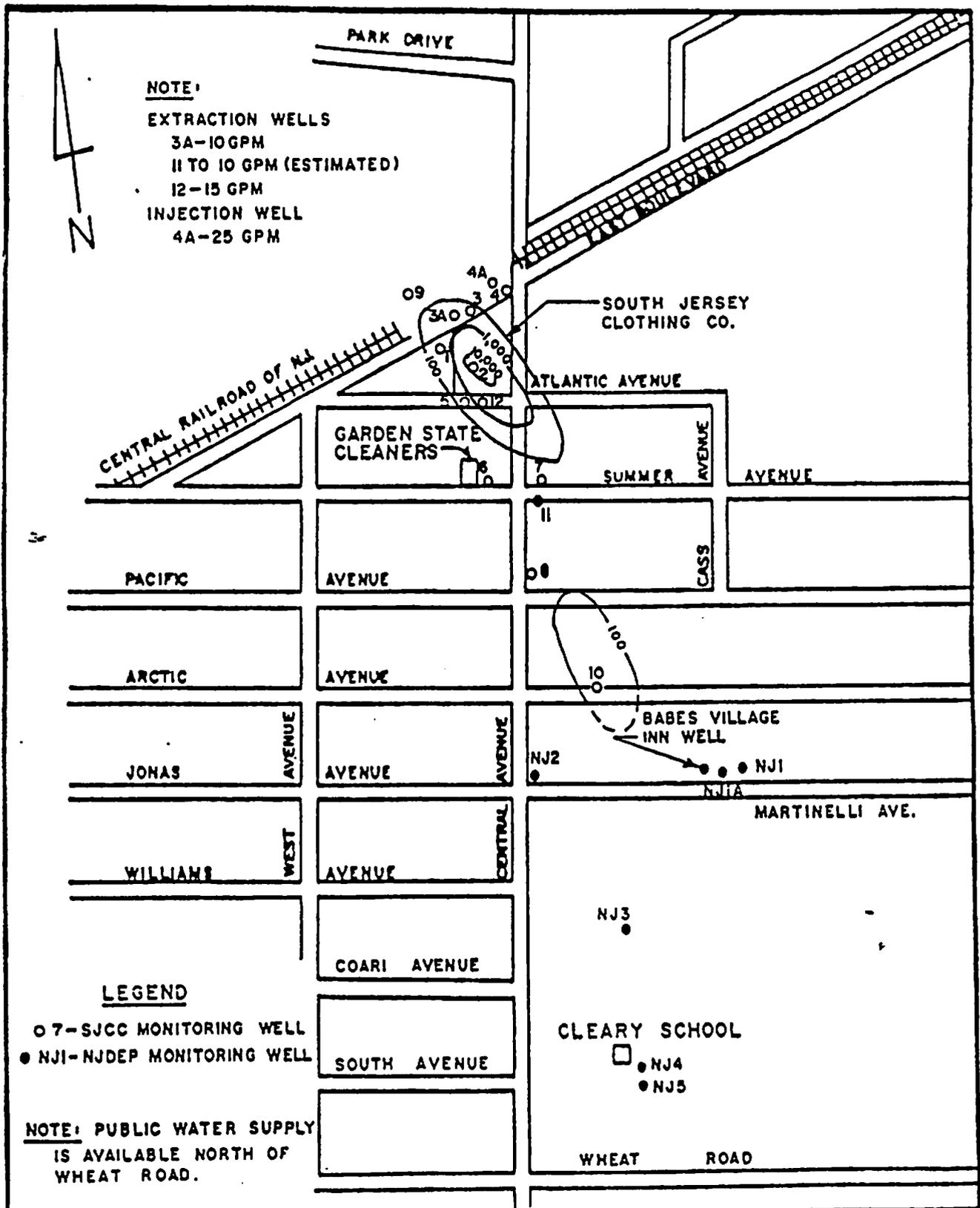
C.C. JOHNSON & MALHOTRA, P.C.

Appendix 5 - TCE levels in groundwater; 1982.



<p>SCALE 1" = 500'</p>	<p>ARCS II SOUTH JERSEY CLOTHING CO./GARDEN STATE CLEANERS SITES TCE IN GROUNDWATER (PPB) FOR 12-09-82</p>	<p>FIGURE 1-8</p>
<p>DATE MAY 1991</p>		

Appendix 6 - TCE levels in groundwater; 1989.

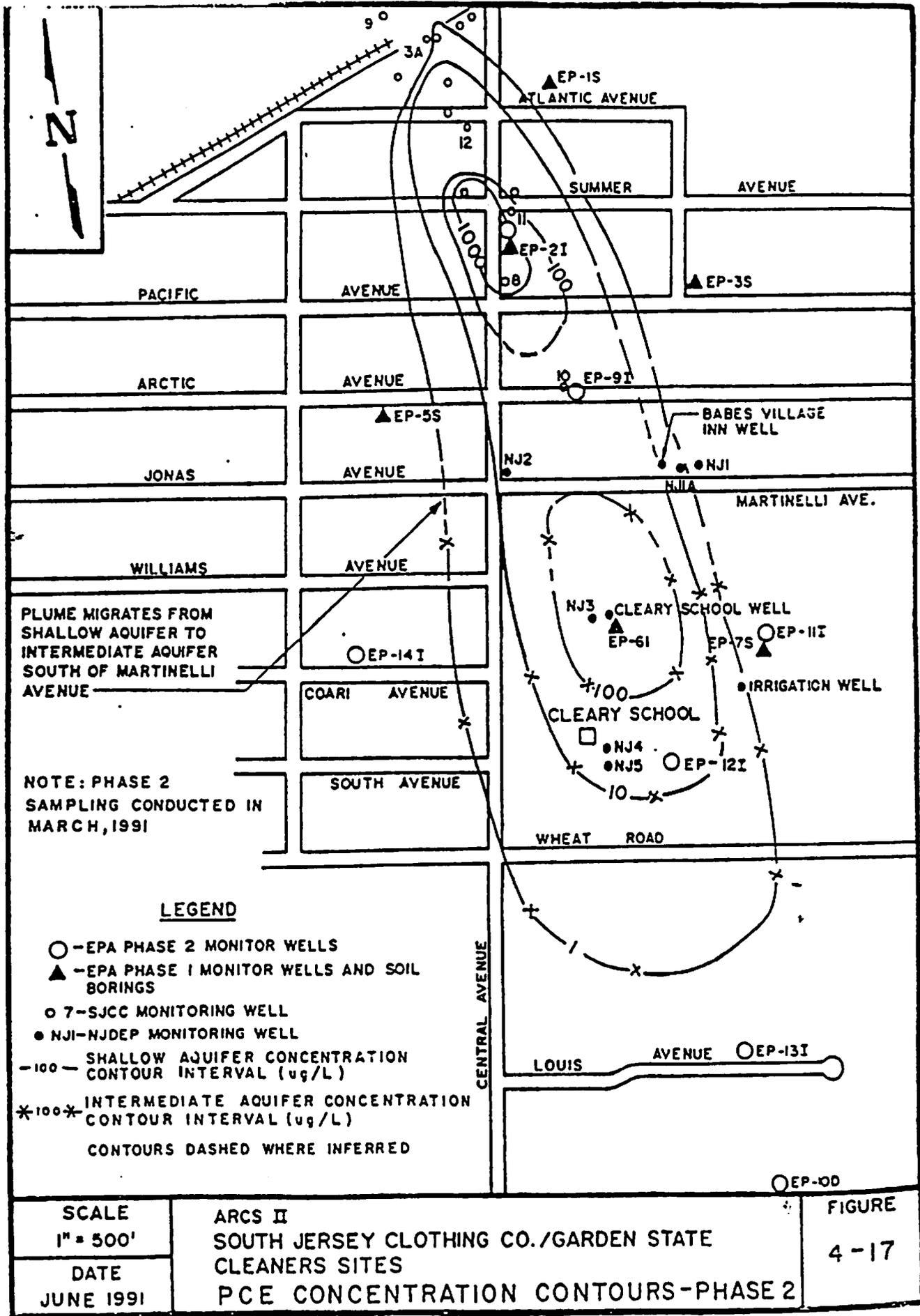


SCALE
 1" = 500'
 DATE
 MAY 1991

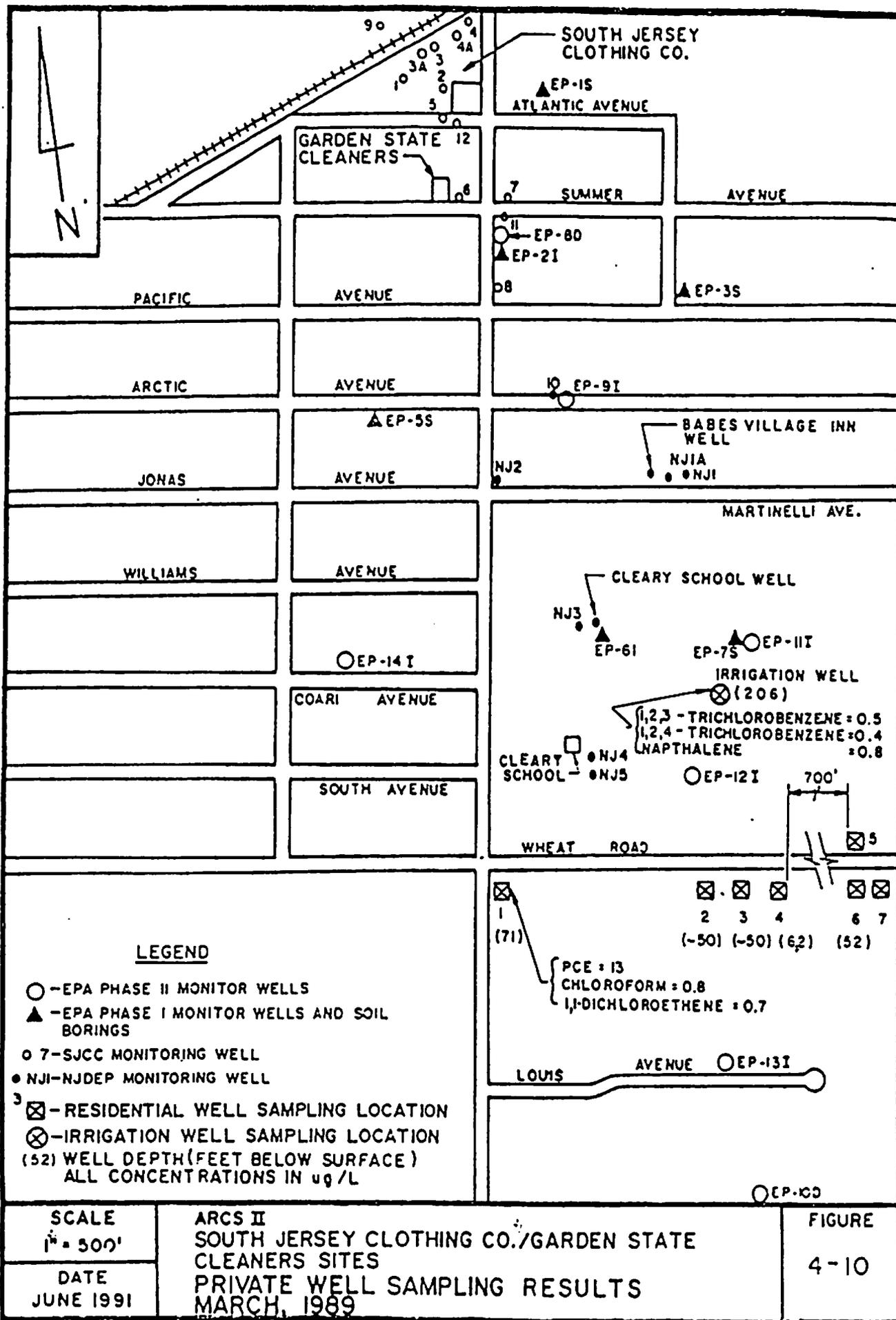
ARCS II
 SOUTH JERSEY CLOTHING CO./GARDEN STATE
 CLEANERS SITES
 TCE IN GROUNDWATER (PPB) FOR 4-27-89

FIGURE
 1-15

Appendix 8 - Phase 2 PCE concentrations in groundwater.



Appendix 9 - Private well sampling results.



APPENDIX 10

**1990 Health Assessments For Garden State Cleaners And
South Jersey Clothing Company**

**Health
Assessment
for**

✓

SOUTH JERSEY CLOTHING COMPANY

CERCLIS NO. NJD980766828

BUENA BOROUG, ATLANTIC COUNTY, NEW JERSEY

SEP 27 1990

Agency for Toxic Substances and Hazardous Waste
U.S. Public Health Service

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i)(7)(A) 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, risk 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.

SOUTH JERSEY CLOTHING COMPANY
ATLANTIC COUNTY
BUENA BOROUGH, NEW JERSEY
Prepared By:
Environmental Health Service
New Jersey Department of Health

Prepared For:
Agency for Toxic Substances and Disease Registry

OBJECTIVES

The main Remedial Investigation and Feasibility Study (RI/FS) of the South Jersey Clothing (SJC) Company site is currently in the third year of the work plan. The objectives of this Health Assessment, based upon the current stage of investigation and based upon completed remedial activities at the site, are to:

- * Assess the nature and magnitude of potential health effects associated with the site and determine the site's degree of public health concern;
- * Identify, if necessary, immediate actions necessary to minimize exposure to hazards and contamination associated with the site;
- * Identify, if necessary, gaps in data and information regarding the site;
- * Document the concerns of the community with regard to the site;
- * Review remedial activities within the context of potential public health implications;
- * Assess whether additional health study or investigation of the site is warranted.

SUMMARY

The South Jersey Clothing Company is a manufacturer of military clothing, located in Buena Borough, New Jersey. Contaminated wastewater and solid production wastes from on-site operations were routinely discharged to the soil on-site. Analytical data has described significant soil and ground-water contamination from trichloroethylene and other volatile organic chemicals. Ground-water contamination downgradient (to the south)

of the site has required the recommended closing of private wells and the installation of a municipal water system. South Jersey Clothing has installed a ground-water treatment system and is in compliance with a 1984 Administrative Consent Order. Municipal water supplies have been made available to affected residents, but utilization is elective. The site was included on the NPL list in October 1989 and is currently ranked 58 out of the 108 sites on the NPL in New Jersey. ATSDR and NJDOH consider the South Jersey Clothing site to be of public health concern. This site is being considered for follow-up health study or evaluation.

SITE DESCRIPTION

The South Jersey Clothing Company is one of two identified responsible parties contributing to the ground-water contamination of the Borough of Buena. South Jersey Clothing is located approximately 500 feet from another NPL site, the Garden State Cleaners company. The U.S. Environmental Protection Agency (USEPA) initiated a joint RI/FS between South Jersey Clothing and Garden State Cleaners in the spring of 1989. It is assumed in site literature that the plumes of contamination emanating from these two sites intermingle and contribute to a general ground-water contamination problem in Buena Borough.

South Jersey Clothing is an active manufacturer of military clothing with approximately 10 employees. The company has been in operation since 1940. The site is approximately 1.2 acres in area and is located on Central Avenue in the town of Minotola (Buena Borough). There are two buildings on-site, one of which is presently inactive. Wastewater from the company's dry cleaning operations, contaminated with volatile organic chemicals (most notably trichloroethylene), was routinely discharged onto the soil, thus contaminating underlying ground water. Additionally, process wastes in the form of sludges were dumped on-site and along nearby railroad tracks, and hazardous wastes were stored on-site in drums.

Since 1981, the site and associated activities have been under the supervision of the New Jersey Department of Environmental Protection (NJDEP). A ground-water treatment system is in place, and the company is complying with the requirements of a 1984 Administrative Constraint Order (ACO) and a NJ Pollutant Discharge Elimination System (NJPDES) permit. Analytical sampling conducted during NJDEP inspections revealed significant soil and ground-water contamination by volatile organic compounds (VOCs).

SITE VISIT

NJDOH personnel visited the site on April 7, 1989, meeting with the owners of South Jersey Clothing and their environmental consultant. An inspection of the site and surrounding area was conducted. There was no visible evidence of the presence of hazardous materials with the exception of the presence of monitoring wells and the air stripping tower of the ground-water treatment system. Stained soils, sludges or physical hazards were not observed on the site. The site was not fenced, and there is no history of trespassing or vandalism.

COMMUNITY CONCERNS

Community involvement with the site was first documented in 1981 when a resident living to the immediate south contacted the Atlantic County Health Department about a chemical odor in well water. Analysis revealed trichloroethylene in concentrations of approximately 27,000 ppb. Further investigation delineated a plume of contamination to the south of the site, which ultimately resulted in the abandonment of private potable/domestic wells and the construction of a public water supply.

Review of the files of NJDEP and the Atlantic County Health Department revealed the following specific concerns of the community:

- * Residents were advised to hook up to a municipal water supply at an initial cost of approximately \$2,400 with an annual water fee of \$240. This figure represented an economic hardship to many residents whose well water was contaminated. As a result, it is uncertain if the use of all potentially affected wells has been curtailed. The Atlantic County Health Department has expressed difficulty in enforcing the well restriction. It is probable that some wells remain in use for irrigation and potable purposes. Attempts are being made by residents to recover the service connection and water costs from the New Jersey Spillfund program.
- * Past exposure to contaminated ground water is a major concern. Although the problem of South Jersey Clothing Company's impact on the ground-water quality was documented in 1981, many residents feel that the contamination problem has been present for a much longer period of time and is not caused solely by the two sites that have been included on the NPL list (South Jersey Clothing and the Garden State Cleaners).

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

The primary contaminant of concern at the South Jersey Clothing site is trichloroethylene (TCE), with relatively lower concentrations of other volatile organic chemicals also having been identified. The primary environmental pathway associated with this site is ground water. The on-site and off-site soil and air pathways are not presently of concern, but on-site soil contamination may have constituted a significant environmental pathway during the period when SJC disposed of wastewaters and sludges on-site. There is no information available to evaluate the significance of on-site and off-site air pathways during the period when SJC disposed of wastewater and sludges on-site. There is no surface water located on-site or in the immediate environs. Ground water in the area is moving in a southerly direction.

The first reports by the Atlantic County Health Department of volatile organic chemicals in Buena Borough domestic wells (Landisville and Minotola area) occurred in April 1981. Subsequent investigation by NJDEP revealed that South Jersey Clothing had been discharging wastes in the form of liquids and sludges from a dry cleaning operation onto the grounds surrounding the plant. Nearby residents' shallow wells were found to be grossly contaminated with TCE (27,000 ppb) and other organic chemicals.

The dumping of sludge on the site occurred from 1972 until 1981. In 1979, a fire caused the rupture of a 500-gallon tank of TCE, emptying the contents onto the soil. A monitoring well located at the position of the tank leak continues to show trichloroethylene at elevated levels (approximately 50,000 ppb).

An Administrative Consent Order (ACO) was signed by the owners of South Jersey Clothing and NJDEP in 1984. As a result of the ACO, discharge of liquid and solid wastes has ceased, and surface wastes and sludges have been removed. A ground-water treatment system was put into operation on-site in July 1985 and has been operating since. Ground water is extracted at the rate of 25-gallons-per-minute (gpm), processed by air strippers, and discharged back to the ground via an injection well. There are 17 monitoring wells in the vicinity of the site that have been used to delineate and characterize the contaminant plume.

NJDEP has identified ground-water problems unrelated to South Jersey Clothing in Buena Borough. Benzene has been found by NJDEP in a well in the Landisville section of the borough, an area not downgradient of South Jersey Clothing. There are many possible contamination sources in the area that could contaminate the highly permeable Cohansey aquifer. Potential non-point sources of ground-water contamination include spillage from private petroleum product and gasoline tanks, misuse of septic systems and septic tank cleaning chemicals, illegal dumping, and use of fertilizers and pesticides. Such sources are likely contributing to the overall ground-water contamination problem of the area.

The USEPA Preliminary Assessment for the South Jersey Clothing site addressed the contaminant concentrations of the liquid sludge and solid sludge wastes. Samples of liquid waste indicated the presence of TCE in the 100 parts per million range. Samples of sludge waste indicated the presence of TCE in the parts per thousand range. TCE has been detected in the soil on the site at 940 ppm.

The most recently (February 13, 1989) and maximum detected concentrations of TCE in the monitoring wells on or near the site are presented in Table 1. The results of the analyses of samples taken in December 1981, when analysis included parameters other than TCE, are presented in Table 2.

It is likely borough residents utilized contaminated water before the public water system became available. For example, in a sample taken on May 5, 1982, the J.P. Cleary School water supply tested positive for volatile organics, necessitating the use of bottled water and point source filters. Of 11 samples taken, 6 showed greater than 100 ppb of total organics (NJDEP personal communication).

The South Jersey Clothing site has no outstanding physical hazards. Although the property is unfenced, it is flat and relatively featureless.

QUALITY ASSURANCE/QUALITY CONTROL

Analysis of samples collected by NJDEP was performed at the New Jersey Department of Health laboratories. Specific information relating to QA/QC is not available for review and evaluation.

DEMOGRAPHICS

The South Jersey Clothing site is located in a mixed residential, commercial, and light industrial section of Buena Borough. The surrounding area is rural and predominantly agricultural in nature. According to the Atlantic County Health Department, there are approximately 1,000 homes within the boundaries of Buena Borough with a population of approximately 4,000 people. Outside the Borough limits, there are trailer parks which contain approximately 1,300 additional persons. Additionally, by assuming 1.5 persons per acre of agricultural land, NJDEP estimates that an additional 10,000 persons may be threatened by irrigation with contaminated ground water. There are approximately 40 homes which are directly in the path of the contamination plume.

Potential sensitive populations in Buena Borough would include children and elderly that live in the Borough. Of particular concern is the J.P. Cleary School, which is downgradient of the South Jersey Clothing site. Volatile organic chemicals had been detected in potable water at the school (see Environmental Contamination section).

ENVIRONMENTAL DATA GAPS

There is some data describing the nature and extent of South Jersey Clothing's contribution to the ground-water contamination of Buena Borough. The Remedial Investigation Report, when available, will provide additional data regarding the contamination associated with the site. The additional site data and information contained in the RI/FS, when available, will be reviewed and evaluated for future addenda to this Health Assessment.

Additional study and investigation beyond the scope of the present RI/FS work plan may be necessary to comprehensively describe the nature and sources of contamination not attributed to South Jersey Clothing or the Garden State Cleaners sites.

EXPOSURE PATHWAYS

Present exposure pathways at the South Jersey Clothing site are predominantly related to the use of contaminated ground water for potable/domestic purposes and irrigation. Use of such ground water for domestic purposes could result in ingestion of, inhalation of, or dermal exposure to contaminants. There are no documented human exposure pathways presently associated with the on-site air and soil media. Human exposure pathways associated with on-site soils and air may have been significant during the period when SJC disposed of wastewater and sludges on-site. Although data demonstrate high concentrations of TCE in on-site soils during this period, there is no information regarding air quality. SJC has ceased on-site disposal of wastewater, and sludges have been remediated. Residual concentrations present in on-site soils do not constitute a significant exposure pathway.

All water used for drinking and irrigation in Buena Borough was once dependent on ground water. Although a public water supply system was made available in the Borough in 1985, all Borough residents may not have access to, or may not have elected to, utilize public water.

PUBLIC HEALTH IMPLICATIONS

The level of public health concern has diminished with the implementation of a municipal water supply in 1985. It is unclear whether all residents have access to and are utilizing public water. There are potential public health concerns associated with those homes that have yet to utilize the public water supply where available, and with the area-wide ground-water problem in Buena Borough, which is a combination of site-related and non site-related contamination.

In humans, exposure to high concentrations of the primary contaminant of concern at the site (TCE) has been noted to affect the central nervous system and to cause eye, nose, and throat irritation. Animal tests have demonstrated that TCE, at concentrations that exceed the exposure concentrations associated with this site, is capable of affecting the central nervous system, immune system, liver, and kidney. Although human data are inadequate to categorize TCE as a human carcinogen, TCE has caused liver, kidney, and lung cancer in animals and is currently listed by the USEPA as a Class B2 (suspected human) carcinogen.

CONCLUSIONS AND RECOMMENDATIONS

Based upon information reviewed, ATSDR and NJDOH have concluded that this site is of public health concern because of the risk to human health resulting from probable exposure to hazardous substances at concentrations that may result in adverse human health effects. As noted in the Environmental Contamination and Physical Hazards section above, human exposure to volatile organic chemicals may occur and has probably occurred in the past via the domestic use of contaminated ground water.

In accordance with CERCLA as amended, the South Jersey Clothing Company site has been evaluated for appropriate follow-up with respect to health effect studies. Since human exposure to on-site and off-site contaminants may be occurring and has probably occurred in the past, this site is being considered for follow-up health effects studies. After consultation with Regional EPA staff and State and local health and environmental officials, the Division of Health Studies, ATSDR, and NJDOH will determine if follow-up public health actions or studies are appropriate for this site. ATSDR will be considering sites for inclusion in the benzene subregistry, and this site will be included in the consideration.

An area-wide ground-water contamination problem exists in Buena Borough. While current remedial investigations adequately define the contributions of identified sites, additional investigation is indicated to identify other non site-related sources and remedial actions necessary to protect the public health.

The site's degree of public health concern has diminished since a municipal water supply was made available to alleviate dependence upon private domestic wells. However, utilization of the municipal water supply is not mandatory and involves significant costs. It is possible contaminated wells continue to be used for potable and domestic purposes. It is recommended that all residents utilize the public water supply system.

When indicated by public health needs, and as resources permit, the evaluation of additional relevant health outcome data and community health concerns, if available, is recommended.

CERTIFICATION

This Health Assessment was prepared by the New Jersey State Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health assessment was initiated.



Technical Project Officer, SPS, RPB, DHAC

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



Division Director, DHAC, ATSDR

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REFERENCES

Administrative Consent Order between South Jersey Clothing and New Jersey Department of Environmental Protection, January, 1984.

United States Environmental Protection Agency (USEPA), Hazardous Ranking Score Documentation, January, 1983.

USEPA, Preliminary Site Assessment, May 1984. Vance, Skinner Company, Draft Status - 1989: Justification for Change, March 1989.

File Reviews:

NJDEP, March 1989.

Atlantic County Health Department, March 1989.

DEP/DWR Southern Enforcement, March 1989.

Interviews:

NJDEP/DWR Southern Enforcement, March 1989.

Atlantic County Health Department, March 1989.

Consultant to South Jersey Clothing, March 1989.

TABLE 1 - TCE Concentrations in Ground Water - South Jersey
Clothing site

Well*	Location	Concentration February 1989	Maximum Reported Concentration (Month/Year)
1	Upgradient	NA	6 (12/82)
4	Upgradient	NA	NA
9	Upgradient	ND	ND (02/89)
2	On-site	32,000	79,000 (06/84)
3	On-site	500	32,000 (01/83)
5	Downgradient	340	78,000 (10/84)
6	Downgradient	150	700 (10/83)
7	Downgradient	45	32,000 (04/84)
8	Downgradient	14	1,000 (12/82)
10	Downgradient	230	5,200 (12/87)
11	Downgradient	76	68,000 (04/84)
12	Downgradient	4,900	36,000 (10/84)

All Concentrations In Parts Per Billion (ppb)

New Jersey MCL for TCE - 1 ppb

* NJDEP Monitoring Wells

NA - Not Analyzed; ND - None Detected

TABLE 2 - Ground-Water Contamination - South Jersey Clothing site

COMPOUND (ppb)	MONITOR WELL NUMBER *				MCL
	1	2	3	4	
Trichloroethylene	ND	9860	286	ND	1
1,2 Dichloroethane	ND	59	ND	ND	2
1,1,1 Trichloroethane	ND	5	ND	ND	26
Tetrachloroethylene	ND	28	1	ND	1
Benzene	ND	22	ND	ND	1
Toluene	ND	82	ND	ND	NA
Ethylbenzene	ND	11	ND	ND	NA
p-Xylene	ND	46	ND	ND	44
o-Xylene	ND	47	ND	ND	44
N-propylbenzene	ND	2	ND	ND	NA
Bromobenzene	ND	34	ND	ND	NA
Benzofuran	ND	37	ND	ND	NA
Cyclopropylbenzene	ND	43	ND	ND	NA

All Concentrations in Parts Per Billion (ppb)

ND - Not detected; MCL - NJ Maximum Contaminant Level

NA - NJ MCL Has not been established or is pending.

* - Responsible Party Ground-Water Remediation Monitor Well (all wells located on-site); data from December 1981 sampling.

**Health
Assessment
for**

GARDEN STATE CLEANERS COMPANY

CERCLIS NO. NJD053280160

BUENA BOROUGH, ATLANTIC COUNTY, NEW JERSEY

SEP 28 1990

Department of Health, Surveys and Disease Registry
New Jersey State Health Department

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i)(7)(A) 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, risk 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.

GARDEN STATE CLEANERS CO.
ATLANTIC COUNTY
BUENA BOROUGH, NEW JERSEY
Prepared by
Environmental Health Service
New Jersey Department of Health (NJDOH)

Prepared for
Agency for Toxic Substances and Disease Registry (ATSDR)

OBJECTIVES

The Remedial Investigation and Feasibility Study (RI/FS) of the Garden State Cleaners (GSC) Site is currently in the second year of the work plan. The objectives of this Health Assessment, based upon the current stage of site remediation, are to:

- * Assess the nature and magnitude of the potential health effects associated with the site and determine the site's degree of public health concern;
- * Identify, if necessary, immediate actions necessary to minimize exposure to hazards and contamination associated with the site;
- * Identify, if necessary, gaps in data and information regarding the site;
- * Document the concerns of the community with regard to the site;
- * Review remedial activities within the context of potential public health implications;
- * Assess whether additional health study or investigation of the site is warranted.

SUMMARY

The Garden State Cleaners Company is a dry cleaning establishment located in Buena Borough, New Jersey. Contaminated wastewater from on-site operations was routinely discharged to on-site soils. Analytical data has described significant soil and ground-water contamination from tetrachloroethylene (PCE) and other volatile organic compounds. Ground-water contamination downgradient (to the south) of the site has required the recommended closing of private wells and the installation of a municipal water supply system. An Administrative Order and Notice of Civil Administrative Penalty Assessment (AO and PSO) were issued to Garden State Cleaners in December 1985, requiring GSC to perform a full RI/FS.

Municipal water supplies have been made available to affected residents, but utilization is elective. The site was included on the NPL list in March 1989 and is currently ranked 105 of 108 sites in New Jersey. ATSDR and NJDOH consider the Garden State Cleaners site to be of public health concern. This site is being considered for follow-up health study or evaluation.

SITE DESCRIPTION

The Garden State Cleaners company is one of two identified responsible parties contributing to the ground-water contamination of the Borough of Buena. Garden State Cleaners is located approximately 500 feet from another NPL site, the South Jersey Clothing Company. The U.S. Environmental Protection Agency (USEPA) initiated a joint RI/FS between Garden State Cleaners and South Jersey Clothing in the spring of 1989. It is assumed in the site literature that the plumes of contamination emanating from these two sites intermingle and contribute to a general ground-water contamination problem in Buena Borough.

The Garden State Cleaners company is an active dry cleaning facility in operation since 1966 on Summer Avenue in Buena Borough. There is one building on-site. In February 1981, during an inspection of the nearby South Jersey Clothing site, it was discovered that wastewater from Garden State Cleaners's dry cleaning operations was being routinely discharged onto the soil. The wastewater contained volatile organic compounds (VOCs), including high concentrations of tetrachloroethylene.

Since 1981, the site and associated activities have been under the supervision of the New Jersey Department of Environmental Protection (NJDEP). Analytical sampling conducted during NJDEP inspections revealed significant soil and ground-water contamination by volatile organic chemicals. Discharge of wastewater ceased in February 1985. Garden State Cleaners is currently operating with a closed loop system, eliminating discharges.

SITE VISIT

NJDOH personnel visited the area of the site on April 7, 1989, but did not enter the Garden State Cleaners property. An inspection from the perimeter of the site and of the surrounding area was conducted. The site is not fenced, and there were no physical hazards evident. Stained soils or other indications of chemical contamination were not visible on-site.

COMMUNITY CONCERNS

Community involvement with the site focuses on GSC's contribution to the general ground-water contamination problem of Buena Borough. Concern with ground-water quality was first documented in 1981 when a resident living to the immediate south of the nearby South Jersey Clothing site contacted the Atlantic County Health Department about a chemical odor in well water.

Subsequent investigations by NJDEP defined a plume of contamination to the south of Garden State Cleaners site which, together with the contamination emanating from the South Jersey Clothing site, ultimately resulted in the recommendation to abandon private wells and to the construction of a public water supply.

Review of the files of NJDEP and the Atlantic County Health Department revealed the following specific concerns of the community:

- * Residents were advised to obtain a municipal water supply at an initial cost of approximately \$2,400 with an annual water fee of \$240. This figure represented an economic hardship to many residents whose well water was contaminated. As a result, it is uncertain if the use of all potentially afflicted wells has been curtailed. The Atlantic County Health Department has expressed difficulty in enforcing the well restriction. It is probable that some wells remain in use for irrigation and potable purposes. Attempts are being made by residents to recover the service connection and water costs from the New Jersey Spillfund program.
- * Past exposure to contaminated ground water is a major concern. Although the impact of Garden State Cleaners on ground-water quality was documented in 1981, many residents feel that the contamination problem has been present for a much longer period of time and is not caused solely by the two sites that have been included on the NPL list (Garden State Cleaners and South Jersey Clothing).

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

The primary contaminant of concern at the GSC site is tetrachloroethylene with relatively lower concentrations of other VOCs also having been identified. The primary environmental pathway associated with this site is ground water. The on-site and off-site soil and air pathways are not presently of concern, but on-site soil contamination may have constituted a significant environmental pathway during the period when GSC discharged wastewater on-site. There is no information available to evaluate the significance of on-site and off-site air pathways during the period of GSC's on-site wastewater discharge. There is no surface water located on site or in the immediate environs. Ground water in the area is moving in a southerly direction. Monitoring wells downgradient of the site have contained tetrachloroethylene concentrations of up to approximately 6,600 ppb.

An initial administrative consent order was signed by the owners of Garden State Cleaners in 1984. NJDEP has installed 14 monitoring wells in the vicinity of the site to characterize the contaminant plume associated with this site and another nearby NPL site, South Jersey Clothing. Tetrachloroethylene has been detected in some of these wells. The Remedial Investigation report summarizing monitoring well data was not available for review and evaluation.

NJDEP conducted soil sampling on the Garden State Cleaners site and at several off-site locations. No contamination was detected at off-site locations. A summary of VOCs that were detected at greater than 1 part per million (ppm) in on-site soils are presented in Table 1.

In a sample taken on May 5, 1982, the J.P. Cleary School water supply tested positive for VOCs, necessitating the use of bottled water and point source filters. Of 11 samples taken, 6 showed greater than 100 ppb of total VOCs (NJDEP personal communication). Tetrachloroethylene has been detected in the school water supply at a maximum concentration of 430 ppb.

NJDEP has described ground-water problems unrelated to Garden State Cleaners in Buena Borough. Benzene has been found by NJDEP in a well in the Landisville section of the Borough, an area not downgradient of Garden State Cleaners. There are many possible sources in the area which could contaminate the highly permeable, underlying Cohansey aquifer. These include spillage from private petroleum product and gasoline tanks, misuse of septic systems and septic tank cleaning chemicals, illegal dumping, and use of fertilizers and pesticides. Such sources are likely contributing to the overall ground-water contamination problem of the area.

The Garden State Cleaners site presents no outstanding or visible physical hazards. Although the property is unfenced, it's area is flat and relatively featureless.

QUALITY ASSURANCE/QUALITY CONTROL

Analysis of samples collected by NJDEP was performed at the New Jersey Department of Health laboratories. Specific information relating to QA/QC is not available for review and evaluation.

DEMOGRAPHICS

The Garden State Cleaners site is located in a mixed residential, commercial, and light industrial section of Buena Borough. The surrounding area is rural and predominantly agricultural in nature. According to the Atlantic County Health Department, there are approximately 1,000 homes within the boundaries of Buena Borough with a population of approximately 4,000 people. Outside the Borough limits, there are trailer parks which contain approximately 1,300 additional persons. Additionally, by assigning 1.5 persons per acre of agricultural land, NJDEP estimates that an additional 10,000 persons may be threatened by contaminated ground water. There are approximately 40 homes which are directly in the path of the contamination plume.

Potential sensitive populations in Buena Borough would include children and elderly that live in the Borough. Of particular concern is the J.P. Cleary School, which is located downgradient of the Garden State Cleaners site. Volatile organic chemicals had been detected in potable water at the school.

ENVIRONMENTAL DATA GAPS

The Remedial Investigation Report of the Garden State Cleaners site, when completed, will detail the nature and extent of contamination associated with the site. The additional site data and information contained in the RI/FS, when available, will be reviewed and evaluated for future addenda to this Health Assessment.

Additional study and investigation of Buenas ground water, beyond the scope of the present RI/FS work plan, may be necessary to comprehensively describe the nature and sources of contamination not attributed to the Garden State Cleaners and South Jersey Clothing sites.

EXPOSURE PATHWAYS

Present exposure pathways at the Garden State Cleaners site are predominantly related to the use of contaminated ground water for potable/domestic purposes and irrigation. Use of such ground water for domestic purposes could result in the ingestion, inhalation, or dermal exposure to contaminants. There are no documented human exposure pathways presently associated with the off-site air and soil media. Human exposure pathways associated with on-site soils and air may have been significant during the period when GSC discharged wastewater on-site. Although data demonstrate high concentrations of PCE in on-site soils during this period, there is no information regarding air quality. Solvent recovery practices instituted by GSC have eliminated external discharge of PCE. Residual concentrations remaining in on-site soils do not constitute a significant exposure pathway.

All water used for drinking and irrigation in Buena Borough was once dependent on ground water. Although a public water supply system was made available in the Borough in 1985, all Borough residents may not have access to or may not have elected to utilize the public water supply. It is likely that Borough residents utilized contaminated water before the public water system became available.

PUBLIC HEALTH IMPLICATIONS

The level of public health concern associated with the site has diminished with the implementation of a municipal water supply in 1985. It is unclear whether all residents have access to and are utilizing public water. There are potential public health concerns associated with homes that have yet to utilize the public water supply and with the area-wide ground-water problem in Buena Borough, which is a combination of site-related and non site-related contamination.

Exposure to high concentrations of the primary contaminant of concern at the site, tetrachloroethylene, has been demonstrated to affect the central nervous system and a number of organs in humans. Animal experiments have demonstrated that (at concentrations that exceed the exposure concentrations associated with this site) tetrachloroethylene is capable of

causing adverse reproductive effects and cancer. Although human data are not adequate to fully categorize tetrachloroethylene's carcinogenicity, tetrachloroethylene is currently listed by the USEPA as a Class B2 (suspected human) carcinogen.

CONCLUSIONS

On the basis of the information reviewed, ATSDR has concluded that this site is of public health concern because the risk to human health resulting from probable exposure to hazardous substances at concentrations that may result in human health effects. As noted in the Environmental Contamination and Physical Hazards section above, human exposure to volatile organic chemicals may be occurring and has probably occurred in the past, via the domestic use of contaminated ground water.

In accordance with CERCLA as amended, the Garden State Cleaners site has been evaluated for appropriate follow-up with respect to health effects studies. Since human exposure to on-site and off-site contaminants may be occurring and has probably occurred in the past, this site is being evaluated for follow-up health effects studies. After consultation with regional EPA staff, and State and local health and environmental officials, the Division of Health Studies, ATSDR, and NJDOH will determine if follow-up public health actions or studies are appropriate for this site. ATSDR will be considering sites for inclusion in the benzene subregistry, and this site will be included in the consideration.

An area-wide ground-water contamination problem exists in Buena Borough. While current remedial investigations adequately define the contributions of identified sites, additional investigations may be indicated to identify other sources of contamination and remedial actions necessary to protect the public health.

The site's degree of public health concern has been diminished since a municipal water supply was made available to alleviate dependence upon private domestic wells. However, utilization of the municipal water supply is not mandatory and involves significant costs. It is possible that contaminated wells continue to be used for potable and domestic purposes. It is recommended that all residents utilize the public water supply system.

When indicated by public health needs, and as resources permit, the evaluation of additional relevant health outcome data and community health concerns, if available, is recommended.

PREPARER OF REPORT

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CERTIFICATION

This Health Assessment was prepared by the New Jersey State Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health assessment was initiated.



Technical Project Officer, SPS, RPB, DHAC

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



Division Director, DHAC, ATSDR

REFERENCES

Superfund Documents:

United State Environmental Protection Agency, Hazardous Ranking Score Documentation, January 1983.

United State Environmental Protection Agency, Preliminary Site Assessment, May 1984.

File Reviews:

Atlantic County Health Department.

New Jersey Department of Environmental Protection, Division of Hazardous Waste Management.

NJDEP/Division of Water Resources Southern Regional Enforcement.

Interviews:

Atlantic County Health Department.

NJDEP/DWR Southern Regional Enforcement.

TABLE 1 - Soil Contamination - Garden State Cleaners

Location	1	2	3	4	5
Sample Depth (inches)	10	15	5	38	4
Compound (ppm)					
Tetrachloroethylene	7.52	43	1.35	0.1	0.56
1,2-Dichloroethylene	0.42	24	ND	ND	ND
Trichloroethylene	0.375	16.5	ND	ND	ND

Sample Locations:

- 1) Beneath mouth of boiler blow down pipe. *
- 2) Beneath mouth of steam condensate pipe, north wall. *
- 3) Adjacent to tetrachloroethylene recycle tank. *
- 4) Beneath mouth of steam condensate pipe, east wall. **
- 5) Front lawn of Garden State Cleaners. **

* - Sampled May 2, 1984; ** - Sampled June 21, 1984.

ND - Not detected.