

# Health Consultation

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CHEMSOL, INCORPORATED

PISCATAWAY TOWNSHIP, MIDDLESEX COUNTY, NEW JERSEY

CERCLIS NO. NJD980528889

SEPTEMBER 22, 2000

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

## **Health Consultation: A Note of Explanation**

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

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

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**HEALTH CONSULTATION**

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**PISCATAWAY TOWNSHIP, MIDDLESEX COUNTY, NEW JERSEY**

**CERCLIS NO. NJD980528889**

**Prepared by:**

**New Jersey Department of Health and Senior Services  
Hazardous site Health Evaluation Program  
Consumer and Environmental Health Services  
Division of Epidemiology, Environmental and Occupational Health  
Under a Cooperative Agreement with the  
Agency for Toxic Substances and Disease Registry**

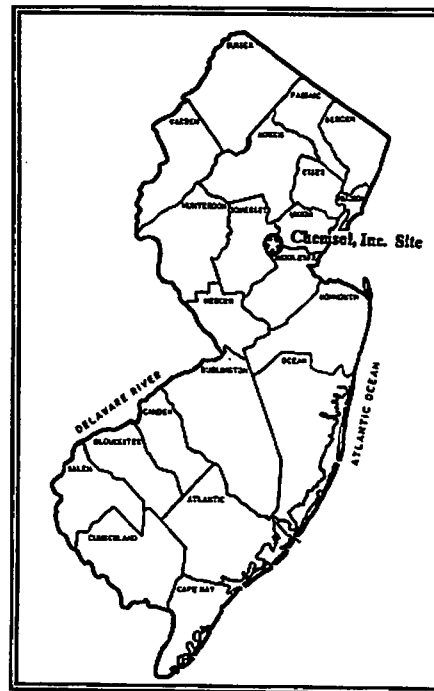
## BACKGROUND AND STATEMENT OF ISSUES

### *Statement of Issues*

A previous Site Review and Update for the Chemsol site prepared by the ATSDR/NJDHSS in 1995 has identified a completed exposure pathway through ingestion of contaminated groundwater by residents near the site.<sup>(1)</sup> Most residences near the Chemsol site are connected to the municipal water supply, but there are still a few residences that continue to use groundwater as a source of potable water. The Agency for Toxic Substances and Disease Registry (ATSDR) and the New Jersey Department of Health and Senior Services (NJDHSS) have reviewed the public health significance of the groundwater sampling data from private potable wells at these residences.

Private potable well samples from homes located west of the Chemsol site and at the Nova Ukraine area (southeast of the site) have been collected and analyzed for volatile organic compounds (VOCs) during several rounds of sampling in past years.<sup>(1)</sup> The most recent residential well water sampling near the Chemsol site was conducted by the New Jersey Department of Environmental Protection (NJDEP) in August and November 1999.<sup>(2,3)</sup> This health consultation will focus on sampling results from six (6) of eight private wells which are believed to be still active near the Chemsol site (Figure 1). The Elizabethtown water company and Piscataway Health Department confirmed that these eight residences are not connected to the municipal water supply.<sup>(4,5)</sup> Two of these eight active potable private wells were not included in the NJDEP investigation in August and November 1999.

The pathway specifically examined in this health consultation is the ingestion of VOC-contaminated groundwater by some nearby residents. Health effects related to VOCs for both adults and children will be evaluated. The public health aspects of potential exposures to other environmental media, if contaminated, will not be addressed within the context of this public health consultation.



40.5625 N; 74.443339 W

### *Background*

The Chemsol site (also known as Tang Realty site) is located at the end of Fleming Street in Piscataway Township, Middlesex County, New Jersey (see inset). Interstate 287 is located one-half mile south of the site. The site is bounded on the south by the Reading Railroad right-of-way.

The Chemsol site covers approximately 40 acres in an industrial/residential area. Single family residences are located immediately west of the site. The nearest part of the Nova Ukraine housing development is approximately 900 feet south-southeast of the site. An apartment complex with more than 1,100 units is located north of the site. Industrial and retail/wholesale businesses are located south of the site. The nearest residence is about 100 feet away from the site to the west.

The groundwater system underlying this site is complex with fractured bedrock. In general, groundwater existing in the perched water zone at depths of less than five feet flows to the south. Groundwater existing in the upper bedrock aquifer at depths of approximately ten to thirty feet flows to the north.

The Chemsol site was a chemical manufacturer which operated as a solvent recovery and waste reprocessing facility in the 1950's through approximately 1964. In 1978, the property was re-zoned from industrial to residential, and purchased by Tang Realty Corporation. In September 1983, the Chemsol site was listed on the National Priority List (NPL). At the present time, no buildings exist on-site except a groundwater treatment facility.

In 1984, the New Jersey Department of Environmental Protection (NJDEP) entered into an Administrative Consent Order with Tang Realty requiring that Tang Realty evaluate contamination at the site and develop a remedial action plan for the site.

Between 1984 and 1990, Tang Realty installed approximately 40 groundwater monitoring wells on-site and downgradient from the site. Groundwater contaminated with organic compounds including chloroform, 1,2-dichloroethane, methylene chloride, vinyl chloride, and benzene was detected in monitoring wells. The concentrations of total VOCs detected in well samples ranged from less than 3 ppb to 87,000 ppb in the perched water zone, and from below detection limits to 516,380 ppb in the upper bedrock aquifer. Pesticides were detected in three of five wells in the perched water zone, and six of sixteen wells in the upper bedrock aquifer. No polychlorinated biphenyls (PCBs) were detected in these monitoring wells.

Tang Realty excavated approximately 3,700 cubic yards (5,970 tons) of PCB-contaminated soils for off-site disposal during the summer of 1988. At the same time, several thousand small (less than 1 gallon) containers of unknown substances were discovered on-site. These containers were stored in a trailer on-site. During 1990 and 1991, these unknown substances were analyzed for compatibility. Compatible wastes were grouped together and disposed off-site by the United States Environmental Protection Agency (USEPA).

Between January and March 1990, Tang Realty and the Middlesex County Health Department sampled residential wells located at the Nova Ukraine area. Organic contaminants including trichloroethene (TCE), tetrachloroethylene (PCE), 1,1,2,2-tetrachloroethane, chlorobenzene, chloromethane, trans-1,2-dichloroethylene and trichlorofluoromethane were detected in well samples.

During the fall of 1990, the Piscataway Township extended municipal water service into the Nova Ukraine area to eliminate exposure to contaminants through groundwater usage. Potable wells of four residences not connected to public water supply in the Nova Ukraine area were sampled by the USEPA in February 1991. Organic contamination was detected in two of four wells. The Piscataway Health Department has recommended that the remaining private well users in the Nova Ukraine area connect to public water supply. At least two residences in this area still use private wells as the primary potable water source.<sup>(4,5)</sup> However, based on the 2<sup>nd</sup> phase RI report<sup>(6)</sup>, the USEPA suggested that contamination detected in the private wells of Nova Ukraine area is unrelated to the Chemsol site. Both analytical chemistry data and hydrogeology information support this observation.<sup>(7)</sup>

Private wells of residences located immediately west of the site were sampled by the USEPA in November 1992. Ten of twelve private wells showed contamination with VOCs including 1,1-dichloroethene, chloroform, 1,1,1-trichloroethane, tetrachloroethylene (PCE), and trichlorofluoromethane.<sup>(1)</sup>

The NJDEP conducted active private well sampling in the Piscataway/South Plainfield areas in August and November 1999. Private wells near the Chemsol site were included in this survey. The results show that some active wells are contaminated with VOCs including chloromethane, 1,1-dichloroethene, chloroform, 1,1-dichloroethane, 1,1,1-trichloroethane, tetrachloroethylene (PCE), trichloroethene (TCE), and methyl tert-butyl ether. Two of six tested wells near Chemsol showed elevated 1,1-dichloroethene levels above the New Jersey Maximum Contaminant Level (NJMCL) of 2 ppb, and one of these two wells with a PCE level above the NJMCL of 1 ppb.<sup>(2,3)</sup> (See discussion, Table 1).

### *Site Visit*

On March 30, 2000, Jeff Winegar, Sharon Kubiak, Suzanne Hooper and Stella Man-Chun Tsai of the New Jersey Department of Health and Senior Services (NJDHSS) conducted a site visit. The NJDHSS staff were accompanied by representatives of the USEPA, potentially responsible parties (PRP), and the Piscataway Health Department. The following observations were made during the site visit:

- The Chemsol site was fenced with locked gates to prevent trespassers from walking on the site. Signs are posted along the fence line indicating the presence of a Superfund site. The site is well vegetated.
- Currently, the only building on-site is a groundwater treatment facility. One groundwater extraction well at the depth of 200 feet is operating on-site. It has pumped 25-30 gallons per minute since August 1994. The Phase II RI/FS has determined that an additional five extraction wells will be installed on-site to increase the pumping rate to 65 gallons per minute. Treated groundwater is discharged into the sewer system. A future discharge plan

will include discharging treated groundwater into Stream 1A, which is along the northern part of the property boundary.

- Phase II RI/FS calls for soil removal to a depth of 2-feet to eliminate VOCs, PCBs and lead contamination on-site. The proposed starting date will be the summer of 2000.
- Several drums containing monitoring well tailings were observed on-site. Drums will be removed when soil removal activity begins.

## DISCUSSION

### *Environmental Contaminants*

#### *On-Site, Groundwater Characteristics*

Groundwater at the site occurs in two zones: a water-bearing zone (formerly identified as a perched zone) exists in the weathered bedrock, and the upper aquifer exists in the competent bedrock. The weathered bedrock water-bearing zone exists below the overburden at depths of approximately 10 feet. Groundwater flow in this zone is to the northeast. The upper bedrock aquifer occurs in interconnected fractures in the bedrock. The fractures of the bedrock provide flow paths through which the water moves. Historically, groundwater in this zone was found to flow to the southeast. This flow pattern may have resulted from the influence of a nearby production well. The weathered bedrock water bearing zone may be hydraulically connected to the water in the competent bedrock by low primary porosity and fractures through the weathered bedrock zone. As a result, the weathered bedrock is not expected to act as a barrier to the downward migration of contaminants<sup>(1)</sup>.

During Phase II RI, a total of 49 monitoring wells on-site were sampled and analyzed. Groundwater contamination is present in the bedrock aquifer at both the northern and southern boundaries of the site. The hydrogeological data indicates that contaminated groundwater continues to migrate off-site. However, due to the influences of groundwater pumping from off-site sources and the limited amount of off-site groundwater sampling data, the direction and extent of groundwater migration is uncertain<sup>(7)</sup>.

#### *Private Wells Near the Chemsol Site*

A total of six private wells near the Chemsol site were sampled in August and November 1999 by the NJDEP. The other two private wells still in use were not sampled in this period at the request of the residents. The maximum concentrations of contaminants detected from these two rounds of sampling are listed in Table 1. Chloromethane, PCE and 1,1-dichloroethene are above health comparison values (see below for definition of health comparison values).

**Table 1.** Maximum volatile organic compounds (VOCs) concentrations in ug/L (ppb) detected in private wells which are still active from Nova Ukraine area, Washington Avenue, Charter Street, and Hanover Street of Piscataway, New Jersey, in August and November 1999.<sup>(2,3)</sup>

Compound	Maximum Value (ug/L)	Health Comparison Value (ug/L)
Chloromethane	<b>17</b>	3 LTHA
1,1-Dichloroethane	0.8	50 NJMCL
Tetrachloroethylene (PCE)	<b>1.2</b>	1 NJMCL
Trichloroethene (TCE)	0.2	1 NJMCL
1,1-Dichloroethene	<b>6.4</b>	2 NJMCL 0.06 CREG
Chloroform	2	6 CREG
1,1,1-Trichloroethane	0.8	30 NJMCL
Methyl tert-butyl ether	8	70 NJMCL

LTHA=Lifetime Health Advisory for Drinking Water

NJMCL=New Jersey Maximum Contaminant Level

CREG=ATSDR Cancer Risk Evaluation Guide

**Bold=** Contaminants above health comparison values

***Pathways Analysis and Public Health Implications***

An exposure pathway is series of media through which an individual is exposed to contaminants that originate from sources. A completed exposure pathway consists of five elements:

- (1) Source of contamination;
- (2) Environmental media and transport mechanisms;
- (3) Point of exposure;
- (4) Route of exposure; and
- (5) Receptor population.

A completed exposure pathway must include each of the elements that link a contaminant source to a receptor population.<sup>(8)</sup> Based on the current information, it is reasonable to assume that a completed exposure pathway exists to those individuals who utilize private well water on a daily basis through ingestion and other non-potable domestic uses. Previous evaluation has assumed that residents lived in the area of the Chemsol site for approximately 45 to 50 years.<sup>(1)</sup> The assumption will be used to present a worst-case scenario for residents near the Chemsol site still using private wells.



## ***Toxicological Evaluation***

This section contains a discussion of health effects in both adults and children exposed to VOC-contaminated groundwater. The levels of VOCs used in this public health consultation are in Table 1.

Two of six tested private wells near the Chemsol site had VOC levels above health comparison values (CVs) (Table 1). The Environmental Media Evaluation Guides (EMEGs), New Jersey State Primary Drinking Water Standards of Maximum Contaminant Levels (MCLs), USEPA Lifetime Health Advisory for Drinking Water (LTHA) and ATSDR Cancer Risk Evaluation Guide (CREG) are used as comparison values to select chemical contaminants of potential concern. These CVs for drinking water are used to determine which contaminants detected may be at levels of potential health concern, and should be further evaluated from a public health perspective. However, the level of contaminant above a CV does not mean that adverse health effects are likely but that the contaminant should be further evaluated.

Health effect 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 potentially more likely to have associated illnesses or disease.<sup>(8)</sup>

Health guidelines are developed for contaminants commonly found at hazardous waste sites. Examples of health guidelines are the ATSDR's Minimal Risk Level (MRL) and the USEPA's Reference Dose (RfD). MRLs are developed for each type 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. When exposure (or dose) is below the MRL or RfD, then non-cancer, adverse health effects are unlikely to occur.

The toxicological effects of the VOC-contaminants detected in the private well water have been considered singly. The cumulative or synergistic effects of mixtures of contaminants may serve to enhance their public health significance. Some research on the toxicity of mixtures indicates that adverse health effects are unlikely when the mixture components are present at levels well below their individual toxicologic thresholds.<sup>(9)</sup> Additionally, individual contaminants or mixtures of contaminants may have the ability to produce greater adverse health effects in children as compared to adults. This situation depends upon the specific chemical being ingested, its pharmacokinetics in children and adults, and its toxicity in children and adults. Dermal contact and inhalation of contaminated water through showers may be associated with health effects.

## ***VOCs Exposure***

Residents near the Chemsol site still using private wells were assumed to be exposed to VOC-contaminated drinking water for approximately 45 to 50 years until 2000. To evaluate the worst-case exposure scenario, exposure doses for VOCs were calculated using the maximum concentrations detected. Exposure dose estimates are based on an intake of 2 liters of water per day for a 70-kilogram adult, and an intake for 1 liter of water per day for a 16-kilogram child. Toxicological evaluations focus on compounds detected above CVs.

### **Chloromethane**

Chloromethane (also known as methyl chloride) occurs naturally from chemical reactions in the oceans or burning grass, wood, charcoal and coal. Chloromethane was also produced industrially for use as a refrigerant in the past. Today, chloromethane may be released from municipal waste streams from treatment plants, or from industrial waste streams as a result of formation or incomplete removal from manufacture process.<sup>(10)</sup> Health advisories published by the USEPA Office of Water designate chloromethane as a possible human carcinogen.<sup>(11)</sup>

The estimated exposure dose through ingestion is based on the highest level of chloromethane collected from six private wells near the Chemsol site. The maximum exposure doses for adults and children were below the available chronic oral RfD for non-carcinogenic adverse health effects reported by the USEPA Office of Water for chloromethane of 0.004 mg/kg/day.<sup>(11)</sup> It is unlikely that non-carcinogenic adverse health effects would occur through ingestion of water containing chloromethane at this level. Therefore, ingestion of chloromethane at the maximum detected level does not constitute a health concern.

Based upon the chronic exposure scenario for adults, estimations of the lifetime excess cancer risk indicate no apparent increased risk of cancer. Therefore, we do not expect carcinogenic effects to occur in the exposed population.

### **1,1-Dichloroethene**

1,1-Dichloroethene is a man-made liquid chemical and is not found naturally in the environment. It is used to make plastics such as packing materials, and flame-retardant coatings for fiber and carpet backings.<sup>(12)</sup> 1,1-Dichloroethene is classified as a possible human carcinogen based on limited animal studies by USEPA.<sup>(13)</sup>

To evaluate the toxicological effects of chronic oral exposure (>365 days) for 1,1-dichloroethene to adults and children, it was assumed that a person ingests 2 liter water every day for 45 years for adults, and 1 liter water every day of 10 years for children. For the chronic exposure scenario for adults and children at the maximum concentration detected, the calculated exposure doses were below the chronic oral MRL of 0.009 mg/kg/day for non-carcinogenic adverse health effects (based

upon animal studies) presented in the ATSDR Toxicological Profile. The chronic MRL is based on a Lowest Observed Adverse Effect Level (LOAEL) for hepatic (liver) effects in rats.<sup>(14)</sup> It is unlikely that non-carcinogenic adverse health effects would occur through ingestion of water containing 1,1-dichloroethene at the maximum detected level among non-hypersensitive individuals.

Based upon the chronic exposure scenario for adults, estimations of the lifetime excess cancer risk indicate no apparent increased risk of cancer. Therefore, we do not expect carcinogenic effects to occur in the exposed population.

### **Tetrachloroethylene (PCE)**

Tetrachloroethylene is a widely used synthetic chemical for dry cleaning of fabrics, metal-degreasing operations, and serves as a starting material for making other chemicals. The U.S. Department of Health and Human Services and the International Agency for Research on Cancer (IARC), have determined that PCE may reasonably be anticipated to be a human carcinogen based on animal studies.<sup>(15)</sup> However, the USEPA has not established a slope factor for PCE. Thus, lifetime excess cancer risk (LECR) could not be estimated at this time. However, essentially equaling the MCL for PCE would not be expected to be associated with any theoretical increased cancer risk.

To evaluate the toxicological effects of chronic oral exposure to tetrachloroethylene for residences, it was assumed that a person ingests 2 liters of water every day for 45 years for adults, and 1 liter water every day for 10 years for children. For the chronic exposure scenario for adults and children at the maximum concentration detected, the calculated exposure doses were below the USEPA's oral RfD of 0.01 mg/kg/day for non-carcinogenic adverse health effects. Therefore, it is unlikely that non-carcinogenic adverse health effects would occur through ingestion of water containing PCE at the maximum detected level (equal to the MCL).

### ***ATSDR Child Health Initiative***

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination in their environment. Children are at greater risk than adults from certain kinds of exposures to hazardous substances emitted from a waste site. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors closer to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most importantly, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care. NJDHSS/ATSDR evaluated the potential for children to be exposed to groundwater with VOCs contamination detected. As previously mentioned, it is not expected that adverse health effects would occur for the children who utilize potable private well water.

## Conclusions

Based on current available data regarding the 1999 sampling reviewed, the ATSDR/NJDHSS have determined that active potable private wells discussed in this public health consultation currently pose **no apparent health hazard** to children and adults who utilize them on a daily basis. However, past contamination levels and resultant potential public implications are unknown. Additionally, the source of the contaminants present in the private potable wells discussed in this health consultation has not been definitively established by the USEPA as being completely or partially related to the Chemsol Inc., site.

Health risks were estimated for the assumed completed exposure pathway associated with ingestion of contaminated groundwater. Using the maximum level of contamination as a worst-case scenario and conservative exposure factors, the NJDHSS has determined that residents using groundwater would not be exposed to VOCs at levels of public health significance. The calculated exposure doses for children and adults were below the levels of VOC exposure that have been shown to cause adverse health effects. Although adverse health effects are not likely from exposure to the levels evaluated, it is prudent public health practice to limit exposure to these chemicals as much as practicable.

## Recommendations

### *Cease/Reduce Exposure*

- Although ATSDR/NJDHSS believe that exposure to contaminants found in residential well water are not likely to result in adverse health effects, residents with contaminated wells should consider an alternate potable water supply or enhance filtration to reduce exposure. Residences not currently connected to the municipal water supply should be strongly encouraged to do so by the Piscataway Health Department.
- Two residences excluded from 1999 sampling events should arrange for private well sampling as soon as possible to evaluate contaminant concentrations.

### *Site Characterization*

- Continued evaluation of monitoring wells to evaluate trends in contamination concentrations and distributions is indicated.

### **Public Health Action Plan (PHAP)**

The purpose of a PHAP is to ensure that this health consultation not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR and NJDHSS to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by ATSDR and NJDHSS are as follows:

#### **Public Health Actions Undertaken by ATSDR and NJDHSS**


1. Available private well sampling data have been evaluated by ATSDR/NJDHSS to determine the public health significance of human exposure pathways associated with VOCs detected in potable private well water.

#### **Public Health Actions Planned by ATSDR and NJDHSS**


1. This document will be provided to the Piscataway Health Department, Middlesex County, New Jersey for distribution to residents as indicated.
2. NJDHSS and ATSDR will assist the Piscataway Health Department if necessary by providing public health education materials and professional expertise to explain the potential implications of human exposure to VOCs.
3. NJDHSS and ATSDR will evaluate future data regarding private potable wells near the Chemsol site for potential public health implications.

### Certification

The Health Consultation for the Chemsol site was prepared by the New Jersey Department of Health and Senior Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

  
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Technical Project Officer, SPS, SSAB, DHAC

The Superfund Site Assessment Branch (SSAB), Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

  
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for Chief, SSAB, DHAC, ATSDR

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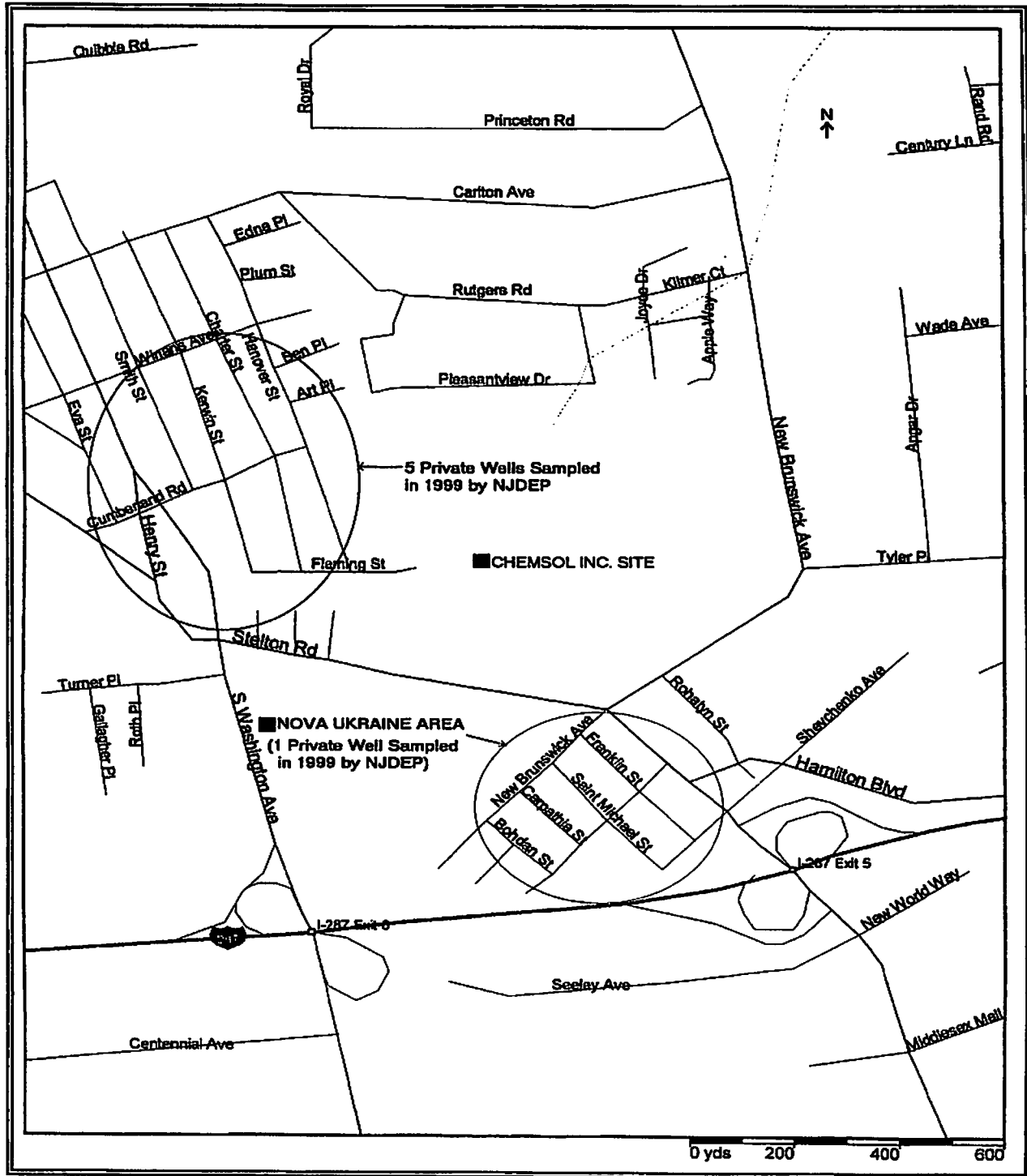


Figure 1. General Site Location; Chemsol Inc. Site.