

Health Assessment for

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NUTMEG VALLEY ROAD
WOLCOTT, NEW HAVEN COUNTY, CONNECTICUT
CERCLIS NO. CTD980669261
MARCH 30, 1992

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

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, risks assessments, risk evaluations and studies available from the Administrator of EPA."

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

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

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.

PUBLIC HEALTH ASSESSMENT
NUTMEG VALLEY ROAD
WOLCOTT, NEW HAVEN COUNTY, CONNECTICUT
CERCLIS NO. CTD980669261

Prepared by
Connecticut Department of Health Services (CT DHS)
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry (ATSDR)

SUMMARY

The Nutmeg Valley Road National Priorities List (NPL) site is an industrialized area located on the border of Waterbury and Wolcott, Connecticut. Surface soils at industrial/commercial properties within the site have been contaminated with heavy metals, volatile organics, and cyanide. Area groundwater has been shown to contain volatile organics and cyanide. Critical to the public health assessment is the individual consideration of 41 businesses and 31 residential properties contained within this site. A public water system has been extended to areas within the site. This system has been accessed by fourteen percent (14%) of the tenants or landowners of "Nutmeg Valley." All others draw their drinking water from private wells. Two different populations are considered at this site. One population consists of residents, the other, the local work force.

Potential exposure pathways of concern consist of ingestion of contaminated groundwater, inhalation of vapors and aerosols formed by industrial or domestic uses of contaminated groundwater, dermal absorption of contaminated groundwater by hygienic and recreational uses, ingestion and inhalation of contaminated soil particulates, and dermal absorption from contact with contaminated soils and sludges. Levels of volatile organics, heavy metals, and cyanide in residential and industrial wells are of concern. Provision of alternate water supplies should be made available to those properties which have been shown to exceed state "Action Levels". Inactive waste impoundments have produced concentrated areas of soil contamination. Closure of these impoundments should be perused. People within the site need to be informed of site contamination and the potential risk factors associated with exposure.

This site is considered by the Agency for Toxic Substances and Disease Registry (ATSDR) and the Connecticut Department of Health Services (CT DHS) to be a Public Health Hazard. There is evidence that exposures have occurred, are occurring, or are likely to occur in the future at concentrations in the environment that, upon long-term exposure, can cause adverse health effects to the receptor population and these concentrations exceed Minimal Risk Levels established in the ATSDR Toxicological Profiles or Connecticut State "Action Levels". This public health assessment is an update to the ATSDR Preliminary Health Assessment of May 2, 1988. ATSDR and the CT DHS have developed public health actions which include: 1) conducting environmental health professional education; 2) conducting community health education; and, 3) evaluating the need for a disease and symptom prevalence study and for further investigation of individual kidney cancer cases.

BACKGROUND

A. Site Description and History

In 1989, Nutmeg Valley Road, a component of "Nutmeg Valley", was placed on the National Priorities List (NPL). "Nutmeg Valley" is a phrase commonly used to identify a geographic area of contamination, existing near an industrial-zoned segment of the town of Wolcott, Connecticut. "Nutmeg Valley" is the focus of an investigation into the contamination of groundwater around the industrialized area of the Route 69 corridor. "Nutmeg Valley" is predominately an industrial area containing small manufacturing facilities and repair shops. The site has a preliminary site boundary until a Remedial Investigation can more accurately define the scope of contamination. The site contains approximately 155 acres of mixed commercial and residential properties. This area is located on the Waterbury/Wolcott town line where Route 69 crosses the town borders. Topographically, "Nutmeg Valley" is within a small river basin.

In response to several reportedly contaminated wells and in response to the hazardous waste inventory conducted by the Connecticut Department of Environmental Protection (CT DEP), an investigation into the nature, extent, and probable source(s) of groundwater contamination in the Wolcott and surrounding areas was conducted by state and local officials (1979-1981). During this study, 21 of 90 wells sampled were found to contain contaminants over the CT DHS state "Action Levels". Several of these wells were located in "Nutmeg Valley." Continued investigation identified numerous potential industrial sources of groundwater contamination within "Nutmeg Valley." Maintaining groundwater quality fit to drink, in such a heavily industrialized area, became a critical issue. Further study was commissioned.

The Chesprocott Health District (CHD) received preventative health block grant funds from the State of Connecticut in 1984. These funds specified partial allocation for a water supply study testing program. Sampling under this block grant contract of 1984-1985 confirmed that groundwater contamination still existed in several wells and identified four additional contaminated wells in "Nutmeg Valley."

The initial investigation started with a 1980 Preliminary Assessment of Nutmeg Screw Machine Products, Inc., on Nutmeg Valley Road, as conducted by CT DEP, which revealed that disposal of solvent waste occurred at a rate of 15 gallons per day from 1966 to about 1980. Disposal at this rate, for 14 years, indicated a total of 54,600 gallons of solvent material may have been disposed of on-site.

In 1985, under Technical Directive Document (TDD) F1-8503-02, the NUS Field Investigation Team (NUS/FIT) was tasked by Region I of the U.S. Environmental Protection Agency (EPA) to perform a site inspection, sample collection, and in-house analytical screening of Nutmeg Screw Machine Products, Inc.

Investigation by EPA officials brought forward information developed in CT DEP Preliminary Assessments which identified several other industrialized properties within this site as potential sources which may have contributed to a groundwater contamination problem in "Nutmeg Valley."

Nutmeg Valley Road in Wolcott, Connecticut was added to the National Priorities List (NPL) in 1989. Although the site has no definite boundary, continued investigation has expanded the "Nutmeg Valley" area to include properties located on Wakelee Road, Swiss Lane, Venus Drive, Town Line Road, Tosun Road, Nutmeg Valley Road, and the inclusive segment of Route 69. The "site", as this area will be referred to, presently contains the above mentioned roadways. Site boundaries may be modified to include or exclude identified properties as additional data develops.

For purposes of this report, each property was assigned an identification number. A detailed description of each property and a corresponding map are included in Appendix A.

The northwest corner of "Nutmeg Valley" lies on a hill sloping to the southeast and is divided from the rest of the site by Route 69. The loop created by Town Line Road and Nutmeg Valley Road contains wetlands as mapped by the U.S. Geological Survey. Mad River runs along the southeast side of this valley. The Tosun Road area is on the north side of the "Nutmeg Valley" site and contains approximately 20 acres of residentially zoned properties. The residential zone is located on a steep hill with a northwesterly slope. Old Tannery Brook runs along the northwest side of Tosun Road. This site contains approximately 41 business and 31 residential properties. Historical information shows that years of on-site disposal of chemical waste at industrial/commercial properties within the site has occurred. Spill reports and complaints have made claim to a degradation of local surface water quality. Wastes identified at industrial/commercial properties within this site include heavy metals, solvents, paints, cyanide, and oils. Aerial photographs have identified historical surface impoundments within this site, six of which are located off Tosun Road. A public water system has been extended from Waterbury to service Wakelee Road, Venus Drive, Swiss Lane, Town Line Road, and Nutmeg Valley Road. Ten of the 72 properties (14%) located at this site have been connected to the public water system. Private wells at these properties have not been abandoned. All other property owners draw water from private wells located on their respective properties.

B. Site Visit

On April 25, 1990, a site visit was conducted by Gregory Ulirsch from ATSDR, Susan Yurasevecz and Brian Toal from the Connecticut Department of Health Services (CT DHS), and representatives from the Connecticut Department of Environmental Protection (CT DEP) and the Chesprocott Health District (CHD). Contact with Patrick Accardi, director of the Chesprocott Health District, and Corey Joseph, of the Wolcott Department of Public Works, was established to assess the nature and extent of groundwater contamination as it would impact the industrial and residential inhabitants of "Nutmeg Valley" and the surrounding area. This initial site visit led to the identification of 41 industry/business properties and 31 residences located within "Nutmeg Valley." Critical to the public health assessment is the individual consideration of these 72 properties. The town of Wolcott extended the Waterbury public water supply in 1986. However, hook up to the public water supply system has been established for only a small percentage of the area properties.

To thoroughly assess the extent of contamination, a second site visit, supplemented with background information on business properties (Appendix A), was conducted. This second visit was instrumental in identifying current occupants of the site.

C. Demographics, Land Use, and Natural Resource Use

The "Nutmeg Valley" Superfund site is situated on the border of Wolcott (population 14,830) and Waterbury (population 111,630). The approximate 155 acres included within the boundaries of "Nutmeg Valley" rest within a 680 acre parcel of land zoned for industrial use. Upgradient, and on the western border of this zone, is the Waterbury Sanitary Landfill.

Southwest of "Nutmeg Valley" is a heavily developed commercial area in the City of Waterbury consisting of shopping malls, shopping plazas, apartment or condominium complexes, service businesses, and various other commercial entities. Conversation with William Phelan of the Waterbury Bureau of Water and a guided tour of Waterbury properties along "Nutmeg Valley," indicated that all public and private property on the Waterbury side of "Nutmeg Valley" was supplied with public water from the City of Waterbury. Data was not obtained to identify when these properties first became serviced by the Waterbury public water system.

The river valley basin continues directly south and down gradient of "Nutmeg Valley." Flowing through the basin is Mad River. This area is highly residential, containing several condominium or apartment complexes and many residential homes. This area is located in the City of Waterbury and is supplied with a public water system. Mad River is readily accessible to all residents.

Although Mad River was not observed as a site of recreation, it is not known to what extent residents associate themselves with this water source. Area surface waters are classified B/A, which means that they may not be meeting the water quality criteria for designated uses as a potable drinking water supply but have met criteria for fish and wildlife habitat, recreational use, agriculture, industrial supply, and other uses, including navigation. Swimming and fishing could be recreational activities performed on or about this site.

Lands southeast, east, northeast, and north of "Nutmeg Valley" are located in the town of Wolcott and consist of rural, residential properties. Ninety eight percent (98%) of Wolcott residents are supplied water by private wells. Northeast, on the one mile perimeter of "Nutmeg Valley," is the Scoville Reservoir (recreational) and the Frisbee School (elementary).

Located within "Nutmeg Valley" are several acres of residentially zoned properties containing 20 single family and 1 multiple family homes, all on private wells. These properties have housed families both young and old.

Also within this site are several residences scattered amongst the industrial businesses. In total, 31 homes have been identified.

Though this area is primarily industrial, the site hosts residential activity as well. Children have grown up on this site and have routinely explored and scavenged local terrain. Conversations with a resident identified past activities of local children playing in an inactive hazardous waste impoundment. Walking or hiking within the site is a common recreational pastime for residents. Field work by local farmers has been observed along the east bank of Mad River.

Two surface water sources flow through "Nutmeg Valley", Tannery Brook and Mad River. These waters are very close to local industrial activity, resulting in a heavy and direct impact on water quality. Industrial areas around Tannery Brook and Mad River are subject to flooding. The effects of this flooding on the movement of contaminants through the site is unknown.

Included in the "Nutmeg Valley" community are the approximate 500 employees who have been working for businesses located within "Nutmeg Valley." Though sensitive populations may exist, the general working population can be described as working-class men and women of various age.

D. State and Local Health Data

Cancer is a plausible adverse health outcome from exposure to the contaminants identified at this site. John Flannery, Director of

the State of Connecticut Tumor Registry, was consulted to investigate the possibility of an increased incidence of cancer occurrences in the vicinity of "Nutmeg Valley." Data were generated to assess the cancer rates for residents of the state of Connecticut, the town of Wolcott, and two census tracts located on the Waterbury side of the Wolcott border (census tracts 3526 and 3511). Data were collected for the period 1984-1988. This time frame was chosen because cancer data prior to 1984 was not represented by census tract and cancer data collected for this time period would be a plausible representation of past exposure and a plausible representation of an appropriate latency period for cancer development from past exposure. Data were collected for the categories of all cancers, testicular, liver, kidney, leukemia, and lung cancer because these cancer types were plausible adverse health effects from exposure to contaminants within this site. These cancer categories were also chosen because these cancer types were most frequently recorded as adverse health effects when considering the combined toxicological data of individual exposures of any one or all the contaminants identified within this site. These data represent the residents of the "Nutmeg Valley" area and may not include a majority of the exposed population, the local work force. Information on the resident status of the work force was not available, creating limitations on the population included in this public health assessment. Results of the data evaluation are discussed in the Health Outcome Data Evaluation subsection of this public health assessment.

Patrick Accardi, Director of the Chesprocott Health District (local health district for "Nutmeg Valley"), was contacted in order to assess the possible impact exposure to contaminants from within this site may have produced on the health of the public living within "Nutmeg Valley." No additional information was found as a result of this inquiry.

In an effort to contact the resident population directly, a mailing was sent to all homes located in the proximity of "Nutmeg Valley." This mailing addressed the issues of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the National Priority List (NPL), the Agency for Toxic Substances and Disease Registry (ATSDR), and public health concerns. A brief and concise questionnaire (one page) was sent to residents asking questions of health concerns, activity regarding those concerns, and suggestions for action. Results from this activity are described in the Public Health Implications section of this public health assessment.

COMMUNITY HEALTH CONCERNS

In an attempt to identify health concerns of those people living within "Nutmeg Valley," a questionnaire was sent to local residents which explained CERCLA, NPL Sites, the "Nutmeg Valley"

listing and the efforts of ATSDR and CT DHS in assessing the impact this NPL site may have on public health. A request was made to local residents to assist ATSDR and CT DHS in their efforts by supplying information relative to health concerns and past activity in dealing with those health concerns.

Of the 51 residents contacted through this mailing, 11 responses were received. Of those responses, two knew of the NPL listing and expressed concern, two knew of the NPL listing and expressed no concern, three did not know of the listing and expressed concern, and the remaining three did not know of the listing and did not express concern. In total, five of the respondents did express concerns related to living on or near a hazardous waste site. The percentage of the responses to this questionnaire was low (21.5%). The remaining 78.5% of the population did not respond to the questionnaire.

The primary concern expressed by these residents was one of water quality assurance. People were concerned that they did not know when their drinking water was safe to drink and when it might have been contaminated. Ninety-eight percent of the residents in Wolcott are supplied water from their private wells. Anecdotal reports indicate that many residents have opted to buy water for the purpose of drinking and are still using tap water for cooking and bathing.

One respondent had a specific concern regarding adverse health effects from living near the hazardous waste site. This concern stemmed from 14 years of exposure to the "Nutmeg Valley" area. Reported changes in taste and compatibility of tap water with other liquids (i.e., milk solidifying in tea water), suggests that periodic contamination of well water had been suspected throughout the 14 years of residence. A water analysis was never conducted. Concern was also expressed as to the possibility of adverse health effects in children who have been known to play in an unrestricted hazardous waste impoundment. The health concern expressed was one of an unexplainable skin rash diagnosed by a physician as "dermatographism" (a vascular reaction of the skin due to a physical allergy) in both the parent and the child of a family living in "Nutmeg Valley."

Another concern expressed in this survey was zoning. Residents have complained about the amount of industrial activity allowed to take place so close to surface water sources and wetlands. Concern was also expressed regarding the continuing problem of water pollution by junked and stripped cars in businesses along Tannery Brook.

Concern was expressed as to the nature and effectiveness of monitoring and enforcing the appropriate hazardous waste disposal activities of the many industrial businesses located in "Nutmeg Valley."

A concern was registered in regard to smelling fumes from a nearby auto body shop and the potential adverse health effects from that exposure.

This public health assessment was made available for public comment between July 22 and August 22, 1991. The public comment period was announced in a legal notice in the Waterbury Republican newspaper and in a press release. The document was made available at the local health department and in the Wolcott Town Hall. In addition, over flyers describing the Nutmeg Valley site were distributed to local citizens and industries during the public comment period. During the public comment period, no comments were received.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

A. On-Site Contamination

To identify possible facilities that could contribute to the air, water, and soil contamination near the Nutmeg Valley Road site, Connecticut Department of Health Services searched the 1987, 1988, and 1989 Toxic Release Inventory (TRI) for the Town of Wolcott. TRI is developed by the U.S. Environmental Protection Agency (EPA) from the chemical release (air, water, and soil) information provided by certain industries. The TRI data indicated that one on-site facility, Joma, Inc., released 1,1,1-trichloroethane into the ambient air at rate of 8,600, 7,414, and 7,414 lbs./year for the years 1987, 1988, and 1989, respectively.

On-site contamination of this approximately 155 acre site is wide-spread. Multiple chemicals at concentrations exceeding acceptable exposure limits have been detected in groundwater in 21 of the properties sampled within this site. Of the several historical inspections conducted on properties within this site, eleven of the properties have recorded histories of dumping waste materials to property grounds within "Nutmeg Valley". Several of these have been documented as early as 1945. The extent (volume and time span) of waste disposal cannot accurately be assessed. Evidence of contamination in both soil and groundwater has been documented (refer to Tables 1, 2, and 3).

Compilation of data indicates that groundwater contamination occurred at several locations within the site. Contamination is primarily in the form of volatile organic compounds (VOCs), both chlorinated and non-chlorinated, and heavy metals. The number and concentration of compounds varies depending upon the sampling location and the time of sample. Contamination has been identified in both consolidated and bedrock aquifers which supply water to local wells.

The following tables identify contaminants found in groundwater, soil, and sludge. Most of the sampling activity at this site has

been focussed on groundwater quality. Table 1 presents a summary of data collected from groundwater analyses. Table 1 includes data from both tap water samples and groundwater from monitoring wells. Table 2 contains data which has been collected from analyses of tap water only. Some sampling activity has also been focussed on levels of contaminants in surface and subsurface soil. This information is presented in Table 3. A limited amount of activity has been focussed on the quality of surface water, surface water sediments, aquatic wild life, and air concentrations (both ambient and indoor). The lack of these data supports the need for additional monitoring. Data in Table 4 contains the analyses of sludge material in the waste impoundment which was accessible by the local children.

Standards or Guidelines listed in these tables represent limits for the acceptable concentrations of contaminants in groundwater designated as suitable for human consumption. Section 22a-471 of the Connecticut General Statutes grants authority to the Commissioner of Health Services to determine when a contaminant of groundwater creates, or may reasonably be expected to create, an unacceptable risk to the health of persons using such waters for drinking or other domestic purposes. An "Action Level," as set by the Connecticut Department of Health Services, is the concentration of a chemical substance known to exist in groundwater intended for human consumption, at or above which exposure to the contaminated groundwater has been determined to create an unacceptable risk to human health. This "Action Level," which may be modified as new data become available, is a health-based number used by the Commissioner of Health Services in making a determination of unacceptable risk.

A major goal in soil remediation by the Connecticut Department of Environmental Protection is to eliminate actual and potential sources of pollution to the waters of the state, preventing groundwater from receiving soil contaminants that would produce groundwater contamination at or above state "Action Levels". State "Action Levels" are listed in the following tables as reference criteria, used for developing cleanup strategies by the CT DEP. These "Action Levels" are based on exposure to contaminated groundwater and are not "Action Levels" for exposure to contaminated soil.

TABLE 1
On-Site Groundwater Contaminants of Concern

<u>Compound</u>	<u>Range (ppb)</u>	<u>Standard/Guidelines</u>	<u>Cancer Class*</u>
Benzene	1.1 - 40	1 ppb (a)	A
Bis-Ethyl Hexyl Phthalate	320	10 ppb (f)	B2
Carbon Tetrachloride	1.0 - 102	5 ppb (a)	B2
Cyanide	440	154 ppb (c)	D
1,2-Dichloroethane	1.0 - 3.3	1 ppb (a)	B2
Iron	2,380-19,000	300 ppb (e)	-
Oil and Grease	34,400	100 ppb (g)	-
Tetrachloroethylene	0.74 - 16.2	5 ppb (a)	B2/C
Total Organic Carbons	6,950 - 56,400	100 ppb (g)	-
Trichloroethylene	0.74 - 320.8	5 ppb (a)	-

ppb = parts per billion

Explanation of Standard/Guidelines:

- a) Connecticut Action Level
- b) EPA Maximum Contaminant Level
- c) EPA Health Advisory; Lifetime-Adult
- d) National Interim Primary Drinking Water Regulation
- e) EPA Secondary Maximum Contaminant Level
- f) Adopted from Massachusetts Guidelines
- g) Adopted from New York Guidelines

(The guidelines from Massachusetts and New York, as represented in this chart, have been adopted as reference guidelines for this health assessment only, and are not actively imposed by the State of Connecticut)

* EPA cancer classifications are explained in Appendix B

TABLE 2
On-Site Groundwater Contaminants of Concern
Tap Water Analyses

<u>Compound</u>	<u>Range (ppb)</u>	<u>Standard/Guidelines</u>	<u>Cancer Class*</u>
Benzene	1.1 - 40	1 ppb (a)	A
Carbon Tetrachloride	120	5 ppb (b)	B2
1,2-Dichloroethane	1.4 - 3.3	1 ppb (a)	B2
Tetrachloroethylene	2.0 - 16.2	5 ppb (a)	B2/C
Trichloroethylene	9.6 - 320.8	5 ppb (a)	-

ppb = parts per billion

Explanation of Standard/Guidelines:

- a) Connecticut Action Level
- b) EPA Maximum Contaminant Level

* Cancer classifications are explained in Appendix B

TABLE 3
On Site Soil Contaminants of Concern

<u>Compound</u>	<u>Range (ppb)</u>	<u>Standard/Guidelines</u>	<u>Cancer Class*</u>
Benzene	105	1 ppb (a)	A
Cadmium	2,250	5 ppb (c)	B1
Chloroform	108	100 ppb (b)	B2
Chromium (total)	25,760	120 ppb (c)	A**
Cyanide	80 - 2,500	154 ppb (c)	D
1,1-Dichloroethane	300-3,794	-	-
1,1-Dichloroethylene	140 - 2,306	7 ppb (b)	C
Ethylbenzene	12 - 1,025	680 ppb (c)	D
Lead	30-37,790	50 ppb (d)	B2
Methylene Chloride	114 - 426	25 ppb (a)	B2
Nickel	60-40,000	150 ppb (c)	A
Tetrachloroethylene	175 - 780	5 ppb (a)	B2/C
1,1,1-Trichloroethane	112 - 31,324	200 ppb (b)	-
Trichloroethylene	177 - 273	5 ppb (a)	-

The majority of sampling data represented in this chart are from analysis of subsurface soil samples taken from the various industrial properties located at this site.

ppb = parts per billion

Explanation of Standard/Guidelines:

- a) Connecticut Action Level
- b) EPA Maximum Contaminant Level
- c) EPA Health Advisory; Lifetime-Adult
- d) National Interim Primary Drinking Water Regulation
- e) EPA Secondary Maximum Contaminant Level
- f) Adopted from Massachusetts Guidelines
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(The guidelines from Massachusetts and New York, as represented in this chart, have been adopted as reference guidelines for this public health assessment

only, and are not actively imposed by the state of Connecticut)

* Cancer classifications are explained in Appendix B

**EPA Proposed Cancer Classification for Chromium +6

TABLE 4
On-Site Impoundment Sludge Contaminants of Concern

<u>Compound</u>	<u>Level (ppb)</u>
Copper	3,778,000
Cyanide	875,000
Iron	18,000,000
Manganese	331,000
Oil & Grease	2,250,000
Trichloroethylene	1,210
Zinc	1,111,000

ppb = parts per billion

B. Off-Site Contamination

Off-site contamination is also wide-spread. The first indication of a well contamination problem was discovered during a cooperative sampling and testing activity between DEP and CHD during 1978-1979. All of the wells tested were north of the "Nutmeg Valley" area along the Route 69 corridor. As a result of this initial contamination discovery, a thorough investigation of possible well contamination areas was conducted by DEP, DOHS, and CHD during 1980-1981. Only 5 of the 21 contaminated wells identified during this investigation were located on the "Nutmeg Valley" site. Further sampling and testing was carried out by the CHD in 1984. These studies have shown that multiple chemicals at high concentrations have been detected at various locations within the town of Wolcott and exist in addition to the possible migration of contaminants from within the site. Historical practices of disposing waste materials to the ground have been recorded for several businesses located within the area of "Nutmeg Valley." Documented leakage of several underground gasoline tanks was also identified as contributing to the contamination of area groundwater. Contaminants most often identified during these groundwater sampling activities were those of volatile organic compounds (VOCs), both chlorinated and non-chlorinated.

Historical disposing of solvents (particularly tetrachloroethylene and trichloroethylene) to the ground behind Kras Tool has been estimated at 100-150 gallons per year for about ten years. Disposing at this location was considered the probable source of contamination of approximately nine of the wells found to be contaminated north and off-site of "Nutmeg Valley". An abatement order from CT DEP required removal of contaminated soil from this source area. Contamination of another off-site well was considered the result of a leaking underground storage tank at an Exxon station on Route 69 at Hillside Drive. This site is also under the remedial direction of CT DEP. Another source of off-site contamination as been linked with the Town and Country Dry Cleaners. This source has been related to three off-site wells found to be contaminated. The Mobil station on Route 69 at

Potuccos Ring Road is still another source of off-site contamination which has contributed to the contamination of off site-wells. Although identification and removal of contamination sources has been addressed by CT DEP, there is no evidence to show that remediation of groundwater contaminated by these sources has been implemented. The following table identifies contaminants found in groundwater from off-site sampling activities of private well water supplies.

TABLE 5

Off-Site Groundwater Contaminants of Concern
Tap Water Analyses

<u>Compound</u>	<u>Range (ppb)</u>	<u>Standard/Guideline</u>	<u>Cancer Class*</u>
Benzene	1.0 - 32,000	1 ppb (a)	A
1,2-Dichloroethane	6.9 - 9.6	1 ppb (a)	B2
Methylene Chloride	1.0 - 320	25 ppb (a)	B2
Pentane	50 - 5,400	-	-
Tetrachloroethylene	1.0 - 2,800	5 ppb (a)	B2/C
Trichloroethylene	0.6 - 1,900	5 ppb (b)	-

ppb = parts per billion

Explanation of Standard/Guidelines:

- a) Connecticut Action Level
- b) EPA Maximum Contaminant Level

*Cancer classifications are explained in Appendix B

C. Quality Assurance and Quality Control

Data generation in the attempt to characterize the scope of chemical contamination within "Nutmeg Valley" began in 1979 and has continued to the present (1990). Several sampling agencies have been involved in the generation of data over these years. Though quality assurance guidelines have been met with the generation of many data points (duplicates, blanks, spike samples, calibration), methodologies and laboratory practices utilized by the varying sampling agencies are not consistent. In preparing this public health assessment, ATSDR relies on the information provided in the referenced documents and assumes 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 public health assessment are determined in part by the completeness and reliability of the referenced information.

D. Physical and Other Hazards

In general, housekeeping practices within the site could be improved. There are limited restrictions to prevent casual passers by from gaining access to industrial/commercial properties. Various numbers of used drums, either stacked or tossed about, exist on industrial/commercial properties within the site. Discarded bottles, paper, tires, car parts, plastics, etc., can be found at various locations within the site. Unattended vehicles (cars, trucks, vans) can be observed at various locations within the site.. Access to these vehicles is not restricted. The existing fence around an inactive hazardous waste impoundment is not adequate to prevent access. Children living on and around the "Nutmeg Valley" area, if given the inclination, can have access to the above mentioned hazards.

PATHWAYS ANALYSIS

As discussed in the Site Description and History subsection, many of the past industrial operations within this site have resulted in soil and groundwater contamination via chemical spills, leaks, and disposal. The majority of contaminants identified in soil and groundwater can be classified as volatile organic compounds (VOCs) and heavy metals. The following subsections discuss the environmental and human exposure pathways that exist within this site.

A. Environmental Pathways (Fate and Transport)

1. Groundwater Pathway

Bedrock underlying "Nutmeg Valley" (Waterbury Gneiss) is part of a basement complex which forms the core of a partly-preserved dome (the Waterbury Dome). Review of data on aquifer characteristics in the area suggests bedrock runs close to the surface of the ground (20 feet) at various locations within the site.

Surficial material on the site is mapped primarily as flood-plain deposits and is shown to exist up to 40 feet thick. These deposits consist of alluvial silt and sand containing organic matter. The two aquifers of concern at this site are 1) a shallow stratified drift aquifer in the basin of the river valley and 2) the underlying bedrock aquifer. The topography of the area and the shallow nature of unconsolidated materials overlying bedrock suggest that both ground and surface water travel from the exterior areas of the site inward toward Tannery Brook and eventually exit the site in a southerly direction. The exception

is on the southeasterly portion of "Nutmeg Valley" where Mad River runs along the perimeter, intercepting Tannery Brook. Groundwater flow patterns in this area are not as clearly understood as those of the rest of the site.

Several properties within "Nutmeg Valley" are located on a flood plain and as such have been subject to major flooding. Anecdotal reports from local town employees identified two occasions in the 1980's when water levels of Mad River rose in excess of twenty feet. Much of "Nutmeg Valley" is in a wetlands area and as such, migration patterns of contaminants identified in the Environmental Contamination and Other Hazards Sections are difficult to predict. It is not known whether or not contaminants from various locations within this site have migrated further down stream. Data from 1985 indicate that contaminants have been identified in both consolidated and bedrock aquifers.

2. Soil Pathway

Because of the physical characteristics of the "Nutmeg Valley" site and historical activities associated within the site, many of the contaminants within the site have a high potential for migration. Surface contamination (as evidenced by soil staining) and soil contamination (as evidenced by historical sampling data) have migrated to the underlying aquifers (as evidenced by ground water sampling data).

Current sampling data from both groundwater and soil analyses support the conclusions that 1) contaminants have been identified in soils within "Nutmeg Valley", 2) contaminants have been identified in both consolidated and bedrock aquifers, and 3) contaminants have been identified in private Drinking water supplies within the site. The extent of contamination is, however, unknown. Aerial photographs of "Nutmeg Valley" indicate that as many as 14 waste impoundments may have existed within this site during the years 1963-1986. Access to these impoundments has not been and is not now adequately restricted. Reports have been made of children actually playing in impoundment waste material. Tracking contaminated soils from these impoundments, back into the household is another exposure route to consider.

3. Air Pathway

No information has been developed to characterize the potential for the air pathway to be a plausible route of exposure. Inhalation of the fumes of volatile organic compounds must be considered as we do know that fumes from VOCs can concentrate in confined air spaces. For this reason, it is important that inhalation of VOCs be considered a plausible route of exposure and that data be developed to ensure that VOCs do not concentrate

in the basements of area houses and industrial businesses and that VOCs are not being emitted into the air of industrial businesses using contaminated groundwater for industrial purposes.

It must also be considered that any attempt to move soil or groundwater within the site, which could contribute to additional volatilization of contaminants into the air, would result in another plausible route of exposure through the air pathway.

4. Foodchain Pathway

There is no information to verify if the agricultural route of exposure would be a plausible pathway to consider within this site. A farmer was observed cutting hay in a field very near this site. It is not known if the hay has been contaminated or what the hay is used for. It is not known if this field had been used for other crops. It is not known if anyone at this site has used contaminated groundwater to irrigate private vegetable gardens. It is not known if any fish exist in the Mad River or in Tannery Brook and if anyone catches those fish for the purpose of consumption. This additional information is necessary to confirm the agricultural pathway as a plausible route of exposure.

B. Human Exposure Pathways

1. Ground Water Pathway

Several contaminated wells have been identified in the "Nutmeg Valley" area. For many wells, historical data do not exist either to identify their depth or to identify the aquifers (consolidated or bedrock) they draw water from.

Evidence has been gathered to conclude that several wells, both industrial and residential, have been contaminated above the "Action Level" for the contaminant identified in Table 2 of the On-Site Contamination subsection. Eight of the wells tested, which were shown to contain contaminants above the 1985 "Action Levels," were cause for these properties to be hooked into a public water system. The public water system of Waterbury was extended to service the "Nutmeg Valley" area in 1986. Only those properties with contaminant levels above the 1985 "Action Levels" were connected. The nature of industrial activity in this area (the use of process water) allows for continued industrial access to contaminated groundwater by the industrial properties connected to the public water supply.

It must be known that justification for properties being placed on public water was based on "Action Levels" set during 1985. As additional data developed, several of these "Action Levels" were adjusted to reflect a more conservative protection factor. Wells

not considered to be contaminated above an "Action Level" in 1985 may need to be reevaluated as a potential current route of exposure.

Wells in the industrial setting have been allowed to operate for purposes of industrial use. It is not known how this water is being used and if anyone is at risk from continued exposure. The public needs to be informed of this potential risk to human health.

Thirty-one private residences exist on or about the "Nutmeg Valley" site. The quality of drinking water from these wells is not known.

2. Soil Pathway

Reports have been made of children actually playing in impoundment waste material. Children playing in areas of contaminated soil is a highly probable route of exposure to contaminants identified at this site. Tracking contaminated soils back into the household is another exposure route to consider and would expose other family members to the contaminated soil.

3. Air Pathway

No information has been developed to characterize the potential for the air pathway to be a plausible route of exposure. Since fumes from volatile organic compounds can concentrate in confined air spaces and people live or work in these confined air spaces, inhalation of the fumes of volatile organic compounds must be considered as a plausible route of exposure. Data must be developed to ensure that VOCs do not concentrate in the basements of area houses and industrial businesses and that VOCs are not being emitted into the air from industrial businesses that are using contaminated groundwater for industrial purposes.

Inhalation of volatile organic compounds during bathing and showering with contaminated groundwater and inhalation of fugitive dusts by children playing in contaminated dirt are two additional exposure pathways which must be considered at this site.

4. Foodchain Pathways

Exposure to contaminants on this site from local gardening activities is a potential route of exposure, however, data does not exist to identify that these activities are ongoing.

PUBLIC HEALTH IMPLICATIONS

As discussed in the Environmental Contamination and Other Hazards and Pathways Analyses sections, residents near the site whose wells have been contaminated and those employees working for companies still using water from contaminated wells, have been and may still be exposed to benzene, carbon tetrachloride, 1,2-dichloroethane, tetrachloroethylene and trichloroethylene via ingestion of drinking water, dermal contact with water, or inhalation of aerosols and vapors from waters used in the industrial or household environments. Exposure to the contaminants may also take place when residents or workers in the area disturb contaminated soil. Children reported to have access to sludge material from a hazardous waste impoundment may also have been exposed to high levels of copper, cyanide, iron, manganese, oil and grease, trichloroethylene, and zinc via dermal absorption of contaminated waste material, inhalation of contaminated soils, or ingestion of contaminated soils or contaminated sludge.

The most sensitive population to be considered at this site is the children. The elderly should also be considered at a higher risk. Smoking and excessive drinking of alcoholic beverages can contribute to the severity of adverse health effects mentioned in this assessment. Smokers and heavy drinkers constitute a third population at higher risk for adverse health effects from exposure to site contaminants.

A. Toxicological Implications

Data does not exist to: 1) accurately characterize the amount of exposure any one person might have been subjected to; 2) accurately characterize the length of time any one person might have been exposed; and, 3) conclude how often a person might have been exposed or to what contaminants a person might have been exposed. The following paragraphs explain the types of adverse health effects which may be possible as a result of exposure to contaminants at this site. It can not be concluded that all of the effects described in the following paragraphs are expected to occur as a result of being exposed to contaminants at this site.

Benzene:

Benzene is volatile and lipid-soluble and can be absorbed into the body following ingestion, inhalation, and dermal contact. Available data from both animal and human studies indicate that after absorption benzene must undergo metabolic transformation to exert its toxic effects. Metabolism of benzene occurs primarily in the liver; however, the enzymes necessary for metabolism are also present in the bone marrow, the putative organ of toxicity. The lymphoid system is another target organ of benzene toxicity. It has been demonstrated experimentally that the benzene

metabolites can produce hematotoxic effects and lymphoid suppression.

In humans, the hematotoxicity of benzene is characterized by pancytopenia (a decrease in various circulating blood cells), a condition that reflects hypoplasia of the bone marrow. Some individuals surviving bone marrow depression have developed myelogenous leukemia. Benzene may also induce immunosuppression or sensitization.

In addition to hematotoxicity and immunotoxicity, benzene can cause neurotoxic effects (drowsiness, dizziness, headache, vertigo, delirium, and loss of consciousness). Animal studies indicate that benzene is not teratogenic, but it has caused increased incidence of resorption, reduced fetal weight, skeletal variations, and altered fetal hematopoiesis. Benzene is genotoxic, causing structural and numeric chromosome aberrations, SCEs, and induction of micronuclei; however, it has rarely been shown to cause gene mutations. The carcinogenicity of benzene has been demonstrated in rats and mice. Epidemiological studies suggest that long-term low-level exposure to benzene is carcinogenic in humans. Based on such evidence, EPA and IARC have classified benzene as a human carcinogen (leukemogen).

Carbon Tetrachloride:

Carbon tetrachloride can enter the body through the lungs if you breathe air containing CCl_4 , or through the stomach if you swallow food or water containing CCl_4 . Liquid CCl_4 can also pass through the skin into the body. CCl_4 can leave the body by being breathed out through the lungs within a few hours. Some CCl_4 in the body temporarily enters into fat, and this CCl_4 is removed by the lungs more slowly.

Most information on the health effects of CCl_4 in humans comes from cases where people have been exposed only once or for a short period of time to relatively high levels of CCl_4 . Studies have not been performed on the effects of long-term exposure of humans to low levels of CCl_4 , so the effects of such exposures are not known.

The most immediate effects of CCl_4 toxicity are usually on the brain. Common effects are headache and dizziness, along with nausea and vomiting. These effects usually disappear within a day or two after exposure.

The liver is especially sensitive to CCl_4 . In mild cases, the liver becomes swollen and tender, and fat tends to build up inside the tissue. In severe cases, many cells may be killed, leading to decreases in liver function. The kidney is also sensitive to CCl_4 .

Fortunately, if injuries to the liver and kidney are not too severe, these effects disappear after exposure stops. This is because both organs can repair damaged cells and replace dead tissue, and function is usually nearly normal within a few days or weeks after exposure.

CCl_4 also causes effects on other tissues of the body, but these are not usually as important as the effects on the liver, kidney, and brain. Limited information from animal studies indicates that CCl_4 does not cause birth defects but might decrease the survival rate of newborn animals. However, this has not been thoroughly studied.

Studies in animals have shown that CCl_4 taken by mouth can increase the frequency of liver tumors. Studies have not been performed to determine if breathing CCl_4 causes tumors in animals, or whether swallowing or breathing CCl_4 causes tumors in humans, but it should be assumed that CCl_4 could have these effects.

A variety of conditions may predispose certain segments of the population to CCl_4 toxicity. Co-ingestion of alcohol, persons with alcoholic cirrhosis, or other liver diseases which have significantly diminished the functional reserve of the liver, have a reduced capacity to tolerate CCl_4 -induced hepatotoxicity. The same is true for CCl_4 -induced nephrotoxicity in people with significant renal dysfunction from other causes. Diabetics may also be particularly susceptible to CCl_4 poisoning.

Copper:

Copper is an essential metal for the human body. The daily requirement of copper has been estimated to be about 2 mg for adult humans. Accidental ingestion of large amounts of copper salts (15-75 mg copper) causes gastrointestinal disturbances. Systemic effects, especially hemolysis and liver and kidney damage, have also been reported after ingestion of large amounts of copper salts. There is no proof for a positive correlation between copper exposure and cancer. Allergic contact dermatitis caused by copper has been reported and has been treated successfully with a hydrocortisone ointment.

Cyanide:

Cyanides are readily absorbed following inhalation, oral, and dermal routes of exposure. Inhalation exposure to HCN provides the most rapid route of entry, resulting in the most rapid onset of toxic effects. Following absorption, cyanide is distributed throughout the body.

Cyanide exerts toxic effects by reacting with iron in cytochrome oxidase, the enzyme that catalyzes the terminal step in the electron transport chain, thereby preventing utilization of oxygen by cells. Cyanide also has inhibitory effects on Schiff base intermediates and can bind to other biomolecules. These reactions may contribute to cyanide toxicity.

Cyanide is detoxified by normal body functions and is excreted in urine or eliminated in expired air.

Signs of acute poisoning from cyanide include rapid breathing, gasping, tremors, convulsions, and death. The severity and rapidity of the onset of effects depends on route, dose, duration of exposure, and compound administered. Oral exposure to cyanide salts results in slower gastrointestinal absorption, passage to the liver, and faster detoxification.

Neurotoxicity may be the most sensitive target organ end point for cyanide, with cardiac/respiratory and thyrotoxic effects reported as well. Neurotoxicity has been observed in humans and animals following inhalation and ingestion of cyanide. Cardiac/respiratory effects have been found in animals following inhalation of HCN. Thyrotoxicity has been reported in humans and animals following inhalation and oral exposure to cyanides.

Exposure of pregnant rats to cyanide-containing diets has resulted in fetotoxicity. Little information was found that would indicate any significant reproductive, mutagenic, or carcinogenic effects of cyanide in humans.

1,2-Dichloroethane:

1,2-Dichloroethane can enter the body by breathing contaminated air or by drinking contaminated water. Studies in animals show that 1,2-dichloroethane can enter the body through the skin. 1,2-Dichloroethane can be a harmful chemical. It causes cancer when large doses are eaten by laboratory animals. If humans were to respond the same way as animals, humans who eat or drink high concentrations of 1,2-dichloroethane for a long time may develop cancer. Those people who have their skin exposed to high levels of 1,2-dichloroethane for a long time may develop benign tumors. Breathing in 1,2-dichloroethane may also possibly cause cancer. The likelihood of this happening increases with increasing exposure to 1,2-dichloroethane as well as other carcinogens, and depends on how susceptible an individual is to this chemical.

Both humans and animals have died from lung and heart failure after breathing, eating, or drinking large amounts of 1,2-dichloroethane. The lungs, liver, and kidneys are the organs

primarily affected in humans and animals exposed to 1,2-dichloroethane. Animals exposed to 1,2-dichloroethane are also not as able to fight infection, but no evidence of this has been reported in humans.

Iron:

Iron is an essential metal for the human body and takes part in oxygen transport and utilization. The daily recommendation for iron in humans is 10-18 mg. Adverse health effects are most often associated with iron deficiency. Long-term ingestion of excessive amounts of iron has caused hemochromatosis (deposition of hemosiderin in parenchymal cells), which eventually leads to cirrhosis of the liver.

Manganese:

Manganese is an essential element for the human body. Excessive exposure to manganese has been shown to cause toxic effects in animals and humans. Manganese is regarded as a metal with a relatively low toxicity. Acute poisoning by manganese in humans is rare. In assessing the health impact of manganese exposure, the effects on the lung and CNS should be considered critical. In humans, nearly all cases of chronic manganese poisoning have occurred after prolonged inhalation of large amounts of manganese oxides. Among all cases of chronic manganese poisoning, there was only one outbreak which was attributed to the intake of manganese dissolved in drinking water. People exposed have shown symptoms of lethargy, increased muscle tonus, and tremor. Mental disturbances were also seen. By retrospective extrapolation of data on manganese in water, the concentrations before the onset of disease were estimated to be 20-30 mg/liter.

Oil and Grease:

"Oil and Grease" is a somewhat generic term for identifying mixed petroleum hydrocarbons. The exact mixture of petroleum hydrocarbons varies. Petroleum distillates are fat solvents and alter the function of nerves to produce depression, coma, and sometimes convulsions. The principal manifestations of inhalation poisoning with these agents are pulmonary irritation and central nervous system depression. Chronic, long-term toxicity of petroleum hydrocarbons is dependent upon the nature of the individual constituents.

Tetrachloroethylene:

Tetrachloroethylene is readily absorbed following inhalation exposure. Absorption of tetrachloroethylene following ingestion is also rapid and nearly complete. Peak blood levels of tetrachloroethylene are reached within one hour following oral administration of the compound in both humans and animals. In

contrast to the extensive absorption of tetrachloroethylene following inhalation or oral exposure, absorption of the chemical following dermal exposure is poor.

The principal target organs of tetrachloroethylene toxicity are the CNS, liver, and kidneys. Interpretation of the available data is complicated by differences in species, exposure schedules, and end points, but the CNS and liver appear to be the most sensitive targets.

Some epidemiological studies suggest a possible association between chronic tetrachloroethylene exposure and increased cancer risk, but confounding factors (particularly exposure to other chemicals) and study limitations make the association inconclusive.

Various segments of the general population can be exposed to levels of tetrachloroethylene significantly above normal background concentrations. Significantly elevated indoor air levels of tetrachloroethylene can occur in homes that use water supplies containing the volatilized chemical. In one home, a running shower was found to elevate levels of tetrachloroethylene in bathroom air from 0.5 to 81 mg/m³ within 17 minutes; this level is nearly one-third the American Conference of Governmental Industrial Hygienists (ACGIH) time-weighted threshold limit value (TLV) for workplace air.

Trichloroethylene:

Unlike many of the contaminants listed in this public health assessment, there is extensive literature defining toxicologic endpoints of trichloroethylene exposure.

Absorption of trichloroethylene following inhalation exposure in humans is characterized by an initial rate of trichloroethylene uptake that is quite high. Retention of inhaled trichloroethylene is independent of inhaled concentration and has been measured at between 37% and 75% of the amount inhaled.

Absorption of trichloroethylene following oral exposure in both humans and animals is rapid and extensive. In animal studies, absorption from the gastrointestinal tract has been measured at 91% to 98%, and peak trichloroethylene blood levels are attained within a matter of hours. Dermal absorption of trichloroethylene in both humans and animals is poor, but dermal absorption studies are complicated by the fact that pure liquid trichloroethylene can act to defat the skin and thereby enhance its own absorption.

In humans, a relatively small amount of absorbed trichloroethylene is exhaled through the lungs, while most of the absorbed dose is metabolized and excreted in the urine. There is a long

biological half-life of elimination of trichloroethylene from the adipose tissue.

Inhalation and oral studies indicate that the bone marrow, CNS, liver, and kidney are principal targets of trichloroethylene in animals and humans. CNS effects are related primarily to narcosis. Effects on the liver and kidney include enlargement with hepatic biochemical or histological alterations. Less adequately characterized effects include indication of impaired heme biosynthesis and other hematological alterations in rats exposed by inhalation and immunosuppression in orally exposed mice. The use of trichloroethylene as an anesthetic agent has been associated with cardiac arrhythmias.

Inhalation studies with rats and mice indicate that trichloroethylene is a developmental toxicant. Fetotoxicity is expressed primarily as skeletal ossification anomalies and other effects consistent with delayed maturation. External hydrocephaly occurred in a small number of rabbits that were exposed to trichloroethylene by inhalation. The incidence of this anomaly was not significantly increased statistically, but occurrence of the anomaly is noteworthy because of its rarity. Oral studies with rats and mice showed no trichloroethylene-related effects on fertility or other indicators of reproductive performance.

The genotoxicity of trichloroethylene has been studied using a variety of assays in both in vivo and in vitro systems. The available data suggest that commercial-grade trichloroethylene is a weakly active mutagen in a number of test systems, including humans. Mutagenic responses generally occurred with metabolic activation only, suggesting the involvement of metabolites of trichloroethylene. The mutagenic potential of pure trichloroethylene is unclear; however, the limited information available suggests that trichloroethylene would be a weak mutagen.

Epidemiologic studies do not allow definite conclusions concerning the carcinogenic potential of trichloroethylene in humans due to mixed chemical exposures and other confounding factors and study limitations. Chronic inhalation exposure to trichloroethylene produced lung and liver tumors and leukemia in mice and Leydig cell tumors in rats. Chronic oral exposure to trichloroethylene produced increased incidence of hepatocellular carcinomas in mice and marginally significant increased incidence of renal adenocarcinomas in rats.

Significantly elevated indoor air levels of trichloroethylene can occur in homes that use water supplies contaminated with trichloroethylene as a result of volatilization. In two home (using well water containing a relatively high level of 40 ppm trichloroethylene), a running shower was found to elevate

trichloroethylene levels in bathroom air from 0.5 to 81 mg/m³ in 30 minutes.

Individuals who may be at greater risk from trichloroethylene exposure include those who consume alcohol and those treated with disulfiram. Because trichloroethylene is metabolized predominantly in the liver, individuals with liver dysfunction or compromised ability to metabolize trichloroethylene may also be at greater risk from trichloroethylene exposure.

The use of trichloroethylene as an anesthetic has been associated with cardiac arrhythmias, and high concentrations of the compound have been reported to sensitize the myocardium to circulatory catecholamines. These effects indicate that individuals with heart conditions may be at a greater risk from trichloroethylene exposure.

Zinc:

Health can be affected when too much zinc is taken into the body through food, water, or dietary supplements. The levels of zinc that produce health effects are usually much higher than the Recommended Dietary Allowances for zinc (RDAs) of 15 mg/day (men) and 12 mg/day (women). If large doses of zinc (10 or 15 times higher than the RDA) are taken by mouth even for a short time, stomach and digestion problems might occur. Too much zinc might also interfere with the body's immune system and with the body's ability to take in and use other essential minerals such as copper and iron.

No studies were located regarding adverse systemic effects in humans or animals following dermal exposure to zinc and its compounds. However, zinc has been reported to promote the healing of burns and wounds when topically applied as zinc oxide or calamine lotion. Very little is known about the long-term effects of breathing zinc dust or fumes. We do not know whether or not zinc causes cancer or birth defects.

Effects in humans and animals following acute inhalation exposure to zinc compounds are primarily limited to the respiratory tract. Oral exposure to zinc and its compounds in humans and animals primarily affects the gastrointestinal system. Zinc also affects the hematological and renal systems in both humans and animals following acute, intermediate or chronic exposures. Hepatic effects were observed in animal after acute oral exposure. No adverse hepatic effects were observed in humans after intermediate exposure.

Intermediate duration of oral administration of zinc to humans has resulted in decreased serum HDL-cholesterol levels. Although this is not a direct effect on the cardiovascular system, the

decrease in HDL levels may be associated with an increased risk of coronary artery disease.

The ingestion of small amounts of zinc is essential to maintain one's health. However, evidence shows that high level ingestion of zinc presents a potential for gastrointestinal disorders. Following acute, intermediate or chronic ingestion of zinc, the primary effect in humans or animals is gastrointestinal irritation. No adverse gastrointestinal effects were observed after inhalation exposure.

B. Health Outcome Data Evaluation

Guided by scientific data which suggests cancer as an adverse health effect from overexposure to contaminants within the "Nutmeg Valley" site, an evaluation into a possible increase in cancer occurrence was conducted in cooperation with the State of Connecticut Tumor Registry.

It must be noted that the evaluation of cancer occurrence within "Nutmeg Valley" was conducted on the basis of resident status and did not consider the health outcome data of the majority of the population of "Nutmeg Valley", the local work force. It must also be noted that the numbers seen in the review of cancer data were very small. These numbers were often 0 or 1. Statistical analyses of numbers this low do not produce information of reliable value.

Data were gathered to compare the incidence of cancer in the town of Wolcott and the incidence of cancer in census tracts 3511 and 3526 of Waterbury (the two tracts directly south and down gradient from the site), to the incidence of cancer in the State of Connecticut. Data were collected for the categories of; all cancers, testicular, liver, kidney, leukemia, and lung cancer. Data were collected for the period of 1984-1988. Data for this cancer evaluation are presented in the following table.

TABLE 7
Incidence Rates and Standard Incidence Ratios
(per 10,000 people during 1984-1988)

<u>Site</u>	<u>Inc. Rate</u>	<u>95% Confidence</u>	<u>SIR</u>	<u>95% Confidence</u>
All Cancers				
State	228.48	226.80 - 230.16	1.0	-
Tracts	ND	ND	ND	ND
Wolcott	184.50**	162.58 - 209.38	0.808**	0.71 - 0.91
Testes				
State	1.37	1.25 - 1.51	1.0	-
Tracts	2.84	0.71 - 11.35	2.072	-0.80 - 4.94
Wolcott	1.54	0.38 - 6.15	1.12	-0.43 - 2.68
Liver				
State	1.70	1.56 - 1.85	1.0	-
Tracts	2.84	0.71 - 11.35	1.67	-0.64 - 3.98
Wolcott	0.77	0.11 - 5.46	0.45	-0.43 - 1.34
Kidney				
State	5.39	5.14 - 5.66	1.0	-
Tracts	11.36*	5.68 - 22.71	2.11	0.65 - 3.57
Wolcott	2.31	0.74 - 7.15	0.43	-0.06 - 0.91
Leukemia				
State	5.30	5.05 - 5.56	1.0	-
Tracts	5.68	2.13 - 15.13	1.07	0.02 - 2.12
Wolcott	4.61	2.07 - 10.27	0.87	0.17 - 1.57
Lung				
State	35.82	35.16 - 36.49	1.0	-
Tracts	68.15*	51.36 - 90.44	1.90*	1.36 - 2.44
Wolcott	33.83	25.17 - 45.45	0.94	0.67 - 1.22

* = Statistically Significantly High

** = Statistically Significantly Low

ND = No Data Available

From the table it appears that the Standard Incidence Ratios for testicular, liver, kidney, and lung cancer are higher in the Waterbury census tracts, as compared with State data, than what would be expected. With the exception of lung cancer, the numbers are not large enough to be of statistical significance. The increase in the incidence rates for both lung and kidney cancer in these tracts are of statistical significance.

Cancer is not one disease but many. Several types of cancer are very common and quite difficult to link to environmental causes. The fact that personal life style is a primary contributor to lung cancer makes lung cancer a difficult tumor type to contribute to environmental exposure. Kidney cancer, on the other hand, is not as common and is not as prone to conditions of personal life style. The higher rate of kidney cancer at this site is noteworthy. To follow the issue further, the three kidney cancer cases in Wolcott and the eight kidney cancer cases in the Waterbury census tracts, were plotted on a map. Seven of the eight kidney cancer cases were located in Waterbury

census tract 3511. A reevaluation of the data to include an independent analysis and an age adjusted analysis of Waterbury census tract 3511, strengthens the hypothesis of an elevated cancer rate within this population. Exactly why there seems to be more cases of kidney cancer in this geographic area is not known. Limited data are available to scientifically support or reject the conclusion that these cases are directly related to the groundwater contamination problem within "Nutmeg Valley." Topologically and hydrogeologically, it appears inconsistent that these cases would be directly related to the groundwater contamination problem. Other risk factors to be considered with an increase in kidney cancer include; chronic analgesic abuse, immunosuppression from organ transplantation, parasitic infestations, food mycotoxins, and the Hepatitis B virus.

Evaluation of kidney cancer data for a period of five years is insufficient to support a definitive conclusion to the analyses of available data. Evaluation of the eight kidney cancer cases in a population the size of census tract 3511 will also not support a definitive conclusion to the analyses of available data. The Connecticut Department of Health Services will continue to collect relevant data from all available sources to provide for an understanding and possible explanation for the observed increase in kidney cancer cases during the five year period of data collection for the Waterbury census tract 3511.

Records concerning the health status and health concerns of people exposed to contaminants in "Nutmeg Valley" were nonexistent. A survey was mailed directly to the population for the purpose of obtaining additional information. The response from this survey was low (21.5%). Aside from one account of skin sensitization, no other health related concerns were expressed.

CONCLUSIONS

From the information reviewed, this site is considered by ATSDR and CT DHS to be a Public Health Hazard. There is evidence that exposures have occurred, are occurring, or are likely to occur in the future at concentrations in the environment that, upon long-term exposure can cause adverse health effects to the receptor population and these concentrations exceed Minimal Risk Levels established in the ATSDR Toxicological Profiles or Connecticut State "Action Levels". Exposure to the chemicals listed in the Environmental Contamination and Other Hazards section may be occurring and has occurred in the past via ingestion of contaminated groundwater, inhalation of vapors and aerosols formed by industrial or domestic uses of contaminated groundwater, dermal absorption of contaminated groundwater by hygienic or recreational uses, ingestion and inhalation of contaminated soil particulates, and dermal absorption from contact with contaminated soils and sludges. The current use of private wells for domestic or industrial activities makes

contamination of groundwater a potential health concern for residents with access to either aquifer at this site and employees of the site whose companies still use water from private wells.

Surface waters in Tannery Brook and Mad River, primarily surface water sediments, have not been characterized with respect to their potential for and extent of contamination. Complaint reports filed at the CT DEP indicate that these waters have been severely impacted, to the point of complete discolorization, from alleged dumping of waste impoundment materials. The impact from that contamination and the continued migration of contaminants in other site related soil and groundwater areas, toward surface water areas, suggests that information to substantiate the quality of surface water and surface water sediments needs to be developed. Children have access to these surface waters. It is necessary to ensure that these children are not playing in contaminated surface water sediments.

Aerial photographs have identified historical surface impoundments and stained surface soils within the site. The effects of periodic flooding on the migration patterns of site contaminants are not known. Information is insufficient to determine the extent and impact of soil contamination within this site. Historical analyses of known contamination scenarios have shown appreciable migration of contaminants in the vicinity of the site and in some cases, complete migration of contaminants from the source area. This information suggests that data on the extent of subsurface contamination still existing as a potential source of groundwater contamination needs to be developed for this site.

Studies mentioned in the Off-Site Contamination Subsection of this Health Assessment show that additional sources of contamination in geographic areas around "Nutmeg Valley" have contributed to groundwater contamination in the commercialized and industrialized areas of Wolcott. It would be advantageous to consider remedial strategies which take into consideration the need to supply clean water to all town residents about the Route 69 corridor where groundwater has been documented, and not just to those directly affected by contamination at the "Nutmeg Valley" site.

Installation of the public water system extended into "Nutmeg Valley" is not, as it presently exists, sufficient to prevent human exposure from contaminated groundwater in that 1) the system is not accessible to all residents of "Nutmeg Valley," 2) access to the public water supply is less than 14 percent of property owners or tenants of "Nutmeg Valley" and 3) property owners or tenants who have been connected to public water are still using their contaminated wells for "industrial purposes".

A large portion of the population within "Nutmeg Valley" consists of those employees who work within "Nutmeg Valley." Health outcome data gathered on residents from within this site may not represent the local work force. Data on the working population was not available and as such, the assessment of adverse health effects, health outcome data, and community concerns at this site is not complete.

Restriction from the many properties which pose both physical and chemical hazards is not adequate to prevent access to these hazards by the local community.

Information from a survey mailed to local residents indicates that a large percentage of the population of "Nutmeg Valley" is unaware of the chemical and health related issues associated with this NPL Superfund site and as such, it can be concluded that an Outreach Program and Communication Package, designed to educate the population about their risks and responsibilities, would be an important tool in protecting human health within the "Nutmeg Valley" site.

Data gaps from within this site include, but are not limited to, background information on all businesses (past and present), characterization of contamination (types, locations, migration patterns, degradation, etc.,) in soils, aquifers, private wells, surface waters, surface water sediments, health outcome data and health concerns of the work force, data defining Mad River as a hydrogeologic barrier to contaminant migration, data defining the quality of groundwater in the bedrock aquifer south and down gradient of the site, identification of historical waste impoundments, and follow-up data on the use of contaminated wells.

The complexity of industrial activities within this site, the required time to collect appropriate data necessary to characterized the status of contamination within this site, the cost of addressing recommendations made in this public health assessment, the limited funds available for addressing the recommendations made in this public health assessment, and the litigation time necessary to identify those people financially responsible for cleaning up the contamination within this site support the conclusion that it will be some time before this site can be fully attended to. It is important to increase public awareness to the potential health risks from within this site so that intelligent and informed decisions can be made by the residents and workers within this site to protect their health as clean-up activities progress.

RECOMMENDATIONS

1. All residents within "Nutmeg Valley" should have a water analysis completed to identify the present quality of

groundwater used for domestic purposes. This analysis should contain parameters outlined in EPA's Hazardous Substance List or Target Compound List, whichever is more appropriate.

2. Residents with wells contaminated above the levels of health concern should be provided with alternate water supplies.
3. Private wells of residents living within the site should be placed on a routine monitoring program to ensure groundwater quality. Monitoring should occur whether the wells have exhibited contamination in the past or not.
4. Physical barriers or effective warning restrictions should be in place to prevent local residents and casual passers-by from gaining access to the chemical and physical hazards of properties included within "Nutmeg Valley."
5. An investigation into the industrial uses of groundwater from contaminated wells of businesses located within "Nutmeg Valley" should be conducted to ensure that improper use of these contaminated wells does not pose an additional risk to human health.
6. Sampling of Tannery Brook, Mad River and their respective tributaries should be performed to determine both the extent of surface water and surface water sediment contamination for contaminants identified in EPA's Hazardous Substance or Target Compound list.
7. Sampling of soil and groundwater should be performed at strategic points (locations and depths) about the site and around the site perimeter to assess the extent and migration patterns of contamination for contaminants identified in EPA's Hazardous Substance or Target Compound list.
8. Information should be obtained to identify the dates of implementation of the Waterbury public water supply to residents down the hydrogeologic gradient from "Nutmeg Valley".
9. A focus should be directed toward the long term problem of groundwater contamination in the Route 69 corridor. Reliance on groundwater as a drinking water supply is predominant throughout the town. Sources of groundwater contamination exist both on and off the "Nutmeg Valley" site. A Groundwater Protection Program and a Public Water Supply Initiative need to be considered for the Route 69 corridor and not just for those affected by the "Nutmeg Valley" site.

10. Residents, employees, and property owners of "Nutmeg Valley" need to be made aware of the activities, potential risk factors, exposure minimization techniques and support resources associated with "Nutmeg Valley" as a NPL site. It is necessary to develop a communication package for these people to raise consciousness, offer assistance, address public health concerns, and gain public support and public trust of those people that may be at risk from exposure to contaminants in the "Nutmeg Valley" area.
11. To characterize the impact this site may present to the integrity of human health, the health status and health concerns of people who work in "Nutmeg Valley" need to be assessed. Extending a communication package to the local work force would alert people to the potential risks posed by contamination within this site, offer assistance to those who have health concerns, and prevent additional exposures.

Health Activities Recommendation Panel (HARP) Recommendation

The data and information in the public health assessment for the Nutmeg Valley Road site, Wolcott, Connecticut, has been evaluated by ATSDR's HARP for appropriate follow-up with respect to health activities. The Panel recommended that follow-up health activities would be appropriate. Specifically, after further evaluation a decision will be made as to the need for a disease and symptom prevalence study. Also, it would be appropriate to evaluate the individual cases of kidney cancer for possible occupational exposure and pathological classification. Furthermore, an environmental professional health education program is also recommended to advise the public health professional and the local medical community of the nature and possible consequences of exposure to contaminants at the site.

PUBLIC HEALTH ACTION PLAN

Based on community concerns and the HARP recommendation, ATSDR has developed the following Public Health Action Plan. This Plan lists those actions planned or to be undertaken by specific government agencies as a result of the recommendations of this public health assessment.

Public Health Actions Taken

The CT DEP has provided alternate water to those residences whose drinking water contained contaminants at levels of public health concern.

Public Health Actions Planned

ATSDR, in cooperation with the CT DHS, will take the following actions:

1. Conduct an environmental health educational program to educate local health professionals and local citizens about the potential risks found at the Nutmeg Valley NPL site. Part of this program is designed to advise the public health professional and the local medical community of the nature and possible consequences of exposure to contaminants at the Nutmeg Valley site. The value of obtaining a complete and accurate exposure history will be stressed as part of this program. In addition, information that is provided on the contaminants of concern may include, but not limited to, the physical nature of the contaminant, potential exposure pathways (i.e., soil, water, air, and food) and the exposure routes (i.e., inhalation, ingestion, and dermal contact), potential health effects, symptoms of exposure and testing and treatment, if known. This program will be conducted by CT DHS in conjunction with ATSDR's Division of Health Education and the local medical community.
2. Evaluate the need for a symptom disease prevalence study and for further investigation of individual kidney cancer cases.

The local health department (Chesprocott Health District) will conduct a survey of local well water use in and near the Nutmeg Valley site and will sample those private wells that have not been previously tested.

The U.S. EPA will limit access to sites with highly contaminated soil (i.e., lagoons) or remove that soil within a short timeframe.

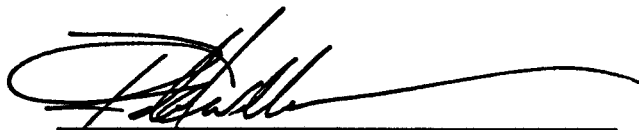
CERTIFICATION

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



Technical Project Officer, SPS, RPB, DHAC

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



Division Director, DHAC, ATSDR

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REFERENCES

Agency for Toxic Substances and Disease Registry, Toxicologic Profile for Benzene, Atlanta, GA, United States Public Health Service 1989 PB/89/209464/AS.

Agency for Toxic Substances and Disease Registry, Toxicologic Profile for Carbon Tetrachloride, Atlanta, GA, United States Public Health Service 1989 PB/90/168196/AS.

Agency for Toxic Substances and Disease Registry, Toxicologic Profile for Cyanide, Atlanta, GA, United States Public Health Service 1990 PB/90/162058/AS.

Agency for Toxic Substances and Disease Registry, Toxicologic Profile for 1,2-Dichloroethane, Atlanta, GA, United States Public Health Service 1990 PB/90/171422/AS.

Agency for Toxic Substances and Disease Registry, Toxicologic Profile for Tetrachloroethylene, Atlanta, GA, United States Public Health Service 1990.

Agency for Toxic Substances and Disease Registry, Toxicologic Profile for Trichloroethylene, Atlanta, GA, United States Public Health Service 1990 PB/90/127523/AS.

Department of Environmental Protection, Automotive Service: Operation Inspection Form: King's Autobody, Hartford, CT. Department of Environmental Protection, Debriefing Memo: Care Manufacturing Co., Hartford, CT, 1989.

Department of Environmental Protection, Debriefing Memo: Maaco-Dream AutoColor, Hartford, CT, 1990.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Delson Hinge Corp., Hartford, CT, 1977.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Edson Manufacturing Co. Inc., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Electrotherm Wire Company, Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Joma Inc., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Line Manufacturing, Inc., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Maily Manufacturing Co., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Mark Eyelet and Stamping, Inc., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Maur Mel Automatics, Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Metalmold, Inc., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Nutmeg Screw Machine Products, Corp., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Raypax Manufacturing Company, Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Secondaries, Inc., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: The National Die Co., Inc., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Materials Management Unit Inspection Report: Waterbury Heat Treating, Inc., Hartford, CT, 1980.

Department of Environmental Protection, Hazardous Waste Inspection Checklist: Brave Equipment Co., Hartford, CT, 1986.

Department of Environmental Protection, Hazardous Waste Inspection Checklist: Dover Manufacturing Corp., Hartford, CT, 1986.

Department of Environmental Protection, Hazardous Waste Inspection Checklist: Dream Auto Colors, DBA Maaco Auto, Hartford, CT, 1986.

Department of Environmental Protection, Hazardous Waste
Inspection Checklist: Dream Auto Color, DBA Maaco Auto and
Paint, Hartford, CT, 1987.

Department of Environmental Protection, Hazardous Waste
Inspection Checklist: Electropower Inc., Hartford, CT, 1984.

Department of Environmental Protection, Hazardous Waste
Inspection Checklist: Joma Inc., Hartford, CT, 1983.

Department of Environmental Protection, Hazardous Waste
Inspection Checklist: P.F. Industries, Inc., Hartford, CT, 1988.

Department of Environmental Protection, Hazardous Waste
Inspection Checklist: Richards Metal Products, Inc., Hartford,
CT 1987.

Department of Environmental Protection, Industrial Survey: Care
Manufacturing Co., Hartford, CT, 1987.

Department of Environmental Protection, Preliminary Assessment
Report: P.F. Industries, Hartford, CT, 1989.

DeNicola L., Chesprocott Health District Water Supply Study,
Cheshire, CT: Chesprocott Health District, 1985.

Environmental Monitoring Systems Laboratory, Site Analysis,
Nutmeg Valley, Wolcott, Connecticut, Las Vegas, NY, United States
Environmental Protection Agency 1988 TS-PIC-88056.

Environmental Protection Agency, Region 1, Preliminary
Assessment: Alpine Electronic Company, Boston, MA:
Environmental Protection Agency, 1980.

Environmental Protection Agency, Region 1, Preliminary
Assessment: Dover Manufacturing Corp., Boston, MA, Environmental
Protection Agency, 1985.

Environmental Protection Agency - Region 1, Preliminary
Assessment: Dover Manufacturing Corp., Boston, MA, Environmental
Protection Agency, 1986.

Environmental Protection Agency Region 1, Preliminary Assessment:
Line Manufacturing, Inc., Boston, MA, Environmental Protection
Agency, 1984.

Environmental Protection Agency, Region 1, Preliminary Assessment
Maily Manufacturing Company, Boston, MA, Environmental
Protection Agency, 1984.

Environmental Protection Agency Region 1, Preliminary Assessment: Maur-Mel Automatics, Boston, MA, Environmental Protection Agency, 1984.

Environmental Protection Agency, Region 1, Preliminary Assessment: Nutmeg Screw Machine Products, Boston, MA, Environmental Protection Agency, 1984.

Environmental Protection Agency Region 1, Hazard Ranking System: Nutmeg Screw Machine Products Co., Boston, MA, Environmental Protection Agency, 1985.

Environmental Protection Agency, Region 1, Preliminary Assessment: Richards Metals, Inc., Boston, MA, Environmental Protection Agency, 1984.

Federal Register, National Primary Drinking Water Regulations; Synthetic Organic Chemicals, Inorganic Chemicals and Microorganisms; Proposed Rule, November 13, 1985 Environmental Protection Agency 40CFR Part 141.

Federal Register, National Primary Drinking Water Regulations; Volatile Synthetic Organic Chemicals; Final Rule and Proposed Rule, November 13, 1985 Environmental Protection Agency 40CFR Parts 141 & 142.

Goodkind and O'dea, Inc., Engineering Report on Studies of Contaminated Wells and Supply of Potable Water for the Southerly Industrial Area Along Route 69 in the Town of Wolcott, Connecticut, 1986.

Harrison, E.Z., Hartford, CT: State of Connecticut Department of Environmental Protection, 1981.

HRP Associates, Inc., First Year Annual Report on Groundwater Monitoring for Par Finishing Company, New Britain, CT 1985 HRP #88-88-16.

HRP Associates, Inc., First Year Annual Ground Water Monitoring Report: Waterbury Heat Treating, Inc., New Britain, CT 1988, HRP #WC-WHT-0.

HRP Associates, Inc., Fourth Year Annual Ground Water Monitoring Report: Former Par Finishing Co., New Britain, CT 1988, HRP #GW-PAR-2.

HRP Associates, Inc., Scope of Study: Joma, Inc., Proposed Remedial Actions, New Britain, CT, 1987.

HRP Associates, Inc., Scope of Study for Waterbury Heat Treating, Inc., New Britain, CT 1986, HRP #WC-WHT-0.

HRP Associates Inc., Soil Contamination Investigation Report and Recommendations: Electro Power, Inc., New Britain, CT, 1984, HRP #84-121-10.

ICAIR Life Systems, Inc., Summary of State and Federal Drinking Water Standards and Guidelines, Cleveland, OH, Chemical Communication Subcommittee Federal-State Toxicology and Regulatory Alliance Committee (FSTRAC) 1990.

NUS Corporation, Final Inspection Report, Line Manufacturing, Inc., New Bedford, MA, 1986, TDD #F1-8506-15.

NUS Corporation, Final Preliminary Assessment: Electro Power, Inc., Bedford, MA, 1988, TDD #F1-8801-32.

NUS Corporation, Nutmeg Screw Machine Products Company Final Site Inspection Report, New Bedford, MA, 1985, TDD # F1-8503-02.

NUS Corporation, Superfund Division, HRS Document Package for Nutmeg Valley Road, Wolcott, Connecticut, Evaluation of Nutmeg Screw Machine Products Company, New Bedford, MA Region 1 United States Environmental Protection Agency, Site Response Section 1986 TDD # F1-8503-02.

Office of Health Assessment, Preliminary Health Assessment for Nutmeg Valley, Agency for Toxic Substances and Disease Registry, 1988.

United States Geological Survey, Bedrock Geology of the Southington, Connecticut Quadrangle, Denver, Co, United States Department of the Interior, Geological Survey, 1963.

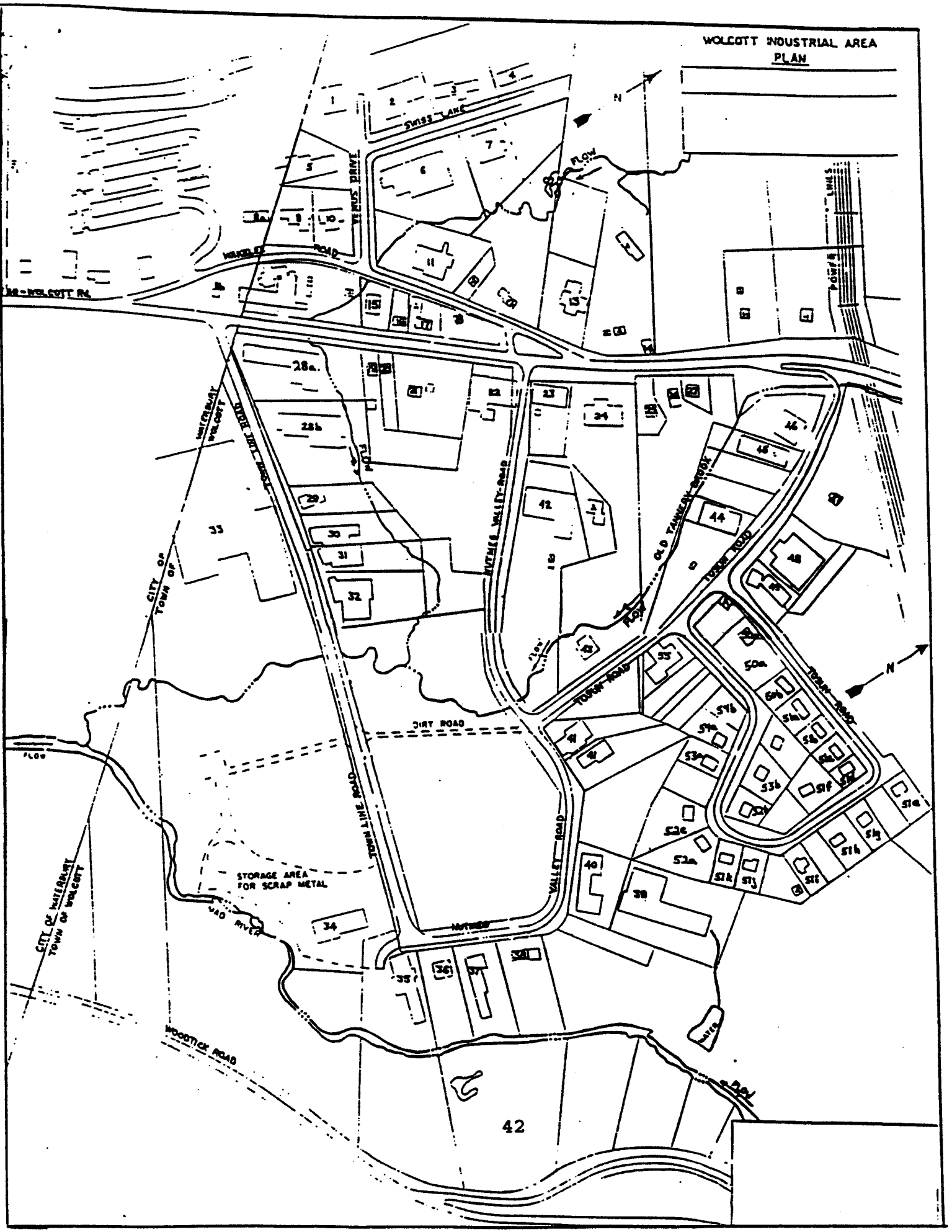
United States Geological Survey, Southington, Connecticut and Waterbury, Connecticut Quadrangles, 7.5 Minute Series (topographic), United States Department of the Interior, Geological Survey, 1968 Photorevised 1984.

United States Geological Survey, Surficial Geology of the Southington, Connecticut Quadrangle, Denver, CO, United States Department of the Interior, Geological Survey 1961.

United States Geological Survey, Water Resource Inventory of Connecticut, Part 5, Lower Housatonic River Basin, Denver CO, United States Department of the Interior, Geological Survey, 1974.

APPENDIX A

WOLCOTT INDUSTRIAL AREA
PLAN



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The following information is a brief summary of each of these "Nutmeg Valley" properties. These properties are identified on the map included in Appendix A.

Property 1

Secondaries, Inc., a small manufacturing facility, has been producing flanges and hinges since 1962. A 1980 inspection report conducted by CT DEP found that although petroleum naphtha was identified as a waste product in the processes of machining and degreasing, there was no evidence of on-site disposal. This site presently uses water from a private well.

Property 2

P.F. Industries, Inc., a small and now inactive machine shop once known to cut and thread steel, brass, and aluminum bar stock into parts, began its business in 1984. Wastes generated in the processes of degreasing and cleaning included methylene chloride and kerosene/oil mixtures. A Preliminary Assessment was conducted in 1989 by the CT DEP under Connecticut's Multi-Site Cooperative Agreement (MSCA) with EPA. Although there was no evidence nor indication that this site contributed to groundwater contamination, location within the "Nutmeg Valley" study area suggests a more thorough investigation is needed. A medium priority Site Investigation was suggested by CT DEP to assess P.F. Industries' relationship with the NPL site. Also included at this property is the Raypax Manufacturing Company, a small manufacturing facility, which has been producing screw machine parts since 1960. A 1980 inspection report conducted by the CT DEP identified the wastes generated during processing as mineral spirits, oils, and tumbling waste (metal chips & dust). Although no evidence of on-site disposal was found, approximately seven years of historical solvent disposal has been recorded. This site presently utilizes water from a private well.

Property 3

Marson Fastener Corporation - No data available. The property uses water from a private well.

Property 4

Roann Electronics, Inc. - No Data. This site presently utilizes water from a private well.

Property 5

Electro Power, Inc., a small sales and service facility, has been dealing with AC/DC electrical motors and industrial motor drives since 1970. A 1988 Preliminary Assessment was conducted by NUS

Corporation under Technical Directive Document (TDD) F1-8801-32 of the Environmental Protection Agency (EPA). Wastes identified at Electro Power included grease-sludge and oil. A 15' x 30' area of ground heavily stained by leakage from a hole in the in the wall of a degreaser tank, as well as unlabeled leaking drums, were observed during this assessment. PCB's (200 ppm) were detected in soil that has since been removed. Due to known soil contamination caused by on-site waste disposal, NUS/FIT recommended that a high priority screening Site Inspection be conducted in order to further assess the site. This property presently utilizes water from a private well.

Property 6

Infodex is the current facility located on property previously occupied by Venus Consolidated, Inc., and as such, EPA's hazardous waste generator's installation ID number has changed from CTD047550611 (Venus) to CTDO01166222 (Infodex). No information can be found on file for Infodex. Partial information on Venus Consolidated Inc. reveals an Environmental Site Evaluation was conducted by HRP Associates relative to the Super Lien Regulations covered in substituent House Bill 7764 of the Connecticut General Statutes. Levels of trichloroethylene (71 ppb and 90 ppb) were detected in groundwater and soil, respectively. Tetrachloroethylene (7.2 ppb) was also detected in groundwater. Although this property has been connected to a public water supply, water from the private well may still be used for processing.

Property 7

Richard's Metal Products, Inc., a small manufacturing and job shop, has been producing drawn metal shells since 1965. An EPA Preliminary Assessment conducted in 1984 identified several barrels of oil-soaked rags in drums disposed of on company property. Priority for Site Inspection was considered low as oil soaked rags would not pose much threat of contamination. In 1987 a hazardous waste inspection was conducted by CT DEP, identifying six full drums of waste oil near open ground. One drum had oil overflowing to the ground. Photos were taken of waste oils and stained ground, as well as drums, woods, metals, tires, and household junk being buried east of the company in a wetland area. The CT DEP - Solid Waste Unit and the Wetland Commission were notified. Current status is undefined. This property presently utilizes water from a private well.

Property 8a

Bedard Tool Company - No Data. This property presently utilizes water from a private well.

Property 8b

There is confusion as to the history of this property. Although a sign on the building identifies this property as Bill and Sam's Restaurant/Snack bar, other information shows that Bill and Sam's Restaurant is located up the street. This property is a roadside luncheonette which services local business employees on a seasonal basis. In 1982, extremely high levels of benzene, dichloroethylene, methyl ethyl ketone, tetrachloroethylene, and trichloroethylene were detected in tap water at "Bill and Sam's". In 1984, high levels of tetrachloroethylene and trichloroethylene were still detectable. A new well was drilled in 1986 to supply the restaurant with cleaner water. Bill and Sam's, previously located at 713 Wolcott Road, is now located at 720 Wolcott Road. It is not known what, if any, sampling was conducted at the property identified on this site. This property presently utilizes water from a private well.

Property 9

Maily Manufacturing Company, a small manufacturing facility, has been producing screw machine products since 1945. A 1980 inspection by CT DEP identified wastes generated as solvents and waste oil (with scrap metals). "Speedi-Dri" used to clean up oil was routinely deposited in a pile outside the building. Approximately 4-5 years worth of contaminated material was leaching into soil. An EPA Preliminary Assessment conducted in 1984 identified historical dumping of carbon tetrachloride from 1945 to approximately 1970. Proper disposal of waste material has since been implemented. Although this property has been connected to a public water supply, water from the private well may still be used for processing.

Property 10

R.J. Dollinger Electric - No Data. This property presently utilizes water from a private well.

Property 11

Barrett Tool Company - No Data. This property presently utilizes water from a private well.

Property 12

Property 12 is a private residence on Wakelee Road. As seen in Appendix A, this residence is down gradient from, properties 2, 3, 4, 6, and 7. Groundwater samples obtained from this property in 1985 did not detect levels of volatile organic compounds, although areas surrounding this property have been shown to be contaminated. This property utilizes water from a private well.

Property 13

The Talk of the Town Restaurant is located directly east of properties 2, 3, 4, 6 and 7 and within the site identified as "Nutmeg Valley." Groundwater samples obtained in 1985 did not detect levels of volatile organic compounds. This property utilizes water from a private well.

Property 14

This property is a private residence located on Wolcott Road (Rt 69). This property utilizes water from a private well.

Property 15

Discount Storage - No Data

Property 16

This property is a private residence located on Wolcott Road. This property utilizes water from a private well.

Property 17

This property is a private residence located on Wolcott Road. This property utilizes water from a private well.

Property 18

Getty Gas Station - No Data. This property presently utilizes water from a private well.

Property 19

Property 19 is a residence which sits in the center of "Nutmeg Valley." Groundwater sampling of this property in 1981 and 1985 documented levels of trichloroethylene contamination at 15 and 6.5 ppb, respectively. In 1985, these levels were considered below action levels. No additional action was taken. This property utilizes water from a private well.

Property 20

Property 20 is a residence which sits in the center of "Nutmeg Valley." Groundwater sampling of this property in 1985 documented levels of trichloroethylene contamination at 7.8 ppb. In 1985, this level was considered below action levels. No additional action was taken. This property utilizes water from a private well.

Property 21

Property 21 is mixed; residential and office space. Groundwater sampling in 1985 did not identify detectable amounts of volatile

organic compounds. This property utilizes water from a private well.

Property 22

The National Die Company, Inc., a small manufacturing facility, has been producing drawn metal shells, carbide tools and dies since 1945. Wastes generated during the processes of machining, degreasing and washing include oils, trichloroethylene and kerosene. Although a 1980 Inspection Report conducted by CT DEP did not identify evidence of on-site disposal of waste materials, oils and solvents were historically discharged to the ground for a period of 15 years or more. Although this property has been connected to a public water supply, water from the private well may still be used in processing.

Property 23

Waterbury Heat Treating, Inc., previously occupied this property, which is presently offered for rent. Waterbury Heat Treating, a small job shop, had been specializing in heat treating since 1958. A 1980 Inspection Report conducted by CT DEP identified wastes generated during processes as quenching oils and cyanide. Historical dumping of spent quenching oils and cyanide existed for approximately 20 years. Vegetation over these leach fields was observed as dead'. Removal of approximately 350 cubic yards of contaminated soil (1986-1987) minimized the degree of groundwater contamination from the contaminated soil area. Although this property has been connected to a public water supply, water from the private well may still be used for processing.

Property 24

A & E Auto Services is a small quantity waste generator identified by EPA Installation ID #CTD097216154. A & E Auto Services has secured this property with fencing. No other files have been found for A & E Auto Services. This company utilizes water from a private well.

Property 25

This property is a private residence located on Wolcott Road. This property utilizes water from a private well.

Property 26

This property is a private residence located on Wolcott Road. This property utilizes water from a private well.

Property 27

This property is a private residence located on Wolcott Road. This property utilizes water from a private well.

Property 28a

Perfection Screw - No Data. This property presently utilizes water from a private well.

Property 28b

Line Manufacturing, Inc., a small manufacturer, has been producing eyelets and drawn metal shells since 1956. An Inspection Report conducted in 1961 by CT DEP indicated that 197 gal/day of detergent, water and oil were routinely discharged into the ground via a dry well. This practice was discontinued in the mid 1970's. A 1966 report states that 166 gal/day of caustic and oil were routinely discharged into a nearby stream. A 1980 Inspection Report identified mineral spirits, waste oils, caustics, tumbling wastes, and oil coated scrap metal as wastes generated by these manufacturing processes. In 1986, under Technical Directive Document (TDD) FI 8506-15, the NUS Field Investigation Team was contracted to perform a Site Inspection. Trace amounts of trichloroethylene were detected in groundwater, surface water and sediment samples. It was concluded in this report that contaminants historically dumped on-site may have migrated off-site or migrated downward through the permeable overburden to the groundwater table. Although this property has been connected to a public water supply, water from the private well may still be used for processing.

Property 29

This property was previously occupied by Nonine. The building has since been abandoned. Groundwater samples collected in 1985 showed contamination by methylene chloride (2.5 ppb), carbon tetrachloride (1.8 ppb) and trichloroethylene (31.6 ppb). Although this property has been connected to a public water supply, water from the private well may still be used for processing.

Property 30

K.I.P. Transformers, Inc., was inspected in 1980 by CT DEP. No evidence of waste materials was identified. Although this property has been connected to a public water supply, water from the private well may still be used for processing.

Property 31

P.A.R. Precision, Inc. - No Data. Although this property has been connected to a public water supply, water from the private well may still be used for processing.

Property 32

Joma, Inc., a small manufacturing facility, has been producing metal stamped parts since 1954. This company is a permitted hazardous waste generator (EPA ID CTD001166032) with one hazardous waste barrel storage area and one hazardous waste underground storage tank. Wastes generated are identified as 1,1,1-trichloroethane, deburring sludge, (alkaline, water and oil) and petroleum naphtha. Evidence of improper disposal practices have not been identified at this site. Although this property has been connected to a public water supply, water from the private well my still be used for processing.

Property 33a

Highland Manufacturing - No Data. This property is connected to a public water supply.

Property 33b

Wolcott Town Line Commons - This property contains an industrial condominium for small businesses. Though several businesses have been supplied with public water, this property still utilizes water from a private well.

Property 34

Mattatuck Scrap Metal - No Data. This property presently utilizes water from a private well.

Property 35

Auto Dynamics and Oil Plus presently occupy the site on property 35. Previous occupants included J.D. Lucas Metals, Structural Steel, Jovan Machine Company, and Dover Manufacturing Company. Information on these companies is limited. This property utilizes water from a private well.

Dover Manufacturing Company, a small manufacturing facility, had been producing screw machine products since 1959. Wastes generated were identified as cutting oils and mineral spirits. Historical data indicate waste oil was discharged to the back yard and accumulated in a swampy area near Mad River. Disposal of grinding wastes containing waste oil and metal chips have been buried in a pit on neighboring property.

Property 36

Fusion Engineering and Manufacturing exists on this property. Groundwater testing in 1985 did not produce evidence of ground water contamination. This property utilizes water from a private well.

Property 37

Quality Used Cars and Autobody exists on this property. Groundwater sampled in 1985 documented levels of benzene (1.1 ppb) ethylbenzene (1.1 ppb), toluene (1.3 ppb) and xylene (2.5) ppb contamination. Groundwater sampled in 1987 documented levels of benzene (13.6 ppb), and toluene (13.1 ppb) contamination. No additional information can be found. Although this property has been connected to a public water supply, water from a private well may still be used for processing.

Property 38

Chem-Clean Furniture Strippers and Truck World occupy this property. Groundwater sampled in 1984 documented levels of benzene (8.1 ppb), toluene (49.1 ppb), and xylene (34.8 ppb) contamination. Groundwater sampled in 1985 documented levels of benzene (1.9 ppb), ethylbenzene (5.6 ppb), toluene (3.8 ppb), and xylene (30 ppb) contamination. No additional information can be found. Although the property has been connected to a public water supply, water from the private well may still be used for processing.

Property 39

Brave Equipment Company Industrial Park houses the businesses of Maaco (previously Dream Auto Colors) and Brave Equipment Company. Also housed on this property was Braemer Machine. An anonymous complaint of oil and paint discharge in 1985 brought CT DEP investigators to inspect this property.

Brave Equipment Company, a commercial and industrial rigger facility, has been servicing and storing equipment since 1970. This property extends over approximately 25 acres. A 1986 Inspection Report conducted by CT DEP identified heavy oil staining on the south side of the building and near several dozen poorly maintained drums of unknown materials (some identified as waste motor oil). Soil samples taken from the stained areas documented levels of PCB (60 ppb) and xylene (100 ppb) contamination.

Dream Auto Colors, d.b.a. Maaco Auto and Paint, is an auto body repair and painting company established in 1978. A 1986 Inspection Report conducted by CT DEP identified wastes generated as paints, thinners, and solvents. Evidence of heavy paint spill

to the ground, disposal of paints to the dumpster, and sump discharge of floor wastes to the west side of the building were recorded. As of May 22, 1989, compliance to orders HN-327 (issued to Dream Auto Colors on April 10, 1986), HM-329 (issued to Brave Equipment Company on May 9, 1986), and HM-330 and HM-331 (issued to property owners on May 8, 1989) are past due. A RCRA inspection in 1990 indicated sump discharge to the ground was still occurring. This property utilizes water from a private well.

Property 40

Romantic Manufacturing Company - No Data. This property presently utilizes water from a private well.

Property 41

Metal mold, Inc., a small manufacturing facility, has been producing drawn shells and metal stampings since 1959. A 1980 Inspection Report conducted by CT DEP identified waste generated as waste oil. No evidence of on-site dumping was observed. This property utilizes water from a private well.

Property 42

Companies located on this property include the Nutmeg Screw Machine Products Company and the Alpine Electric Company. Nutmeg Screw Machine Products Company, a small metal working and machine shop, has been producing screw machine products since 1951. A 1980 Inspection Report conducted by CT DEP identified waste materials as oil-coated floor sweepings and chlorinated solvents. Improper disposal of oils behind the building and historical disposal of chlorinated solvents to the ground were recorded. A Preliminary Assessment was conducted by EPA in 1980. In 1985, a Site Inspection was conducted by NUS Corporation for EPA under Technical Directive Document (TDD) F1-8503-2. Unidentified volatile organic contaminants were present in soil adjacent to the building. Metal contaminants (copper 1,000 ppm, lead 1,000 ppm, zinc 501-1,000 ppm) have been documented in soil samples. No volatile or PCB contaminants were detected on-site in surface water or sediments from Old Tannery Brook. It is unknown whether or not contaminants are migrating to the underlying aquifer.

Alpine Electronic Components, Inc., a small manufacturing facility, has been producing connectors and screw machine parts since 1955. A 1980 Preliminary Assessment conducted by the EPA identifies waste materials as waste oils, solvents, and acid. Disposal of these materials to the ground around the building was recorded.

Investigation of this property led to the listing of Nutmeg Valley Road as an NPL Superfund Site. This property utilizes

water from a private well.

Property 43

Kings Autobody is a small waste generator identified at EPA by CTD981066936. An automotive service operation inspection was conducted in 1988 by the local Chesprocott Health District. An uncontained 275 gallon above ground tank holds waste oil for disposal. No signs of on-site dumping were recorded. This property utilizes water from a private well.

Property 44

Frenchie Construction - No Data. This property utilizes water from a private well.

Property 45

Delson Hinge Corp., a small and now inactive manufacturing facility, had been producing hinges and metal stampings since 1977. A 1980 Inspection Report described waste materials as used oils and solvents. Wastes were removed off site by a commercial hauler. The building is presently unoccupied.

Property 46

The Phaneuf Company is involved with the sales and service of bank and office systems. Limited information is available on this company. From 1980 to 1983, this site was occupied by Craftsman Litho. No information can be found on this company. This property presently utilizes water from a private well.

Property 47

This property had been identified as a house. Upon inspection, no house could be found. The area is a large dirt and gravel pit.

Property 48

This property is presently occupied by Industrial Mailing. No information could be found for this company. Other businesses included on this property were Specialty Coil and Simon and Gagnon Moving. This property utilizes water from a private well.

Specialty Coil Company produced electrical coils, transformers and other magnetic components. A 1987 Industrial User Survey (USI) stated no wet discharge was occurring. Specialty Coil is presently out of business. A small landscaping business run by the former owner's son is located in the rear of the building. No other information could be found.

Property 49

This property was the previous location of PAR Finishing. At present, the Businesses of Bob-Ken Automatic and Care Manufacturing are sharing the building. No information can be found on Bob-Ken Automatics. This property utilizes water from a private well.

Care Manufacturing Co., a small manufacturing facility, has been producing screw machine products since 1985. A 1987 Industrial Survey conducted by CT DEP identified waste materials as cutting oils and scrap metals. A 1989 Inspection Report conducted by CT DEP identified wastes as 1,1,1-trichloroethane, kerosene, waste oil and scrap metals. The rear of the building housed 20 empty drums. Oil staining of the ground was evident. At the front of the building were 17 open drums of scrap metal chips identified as belonging to a previous tenant.

The Par Finishing Company, formerly Wolcott Electroplating, was once located on this property. The facility consisted of two parcels of land east and west of Tosun Road. The east side contained office space, production wells and metal finishing facilities. Discharge from the retention basins were pumped to the west side parcel for disposal into three surface impoundments. These impoundments (40' x 50') were located 30 feet from Old Tannery Brook. Many complaints have been registered with state officials as to the improper disposal of waste materials into neighboring surface waters. Sludge samples taken from the surface impoundment (lagoons) documented extremely high levels of copper, iron, manganese, nickel, cyanide, oil and grease, toluene, xylenes, and tetrachloroethylene. A Hazardous Waste Closing Plan was submitted to CT DEP in 1984. The First Year Annual Report on Groundwater Monitoring was submitted to CT DEP in 1985. High levels of cyanide, iron, manganese, TOC's, and sulfate were documented. The Fourth Year Annual Report on Groundwater monitoring was submitted to CT DEP in 1988. Parameters in excess of drinking water standards included: pH, iron, manganese, and sodium. TOC's at 35.5 have been recorded. Activities at this site are ongoing.

Properties 50a, 50b, 51a, 51b, 51c, 51d, 51e, 51f, 51g, 51h, 51i, 51j, 51k, 52a, 52b, 52c, 53a, 53b, 54a, 54b

These properties are all private residences located on Tosun Road. These properties, with the exception of property 50a, utilize private well water with no treatment. Property 50a has been supplied with a carbon filter. Levels of trichloroethylene have been documented at property 53a (1.3 ppb/1985) and 54a (1.1 ppb/1985). Levels of toluene (2 ppb/1986), ethylbenzene (2 ppb/1986), mixed xylenes (15 ppb/1986) and dichloroethane (1.4 ppb/1986) have been documented at property 52b. Methylene chloride (2 ppb/1987), chloroform (3 ppb/1987), 1,2-dichloro-

ethane (2.0 ppb/1987), 1,1,1-trichloroethane (11 ppb/1987), carbon tetrachloride (3 ppb/1987), trichloroethylene (10 ppb/1987), tetrachloroethylene (3.0 ppb/1987) and 1,1-dichloroethane (2.1 ppb/1987) were documented at property 50a.

APPENDIX B

EPA CANCER CLASSIFICATION

Group A Human Carcinogen

This group is used only when there is sufficient evidence from epidemiologic studies to support a causal association between exposure to the agents and cancer.

Group B Probable Human Carcinogen

This group includes agents for which the weight of evidence of human carcinogenicity based on epidemiologic studies is "limited" and also includes agents for which the weight of evidence of carcinogenicity based on animal studies is "sufficient." The group is divided into two subgroups. Usually, Group B1 is reserved for agents for which there is limited evidence of carcinogenicity from epidemiologic studies. It is reasonable, for practical purposes, to regard an agent for which there is "sufficient" evidence of carcinogenicity in animals as if it presented a carcinogenic risk to humans. Therefore, agents for which there is "sufficient" evidence from animal studies and for which there is inadequate evidence or "inadequate evidence" or "no data" from epidemiologic studies would usually be categorized under Group B2.

Group C Possible Human Carcinogen

This group is used for agents with limited evidence of carcinogenicity in animals in the absence of human data. It includes a wide variety of evidence, e.g., (a) a malignant tumor response in single well-conducted experiment that does not meet conditions for sufficient evidence, (b) tumor responses of marginal statistical significance in studies having inadequate design or reporting, (c) benign but not malignant tumors with an agent showing no response in a variety of short-term tests for mutagenicity, and (d) responses of marginal statistical significance in a tissue known to have a high or variable background rate.

Group D Not Classifiable as to Human Carcinogenicity

This group is generally used for agents with inadequate human and animal evidence of carcinogenicity or for which no data are available.

Group E Evidence of Non-Carcinogenicity for Humans

This group is used for agents that show no evidence for carcinogenicity in at least two adequate animal tests in different species or in both adequate epidemiologic and animal studies.

The designation of an agent being in Group E is based on the available evidence and should not be interpreted as a definitive conclusion that the agent will not be a carcinogen under any circumstances.