ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Public Health Assessment for

LIBERTY INDUSTRIAL FINISHING CORPORATION
FARMINGDALE, NASSAU COUNTY, NEW YORK
EPA FACILITY ID: NYD000337295
MARCH 22, 2005

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

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

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

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

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PUBLIC HEALTH ASSESSMENT

LIBERTY INDUSTRIAL FINISHING CORPORATION
FARMINGDALE, NASSAU COUNTY, NEW YORK
EPA FACILITY ID: NYD000337295

Prepared by:

New York Department of Health
Under a Cooperative Agreement with
The U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
Atlanta, Georgia

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SUMMARY

The Liberty Industrial Finishing site, which is on the National Priorities List, is situated in a suburban residential area in the Town of Oyster Bay, South Farmingdale, Nassau County, New York. Since the late 1930s, industrial operations at the site included aircraft parts manufacturing, trailer manufacturing, and metal plating and finishing. Untreated industrial wastes were placed in leach fields and unlined groundwater recharge basins on site.

This site posed an indeterminate public health hazard in the past. Surface soils contaminated with polychlorinated biphenyls (PCBs) existed on-site and may have presented a source of exposure to workers and trespassers.

Low concentrations of volatile organic compounds (VOCs) were present in a sidegradient drinking water supply well from 1976 to 1978. This well operated for about 24 years before closure in 1978; however, the presence and extent of contamination in the well before 1976 cannot be determined because monitoring data specific to VOCs were not mandated for collection before 1980, and therefore are unavailable. Persons receiving their drinking water from this well were exposed to levels of VOCs that could result in a low increased risk of developing cancer if the exposure was long-term; however, the source of contamination has not been determined for this past completed exposure pathway. Other potential sources of this contamination existed in the area. On-site and downgradient groundwater monitoring wells in the upper aquifer are contaminated with organic compounds, including VOCs, and metals at concentrations that exceed drinking water standards. Downgradient public drinking water supply wells, which pump water from the deeper Magothy Aquifer, are not contaminated. The water from the public drinking water supply wells is monitored quarterly for organic contamination.

The site poses no apparent public health hazard. The limited surface soil data for the western portion of the site do not represent a public health concern provided site use remains industrial/commercial. Low levels of trichloroethene and tetrachloroethene were found in on-site soil gas; however, the data are inadequate to determine whether these compounds have migrated to off-site dwellings. The findings from a proposed off-site soil gas investigation will be evaluated to determine the existence of contaminants from the site and likelihood of human exposure.

Edible fish species, particularly white perch, collected from Massapequa Reservoir are contaminated with chlordane and PCBs. A New York State Department of Health (NYS DOH) sportfish consumption advisory is in effect for the Upper Massapequa Reservoir. The source of these fish contaminants has not been determined and is probably is not attributable to the site because chlordane was detected infrequently at exceedingly low concentrations in subsurface soils at the site and has not been detected in groundwater samples. Furthermore, although PCBs were present in soils at the site, these compounds tend to bind to the soil; therefore, they are unlikely to migrate off the site.

Residents in the community have three primary concerns-direct contact with contamination at

the site, potential for the site to serve as a source of groundwater contamination, and potential exposures to contaminated groundwater. During the past several years, representatives of the NYS DOH, U.S. Environmental Protection Agency (US EPA), Agency for Toxic Substances and Disease Registry (ATSDR), New York State Department of Environmental Conservation (NYS DEC) and Nassau County Department of Health (NC DOH) participated in public meetings to present findings of remedial investigations, to address public and community health concerns, and to present possible measures for remediation of the site.

The NYS DOH has recommended measures to reduce and prevent exposure to contaminants and to determine the extent of contamination at and migrating from the site.

Public health actions taken include the following: (1) public drinking water supply wells have been and continue to be tested for site-related contaminants; (2) PCB contaminated soils have been excavated and removed from areas where transformers are or were situated; and (3) the NYS DOH, ATSDR, NYS DEC, US EPA, and NC DOH have been involved with the site and continue to provide education and information pertaining to residents' health concerns.

BACKGROUND

In cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), the New York State Department of Health (NYS DOH) will evaluate the public health significance of the Liberty Industrial Finishing site. Specifically, ATSDR and NYS DOH will determine whether health effects are possible and will recommend actions to reduce or prevent possible health effects. ATSDR, located in Atlanta, Georgia, is a federal agency within the U.S. Department of Health and Human Services and is authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) to conduct public health assessments (PHAs) at hazardous waste sites.

All figures and tables in this PHA are in appendices A and B, respectively. The use of the words "on-site" and "off-site" throughout the document depict the area within and around the site boundary shown on Figure 1 and are not intended to convey the meanings defined under CERCLA.

A. Site Description and History

The Liberty Industrial Finishing site (i.e. Liberty Site) is a former aircraft part manufacturing and metal plating facility about 1 mile south of Bethpage State Park in the Town of Oyster Bay, South Farmingdale, Nassau County, New York (Figure 2). The 30-acre site is bordered by Long Island Railroad tracks to the north, Motor Avenue to the south, Main Street to the east, and a small park (the Ellsworth-Allen Park) to the west. Kirkham Engineering and Manufacturing Corporation began manufacturing aircraft-related equipment at the site in 1934. During the 1940s, the Defense Plant Corporation (DPC) purchased a portion of the site and built additional plant facilities for the manufacture of aircraft parts. The DPC leased the facilities and parcel to Liberty Aircraft Products Corporation (formerly Kirkham Engineering and Manufacturing Corporation). Liberty Aircraft Products Corporation discharged untreated chromic-rich anodizing waste solutions to a common recharge basin every 2 weeks during the war and about every 2 months after the war. Operation of a chromium-treatment plant began at the Liberty site in November 1949 to remove chromium from the discharged solutions.

Ownership of the Liberty site changed several times from the early 1940s to the late 1950s. By the 1950s, the Liberty Plant was equipped to conduct acid and alkaline metal cleaning; chrome-plating; cadmium, nickel, copper, and zinc plating; and various rinsing operations. In 1957, the Liberty Aircraft Products Corporation ceased operating at the site. In 1958, the Liberty Industrial Finishing Corporation (Liberty Finishing I) began operating at the site. In 1959, the Nassau County Department of Health (NC DOH) reported that liquid wastes dripped through floor grates in the process areas and were carried to a sump, which discharged the untreated wastes to the on-site recharge basins. NC DOH records also indicate inadequacies and improper operation of Liberty Finishing I's wastewater treatment system. By 1965, another company named Liberty Industrial Finishing Corporation (Liberty Finishing II) began operating at the site. When Liberty Finishing I stopped operating at the site is not known. The Liberty Finishing II operations included painting and plating with continued discharges of treated and untreated wastewater to on-site recharge basins. In addition to the use of the recharge basins, Liberty

Finishing II constructed a separate-sludge drying bed to receive metal sludge from the chromium-treatment plant. In August 1978, Liberty Finishing II moved its operations to Brentwood, Suffolk County, New York. Ten buildings remain at the site. These buildings are used for a variety of operations including trucking, warehousing, auto parts salvaging, product distributing, and pallet recycling.

In September 1978, Liberty Finishing entered into an agreement with the New York State Department of Environmental Conservation (NYS DEC) to clean up the Nassau County site. Limited cleanup activities consisted of the partial removal of soils from two recharge basins.

In December 1980, the Four J's Company (a real estate partnership) leased a portion of the site to build condominium units on the parcel. In April 1985, the Four J's Company entered into an agreement with the NYS DEC to conduct a remedial investigation (RI) / feasibility study (FS) at the site. RIs follow preliminary site investigations conducted by town, county, state and/or federal agencies to verify whether hazardous wastes are present and to determine whether wastes pose a significant threat to public health and the environment. An RI is carried out to determine the nature and extent of contamination. The FS uses RI information to develop alternative cleanup plans that will eliminate the threat to public health or the environment posed by the site. A final RI report, prepared by the environmental consulting firm, Lockwood, Kessler and Bartlett (LKB) for the Four J's Company, was submitted to the NYS DEC in November 1985. The investigation undertaken by LKB included soil borings in the recharge basins and sludge-drying bed, installation of monitoring wells on-site, and collection/analysis of on-site and off-site groundwater samples and surface water sampling of Massapequa Creek, south of the site (Figure 3). In July and August 1987, limited portions of the sludge drying bed and recharge basins were excavated, and material identified as hazardous was disposed off-site.

In May 1986, the Liberty Industrial Finishing site was placed on the U.S. Environmental Protection Agency's (US EPA's) National Priorities List (NPL). In June 1989, NYS DOH prepared a Preliminary PHA for the site under a cooperative agreement with ATSDR.

In September 1990, US EPA contracted Roy F. Weston, Inc., to conduct a federally funded RI/FS at the Liberty site. Field work, conducted from November 1991 to July 1992, included various contaminant source and migration investigations and an ecologic investigation. The ecologic assessment was conducted to develop a general description of the existing ecology and natural resources associated with the site. A final RI report and a draft FS report were completed in January 1994 and April 1994, respectively.

B. Actions Implemented During the Public Health Assessment Process

1. Active downgradient public drinking water supply wells have been and continue to be tested by NC DOH at the specified intervals as mandated by NYS DOH. Public drinking water supply wells in Nassau County are tested quarterly for volatile organic compounds (VOCs) and annually for metals. This action should significantly reduce the potential for exposure to site-related groundwater contaminants from the public drinking water supplies because it verifies continued compliance with state and federal drinking water standards.
2. On December 7, 1993, and April 20, 1994, US EPA conducted a public meeting to

present findings of the RI/FS, to discuss future land-use alternatives, and to inform the community about future activities at the site. About 50 persons attended the December 1993 meeting; the April meeting was attended by about 200 persons, many of whom voiced concern about the site. John Olm (NYS DOH), a representative of NC DOH, Arthur Block and Steve Jones (ATSDR), and US EPA representatives addressed health-related concerns and questions at the meetings.

3. On August 11, 1997; August 9, 2001; and January 9, 2002, US EPA conducted public meetings to discuss the Proposed Remedial Action Plan (PRAP) for remediating on-site and off-site soil and groundwater contamination. Close to 200 residents attended all three meetings. Health-related concerns and questions were addressed by Mr. John Olm at the August 11, 1997, meeting and by Mrs. Jacquelyn Nealon (NYS DOH) and Mr. Michael Sivak, the US EPA Risk Assessor, at the meetings on August 9, 2001, and January 9, 2002.

C. Site Visit

Mr. John Olm and Ms. Nina Knapp with NYS DOH; a representative of the NC DOH; and Mr. Arthur Block and Mr. Steve Jones, ATSDR regional representatives, visited the site area on December 7, 1993. During the site inspection, they made the following observations:

During the day, numerous vehicles entered and exited the property through two unsecured entrances along Motor Avenue. Vehicles that entered the site through the westernmost entrance way were driven to several active businesses on the property. The easternmost entrance way appeared to be used solely by an active recycling business. A return site visit at about 11 p.m. revealed that the easternmost entrance was obstructed by a locked gate.

About 14 acres of vacant land exists at the western portion of the site. This parcel is separated from the active portion of the site by a 3½ foot high chain-link fence. Two US EPA placards were attached to the fence that identified the parcel as a hazardous waste disposal area and warned against trespassing.

Trespassers probably enter the site at the northwest disposal area through an opening in the fence bordering the railroad tracks. A path has been worn through from the fence line to an open area where a barrel used for burning was present. The ground was littered with debris, including construction and demolition materials and beer bottles.

A man who later identified himself as an employee at an on-site business, was observed crossing over the fence that separates the former disposal basins and northwestern disposal area from the active industrial complex. The man walked down into the disposal basins, where he remained for several minutes. He then exited the basins and crossed over the fence to return to his place of business. The man stated he had entered the basins in search of scrap material for use at his business.

Several adults and children were using the playground area adjacent to the office building at the Ellsworth-Allen Park. A chain-link fence about six feet high separates the park from the site property. One "No Trespassing" sign was posted on the fence and indicated the adjacent property is a hazardous waste disposal site. A section of the fence at the northern end was down, and a worn path indicates trespassing onto the Liberty site at this location. Numerous softballs and baseballs were observed on the Liberty site property near the fence and probably were hit or thrown out of the softball field at the park.

The nearest dwellings to the site were on the south side of Motor Avenue. These dwellings were mainly small businesses and single-family residences.

Mrs. Jacquelyn Nealon, Ms. Wendy Kuehner, and Ms. Rebecca Mitchell of the NYS DOH conducted an additional site visit on July 26, 2001. The following observations were made:

The site is now accessible through one sliding chain-link fence at the southeastern end of the property off Motor Avenue.

The 14-acre parcel of vacant land at the western portion of the site separated from the active portion by the chain-link fence was difficult to identify because underbrush had taken over the area. Whether site-related trash or debris was in the area was unclear.

A part of the northern portion of the site was filled with several trailers from tractor trailer trucks. Whether the trailers were full or empty was unclear.

An Interim Remedial Measure groundwater treatment system for metals and VOCs was in a gated section on the southwestern end of the property. This area appeared to be in use and clean.

A man who identified himself as an on-site business employee approached the NYS DOH representatives and questioned their presence on the site. The NYS DOH representative informed the man that they were conducting a site visit in conjunction with the upcoming PRAP meeting and for the PHA.

D. Demographics, Land Use, and Natural Resource Use

Demographics

The Liberty site is in a suburban residential area in the Town of Oyster Bay, South Farmingdale, Nassau County, New York. The 30-acre facility is bordered on the north by railroad tracks, on the east by Main Street, on the west by a small park (the Ellsworth-Allen Park), and on the south by Motor Avenue.

The NYS DOH determined from the 1990 census that 22,590 people live within one mile of the Liberty Finishing site. The population within 1 mile of the site is 97% white, less than 1% black, and 2.5 % other races. The site is within census tract 5205.01 in which 6.2% of the population is

under 5 years of age, 16.1% is 5 - 19 years of age, 64.2% is 20 - 64 years of age, and 13.5% is 65 years or older. The median household income in 1989 for this census tract was $55,640 with 3.5 % of the families having income below the poverty level.

Land Use

The Liberty site is zoned light industrial, and the surrounding land use is predominantly residential with general neighborhood businesses located at main road intersections. The residential area south of the Liberty site comprises mostly small homes built during 1946 - 1962. A small tributary to Massapequa Creek originates to the south within ½ mile downslope of the site. The Village of Farmingdale maintains the creek and the associated Massapequa Creek Preserve for open space and recreation. The preserve extends from the headwaters of the east and west branches of Massapequa Creek downstream to its mouth at South Oyster Bay (Figure 3). Institutional use of the surrounding area includes 10 public schools within 1.5 miles of the site and Republic Airport about 1 mile to the east. The Howitt Middle School, at the intersection of Van Cott Avenue and Grant Avenue, is the nearest public school, which is about ½ mile northeast of the Liberty site. Approximately 837 children attend grades 7 and 8 at this school. The site is about 1 mile south of the Bethpage State Park and is adjacent to Ellsworth-Allen Park.

Natural Resource Use

Twenty public drinking water supply wells, irrigation wells, and commercial supply wells are within a 1- mile radius upgradient and within 2 miles downgradient of the site (Figure 3). Many residents in the Oyster Bay receive their drinking water from these public drinking water supply wells.

The NYS DEC stocks Massapequa Creek with trout. Fishing for pan fish is common, and people eat fish from the ponds and lakes within the Massapequa Creek Preserve. A NYS DOH sportfish consumption advisory (http://www.health.state.ny.us/nysdoh/fish/fish.pdf) is in effect for the Upper Massapequa Reservoir. The NYS DOH advises that women of childbearing age, infants, and children under age of 15 years should not eat any fish from the Upper Massapequa Reservoir and upstream in Massapequa Creek to the first barrier impassable by fish. Other people are advised to eat no more than one meal per month of white perch from these waters. The Upper Massapequa Reservoir is in the Massapequa Preserve and is just north of Sunrise Highway (Route 27), about 2.5 miles downstream of the headwaters to Massapequa Creek. The Liberty site is unlikely to be the source of the chlordane and polychlorinated biphenyl (PCB) contamination in the fish. Chlordane was infrequently detected in on-site soils and the levels were low. Although PCBs were present in on-site soils, multiple sources probably contribute to their presence in the fish. The main chemical of concern associated with the advisory is chlordane, but PCBs also were detected.

COMMUNITY HEALTH CONCERNS

Citizens were concerned about the Liberty site. Residents joined with the community group, Citizens for Pure Water, and collaborate to address various environmental and health issues in the community around the Liberty site. NYS DOH learned of community health concerns during public information meetings conducted by US EPA. Residents were concerned about an apparent excess of Hodgkin disease in the Farmingdale area of Nassau County; about possible contamination at or near the Ellsworth-Allen Park that could result in exposure and adverse health effects; and about health risks posed by exposure to contaminants at the site and the site's role as a continuing source of aquifer (groundwater) contamination. The Public Health Implications section addresses these concerns.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

To evaluate whether a site poses an existing or potential hazard to the exposed or potentially exposed population(s), the site conditions are characterized. This site characterization involves a review of sampling data for environmental media (e.g., soil, surface water, groundwater, air) both on- and off-site, and an evaluation of the physical conditions of the contaminant sources or physical hazards near the site that may pose an additional health risk to the community.

Contaminants selected for further evaluation are identified on the basis of consideration of the following factors:

1. Concentrations of contaminant(s) in environmental media both on- and off-site;

2. Field data quality, laboratory data quality, and sample design;

3. Comparison of on-site and off-site contaminant concentrations in environmental media with typical background levels;

4. Comparison of contaminant concentrations in environmental media, both on- and off-site, with public health assessment comparison values for (1) noncarcinogenic endpoints and (2) carcinogenic endpoints. These comparison values include Environmental Media Evaluation Guides (EMEGs), Cancer Risk Evaluation Guides (CREGs), drinking water standards, and other relevant guidelines. Contaminant concentrations that exceed a comparison value do not necessarily pose a health threat;

5. Community health concerns.

The selected contaminant(s) are evaluated further in the PHA to determine whether exposure to these chemicals is occurring and whether the exposure is of public health significance.

The On-Site Contamination and Off-Site Contamination subsections discuss sampling data for environmental media; summary tables of sampling data are presented in Appendix B. If a

chemical is selected for further evaluation in one medium (e.g., soil, sediment, surface water, groundwater, air), the contaminant also will be reported in all other media, if detected. The listing of a contaminant does not necessarily mean exposure to that contaminant will cause adverse health effects.

A. On-Site Contamination

Most on-site environmental data for the Liberty site were collected by the environmental consulting firm, Roy F. Weston, Inc. (Weston) of Edison, New Jersey, under contract with the US EPA. These data are presented in the RI report and are used to describe the nature and extent of contamination at the site on a media-specific basis at the time of sampling. The on-site media sampled during the RI were ambient air, soil gas, soil, and groundwater.

Ambient Air and Soil Gas

Two rounds of ambient air sampling were conducted on-site during the RI (Figure 4). The first round conducted on September 18, 1991, consisted of baseline air sampling to determine ambient airborne contaminant levels before actual field activities began. The second round of ambient air sampling, conducted during the test pit excavation on January 17, 1992, determined the amount of contaminants in the soil that were released to the air and assessed potential health risks to workers and nearby residents during cleanup activities that disturbed contaminants in soil. Both rounds included sample collection from four monitoring stations set up on the site property. The data were collected during a 24-hour period. One sample station was situated about 100 feet upwind of the pits to determine background levels. The remaining three stations were placed downwind of the pits in a 180^{o} arc about 20 - 50 feet away from the pits to determine if airborne contaminants were leaving the site. Air samples collected during both rounds were to be tested for VOCs and metals.

Air samples collected during the first round were tested for 31 VOCs, none of which were reported above detection limits. The testing results for the metals (cadmium, chromium, and mercury only) were considered suspect because of levels of inorganic contamination detected in the field blanks. Because of laboratory error, the samples for hexavalent chromium were not analyzed.

Air samples collected during the second round were tested for 41 VOCs. Low concentrations of dichlorodifluoromethane (freon 12) were detected at all four sample locations. These levels ranged from 1.4 parts per billion (ppb) at location AR-8 to 2.0 ppb at the upwind location, AR-5. The presence of this compound in the air samples is not considered to be site-related, because the highest concentration was detected in the upwind or background sample. No other VOCs were detected. Metal samples collected during the second round were not tested because of scheduling problems.

A soil gas investigation was conducted at the Liberty site in November 1991 as a field screening method to locate areas of subsurface VOC contamination on the site and at the adjacent Ellsworth-Allen Park. Samples were obtained from a total of 114 locations (Figure 5). The soil

gas samples were tested for trichloroethene, tetrachloroethene, *trans*-1,2-dichloroethene, and benzene. Trichloroethene and tetrachloroethene, the only two compounds detected, were detected up to 2.5 and 0.75 parts per million by volume (ppmv), respectively.

Trichloroethene was detected at 107 of 114 sample locations but was not found along the western boundary of the sampled area (Ellsworth-Allen Park). The highest concentrations of trichloroethene were detected in the basin area of the site.

Tetrachloroethene was found at 82 of the 114 sample locations and was highest in samples from the Basin 1 area and the Building B and Building D areas. An evaluation of the July 27 and August 17, 2000, Dames & Moore groundwater test results from MW-20, 22A, 22B, 33B and 34B (draft RI report, Dames & Moore, 1999) indicated that detection of tetrachloroethene in soil gas appears to be from the shallow portion of the tetrachloroethene plume referred to as "Plume B." The tetrachloroethene that is off-gassing from Plume B is believed to be from an off-site upgradient source. For example, many dry cleaners are along Main Street north of the site (see Figure 10).

Surface Soil (0 - 3 Inches)

In October 1993, seven surface soil samples (0 - 3 inches) were collected from the eastern and western parcels of the site and tested for VOCs, semivolatile organic compounds (SVOCs), pesticides, PCBs, and metals (Figure 6). According to the US EPA, these locations were thought to pose the greatest likelihood of surficial contamination on the basis of site, visual observations during the site reconnaissance, and RI data. Therefore, these surface soil sampling data should not be considered representative of conditions at the site as a whole. Sampling results for the surface soil samples are summarized in Table 1. With the exception of sample SS-1, the surface soil samples were collected from the western portion of the site. Soil sample SS-1, taken outside a one-room cinder block building immediately west of Building F, was stained. Sample SS-2 was taken from the northern area of the site, close to the Long Island Railroad tracks. No vegetation was growing at this sampling location. Sample SS-3 was taken along side of what appeared to be a path from a patch of ground not supporting vegetation. Soil samples SS-4, SS-5, and SS-6 were taken from basins 3, 1, and 2, respectively. These soil samples appeared to be stained. Soil sample SS-7 was taken from the former Building B location. Two other soil samples were collected from two transformer locations and tested for PCBs (Figure 6, PCB-1 and PCB-2). Soil sample PCB-1 was taken from the pad of an active transformer located north and adjacent to Building B. The surface soil immediately adjacent to an inactive transformer pad located west of Building F also was sampled and is identified as PCB-2. The PCB mixture, Aroclor 1260, was detected in both samples at concentrations of 87 milligrams per kilogram (mg/kg) and 18,000 mg/kg, respectively.

In October and November 1994, additional soil sampling was conducted at the transformer areas PCB-1 and PCB-2 to further characterize the extent of PCB contamination. Soil samples also were collected at two other transformer areas (Figure 6, PCB-3 and PCB-4). Sampling results confirmed previous findings at transformer areas PCB-1 and PCB-2. Elevated concentrations of Aroclor 1254 also were detected at transformer area PCB-4. The PCB-4 location is a fenced area near the railroad tracks in the northeastern corner of the site that reportedly was used to

store transformer units.
No VOCs were detected in any of the surface soil samples.

Subsurface Soil: Test Pits (0 - 13 Feet)

A total of 90 test pits were excavated on-site, and 61 test pit soil samples were collected (Figure 6). Test pit samples were collected at depths ranging from 0 to 13 feet and tested for VOCs, metals, and cyanide. A portion of the samples also were tested for SVOCs, pesticides, and PCBs. Sampling results for the test pit soil samples are summarized in Table 2 and comparison values for soil contaminants are listed in Table 3.

The only organic compounds selected for further evaluation were several PCB mixtures (Aroclors). Aroclor 1242 was detected in only one soil sample (TP-38-1-4) collected at a depth of 1 - 4 feet from a leaching chamber at the east side of a former shed pad just east of disposal basin #1. Each of the three remaining Aroclors (1248, 1254, and 1260) was detected at the highest concentration in a soil sample collected from a leaching chamber at the western leaching field.

Metals detected in test pit samples at concentrations that exceed comparison levels and/or typical background levels include aluminum, arsenic, chromium, iron, lead, and zinc.

Subsurface Soil: Soil Borings (0 - 18 Feet)

Forty soil borings were drilled on-site, and 67 soil samples were collected at depths of 0 - 18 feet. One to three samples per soil boring were collected for testing. Soil boring locations include three former disposal basins and a sludge-drying bed at or near previously excavated test pits. One soil boring was located near the northern boundary of the site to determine site background conditions (SB-1). The samples were tested for VOCs, metals, and cyanide. Ten samples also were tested for SVOCs, pesticides, and PCBs. The laboratory analyses found elevated levels of organic compounds and several metals (Tables 2 and 7). Organic compounds exceeding comparison values include trichloroethene, styrene, several PCB mixtures, and polycyclic aromatic hydrocarbons (PAHs). The highest concentration of trichloroethene and styrene were found in a soil boring sample (SB-30) obtained at a depth of 1.5 - 4.5 feet from a floor drain in Building G. The highest levels of PAHs were obtained at a depth of 0 - 0.5 feet. The PCB mixture, Aroclor 1260, was detected at three soil boring locations at depths of 0 - 12 feet, and its comparison value was significantly exceeded in sample SB-23 (depth 0 - 0.5 feet). Aroclor 1248 and Aroclor 1254 also were detected in several soil boring samples. The highest concentrations of these two PCB mixtures were found in a sample (SB-17), collected at a depth of 1.5 - 3 feet, from the floor of disposal basin #3. The cancer comparison value for arsenic was exceeded in 10 samples. However, no concentrations exceeded the typical background value for this metal. Although a comparison value is unavailable for lead, this metal exceeded its typical background concentration in about three of the 71 samples in which it was detected and was found at the highest concentration in sample SB-35.

The soil boring sample (SB-1) collected at the site background location was free of organic contamination, with the exception of acetone, which may be attributed to field equipment

decontamination procedures. The concentration of acetone did not exceed its comparison value. Metals detected in this background sample did not exceed comparison values.

Groundwater: Monitoring Wells

A total of 11 groundwater monitoring wells on the Liberty site were used to investigate the hydrogeology of the site and to determine groundwater quality (Figure 7). Monitoring well MW-4, located on the northern property line, was installed to determine background groundwater levels. Except for two monitoring wells (MW-6B, MW-7B), the on-site monitoring wells were installed to about 25 feet below grade in the shallow (Upper Glacial) aquifer. Monitoring wells MW-6B and MW-7B were also installed in the shallow aquifer at a depth of about 60 feet below grade. Groundwater samples were tested for VOCs, SVOCs, pesticides/PCBs, metals, cyanide, and hexavalent chromium. The well data and comparison values are presented in Tables 3 and 8, respectively. The on-site groundwater contains VOCs (primarily solvents), the SVOCs, bis(2-ethylhexyl)-phthalate, 4-nitroaniline, and pentachlorophenol; and the pesticide, dieldrin, at concentrations that exceed drinking water standards and guidelines and/or their comparison values. The VOCs are 1,1-dichloroethane, 1,2-dichloroethene (total), 1,1,1-trichloroethane, trichloroethene, 1,2-dichloropropane, 1,1,2-trichloroethane, tetrachloroethene, and benzene. These compounds will be further evaluated in this public health assessment. Except for two phthalate compounds, butylbenzyl phthalate (1 microgram per liter (mcg/L)) and di-n-butylphthalate (1 mcg/L), at concentrations below their comparison values, no organic contamination was found in monitoring wells MW-4, MW-5, and MW-7B.

Numerous metals were detected in groundwater samples from the on-site monitoring wells at concentrations above their respective comparison values and include: arsenic, cadmium, chromium, manganese, nickel, and hexavalent chromium. These compounds will be further evaluated. Aluminum and iron are the only metals detected in the upgradient monitoring well (MW-4) at concentrations above their respective comparison values. The metals data summarized and presented in this assessment are for unfiltered groundwater samples.

B. Off-site Contamination

Air and Soil Gas

Off-site ambient air and soil gas analyses were not conducted during the RI.

Surface Water and Sediments

In the area of the Liberty site, some portion of groundwater discharges into the Massapequa Creek streambed, and the remainder continues to move to the south as underflow beneath the stream toward downgradient areas. Surface water elevation measurements, taken during the RI, indicate that the east branch of the Massapequa Creek receives discharge of groundwater from the upper part of the water-table aquifer.

During the RI, 10 surface water and sediment samples were collected from the headwaters of the Massapequa Creek to determine whether contaminated groundwater from the site discharges to the creek (Figure 7, Tables 4 and 5). Samples were tested for VOCs, metals, and cyanide. US EPA considers the samples collected from the western branch of the creek to be background for the area.

No VOCs were detected in the surface water samples collected from the western branch of Massapequa Creek (samples SW-8 through SW-10). The metals detected in these three surface water samples did not exceed public health comparison values. Cyanide was not detected in any of the creek water samples.

Trichloroethene and tetrachloroethene were detected below drinking water standards in three surface water samples (SW-5, 6, and 7) collected from the eastern branch of the creek.

Sediment sample SD-7 is the only sediment sample that had a detectable VOC. Toluene was detected at SD-7 at a concentration below the comparison value for this compound. No metals were detected above public health assessment comparison values.

Soil

Note: Contaminants detected in off-site soil samples are not evaluated for their potential adverse health effects given the low concentrations detected and the detection of these contaminants at soil depths that would make exposure unlikely.

Subsurface Soil (1 - 3.6 Feet)

ATSDR defines subsurface soil as soil more than 3 inches deep. Figure 6 presents the locations of shallow, hand augered soil samples collected in Ellsworth-Allen Park (Tables 2 and 7). The hand auger investigation was designed to evaluate alleged mercury dumping in Ellsworth-Allen Park. Ten soil samples were collected at depths of 1 - 3.6 feet and tested for VOCs, metals, and cyanide. Two of the 10 samples also were tested for SVOCs, pesticides, and PCBs. No organic compounds were detected in any of the samples. Arsenic was detected in two samples above its comparison value. However, the highest concentration (6 mg/kg) of arsenic detected is within the typical background range for this compound in soils.

Groundwater (Monitoring Wells)

A total of 15 off-site monitoring wells, ranging in depth from 12 to 120 feet, were installed downgradient of the site during the RI (Figure 7). Except for one downgradient monitoring well (MW-11C), all off-site monitoring wells are screened in the Upper Glacial Aquifer at 12 - 75 feet below grade. Monitoring well MW-11C is screened in the Magothy Aquifer at 120 feet below grade. Off-site groundwater samples were tested for VOCs, SVOCs, pesticides/PCBs, metals, cyanide, and hexavalent chromium (Tables 6 and 8).

The off-site downgradient groundwater contained nine VOCs (primarily solvents); the SVOC, bis(2-ethylhexyl)phthalate; and the pesticides, heptachlor-epoxide, chlordane, and dieldrin, at

concentrations exceeding their drinking water standards/guidelines and/or comparison values. Metals, including arsenic, cadmium, chromium, and manganese, were detected at concentrations above their drinking water standards/guidelines and/or comparison values. These organic and inorganic compounds will be further evaluated. The metals data are for unfiltered groundwater samples. Before public release of the draft PHA, two rounds of groundwater sampling had been conducted from the monitoring well (MW-11C) screened in the Magothy Aquifer. In the first round of sampling in March 1992, the only site-related contaminants detected above comparison values were 1,2-dichloroethene at 69 mcg/L and trichloroethene at 760 mcg/L. In the second round of sampling in June 1992, these compounds again were the only site-related contaminants detected above comparison values at estimated concentrations of 120 mcg/L and 1300 mcg/L, respectively.

Groundwater (Private Supply Wells)

Information gathered as part of the RI identified only one active private supply well within a 1-mile radius upgradient and within 2 miles downgradient of the Liberty site (Figure 3). This well, identified by the NYS DEC as Well N-8136, is used at the Farmingdale High School for lawn irrigation only. The well is screened at 55 - 70 feet below grade. The NC DOH sampled this well in 1979, 1982, and 1986. VOCs (1,1,1-trichloroethane, 1,1-dichloroethane, 1,1-dichloroethene, 1,2-dichloroethane, chloroform, tetrachloroethene, and trichloroethene) were detected with total VOC concentrations of 41, 97, and 29 mcg/L in 1979, 1982, and 1986, respectively. Except for chloroform, these compounds exceeded their drinking water standards/guidelines and/or comparison values.

Groundwater (Public Supply Wells)

Potable water in the area surrounding the Liberty site is supplied through public water supplies derived entirely from groundwater wells in the Magothy Aquifer. Although the RI did not provide for sampling public supply wells, NYC DOH conducts mandated testing of public drinking water supply wells. The closest public supply wells (N-7515 and N-7516) are adjacent to the western property line of the Liberty site and just north of Ellsworth-Allen Park (Figure 3). Well N-7515 is 347 feet deep, and well N-7516 is 584 feet deep. These wells are sidegradient to the site. Since 1976, when VOC testing began, no VOC contamination has been detected in well N-7516. The VOCs, 1,2,3-trichlorobenzene, 1,2,4-trichlorobenzene, and hexachlorobutadiene, each were found at 8 mcg/L in a groundwater sample collected from N-7515 in May 1985. The presence of these three compounds is suspect because they never were detected in subsequent samples. Metals data compiled for these two wells since 1965 indicate that no metals were detected at concentrations exceeding applicable drinking water standards.

A South Farmingdale Water District (SFWD) wellfield is about 4000 feet southwest of the site and comprises wells N-4042, N-4043, N-5148, and N-7377. This wellfield is sidegradient to the Liberty site and is not likely to be impacted by site-related contamination. Well N-4042, completed at a depth of 154 feet and placed into service in 1954, was taken out of service in 1978 and abandoned in 1982. Sampling data for N-4042 from 1976 to 1978 indicate the

presence of 1,1,1-trichloroethane up to 14 mcg/L, 1,1-dichloroethane at 10 mcg/L, 1,2-

dichloroethane at 8 mcg/L, and trichloroethene up to 16 mcg/L. Benzene also was reported at 30 mcg/L in a sample collected in May 1978. No metals contamination was detected before closure of this well.

Well N-4043, completed at 374 feet below grade, is active. In January 1977, trichloroethene was reported in this well at 6 mcg/L. The presence of this compound is suspect because it has not been detected since 1977. An elevated concentration of lead (320 mcg/L) was detected in an untreated groundwater sample collected from this well in June 1989. The presence of lead in the groundwater at this concentration is suspect because this metal has not been found in any other sample above the applicable drinking water standard. The water supply from N-4043 is treated for corrosivity.

Well N-5148, completed at a depth of 369 feet, is active. No VOCs or metals have been detected above applicable drinking water standards in groundwater samples collected at the wellhead. The water supply from this well is treated for hardness and corrosivity.

Well N-7377, completed at a depth of 758 feet, is active. No VOCs or metals have been detected above applicable drinking water standards in groundwater samples collected from this well. The water supply from this well is treated for hardness and corrosivity.

Well N-6148, completed at a depth of 561 feet, is about 7500 feet southwest of the Liberty site. In January 1977, trichloroethene was reported in this well at 11 mcg/L. The presence of this compound is suspect because it has not been found above detection limits in any other samples. Elevated concentrations of iron (up to 860 mcg/L) have, on occasion, been detected in the groundwater from this well. The water supply from N-6148 is treated for corrosivity.

Wells N-5147 and N-6149, completed at depths of 219 feet and 640 feet, respectively, are about 8000 feet south-southeast of the site. No VOCs have been detected above applicable drinking water standards in groundwater samples collected from these wells. Elevated concentrations of iron (up to 8000 mcg/L) have been detected in these wells. The water supply from this wellfield is treated for corrosivity, hardness, and iron.

A Massapequa Water District wellfield is about 2 miles south-southeast of the site and comprises wells N-4602, N-5703, N-8214, and N-9173. These wells are treated for corrosivity, hardness, and taste and odor. These active wells are completed at depths of 444 feet, 459 feet, 686 feet and 850 feet, respectively. No VOCs or metals have been detected above applicable drinking water standards in groundwater samples collected from these wells.

Biota (Edible Fish)

In 1991, the NYS DEC collected several fish species from the upper Massapequa Reservoir for pesticides and PCB analyses. The upper Massapequa Reservoir, part of the Massapequa Creek Preserve, is between Clark Boulevard and Sunrise Highway. Results of the fish tissue analysis (of the edible portions, skin on) showed elevated concentrations of chlordane and PCBs, particularly in the white perch specimens (Table 9). Chlordane is not considered a site-related contaminant. The source of these contaminants has not been determined; however, the source

probably is not the Liberty site.

C. Quality Assurance and Quality Control

In preparing this public health assessment, NYS DOH relied on the information provided in the referenced documents and assumed that adequate quality control measures were followed with regard to chain of custody, laboratory procedures, and data reporting.
Specific quality assurance and quality control information is included in Appendix C.

D. Physical and Other Hazards

Portions of the site are littered with rubble and refuse, particularly at the northwest disposal area. Persons accessing these areas are faced with an increased risk for injury from trips, slips, and falls.

PATHWAYS ANALYSES

This section of the public health assessment identifies potential and completed exposure pathways that may or may not be associated with past, present, and future use of the site. An exposure pathway is the process by which a person may be exposed to contaminants. An exposure pathway comprises five elements: (1) a contaminant source; (2) environmental media and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population.

The source of contamination is the source of contaminant release to the environment (any waste disposal area or point of discharge); if the original source is unknown, it is the environmental media (soil, air, biota, water) that are contaminated at the point of exposure. Environmental media and transport mechanisms "carry" contaminants from the source to points where human exposure can occur. The exposure point is a location where actual or potential human contact with a contaminated medium can occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (i.e., ingestion, inhalation, dermal adsorption). The receptor population is the person or people who are exposed or may be exposed to contaminants at a point of exposure.

Two types of exposure pathways are evaluated in the public health assessment; a completed exposure pathway exists when the criteria for all five elements of an exposure pathway are documented; a potential exposure pathway exists when the criteria for any one of the five elements comprising an exposure pathway are not met. A suspected exposure pathway is considered to be eliminated when any one of the five elements constituting an exposure pathway has not existed, does not exist, and will never exist.

A. Completed Exposure Pathways

Groundwater Exposure Pathway

Groundwater is contained in two water-producing aquifers at the site. The aquifers are hydraulically connected. The shallow aquifer (the Upper Glacial Aquifer), extends from the surface to a depth of about 85 feet and consists of sands and gravel. The depth to groundwater in this aquifer is about 10 feet below grade at the site and decreases to about 2 feet below grade near Massapequa Creek. Locally, groundwater in the Upper Glacial Aquifer moves predominantly south-southwest. In the Liberty site area, a portion of groundwater from the Upper Glacial Aquifer discharges into the Massapequa Creek stream bed, and the remainder flows beneath the creek toward downgradient areas. Groundwater contamination in this aquifer has been detected on-site, particularly in the area directly downgradient of the former disposal basins and wastewater treatment/process area where elevated concentrations of VOCs and metals have been detected to a depth of about 26 feet. Many of the organic and inorganic contaminants detected in this shallow aquifer on-site also were reported at elevated concentrations in the same aquifer downgradient from the site. An organic groundwater contaminant plume is estimated to have migrated from the Liberty site about 8000 feet south with a width of about 700 feet (see notes on Figure 7). The deeper water-producing aquifer beneath the site is known as the Magothy Aquifer. At the site area, the Magothy Aquifer extends from about 85 feet to a depth of about 785 feet and consists of fine sand with thin beds and lenses of silt and clay. In the site area, groundwater in the Magothy Aquifer moves south and discharges into the south shore bays and the Atlantic Ocean. The Magothy formation is the main aquifer of use for public drinking water supply in Nassau County. The aquifer system underlying all of Long Island has been designated as a sole source aquifer because no other source of drinking water is available. The NYS DOH mandated monitoring of the county's public drinking water supply wells ensure continued compliance with all federal and state drinking water regulations.

A number of public drinking water supply wells have been identified within 2 miles downgradient/sidegradient of the Liberty site. The Magothy Aquifer is the source of groundwater for all of these active and/or inactive supply wells. During 1976 - 1978, low concentrations of several VOCs were detected in a public drinking water supply well (N-4042), about 4000 feet southwest (sidegradient) of the site. The concentrations of the VOCs detected were below the NYS and federal public drinking water guidelines/standards in effect at the time of this monitoring. Therefore, water quality data indicate water distributed from SFWD well No. N-4042 was of acceptable drinking water quality during monitoring. Contamination in this well probably is not related to the Liberty site. This well was placed into service in 1954; however, the full extent of contamination cannot be determined because of the limited water quality information generated before this well was taken out of service in 1978. The analytical testing for VOCs in drinking water did not become common until the late 1970s. Therefore, exposure may have resulted from the use of this well during 1954 - 1976, although data are not available to confirm that conclusion. An estimated 22,000 people may have been exposed to VOCs in the public drinking water supply well.

VOC concentrations detected at the wellhead would be expected to be further reduced during storage and after entering the distribution system, although point-of-use data are not available to

confirm this.

Biota (Fish) Exposure Pathway

Ingestion of fish from the upper Massapequa Reservoir is a completed human exposure pathway. Fishing in the upper Massapequa Reservoir is common, and people eat fish from this body of water. In 1991, the NYS DEC collected several fish species (edible fish) from the upper Massapequa Reservoir for pesticides and PCB analyses. Results of the fish tissue analysis showed elevated concentrations of chlordane and PCBs, particularly in the white perch specimens. A NYS DOH fish consumption advisory is in effect for the Upper Massapequa Reservoir. The main chemical of concern associated with the advisory is chlordane. Signs posted along the reservoir advise that women of childbearing age, infants, and children under age 15 years should not eat any fish from this body of water. Other people are advised to eat no more than one meal per month of white perch from the reservoir. Contaminants that bioaccumulate in fish or bioaccumulate through the food chain could result in exposure to people who eat fish caught in the upper Massapequa Reservoir. How many people may have been eating contaminated fish is unknown . The source(s) of PCBs and chlordane have not been determined; however, chlordane has not been identified as a chemical of concern at the Liberty site. Although PCBs were present in on-site soils, multiple sources probably contributed to their presence in the fish.

B. Potential Exposure Pathways

Groundwater Exposure Pathway

Groundwater contamination has been detected on-site in the Upper Glacial Aquifer and downgradient of the site in the Upper Glacial Aquifer and shallow portion of the Magothy Aquifer. Contaminants that have entered the groundwater beneath the site could be transported with the groundwater flow to on-site industrial wells and toward downgradient public or private supply wells. Three inactive industrial wells are located in the Liberty Industrial Park; two are completed in the Magothy Aquifer and one in the Upper Glacial Aquifer. Humans would not be expected to be exposed to contaminated groundwater supplied in the past by these wells because these wells were used for industrial purposes (i.e., cooling water) and not to supply drinking water. These wells were not sampled during the RI.

Because information is limited about the extent of contamination in the Magothy Aquifer downgradient of the site, the possibility cannot be dismissed that downgradient supply wells could be affected by site-related contamination. In the absence of monitoring and detection, this could expose 22,000 people. However, since 1988, all public supply wells have been and are tested quarterly for over 70 VOCs as required by the NC DOH. From 1977 through 1987, water from all public supply wells was tested annually for VOCs. Since the early 1970s, water from public supply wells has been tested annually for metals contamination. If contamination is detected, controls will be implemented to minimize the potential for further exposure through this pathway.

The SFWD public supply wells, which are about 7500 feet southwest (well N–6148) and 8000 feet south-southwest of the site (wells N–5147 and N–6149), and the Massepequa Water District wells, which are about 2 miles south-southwest of the site (wells N–4602, N–5703, N–8214, and N–9173) are not in the pathway of "Plume B." Plume B is the well-defined Upper Glacial unit plume, which is not site-related (Figure 8). On July 27 and August 17, 1999, Dames and Moore collected groundwater samples, with US EPA oversight, from five monitoring wells that had contained tetrachloroethene at levels above NYS DOH drinking water standards. Monitoring wells 20, 22A, 22B, 33B, and 34B were sampled in conjunction with "Plume B" in the draft RI report (Dames and Moore 3/30/99). Plume B appears to originate from one or more dry cleaning facilities along Main Street in Farmingdale north of the site. Plume B will continue to be monitored.

Soil Gas/Ambient Air Exposure Pathway

Shallow soil gas samples collected at the site indicate the presence of trichloroethene and tetrachloroethene at low concentrations. Soil gas, if released at the ground surface, could result in exposure to these VOCs; however, contaminant concentrations most likely would be further diluted by mixing with ambient air and volatilization to the atmosphere. In addition, a potential exists for these VOCs in soil gas to migrate through the subsurface and enter confined building spaces (basements) through crawl spaces, plumbing holes, other floor holes (e.g., sumps) and foundation cracks, and contaminate indoor air.

At this time, the soil gas/ambient air exposure pathway is considered a potential human exposure pathway because only limited quantitative data exist to fully evaluate this pathway. Soil gas has not been tested at off-site locations. Of particular concern is the potential for contaminated soil gas to migrate to the residential area along Motor Avenue. After the July 27 and August 17, 1999, Dames & Moore groundwater collection of MW-20, -22A and -22B, -33B and -34B, tetrachloroethene in soil gas within the footprint of the on- and off-site tetrachloroethene plume (Plume B) was determined to be related to off-gassing from the shallow portion of Plume B. The tetrachloroethene in off-gassing from Plume B is believed to be from an off-site upgradient source because of the many dry cleaners along Main Street north of the site (Figure 10).

The scope of the ambient air study conducted during the 1992 RI was limited and is not adequate to fully characterize the ambient air pathway. VOCs released to ambient air (breathing zone) are likely to disperse and be diluted at unconfined on-site and off-site areas. The extent of metals contamination in ambient air cannot be determined because the limited data collected during the 1992 RI were considered suspect.

Soil Exposure Pathway

Many contaminants related to past disposal of wastes at the site are migrating through the soils into the groundwater beneath the site. The RI identified numerous on-property source areas, including the former disposal basins, the sludge-drying bed, process areas, the Building B basement area, the northwest disposal area, the building M pad area, sanitary leaching fields, leaching chambers, transformer areas, and underground storage tanks. Past exposure pathways to an unknown number of people were possible from contamination of surface soils at the site.

The full extent of surface soil contamination at the site has not been determined; however, elevated concentrations of the PCB, Aroclor 1260, were present in the shallow (0 - 6 inches) soil at two of four areas where transformers are or were situated. Elevated concentrations of Aroclor 1254 also were detected in the soil at one other transformer area. These contaminants have an affinity for soils that reduces their mobility and lessens the potential for migration into the underlying groundwater. PCB-contaminated soils from these three transformer areas have been excavated and transported to an off-site facility for treatment and disposal. Before this removal action, a fence was constructed around an unfenced transformer pad area. However, before the fence was installed, trespassers and workers at the industrial park may have traveled across the transformer pad area and could have been exposed to the PCBs by direct contact with or incidental ingestion of the soil. The limited surficial soil data collected at the western portion of the site do not indicate the existence of contamination at levels of health concern. People will not be exposed to contaminated subsurface soils and sludges unless subsequent on-site excavation of soils is conducted.

C. Eliminated Exposure Pathways

Groundwater Exposure Pathway

VOC contamination has been detected in a downgradient private well used to irrigate lawns at Farmingdale High School. Ingestion of water distributed by the well is not known to be occurring or occurs limitedly and infrequently. Drinking water at the school is supplied by the public drinking water supply system. Because VOCs readily evaporate from water, VOCs in the well water will be diluted further in the ambient air because the lawn is irrigated by sprinklers. Any regular exposures to contaminants released by the irrigation system would occur through inhalation and dermal contact, both of which would be of short duration. Therefore, this exposure pathway is eliminated from further discussion. Although no private drinking water supply wells have been identified, this pathway will be reevaluated if such wells are identified.

Surface Water/Sediment Exposure Pathway

This human exposure pathway has been eliminated from further discussion in this public health assessment because none of the contaminants detected in the surface water and sediments of Massapequa Creek were found at levels that exceed public health assessment comparison values.

Soil Exposure Pathway

In the original PRAP, soil contaminated above soil cleanup levels was to remain on-site and be covered with a soil cover or cap. Residents were concerned about exposures to contaminants in the soil if the property was developed and subsurface contamination was brought to the surface. Residents also were concerned that the subsurface soil contamination would be a continuing source of groundwater contamination. After the January 9, 2002, PRAP meeting, US EPA revised a portion of the final remedy for the on-site soil contamination in response to these concerns. The March 28, 2002, Record of Decision calls for the evacuation and off-site disposal of all contaminated soils above groundwater protection levels, estimated at 73,110 cubic yards.

This will essentially remove the subsurface contamination associated with the hot spot areas on-site.

PUBLIC HEALTH IMPLICATIONS: ADULT AND CHILD HEALTH ISSUES

A. Toxicologic Evaluation

To evaluate the potential health risks from contaminants of concern that may be associated with the Liberty site, the NYS DOH assessed the risks for cancer and noncancer health effects. The health effects are related to contaminant concentration and exposure pathway, frequency, and duration. For additional information about how the NYS DOH determined and qualified health risks applicable to this health assessment, refer to Appendix C.

1. Past exposure of persons eating fish from the Massapequa Reservoir and its tributaries.

   Ingestion of fish from Massapequa Reservoir and its tributaries is a completed human exposure pathway. Chlordane and PCBs have been detected in fish from these waters; however, the source of these contaminants in the fish is unlikely to be attributable to the Liberty site. These two chemicals cause cancer in laboratory animals exposed to high levels over their lifetimes (ATSDR, 1994, 2000). Eating one fish per week for a lifetime with the average level of PCBs in fish from the Massapequa Reservoir and its tributaries could pose a high increased risk for cancer, whereas exposure to the average level of chlordane could pose a moderate increased risk for cancer. The risks would be lower for people who eat less fish from the reservoir.

   PCBs and chlordane also cause noncarcinogenic toxic effects. Human effects reported after chronic exposures to PCBs include skin, eye, and respiratory tract irritation (ATSDR, 2000). A mother's increased exposure to PCBs may be linked with slight effects on her child's birthweight and behavior (ATSDR, 2000; Rogan and Gladen, 1991, 1992). Studies of women exposed to relatively high levels of PCBs in the workplace suggested their babies might weigh less than babies born to women exposed to lower concentrations. Children born to women who ate fish contaminated with PCBs before and during pregnancy had lower scores on tests measuring gross and fine motor coordination. PCBs also have caused skin, liver, nervous system, immune system, and reproductive effects in animals (ATSDR, 2000). The primary adverse noncarcinogenic effects from exposure to elevated levels of chlordane are liver and central nervous system damage (ATSDR, 1994). Chemicals that cause adverse effects in humans and/or animals after high-level exposure also may increase the risk of adverse health effects in humans exposed to lower levels over long periods of time. Although the risks for noncarcinogenic effects from possible exposure to contaminated fish are not completely understood, data suggest that they could be high for PCBs and low for chlordane for people who eat one fish a week from the reservoir. The risks would be lower for people who eat fewer fish from the reservoir.

2. Past ingestion, dermal, and inhalation exposure to organic contaminants in a public water supply well.

For an undetermined period (fewer than 24 years) a public drinking water supply well (N-4042) near the Liberty site was contaminated with organic chemicals. Because this well is sidegradient to the site, the contamination probably is not attributable to the site. Contaminant levels in this well were reported from 1976 to 1978. Contaminant levels in drinking water before this time are not known. The highest levels of 1,1,1-trichloroethane (14 mcg/L), 1,1-dichloroethane (10 mcg/L), 1,2-dichloroethane (8 mcg/L), trichloroethene (16 mcg/L) and benzene (30 mcg/L) exceeded present NYS public drinking water standards and/or PHA comparison values for each of these chemicals (Table 8) and, therefore, these contaminants have been selected for further evaluation (see below). This public water supply well, which opened in 1954, has not been used since 1978. Chronic exposure to chemicals in drinking water is possible by ingestion, dermal contact, and inhalation from water uses such as showering, bathing, and cooking. Although exposure varies depending on an individual's lifestyle, each of these exposure routes contributes to the overall daily uptake of contaminants and increases the potential for harmful health effects.

Benzene is a known human carcinogen (ATSDR, 1993b). Chronic exposure to the highest level of benzene in public water supply well N-4042 would pose a low increased cancer risk. Trichloroethene and 1,2-dichloroethane cause cancer in laboratory animals exposed to high levels over their lifetimes (ATSDR, 1992a; 1993l). Chemicals that cause cancer in laboratory animals also may increase the risk for cancer in humans exposed to lower levels over long periods. Whether these chemicals cause cancer in humans is not known. The results of animal studies and limited sampling of this public water supply well suggest that persons exposed to drinking water contaminated with trichloroethene and 1,2-dichloroethane could have a low increased risk of developing cancer. Toxicologic data are inadequate to assess the carcinogenic potential of 1,1,1-trichloroethane and 1,1-dichloroethane (ATSDR, 1990b; 1993k), although US EPA has classified the latter chemical as a possible human carcinogen. The determination of low increased cancer risk from exposure to VOCs (i.e., benzene, trichloroethene and 1,2-dichloroethane) in drinking water is based on an exposure period of up to 24 years (from 1954, when the well was placed in service, until 1978, when its use was discontinued) and at the highest concentration each VOC was detected during the 1976-1978 monitoring.

The chlorinated contaminants 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethane, and trichloroethene also produce noncarcinogenic toxic effects, primarily to the liver, kidneys, and nervous system. Benzene causes damage to blood-cell-forming tissues and to the immune system. All these contaminants produce their effects after exposures that are several orders of magnitude greater than estimated past exposures to these chemicals in drinking water from residential wells. Chemicals that cause health effects in humans and/or animals after high levels of exposure also may pose a risk to humans exposed to lower levels over long periods. Although the risks for noncarcinogenic effects from past exposures are not completely understood, the existing data suggest that

they would be low for benzene and minimal for 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethane, and trichloroethene.

3. Potential ingestion, dermal, and inhalation exposure to contaminants in drinking water because of future contaminant migration.

On-site and off-site groundwater is contaminated with organic chemicals and metals at concentrations that exceed NYS drinking water standards or PHA comparison values (Tables 3, 6, 8). Therefore, these chemicals have been selected for further evaluation (see below). Municipal and unidentified private drinking water supply wells could become contaminated by on-site and off-site groundwater contaminant migration. Municipal wells are tested to ensure the water distributed meets federal and state drinking water standards.

Organic Compounds:

Vinyl chloride and benzene are known human carcinogens (ATSDR, 1993b,m). Chronic exposure to the highest level of vinyl chloride detected in off-site groundwater could pose a high increased risk for cancer, whereas exposure to the highest level of benzene detected in on-site groundwater could pose a low increased risk for cancer. However, the low frequency of detection of these two contaminants (Tables 3 and 6) suggests that the levels of exposure to them should be reduced, and consequently, the cancer risks they pose also should be considerably reduced. Trichloroethene, tetrachloroethene, bis(2-ethylhexyl)phthalate, and dieldrin detected in both on-site and off-site groundwater; 1,2-dichloropropane, 1,1,2-trichloroethane, and pentachlorophenol detected in on-site groundwater; and methylene chloride, 1,1-dichloroethene, heptachlor epoxide, and chlordane detected in off-site groundwater are chemicals that cause cancer in laboratory animals exposed to high levels over their lifetimes (ATSDR, 1989a,b; 1991a,c; 1994,c,d; 1993f,j,l). Results of animal studies indicate that chronic exposure to trichloroethene, bis(2-ethylhexyl)phthalate, 1,2-dichloropropane, 1,1,2-trichloroethane, tetrachloroethene, dieldrin, and pentachlorophenol at the highest levels found in on-site groundwater, could pose a combined high increased risk for cancer. In addition, exposure to methylene chloride, trichloroethane, tetrachloroethene, bis(2-ethylhexyl)phthalate, heptachlor epoxide, dieldrin, and chlordane at the highest levels found in off-site groundwater could pose a combined high increased risk for cancer. Exposure to 1,1-dichloroethene, which also was detected in off-site groundwater, could pose a moderate increased risk for cancer. Toxicologic data are inadequate to assess the carcinogenic potential of chlorobenzene, 1,1-dichloroethane, 1,2-dichloroethene, and 1,1,1-trichloroethane (ATSDR, 1990a,b,c; 1993) (Tables 3 and 6).

Ten contaminants in on-site and/or off-site groundwater that exceed either NYS drinking water standards or noncancer public health assessment comparison values and consequently were selected for further evaluation (see below): vinyl chloride, trichloroethene, 1,2-dichloroethene, methylene chloride, chloro-benzene, 1,1-dichloroethane, 1,1,1-trichloroethane, tetrachloroethene, pentachloro-phenol, and bis(2-ethylhexyl)phthalate. These contaminants all produce noncarcinogenic toxic

effects, primarily to the liver, kidneys, and central nervous system. Bis(2-ethylhexyl) phthalate can adversely affect the male reproductive system (ATSDR, 1993f). Vinyl chloride causes noncarcinogenic effects at exposure levels about five times greater than potential exposure from off-site groundwater; the other contaminants produce their noncarcinogenic effects at exposure levels several orders of magnitude greater than potential exposure to these chemicals in on-site and/or off-site groundwater. Although the risks for noncarcinogenic effects from potential exposure to contaminants in drinking water are not completely understood, the data suggest they could be high for 1,2-dichloroethene and trichloroethene, and minimal for vinyl chloride, chlorobenzene, 1,1-dichloroethane, methylene chloride, 1,1,1-trichloroethane, tetrachloroethene, pentachlorophenol, and bis(2-ethylhexyl)phthalate.

Inorganic Contaminants:

Inorganic contaminants of potential concern in on-site and/or off-site groundwater are arsenic, aluminum, cadmium, chromium, iron, manganese, nickel, sodium, thallium, and cyanide. The following summarizes the potential health effects from exposure to these inorganic chemicals which, except for cyanide, are all metals.

Arsenic is a known human carcinogen. Studies of people exposed to high levels of arsenic in drinking water in foreign countries provide evidence of an association between arsenic ingestion and skin cancer. The scientific community debates about the quantitative uncertainties in US EPA's cancer potency factor and epidemiologic studies of Taiwanese populations exposed to arsenic in drinking water (ATSDR, 1993a). The data suggest that, if drinking water were contaminated with arsenic from on-site and/or off-site groundwater, exposure to this metal could pose a low increased risk for cancer (Tables 3 and 6).

Although little is known about the chronic toxicity of aluminum in humans, some toxicity studies of animals indicate that aluminum may cause nerve and skeletal damage and may adversely affect the reproductive system (NYS DOH, 1990a). The most sensitive effect from chronic elevated exposure to cadmium is kidney damage (ATSDR, 1993c). The primary toxic effects associated with ingestion of large amounts of chromium are kidney damage, birth defects, and adverse effects on the reproductive system (ATSDR, 1993d). Although iron is an essential nutrient, ingestion of large amounts can lead to iron toxicity characterized primarily by gastrointestinal effects (Henretig and Temple, 1984). Its presence in drinking water, however, is objectionable primarily because of its affect on taste and staining of laundry and plumbing fixtures (WHO, 1984). Exposure to high manganese concentrations primarily causes nervous system effects (ATSDR, 1991b). Exposure to high levels of nickel can cause reproductive effects and allergic reactions (ATSDR, 1993h). The main health concern about sodium ingestion is its association with high blood pressure and possibly heart disease (WHO, 1984). Chronic exposure to elevated levels of thallium can adversely affect the respiratory, cardiovascular and gastrointestinal systems, liver, kidneys, and male reproductive system (ATSDR, 1992d). The primary effects associated with exposure to elevated levels of cyanide are blood cell changes and central nervous system effects (ATSDR, 1993e). Chronic exposure to

drinking water contaminated with manganese and thallium at the highest concentrations found in on-site and off-site groundwater monitoring wells would pose a high risk for adverse health effects; chronic exposure to cadmium, chromium, and sodium would pose a low noncancer risk. The remaining metal contaminants, as well as cyanide, would pose a minimal increased risk for adverse health effects.

4. Potential inhalation exposure to migrating on-site soil gas.

Contamination of soil gas by trichloroethene and tetrachloroethene was confirmed in certain areas of the site. As previously discussed, trichloroethene and tetrachloroethene are considered potential human carcinogens and can produce noncarcinogenic toxic effects, primarily to the liver, kidneys, and central nervous system. The health risks from trichloroethene and tetrachloroethene are indeterminate because of inadequate data on current potential exposure to these chemicals in migrating soil gas.

5. Past potential ingestion and dermal contact exposure to contaminants in soil at on-site transformer areas.

Surface soil at three on-site areas where transformers are or were situated were contaminated with PCBs at elevated levels as high as 18,000 mg/kg which exceed PHA comparison values for these soil contaminants (Table 7). PCB-contaminated soils have been excavated and removed from these three areas. Before this removal and before a fence was constructed around the transformer pad area, trespassers and workers may have traveled across the area and could have been exposed to the PCBs by unintentionally eating soil or by absorbing PCBs through the skin. One important factor is that the amount of soil-bound PCBs absorbed through skin is relatively low, particularly compared with absorption after ingestion. Studies in animals and humans consistently show that about 90% or more of ingested PCBs (not bound to soil) are absorbed into the body (ATSDR, 1998). A study with rats suggests that the percentage of absorption of soil-bound PCBs when ingested is 70% - 90% (Fries et al., 1989). In contrast, an estimate of the percentage of absorption of soil-bound PCBs (as Aroclor 1242 or Aroclor 1254) applied to monkey skin is about 14% (Wester et al., 1993). Exposure to the PCB-contaminated soil could pose an increased risk for carcinogenic and noncarcinogenic effects. The PCB contamination was confined to the transformer areas and may not represent potential exposures for other areas of the site. In addition, no specific exposure information exists for trespassers at the site. Because of these uncertainties, the magnitude of the health risks cannot reliably be determined.

B. Health Outcome Data Evaluation

NYS DOH conducted three studies on cancer incidence in ZIP codes 11701, 11735, 11758, and 11762. The first study, completed in 1992, investigated the incidence of Hodgkin disease in the area and found no significant excess of the disease in either males or females for 1978 - 1987. A follow-up study of Hodgkin disease in this area covering 1980 - 1989 was completed in 1994. Overall rates of Hodgkin disease were not significantly elevated in either males or females;

however, when the number of Hodgkin disease cases was examined by year, an apparent excess of cases was observed among females during the last 2 years of the study. Further testing indicated a disproportionate number of these cases were located in ZIP codes 11735 and 11758. The third study investigated all cancers in the area for 1983 - 1992, with additional follow-up of bladder cancer and Hodgkin disease incidence for 1993 - 1997. No cancers were significantly elevated among any specific cancer sites for the study area as a whole. However, a statistically significant excess of bladder cancer was found for ZIP code 11735 among both males and females for 1983 - 1992. In the follow-up, no significant excess of bladder cancer was observed in any ZIP code for 1993 - 1997. Taken together these studies suggest that before 1988 no significant excesses of Hodgkin disease existed in the area; however, during 1988 - 1992 significant excesses of Hodgkin disease and bladder cancer were noted in ZIP codes 11758 and 11735, which includes the Liberty site. The most recent study showed that, in the latest period examined (1993 - 1997) significant excesses of Hodgkin disease or bladder cancer no longer existed in the area.

Rates of cancer that occur naturally over time and space vary. Year-to-year fluctuations in cancer rates in a small community, such as an individual ZIP code, are not unusual and the significant results observed in these studies could be due simply to chance fluctuations. Variation in cancer incidence also may be due to differences in diagnosing, treatment, and reporting of cancers across the state. In addition, because of the number of individual tests conducted (one for each type of cancer, for each sex, in each ZIP code, in each time period), several tests would be expected to have statistically significant results even though the differences between the observed and expected rates were due entirely to random fluctuations in the data alone.

Proving that the cancer incidence rate in a community is associated with a specific environmental contaminant is difficult. Generally studies are limited by lack of information about individual water use and consumption, lack of control for confounding variables, and exposures to numerous contaminants. Some evidence indicates that two of the chemicals evaluated for past exposures in public water supplies may cause cancers of the hematopoietic system, which were elevated in some of the ZIP codes. Benzene is considered a human carcinogen because of increased incidence of leukemia among workers who breathed high levels of the chemical in air over long periods. Also, studies of people exposed to trichloroethene in drinking water showed a higher risk for hematopoietic cancers (e.g., leukemia, non-Hodgkin lymphoma and Hodgkin disease), but these studies have inadequate individual exposure information and did not account for several confounding variables, including exposure to other chemicals in the drinking water. The epidemiologic data, although limited, do not suggest that these public water contaminants cause human bladder cancer. The NYS DOH investigations of the four ZIP codes cannot determine whether any of the increased incidence of cancer in the ZIP codes is due to a specific environmental contaminant because, by design, NYS DOH examined only cancer incidence and did not evaluate exposures.

C. Community Health Concerns Evaluation

We have addressed each of the community concerns about health as follows:

1. Residents are concerned about an apparent excess of Hodgkin disease in the community near the Liberty site.
   NYS DOH conducted three studies on cancer incidence in ZIP codes 11701, 11735, 11758, and 11762. Taken together these studies suggest that before 1988 no significant excesses of Hodgkin disease occurred in the area; however, during 1988 - 1992, significant excesses of Hodgkin disease and bladder cancer were noted in ZIP codes 11758 and 11735, which includes the Liberty site. The most recent study showed that, during the latest period examined (1993 - 1997), significant excesses of Hodgkin disease or bladder cancer no longer were evident in the area. The NYS DOH investigations of the four ZIP codes cannot determine whether any of the increased incidence of cancer in the ZIP codes is due to a specific environmental contaminant because, by design, NYS DOH examined only cancer incidence and did not evaluate exposures. This question is discussed in more detail in of the Health Outcome Data Evaluation section.

2. Local residents have asked about possible contamination at or near the Ellsworth-Allen Park, a public recreation area.

   During the RI, a geophysical survey (to determine the presence of underground features such as drums), a soil gas survey (to determine the presence of VOCs in the soil), and sampling of shallow soil were conducted at a portion of the Ellsworth-Allen Park. The purpose of the soil sampling was to evaluate the alleged dumping of methyl mercury diisocyante in the park. The test results for the soil samples are included in Table 2 (Off-site Hand Auger samples) and discussed in the Off-Site Contamination section of this assessment. The area of investigation consisted of a former disturbed area with soil piles shown on a historical aerial photograph from 1966. This area corresponds to the current location of the baseball field closest to the Liberty property boundary (Figure 1). None of the field activities conducted in this area revealed any significant evidence of organic or inorganic (including mercury) contamination. The groundwater directly downgradient of the park does not contain any contaminants at concentrations exceeding PHA comparison values. Therefore, we believe the park is not contaminated with site-related constituents.

3. Residents have been concerned for many years about health risks posed to the local community from contamination at the site.

   To evaluate the potential health risks from contaminants of concern associated with the Liberty site, the NYS DOH assessed the risks for cancer and noncancer health effects. This toxicologic evaluation is included in the Public Health Implications section of this assessment. The health risks posed to residents near the site involve potential inhalation exposure to migrating on-site soil gas and potential ingestion, dermal contact, and inhalation exposure to contaminants in on-site soil. No data exist on off-site soil gas concentrations. The potential exists for site-related contamination to migrate to downgradient drinking water supply wells. No downgradient private drinking water supply wells are known in the area. Downgradient public drinking water supply wells in operation are not contaminated. Routine monitoring of the public drinking water supply wells will detect any site-related contamination, and measures will be taken to control it

and avert any ingestion exposure to the supply.

4. Residents were concerned that contaminated soils remaining on-site under US EPA proposed soil cover (cap) would continue to contaminate groundwater and act as a potential source of dermal exposure if subsurface contamination is brought to the surface during redevelopment activities on the site.

   In March 2002, US EPA changed a portion of the final remedy for cleanup of the on-site soils. The initial remedy called for excavation and off-site disposal of 25,600 cubic yards (cu. yds.) of the most highly contaminated soil, followed by capping of the remaining soils that contained contaminants in excess of soil cleanup levels. The final remedy calls for excavation and off-site disposal of all contaminated soils above groundwater protection levels. This is estimated to include 73,100 cu.yds of soil, which essentially will remove the subsurface contamination that the residents had requested.

CONCLUSIONS

1. ATSDR's present public health hazard category classification (Appendix D), and potential exposures to PCBs and VOCs indicate that an indeterminate public health hazard existed in the past. Past exposure pathways were possible from contamination of the surface soils with PCBs at one or more transformer pad areas. Exposure to PCB-contaminated soils at three on-site transformer areas has been abated by the recent completion of a US EPA action involving the excavation and removal of the contaminated soil. A supplemental RI is ongoing to determine the extent of contamination at the eastern portion of the site.

   Also, people may have been exposed to levels of VOC contaminants in their drinking water that, upon long-term exposure, could result in a low increased risk for cancer. However, the source of the contamination was not determined and could be other than the Liberty site. Low levels of VOCs were detected in a sidegradient public drinking water supply well during 1976 - 1978. This well operated for about 24 years before closing in 1978; however, the presence and extent of VOC contamination in the well before 1976 cannot be determined.

   On-site and downgradient groundwater monitoring wells are contaminated with organic compounds and metals at concentrations that exceed drinking water standards. Currently operating downgradient public drinking water supply wells are not contaminated; the water supply wells are monitored routinely. A supplemental RI is being conducted to determine the extent of contamination in the deeper Magothy Aquifer downgradient from the site.

2. The information reviewed indicates the Liberty site currently poses no apparent public health hazard. The limited surface soil data for the western portion of the site do not represent a public health concern provided site use remains industrial/commercial. The site was and remains zoned for light industry. On-site soil gas contains low levels of

VOCs that have the potential to migrate off-site by underground utilities. Soil gas samples have not been collected from residential areas near the site to assess the presence of VOCs from the site. An off-site soil gas investigation is proposed along the Motor Avenue residential area.

3. In 1991, the NYS DEC collected fish from Massepequa Reservoir for pesticides and PCB analyses. The fish, particularly white perch, contained elevated concentrations of chlordane and PCBs. Although the source(s) of this contamination has not been determined, it probably is not attributable to the site. This conclusion is supported by the infrequent detection of chlordane at exceedingly low concentrations in subsurface soils at the site but not in groundwater samples. Furthermore, even though PCBs were present in soils at the site, these compounds tend to bind to soil and therefore, would be unlikely to migrate off the site. A NYS DOH sportfish consumption advisory is in effect for the Upper Massapequa Reservoir.

4. Elevated concentrations of Aroclor 1260 and Aroclor 1254, PCB mixtures, were detected in the shallow (0 - 6 feet) soil at three transformer areas on-site. These soils were excavated and removed from the site.

5. Site-security measures by US EPA have not been completely successful. Additional fencing has been installed, and existing fencing has been repaired to prevent trespassers from entering the site, particularly the inactive western portion. Vandals continually destroy sections of fencing to gain access to the site.

6. Local residents are concerned about health risks posed to the community from contamination at the site. Residents also suspect an excess of Hodgkin disease in the community near the Liberty site resulting from exposure to contaminants from the site. NYS DOH conducted three studies on cancer incidence in ZIP codes 11701, 11735, 11758, and 11762. Taken together, these studies suggest that before 1988 no significant excesses of Hodgkin disease existed in the area; however, during 1988 - 1992, significant excesses of Hodgkin disease and bladder cancer were noted in ZIP codes 11758 and 11735, which includes the Liberty site. The most recent study showed that, in the latest period examined (1993 - 1997), significant excesses of Hodgkin disease or bladder cancer no longer existed in the area. The NYS DOH investigations of the four ZIP codes cannot determine whether any of the increased incidence of cancer in the ZIP codes is due to a specific environmental contaminant because, by design, they examined only cancer incidence and did not evaluate exposures.

RECOMMENDATIONS

1. Public drinking water supply wells downgradient of the site should continue to be monitored to determine whether they are being affected by site-related contaminants. This monitoring is mandated by the State of New York and the federal government. If any contamination advances to any of these wells, measures should be taken to control it.
2. Groundwater quality needs to be monitored downgradient from the site and in the general

path of groundwater flow. Additional monitoring wells should be installed to determine the extent of site-related contamination in the deeper Magothy Aquifer.

3. Additional soil gas measurements should be taken near the dwellings at homes opposite the site along Motor Avenue because of the potential for site-related contaminants to impact indoor air quality. These data should determine the need to conduct indoor air sampling. US EPA has proposed an off-site soil gas investigation.

4. Additional sampling of surface soil should be done during the design phase of the remedial program, as stated in the Record of Decision, to ensure the western portion of the site is acceptable for recreational use.

5. Site security measures need to be improved to control ongoing trespassing.

6. The NYS DOH sportfish consumption advisory for the Upper Massapequa Reservoir should remain in effect until the PCBs and chlordane concentrations in the fish decrease to acceptable levels.

7. The eastern portion of the site should be restricted to industrial and appropriate commercial use.

PUBLIC HEALTH ACTION PLAN

The PHAP for the Liberty site contains a description of actions to be at and near the site, after completion of this PHA. See the Background section of this PHA for actions already taken at the site. The purpose of the PHAP is to ensure that this PHA not only identifies public health hazards but also provides a plan of action to mitigate and prevent adverse human health effects resulting from past, present, and/or future exposures to hazardous substances at or near the site. Included is a commitment by ATSDR and/or the NYS DOH to follow up on this plan to ensure its implementation. The public health actions to be implemented are as follows:

1. US EPA has begun field work for the supplemental groundwater RI. The installation of additional monitoring wells is in progress. This investigation will further characterize the downgradient groundwater quality in the Magothy Aquifer. The results of this investigation will be evaluated to determine potential source(s) of contamination in the site area. As part of the supplemental RI, a soil gas survey will be conducted at the eastern portion of the site and at selected locations along the south side of Motor Avenue.

2. ATSDR and NYS DOH will coordinate with the appropriate agencies regarding actions to be taken in response to recommendations in this PHA for which no plan has yet been developed.

3. ATSDR and NYS DOH will provide follow-up to the PHAP, outlining the actions completed and those in progress. This report will be placed in repositories that contain copies of this PHA and will be provided to persons who request it.

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

CERTIFICATION

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

Technical Project Officer, SPAB, DHAC

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

for RE

Team Leader, CAT, SPAB, DHAC, ATSDR

PREPARERS OF THE REPORT

New York State Department of Health Authors

Jacquelyn Nealon
Public Health Specialist II
Bureau of Environmental Exposure Investigation
New York State Department of Health

John Olm
Public Health Specialist III
Bureau of Environmental Exposure Investigation
New York State Department of Health

and

Joel Kaplan
Research Scientist II
Bureau of Toxic Substance Assessment
New York State Department of Health

Agency for Toxic Substances and Disease Registry

Senior Regional Representative:
Arthur Block
Regional Services
Office of the Assistant Administrator

Technical Project Officer:
Greg Ulirsch
Technical Project Officer
Division of Health Assessment & Consultation
Superfund Site Assessment Branch

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