ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Public Health Assessment for

JACKSON STEEL PRODUCTS, INC.
HEMPSTEAD, NASSAU COUNTY, NEW YORK
EPA FACILITY ID: NYD001344456
MARCH 15, 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

JACKSON STEEL PRODUCTS, INC.

HEMPSTEAD, NASSAU COUNTY, NEW YORK

EPA FACILITY ID: NYD001344456

Prepared by:

New York Department of Health
Center for Environmental Health
Under a Cooperative Agreement with
The U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Superfund and Program Assessment Branch
Atlanta, Georgia

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SUMMARY

The Jackson Steel site is on First Street, off Herricks Road in a light industrial area of the Town of North Hempstead, Nassau County, New York. Jackson Steel Products, Inc. manufactured custom rolled steel products and shaped metal from 1978 through 1991. The company used chlorinated solvents as degreasers, and oils as lubricants and cutting fluids.

An environmental consulting firm investigated the Jackson Steel site between 1991 and 1994 and found subsurface soil and groundwater contamination on-site. Subsurface soil and groundwater were contaminated with chlorinated solvents, primarily tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, and petroleum constituents. The US. Environmental Protection Agency (US EPA) investigated on-site soils and on-site and off-site groundwater during the summer of 2002, but off-site groundwater sampling was very limited. The New York State Department of Health (NYS DOH) and the Nassau County Department of Health (NC DOH), however, have data characterizing area groundwater. The NC DOH maintains records of monitoring data for public water supply wells, including raw water (water before it is treated) data.

The New York State Department of Environmental Conservation (NYS DEC) studied area groundwater during an investigation of the nearby 150 Fulton Avenue/Garden City Park Industrial Area (GCPIA). Because the Jackson Steel site is close to the GCPIA, some of the same public supply wells within the 6-square-mile groundwater study area may be affected by groundwater contamination from Jackson Steel. Groundwater downgradient of the GCPIA and the Jackson Steel site is contaminated with volatile organic compounds (VOCs), primarily tetrachloroethene and trichloroethene. One Village of Garden City Park public water supply well is downgradient of the Jackson Steel site and one Mineola Village well is side gradient to the east of the site. Both wells are contaminated and use air strippers to remove VOC contamination prior to distribution. Contamination affecting these wells may be attributable to the Jackson Steel site based on the existing environmental sampling data. Though the VOCs (tetrachloroethene and trichloroethene) detected in soils and groundwater at the Jackson Steel site are the same VOCs detected in the nearby public water supply wells, more information is needed to identify the source of off-site groundwater contamination. The treatment systems for both public water supply wells are being upgraded to minimize possible exposures to groundwater contamination. Further information regarding this groundwater investigation can be found in the Agency for Toxic Substance and Disease Registry (ATSDR) Public Health Assessment for 150 Fulton Avenue/Garden City Park (ATSDR, 2002).

Inhalation of tetrachloroethene in indoor air was a completed exposure pathway in the past related to the contamination at the Jackson Steel site. Site-related contaminants in soil gas infiltrated buildings adjacent to the Jackson Steel facility: the Tutor Time Daycare Center and Shooters Billiards Club, both on Herricks Road. The NC DOH sampled the Tutor Time Daycare Center in December 2001, and US EPA sampled the Tutor Time Daycare Center and Shooters Billiards Club in January 2002. Samples of indoor air from both buildings contained tetrachloroethene at levels above the NYS DOH indoor air guideline of 100 micrograms per cubic meter (mcg/m^3). In January 2002, the Tutor Time Daycare Center changed the heating/ventilation/air conditioning system to increase outside (fresh) air into the building to 20%. Prior to this change no measurable percentage of fresh air was entering the building. Also in January 2002, US EPA installed sub-

floor slab trenches with a vacuum extraction system around Tutor Time Daycare Center and Shooters Billiard Club. Changing the air conditioning system and installing the sub-floor trenches effectively reduced the tetrachloroethene to levels below the NYS DOH indoor air guideline. US EPA has performed operation and monitoring activities to prevent further soil gas migration into the buildings.

Public health implications were evaluated by estimating the risks for cancer or noncancer health effects from tetrachloroethene inhalation exposures at the Tutor Time Daycare Center. The risk for developing health effects depends on contaminant concentrations and exposure routes, frequency and duration. On the basis of the levels found in the limited indoor air sampling and the frequency and duration of exposure to the air contaminants, the risk for developing cancer from tetrachloroethene inhalation exposure is low for children, staff, and parents involved with the daycare. The risk for developing a noncancer health effect is considered minimal for the same population.

Children and the developing fetus may have an increased sensitivity to tetrachloroethene compared to adults. However, the estimated levels of exposure to tetrachloroethene in indoor air near the Jackson Steel site prior to the start of remedial measures are about 300 times lower than exposure levels that cause adverse developmental effects in animals.

Sampling of indoor air at the Tutor Time facility by US EPA on February 14, 2002, and April 4, 2002, also detected additional VOCs above the NYS DOH and Federal databases for background levels in indoor air. These VOCs were naphthalene, dichlorobenzene, 1,2-dichloroethane, benzene, bromoform, carbon tetrachloride, ethylbenzene, n–hexane, toluene, and xylene. An inventory of chemicals used and stored at the Tutor Time Daycare Center was not taken. Such an inventory would have helped to determine what chemicals are associated with Jackson Steel and what chemicals were used at or within the Tutor Time Daycare Center. Additional sampling done by US EPA on April 4, 2002, suggests that these chemicals could be components of commercial cleaning products. The health risks for exposure to these chemicals, except xylene, dichlorobenzene, n-hexane, and toluene, are summarized in the "Toxicologic and Epidemiologic Evaluation" section of this document under "Past Exposures to Other Contaminants." Xylene, dichlorobenzene, n-hexane, and toluene levels, though above background, did not exceed public health assessment comparison values so were not further discussed.

NYS DOH has not previously evaluated health outcome databases specifically for the Jackson Steel site. NYS DOH maintains several health outcome databases, which could be used to generate health outcome data for a specific area, if appropriate. These databases include the Cancer Registry, the Congenital Malformations Registry, Vital Records (birth and death certificates), and hospital discharge information. NYS DOH has not conducted an evaluation using these health outcome databases for this specific site because the number of individuals exposed to tetrachloroethene at Tutor Time Daycare facility is relatively small and the exposures are not associated with a specific geographic area.

NYS DOH is providing the opportunity for children who attended the Tutor Time Daycare Center and employees of the daycare center to be included in the New York State Volatile Organic Compounds Exposure Registry (VOC Registry). The VOC Exposure Registry is a statewide

project used to help evaluate exposures and health status for people who were exposed to VOCs in drinking water and in indoor air. Enrollment in the registry involves completing a survey about possible exposures to VOCs, the health status of each exposed person, and other factors related to health, such as exposure to tobacco smoke. Families and employees who choose to enroll will then be contacted approximately every 2 years to update address information and monitor changes in health status.

Community members are concerned about exposure to possible contamination in the water from public supply wells near the Jackson Steel site. Families and employees are concerned about exposures in the past from indoor air contaminants at the former Tutor Time Daycare Center. Parents of children who attended the Tutor Time Daycare Center have concerns about possible long-term health effects. NYS DOH, US EPA, NYS Office of Children and Family Services (OCFS) and the NC DOH held informational meetings on February 13, 2002, and May 8, 2002, to discuss indoor air quality issues at the Tutor Time Daycare Center. Community concerns are further addressed in the "Community Health Concerns" portion of this document.

Because indoor air exposure to tetrachloroethene above 100 mcg/m^3 occurred in the past at the Tutor Time Daycare Center, public health actions were needed and were taken in January of 2002 to reduce the levels of tetrachloroethene within the facility. A subsurface slab ventilation system, put in place in January 2002, reduced indoor air exposures to tetrachloroethene at the Tutor Time Daycare Center and the Shooters Billiards Club. The businesses' leaving their buildings, Tutor Time Daycare Center in April 2002, and Shooters Billiards Club in December 2002, eliminated indoor air exposures to site-related contaminants.

The property owner of the building that housed the Tutor Time Daycare Center had intended to reopen the facility as a new daycare center. In January of 2003, NC DOH recommended to the NYS OCFS that a license to operate a daycare facility be denied until the soil gas issues associated with Jackson Steel have been resolved. Consequently, later in January of 2003, NYS OCFS denied the permit. In spring 2004, the Dollar Experience, a discount merchandise store, opened in the space formerly occupied by the Shooters Billiards Club. US EPA inspected the ventilation and vacuum extraction system in place to reduce tetrachloroethene indoor air contamination and collected indoor and ambient air samples from the new store in August 2004. No tetrachloroethene was detected above background levels.

US EPA should investigate the off-site groundwater contamination from the Jackson Steel site to determine if site-related groundwater contamination is affecting nearby public water supply wells. Although VOC contamination was detected in on-site drywells and groundwater, the full extent of groundwater contamination attributed to releases from the Jackson Steel site cannot be determined from the existing on-site and off-site environmental investigations conducted to date. Because the data are insufficient to determine whether the Jackson Steel site contributed to the contamination affecting public water supply wells, the site is an indeterminate public health hazard.

PURPOSE AND HEALTH ISSUES

This public health assessment (PHA) evaluates past, current and potential future exposures to site-related contaminants, physical hazards, and other conditions related to the Jackson Steel site. This PHA fulfills the congressional mandate that requires a public health assessment for each site proposed to the National Priorities List (NPL). The New York State Department of Health (NYS DOH), under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), conducted this evaluation. More specifically, ATSDR, a federal agency within the U.S. Department of Health and Human Services, and NYS DOH determine whether adverse health effects are possible and recommend actions to reduce or prevent possible adverse health effects. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, authorizes ATSDR to conduct public health assessments at inactive hazardous waste disposal sites proposed for the NPL. The Jackson Steel site was proposed for the NPL in October 1999 and listed on the NPL in February 2000.

BACKGROUND

A. Site Description and History

The Jackson Steel site is at 435 First Street in the Town of North Hempstead, Nassau County, New York. The site is about 1,000 feet east of the 150 Fulton Avenue inactive hazardous waste disposal site which is in the 65 acre Garden City Park Industrial Area (GCPIA). The Jackson Steel property, about 1.4 acres, is on the southern side of First Street and the eastern side of Herricks Road. Long Island Railroad tracks border the site to the south (Figure 1). A one-story brick building (39,000 square feet) covers a majority of the site. Paved parking and loading areas cover the remaining portions.

Jackson Steel Products, Inc., manufactured custom rolled steel products and shaped metal from 1978 through 1991. The company used oils as lubricants and cutting fluids and the following chlorinated solvents as degreasing agents: tetrachloroethene (also known as Perc or PCE), trichloroethene (also known as TCE), and 1,1,1-trichloroethane, (also known as1,1,1-TCA). The company used 9,400 gallons of tetrachloroethene between 1978 and 1982 and 2,000 gallons of 1,1,1-trichloroethane between 1982 and 1983 (Geraghty & Miller, Inc., 1992). The degreasing process reportedly was discontinued in 1985. One Village of Garden City public water supply well is downgradient of the Jackson Steel site and one Mineola Village public water supply well is side gradient to the east of the site. Both supply wells contain volatile organic compounds (VOCs) in their raw (before treatment) water at concentrations above current state and federal public drinking water standards. The affected wells use air stripping treatment systems to meet NYS DOH drinking water standards. The public health assessment (PHA) for the 150 Fulton Avenue/Garden City Park Industrial Area (GCPIA) summarizes the results of the investigations of groundwater contamination in and around the 150 Fulton Avenue/Garden City Park Industrial Area (ATSDR, 2002). The Jackson Steel site is 1,000 feet east of the 150 Fulton Avenue hazardous waste disposal site. Contamination from the Jackson Steel site may affect similar

public water supply wells that are also potentially affected by contamination from the GCPIA. Therefore, the discussion of groundwater contamination downgradient from GCPIA, as presented in the 150 Fulton Avenue/Garden City Park Industrial Area PHA, is pertinent to the Jackson Steel site (Figure 2).

B. Site Visit

The Nassau County Department of Health (NC DOH) inspected the site in May 1994 and found two drywells in the rear parking area (NC DOH 1994a). The pavement around one dry well was stained. NC DOH also found approximately 20 metal drums with oily residue stacked outside the building in the same rear parking area. In June 1994, NC DOH and US EPA inspected the site again and collected sludge samples from the two drywells in the rear parking area (NC DOH 1994b). During the second inspection NC DOH and US EPA found at least 28 metal drums stacked outside the building.

On August 23, 2000, Mr. John Olm of the NYS DOH visited the site and surrounding neighborhood area. The Jackson Steel building was unoccupied. Locked doors prevented trespassing at the site and no physical hazards were seen outside the building. The Richlee Apartment complex, consisting of three multi-unit apartment buildings, is 50 feet to the east of the site. The Tutor Time Daycare Center and Shooters Billiards Club are adjacent to the southern portion of the Jackson Steel facility. Visitors to the daycare center, the billiards club, and the Jackson Steel site share a paved parking lot west of the facility. At the time of the site visit, the parking lot, which ends at Herricks Road, was empty with the exception of a large storage container behind the nearby Ian McGregor's Public House restaurant. Two monitoring wells and two storm water drains are in the parking lot. The two storm water drains had standing water in their catch basins. Professional offices occupied by the law firm Sanders, Sanders, Block & Woycik, P.C., and the Ian McGregor's restaurant are between the Jackson Steel site parking lot and Herricks Road. Numerous private residences are across First Street, immediately to the north of the site. Mr. Olm identified the following industrial/commercial businesses along Herricks Road near the Jackson Steel site: Chemicolloid Laboratories, Alpha Collision, Sparta Restaurant, Express Dry Cleaners, and Grand Autobody (Figure 3).

A NC DOH representative visited the Jackson Steel site and collected indoor air samples from the Tutor Time Daycare Center and the Shooters Billiards Club on November 29–30, 2001, December 17–18, 2001, and January 22–23, 2002. After indoor air quality issues were identified in the daycare center and the billiards club, staff from NYS DOH and NC DOH visited the site many times to monitor the effectiveness of the tetrachloroethene reduction measures within the buildings, to conduct additional indoor air sampling at other adjacent buildings, and to meet with other agencies participating in the investigation of the Jackson Steel site. The indoor air quality and the tetrachloroethene reduction measures are discussed further in the "Environmental Contamination" section of this document.

C. Demographics

Because the groundwater contamination from the Jackson Steel site may be contributing to the groundwater contamination described in the 150 Fulton Avenue/Garden City Industrial Park PHA (ATSDR, 2002), the study area described in the 150 Fulton Avenue PHA is also pertinent to the Jackson Steel PHA. (See Figure 1). This area includes groundwater contamination of the public water supplies of the Water Authority of Western Nassau, Garden City Park, Garden City Village Franklin Square, and Mineola Village water districts. NYS DOH estimated, from the 2000 Census (US Bureau of the Census. 2001), that 177,142 people live within the five water districts affected by the contaminated groundwater. The age distribution of the area is similar to that of New York State with a slightly higher percentage of individuals 64 years and older living in the area. There were 36,397 females of reproductive age (ages 15-44) in the area. The area has a slightly lower proportion of minorities compared to the rest of the state. On the basis of the 2000 Census (US Bureau of the Census. 2002), a lower percentage of the population is living below the poverty level and the median household income is higher than the rest of the state. These comparisons are provided in the following table. In addition, there are approximately 50 schools and one nursing home in the area.

	New York State	Jackson Steel Area
Age Distribution		
<6	8%	8%
6-19	20%	19%
20-64	60%	58%
>64	13%	16%
Race Distribution		
White	68%	74%
Black	16%	11%
Native American	<1%	<1%
Asian	6%	9%
Pacific Islander	<1%	0%
Other	7%	3%
Multi-Racial	3%	3%
Percent Minority*	38%	31%
Ethnicity Distribution		
Percent Hispanic	15%	9%
1999 Median Income	$43,393	$70,726
% Below Poverty Level	15%	4%

* Minority includes Hispanic, African Americans, Asian Americans, Pacific Islanders, and American Indians.

DISCUSSION

A. Environmental Contamination

Site conditions are characterized to determine whether a site poses an existing or potential hazard to the area residents. This site characterization involves an evaluation of sampling data for on-site and off-site environmental media (e.g., soil, surface water, groundwater, air), possible contaminant sources, and physical hazards on-site.

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

- Concentrations of contaminants in environmental media both on-site and off-site;
- Field data quality, laboratory data quality, and sample design;
- Comparison of on-site and off-site contaminant concentrations in environmental media with typical background levels;
- Comparison of contaminant concentrations in environmental media both on-site and off-site with public health assessment comparison values (CVs) for (1) noncarcinogenic endpoints (noncancer health effects) and (2) carcinogenic endpoints (cancer health effects). These CVs include environmental media evaluation guides (EMEGS), cancer risk evaluation guides (CREGs), drinking water standards, and other relevant guidelines. Contaminant concentrations which exceed a CV do not necessarily pose a health threat. Physical contact is needed for exposures to occur. Even a potentially dangerous contaminant cannot pose a health threat if people are not exposed to it.

On-Site Contamination

Soils

In December 1991, the property owner hired environmental consultants Geraghty & Miller, Inc. to do a limited environmental assessment of the former Jackson Steel site property. The findings from this limited environmental assessment are in the January 1992 *Limited Phase 2 Assessment* report (Geraghty & Miller, Inc. 1992). In February 1993, a drywell at the Jackson Steel site was investigated at the request of NC DOH. Tetrachloroethene contamination was detected in each of the drywell samples. Total VOC contamination in the soil samples ranged from 761 milligrams per kilogram (mg/kg) at 33–35 feet deep to 38,150 mg/kg at 18–20 feet deep (NCDOH 1997).

US EPA conducted surface and subsurface soil investigations at the Jackson Steel site from November 2001 through July 2002. Dumping, spills, improper drum storage, and leaks during facility operations are most likely the sources of the VOC contamination found in shallow soils

inside and outside the building. Surface soil sample SS-5 is the only surface sample containing tetrachloroethene at elevated levels. Metals contamination was found in all unpaved shallow soil samples collected around the site. Arsenic, cadmium, copper, lead, mercury, and zinc were all detected in the on-site soils and considered by-products of past site operations. Semi-volatile organic compounds (SVOCs) were also detected in the shallow unpaved soils throughout the site, but are those commonly found in urban environments (Figure 4).

The drywells DW-2 and DW-3 are the only locations identified on-site with VOC contamination greater than 1 foot deep. Although workers disposed of waste solvents in all three drywells, more waste solvents likely were disposed in DW-2 and DW-3. Drywells DW-2 and DW-3 are the suspected point sources of site-related VOC contamination in the soil and groundwater. Metals contamination was detected in six soil borings inside the Jackson Steel building, but the highest levels were found in drywell DW-1. During manufacturing operations the floor was washed and metals-contaminated water was likely flushed into DW-1 (Figure 4).

Groundwater

The majority of the VOC contamination on-site is in the shallow groundwater, 50 to 60 feet deep or at the top of the water table. Monitoring wells MW-5M, MW-4S, and MW-5S had the highest levels of VOCs at 492 micrograms per liter (mcg/L), 30 mcg/L and 241 mcg/L, respectively. The compound found at the highest concentrations in these wells was cis- 1,2-dichloroethene at 340 mcg/L in MW-5M, 210 mcg/L in MW-4S, and 160 mcg/L in MW-5S. Cis-1,2-dichloroethene is a breakdown product of tetrachloroethene and trichloroethene, which were detected in much lower levels in the same samples. VOCs were detected in the remaining monitoring well samples located upgradient or side gradient to the suspected source areas, but at levels slightly above the NYS DOH drinking water standard of 5 mcg/L. Deep groundwater contamination was also detected on-site with tetrachloroethene and trichloroethene above NYS DOH drinking water standards. Trichloroethene was detected at its highest levels in MW-5M, 190 mcg/L at 404 ft., 52 mcg/L at 429 ft., and 200 mcg/L at 454 ft. Tetrachloroethene was also detected at depth; 53 mcg/L at 404 ft., 24 mcg/L at 429 ft., and 86 mcg/L at 454 ft. The monitoring wells with the highest detections of VOCs were downgradient of the suspected point sources of soil and groundwater contamination, DW-2 and DW-3. When compared to historic on-site groundwater data, the current level of VOC contamination has decreased substantially, suggesting that on-site groundwater contamination has left the site and could be affecting downgradient and side gradient public water supply wells (Figure 4).

Soil Gas

On February 25 and 26, 2002, US EPA collected a total of 32 soil gas samples, 15 from locations at the Jackson Steel site (Figure 5). The highest concentration of tetrachloroethene appears to be in the parking lot area, the southwestern portion of the Jackson Steel property. Tetrachloroethene was detected at elevated levels at locations SG-6 (11,000 parts per billion by volume (ppbv)) and SG-9 (9,700 ppbv). Additional positive detections of VOCs include: trichloroethene (5,000 ppbv), cis-1,2-dichloroethene (14,000 ppbv), and 1,1,1-trichloroethane

(2,700 ppbv). The complete findings from this investigation are in the April 2002 Soil Gas, Soil and Water Sampling Report (Lockheed Martin, 2002) (Table 1).

Indoor Air

NC DOH collected indoor air samples from the Jackson Steel building on December 17 and 18, 2001. Tetrachloroethene was detected at levels slightly in excess of US EPA background levels in indoor air, but lower than the NYS DOH indoor air guideline of 100 micrograms per cubic meter (mcg/m^3) (Table 2).

Off-Site Contamination

Soils

To date, no off-site soil sampling has been completed for the Jackson Steel site.

Groundwater

One monitoring well was installed off-site and sampled for site-related VOCs. Tetrachloroethene and trichloroethene were detected at shallow and intermediate depths in MW-8M at levels below 5 mcg/L. Trichloroethene and cis-1,2-dichloroethene were detected at levels well below 5 mcg/L in the shallow and intermediate depths at the one upgradient well sampled, MW-7M. No samples were collected from depths of more than 300 feet in upgradient or downgradient monitoring wells. No site-related chlorinated solvents were detected above 1 mcg/L (Figure 2) (Figure 4).

Some of the groundwater monitoring wells and public water supply wells impacted with contamination from the 150 Fulton Avenue/Garden City Park Industrial Area (GCPIA) could also be affected by groundwater contamination from the Jackson Steel site on the basis of the historic and current data on contamination in Jackson Steel site-related soils and groundwater.

As mentioned in the 150 Fulton Avenue/Garden City Park Industrial Area PHA (ATSDR, 2002), a 6-square-mile area was studied to determine the groundwater contamination associated with the GCPIA. Thirty groundwater monitoring wells and 21 public water supply wells are within the 6 mile study area. Of the 21 public water supply wells, two could potentially be affected by the Jackson Steel site.

One Village of Garden City public water supply well is downgradient of the Jackson Steel site and one Mineola Village public water supply well is side gradient to the east of the site. Both supply wells contain VOCs at concentrations above current state and federal public water standards in the raw water entering the wells. The affected wells use air stripping treatment systems to meet NYS DOH drinking water standards. The PHA for the 150 Fulton Avenue/Garden City Park Industrial Area summarizes the results of the investigations of groundwater contamination in and around the GCPIA. The Jackson Steel site is 1,000 feet east

of 150 Fulton Avenue. Contamination from the Jackson Steel site may affect two of the public water supply wells within the 6-square mile-study area potentially affected by contamination from the GCPIA. Therefore, portions of the discussion of groundwater contamination beyond the GCPIA, as presented in the 150 Fulton Avenue/Garden City Park Industrial Area PHA, are pertinent to the Jackson Steel site (ATSDR, 2001) (Figure 2).

Soil Gas

On February 25 and 26, 2002, US EPA collected a total of 32 soil gas samples, 17 from locations immediately adjacent to or a short distance from the Jackson Steel site (Figure 5). The highest off-site concentrations of tetrachloroethene were observed in the parking lot in front of Shooters Billiards Club and the Tutor Time Daycare Center at locations SG-12 (2,000 ppbv) and SG-16 (1,900 ppbv). On the north side of the daycare center, tetrachloroethene concentrations are as high as 2,000 ppbv. On the west and south sides of the daycare center, tetrachloroethene concentrations are generally less than 100 ppbv. Additional positive detections of VOCs include: TCE (460 ppbv), cis-1,2- DCE (600 ppbv), and 1,1,1-trichloroethane (140 ppbv). The complete findings from this investigation are in the April 2002 Soil Gas, Soil and Water Sampling Report (Lockheed Martin, 2002) (Table 1).

Indoor Air:

NC DOH collected indoor air samples from properties adjacent to the Jackson Steel site on November 29–30, 2001, December 17–18, 2001; January 22–23, 2002; and January 29–30, 2002. US EPA also collected indoor air samples on January 24, 2002, February 14, 2002 and April 4, 2002 to determine if soil gas contamination from the Jackson Steel site was affecting indoor air quality in buildings off-site. Tetrachloroethene was detected in the Tutor Time Daycare Center on November 29-30, 2001, at levels as high as 81 mcg/m^3. Although 81 mcg/m^3 is below the NYS DOH tetrachloroethene indoor air guideline of 100 mcg/m^3, this level is higher than typical background levels for tetrachloroethene in indoor air. NC DOH also sampled the Tutor Time Daycare Center and the former Ian McGregor's restaurant on December 17-18, 2001. Levels of tetrachloroethene as high as 260 mcg/m^3, were detected in the Tutor Time Daycare Center. The former Ian McGregor's restaurant had levels of tetrachloroethene below 100 mcg/m^3.

Indoor air samples were collected at the Tutor Time Daycare Center by NC DOH on January 22-23, 2002, and by US EPA on January 24, 2002, February 14, 2002, and April 4, 2002 to determine the effectiveness of the measures taken to reduce the level of tetrachloroethene in indoor air. Tetrachloroethene levels were below 100 mcg/m^3 on all sampling dates. The highest level of tetrachloroethene detected on these days was 23 mcg/m^3. US EPA's sampling of the lawyer's office, in an office building near the former Ian McGregor restaurant, on February 14, 2002, did not show tetrachloroethene levels above 20 mcg/m^3. US EPA sampled the Shooters Billiards Club on January 24, 2002 and detected tetrachloroethene at 169 mcg/m^3. US EPA advised the property owner and the tenants to take steps to reduce tetrachloroethene levels within the Shooters Billiards Club (Table 2).

When US EPA collected indoor air samples at the Tutor Time Daycare Center on January 24, 2002, February 14, 2002, and April 4, 2002, additional VOCs were also detected: naphthalene, dichlorobenzene, 1,2-dichloroethane, benzene, bromoform, carbon tetrachloride, ethylbenzene, n-hexane, toluene, and xylene. These VOCs were detected above the NYS DOH and federal databases for background levels in indoor air (Table 3). US EPA personnel did not take an inventory of chemicals used or stored in the Tutor Time Daycare Center while collecting the indoor air samples. An inventory of used and stored chemicals would have helped to determine what chemicals were associated with the Jackson Steel site and what chemicals were used at or within the Tutor Time Daycare Center. The chemicals detected in the indoor air samples were not detected in the soil gas.

US EPA also sampled ambient air and air derived from the subslab venting pipes on April 4, 2002. The additional VOCs were not detected in the ambient air and vent pipe samples, suggesting that the source of the additional VOCs was within the Tutor Time Daycare Center. These same additional VOCs were also detected in the office building adjacent to Jackson Steel sampled on the same day, further suggesting that these chemicals could be components of commercial cleaning products. On February 14, 2002, US EPA also sampled one of the subslab venting pipes. Both trichloroethene (759 mcg/m^3) and 1,1,1-trichloroethane (463 mcg/m^3) were detected in this sample (Table 3). Neither of these chemicals, however, were detected in any of the indoor air samples taken inside the Tutor Time Daycare Center. The Tutor Time Daycare Center ended its use of the Herricks Road building on April 26, 2002. The Shooters Billiards Club also ceased operating in the affected building in December 2002.

The property owner of the building that housed the Tutor Time Daycare Center had intended to reopen the facility as a new daycare center. In January of 2003, NC DOH recommended to the NYS OCFS that a license to operate a daycare facility be denied until the soil gas issues associated with Jackson Steel have been resolved. Consequently, later in January of 2003, NYS OCFS denied the permit. In spring 2004, the Dollar Experience, a discount merchandise store, opened in the space formerly occupied by the Shooters Billiards Club. US EPA inspected the ventilation and vacuum extraction system in place to reduce tetrachloroethene indoor air contamination and collected indoor and ambient air samples from the new store in August 2004. No tetrachloroethene was detected above background levels.

B. Pathways Analysis

This section of the public health assessment (PHA) identifies potential and completed exposure pathways associated with past, present, and future uses of the site. An exposure pathway is the process by which an individual may be exposed to contaminants. An exposure pathway is comprised of 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 point of contaminant release to the environment (any waste disposal area or point of discharge). If the original source is unknown, the contaminant source is considered to be the environmental media (soil, air, biota, water) which are contaminated at the

point of exposure. Environmental media and transport mechanisms carry contaminants from the source to points where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (i.e., ingestion, inhalation, dermal absorption). The receptor population is the person or people who are exposed or may be exposed to contaminants at a point of exposure.

A PHA evaluates two types of exposure pathways. 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 criterion for any one of the five elements is not met. An exposure pathway is eliminated from further discussion in the PHA when any one of the five elements has not existed in the past, does not exist in the present, and will not exist in the future.

Completed Exposure Pathways

Soil gas contamination infiltrated the Tutor Time Daycare Center and Shooters Billiards Club, the two buildings adjacent to Jackson Steel. Indoor air sampling determined the existence and migration of contaminated soil gas from drywells at the Jackson Steel site. Measures were taken to reduce the tetrachloroethene contamination including changing the heating/ventilation/air conditioning (HVAC) system to bring 20% fresh outside air into the building and the installation of subfloor slab trenches with a vacuum extraction system. Prior to changing the HVAC system, no measurable percentage of fresh air was entering the building. Inhalation exposures ceased at the Tutor Time Daycare Center when the daycare ended its use of the Herricks Road building on April 26, 2002. Inhalation exposures ceased at the Shooters Billiards Club in December 2002 when the business closed.

The 150 Fulton Avenue/Garden City Park Industrial Area PHA (ATSDR, 2002) identifies a past completed exposure pathway related to contaminated public water supply wells near the GCPIA and Jackson Steel. Exposures to contaminants in drinking water can occur via ingestion, dermal contact, and inhalation (e.g., when showering and cooking). As mentioned in the 150 Fulton Avenue/Garden City Park Industrial Area PHA, a 6-square-mile area was studied to determine the groundwater contamination associated the GCPIA. Some of the groundwater monitoring wells and two public water supply wells in this study area could also be affected by groundwater contamination from the Jackson Steel site on the basis of the historic and current data of contamination in on-site soils and groundwater.

Eliminated Exposure Pathways

Pathways Related to Soils

Exposure routes associated with contaminated soil are ingestion, dermal contact, and inhalation of contaminated soil particulates. Buildings and pavement cover the majority of the site, making exposures to potentially contaminated surface soils unlikely. However, subsurface soils and sludge within several on-site drywells are contaminated with VOCs. Because contamination is present at considerable depth and the drywells can only be accessed through covered storm drains, exposures to the contaminated materials are not occurring. Exposure to the drywell contamination will not occur unless on-site drywells are excavated and community health and safety measures are not in place to address the potential release of VOC vapors or contaminated soil particulates into the air. This subsurface soil pathway has been eliminated as future subsurface excavations unlikely would not occur without the authorization of US EPA, NC DOH, and NYS DOH. Such authorization would be contingent on the availability of an approved community health and safety plan to address community exposure concerns.

Metals and SVOCs were detected in the shallow, on-site soils in the unpaved areas surrounding the site. These areas are limited to the greenspaces/ornamental areas immediately in front of the 435 First Street building and the strip of grass adjacent to the street; the remainder of the site is pavement or the footprint of the building. The metals detected in these areas are considered to be by-products of the past operations at the site. The SVOC contamination is considered to be the result of the urban environment associated with the area around the site. Although elevated contamination exists within the surface soils, this area in front of the building is not considered an area conducive to trespass or other human dermal contact. On the basis of this information, this surface soil pathway was eliminated.

C. Public Health Implications

Toxicologic and Epidemiologic Evaluation

An analysis of the toxicologic and epidemiologic implications of the human exposure pathways of concern is presented below. To evaluate the potential health risks from contaminants of concern associated with the Jackson Steel Products, Inc. site, NYS DOH assessed the risks for cancer and noncancer health effects. The risks of health effects depend primarily on contaminant concentration, exposure route, exposure frequency, and exposure duration. Additional information on the NYS DOH assessment for this site is presented in Appendix C.

Tutor Time Daycare Center

People have been exposed to elevated indoor air levels of tetrachloroethene and other organic chemicals at the Tutor Time Daycare Center. Air sampling took place at the daycare center on six separate occasions. Two of these sampling events took place prior to January 17, 2002. After this date, remedial measures aimed at reducing the level of tetrachloroethene in air were undertaken. The two pre-remedial sampling events tested only for tetrachloroethene, while the post-remedial sampling events tested for tetrachloroethene and several other chemicals. We therefore evaluated the pre-remediation and post-remediation sampling results for tetrachloroethene separately. In addition, we evaluated sampling results for the infant care room

and newborn room separately from results for the rest of the daycare center, because people (e.g., staff and infants) who used these specific rooms were likely to stay in these rooms most of the time. For the remainder of the daycare center, children and staff regularly occupied different rooms during the course of the day. In locations where more than one sample was taken, we used the average contaminant air concentrations for our evaluation of the health risks.

1) Past Exposure to Tetrachloroethene

Air sampling results (single samples) for the newborn room and the infant care room at the Tutor Time Daycare Center prior to remediation showed tetrachloroethene air levels of 90 mcg/m^3 and 91 mcg/m^3, respectively. The tetrachloroethene air concentration for the remainder of the facility ranged from 46 mcg/m^3 to 260 mcg/m^3 and averaged 102 mcg/m^3. All of these levels exceed typical background levels for tetrachloroethene in indoor air and the public health assessment comparison value (CV) based on carcinogenic effects (Table 4). The CV is an estimate of the air concentration for continuous lifetime exposure that corresponds to an increased lifetime cancer risk of 1-in-1 million. The average level for the remainder of the building also exceeds the NYS DOH guideline of 100 mcg/m^3 (NYS DOH, 1997), which considers lifetime exposure and potentially sensitive individuals, including children and the elderly. Following the remedial action, the levels of tetrachloroethene were reduced to levels below the NYS DOH guideline. Although still slightly elevated over typical indoor background levels, the highest levels of tetrachloroethene in the newborn and infant care rooms were 28 mcg/m^3 and 21 mcg/m^3, respectively. The levels for the rest of the facility ranged from 7.0 mcg/m^3 to 32 mcg/m^3, and averaged 16 mcg/m^3. The tetrachloroethene sampling results for the Tutor Time Daycare Center are summarized below. Since the public health CVs were exceeded, and in some cases the NYS DOH guideline of 100 mcg/m^3 (NYS DOH, 1997) was also exceeded, the potential health risks for exposure to tetrachloroethene were further evaluated.

Air Concentrations of Tetrachloroethene Detected at Tutor Time Daycare Center Before and After Remedial Measures

Location	Frequency of Detection	Range of Detection (mcg/m^3)	Average Concentration (mcg/m^3)
Before Remediation			
Infant Care Room	1/1	91	---
Newborn Room	1/1	90	---
Other Rooms	14/14	46260	102
After Remediation			
Infant Care Room	6/6	1621	18
Newborn Room	4/4	9.928	17
Other Rooms	42/44	7.032	16*

*For samples that did not detect tetrachloroethene, one-half the method detection limit (3.4 mcg/m^3) was used to calculate the average.

Because staff and users of the Tutor Time Daycare Center were not in the building on a continuous basis, the exposures to tetrachloroethene were not continuous. Accordingly, the average air concentrations were adjusted to obtain a daily air concentration that is more likely to reflect long-term exposure for daycare staff and patrons. We assumed that staff and users of the daycare center are present for 10 hours a day and 5 days per week. For evaluation of cancer endpoints, we also assumed (on the basis of information about the operating dates of the daycare center) that people were exposed for 6 years prior to the time remedial measures were taken, and for 3 months after the measures were put in place (January–April, 2002), at which time the daycare center closed. The following table shows the adjusted tetrachloroethene air concentrations that were used in our evaluation.

Adjusted Air Concentrations for Tetrachloroethene at Tutor Time Daycare Center Before and After Remedial Measures*

(all values in mcg/m^3)

Location	Average Air Concentration	Adjusted Air Concentration for Noncancer Evaluation	Adjusted Air Concentration for Cancer Evaluation
Before Remediation			
Infant Care Room	91	27	2.3
Newborn Room	90	27	2.3
Other Rooms	102	30.4	2.6
After Remediation			
Infant Care Room	18	5.4	0.019
Newborn Room	17	5.1	0.018
Other Rooms	16	4.8	0.017

*Because exposures were not continuous, the average air concentrations were adjusted assuming exposure only took place for 10 hours per day and five days per week. The cancer evaluation also assumed exposure only took place for six years (of a 70-year lifetime) prior to remedial measures and for three months after the measures were put in place.
†Result for single sample.
mcg/m^3 = micrograms per cubic meter

Studies of workers exposed to tetrachloroethene and other chemicals show an association between exposure to high levels of these chemicals and increased risks for health effects. Some studies show a slightly increased risk of some types of cancer and reproductive effects among workers, including dry-cleaning workers, exposed to tetrachloroethene and other chemicals. Cancers associated with tetrachloroethene exposures include cancers of the esophagus, bladder, and non-Hodgkin's lymphoma. These associations are unlikely to be due to chance; however, the role of other factors in causing these cancers, including exposures to other potential cancer-causing chemicals, is not fully known. Thus, these data suggest, but do not prove, that tetrachloroethene causes cancer in humans. Other studies show that people living in communities with drinking water supplies contaminated by mixtures of chemicals including tetrachloroethene have higher risks of certain types of cancer (e.g., non-Hodgkin's lymphoma) than do people living in communities with uncontaminated drinking water. The studies of people are weaker than those of workers mostly because we do not know for certain whether the people who got cancer actually drank the contaminated water for long periods of time before they got cancer.

Tetrachloroethene causes cancer in laboratory animals exposed to high levels over their lifetimes (ATSDR, 1997a). Chemicals that cause cancer in laboratory animals may also cause cancer in humans who are exposed to lower levels over long periods of time. Based on the results of epidemiology (human) and animal studies, the increased lifetime cancer risk for people exposed to the adjusted tetrachloroethene levels at all locations in the Tutor Time Daycare Center is estimated to be low (between 1-in-1 million and 1-in-10,000) before remedial measures were taken, and very low (less than 1-in-1 million) after the remedial measures were taken. The decrease in the estimated cancer risk following remediation is primarily the result of two factors: 1) the lower tetrachloroethene levels measured following remediation, and 2) the shorter assumed exposure duration for the post-remediation period.

The average measured levels of tetrachloroethene following remediation were about 80% lower than the average levels prior to remediation. With respect to the shorter exposure duration, a duration of three months was assumed because this was the amount of time between completion of remediation and closure of the daycare center. A 6-year exposure duration was assumed for the period prior to remediation based on information about the operating dates of the daycare center. Consistent with current practices for cancer risk assessment, both exposure durations (3 months and 6 years) were averaged over a 70-year lifetime. Although there is some uncertainty associated with estimating cancer risks for short periods of time (such as 3 months), we can reasonably conclude that the cancer risk for the post remediation period is very low on the basis of the quantitative estimate and because chemically-induced cancers are generally believed to be the result of long term exposure.

Exposure to high levels of tetrachloroethene is also known to produce a variety of noncarcinogenic health effects, primarily on the liver, kidney, and nervous system (ATSDR, 1997a). In humans, the potential health effects for tetrachloroethene exposure include changes in nervous system activity, mild and reversible effects on nervous system performance, and central nervous system symptoms such as dizziness (Stewart, et al., 1970; Hake et al., 1977; Altman et al., 1990, 1992, 1995; Cavalleri, 1994). Although the risks for noncarcinogenic health effects for past exposure to tetrachloroethene in air are not completely understood, the available information indicates they would be minimal for staff and users of all locations of the Tutor Time Daycare Center (before and after remedial measures). Our evaluation of the potential cancer and noncancer health risks for tetrachloroethene is summarized in the following table.

Evaluation of Cancer and Noncancer Risks for Tetrachloroethene at Tutor Time Daycare Center Before and After Remedial Measures

Location	Adjusted Air Concentration for Cancer Evaluation (mc/m^3)	Qualitative Descriptor for Increased Cancer Risk	Adjusted Air Concentration for Noncancer Evaluation (mcg/m^3)	Qualitative Descriptor for Increased Noncancer Risk
Before Remediation				
Infant Care Room	2.3	Low*	27	minimal
Newborn Room	2.3	Low*	27	minimal
Other Rooms	2.6	Low	30	minimal
After Remediation				
Infant Care Room	0.019	very low*	5.4	minimal
Newborn Room	0.018	very low*	5.1	minimal
Other Rooms	0.017	very low*	4.8	minimal

*The actual estimated increased lifetime cancer risks ranged from 2.3 in 1 million to 2.6 in 1 million before remediation, and from 1.7 in 100 million to 1.9 in 100 million after remediation.
mcg/m^3 = micrograms per cubic meter

2) Past Exposure to Other Contaminants

Sampling for contaminants other than tetrachloroethene at the Tutor Time Daycare Center was not done until after remedial measures to reduce contaminant air levels were in place. An inventory of chemicals used and stored at the Tutor Time Daycare Center was not taken. Such an inventory would have helped to determine what chemicals were associated with Jackson Steel and what chemicals were used at or within the Tutor Time Daycare Center. 1,2-Dichloroethane was detected in the infant care room and the newborn room at average concentrations of 22.8 mcg/m^3 and 20.3 mcg/m^3, respectively. These levels are higher than what would be expected in indoor air (i.e., typical background), and also exceed public health comparison values (CVs) for cancer and noncancer effects (Table 4). The health CV for carcinogenic effects is an estimate of an air concentration for continuous lifetime exposure that corresponds to an increased cancer risk of 1-in-1 million. The noncancer CV is an estimate of the air concentration for continuous exposure that is likely to be without an appreciable risk for noncancer health effects during a lifetime. In areas other than the infant care and newborn room, benzene, bromoform, carbon tetrachloride, 1,2-dichloroethane, ethylbenzene, and naphthalene were detected above typical indoor air background levels and public health assessment CVs (Table 4). Sampling data for contaminants other than tetrachloroethene are summarized below. The health risks for exposure to these contaminants were further evaluated. *o*-Dichlorobenzene, n–hexane, toluene, and xylenes were also detected above typical indoor air

background levels, but the levels of these contaminants did not exceed public health assessment CVs.

Air Concentrations for Contaminants Detected at Tutor Time Daycare Center

Chemical	Frequency of Detection	Range of Detection (mcg/m^3)	Average Concentration (mcg/m^3)*
Infant Care Room			
1,2-dichloroethane	2/3	ND - 33.7	22.8
Newborn Room			
1,2-dichloroethane	½	ND - 39.1	20.3
Other Rooms			
Benzene	2/2	2.6 - 15	8.8
Bromoform	1/1	246.9	---
carbon tetrachloride	1/1	48	---
1,2-dichloroethane	11/19	ND - 52.4	21.7
naphthalene	6/10	ND - 176.7	75
ethylbenzene	1/1	16.9	---

ND = not detected.
*For samples that did not detect the chemical, one half the method detection limit was used to calculate the average.
mcg/m^3 = micrograms per cubic meter.

As with tetrachloroethene, the exposures to benzene, bromoform, carbon tetrachloride, 1,2-dichloroethane and naphthalene were not continuous. The average air concentrations were adjusted to reflect long-term exposure assuming that staff and users of the daycare center were present for 10 hours a day and 5 days per week. For evaluation of cancer endpoints, we assumed that people were exposed for 6 years. The following table shows the adjusted air concentrations that were used in our evaluation.

Adjusted Air Concentrations for Contaminants at Tutor Time Daycare Center*
(all values in mcg/m^3)

Chemical	Average Air Concentration	Adjusted Air Concentration for Noncancer Evaluation	Adjusted Air Concentration for Cancer Evaluation
Infant Care Room			
1,2-dichloroethane	22.8	6.8	0.58
Newborn Room			
1,2-dichloroethane	20.3	6.0	0.52
Other Rooms			
benzene	8.8	2.6	0.22
Bromoform	246.9†	73.5	6.3
Carbon tetrachloride	48†	14.3	1.2
1,2-dichloroethane	21.7	6.4	0.55
Ethylbenzene	16.9†	5	0.43
Naphthalene	75	22.3	---

*The average air concentrations were adjusted assuming exposure takes place for 10 hours per day and 5 days per week. The cancer evaluation also assumed exposure takes place for 6 years of a 70-year lifetime.
†Result for single sample.
mcg/m^3 = micrograms per cubic meter.

Several studies of workers exposed to elevated levels of benzene in air report an increased risk for leukemia. On the basis of the increased risk for leukemia among people who worked with benzene in occupational settings, benzene is considered a known human carcinogen (ATSDR, 1997b). Bromoform, carbon tetrachloride, ethylbenzene, and 1,2-dichloroethane cause cancer in laboratory animals exposed to high levels for their lifetimes (ATSDR, 1990, 1994, 2001). Evidence that naphthalene causes cancer in animals is weak. Chemicals that cause cancer in laboratory animals may cause cancer in humans who are exposed to lower levels over long periods of time. On the basis of the results of epidemiological and animal studies, exposure to the adjusted air levels of benzene (0.22 mg/m^3), bromoform (6.3 mcg/m^3), carbon tetrachloride (1.2 mcg/m^3), and 1,2-dichloroethane (0.58, 0.52 and 0.55 mcg/m^3) in air at the Tutor Time Daycare Center for 6 years is estimated to pose a low increased risk for cancer. Exposure to the adjusted air level of ethylbenzene is estimated to pose a very low risk for cancer. Because a quantitative estimate of potency for naphthalene is not available, an estimate of increased cancer risk is not made.

Benzene, bromoform, carbon tetrachloride, and 1,2-dichloroethane also cause a variety of noncancer health effects, primarily to the liver, kidney, and nervous system (ATSDR, 1990, 1994, 1997b. 2001). Naphthalene damages the respiratory system of laboratory animals exposed to high levels for their lifetimes (ATSDR, 1995). Although the risks for noncancer effects from past exposure to air contaminants is not completely understood, the existing data suggest the risks could be moderate for the adjusted air levels of carbon tetrachloride and naphthalene, low for the adjusted air levels of bromoform, and 1,2-dichloroethane (all locations), and minimal for the adjusted air level of benzene and ethylbenzene. The adjusted air levels of carbon tetrachloride (14.3 mcg/m^3) and naphthalene (22.3 mcg/m^3) are both more than 400 times lower than the air concentrations of these contaminants known to cause adverse noncancer health effects in laboratory animals. The following table summarizes our evaluation of the potential cancer and noncancer health risks for benzene, bromoform, carbon tetrachloride, 1,2-dichloroethane and naphthalene.

Evaluation of Cancer and Noncancer Risks for Benzene, Bromoform, Carbon Tetrachloride, 1,2-Dichloroethane and Naphthalene at Tutor Time Daycare Center

Chemical	Adjusted Air Concentration for Cancer Evaluation (mcg/m^3)	Qualitative Descriptor for Increased Cancer Risk	Adjusted Air Concentration for Noncancer Evaluation (mcg/m^3)	Qualitative Descriptor for Increased Noncancer Risk
benzene	0.22	low*	2.6	minimal
Bromoform	6.3	Low*	73.5	low
carbon	1.2	Low*	14.3	moderate
1,2-dichloroethane	0.58*	low*	6.8†	low
Ethylbenzene	0.43	Very low*	5	minimal
Naphthalene	---	---	22.3	moderate

.*The actual estimated increased lifetime cancer risks were 1.7 in 1 million for benzene, 6.9 in 1 million for bromoform, 1.8 in 100,000 for carbon tetrachloride, 9.9 in 1 million for 1,2-dichloroethane, and 4.3 in 10 million for ethylbenzene.
†Value was adjusted from the average 1,2-dichloroethane levels found in infant care room. The average levels in the newborn room and in other parts of the facility were lower, and resulted in the same qualitative descriptors for cancer and noncancer risks (low).
mcg/m^3 = micrograms per cubic meter.

Other Off-Site Buildings

Air samples were taken for several other off-site buildings in addition to the Tutor Time Daycare Center. Inventories of chemicals used and stored at these buildings were not taken. Tetrachloroethene was detected at the Shooters Billiard Club and at a nearby attorney's office at 169 mcg/m^3 and 20 mcg/m^3, respectively. 1,2-Dichloroethane and naphthalene were detected at 48.8 mcg/m^3 and 126 mcg/m^3, respectively, at the attorney's office. These levels are above typical indoor background levels and public health CVs (Table 4), but we do not know if these single sample results are representative of people's potential exposure. The potential health effects of tetrachloroethene, 1,2-dichloroethane, and naphthalene have been discussed previously in this document. If we assume that the single measured levels of these contaminants are representative of people's potential exposure, the estimated increased lifetime cancer risk would be low for tetrachloroethene and 1,2-dichloroethane. The estimated noncancer risks would be minimal for tetrachloroethene, low for 1,2-dichloroethane, and moderate for naphthalene. These evaluations use similar exposure parameters to those that were used for the daycare center. Additional indoor air samples in other off-site buildings (the Richlee Apartments and several residences on First Street) were collected. No site-related contamination was detected in these samples.

D. Health Outcome Data Evaluation

NYS DOH has not previously evaluated health outcome data specifically for the Jackson Steel site. NYS DOH maintains several health outcome databases, which could be used to generate health outcome data for a specific area, if appropriate. These databases include the Cancer Registry, the Congenital Malformations Registry, Vital Records (birth and death certificates) and hospital discharge information. NYS DOH has not conducted an evaluation using these health outcome databases for this specific site because the number of individuals exposed to tetrachloroethene at Tutor Time Daycare Center is relatively small and the exposures are not associated with a specific geographic area. However, NYS DOH has included this site in the New York State Volatile Organic Compounds (VOC) Exposure Registry. By enrolling individuals from multiple sites across New York State, the VOC Exposure Registry provides the opportunity to evaluate health outcomes for larger groups of people with similar exposures. The VOC Exposure Registry enrolls individuals who are willing to participate and provide health outcome information, as described below.

In 1999, NYS DOH established the New York State Volatile Organic Compounds (VOC) Exposure Registry as a tool for health status assessment and long term follow-up for communities and individuals with documented exposures to VOCs. The Registry is currently evaluating exposures and health status of New York State residents at locations where drinking water or indoor air was contaminated with chemicals such as industrial solvents or petroleum products from landfills, industrial sites, spills, or other sources. Individuals and communities are selected for inclusion in the registry if potential exposures from the contamination of private wells, public water supplies, or indoor air have been verified by sampling results.

Children and employees were exposed to tetrachloroethene in indoor air at the Tutor Time Daycare facility for an undetermined amount of time. Because the daycare center began its Mineola business in 1995, the total length of time does not exceed 6 years. As a result of this exposure, NYS DOH and ATSDR have offered the exposed children and employees the opportunity to enroll in the New York State VOC Exposure Registry. Past and current health information will be gathered using a questionnaire. NYS DOH will maintain contact with the exposed population so health status updates can be obtained periodically.

E. ATSDR Child Health Considerations

The ATSDR Child Health Considerations emphasizes the ongoing examination of relevant child health issues in all of the Agency's activities, including evaluating child-focused concerns through its mandated public health assessment activities. ATSDR and NYS DOH consider children when we evaluate exposure pathways and potential health effects from environmental contaminants. We recognize that children are of special concern because of their greater potential for exposure from play and other behavior patterns. Children sometimes differ from adults in their susceptibility to hazardous chemicals, but whether there is a difference depends on the chemical. Children may be more or less susceptible than adults to health effects, and the relationship may change with developmental age.

The possibility that children or the developing fetus may have increased sensitivity to tetrachloroethene (the primary contaminant associated with the Jackson Steel site) was taken into account when evaluating the potential health risks associated with the indoor air contamination. Human studies suggest that exposure to mixtures of chlorinated solvents (including tetrachloroethene) in drinking water during pregnancy may increase the risk of birth defects (e.g., neural tube defects, oral cleft defects, and congenital heart defects) or childhood leukemia (ATSDR, 1997a). In each of these studies, however, uncertainties exist about how much contaminated water the women drank during pregnancy and about how much tetrachloroethene was in the water the women drank during pregnancy. Moreover, the role of other factors in causing these effects is not fully known. The most important of the factors was the potential exposure during pregnancy to other chemicals in drinking water. These studies suggest, but do not prove, that the developing fetus may have increased sensitivity to the effects of tetrachloroethene.

When pregnant animals are exposed by ingestion or inhalation to large amounts of tetrachloroethene (i.e., amounts that caused adverse health effects in the adult animal), adverse effects on the normal development of the offspring are observed. In addition, a study in young mice suggests effects on the central nervous system after transient exposure to tetrachloroethene by ingestion 10 to 16 days after birth (Fredriksson et al., 1993). The estimated levels of exposure to tetrachloroethene in indoor air near the Jackson Steel site prior to the initiation of remedial measures are about 300 times lower than the exposure levels that cause these adverse developmental effects in animals.

COMMUNITY HEALTH CONCERNS

Members of the community expressed their health concerns to NYS DOH at US EPA-sponsored public meetings and through meetings the department had with local elected officials. Residents living near the Jackson Steel site are concerned about the possibility of site-related chemicals contaminating the nearby public water supply wells. Parents of children who attended the Tutor Time Daycare Center are concerned about children's exposure to tetrachloroethene from site-related soil gas contaminating the daycare facility's indoor air. NYS DOH, US EPA, NYS OCFS and NC DOH held informational meetings on February 13, 2002, and May 8, 2002, to discuss indoor air quality issues at the Tutor Time Daycare Center and the on-site remedial activities at the Jackson Steel site. These concerns were addressed as follows.

Concern: The primary concern of parents whose children attended the Tutor Time Daycare Center is that exposure to tetrachloroethene may cause health effects in their children. Uncertainty about the length of exposure and the levels of contaminants are also of concern.

Answer: Potential health effects from past exposure to contaminants in indoor air are evaluated and discussed in the Public Health Implications section. Since no indoor air samples were collected before November and December 2001, the historic levels of tetrachloroethene in the indoor air will never be known. Initial contamination of the indoor air may have occurred as soon as the Tutor Time Daycare Center began operating in the Mineola building in 1995. For this public health assessment, we assumed a maximum time period of 6 years. The increased lifetime cancer risk for people exposed to the adjusted tetrachloroethene levels at all locations in the Tutor Time Daycare Center is estimated to be low and the increased risk of non-cancer health effects is estimated to be minimal.

Concern: Parents of children exposed to tetrachloroethene at the Tutor Time Daycare Center are interested in available medical or cognitive monitoring which measure the health effects caused by tetrachloroethene exposure.

Answer: Volatile organic compounds (VOCs), such as tetrachloroethene, that were detected in indoor air at the Tutor Time Daycare Center, do not persist in the body for very long after the exposure stops. Because people are no longer exposed to these chemicals from the Jackson Steel site, biologic monitoring for these VOCs or their metabolites is not useful.

Research studies have not identified specific medical tests to look for effects from these chemicals. Biologic tests such as urinalysis or blood chemistry analyses are useful, while non-specific for VOC exposure, tools for identifying general health problems early. A person's physician may have already used these routine tests when giving periodic checkups in the past. Physicians evaluate test results by comparing them to normal ranges for sex and age. A wide range of medical conditions can cause abnormal findings in these tests. Each physician also interprets a person's results in relation to individual medical histories. Residents may wish to tell their physician about their exposure to VOCs because the physician will consider the patient's personal health history when deciding the types of tests needed and how frequently the patient needs to be seen. If your physician would like to talk with a NYS DOH environmental

health nurse or physician, he or she should contact the NYS DOH at 1-800-458-1158, extension 27950.

NYS DOH and ATSDR participated in two public meetings with US EPA, one on February 13, 2002, and the other on May 8, 2002, to answer health-related questions and explain in greater detail the Volatile Organic Compound Registry questionnaire to affected persons and their families. NYS DOH and ATSDR addressed resident's health concerns and distributed prepared educational materials on site-related conditions, site-specific chemicals, and exposure to those chemicals. On May 6, 2002, Dr. Joel Forman of the Selikoff Center for Occupational and Environmental Medicine met with parents of children affected by the indoor air contamination. NYS DOH also assisted area health care providers with educational outreach materials. These concerns were addressed as follows.

Concern: Some parents of children attending the Tutor Time Daycare Center suspect that illnesses (e.g., asthma, headaches, upper respiratory infections) were caused by exposure to contaminated indoor air.

Answer: Potential health effects are discussed in the Public Health Implications section. Asthma, and upper respiratory infections are not ailments commonly associated with tetrachloroethene inhalation exposure. They are, however, associated with poorly ventilated buildings. Prior to changing the HVAC system, no measurable fresh air was entering the building. Recirculated air was distributed throughout the building, increasing the likelihood of respiratory conditions.

Community health concerns about groundwater contamination coming from the Jackson Steel site were gathered from information in the 150 Fulton Avenue/Garden City Park Industrial Area PHA (ATSDR, 2002). These concerns were addressed as follows.

Concern: Exposure to contaminated drinking water is a primary concern of the surrounding community. In the past, community exposure to VOCs in downgradient public drinking water supplies has occurred. Members of the community have suggested a possible link with these past exposures to the high incidence of breast cancer on Long Island.

Answer: Community exposures to VOCs have occurred through contaminated drinking water. The health risks due to these historic exposures are not known. No individual data on past exposure to VOCs in drinking water are available. Moreover, not enough scientific data exist to confidently classify these chemicals as to their potential to be an environmental risk factor for human breast cancer.

Concern: Residents have requested that all sources of contamination affecting their public drinking water supplies be identified and cleaned up.

Answer: Although it appears the 150 Fulton Avenue site served as a major source of tetrachloroethene contamination downgradient of the GCPIA, other environmental investigations have identified additional facilities as possible sources of contamination in the area. These sites

include Jackson Steel, Precision Fabricators, Star Carting, Manfred Schulte, Tres Bon Cleaners, and the former Town Sheet Metal facility. However, these sites do not represent contamination sources for the significant trichloroethene groundwater plume impacting this area from the northwest. Additional investigations are necessary to identify the source(s) of the trichloroethene contamination affecting the groundwater in the site area.

Concern: Parents are concerned that their children will experience long-term health effects as a result of their exposure to the tetrachloroethene in the indoor air at the Tutor Time Daycare Center.

Answer: Potential health effects of children's exposure to tetrachloroethene in indoor air at the Tutor Time Daycare Center are discussed in the section called *Public Health Implications*. NYS DOH estimates that the increased lifetime cancer risk for people exposed to the adjusted tetrachloroethene levels at all locations in the Tutor Time Daycare Center is low (between 1-in-1 million and 1-in-10,000) prior to the time remedial measures were taken, and very low (less than 1-in-1 million) after the remedial measures were taken and minimal for non-cancer risks.

Concern: Parents have concerns about the concentrations of tetrachloroethene in the indoor air prior to the November 2001 indoor air sampling, and how long the indoor air quality impacts occurred.

Answer: No indoor air sampling activities were conducted at the Jackson Steel site or any buildings adjacent to the site prior to November 2001. Since no historic sampling was conducted, the indoor air quality at these buildings prior to November 2001 will never be known.

Concern: Parents want to be assured that the tetrachloroethene indoor air contamination will not happen again at the Tutor Time Daycare Center.

Answer: Measures were taken immediately to reduce levels of tetrachloroethene in the indoor air after it was detected above the NYS DOH indoor air guideline of 100 mcg/m^3. However, after measures were put in place and the level of tetrachloroethene was reduced in the indoor air, the Tutor Time Daycare Center decided to move its operation from the impacted building to another space.

The public was invited to review the draft during the public comment period, which originally ran from March 18th, 2004, to April 30th, 2004. Because of public interest, the comment period was extended until July 7th, 2004. We received seven responses, one of which came from a public agency. Some statements were reworded for clarity. The summary of the response to public comments is shown in Appendix E.

CONCLUSIONS

NYS DOH concludes that the Jackson Steel site may have contributed to groundwater contamination affecting public water supply wells in the area. Many industrial or commercial sources such as 150 Fulton Avenue and other businesses in the GCPIA contributed to past and present groundwater contamination. The public water supply treatment systems currently in use near these sites are being upgraded to prevent exposures to groundwater contamination.

Although VOC contamination was detected in on-site drywells and groundwater, the full extent of groundwater contamination attributed to releases from the Jackson Steel site cannot be determined from the existing on-site and off-site environmental investigations conducted to date. US EPA needs to conduct additional off-site groundwater investigation at the Jackson Steel site. Because the groundwater data are insufficient to determine whether the Jackson Steel site contributed to the contamination affecting public water supply wells, the site is an indeterminate public health hazard.

Indoor air exposure to tetrachloroethene above 100 mcg/m^3 occurred in the past at the former Tutor Time Daycare Center. Public health actions were needed and measures were taken in January 2002 to reduce the levels of tetrachloroethene within the Center. The increased lifetime cancer risk for people exposed to the adjusted tetrachloroethene levels at all locations in the Tutor Time Daycare Center is estimated to be low and the increased risk of non-cancer health effects is estimated to be minimal. No ongoing exposures to contaminated indoor air exist because the former Tutor Time Daycare Center moved its operation out of the impacted building in April 2002.

The other chemicals (non-tetrachloroethene) detected in indoor air at the former Tutor Time Daycare Center are believed to be associated with the cleaning supplies used at the center since these chemicals were not detected in the site-related soil gas.

Indoor air exposure to tetrachloroethene above 100 mcg/m^3 occurred in the past at the Shooters Billiards Club. Although efforts were made by the agencies, no remedial measures in addition to the sub slab ventilation were employed to reduce tetrachloroethene indoor air contaminations. The Shooters Billiard Club ended its business in the affected building in December 2002. The office building used by the attorney was sampled for tetrachloroethene. Although tetrachloroethene indoor levels were slightly above background concentrations, they were not at a level that would cause health effects. The other contaminants (non-tetrachloroethene chemicals) detected in the attorney's office are similar to those non-tetrachloroethene chemicals found in the former Tutor Time Daycare Center that are associated with cleaning supplies.

Before any future reoccupation of either the Tutor Time Daycare Center or the Shooters Billiards Club building, indoor air sampling must be performed to determine indoor air quality. The property owner of the building that housed the Tutor Time Daycare Center had intended to reopen as a new daycare center. NC DOH recommended to NYS OCFS that a license to operate a daycare facility be denied until the soil gas issues associated with Jackson Steel have been resolved. In January of 2003, OCFS denied the permit. In spring 2004, the Dollar Experience, a

discount merchandise store, opened in the space formerly occupied by the Shooters Billiards Club. EPA inspected the ventilation and vacuum extraction system in place to reduce tetrachloroethene indoor air contamination and collected indoor and ambient air samples from the new store in August 2004. No tetrachloroethene was detected above background levels.

RECOMMENDATIONS

US EPA, in cooperation with NYS DEC, NYS DOH, and NC DOH should investigate off-site groundwater contamination from the Jackson Steel site to determine the potential for impacts to nearby public water supply wells.

US EPA should identify the source of the indoor air tetrachloroethene contamination at the affected buildings which are both currently unoccupied.

US EPA should conduct indoor air sampling prior to the reoccupancy of the two affected buildings (adjacent to the Jackson Steel site).

PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan (PHAP) for the Jackson Steel site contains a description of actions already taken or to be taken following completion of this public health assessment. The purpose of the PHAP is to ensure that this Public Health Assessment identifies public health hazards and provides a plan of action designed to mitigate and prevent adverse human health effects resulting from past, present, or future exposures to hazardous substances in this area. Included is a commitment on the part of the NYS DOH to follow-up on this plan to ensure its implementation. The Public Health Actions are as follows:

Actions already taken

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- The Tutor Time Daycare Center increased the heating/ventilation/air conditioning system at former center to introduce 20% outside (fresh) air into the building to reduce exposures to VOCs. This additional fresh air also improved the overall indoor air quality at the daycare center.

- In January 2002, EPA installed subfloor trenches with a vacuum extraction system around former Tutor Time Daycare Center and Shooter' Billiards Club. This effectively reduced the tetrachloroethene to levels below the NYS DOH indoor air guideline.

- New York State Volatile Organic Compounds (VOC) Exposure Registry offered enrollment to children and employees of the former Tutor Time Daycare Center.

- US EPA performed an inspection of ventilation and vacuum extraction system and conducted indoor air sampling to determine indoor air quality for reoccupation of former billiard club.

Actions planned or ongoing

- NYS DOH will assist NYS DEC and US EPA as investigations progress relative to the Jackson Steel site and any other potential sources of groundwater or soil gas contamination that were or may be identified in the future. NYS DOH will further assist these agencies in the development and implementation of remedial measures deemed appropriate to address the contamination.

- NYS DOH and ATSDR will coordinate with the appropriate environmental agencies to implement the recommendations and provide followup to the Public Health Action Plan. The followup includes enrollment of individuals with exposure to tetrachloroethene contaminated air within the Tutor Time Daycare Center in the NYS Volatile Organic Compounds (VOC) Exposure Registry with contact every two to three years to update their health status.
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- NYSDOH will coordinate with US EPA and NC DOH to conduct off-site groundwater investigations to monitor and protect the public water supply wells potentially impacted by site-related groundwater contamination. ATSDR and NYS DOH will revisit the site as new data become available and re-evaluate the public health hazard posed by the site.

ATSDR and NYS DOH will reevaluate and expand the Public Health Action Plan when needed. New environmental or health outcome data, or the results of implementing the above proposed actions, may determine the need for additional actions at this site.

CERTIFICATION

The Public Health Assessment for the Jackson Steel site 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.

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Technical Project Officer, CAT, SPAB, DHAC

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

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Team Leader, CAT, SPAB, DHAC, ATSDR

AUTHORS, TECHNICAL ADVISORS

New York State Department of Health Authors

Jacquelyn Nealon
Public Health Specialist II
Bureau of Environmental Exposure Investigation

John M. Olm
Public Health Specialist III
Bureau of Environmental Exposure Investigation

Thomas Johnson
Research Scientist
Bureau of Toxic Substance Assessment

Donald Miles
ATSDR Grant Coordinator
Public Health Specialist IV
Bureau of Environmental Exposure Investigation

Agency for Toxic Substances and Disease Registry

ATSDR Regional Representative
Arthur Block
Senior Regional Representative
Region 2
Office of Regional Operations

ATSDR Technical Project Officer
Gregory V. Ulirsch
Environmental Health Engineer
Superfund Site Assessment Branch
Division of Health Assessment and Consultation

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