HEALTH ASSESSMENT
NASCOLITE CORPORATION SITE
CUMBERLAND COUNTY
MILLVILLE, NEW JERSEY
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Prepared For:
Agency for Toxic Substances and Disease Registry (ATSDR)

SUMMARY

The Nascolite Corporation site is located on the municipal boundary of the cities of Millville and Vineland, Cumberland County, New Jersey. The Nascolite Corporation used solid scrap acrylic, virgin Polymethyl methacrylate(MMA) monomer and liquid waste MMA to manufacture MMA plastic sheets. The scrap material was reclaimed through a depolymerization process using a molten heat exchange furnace. Waste residues from the various distillation process were stored in several buried tanks in the northern area of the plant to be burned later with other waste oils and solvents as fuel in the plant's boiler. Wastewaters from the non-contact cooling water and other on-site sources, were discharged to a ditch southwest of the plant along the Conrail tracks.

The site was placed on National Priority List (NPL) in August 1983. A Remedial Investigation/Feasibility study (RI/FS) completed in March 1986, revealed that contamination of groundwater with Methyl Methacrylate and Volatile Organic Chemicals (VOCs) predominantly. New Jersey Department of Environmental Protection (NJDEP) identified over one hundred 55-gallon drums and several underground storage tanks. Some of the drums were subsequently removed by Nascolite Corporation. Contamination of off-site potable wells was documented. A supplemental RI/FS completed in September 1990, revealed contamination of surface soils with lead and other inorganics. VOC contamination correlated positively with increasing depth in the soils but inorganic contamination was limited to the upper 5 feet of soil. A record of Decision for the first operable unit to address groundwater contamination was signed in March 1988.

Residential properties are located northwest, south and east of the site. Approximately 60 residential homes, including apartments, are located within one-half mile of the site, primarily near Wheaton Avenue. The area surrounding the site is zoned for residential and industrial purposes. Approximately 19,700 residents within a 3-mile radius of the site, including residents of both Millville and Vineland cities, are highly dependent upon groundwater sources for potable, industrial and agricultural purposes. Sensitive populations include neighborhood children and remedial workers. Potential migration routes for chemicals at the Nascolite site include migration from soil into groundwater either by dissolving or leaching, migration into air by volatilization, fugitive dusts and transportation of contaminants bound to soil particles into air by

particulate suspension, and, surface water by runoff and erosion. The main public health concerns center around high concentrations of lead in surface soils and Contaminated groundwater is currently not of concern as the potable water supply has been extended to the residents on Doris Avenue. Based on information reviewed, and, the many existing data gaps, ATSDR and NJDOH have concluded that the Nascolite Corporation Site is of indeterminate public health hazard.

BACKGROUND

A. Site Description and History:

In October, 1979 the Cumberland County Department of Health, received a complaint from the Cumberland Recycling Company on Delsea Drive concerning odors in their potable water supply. Because of the proximity of Nascolite Corporation on Doris Avenue an investigation was made of this establishment. The New Jersey State Department of Environmental Protection (NJDEP) was notified and an investigation into the alleged complaint was initiated. It was discovered that the main chemical used by Nascolite is Methyl Methacrylate (MMA). Sampling of the well at Cumberland Recycling did not reveal any contamination with (MMA) A flow of water was noted coming from the Nascolite plant into a ditch situated behind the Nascolite site. Initial sampling of the water from the ditch showed 185 parts per billion (ppb) of Methyl Methacrylate.

The Nascolite Corporation site is located on the municipal boundary of the cities of Millville and Vineland, Cumberland County, New Jersey. The Nascolite property is delineated as Lots 41, 41A. and 42 of Block 127 in Millville and Lot 2, Block 1121 in Vineland. These parcels of land cover an area of 17.5 acres, of which over half is wooded. The site is situated west of the intersection of U.S. Route 55 and Wheaton Avenue on Doris Avenue. (Map appended) The Nascolite Corporation site includes the Nascolite manufacturing facility, the adjacent Nascolite-owned residential areas south and east of the facility, and the wetland areas of the southwest. Six buildings on the site served as the production facility, laboratory and office for the company. Manufacturing and waste disposal activities were conducted on approximately seven acres.

The Nascolite corporation site overlies the Cohansey Land Formation. The Maurice River is located approximately one mile to the southwest of the site. The river runs north to south, draining and feeding the man-made Union Lake. The Petticoat stream flows along the western edge of the wetlands into the Maurice River which eventually discharges into the Delaware Bay. The only surface drainage feature in the immediate area is a drainage ditch which runs parallel to and on the east side of the Conrail tracks. Hence, any surface runoff from the site presumably will collect in the drainage ditch and rapidly infiltrate onto the wetlands. The nearest downgradient potable well that can be potentially impacted by contamination from Nascolite is Millville's municipal supply well which is two miles away.

The Nascolite Corporation Site began operations in the early 1940s in Elizabeth, New Jersey, and was then known as the National Solvents Company. Nascolite moved from Elizabeth, to its present location in 1952 where it operated a scrap acrylic reclamation facility from 1953 to 1980. Currently it is an inactive site.

The Nascolite Corporation used solid scrap acrylic, virgin Polymethyl Methacrylate (MMA) monomer and liquid waste MMA to manufacture MMA plastic sheets. The scrap material was reclaimed through a depolymerization process using a molten heat exchange furnace. Waste residues from the various distillation process were stored in several buried tanks in the northern area of the plant to be burned later with other waste oils and solvents as fuel in the plant's boiler. Non-contact cooling water from the cracking process was piped to the Villano (owner) residence swimming pool where it was cooled and returned to cool the heat exchangers. Wastewaters from the non-contact cooling water and other on-site sources, were discharged to a ditch southwest of the plant along the Conrail tracks.

The Nascolite Corporation Site was placed on the National Priority List (NPL) in August 1983 and is currently ranked twenty fourth on the NPL and twenty third among NPL sites in New Jersey. The site has been the subject of several investigations and study for several years. The New Jersey Department of Environmental Protection (NJDEP) issued an Administrative Order in February 1980 requiring the Nascolite Corporation to stop discharging wastewaters into the ditch.

In September 1981, an Administrative Consent Order (ACO) was signed, and the NJDEP Division of Water Resources (DWR) began in-depth investigations at the Nascolite site. The ACO called for the installation of three monitoring wells and the subsequent collection and analysis of groundwater samples. Groundwater sampling in the fall of 1981, and again in February 1983 revealed significant on-site VOC contamination. During the sampling of the wells in February 1983, a strong, "sweet plastic" odor was detected in the northernmost well and a strong fuel-like odor in the remaining two wells. In addition, a floating product observed at one location solidified when the bailer was pulled out of the well.

In May 1982, NJDEP personnel observed the removal of ten cubic yards of soil contaminated with oil, plastic and other debris from the drainage ditch. The underground storage tanks for the distillation residues were excavated in 1983 and left on the ground surface north of the plant.

The NJDEP also identified over one hundred 55-gallon drums and several other underground storage tanks. Some of the drums were removed by the Nascolite Corporation, while the remainder were removed during a Removal Action conducted by the EPA at the request of the NJDEP during November, 1987. In addition, waste material storage tanks were cleaned and cut into scrap metal, twenty cubic yards of MMA were removed from the soil and thirty cubic yards of asbestos were removed from the site buildings. All of the tanks and remaining drums on-site were sampled, bulked into 1825 gallons of corrosive/ignitable liquid and 134 cubic yards of solvent sludge, and shipped for proper disposal off-site. The removal action by EPA also included installation of tarps to the lead contaminated soil, covering of remaining asbestos pipe installation with tarp, and securing all unsecured wells. In addition, the site was secured by a fence in an effort to further abate immediate hazards to the surrounding community.

An initial Remedial Investigation/Feasibility Study (RI/FS) (November 1984) at the Nascolite Corporation site was conducted under contract to NJDEP by the TRC Environmental Consultants, Inc.(TRC). At the conclusion of this RI/FS there was enough information to make a decision with respect to contaminated groundwater and an operable unit Record of Decision (ROD) was signed on March 31, 1988.

EPA's Emergency Response Team (ERT) performed a soil gas survey in December 1988 to delineate the extent of the Volatile Organic Chemical (VOC) and MMA contamination in the soil at the site. An additional confirmatory soil gas survey was performed by ERT in April 1989. In addition, an X-ray Fluorescence (XRF) Survey was performed in May 1989 by Lockheed Engineering and Sciences Company for EPA's Environmental Monitoring Systems Laboratory.

A residential water-line was constructed by several Potentially Responsible Parties (PRPs) in June 1989 to provide the residents of Doris Avenue with a permanent potable water source in accordance with the ROD for the first operable unit. The U.S. Army Corps of Engineers is currently conducting a remedial design for the contaminated groundwater.

A 35% design developed for the site indicated that further treatability studies are necessary. In May 1990, EPA issued a Special Notice to the PRPs affording them an opportunity to undertake the additional treatability studies, complete the design and implement the remedy. Negotiations were scheduled to conclude in September 1990.

A Supplemental Final Remedial Investigation Report/Feasibility Study for the site was completed by the Ebasco Services Incorporated and reported to the United States Environmental Protection Agency (USEPA) in September 1990.

B. Site Visit

On January 22, 1991 the Department of Health visited the Nascolite Corporation Site in Millville. We were accompanied on the site visit by representatives from the New Jersey Department of Environmental Protection (NJDEP), the Cumberland County Health Department as well as the caretaker (Mr. Sooy) from the Nascolite Corporation site.

Numerous surface drainage channels were observed on-site, generally flowing toward the Conrail line (western) and wetland (south). These were apparently the product of erosion by surface water run-off and are a significant mechanism for the off-site migration of contaminants.

Populations potentially threatened by the site include the residents on Doris Avenue, Cumberland Greens Apartment Complex (located within half a mile) and the workers in the surrounding industrial facilities. The surrounding area encompassing both residential and industrial properties is highly dependent on groundwater for potable purposes.

The site has a few dilapidated manufacturing buildings, abandoned equipment and mounds of excavated soil, some of which were covered with tarps. It was observed that these mounds of soil contained MMA scrap. In addition, plastic tanks in several stages of deterioration were seen at different locations on the site. Ongoing remedial activities by EPA include excavation of contaminated soil. We observed that several 55-gallon drums with contaminated soil were stored on site and awaited proper disposal. All of the above pose potential physical hazards to trespassers and remedial workers.

The site is fenced and locked but unattended. Warning Signs and No Trespassing signs were posted visibly on the fence as well as along the site access roads.

However, the fence has previously been broken into by trespassers and the buildings vandalized. Graffiti was evident at a few places. We also observed a decontamination area zoned for workers engaged in remedial activities at the site. Because of the site conditions mentioned above, it was difficult at this time to determine if there was stressed vegetation.

C. Demographics, Land Use, and Natural Resource Use

Millville, New Jersey is a small community in the north-central part of Cumberland County and had a population of approximately 25,000 people in 1980. The town of Millville lies approximately 1 mile south of the site. The area near the site includes light industrial, commercial and residential properties.

The largest industry in Cumberland County and Millville is glass manufacturing. The area has also a substantial agricultural industry and light industry including food processing, textiles, lumber and concrete.

The area surrounding the site is zoned for both residential and industrial use. Hence, the potential for industrial growth and increase in both worker and residential population in the vicinity of the site is foreseen. Residential properties are located northwest, south and east of the site. Approximately 60 residential homes, including apartments, are located within one-half mile of the site, primarily near Wheaton Avenue. Several homes are located near the site along Doris Avenue. The Cumberland Greens Apartment Complex borders the south property line. Lucretia Villano, who was the owner of the Nascolite Corporation during its years of operation, resides in a home located within the Nascolite Corporation boundary.

The Consolidated Rail Corporation (Conrail) owns and operates a switching facility and two separate railroad track spurs on the western border of the Nascolite site. The Cumberland Recycling Corporation is located immediately west of the tracks. The E.P. Henry Corporation, a concrete casting company, and High Industries are located northwest of the site.

Surface water in the vicinity of the Nascolite site includes Petticoat Stream (the ditch is the headwaters of the Petticoat Stream), located 600 feet west of the railroad tracks, which flows south approximately parallel to the railroad tracks, and along the west edge of wetlands located approximately 1000 feet south of the site. The stream eventually finds its way to the Union lake and the Maurice River. Approximately 19,700 residents within a 3-mile radius of the site, including residents of both Millville and Vineland cities, are highly dependent upon groundwater sources for potable, industrial and agricultural purposes.

State and Local Health Data:

There is no single source for evaluating the health outcome in New Jersey. Data resources for Health Outcome information in the State of New Jersey include the New Jersey State Cancer Registry, the Birth Defects Registry, State and Local Vital Statistics Records, Renal Dialysis network, and Hospital Discharge Reports. Pertinent information for the Nascolite

Corporation site from these sources could not be gathered and evaluated at the time of writing of this health assessment. However, the available health information will be reviewed and incorporated into the health assessment when it is revised, amended or appended as addenda.

Toxics Release Inventory (TRI) data base could not be accessed prior to the writing of this health assessment. Information from TRI will be incorporated into this health assessment when access to TRI is possible and the health assessment is revised or amended.

Community Health Concerns

Community concern regarding the Nascolite site has been limited. In October, 1979 the Department of Health, Cumberland County received a complaint from the Cumberland Recycling Company on Delsea Drive concerning odors emanating from their potable water supply. The County Health Department responded initially by sampling the well on the Cumberland Recycling property and did not find any MMA. The NJDEP was notified and subsequent sampling of the waste water drainage coming out of the Nascolite property revealed contamination with MMA.

There has been little documentation of public involvement with the site. Newspaper articles announced the listing of the site on the NPL in August 1983, but there appears to have been little followup news coverage of any community reactions.

Community interest is limited to the concerns expressed by adjacent homeowners and industrial facilities, and centers primarily around groundwater contamination and the quality of potable water. The Cumberland County Health Department notified the owners of one on-site and one off-site well not to use their wells for potable purposes.

In February 1985, NJDEP conducted a public meeting to discuss the commencement of the RI/FS. Approximately 25 people attended, including six or seven reporters and newspaper photographers.

In August 1986, USEPA presented the results of the RI/FS and EPA's preferred remedy in a public meeting with the community. Subsequent to this the Superfund Amendment's and Reauthorization Act of 1986 (SARA) was passed, which required more permanent alternatives, forcing the reevaluation of the alternatives.

In March 1988, USEPA conducted a public meeting to:

* present the new preferred alternative,
*to explain the delay since the last public meeting
* to announce the initiation of a public comment period for the first operable unit (groundwater remediation) RI/FS and

At the public meeting, major concerns were raised by adjacent homeowners regarding the quality of their potable well water. USEPA, in response to community concerns and as part of the first operable unit (ROD), recommended that the existing water line along Wheaton Avenue be extended to include the

residences of Doris Avenue. The comments recieved by USEPA at that time focused upon several issues and included concerns about:

* the assurance and continuation of a safe drinking water supply and whether they could be connected to municipal water system as part of the ROD.
* the nature of MMA and information on how to detect MMA contamination in water.
* the nature and extent of contamination, and the disposal of contaminated materials.
* the impacts of pumping and extraction of groundwater for cleanup on private wells.
* the potential longterm health effects associated with site contamination.
* property values and who the future owners of the Nascolite Corporation site would be.

Local Health Department officials suspect that the community will express greater concern, especially if it is established that the groundwater contamination is spreading, as evidenced by contamination of private wells and degradation of the quality of the surface water of the Petticoat Stream. In addition, the remaining concern of residents focuses on the issue of soil remediation.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

A. On-Site Contamination

Groundwater Investigation:

A series of sampling events to detect groundwater contamination was undertaken by both DEP (1981-1983) and TRC Consultants (1986-1987). Table 1 summarizes contaminant concentrations detected in groundwater throughout the history of the Nascolite Corporation site. Documented data suggest that MMA and organic contaminants are being released in significantly high concentrations.

MMA was detected in highest concentrations (400 & 7,400 ppm) in two on-site monitoring wells. Other well samples had an MMA odor but no MMA was detected by laboratory instruments.

Maximum concentrations of ethylbenzene (7700ug/L), toluene (440ug/L), total xylenes (1340 ug/L), napthalene (620 ug/L) were found just south of the Process Plant Building. Benzene (340 ug/L), toluene(250 ug/L), 1,1,1-trichloroethane (40 ug/L), tetrachloroethane (22ug/L) and trichloroethene (320 ug/L) were of concern at the northeast of the facility. Subsequent sampling confirmed previously detected contamination. In addition, a "sweet plastic" odor was detected in the northernmost wells and a strong fuel like odor was evident in other sampled wells.

MMA was found to be floating on the top of the water table just north of the Nascolite plant. The floating product observed at one well location indicates that there is a significant volume of waste material extending horizontally off the Nascolite property to the west.

One of the monitoring wells had gross alpha (43 pico Curies/liter) radiation which was three times the Federal and State Primary Drinking Water Standard (15 picoCuries/liter). It was uncertain at that time whether the gross alpha level was due to radioactive contamination of residue materials or due to naturally occuring high radioactive levels. Subsequent sampling of eight monitoring wells for the purpose of conducting radiation analyses in June 1987 revealed that there was no radiation contamination at the Nascolite Site.

Potable Well Sampling:

Sampling of an on-site potable well which supplied water to the old Nascolite office building revealed contamination with several VOCs including benzene, ethylbenzene, toluene, trichloroetylene and MMA. This well is no longer in use for potable purposes. Table 2 summarizes the contaminants of concern in potable wells.

Surface Water:

No on-site permanent surface water exists on the Nascolite site although ponding occurs in depressions during prolonged precipitation events. The wastewater drainage stream on the southwestern side is the only surface water of concern. Initial sampling by NJDEP revealed the presence of MMA. The wastewater discharge is no longer occurring as the facility has been inactive since 1980.

Surface Soil:

On-site surface soil samples were taken from four locations on March 1, 1985. The primary contaminants were bis-(2-ethylhexyl)phthalate (commonly used as a plasticizer) and MMA (32,000 ppm). But, only the surface soils in the drainage ditch had minimal organic contamination. Table 3 summarizes the contaminants of concern, in surface and subsurface soils.

Surface soil contamination with lead in concentrations greater than 14,000 ppm occurred primarily in the ditch between the plant and the railroad tracks and minimally at the trench where "non-contact" cooling water was pumped to the Villano's pool.

On-site surface soil samples collected in December, 1988 in the nearby wetlands and the swimming pool revealed that metal concentrations were considerably higher in the surface soil samples than in the 3 foot samples. The highest concentrations of cadmium, lead and zinc (523 mg/kg, 13775.5 mg/kg and 478.3 mg/kg, respectively) were present in the ditch adjacent to the railroad tracks. Data suggests that these three metals decrease steadily from the contaminant source and have demonstrated minimal migration.

An X-Ray Flourescence (XRF) survey confirmed that lead and copper contamination in the surface soil around the loading dock and along the west

edge of the processing building was high. It also revealed high contamination of lead and copper between the facility buildings and along the ditch which drains from the process building. Low lead contamination was identified within a large portion of the wetlands and immediately southeast and northeast of the site.

Subsurface Soil:

A limited amount of intermediate subsurface soil sampling at 4 to 8 feet performed in December 1988, revealed that metal concentrations were low in subsurface soils and zinc was the only metal found in a high concentration of 397 mg/kg. Lead and zinc were found in concentrations of 13.9 mg/kg and 143.6 mg/kg respectively in the debris sample from the bottom of the swimming pool. Cadmium was found to be below detection limits at all the sampling locations.

Intermediate subsurface soil sampling in April 1989, showed contamination with VOCs but only in concentrations of less than 20 ug/kg. MMA was detected at 2.6 ug/kg at eight feet and 5,814 ug/kg at fifteen feet. Deeper soil samples were significantly more contaminated than shallow samples from the same boring indicating that VOC contamination is increasing with depth.

Soil Boring Investigation:

The most recent deep soil investigation performed in April 1989, revealed patterns of contamination similar to the waste material in the original remedial investigation and showed the presence of all VOCs and semi-volatile organics, except for styrene and total xylenes. Compounds found with the greatest frequency and/or highest concentration were trichloroeththene, benzene, toluene, ethylbenzene, styrene, and total xylenes. These six compounds ranged in concentration from 2 ug/kg to 71,000 ug/kg and each had atleast one detection greater than 1000 ug/kg. Acetone was also found in several samples at concentrations that ranged from 5 to 5200 ug/kg. Other VOCs were found with less frequency and had concentrations less than 1000 ug/kg, except for 1,1,1 trichloroethane (1800 ug/kg).

Semi-volatile organic compounds were found at all sample locations where the VOC concentrations were greater than 1000 ug/kg. However, at many sample locations only semi-volatile organics were detected. Pestcides were found at low levels in only a limited number of samples.

Analytical results for soil sampling show that inorganic contamination was the highest in the North Plant area between the plant buildings and in the northern section of the wetlands near the drainage ditch which received wastewater from the plant. Cadmium, lead, mercury, copper, selenium and zinc exceeded NJDEP soil action levels and were detected at concentrations above background levels. Barium was found above background levels but below NJDEP action levels. Cadmium, Zinc and lead were the most frequently occurring metals. Table 3 summarizes the contaminants of concern in surface and subsurface soils.

Air:

Air sampling was performed at five on-site locations to identify air contaminants at ambient conditions and during site activities. All air samples were analyzed for volatile organic compounds (VOC) including MMA. With the exception of two air samples, results indicated that the priority pollutants were below laboratory detection limits. The two samples showed detectable concentrations (0.03 ppm, 4.95 ppm) of MMA and these were well below the Occupational Safety and Health Administration (OSHA) permissible limit of 100 ppm averaged over an 8-hour work shift. EPA's removal action has removed the predominant source of the air emissions.

The weather conditions during the field program were not favorable for collecting meaningful air quality data. The air temperature was cold (10 -35 F) which significantly reduces the release of VOC. Therefore, concentrations measured during the air monitoring program are not reflective of the concentrations which would occur during the summer season. In addition, the winds were very brisk which diluted the VOC concentration. Therefore the data generated by the air monitoring program are not reflective of summertime conditions when contaminant concentrations would be expected to be the highest and thus do not shed light on air contamination.

Building Survey:

All site buildings and structures were investigated for potentially hazardous substances in accordance with the stipulation in the March 1988, ROD. Wipe and debris samples were collected and analyzed for MMA, asbestos and total metals. Results are presented in Table 4. Analytical results of asbestos wipe samples are awaited.

Results of wipe sampling indicated that MMA was present in high concentrations in the still-house and in the depolymerization building. The process building had relatively low concentrations of MMA. The boiler/maintenance shop, the still house and the cracker unit had significantly high metal concentrations. High concentrations of lead (up to 181,000 ug/wipe) in the cracker building are probably related to the depolymerization process with molten lead. Cadmium was detected in the depolymerization building and the boiler/maintenance shop. Zinc was present in high levels (at 10,900 ug/wipe) in the boiler/maintenance shop.

Chrysotile and amosite were the only minerals detected in the debris samples. The highest amount of asbestos minerals (40%) were detected in the process building, of which amosite (20%) was found in the thermal system insulation. High concentration of chrysotile (30%) were also found in the process building, distillation building and cracker building. Asbestos containing material in the Nascolite buildings were observed to be in a friable state.

The highest concentration of MMA was present in the building debris sample from the material storage building. High concentrations were also detected in the depolymerization building, the process building and the laboratory building and were relatively lower in the boiler/maintenance shop.

Data on total metals in the debris samples indicate high concentrations in on-site buildings, particularly, in the cracker unit and the process

building. Aluminum was present in high concentrations in the laboratory building whereas zinc was present in high levels in the material storage building. Iron, magnesium, calcium, and vanadium were in high levels in the boiler/maintenance shop.

CHEMICAL WASTE SAMPLING:

Waste material was collected for analysis, from a test pit (WM-1), from excavated tanks previously buried north of the plant (WM-2, WM-3) and from material floating on water in a monitoring well (MW-8S) located along the property line prior to collecting ground water samples. Samples differed in their physical and chemical composition.(Table-5) The principal contaminant MMA was found in concentrations ranging from 1426 to 475300 ppm and comprised over 25-45 % by weight of the total waste. The three on-site samples contained high concentrations of lead, and volatile organic chemical compounds. Waste sample from WM-1 was characterized as a fine to coarse grained sand, saturated with a dark red viscous material, whereas, the waste sample from WM-2 was an oily viscous sludge. On the other hand, the waste sample from the property line was characterized as a dark, cherry-red fluid and contained a very low concentration of metals. In addition, it contained heavy concentrations of benzene, methylene chloride, ethylbenzene, butyl benzyl phthalate and napthalene.

B. Off-Site Contamination

Groundwater Investigation:

Sampling of off-site groundwater revealed that MMA, the organic compound with the highest detected concentrations on the site, was found in one of the monitoring wells at a concentration of 400 ppm. This well was located in the north plant area of the site. Groundwater also contained bis(2-ethylhexyl)phthalate and di-n-butyl phthalate as well as heavy concentration of several VOCs including benzene, toluene, ethylbenzene and trichloroetylene. Benzene and trichloroetylene were both above the proposed RMCLs and MCLs. Several other wells had an MMA odor but no MMA was detected by the laboratory. This could happen when the threshold limit value (TLV) is close to the laboratory detection limit. Only a few metals were detected in these wells. Table 1 summarizes the contaminants of concern in off-site groundwater.

Potable Well Sampling:

Seven off-site private wells located within a half mile radius were sampled as part of the field investigation. Results are summarized in Table 2. Millville's municipal supply well located two miles from the site is the nearest downgradient potable well that can be impacted by contamination from the Nascolite site. Analytical results of samples from this well indicated no contamination. None of the other off-site potable wells contained any detectable organic chemicals except for methylene chloride, which is a common laboratory contaminant. All but one well contained metal concentrations within federal drinking water standards. Lead concentration in one well

ranged from 0.068 to 0.074 ppm. Hence, it can inferred that contamination has migrated off-site but has not yet reached the municipal water supply well.

Surface Water:

Surface water run-off originating at the site during heavy or prolonged precipitation events discharge into the wetlands. Sampling of the Petticoat Stream by EPA or NJDEP has not been performed to date. However, sampling conducted by the Cumberland County Health Department revealed that the waters are contaminated with MMA (34.6 to 185 ppb).

Soil Gas Survey:

In April, 1989 the soil gas survey included collection of samples at Cumberland Recycling Center area. The HNu data indicated the presence of high organic vapors in this area suggesting extensive contamination to the northwest of the site in the Cumberland Recycling region. This was further confirmed by Gas Chromatograph/Mass Spectrometer (GS/MS) readings.

Soil:

Data from off-site soil sampling locations in the vicinity of the Cumberland Recycling Area indicate the presence of MMA and several volatile organics.

Subsurface soil samples collected at three locations in the northern section of the site in April 1989, were analyzed for selected volatile and semi-volatile organics. MMA was the primary contaminant at all the three locations and the concentration of MMA in the soil increased in proportion with the depth of the sampling point. Reported results indicate the concentrations of MMA to vary from 29 mg/kg to 4,436 ug/kg. The highest concentration of volatile organics were found at a depth of 13 feet and were in concentrations of greater than 1,000 ug/kg.

Air:

Off-site air sampling for contaminants of concern at the Nascolite Corporation site was not performed during the RI/FS.

C. QUALITY ASSURANCE AND QUALITY CONTROL

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

Laboratory analysis conducted by NJDEP and other consultants complied with state sample collection and analyses procedures during the entire history of the Nascolite plant. No significant quality assurance/quality control

problems were documented in the available files nor expressed by the NJDEP. (Personal Communication)

D. PHYSICAL AND OTHER HAZARDS

The site has a few dilapidated manufacturing buildings, abandoned equipment and mounds of excavated soil, some of which were covered with tarps. Of these mounds of soil, a few contain MMA scrap. In addition, excavated plastic tanks in several stages of deterioration were observed at different locations on the site. Several 55-gallon drums with contaminated soil are stored on site and await proper disposal. Though the site is fenced and locked, it is unattended. The fence has previously been broken into by trespassers and the buildings vandalized. It is quite certain that all of the conditions detailed above pose potential physical hazards to trespassers and remedial workers.

HYDROGEOLOGY:

The Nascolite corporation is located in the New Jersey Coastal Plain which is underlain by a wedge-shaped mass of unconsolidated sediments composed of thousands of feet of clay, silt, sand and gravel layers. The entire sediment is considered an independent and isolated hydrologic system, bounded by the Atlantic Ocean, The Delaware River, and the rocky Appalachian Highlands of Northern New Jersey. The Nascolite Site overlies the Cohansey Land Formation.

Generally, groundwater in the site area occurs approximately 10 to 15 feet below ground surface and flows to the southwest towards Union Lake. However, a mounding of the water table has been detected at the north plant area of the site. In addition, a downward hydraulic gradient has also been observed in the site area suggesting a localized downward flow component. This would mean that the clay layers are probably discontinous, and that Nascolite may be situated in a groundwater recharge zone.

The southern part of the Nascolite property comprised of Atsion sand is highly permeable, wet, poorly drained and subject to flooding. The Hammonton loamy sand and Klej loamy sand underlying the site buildings consisting of marine and fluvial deposits are moderately well drained, moderately permeable but subject to wind erosion in dry season.

Fill material was found beneath and near the Nascolite office and the plant buildings as well as around the foundations and waste piles located south and east of the office building.

PATHWAYS ANALYSIS

A. Environmental Pathways (Fate and Transport)

Site characteristics presumed to have a significant impact on the fate and transport of contaminants for the Nascolite site include contaminant characteristics, the environmental media in which they are detected, site

conditions, geology of the Cohansey land formation and the variety of pumping/artificial recharge scenarios.

The potential migration routes for chemicals at the Nascolite site include migration from soil into groundwater either by dissolving or leaching, migration into air by volatilization, fugitive dusts and transportation of contaminants bound to soil particles into air by particulate suspension, and surface water by runoff and erosion.

The organics (including MMA) and inorganics detected in the groundwater may have resulted from the direct percolation of liquid wastes through the soils and/or by the leaching of constituents in the soil by infiltrating precipitation. In addition, the VOCs act as cosolvents in groundwater and increase the solubility of the less soluble organic compounds. This chemical property along with the relatively permeable nature of the soil, augment the leachability of the contaminants and thus constitute an environmental pathway of concern. However, Arsenic and selenium are the only metals which were found to have leached from the site soil samples, but were in low concentrations and do not threaten to migrate. Cross-sectional analysis indicate no downward migration of metal contamination below 5 feet, except for lead. EP toxicity samples indicate that the lead contamination is not leaching from the contaminated soil. The high vapor pressures and water solubilitites of the VOCs detected at the Nascolite site indicate that they are very mobile in the soil.

VOCs present in the soil can volatilize and become airborne. Further, volatilization from soil can be enhanced by disturbance of the soil. MMA is the primary contaminant of concern in this regard due to its volatility. Benzene, chloroform and toluene are also among the highly volatile compounds. Migration of chemicals and asbestos fibers into the atmosphere during demolition of the buildings is also of primary concern. Thus air constitutes a potential environmental pathway of concern.

Surface soil in the drainage ditch area between the railroad tracks and the Nascolite buildings contain high concentrations of organic and inorganic contamination. Migration of chemicals into the surface water and sediments may be of concern during periods of precipitation, and thus, contaminated surface soil and sediments both constitute environmental pathways of concern, in particular, to off-site areas. A Proposed Remedial Alternative Plan (PRAP) as a longterm measure to address the soil issues is being considered.

Solidified lead visually observed within the cracker unit during the study and activities performed at other buildings at the site may have spread the metal contamination across the North Plant site. Though the exact dispersion of the contamination is not known it can be assumed that in the past air has also acted as an environmental pathway in transporting contaminants such as lead. Minor environmental pathways for inorganics, VOCs and asbestos are fugitive dusts which are likely to arise from exposed on-site soils and dilapidated buildings.

The wastewater discharge is the likely cause of the metal contamination within the ditch and the wetland, though activities within the Conrail yard may have contributed to the contaminants. Thus the wastewater can be considered an active transport media for contaminants.

The pattern of groundwater contours lines suggests that contamination originating from the leaking tanks in the North Plant area of the site may travel away off-site from the mound towards the southeast, southwest, or northwest. A downward hydraulic gradient from the shallow to the deeper sampling levels has been observed, suggesting a downward flow component near the center of the mounded area of the groundwater table. Thus groundwater constitutes an environmental pathway of concern.

Hence, the primary environmental pathways of concern are contaminated surface soil, subsurface soil and groundwater. Excavated soils and building debris (if not properly attended to) could allow off-site migration of contaminants via erosion and atmosperic dispersion. This environmental pathway is of potential concern for the above stated reasons.

Data Gaps:

The information provided to ATSDR did not characterize the full extent of contaminants on site. As noted in the environmental pathways section the limited data do not indicate that past exposures have occurred and if present exposures are continuing, and, if exposure to these levels have adversely affected the health of either the neighbouring worker population nor of the resident population.

The weather conditions during the field program were not favorable for collecting meaningful air quality data. The air temperature was cold (10-35 F) which significantly reduces the release of VOC. Therefore, concentrations measured during the air monitoring program are not reflective of the concentrations which would occur during the summer season. In addition, the winds were very brisk which diluted the VOC concentration. Therefore the data generated by the air monitoring program are not reflective of summertime conditions when contaminant concentrations would be expected to be the highest. Air sampling performed in summer for both on-site and off-site locations would have provided additional information on the extent of VOC contamination in the nearby residential areas.

Off-site air sampling has not been performed to date. If on-site soils are disturbed during remedial activities, significant volatilization of VOCs, semi-volatiles, and suspension of adsorbed inorganic particles may result. The absence of baseline background information limits the ability to evaluate off-site air quality and make meaningful comparisons. There is no documented information to evaluate this environmental pathway and this constitutes an important data gap.

Groundwater results represent a screening effort and do not delineate the full extent of vertical and horizontal contamination. An unusual phenomenon was observed with regard to the analytical data for soil gas sampling near MW-8S. Despite the documented free floating product (MMA) in this well there were no extraordinary readings or contaminant levels at this point. One unsubstantiated explanation was the presence of a confining layer such as a clay lense between the sampling depth and groundwater. The unusual occurrence needs to be addressed. Hence there is need for additional information.

There is currently no documented information to indicate that the groundwater remediation has commenced. This constitutes a data gap.

Petticoat Stream has not been investigated during the RI/FS for this site. This constitutes an important data gap. Lack of information limits the ability to determine the extent of contamination and does not rule out transfer of contamination during periods of heavy precipitation. In addition, there is no documented information on the use of the stream either for recreational or fishing purposes.

B. HUMAN EXPOSURE PATHWAYS

A completed exposure pathway consists of a source of contamination (in this case the Nascolite Corporation site), an environmental medium for transport, a point of human exposure, a route of human exposure (inhalation, ingestion and dermal contact) and a receptor population.

Based upon evaluation of environmental pathways of concern and review of current conditions existing at the Nascolite Corporation site, the principle human exposure pathways of concern are associated with groundwater (both on-site and off-site), surficial and subsurface soils (both on-site and off-site), and air. The populations at risk are trespassers, remedial workers and off-site residents including sensitive populations such as children.

Direct contact with and/or ingestion of contaminated groundwater by on-site and off-site residents has been an exposure pathway of concern in the past and is also likely to be of concern if the spread of contamination is not limited by the preferred remedial alternatives. As an interim measure the supply of alternate water has eliminated concerns from ongoing exposure to contaminated groundwater.

Site trespassers (adults and adolescents) are likely to come in contact with surface soil on that part of the site which is not vegetated. The degree of soil contact will depend upon the period of time spent on the site, the frequency of the intrusions, and the type of activity engaged in on the site. Other factors influencing the degree of contact are time of year, temperature, moisture content of soil, the chemical and physical properties of contaminants and type of clothing worn. Since the concentrations of VOCs in surface soils are low, human exposure due to volatilization from soil is not anticipated to be a concern except during summertime when volatilization of VOCs from the deeper subsurface soils are enhanced. Human exposure to contaminated soils can occur through direct dermal contact, inhalation of suspended particulates and incidental ingestion of soil. In addition to the above, remedial workers are likely to be exposed to surface and near surface soil when disturbance of the soil occurs during the performance of remedial activities.

Dermal contact, ingestion and inhalation of VOCs, fugitive dusts, suspended soil particulates and asbestos fibers both inside and outside the buildings are all potential routes of exposure to remedial workers and trespassers when on-site excavation and removal activities occur.

Exposure to lead and other inorganic contaminants in surface soils to off-site residents and children can occur either by direct dermal contact or by inhalation. In addition, exposure of off-site residents to VOCs can occur by inhalation of VOCs released from surface and subsurface soils.

PUBLIC HEALTH IMPLICATIONS

The public health implications of the documented exposure pathways with regard to the Nascolite site may be summarized as follows:

The high concentrations of lead in surface soil are a matter of concern at the Nascolite site. Although a quantitative estimation of carcinogenic and non-carcinogenic risks attributable to lead could not be made, it is evident by the extremely high concentrations detected, that the surface soils at the site pose an unacceptable risk through dermal contact. Approximately sixty residential homes, including apartments are located within one-half mile of the site. Considering the sensitivity of the neighboring population (school children and residents in very close proximity to the site), the extremely high concentration of lead and the known health effects of lead, this site has serious and imminent public health implications. In addition, trespassers are also at increased risk of being exposed to on-site contaminants.

Inorganic contamination (lead and cadmium) was detected in the ditch along the southwestern edge of the site and along the western edge of the wetland, to a maximum depth of five feet. Though there is no evidence of migration of contamination to Petticoat Stream, contamination of the wetlands is of potential public health concern. Through dermal contact with the soils and surface waters, the contaminants at the site pose a potential risk to the public health.

The air investigation found air emissions from the Nascolite site at levels that do not pose a public health threat. But the two soil gas surveys performed to identify areas of concern showed sporadic locations south of the site with low levels of VOC contamination, and indicated that there was extensive contamination in the northwestern region of the plant towards Cumberland Recycling area. Contamination was apparent in the north and appeared to be decreasing in the west. During summertime the increase in the potential for VOCs to volatilize pose a public health concern to workers in the adjacent and neighbouring industrial facilities.

On-site soil is contaminated with MMA and organic chemicals. The main public health concerns appear to be excavated waste sludges (inhalation, incidental ingestion and dermal contact) and exposure by inhalation of airborne volatile organic chemicals and fugitive dusts. Measures that could be taken to reduce public health impacts of the site to workers in the adjacent recycling facility, Conrail warehouse and residents in the vicinity include removing (or at a minimum tarping of all excavated waste soils/sludge), and increasing the security around the site.

Asbestos containing material present in the Nascolite buildings and debris are in a friable state. Asbestos fibers can easily be transported as suspended particulates via air to off-site residential and industrial

properties. Proper asbestos abatement techniques would be required prior to building demolition. The presence of asbestos in the building debris is of potential public health concern and is related to the air dispersal of asbestos fibers during remediation and abatement.

Both on-site and off-site potable well sampling have revealed contamination with several VOCs including benzene, ethylbenzene, toluene, trichloroetylene and MMA. With the provision of alternate potable water supply to the affected residences this is no longer of public health concern. However, potable groundwater has been an environmental pathway for past exposures and may have public health implications in future.

A. TOXICOLOGICAL IMPLICATIONS

Of the several contaminants identified of particular concern are MMA, 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, benzene, ethylbenzene and toluene as they have been found in high concentrations in the groundwater, surface soils, subsurface soils and wastes. Inorganic contaminants such as lead, zinc, copper, cadmium and selenium have also been detected in high concentrations in the soils (both surface and subsurface). Of equal concern is the contamination of existing on-site structures with asbestos. Exposure to these chemicals and elements for a prolonged period of time could result in chronic health effects as well as cancer. Acute exposures can result in acute health effects.

Lead which has no reference dose (RfD), was present at a maximum concentration of 41,800 ppm in surface soils which is significantly higher than the EPA's recommended soil cleanup level of 500-1000 ppm. Lead presents a hazard to reproduction and primarily effects the kidneys, hemopoietic system, the central nervous system and the gastro-intestinal system. The toxic effects of lead have been observed at relatively low blood lead concentrations, and the effects are particularly significant in children. High blood concentrations levels can cause severe irreversible brain damage and possible death. Furthermore , EPA has classified lead as a B2 carcinogen, indicating that there is sufficient evidence from epidemilogical studies of carcinogenicity in animals.

Zinc is an essential nutrient. Adverse health effects have been reportedly observed to result from high exposures to zinc or zinc compounds by either inhalation or ingestion route, resulting in overdosage. However, there are no reports of animal or human studies available to support these observations. The respiratory system, the gastro-intestinal system, the immune system, renal system and ocular system have all been observed to have been effected by overdosage of zinc. Of particular concern are pancreatic abnormalities, metal fume fever, the reduction of high density lipo-protiens (HDL) resulting in increased risk of coronary artery disease, copper deficiency (an essential nutrient) and anemia.

Review of the toxic effects of inhalation and oral exposure to Cadmium in animal studies, as well as toxic effects based on human exposure data, has shown that adverse effects could result on a number of tissues including kidney, liver, bone, testes, the immune system, and the cardiovascular system. Animal studies have indicated that cadmium is a potential lung

carcinogen but epidemiological studies have limited evidence that inhaled Cadmiun is a lung carcinogen. However, several studies have indicated that exposure to high doses of cadmium increases the risk of prostatic cancer.

Information derived from animal and human studies indicate that many health effects have been plausibly related to high-level exposures to VOCs including benzene, ehtylbenzene, tetrachloroethane and dichloroethane. Acute inhalation and ingestion exposures to benzene, ethylbenzene, tetrachloroethane and dichloroethane have been shown to cause adverse effects on the central nervous system (CNS), headaches and dizziness. Chronic low dose exposure to these contaminants have been shown to cause tumors of the liver, kidney, and lung as well as developmental toxicity. Human exposure to VOC's have been shown to cause renal toxicity, hepatotoxicity, neurotoxicity, and dermatological reactions after chronic exposures.

NO RfD for benzene has been established by EPA. CAG has estimated the cancer potency factor of benzene at 2.9 x 10-2 (mg/kg/day) for both inhalation and ingestion exposure. This potency estimate was based upon the increased risk of leukemia among individuals occupationally exposed to airborne benzene, based on data pooled from several studies. Benzene causes leukemia and aplastic anemia. In addition, it has been associated with chromosomal damage as well as fetotoxicity in experimental animals.

Bis-(2-ethylhexyl)phthalate (DEHP) is readily absorbed following oral or inhalation exposure. DEHP has been reported to be carcinogenic in rats and mice, causing increased incidence of hepatocellular carcinomas or neoplastic nodules following oral administration.

Human exposures to high concentrations of methylene chloride have resulted in adverse effects on the CNS and hepatic system. Major CNS effects include narcosis, irritability, analgesia, and fatigue. Short term exposures have resulted in impairment of sensory and motor function. In addition, high exposures result in carboxyhemoglobinemia, a condition resulting from carbon monoxide (CO) interference with oxygen transport in blood. Based on animal studies, EPA considers methylene chloride to be a probable human carcinogen.

MMA is released to the ambient air as a gaseous byproduct of polymethyl methacrylate combustion. Exposure to airborne MMA among workers has been associated with headaches, pain in the extremities, fatigue, sleep and memory disturbance, and irritability. Teratogenic effects in rats include reduced fetal body weight and increase in the occurrence of hepatomas at various sites in the animals. Mutagenicity has been demonstrated in rats and humans, with chromosomal aberrations appearing in bone marrow cells (rats) and lymphocytes (humans). MMA has not been demonstrated to induce carcinogensis in animal studies.

Asbestos fibers are invisible to the human eye. Asbestos fibers have historically been found to contaminate air, food, clothing and water. Asbestos is classified as a Class A carcinogen. Lung cancer tends to develop 15 to 35 years after the first exposure. Mesothelioma or cancer of the lining of the chest and abdominal cavity has also been attributed to asbestos exposures. Human epidemiological studies have also associated cancer of the stomach, esophagus, colon and rectum with exposure to asbestos. Acute exposures to asbestos fibers either by inhalation of suspended

particles, ingestion of contaminated food or water in humans have not shown to be associated with specific health effects. Chronic exposures have resulted in nonmalignant effects such as asbestosis. However, several studies have been performed to investigate the carcinogenic potential of chronic exposure to ingested asbestos on human populations. The possibility of an elevated risk of cancer of the stomach and pancreas must be considered as possibly associated with asbestos in water. These conclusions are based on a number of epidemiological studies with several limitations. Smokers are at great risk of developing lung cancer after their initial exposure to asbestos as asbestos demonstrate cancer promotion properties.

Based on reviewed toxicological information, possible human exposure to maximum contaminant concentrations of VOCs detected in potable waters could have resulted in acute health effects and not necessarily in chronic health effects as the contaminated potable well (environmental pathway) has been discontinued and alternate supply of potable water instituted. However, lead and other heavy metal contamination in the surficial and subsurface soil, as well as VOCs, still continue to be of public health importance.

HEALTH OUTCOME DATA EVALUATION

There have not been any health studies conducted for the Nascolite Corporation site. To date, there is no reported health outcome data evaluation of the area around the site. Prior to the preparation of this report, we were unable to adequately evaluate State of New Jersey disease registries or vital records for inclusion in this report.

Conclusions

Based on the information reviewed, ATSDR and NJDOH has concluded that the Nascolite Corporation site is of indeterminate public health hazard because there are many existing data gaps and because humans have probably been exposed to hazardous substances at concentrations that may result in adverse health effects. As noted in the environmental pathways section and human exposure pathways section, the limited data do not indicate that past exposures have occurred and if present exposures are continuing, and, if exposure to these levels have adversely affected the health of either the neighboring worker population nor of the resident population. However, based on the information reviewed the following conclusions can be made.

*Soil investigation indicated organic contamination to be present up to a depth of 50 feet. Soil boring investigation revealed that the contamination predominantly exists in the North Plant area and southeastern section of the site. MMA was the most prevalent organic compound and exceeded the NJDEP action level of 50 mg/kg. At 30 feet MMA concentration exceeding the action level was found to extend horizontally northwest and southeast from the North Plant area. Volatile and semi-volatile organics were found at concentrations in excess of their NJDEP action levels in and around the zone of MMA contamination.

*Inorganic contamination was found in the North Plant area within, and south of the facility to a depth of five feet. The inorganic contaminants detected at concentrations in excess of their NJDEP action levels were cadmium, copper, lead, zinc, mercury and selenium. High concentrations of lead is of particular concern.

*Inorganic and semi-volatile organic contamination is present in the ditch along the southwest edge of the site and along the west edge of the wetlands, but only to a depth of five feet. Minimal contamination was observed at the south edge of the wetland and there was no evidence of contaminant migration toward the Petticoat Stream and the wetlands located further south of the site.

*Off-site MMA and VOC contamination in soil was confirmed at the Cumberland Recycling area located northwest of the Nascolite site. This indicates that contamiants have migrated off-site via groundwater.

*On-site buildings and debris are contaminated with MMA, VOCs,inorganic chemicals such as lead, zinc, cadmium and asbestos, and relate to past activities.

*Well 6 contamination cannot be attributed to Nascolite, since it is one-mile upgradient of the site.

*The physical and chemical properties of the contaminants present in the site indicate potential for migration. The volatiles and chlorinated organics detected at the site are strong solvents and could act as cosolvents to increase the solubility and mobility of the semi-volatiles and MMA. The inorganics are likely to persist in the soil.

The Division of Health Studies (DHS) is not considering conducting a follow-up health study at this time because of the absence of evidence for exposure to significant levels of contamination or evidence of adverse health effects associated with the site. However, if data become available suggesting that human exposure to significant levels of hazardous substances is occurring or has occurred in the past, the DHS will reevaluate the need for any indicated follow-up. If appropriate, the Division of Toxicology will assess the need to reevaluate existing research priorities or develop toxicological profiles for specific chemical substances identified at the site.

RECOMMENDATIONS

The followup health activities recommendation statement will be added to this health assessment before it is finalized.

*With the exception of on-site ambient air sampling performed under winter conditions there has been no repeat air sampling performed either for total suspended particulates or VOCs in current site conditions. If on-site soils are disturbed during remedial activities,

significant volatilization of VOCs, semi-volatiles, suspension of adsorbed inorganic particles may result. There is no documented information to evaluate this environmental pathway. Hence it is being recommended that air sampling be repeated in summer.

*The high concentrations of lead in surface soils are of major concern as long-term exposures can result in adverse health effects to any receptor population identified in the previous sections. To eliminate the potential effects on human health, surface soil should be cleaned until the residual contamination has been brought below acceptable clean-up standards. Soil remediation should be initiated as soon as is practical. The remedial activities should be conducted in such a manner as to minimze the generation and migration of fugitive dusts in recognition of nearby sensitive populations and commercial operations, and their proximity to the site.

*It has been observed that all excavated soils have not been covered by tarps. To minimize migration of contaminants to air and direct contact to tresspassers and workers it is being recommended that all mounds of soil should be tarped securely or the soils removed to an appropriate landfill at the earliest possible time.

*The vertical and horizontal extent of the groundwater contaminant plume off the site have not been completely characterized and monitoring wells located along the periphery are inadequate to detect all off-property migration of contaminants. While current exposure is not of concern, future exposures may occur if excavated soils and wastes are left in place and remedial measures fail to prevent contaminant migration. Although the general trends in contaminant migration have been characterized the limits of the plume itself have been undefined. Periodic monitoring is required to see if the plume is continuing to spread.

*Hydrogeological investigation results have suggested the possibility of the flow system discharging to the Petticoat stream. This Stream has to be periodically sampled to determine possible contamination.

*Periodic ambient air sampling has to be performed.

*Site access has to be restricted as well as secured.

*The data indicate that MMA contamination is present in the debris inside the buildings. Proper removal of the debris from the buildings may be necessary prior to demolition to prevent release of MMA into the air. It is being recommended that adequate precautions need to be taken during removal activities.

*Debris present inside the Nascolite buildings is contaminated with high concentration of metals. Removal of the debris and proper disposal/remediation may be necessary prior to demolition of the building. It is being recommended that adequate caution be taken during removal activities.

*The remedial action for the Nascolite Corporation site selected in the Record of Decision for the first operable unit (groundwater remediation) should be initiated as soon as is practical.

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

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REFERENCES

NTIS "Drinking Water Criteria Document for Asbestos" USEPA 86-118262 March 1985.

Agency for Toxic Substances and Disease Registry. Toxicological Profile for:

a. ZINC
b. CADMIUM
c. BENZENE
d. METHYLENE CHLORIDE
e. LEAD
f. 1,1, DI-CHLOROETHENE

Superfund Documents:

1. Final Remedial Investigation Report, Supplemental RI/FS, for the Nascolite Corporation Site, Millville, Cumberland County, New Jersey. Vol I., Vol II., September 1990. Prepared for The U.S. Environmental Protection Agency. Prepared by Ebasco Services Inc. C.C.Johnson & Malhotra, P.C.

2. Draft Report of The Task 2 Site Investigation At The Nascolite Corporation, Millville, Cumberland County, New Jersey. Vol. I., Vol. II. Prepared by TRC Environmental Consultants, Inc. TRC March 1986.

3. Nascolite Corporation site. RECORD OF DECISION. March 1988.

4. Community Relations Plan For Hazardous Waste Site Remedial Action. Nascolite Corporation Site., Millville, Cumberland County. November 1984. Revised April 1985. Prepared by the New Jersey Department of Environmental Protection, Division of Waste Management, Hazardous Site Mitigation Administration.

5. County of Cumberland, Department of Health: 'City of Millville. Update on Nascolite.' Dated 1-28-80.

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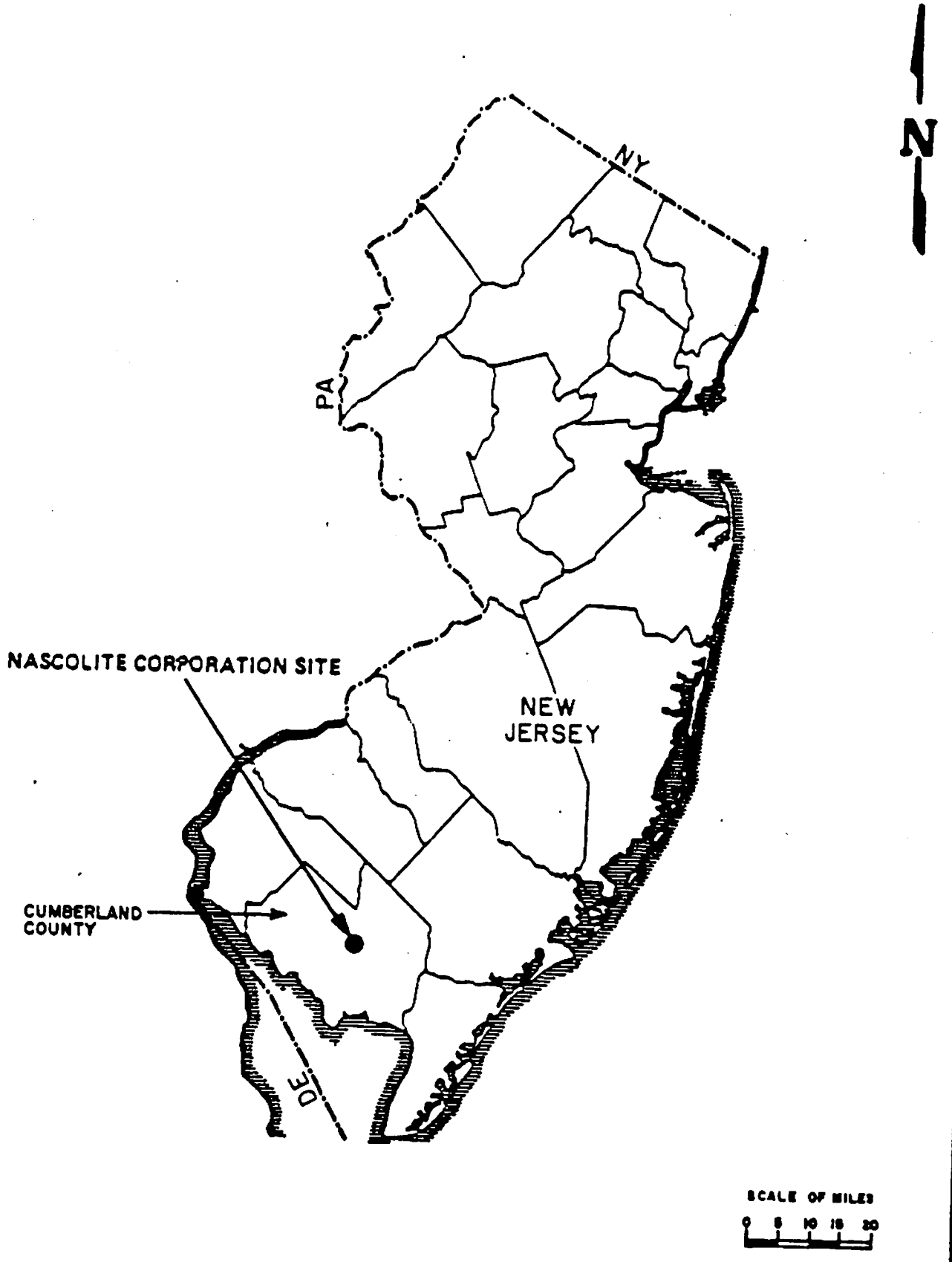
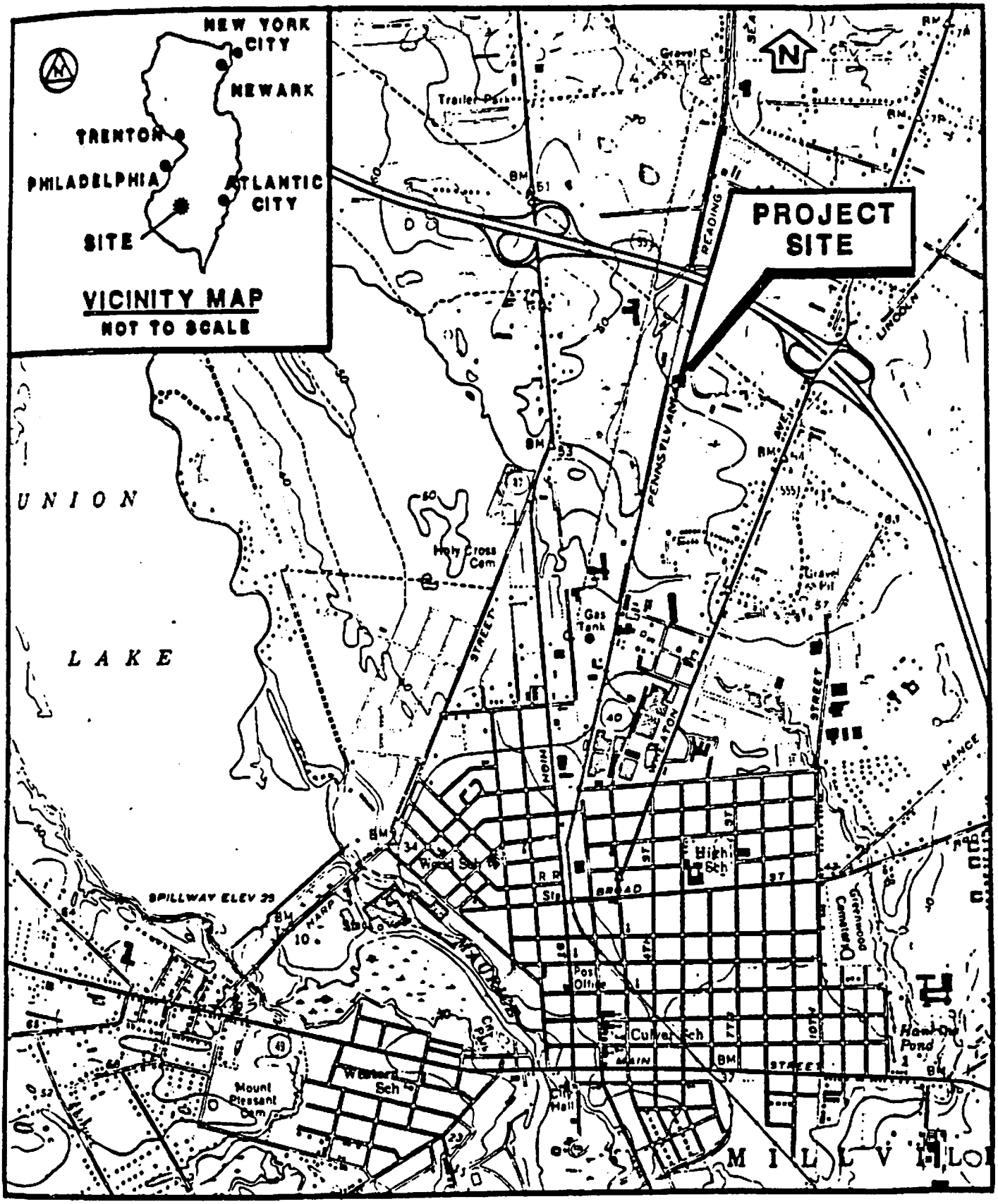
APPENDICES

TABLES



SCALE AS SHOWN	REM III	FIGURE
DATE JUNE 1990	REGIONAL LOCATION MAP NASCOLITE CORPORATION SITE, MILLVILLE, NJ	1-1



FROM MILLVILLE, NJ 7 1/2'
USGS TOPOGRAPHIC MAP

0 8000 FT

SCALE

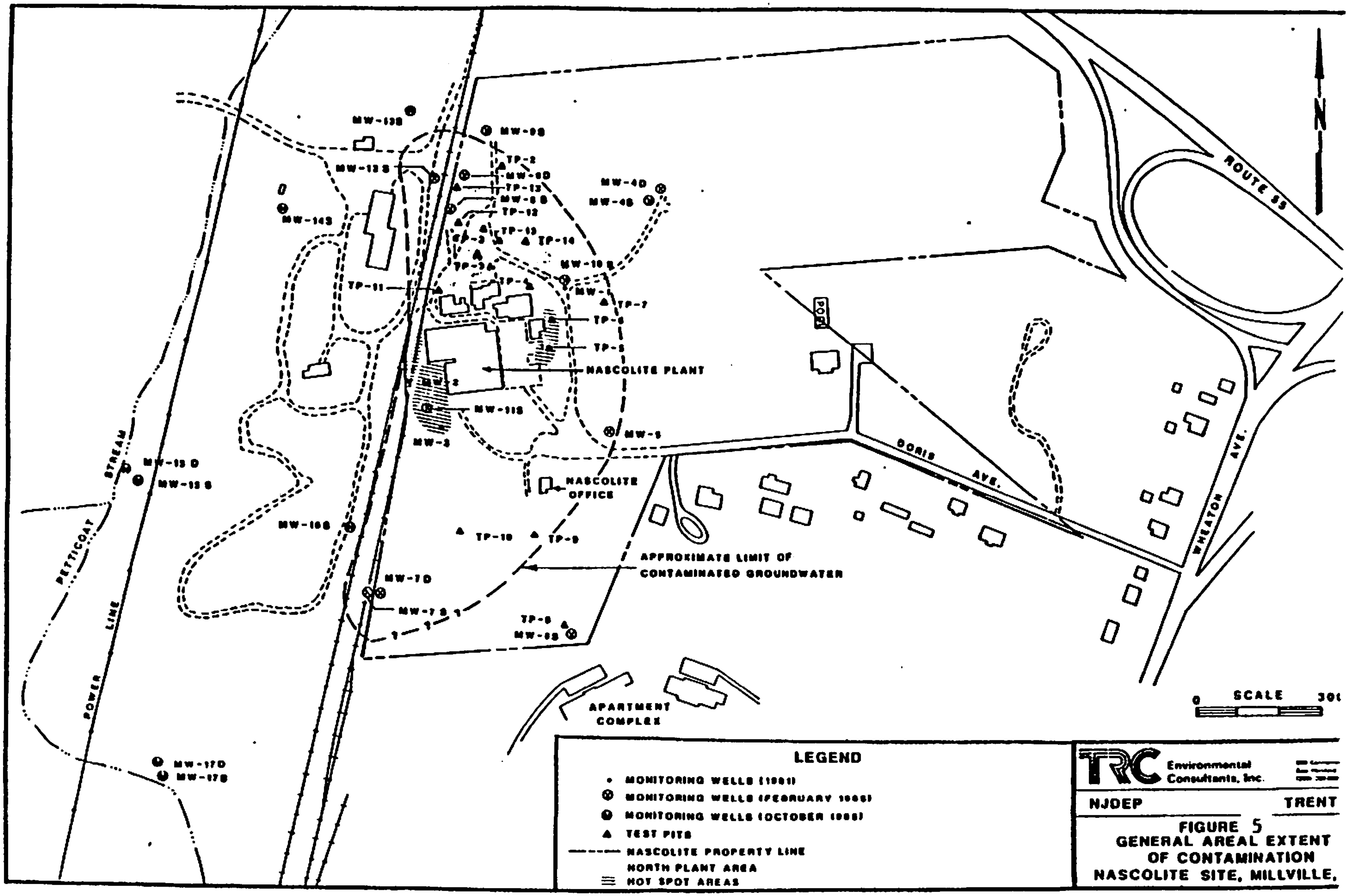
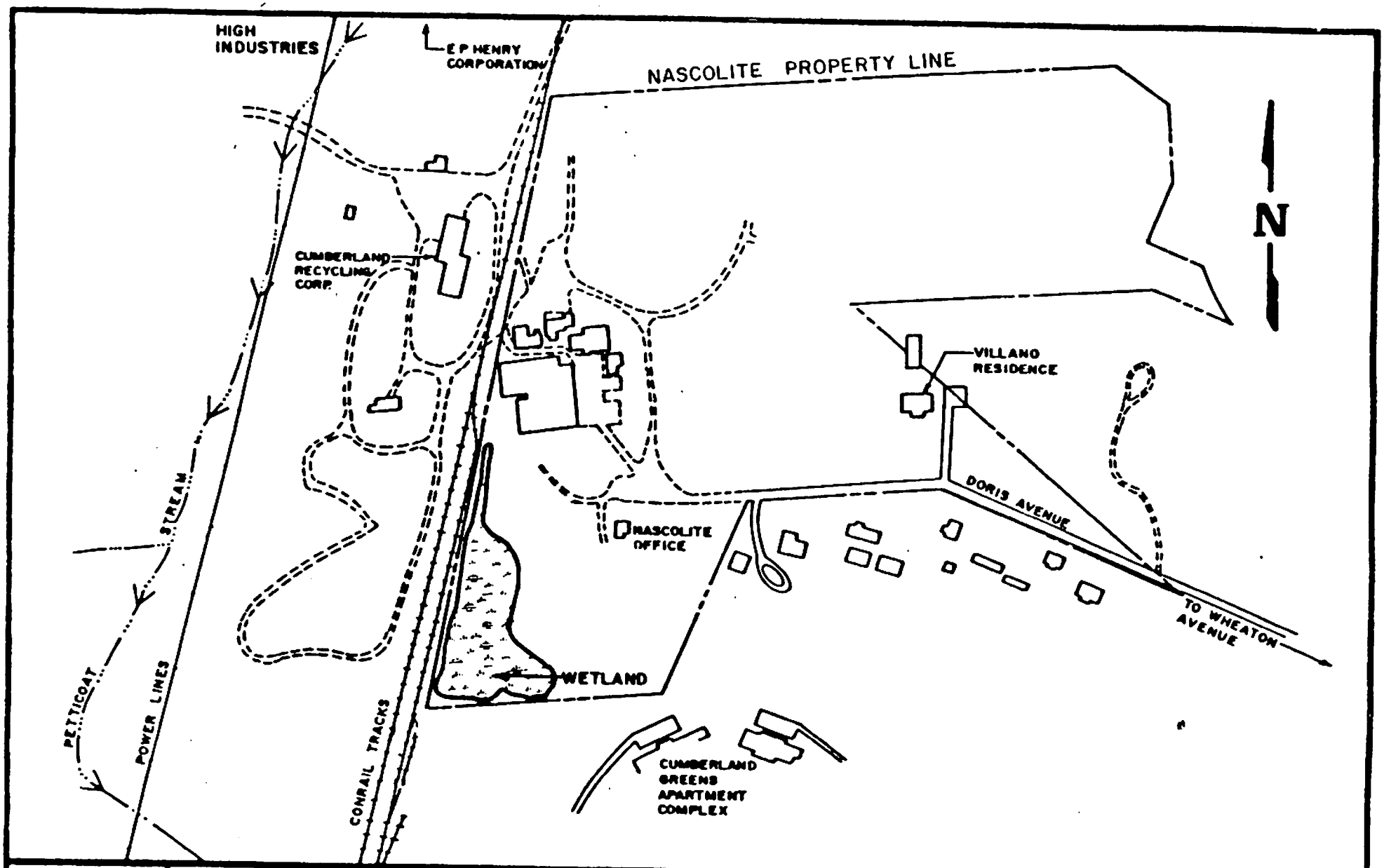


FIGURE 5
GENERAL AREAL EXTENT
OF CONTAMINATION
NASCOLITE SITE, MILLVILLE,



SCALE	REM III	FIGURE
1" = 3830'	GENERAL SITE MAP	1-3
DATE	NASCOLITE CORPORATION SITE, MILLVILLE, NJ	
JUNE 1990		

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

EBASCO SERVICES INC

APPENDIX 4

TABLE - I

Table of Results of Groundwater Analysis. Monitoring Wells

COMPOUND	On-site 1983	On-site 1987	Off-site 1987	Federal MCL'a' ug/l	NJ'b' RMCL ug/l
ORGANIC COMPOUNDS					
VOLATILE ORGANICS:					
1,1-dichloroethane	NR	4700	50	-	-
1,2-dichloroethane	14	2800	30	-	-
Trans-1,2-dichloroethane	NR	1600	20	-	-
1,1,1-Trichloroethane	40	9000	700	-	-
Trichloroethylene	320	11500	2400	-	-
Tetrachloroethylene	NR	41000	100	-	-
Benzene	340	30400	3800	5	1
Toluene	440	158000	1600	-	1
Ethylbenzene	7700	41300	500	-	-
Methylene Chloride	15	19200	2700	-	-
SEMIVOLATILE ORGANICS:					
2,4-Dimethylphenol	NR	600	400	-	-
bis(2-Ethylhexyl)phthalate	NR	1000	1600	-	-
Napthalene	620	6700	20	-	-
Di-N-Butylphthalate	NR	71400	200	-	-
Total Phenols	NR	14000	2200	-	-
INORGANIC COMPOUNDS					
METALS:					
Antimony	NA	800	100	-	-
Cadmium	NA	20	00	-	-
Chromium	NA	40	20	50	-
Copper	NA	70	330	-	-
Lead	NA	26	10	50	-
MISCELLANEOUS PARAMETERS					
Methyl Methacrylate	NA	7440000	398000	-	-

*Only Maximum concentrations are reported.
*All concentrations are reported in ug/l.
* 'ND' Not Detected
* 'NA' Not Analyzed.
* 'a' Federal register, November 13, 1985 and July 8, 1987.
* 'b' New Jersey Drinking Water Quality Institute, Maximum Contaminant Level Recommendations for Hazardous Contaminants in Drinking Water March 26, 1987.
* '-' not yet available

TABLE - 2

Table of Results of Groundwater analysis.

COMPOUND	Potable Wells On-site 1987	Off-site	Federal MCL'a' ug/l	NJ'b' RMCL ug/l
ORGANIC COMPOUNDS				
VOLATILE ORGANICS:				
1,1-dichloroethane	ND	ND	-	-
1,2-dichloroethane	ND	ND	-	-
Trans-1,2-dichloroethane	76.6	16	-	-
1,1,1-Trichloroethane	ND	ND	-	-
Trichloroethylene	50	2	-	-
Tetrachloroethylene	ND	ND	-	-
Benzene	168	4.4	5	1
Toluene	79	6	-	1
Ethylbenzene	141	7.2	-	-
Methylene Chloride	31	4.2	-	-
SEMIVOLATILE ORGANICS:				
2,4-Dimethylphenol	20	3	-	-
bis(2-Ethylhexyl)phthalate	ND	ND	-	-
Napthalene	ND	ND	-	-
Di-N-Butylphthalate	ND	ND	-	-
Total Phenols	290	2	-	-
INORGANIC COMPOUNDS				
METALS:				
Antimony	ND	ND	-	-
Cadmium	ND	ND	-	-
Chromium	ND	ND	50	-
Copper	ND	430	-	-
Lead	ND	74	50	-
MISCELLANEOUS PARAMETERS				
Methyl Methacrylate	96	10	-	-

*Only Maximum concentrations are reported.
*All concentrations are reported in ug/l.
* 'ND' Not Detected
* 'a' Federal register, November 13, 1985 and July 8, 1987.
* 'b' New Jersey Drinking Water Quality Institute, Maximum Contaminant Level Recommendations for Hazardous Contaminants in Drinking Water March 26, 1987.
* '-' not yet available

TABLE - 3

Table of Results of Soil Investigation

COMPOUND	Surface Soil On-Site 1985 'c'	Subsurface Soil On-site 1989	Site 'a' Background mg/kg	NJDEP 'b' Action levels
ORGANIC COMPOUNDS				
VOLATILE ORGANICS:				
1,1-dichloroethane	ND	18-25	-	-
1,2-dichloroethane	ND	42-220	-	-
Trans-1,2-dichloroethane	0.008	ND	-	-
1,1,1-Trichloroethane	ND	1-1800	-	-
Trichloroethylene	0.006	1-5300	-	-
Tetrachloroethylene	ND	1-190	-	-
Benzene	ND	1-2500	-	-
Toluene	ND	1-13000	-	-
Ethylbenzene	ND	3-71000	-	-
Methylene Chloride	0.05	7-2100	<2.8	-
SEMIVOLATILE ORGANICS:				
2,4-Dimethylphenol	0.42	500-7600	-	-
bis(2-Ethylhexyl)phthalate	3033	76-630000	-	-
Napthalene	ND	240-3600	-	-
Di-N-Butylphthalate	18.2	47-76000	-	-
Total Phenols	1.8	170-7100	-	-
INORGANIC COMPOUNDS				
METALS:				
Antimony	40	2.1-28	-	-
Cadmium	117	.2-57	ND	3
Chromium	28	1.4-40.8	2-15	100
Copper	510	.7-174	3-5	170
Lead	21400	0.56-10700	.8-2.7	250-1000
Zinc	531	1.4- 868	2.5-8.6	350
MISCELLANEOUS PARAMETERS				
Methyl Methacrylate	32,000	1-1,900,000		5-50

*Only Maximum concentrations are reported.
*All concentrations are reported in ppm .
*Inorganic are reported in mg/kg
* 'ND' Not Detected
* 'a' Site backgrounds determined from borehole (TRC) 1986.
'b' New Jersey Department of Environmental Protection Action Levels.
* 'c' Data source 'TRC Report, 1986.
* '-' not yet available

Data Source 'Final Remediation Investigation Report, Vol. I, September 1990.'

TABLE -4

Table of Results of Building Survey.

COMPOUND	WIPE	DEBRIS
Asbestos Minerals (%)		
1. Chrysotile	-	30%
2. Amosite	-	20%
Total Metals:	(ug/wipe)	
Aluminum	4940	125000
Antimony	516	603
Arsenic	863	62.3
Barium	1040	932
Cadmium	597	391
Calcium	17000	74900
Chromium	692	188
Copper	7100	1010
Lead	181000	79900
Magnesium	3920	39700
Manganese	2400	2470
Vanadium	332	450
Zinc	10900	6250
Methyl Methacrylate (ug/wipe)	380	9900000

'-' Results are currently unavailable
Only maximum conentrations are reported.

Data Source 'Final Remediation Investigation Report, Vol. I, September 1990.'

TABLE - 5

Table of results of Chemical Waste Sampling from Monitoring Wells.

COMPOUND	WM-1 On-site	WM-2 On-site	WM-3 On-site	WM-8A On property line
ORGANIC COMPOUNDS				
VOLATILE ORGANICS:				
Toluene	<60	225	328	<60
Trichloroethylene	<190	<9.5	<9.5	1179
Benzene	<440	31	<22	259
Ethylbenzene	<720	112	45	84
Chlorobenzene	<600	85	<30	<60
Methylene Chloride	584	24	<14	239
SEMIVOLATILE ORGANICS:				
Phenol	193	3490	186	<150
2,4-Dimethylphenol	59	535	86	<270
bis(2-Ethylhexyl)Phthalate	2210	75798	18	53000
Total Phenols	240	5700	900	320
INORGANIC COMPOUNDS				
METALS:				
Antimony	320	10	20	<6
Cadmium	2200	90	2760	<0.2
Chromium	190	19	155	<1
Copper	2000	372	1130	<1
Lead	<8	3930	48000	<0.6
Mercury	28	0.9	57	<0.2
Nickel	68	4	95	2
Silver	5	<0.9	10	<0.7
Selenium	210	15	220	1
Zinc	4200	352	6440	<3
MISCELLANEOUS PARAMETERS				
Methyl Methacrylate	252000	1426	6446	475300

*All concentrations are reported in ppm.

Source of data:'TRC Report of the Task2 Site Investigation at the Nascolite Corporation Site, June 1986'.