

**Health
Assessment
for**

A.O. POLYMER

CERCLIS NO. NJD030253355

SPARTA, SUSSEX COUNTY, NEW JERSEY

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Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104(i)(7)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risk assessments, risk evaluations and studies available from the Administrator of EPA."

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

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

HEALTH ASSESSMENT
A.O. POLYMER
SUSSEX COUNTY
SPARTA, NEW JERSEY

Prepared by:
Environmental Health Service
New Jersey Department of Health

Prepared for:
Agency for Toxic Substances and Disease Registry (ASTDR)

OBJECTIVES

Phase I of the Remedial Investigation of A.O. Polymer has been completed, and a Phase II sampling plan is currently being reviewed. The objectives of this Health Assessment based upon the current stage of site remediation are to:

- * Evaluate the potential past, current, and future exposure and public health impacts which may be associated with the site;
- * Identify, if necessary, any actions that need to be taken to prevent or minimize exposure to hazards or contamination associated with the site;
- * Identify, if necessary, additional exposure and sampling points;
- * Identify, if necessary, gaps and deficiencies in the data or information associated with the site;
- * Document the concerns of the community with respect to the site; and
- * Assess whether a health study of the site is indicated.

SUMMARY

The A.O. Polymer site is an active four-acre manufacturing plant involved in the production of resins and plasticizers. The site has been an identified source of environmental contamination and the object of water quality and odor complaints for

approximately fifteen years. In 1980-81, the New Jersey Department of Environmental Protection (NJDEP) conducted a clean-up operation of contaminated soil from waste disposal lagoons and drums containing hazardous materials. Contamination of groundwater and surface water have been documented off-site and odor violations are currently being litigated. The site has been on the National Priority List since 1982, and has been the subject of investigation by a variety of Local, State, and Federal authorities. The site is currently being evaluated in a NJDEP Remedial Investigation and Feasibility Study (RI/FS). Phase I of the RI has recently been completed, and a Phase II sampling plan is currently under review.

Public health implications of the site are associated with groundwater use, the proximity of the local high school, contamination of surface water, and occupational exposure. There are actions that need to be undertaken at the site, and data gaps that need to be filled.

On the basis of the information reviewed, the A.O. Polymer Site is considered to be a potential public health concern. After consultation with Regional EPA staff and State and local health and environmental officials, the Epidemiology and Medicine Branch, Division of Health Studies, ATSDR, will determine if follow-up public health actions or studies are appropriate for this site.

SITE DESCRIPTION

The four-acre A.O. Polymer site is an active industrial operation located in Sparta Township, Sussex County. It is situated in a semi-rural area near the Wallkill River, about one-quarter mile from the commercial district of Sparta and one-half mile from the Sparta high-school. It is bordered on the northwest by an unnamed tributary to the Wallkill River, on the northeast by the Station Park recreation area, on the southeast by Station Road, and on the southwest by the New York, Susquehanna & Western railway. A private gun club and undeveloped wetlands also adjoin the property.

From the early 1960's to 1977, the plant was owned and operated by Mohawk Industries Inc. In 1977, the facility was purchased by the A.O. Polymer Corporation. Some of the manufacturing/mixing processes of Mohawk Industries are continued by A.O. Polymer (eg., the production of specialty polymers, plasticizers, paper coatings, as well as polyketone and acrylic resins).

In 1978 and 1979, NJDEP documented the contamination of soils, groundwater, and surface waters in the area of the chemical plant which allegedly resulted from substandard operational practices and waste disposal inadequacies by both Mohawk Industries and A.O. Polymer (Letter: ICF to NJDEP, 1987). Pollutants include numerous volatile organic compounds, phenols, phthalate esters, acetone, freon, and formaldehyde.

An extensive surface clean-up was performed in 1980-81 by NJDEP which included the removal of 600 drums of hazardous waste, and 165 truckloads of contaminated soil from three lagoons. In addition, 86 drums of contaminated alcohols were voluntarily removed by a responsible party.

The first complaints of odors in well water and air near the site were made by a nearby resident in 1973. Complaints intensified by 1978, and resulted in an investigation by the Sparta Health Department and NJDEP. The analysis of samples from several potable wells off-site confirmed contamination with volatile organics. In 1982, the NJDEP Division of Water Resources installed eleven monitoring wells. In 1984, the investigation was turned over to NJDEP Hazardous Site Mitigation, and in 1986 a contract was issued to a private sector consulting company for a Phase I RI/FS.

Throughout this period, A.O. Polymer was the focus of a variety of regulatory actions by Local, State, and Federal authorities (Letter: ICF to NJDEP, 1987). After a site inspection in November 1981, A.O. Polymer was cited by NJDEP for failing to have a State discharge permit for process water discharged to the cooling lagoon. This directive was dropped when A.O. Polymer insisted that the lagoon is lined and is only used to recycle cooling water for the reactor. In January 1982, NJDEP issued a directive order to redress a situation by which plant wastewater was being discharged into the plant septic system. These circumstances are still a focus of investigation. The NJDEP Division of Air Quality has issued three administrative orders to A.O. Polymer to come into compliance with air quality standards as a result of odor complaints. These are presently being challenged by the company.

In July 1984, the Town Council of Sparta adopted a resolution describing the environmental contamination associated with the A.O. Polymer site, and supporting the present remedial investigation by NJDEP (Resolution of Township of Sparta, 1984). The Sparta Fire Department, upon its most recent inspection of the site, uncovered several violations of their fire code and is presently preparing an emergency response plan for the community to deal with an industrial accident/fire scenario.

The Federal Occupational Safety and Health Administration (OSHA) investigated the A.O. Polymer site from April to August 1983 as a result of an internal referral regarding exposure of workers to TDI (toluene diisocyanate), formaldehyde, and resin dust. The results of this investigation were citations for failure to maintain a clean and orderly workplace, provide eye drenching facilities for the laboratory workers, and provide training to workers on fire management (Report of Malcolm Pirnie; Interview with OSHA regional office).

SITE VISIT

A.O. Polymer site is located in close proximity to a busy commercial thoroughfare. It is situated at the end of a short side road leading from Main Street. There are several residences, a few small businesses, and a town recreation area close to the site. The principal features of the site are the railroad tracks bordering one side and a steep but negotiable embankment along the other side of the plant area. Two roads enter the site. Several buildings occupy the site, including the office building, plant operations buildings, and storage buildings. There are storage tanks on the site. Drums are interspersed throughout the area, some stored on pallets. The facility resides largely on dirt and sparse grassy areas.

The site is accessible by way of a variety of overland routes from the park or the railroad property. The owner has reported break-ins and vandalism to the police. There were footprints on the side of the embankment which leads to the park. The site is fenced near the entrance from the road and electronic surveillance equipment monitors this entrance. There is no guard at the site but a security alarm system is in place for some of the buildings.

Deer excrement was noted on the property and, according to a former local Health Officer, hunting is allowed in areas within several miles of the plant. The Wallkill River is stocked with trout and is fished by local residents. At least one resident who lives 0.6 miles downstream from the site lets his beef cattle drink directly from the Wallkill River.

There were no apparent odors off-site, during the site visit. However, NJDOH visitors noticed odors on-site at the reactor building (inducing nausea) and near the laboratory. Conversations with several nearby residents revealed that odors are noticed off-site intermittently, which vary in intensity. One resident reported that odors are usually worse on weekends and off-shift hours.

COMMUNITY CONCERNS

Community concerns have centered around odor complaints, the threat of contamination of the high school drinking well (especially with formaldehyde), contamination of the park playing fields, and pollution of the Wallkill River.

The odor complaints controversy is still a very active issue after nearly fifteen years. Reports usually come from the east side of the plant although one resident informed the New Jersey Department of Health (NJDOH) that people on the other side of the

site also complain about the odors. Area residents have reported that odors are produced intermittently. Some complaints allege that odors are worse on weekends and off-shift times. The odors have been described as invoking a burning sensation in the back of the throat, causing eyes to water, and to be irritating.

The denial of an adjacent recreation park (Station Park) as a Green Acres selection has caused considerable consternation among residents and raised concerns whether potential health effects or noxious odors were factors that entered into the denial decision. The proposed referendum to construct a new high school on the Station Road tract near the site has been the subject of citizen debate and, according to a local official, is not likely to be approved (N.J. Herald, 1986).

ENVIRONMENTAL CONTAMINATION AND PHYSICAL HAZARDS

During the ten years the site has been under investigation, samples have been taken from the following media: both on-site and off-site potable wells, the A.O. Polymer cooling lagoon, on-site and off-site soils, waste containers, the Wallkill River, sub-surface soils, drums, ambient air, on-site and off-site monitoring wells, workplace air, and the on-site septic tank. Samples were analyzed for priority pollutants and tentatively identified compounds. Unless otherwise specified, the following information was taken from the RI/FS report.

In the most recent investigation (Phase I RI/FS), on-site soils were screened in May 1987 using a photo-ionization detector. These consisted of 15 subsurface soil samples and 1 surface sample. Three off-site samples were collected from Station Park as background. Samples were also drawn for groundwater analysis from 11 existing monitoring wells and 12 newly installed wells. Eight potable wells in the area were also sampled. A well located in Sparta approximately 0.75 miles southwest of the site was used as a background location. Off-site surface water samples were gathered at three stations on the Wallkill River and one sample from the cooling lagoon on A.O. Polymer property. Benthic sediment samples were also collected from the river bed at these three points. All samples were analyzed for 126 organic compounds and 24 inorganic substances found on the USEPA Hazardous Substance List. Additionally, freon 11 was targeted for analysis.

SOILS:

Inorganic Data. With the exception of zinc, magnesium and calcium there appears to be no apparent differences with regard to metal contaminants between on-site and off-site samples.

Organic Data. No organic pollutant compounds were found in the background samples. However, a number of organic chemicals were found in on-site samples including: polycyclic aromatic hydrocarbons (PAHs), halogenated aliphatic hydrocarbons (HAHs), monocyclic aromatic hydrocarbons (MAHs), phthalate esters, phenols, and ketones. The PAH contamination is generally a surface phenomenon while the HAH contamination (mostly chlorinated solvents) is a subsurface phenomenon. MAHs and phenolic compounds were found in connection with the HAHs and are believed to be the remnants from the Mohawk Industries waste burial lagoons. The PAHs may be due to past railroad fueling activities.

GROUNDWATER:

Inorganic Data. According to the most recent investigations, accurate background locations could not be established given the unpredictable occurrence and distribution of metals in the environment, land use, vegetation patterns, and geochemistry of the contaminants and aquifers. However, beryllium and nickel, although detected infrequently, were always recorded at levels above their comparative Ambient Water Quality Criteria (AWQC).

Organic Data. Groundwater contamination extends from the site in nearly every direction. Organic contaminants were found in 12 of 15 monitoring wells within a rectangular area around the site. The three uncontaminated wells are all bedrock wells. The highest level of organic contaminants was a total volatile organic chemical (TVOC) concentration of 21,306 ppb consisting mostly of 1,1,1-trichloroethane (TCA), trichloroethylene (TCE), and their breakdown products in combination with a high concentration of methyl isobutyl ketone (MIBK) and acetone. The next highest level of TVOC was 18,510 ppb, being almost all methyl ethyl ketone (MEK).

These results indicate that in addition to a contaminant plume moving east toward the Wallkill River, a contaminant plume is also moving north in the direction of the wetlands.

POTABLE WELLS:

Inorganic Data. Samples were not found to contain any significant levels of inorganic contaminants.

Organic Data. No organic contaminants were detected in wells that were sampled and are currently being used for potable water.

SURFACE WATER & SEDIMENT:

Inorganic Data. Beryllium, nickel, and cyanide were detected near the entrance to Station Park, but whether this is evidence of naturally occurring phenomena or site-related contamination is unclear.

Organic Data. Xylenes were detected at 17 ppb at the A. O. Polymer cooling lagoon, possibly due to plant processes or truck emissions on-site. Trans 1,2-dichloroethene was found at 6.3 ppb in the Wallkill River about 0.5 miles northeast of the site. Since this is the direction of one of the contaminant plumes, it could be indicative of contaminated groundwater discharge. PAHs were found upstream in greatest concentration and could result from the use of fossil fuels. However, toluene and di-n-butyl phthalate were recorded in downstream samples.

FREON:

Freon was often found in monitoring wells in samples with large amounts of other contaminants. Since A.O. Polymer was engaged in the refinement of contaminated freon, the detection of freon may be relevant.

AIR:

No air sampling was done in Phase I of the RI/FS.

SEPTIC TANK:

While several volatile organic contaminants were detected in the septic tank, their levels may not be high enough to indicate that the septic tank is a major source of contaminants found in monitoring wells. Residues of three phthalate compounds and benzoic acid were also detected.

The source of contaminants within the A.O. Polymer site has not been completely determined. There is some evidence that the former waste lagoons are not the source of all the pollutants, especially the MEK contaminant plume which appears to be heading in a southeasterly direction on an interception course with the main plume which is moving towards the Wallkill River. Possible sources of contamination may include the reactor building, abandoned tanks, small brick outbuildings, and the septic tank near the laboratory.

PHYSICAL HAZARDS:

There are reported to be corrosive and flammable chemicals on the site, along with stacks of drums and equipment that pose potential physical hazards. An emergency response plan is currently being developed by local fire prevention officials to address potential problems with on-site fires and/or explosions.

Table I lists chemicals that are included as contaminants of concern at the site. These chemicals were identified based on their toxicity, detected concentrations, and fate.

TABLE I - Maximum Concentrations of Contaminants of Concern

All Concentrations in Parts Per Billion (ppb)

Chemical	Groundwater	Soil
Methylene Chloride	956	-
Tetrachloroethylene	21,600	27,000
Carbon Tetrachloride	448	-
1,1,1-Trichloroethane	3,340	32,000
Trans 1,2-Dichloroethene	6,340	-
Trichloroethene	2,950	-
Methyl Ethyl Ketone	50,200	-
1,1-Dichloroethane	750	-
Toluene	840	61,000
Acetone	8,100	-
4-Methyl-2-Pentanone	2,900	-
Bis (2-ethylhexyl) Phthalate	97	41,000
Trichlorofluoromethane	-	53,000
Ethylbenzene	-	15,000
Xylenes (total)	-	34,000
Naphthalene	-	16,000

Source: Phase I Remedial Investigation Report.

All samples were from on-site. All soil samples reported in this table are from subsurface soils.

QUALITY ASSURANCE/QUALITY CONTROL

According to the RI, the validity of analytical results received from the laboratory and their suitability were independently evaluated by ICF/SRW Associates (the analysis was done by Compuchem) using EPA data validation procedures. Additionally, July 1987 NJDEP Data Validation Guidelines were used to evaluate the overall content of the data packages, sample holding times, and blank sample quality. Of wells sampled both by ICF/SRW and NJDEP, there was good correlation between the analyses, according to NJDEP.

Within the report from the Phase I RI/FS some problems are mentioned. There was potential interference with the lab analysis from at least one monitoring well due to the constituents of the groundwater in that area. Additionally, no validated or approved method exists for the analysis of formaldehyde at low concentrations in water.

In general, the quality of the data is judged to be acceptable for this health assessment.

DEMOGRAPHICS

The residential population in the vicinity of A.O. Polymer is estimated to be 760 people (200 wells x 3.8 persons/household). However, the use of the park and the high school suggest that the population potentially at risk of exposure may be greater. The community has expressed concerns over the integrity of the surface water supplying Ogdensburg and Franklin Township, and the future degradation of a productive aquifer in Sussex County. The population affected by the plumes may grow due to development of the area, and the potential migration of the plumes.

The proximity of a gun club, wetlands, a railway, and a town park with many actively used playing fields is a special consideration. Similarly, the site is only 0.3 miles from a busy commercial and municipal area, and 0.5 miles from a public high school.

ENVIRONMENTAL DATA GAPS

As the site has not yet been adequately characterized, there are data gaps associated with assessing the public health implications of the site. These include:

- * The groundwater plumes and groundwater movement in the area need to be better delineated and evaluated. The Wallkill River is a source of water for townships farther downstream. The groundwater aquifer beneath the site is a potentially important water resource for a large area of future development.
- * Off-site testing of soils in the run-off troughs at the northeast and southeast points of the site should be sampled. Sampling of on-site soils for residual contamination especially in the area of the NJDEP clean-up operations is needed.
- * The question of odor complaints has been incompletely addressed to date, especially in view of the fact that certain noxious chemicals such as TDI and formaldehyde may pose hazards at levels at or below the odor threshold. A consultant engaged by the Sparta Health Department assessed the available information, and identified a list of potential odor-producing agents. In addition to TDI and formaldehyde, MEK, cyclohexanone, acrylates, and xylene were identified as potential source(s) of the odor (RI/FS report). Allegations of increased odor problems on weekend and off-shift hours must be investigated.

- * Data is needed relating to soil gas concentrations in the area of the playing field.
- * The presence of MEK at high concentrations in soils and monitoring wells in a localized area downgradient of the site suggests a source other than the old waste lagoon. The MEK plume source and direction needs to be identified with more certainty.
- * In addition to the children using the playing fields and attending the high school, the existence of other sensitive populations must be identified, as part of the RI/FS.
- * The consumption of potentially contaminated food (i.e. fish, wildlife, and domestic animals) by area residents needs to be examined.

EXPOSURE PATHWAYS

This site has exhibited the potential to expose the surrounding population and on-site workers by a variety of routes. Routes of migration are via the groundwater and surface water. Soil contamination on-site still exists and the possibility of off-site migration due to run-off must be considered as possible sources of dermal and inhalation exposure in recreation areas. Ingestion of contaminated food sources is another possible exposure pathway. Odor complaints carry the possibility of sporadic inhalation exposure.

On-site exposure of workers could occur by dermal and inhalation routes. The plant is accessible to trespassers who could be exposed to contaminants via inhalation, ingestion, and dermal absorption pathways.

PUBLIC HEALTH IMPLICATIONS

While several pollutants of concern have been detected, certain contaminants deserve special consideration. Both TCE and TCA can damage the liver and kidney, while MEK can increase the toxicity of these compounds. Formaldehyde is an eye and respiratory irritant, but it is not known if formaldehyde causes carcinogenic, mutagenic, or teratogenic effects in humans (though it has been linked to cancer in laboratory rats). Infants, children, the elderly, and people with a history of allergies or respiratory disease are more likely to develop a reaction from exposure to formaldehyde. With regard to TDI, one study found that 5% of workers exposed to TDI developed asthma while another found that TDI used in plasticizers produced allergic-like symptoms via inhalation. Other reported effects were a concentration dependent immunologic response and

decreases in pulmonary function with some long-term reductions in function. Phthalate esters are ubiquitous and persistent in the environment. Evidence suggests that they have the potential for causing cancer.

The relatively unrestricted access to the site is a potential hazard to the trespassers on the site. Unintentional or willful sabotage could pose a fire or explosion hazard.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the information reviewed, the A.O. Polymer Site is considered to be a public health concern because humans have probably been exposed to hazardous substances at concentrations that may result in adverse health effects. As noted in the Environmental Contamination and Physical Hazards, Exposure Pathways, and Public Health Implications sections, human exposure to TCE, TCA and MEK as well as TDI and formaldehyde is probably occurring and has probably occurred in the past via inhalation, dermal contact with soil and ingestion of contaminated food.

Many of the data gaps identified in this health assessment and recommendations in the Phase I RI/FS, will be addressed by the Phase II Remedial Investigation study. Proposed activities include the following: 1) investigation of A.O. Polymer hazardous chemical and waste storage, transfer, and disposal practices; 2) a soil gas investigation; 3) additional monitoring well installation; 4) pump testing for groundwater contamination remediation; 5) hydrogeologic investigation north of the site; 6) hydrogeologic investigation along the Wallkill River to determine if the groundwater discharges into the Wallkill; and 7) resampling of monitoring wells for VOCs and freon.

Access to the A.O. Polymer site needs to be restricted by fencing of the property. Signs need to be posted on the park side of the site to discourage trespassing.

Surface water monitoring of the unnamed northern tributary of the Wallkill and downstream waters, including Franklin Reservoir, should be undertaken since these waters are known to be used for recreation and animal husbandry.

Soil gas and surface soil sampling needs to be conducted on the nearby playing fields. Surface and subsurface soils need to be sampled in the run-off troughs formed at either end of the site.

A strategy to monitor air quality should be developed to define the nature and extent of air contamination originating at the site, and to address community concerns about intermittent odors from the site. Attention needs to be paid to the training of employees which may reduce reactor spills or inappropriate procedures that result in odor production and threats to worker health.

In accordance with CERCLA as amended, the A.O. Polymer site has been evaluated for appropriate follow-up with respect to health effects studies. Since a nonworker population exposed to on-site and off-site contaminants at a level of public health concern has not yet been identified, the A.O. Polymer site is not being considered for community follow-up health studies at this time. However, workers on-site may be exposed to contaminants at levels of public health concern and this should be referred to the appropriate authorities for possible follow-up. If data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring or has occurred in the past, ATSDR and NJDOH will reevaluate this site for any indicated follow-up.

This Health Assessment was prepared by the State of New Jersey, Department of Health, Environmental Health Service, under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry. The Division of Health Assessment and Consultation and the Division of Health Studies of ATSDR have reviewed this Health Assessment and concur with its findings.

REFERENCES

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Public Meeting in Sparta Township, Minute, April 1987.
Township of Sparta, Resolution No. 3159, July 24, 1984.

Interviews:

A.O. Polymer President Sparta Township Health Officer NJDEP.
Bureau of Safe Drinking Water.
NJDEP Regional Office: Division of Environmental Quality.
NJDEP Regional Office: Division of Fish, Game, and Wildlife.
NJDEP Site Manager.
USEPA Site Manager.
United States Occupation Safety and Health Administration
(OSHA) Inspector.
Former employee of Mohawk Industries.
Hamm Sanitation Company Owner.
Local Fire Inspector.
Local Fire Prevention Office.
Residents near the site.
Worker at near-by business.