

Site Review And Update

VINELAND CHEMICAL COMPANY, INCORPORATED

VINELAND, CUMBERLAND COUNTY, NEW JERSEY

CERCLIS NO. NJD002385664

MAY 1, 1995

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

SITE REVIEW AND UPDATE

VINELAND CHEMICAL COMPANY, INCORPORATED

VINELAND, CUMBERLAND COUNTY, NEW JERSEY

CERCLIS NO. NJD002385664

Prepared by:

The New Jersey Department of Health
Under a Cooperative Agreement with
The Agency for Toxic Substances and Disease Registry

SUMMARY OF BACKGROUND AND HISTORY

Vineland Chemical Company (ViChem) is located on Wheat Road, Vineland City, Cumberland County, New Jersey (Figure 1). The site consists of 54 acres of land in an industrial/residential area (Figure 2). The company manufactured herbicides, pesticides, and fungicides at the site since 1949.

North of ViChem is Blackwater Branch which flows east to west and discharges into the Maurice River about 1.5 miles downstream from the plant. The upper Maurice River then flows about seven miles into Union Lake, which flows for two miles. The water then flows downstream about 25 miles from Union Lake and discharges into the Delaware Bay (Figure 3).

Residential areas border ViChem to the east, west, south, and partially to the north. Martex Manufacturing, which produces packaging materials, is located north of ViChem. Eight residences are adjacent to the facility and several other residences are located close to the plant along Wheat, Orchard, Oak, and Mill Roads. The residents are supplied with city water. Plant access is on Wheat Road.

The plant has several manufacturing and storage buildings, a laboratory, a worker change facility, a wastewater treatment plant, and several lagoons. The manufacturing and parking areas are paved while the areas around the lagoons are unpaved and devoid of vegetation.

The New Jersey Department of Environmental Protection and Energy (NJDEPE) reported in 1966, that ViChem was discharging untreated waste waters into unlined lagoons, and that they were storing waste salts containing up to 2% arsenic in former chicken coops, in open piles without containment barriers, and in a concrete pit with cracked walls. The wastes sporadically overflowed onto the soil. ViChem personnel reported to the United States Environmental Protection Agency (USEPA) that chemical spills in Building #9 resulted in arsenic contamination beneath the floor of the building.

The groundwater became contaminated via leaching of the arsenic laden wastes. The groundwater subsequently discharged into the Blackwater Branch and then into the Maurice River drainage system. The Draft Remedial Investigation (4) reported that approximately six metric tons/year are being discharged from the groundwater into the Blackwater Branch.

ViChem was responsive to a series of Administrative Consent Orders issued by the NJDEPE starting in 1971. NJDEPE installed a non-contact cooling water system, lined two of the lagoons, striped surface soils in the manufacturing area and then paving this area, installed a storm water runoff collection system, disposed of the piles of waste salts, and installed a waste water treatment system to treat process water and arsenic-contaminated groundwater. The NJDEPE found that the waste water treatment system was not effective and the waste water treatment operation was halted in July 1987. The NJDEPE found arsenic in surface water and sediments as far as the Delaware Bay, about 27 miles downstream of the plant.

In 1982, ViChem was denied a New Jersey Pollutant Discharge Elimination System (NJPDDES) permit to continue to use the lagoons for the discharge from the waste water treatment unit. The company subsequently changed their manufacturing process so that all of the water used in the manufacture of the herbicides is consumed by the process and is included as inherent moisture in the product.

The USEPA has divided the task of remediating the site into four Operable Units (OU's). OU1 is concerned with the plant site source control, OU2 deals with plant site management of migration, OU3 is concerned with the river area sediments, and OU4 deals with Union Lake sediments. A remedial Investigation (4) and a Feasibility Study (RI/FS) has been prepared for OU1, OU2, and OU3. A Record Of Decision (ROD) was signed on September 28, 1989 which covered the remediation strategies for all four Operable Units (5). Remediation activities for OU1, OU2, and OU3 will be performed at the same time. OU4 will be remediated subsequent to these activities.

Vineland Chemical Company ceased operations in April 1994. The site is in the remediation design stage. Remediation is expected to commence by the end of the summer of 1995.

An arsenic plume in the shallow groundwater aquifer discharges into the Blackwater Branch which then discharges into the Maurice River, and then Union Lake. The arsenic contaminant plume is traveling northwest of the site. Residents northeast of the site use the shallow aquifer for drinking water. However, their wells were found by the USEPA not to be contaminated. The deep aquifer was not contaminated. It is not known if the downstream surface or ground waters are used for drinking water.

Estimates put the amount of arsenic transported off-site at 500 metric tons. The Blackwater Branch floodplain contains arsenic concentrations up to 4,000 ppm. Union Lake has up to 1,600 ppm of arsenic by mass balance (7) and the surface water contains between 50 to 100 ppb of arsenic. The Maurice River below Union Lake contains elevated sediment and water arsenic concentrations until it flows into the tidal basin. At that point the water arsenic concentration fell below 50 ppb. Arsenic may still be discharged into the groundwater from the arsenic-contaminated soil at the ViChem facility. The Blackwater Branch watershed is probably acting as a conduit for the arsenic flux since arsenic is highly soluble and can be desorbed off of the sediments.

In 1982, a ViChem employee was diagnosed as having subacute arsenic poisoning. The NJDOH then conducted an evaluation of on-site arsenic exposure and toxicity and found that employees had elevated concentrations of arsenic in their hair and urine, but exhibited only minor symptoms that were associated with arsenic trioxide dust on the skin and mucous membranes. Although the source of contamination was not determined, ViChem handling practices were improved.

Residents near the facility complained of a strong garlic odor (ie., arsine gas) emanating from the site in August 1991. The NJDEPE investigated and was told by employees that the odor was

generated during the cleaning of a tank in Building #9 resulting from a reaction of bleach and pigeon droppings. The NJDEPE suspected that the addition of bleach reacted with residual arsenic waste salts in the tank resulting in the generation of arsine gas. Later, a ViChem employee stated that this was probably the case. Air samples did not detect arsine gas. Building #9 was sealed with plastic.

Several beaches are found on the Maurice River and Union Lake. Maurice River, Union Lake, and Blackwater Branch are used for recreational activities such as fishing, boating, and/or swimming. Therefore, human exposure to arsenic may have occurred and may be occurring via ingestion of surface and ground water, inhalation of aquatic biota and/or soils and sediments, and dermal contact of contaminated surface water and soil. Although several ViChem employees were previously reported to have had elevated arsenic levels in their hair and urine, the exposure pathway was not determined.

A Health Assessment for this site was prepared by the Agency for Toxic Substances and Disease Registry (ATSDR) on May 25, 1989 (1). The health assessment concluded: 1) The site is of potential health concern because of the risk to human health resulting from possible exposure to hazardous substances at concentrations that may result in adverse human health effects; 2) Although levels of the contaminants of concern found in groundwater, surface water, and sediments greatly exceed health-based standards at locations on-site and in the Blackwater Branch, no known exposure is occurring at these locations or concentrations; and 3) Since the on-site groundwater is recharging the Blackwater Branch with very high arsenic concentrations, the arsenic concentrations of the Blackwater Branch and the Maurice River are likely to remain high without remediation of on-site groundwater.

The health assessment identified the following community health concerns: 1) Human health risks from exposure to contaminated groundwater because some residents rely on groundwater as the source for potable water; and 2) Human health risks from exposure to contaminated surface water because local rivers and lakes are used for recreation. (1) Public health concerns were not addressed.

It was recommended that: (1) Public access to the ViChem facility should be prevented; (2) Public access to Union Lake should be restricted until the dam repairs are completed and the lake is restored to its normal water level. Public access to off-site areas with high concentrations of arsenic in the sediment should be minimized by posting warning signs; (3) Discharge of non-contact cooling water to an unlined lagoon should cease; (4) A survey of residential well water use to the west of the plant should be conducted; (5) Groundwater monitoring wells should be installed to the west of the plant site to determine if the westward off-site migration of groundwater has resulted in contamination to this area; (6) The chickens housed in chicken coop #4 should be removed; and (7) Although human exposure to contaminants may be occurring and may have occurred in the past, the site was not being considered for follow-up health studies because human exposure to contaminated media at contaminant levels, at exposure frequency, and at a duration necessary to result in adverse health effects are not known to be occurring. The USEPA has addressed the recommendations of the health assessment.

CURRENT SITE CONDITIONS

On May 9, 1994, a site visit was conducted by James Pasqualo and Howard Rubin, Ph.D. of the NJDOH, The NJDEPE Project Officer, the United States Environmental Protection Agency (USEPA) Remedial Project Officer, and the Health Officer from the City of Vineland.

The site consisted of an inactive facility consisting of several abandoned manufacturing and storage buildings, a laboratory, several empty lagoons, and five large chicken coops. At least ten homes are adjacent to the facility. On the northwest side of the facility is a packaging plant, Martex Manufacturing Co.

The site was fenced off, however, no signs were evident indicating the presence of a Superfund site. Holes in the fence indicate that trespassers had forced entry onto the site. There were also signs of forced entry into several of the buildings. The trespassers are thought to be adolescents. Numerous physical hazards exist on-site. These hazards include the abandoned buildings, tanks, and equipment.

Changes in site conditions subsequent to the health assessment consists of preliminary remediation efforts. The lagoons have been emptied and contaminated buildings have been secured (However, there are signs of forced entry), all chemicals have been removed, and the storage tanks have been drained and rendered inoperable.

Conclusions of the 1989 health assessment remain valid under present site conditions. New data indicate that the groundwater, and subsequently, downstream surface waters are continuing to be contaminated with arsenic.

Additional studies of the groundwater, surface waters, and soil have been conducted since the release of the health assessment. On September 30, 1992, the sediment and surface waters of three beaches along the Maurice River were sampled for arsenic (6). Arsenic concentrations in sediments ranged between 3.5 to 20.0 ppm. The water samples ranged from 0.036 to 0.520 ppm of arsenic. Previous studies found the maximum observed sediment samples at 14,000 ppm and water samples containing 2.78 ppm, total arsenic. The drinking water standard is 0.05 ppm. It was concluded that arsenic is present in the sediment at all three beaches examined, surface water obtained from two of the three beaches exceeded the USEPA drinking water standard for arsenic (2), and that human use patterns and activities at the three beaches should be examined to evaluate exposure potential.

In February 1994, an arsenic mass balance was performed for the Blackwater Branch, Maurice River, and Union Lake (7). The amount of arsenic calculated to flow over Union Lake spillway, between August 11 and August 20, 1993, ranged from 58 $\mu\text{g As/sec}$ to 92 $\mu\text{g As/sec}$; with the spillway flow between 3.4 and 5.2 m^3/sec . During the stratification of Union Lake, there was a direct correlation between arsenic concentration and depth, with arsenic maximum values ranging from 21.5 $\mu\text{g As/l}$ at 0 m to 66.3 $\mu\text{g As/l}$ at 6.5 m. Between 58% to 73% of the total

flux of arsenic within the water column was composed of dissolved arsenic, rather than arsenic associated with particulates (Sediment). It was concluded that arsenic is in a state of flux moving downstream from the ViChem site and is diffusing from the sediment into the surface waters of the Maurice River and Union Lake.

Analyses of arsenic in different species of fish were performed. However, 75% of the data was found to be flawed and the remainder of the data was unavailable for use. The significance of the remaining data is questionable due to the paucity of valid samples.

The shallow, but not the deep, aquifer has been contaminated with arsenic from the ViChem site. The possibility exists that the deep aquifer will become contaminated with arsenic over time. This is of concern because the deep aquifer is used for drinking water.

CURRENT ISSUES

The Vineland Health Officer stated that public health concerns focused on: 1) Residents using the surface waters downstream from ViChem for recreational purposes; 2) Consuming fish caught in the arsenic contaminated waters, especially for people who are catching the fish for subsistence rather than for sport; and 3) The possibility of exposure during the remediation process. The NJDOH and ATSDR concur and have identified a potential exposure pathway regarding fishermen consuming arsenic-contaminated fish.

Community health concerns as stated in the health assessment focused on: (1) Human health risks from exposure to contaminated groundwater and (2) Human health risks from exposure to contaminated surface water. These health concerns are still valid. No new completed human exposure pathways have been identified since the release of the health assessment.

The past concern which still exists is the health risk to people who use the Blackwater Branch, Maurice River, and Union Lake for swimming. It is not known if people who reside downstream from the ViChem site use the surface water for potable water. Vineland has a number of homeless individuals who might be drinking the arsenic tainted surface waters. There is also concern for those people who eat fish drawn from these waters on a regular basis. Additional information is needed to determine the potential for adverse health effects that can occur due to swimming, drinking, and fishing these contaminated waters. Also, there is reason for concern that trespassers on the ViChem site may be exposed to contaminated soils, buildings, and physical hazards.

CONCLUSIONS

1. Based on the existing data, site-related contamination by arsenic has occurred in the groundwater on-site and off-site. This has caused the surface waters of the estuary as far as the Delaware Bay (About 27 miles away) to have elevated arsenic levels in the surface water and/or sediments.

2. After a review of the most recent documents and the current site conditions for the Vineland Chemical Company site, the ATSDR and the NJDOH have determined that completed human exposure pathways exist via the ingestion route of exposure by swimming and fishing.
3. There are significant information gaps for health related data. This prevents further health related assessments from being performed at this time.
4. Conclusions made in the 1989 health assessment regarding the site being of potential health concern are still valid. ATSDR and the NJDOH have determined that further assessment of the site is needed because of the likelihood of completed exposure pathways to site contaminants.
5. The recommendations regarding further groundwater sampling made in the May 25, 1990, health assessment are valid. These recommendations have been followed by the USEPA.
6. Physical hazards exist at the ViChem site including abandoned buildings, storage tanks, equipment, and large chicken coops. Trespassers appear to be adolescents who gain access by cutting holes in the fence. There is evidence that they have forced entry into secured buildings.
7. The RI/FS found that the deep aquifer was not contaminated with arsenic. However, no additional sampling has been performed to determine if this aquifer has become contaminated with arsenic.
8. Residents who use the shallow aquifer and are side-gradient to the arsenic contaminant plume were found not to have contaminated well water. The possibility exists that their wells will become contaminated with arsenic in the future.
9. The remedial activities specified in the ROD, when implemented, are sufficient to address the remaining concerns of the ATSDR, the NJDOH, and the community regarding the site and are consistent with protection of the public health.
10. Future environmental, toxicological, health outcome data or changes in the conditions as a result of implementing the proposed plan, may determine the need for additional actions at this site.

RECOMMENDATIONS

1. The data and information developed in this Site Review and Update have been evaluated to determine if follow-up actions may be indicated. The ATSDR and the NJDOH have

determined that a health assessment addendum should be performed, based on the following facts:

- A) There are probable past and current completed exposure pathways associated with the site resulting from the ingestion of arsenic contaminated water and sediments during recreational activities and perhaps via the ingestion of arsenic contaminated fish. A public health assessment addendum should be performed when sufficient pertinent information becomes available (ie. fish bioassays, additional sampling analyses, etc.).
 - B) Arsenic has been widely dispersed to the Delaware Bay, about 27 miles downstream.
2. A health consultation should be conducted when new data becomes available for beaches along the Maurice River and/or Blackwater Branch to evaluate the potential for adverse health effects to swimmers.
 3. Swimming and fishing at Union Lake should continue to be restricted. The rule that boats can go no faster than 10 mph on Union Lake should remain in effect so that the sediment will not be pertubated.
 4. Fish bioassays for arsenic should be conducted at the Blackwater Branch, Maurice River, and Union Lake. Also, all beaches should be regularly tested for arsenic contamination.
 5. The down-gradient and side-gradient wells should be regularly monitored for five years after completion of the remedial efforts to ensure that the remediation was effective. It is unlikely that further groundwater contamination would occur five years after remediation is completed.
 6. The deep aquifer should be regularly monitored to determine if it becomes contaminated.
 7. Community and health professional education programs should be implemented so that the citizens and health professionals understand the potential problems associated with the arsenic contaminated areas.
 8. Health Officers of the impacted areas should be kept current regarding site conditions so that they can decide how to properly deal with the issues surrounding the arsenic contaminated surface waters in their jurisdictions.
 9. A review of the health outcome data should be performed for arsenic-induced cancer.
 10. The ViChem site should be posted indicating that it is a USEPA Superfund site. Also, the Blackwater Branch, Maurice River, and Union Lake should be posted with warning signs indicating an arsenic health hazard.

HEALTH ACTIVITIES RECOMMENDATION PANEL (HARP)

The data and information developed in the Site Review and Update for the Vineland Chemical Company, Vineland City, New Jersey, has been evaluated by ATSDR's Health Activities Recommendation Panel (HARP) for appropriate follow up with respect to health activities. Because of probable arsenic exposures, the panel determined that community health education is indicated. Specifically, the NJDOH will perform educational activities during the conduct of the public health assessment addendum for the site. Further identification and characterization of the exposed population is needed to determine the need for additional follow-up health activities.

PUBLIC HEALTH ACTIONS

The Public Health Action Plan (PHAP) for the Vineland Chemical Company site contains a description of actions to be taken by the NJDOH and/or the ATSDR at the site subsequent to the completion of this public health assessment. The purpose of the PHAP is to ensure that this site review and update not only identifies public health hazards but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment by the NJDOH and the ATSDR to follow-up on this plan to ensure that it is implemented.

A. Public Health Actions Taken

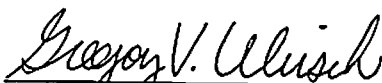
1. Environmental data and proposed remedial activities have been evaluated within the context of human exposure pathways and relevant public health issues.

B. Public Health Actions Planned

1. The NJDOH will conduct community health education targeting those persons exposed to arsenic via contact with contaminated water or fish.
2. ATSDR will provide an annual follow-up to this PHAP, outlining the actions completed and those in progress. This report will be placed in repositories that contain copies of this health assessment, and will be provided to persons who request it.
3. ATSDR will reevaluate and expand the Public Health Action Plan (PHAP) when needed. New environmental, toxicological, health outcome data, or the results of implementing the above proposed actions may determine the need for additional actions at this site.

CERTIFICATION

The Site Review and Update for the Vineland Chemical Company site was prepared by the New Jersey Department of Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Site Review and Update was initiated.



Technical Project Officer, SPS, RPB, DHAC

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



Division Director, DHAC, ATSDR

DOCUMENTS REVIEWED

1. Agency for Toxic Substances and Disease Registry. Health Assessment for Vineland Chemical Company, Vineland, Cumberland County, New Jersey, May 25, 1990.
2. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Arsenic. April 1993.
3. Memo from Andrew C Marinucci to Thomas Cozzi, regarding Vineland Chemical Site, Union Lake Data, Spring 1990. New Jersey Department of Environmental Protection, Bureau of Environmental evaluation and Risk Assessment. July 11, 1990.
4. United States Environmental Protection Agency. Final Draft Remedial Investigation Report for the Plant Site. Vineland Chemical Company, Vineland, Cumberland County, New Jersey. June 1989.
5. United States Environmental Protection Agency. Record of Decision for Vineland Chemical Company. Vineland Chemical Company, Vineland, Cumberland County, New Jersey. September 28, 1989.
6. United States Environmental Protection Agency. Final Report. Supplemental Beach Sampling. Vineland Chemical Company, Vineland, Cumberland County, New Jersey. December 1992.
7. United States Environmental Protection Agency. Draft Arsenic Mass Balance for the Blackwater Branch, Maurice River, and Union Lake. Work Assignment Number 081-2NB8. Vineland Chemical Company, Vineland, Cumberland County, New Jersey. February 1994.

PREPARERS OF REPORT

Preparers of Report:

Howard E. Rubin, Ph.D.
Research Scientist
Environmental Health Service
New Jersey State Department of Health

ATSDR Regional Representatives:

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

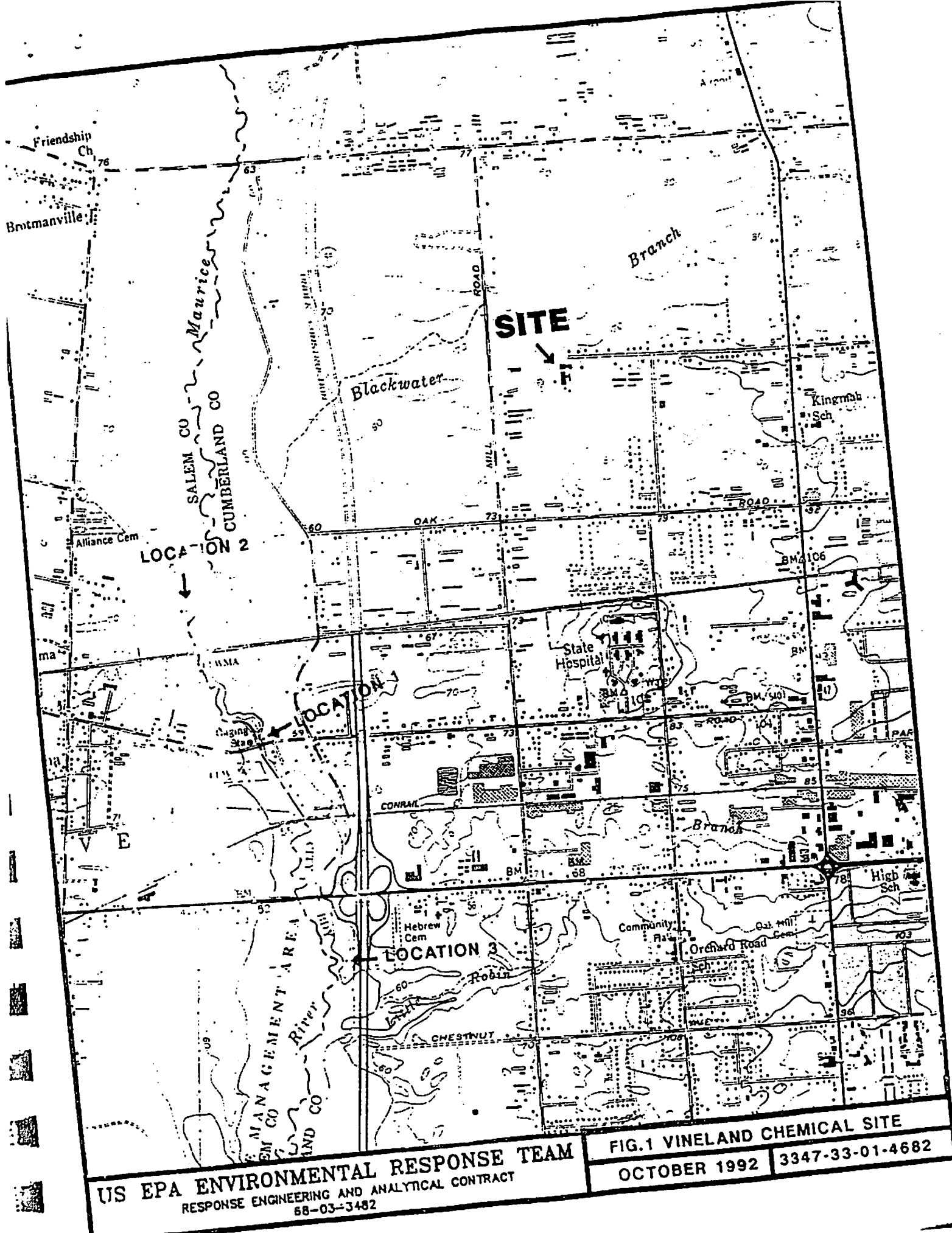
ATSDR Technical Project Officer:

Gregory V. Ulirsch
Environmental Health Engineer
Superfund Site Assessment Branch
Division of Health Assessment and Consultation

Any questions concerning this document should be directed to:

ATSDR Project Manager
The New Jersey Department of Health
Environmental Health Service, CN 360
Trenton, NJ 08625

APPENDICES

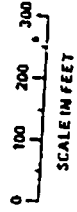


US EPA ENVIRONMENTAL RESPONSE TEAM
 RESPONSE ENGINEERING AND ANALYTICAL CONTRACT
 68-03-3482

FIG.1 VINELAND CHEMICAL SITE
 OCTOBER 1992 3347-33-01-4682



- R RESIDENCES
- VICHEM PROPERTY BOUNDARY
- LL LINED LAGOON
- UL UNLINED LAGOON



TOPOGRAPHIC BASE PREPARED FOR U.S. ARMY COMPC &
ENGINEERS BY KUCI & INTERNATIONAL, JANUARY 1984
U.S. ENVIRONMENTAL PROTECTION
AGENCY

VINELAND CHEMICAL COMPANY SITE

FIGURE 2

VINELAND CHEMICAL COMPANY
SITE PLAN

EVASCO SERVICES INCORPORATED

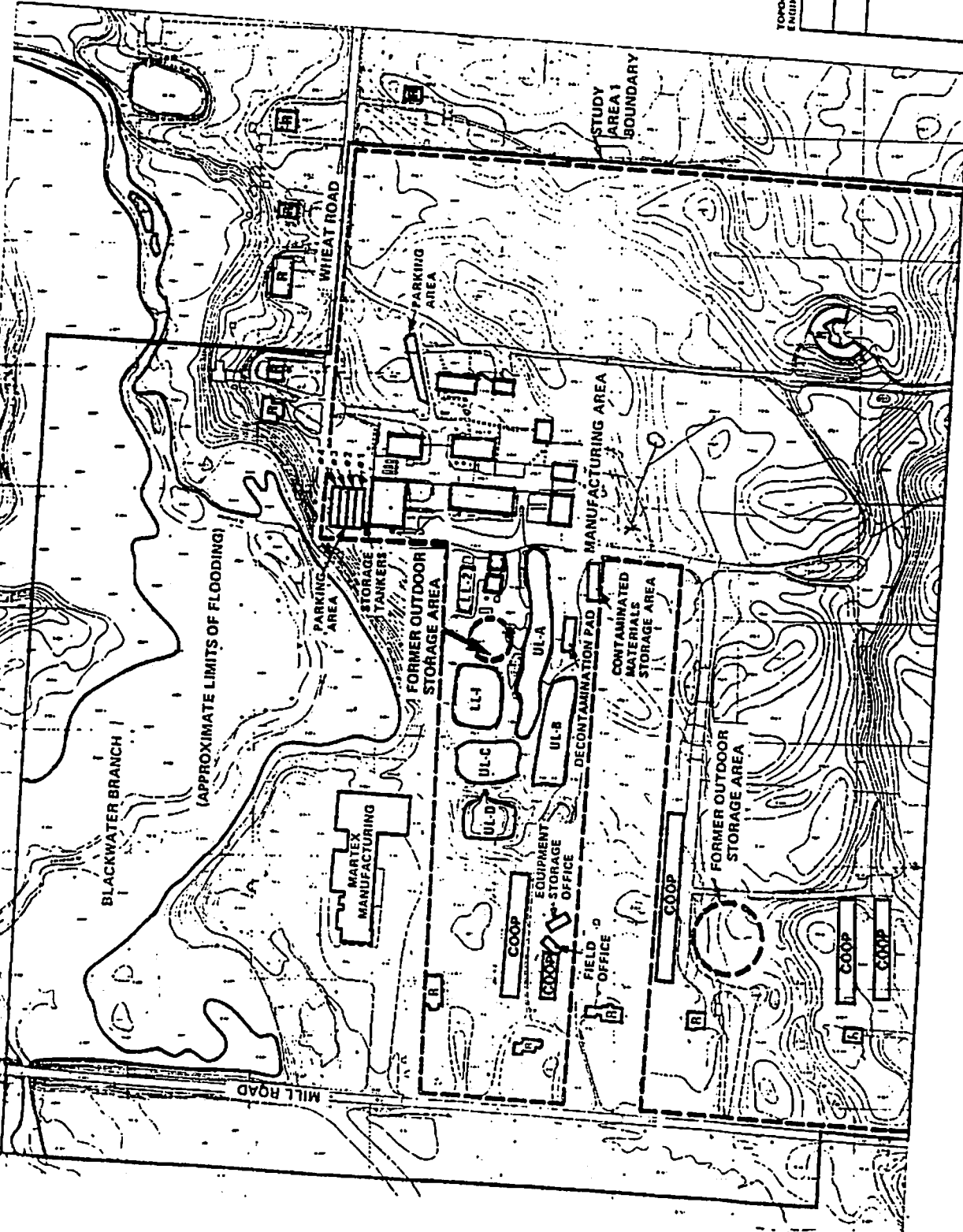


FIGURE 3
SAMPLE LOCATION MAP
VINELAND CHEMICAL SITE
VINELAND COUNTY, NEW JERSEY
OCTOBER, 1982

U.S. EPA ENVIRONMENTAL RESPONSE TEAM
 RESPONSE OPERATIONS AND ANALYTICAL CONTRACT
 USE ONLY FOR THIS PROJECT

NOT TO SCALE

