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Superfund Record of Decision:

Velsicol Chemical Corporation, IL

50272-101

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Velsicol Chemical Corporation, IL
First Remedial Action - Final

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14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Velsicol Chemical Corporation (VCC) is a manufacturing facility located in east-central Illinois, approximately one mile north of the City of Marshall, Clark County, Illinois. The site is bordered by a railroad on the south and by an unnamed tributary on the southwest. A total of 334 acres onsite are leased for crop farming. VCC was in operation between the mid-1930s and August 1987, and occupied an area of approximately 420 acres, 172 of which were used for production or disposal practices for petroleum derivatives including resins, solvents, and pesticides, including chlordane manufacturing. All process wastewater has been deep-well injected onsite since 1965 and the majority of the waste solids and sludges generated at the facility were disposed of in Pond 5/6 until 1980 when the firm ceased operations. Accidental and intentional offsite releases of wastes were noted during the period the ponds were in operation. In the 1980s, all contaminated soil and visually contaminated sediments were consolidated and stabilized with cement and fly ash, and covered with a temporary clay cap and vegetation. The primary contaminants of concern affecting the soil, sediments, surface water and ground water are VOCs including benzene and other organics including PAHs and pesticides.

(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
Velsicol Chemical Corporation, IL
First Remedial Action - Final
Contaminated Media: gw, sediments, soil, sw
Key Contaminants: organics (PAH, pesticides), VOC (benzene)

b. Identifiers/Open-Ended Terms

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18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 94
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Velsicol Chemical Corporation, IL
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16. ABSTRACT (continued)

The selected remedial action for this site includes: excavation of 10,200 yd^3 of contaminated stream and pond sediments and 87,900 yd^3 of contaminated soil and backfilling with clay, and revegetation; and consolidation of all excavated material onsite with in-place stabilization followed by construction of a RCRA cap; construction of ground water collection drain with disposal via onsite deep well injection or treatment using granular activated carbon prior to offsite discharge; ground water and surface monitoring; and implementation of land use and deed restrictions. The estimated present worth cost for this remedial action including O&M is $9,080,910.

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Velsicol Chemical Corporation
Marshall, Illinois

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Velsicol Chemical Corporation site, in Marshall, Illinois, developed in accordance with CERCLA, as amended by SARA, and the National Contingency Plan. This decision is based on the administrative record for this site. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

The State of Illinois has concurred in the selected remedy.

Description of Selected Remedy

The final remedy at the Velsicol Chemical Corporation's Marshall, Illinois facility consists of the following:

- Excavate 24 inches of contaminated sediments in the unnamed tributary between the plant site and Velsicol's western property boundary. Additional segments in the unnamed tributary will be excavated as determined on the basis of additional sampling until background concentrations of chlordane are reached. The on-site section of the unnamed tributary will be backfilled with clay and revegetated. A new diversion channel will be constructed.

- Excavate contaminated plant production area soils to predetermined depths, backfill with clean soil, regrade the plant area to provide effective surface water drainage and establish a vegetated cover over the entire site.

- Excavate six inches of contaminated sediment from the base and sides of the 2 Pond and 4 Pond, backfill each impoundment with clean soil, grade the area to provide surface water drainage and establish a vegetated cover. Decontaminated debris from decommissioning of the facility will be placed and compacted in the bottom of these ponds.

- Consolidate all excavated material from the plant site, the unnamed tributary and the 2 Pond and 4 Pond on top of the 5/6 Pond, treat the excavated material by in-place chemical stabilization, and provide a Resource and Conservation Recovery Act (RCRA) compliant multimedia cap over the regraded 5/6 Pond.

- Construct a groundwater collection drain east of the 5/6 Pond. Dispose of extracted groundwater via the on-site deep injection well, in accordance with the terms of the Consent Decree or treat the extracted groundwater to established clean-up objectives using primarily granular activated carbon prior to off-site discharge.

- Monitor groundwater and surface cover conditions. Operate and maintain all remedial systems.

- Apply and enforce land use and deed restrictions in accordance with the terms of the Consent Decree.

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate for this remedial action, and is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

for Regional Administrator — 9/30/88 Date

The Illinois Environmental Protection Agency finds the selected remedy to be appropriate as declared above under the requirements of CERCLA, as amended by SARA, and the NCP. The State of Illinois, through the Illinois Environmental Protection Agency, concurs with the decision the Regional Administrator has made in the exercise of his authority in selecting this remedy.

State Director — 9/26/88 Date

VELSICOL CHEMICAL CORPORATION
MARSHALL, ILLINOIS SITE

ROD DECISION SUMMARY

SEPTEMBER 21, 1988

VELSICOL CHEMICAL CORPORATION
MARSHALL, ILLINOIS SITE

ROD DECISION SUMMARY INDEX

Velsicol Chemical Corporation
Marshall, Illinois Site
ROD Decision Summary

I. SITE NAME, LOCATION, AND DESCRIPTION

Site Description

This Velsicol Chemical Corporation manufacturing facility is located in east-central Illinois, approximately one mile north of the City of Marshall, Clark County, Illinois, along State Highway Route 1. Interstate Highway 70 is approximately 0.6 miles north of the plant. The regional location and vicinity maps of the Velsicol site are shown in Figures 1 and 2 in Appendix A.

Velsicol's property occupies an area of approximately 420 acres, of which 86 acres are utilized for the production facility and on-site ponds. The site map is shown in Figure 3. The production facility occupies 50 acres of the easterly portion of the plant area. Immediately west of the production facility, 14 acres are devoted to stormwater management ponds (Pond 2, Pond 4 and North Stormwater Pond). Since 1965 all process wastewater, and since 1974, additionally all surface water from the facility, has been deep well injected on-site. The 5/6 Pond occupies an area of approximately 22 acres and contains the majority of waste solids/sludges generated over the plant's lifetime until 1980. These wastes were chemically stabilized, temporarily covered with clay and revegetated by Velsicol in the early 1980's. The major portion of the remaining 334 acres, owned by Velsicol, is leased for crop farming.

A Conrail railroad right-of-way parallels the southern boundary of the site. A spur of the Conrail track enters the facility from the south and is used for delivery of raw materials to the plant. An unnamed tributary to East Mill Creek flows westerly through the southwestern corner of the site. The tributary travels approximately 2.5 miles prior to its confluence with East Mill Creek.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Velsicol Chemical Corporation Site in Marshall, Illinois, was an active chlordane manufacturing facility until August, 1987 when USEPA and Velsicol reached an agreement cancelling the registration of products containing chlordane and heptachlor. The plant had been operating since the mid-1930's for the production of petroleum derivatives from petroleum by-products. Finished products included a variety of resins (styrene/vinyl toluene copolymer and methylcyclopentadiene/dicyclopentadiene monomers), solvents and rubber extenders. Production of chlordane began in the mid-1940's. The manufacturing operations at the facility remained essentially unchanged until 1979, at which time Velsicol withdrew from the resin market. Manufacture of technical grade chlordane had been the sole product at this facility since 1980.

Hazardous wastes generated from various manufacturing activities at the plant were stored in on-site impoundments in the past. Accidental and intentional releases of these wastes to East Mill Creek tributaries have occurred from time to time during the period the ponds were in operation. All the ponds that were previously used for the waste storage (Hex Ponds and 5/6 Pond) are no longer in use. The contents of the Hex Ponds, some contaminated plant area soils and visually contaminated sediments from Ponds 2 and 4 were transferred to the 5/6 Pond and stabilized with cement and fly ash. This stablization program was started in 1983 and completed in 1984. A temporary, vegetated clay cover has been in place over the 5/6 Pond since 1985.

The Velsicol/Marshall site was proposed for inclusion on the National Priorities List (NPL) in December, 1982 and finalized in September, 1983. The Illinois Environmental Protection Agency (IEPA) accepted lead responsibilities for conduct of a Remedial Investigation/Feasibility Study (RI/FS), with support from USEPA. Negotiations were carried out with Velsicol Chemical Corporation throughout 1984 and 1985 toward an agreement to allow them the opportunity to voluntarily undertake an appropriate RI/FS. However, these negotiations were unsuccessful and a state-lead RI/FS was initiated in September, 1985. The remedial investigation field work took place from May, 1986 through September, 1987. The final report documenting the findings of the RI was issued on February 19, 1988. The Public Comment Feasibility Study report was released on July 15, 1988, as was the Agencies' proposed plan. A Special Notice Letter was also sent to the Velsicol Chemical Corporation on July 15, 1988, beginning the moratorium period on Remedial Design/Remedial Action (RD/RA) settlement discussions.

Six formal negotiation meetings have taken place between Velsicol, the USEPA, the IEPA, the Illinois Attorney General's Office (IOAG) and the United States Department of Justice (U.S. DOJ). A draft RD/RA consent decree was issued to Velsicol in late July, 1988. Discussions on legal issues have been concurrent with technical sessions. A draft good faith proposal to conduct the Remedial Design and Remedial Action was received from Velsicol on August 31, 1988. A final good faith proposal was received on September 15, 1988.

III. COMMUNITY RELATIONS

The Illinois Environmental Protection Agency (IEPA) has been responsible for conducting a community relations program for this site. A Community Relations Plan was submitted to, and approved by, the USEPA in November 1985. Interviews with neighbors, concerned citizens and community leaders indicated a community-wide consensus that environmental contamination attributed to Velsicol needed to be investigated. The community relations program emphasized:

a. Initial visits with site neighbors and community leaders,

b. Establishment of a local repository of documents,

c. Assistance to news media in Illinois and Indiana to inform the public of ongoing activities and the results of the investigation.

Milestone activities conducted by Community Relations staff during the RI/FS included:

* Interviews with neighbors near site and with community leaders,

* Establishment of a repository of public documents at the Marshall Public Library,

* Development of a mailing list (150+) of site neighbors, interested citizens and organizations, news media, and elected officials in local, county and state government,

* Periodic news releases announcing startup of various levels of investigation at the site, on-site activities and results of investigations,

* Fact sheet #1 explaining the results of the remedial investigation.

* Paid newspaper advertisements announcing the RI public meeting and FS public hearing,

* A public meeting in February 1988 to meet concerned citizens and discuss results of remedial investigation. Approximately 50 people attended the meeting,

* Fact sheet #2 explaining the results of the feasibility study and setting forth the proposed plan in accordance with CERCLA Section 117,

* Public hearing on feasibility study and proposed plan in July, 1988. Approximately 40 people attended the hearing,

* Separate meetings with community leaders to discuss feasibility study and proposed plan.

A responsiveness summary addressing comments and questions received during the public comment period on the RI/FS and proposed plan is attached as Appendix B.

IV. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

This is the first and only operable unit at the site and addresses all affected media: soils, sediments, groundwater and surface water.

V. SITE CHARACTERISTICS

The remedial investigation characterized the nature and extent of actual or potential contamination associated with the site. The following activities were accomplished as part of the RI:

- Review of existing data
- Geophysical surveys in western agricultural land
- Surface and stratified sampling of plant soils, agricultural soils, 5/6 pond stabilized sludges and bottom clay, creek sediments, and on-site pond sediments
- Nested groundwater monitoring well installation and sampling
- 5/6 Pond leachate sampling
- Creek and on-site pond surface water sampling
- Fish sampling in East Mill Creek and Mill Creek (background stream)
- Ambient air sampling of waste impoundment and background areas

General conclusions about the site and this contamination assessment are presented below:

Groundwater

The extent of groundwater contamination was assessed by the sampling of 40 groundwater monitoring wells screened into both the upper and lower hydrogeological units at 18 locations. These locations were selected to define groundwater contamination within the plant area, downgradient of the existing pond system, and upgradient of the plant area. The general locations of the monitoring wells are shown in Figure 4. Additional monitoring wells were installed by Velsicol around the 2 and 4 Ponds as part of a separate activity, but for which data has been collected and reviewed.

The direction of horizontal groundwater flow is basically from east to west. The velocity of potentially contaminated groundwater flow through the upper unit west of the on-site ponds is estimated to range from approximately 2 to 5 feet/year. The corresponding velocity within the bedrock unit is estimated to range from approximately 3 to 8 feet/year.

The hydrogeologic investigation determined that some component of groundwater from both hydrogeologic units discharges to the unnamed tributary west of Pond 2. Preliminary estimates based on horizontal flow patterns and vertical gradient directions suggest that about 40 to 60 percent of the water in the upper hydrogeologic unit that has passed beneath the 5/6 Pond and the Pond 2 could be discharging to the unnamed tributary. Similarly, about 10 to 30 percent of the water in the lower hydrogeologic unit that has passed beneath the ponds could be discharging to the unnamed tributary. Therefore, the unnamed tributary is the primary receptor for groundwater discharge and completed pathway of groundwater migration in the vicinity of the southwestern corner of the site.

Significant pesticide contamination was not detected in groundwater west of the existing pond system. Wells screened into the unstabilized spur east of the 5/6 Pond (well G205M) and in the production area (wells G217M and G218M) were significantly contaminated with volatile and semi-volatile organic compounds. Volatile and semi-volatile organic compounds were found in trace amounts in wells west of the existing pond system. These findings suggest that organic constituents are greatly attenuated or are not being transported to downgradient wells in

significant concentrations at this time. Groundwater sampling and geophysical study indicated that chlorides, which are more mobile than organics, have migrated west of the pond systems. The geologic materials present at the site, clayey soils, appear to act as a barrier to the movement of organic contamination. Inorganic metals contamination in groundwater was present at low concentrations adjacent to and west of 5/6 Pond and Pond 2. Table 1 in Appendix A presents the range of chemicals and their concentrations found during the groundwater investigation.

Soils

Sampling and analyses of soils was conducted to determine the presence and extent of residual contamination in that media both on and off site. Surface soil, three-foot and six-foot soil borings were performed in the agricultural land, west and north of the Velsicol facility, and in the general plant production area. Analytical results are summarized in Table 2 in Appendix A.

The results of pesticide analyses from the soil borings in the agricultural land indicate that pesticide contamination above background levels most frequently occurred directly west of the 5/6 Pond and southwest of Pond 2. Volatile contamination in the agricultural land soil was minimal. Smaller amounts of semi-volatile contamination were detected only at one location west of the 5/6 Pond.

The plant area soil characterization focused on the most highly contaminated areas or suspected areas of contamination. The results indicate that the plant area soils are significantly contaminated with organic compounds.

Very high concentrations of pesticides, volatile and semi-volatile organics were detected in the stabilized waste material in the 5/6 Pond. Leachability testing indicated the pesticide compounds were not leachable. The leachability of several volatile and semi-volatile organic compounds were significantly reduced because of the stabilization treatment.

Permeability testing of soil samples from the 5/6 Pond bottom showed a range of permeabilities from 3.4×10^{-8} to 9.3×10^{-9} cm/sec. These results indicate that the soils directly beneath the 5/6 Pond are highly impermeable and would minimize vertical migration of contaminants. However, leachable contaminants can migrate west of the 5/6 Pond as shown by the low-level groundwater contamination of the wells immediately west of the 5/6 Pond.

Surface Water and Sediments

Surface water and sediment samples were taken to determine the presence and magnitude of contamination in on-site ponds and in the unnamed tributary to East Mill Creek. Analytical data are summarized in Table 3 and 4 for waters and sediments of the ponds and creek, respectively.

Very low levels of organic and inorganic contamination were detected in creek water samples. Creek sediments were not significantly contaminated with volatile organics. However, creek sediments were significantly contaminated with chlordane and several semi-volatile organic compounds at concentrations much higher than those found in background samples. Pesticide and semi-volatile contamination was found at the farthest downstream sampling location at the western edge of the Velsicol property, almost one-half mile west of the facility.

Water from Ponds 2 and 4 and the North Stormwater Pond and sediments from Ponds 2 and 4 were analyzed to determine the presence and magnitude of contamination in them from plant runoff. Moderate chlordane contamination was found only in sediments from Pond 2. Moderately high volatile and semi-volatile organic compounds were detected in the sediments from Pond 2 and to a lesser extent, Pond 4.

Fish

Whole and fillet fish samples of the three trophic levels were collected from three locations ranging to three and one-half miles downstream of the Velsicol property. The samples were only analyzed for HSL pesticides and PCBs. Fish samples collected downstream of the facility in East Mill Creek are contaminated with alpha-chlordane in higher concentrations in comparison with similar fish samples from the adjacent background stream.

Air

Air sampling around the waste impoundments indicated several volatile organic compounds, chlordane, and hexachlorocyclopentadiene were present in air samples at very low concentrations. Volatile organics were generally also detected at the background location. Due to the very low concentrations of contaminants present in air sampling, fugitive emissions from the existing pond system were not considered significant.

VI. SUMMARY OF SITE RISKS

As part of the remedial investigation for the Velsicol site, a risk assessment was developed to evaluate actual and potential human health and environmental threats from the site under a "no action" and an "abandonment" scenario. The no action scenario assumed that no remedial action would take place and the site would continue to function as an active chemical manufacturing plant. The abandonment scenario assumed that Velsicol ceased to be an active manufacturing plant with minimal shutdown procedures. Under that scenario, the potential risks from unsecured site access and discontinuation of routine maintenance of plant facilities were evaluated.

The risk assessment identified the exposure pathways in which people can potentially come into contact with contaminants from the site, under current site conditions, and exposures that could result from

abandonment of the site (Table 5). Potential exposure pathways for this site can be divided into two major categories:

1. Exposure associated with the migration of contaminants into the unnamed tributary, including direct contact by aquatic organisms and/or humans, or indirect exposure through consumption of fish; and

2. Exposures associated with trespassing on the site or activities associated with future site development and use.

Exposure through the use of the shallow groundwater was not considered under either alternative evaluation because of the limited groundwater yield and the use of municipal water by nearby residences.

The risk assessment evaluated the potential exposures based on the contaminant data gathered during the remedial investigation phase. The major results of the risk assessment are summarized in Table 6.

Under the no-action alternative, the major pathway of concern is through fish ingestion. Excess cancer risks were above 1×10^{-6} for chlordane and heptachlor. The exposure data assumed that adults consumed 3.5 pounds of fish per year for a period of 10 years. During a public meeting held on 10 February 1988, in Marshall, Illinois, local officials informed the IEPA and USEPA that East Mill Creek was a popular area for fishing. Based on this new information, the exposure data was reassessed and excess cancer risks recalculated for a fish consumption of 7 pounds per year for a period of 30 years. For comparison, the new excess cancer risk with these assumptions is calculated to be 2.30×10^{-5} for fish containing maximum levels of chlordane and heptachlor. The corresponding background cancer risk for fish affected by local agricultural soil runoff is 2.2×10^{-6}.

Under the abandonment alternative, excess cancer risk from fish consumption is elevated, as is noncarcinogenic risk. Excess cancer risk is also elevated for trespassers due to direct contact and inhalation of contaminated soil particles or volatilized compounds. Chemicals of potential concern, in addition to the pesticides, chlordane and heptachlor, include hexachlorocyclopentadiene, benzene, chloroform, phthalates, polycyclic aromatic hydrocarbons, lead, phenol, and toluene.

Another potential environmental risk exists under both alternatives through recharge of contaminated groundwater into the unnamed tributary, immediately adjacent to the Velsicol facility. Surface water contaminant levels in the unnamed tributary did not exceed Federal Ambient Water Quality criteria based on the RI data; however, the concentrations of contaminants in the groundwater partially recharging to the unnamed tributary did exceed these criteria for several metals and chlordane.

VII. DOCUMENTATION OF SIGNIFICANT CHANGES

The Agency draft feasibility study report was issued on June 10, 1988. In a pre-negotiation meeting on June 21, 1988, followed by written

correspondence on June 30, 1988, Velsicol informed the agencies that the Marshall, IL facility would close no later than August 30, 1988.

The letter stated that it was currently "far too uneconomical to continue manufacturing operations at the facility," and that the company had "unsuccessfully spent tremendous effort to find replacement products which could fill the capacity of the facility."

The proposed plan, therefore, first recommended a modified remedial alternative which called for complete and thorough excavation of contaminated soils in the plant production area which would become accessible due to closure of the plant and removal of all structures and associated piping. Secondly, the proposed plan pointed out that the existing deep well injection system might not be considered for long-term disposal of extracted contaminated groundwater due to the company's initial position that it was in favor of closure of the two wells.

This proposed plan was issued on July 15, 1988, as was the Special Notice Letter to Velsicol officially starting the 60 day moritorium on negotiations toward a voluntary settlement for Remedial Design/Remedial Action work. As a result of plant closure, the scope of the consent decree negotiations has been expanded to include RCRA closure of the regulated units and closure or operational requirements of the deep injection wells under the UIC program. As of September 21, 1988, six technical and consent decree negotiation sessions have been held with the responsible party. A final "good faith" proposal was received on September 15, 1988.

VIII. DESCRIPTION OF ALTERNATIVES

The feasibility study process identifies, screens, then develops remedial alternatives to effectively mitigate existing and/or potential public health and environmental threats posed by the site.

Site-specific remedial action goals included:

- Minimization of existing direct contact and ingestion risks from contaminated soils/sediments on and off-site.
- Minimization of potential direct contact, inhalation and ingestion risks from soils/sediments on-site.
- Minimization of direct contact and ingestion risks from contaminated groundwater off-site.
- Minimization of future groundwater contamination on-site; restoration of existing and future contaminated groundwater.

The following is a summary of the findings of the feasibility study for the Velsicol/Marshall site, as detailed in the proposed plan. As previously noted in Section VII, Documentation of Significant Changes, modifications in the design and implementation of the preferred alternative are being considered in ongoing RD/RA negotiations. These details will be outlined in Section X., Selected Remedy.

For the Velsicol site, the Agencies considered at a minimum the development of: an alternative involving treatment as a principal element to reduce toxicity, mobility or volume of site waste; an alternative involving containment of site waste with little or no treatment, but which is protective of human health and the environment; and a no action alternative as a baseline for comparison.

Engineering judgment was used to assemble alternatives using the best technologies currently available. Applicable remedial technologies considered for contaminated soil and sediment included: excavation and direct containment in an engineered landfill either on-site or off-site; excavation followed by containment with chemical stabilization in an on-site landfill; excavation and incineration either on-site or off-site; and inplace containment and stream relocation for creek sediments only, in combination with any of the above cited technologies for other contaminated soils and sediments.

The applicable remedial technologies considered for contaminated groundwater included: collection either through an interceptor trench system or extraction well network, followed by either on-site treatment utilizing physical/chemical systems and then surface water discharge, or direct disposal utilizing the existing deep well injection system.

The assembled remedial alternatives were screened based on their site-specific effectiveness (i.e., protection of human health and the environment and reliability), implementability (i.e. technical feasibility and compliance with identified State and Federal requirements) and relative costs (i.e., capital and operation and maintenance).

Based on this initial analysis, soils and sediment alternatives involving disposal in an off-site landfill and on-site or off-site incineration were eliminated. Chemical stabilization has been demonstrated to provide significant treatment benefits through immobilization of site-specific contaminants. Although not equivalent to the destruction of wastes using incineration, with proper management of residuals, stabilization technology is considered effective and less costly, and is consistent with management requirements for the existing 5/6 Pond. Accordingly, off-site landfilling was eliminated because on-site landfilling provides the same environmental benefits at a lower cost and without risks or time delays associated with transportation of wastes off-site.

Seventeen remedial alternatives were developed for contaminated soil and sediment at the Velsicol/Marshall site, including the no-action case. These are individually outlined in the attached summary table. Each source material alternative must be combined with one of the two contaminated groundwater action alternatives to develop a complete remedial action plan for this site. Long-term groundwater monitoring is also required to evaluate a remedies effectiveness. The common remedial components are briefly highlighted here.

Excavation

Chemical-specific remedial clean-up objectives have been developed during the feasibility study for plant area and agricultural soils, and Pond 2/4 sediments and the unnamed tributary. Excavation volumes have been estimated after review of RI data, based upon achieving the site-specific clean-up objectives. The estimated volume used for comparison of alternatives is 71,000 cubic yards. This amount is reduced by approximately 4,000 cubic yards in alternatives considering in-place containment of creek sediments. The FS report documents the assumptions used in the volume estimates.

On-Site Containment

Excavated contaminated soils and sediments have two alternative disposal locations: either on top of the existing 5/6 Pond unit or in a new RCRA landfill cell immediately west of the 5/6 Pond on land currently used for agricultural production.

Excavated contaminated soils and sediments can further be subjected to chemical stabilization through mechanical mixing with pozzolan-type chemical reagents such as cement kiln dust in conjunction with containment in either unit. This treatment process was used effectively for the highly contaminated waste sludges deposited previously in the 5/6 Pond.

Following consolidation on top of the 5/6 Pond, with or without chemical stabilization treatment, two cover systems are considered, based on meeting applicable technical requirements of the Resource Conservation and Recovery Act (RCRA). A capping system for a disposal unit, among other things, must be as impermeable as its bottom liner. Two multilayer capping options are therefore considered, one utilizing a single clay layer of proper thickness and sufficient compaction, and the other utilizing less clay in combination with a synthetic liner. The new RCRA cell would require the latter multimedia cap, due to the extremely low permeability associated with its engineered liner system.

In-Place Containment of Creek Sediments

As mentioned previously, several alternatives feature excavation of contaminated soils and on-site sediments, with in-place containment and isolation of creek sediments. These alternatives involve capping creek sediments with a compacted layer of clay and then clean backfill to surrounding grade. The unnamed tributary would be realigned to divert and convey surface water flows. In addition, the contaminated sediments would be isolated from contact with groundwater through installation of a shallow subsurface drainage system.

Groundwater Collection

Both groundwater alternatives under consideration in the feasibility study employed the same collection system. This consisted of interceptor trench/tile lines within the shallow till aquifer which

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility or volume
- Short-term effectiveness
- Implementability
- Cost
- Support Agency acceptance
- Community acceptance

The IEPA and USEPA identified their preferred alternative in the proposed plan for the Velsicol/Marshall site as 2A-1, Modified, in combination with GW-2 based on all information currently available (see remedial alternatives summary, Table 7). This preferred alternative, or proposed remedial action plan, included excavation of contaminated plant area and agricultural soils and pond and creek sediments; consolidation of these wastes with stabilization on top of the 5/6 Pond followed by construction of a RCRA compliant, multimedia cap. This source type action would be combined with collection of contaminated groundwater in interceptor trenches, followed by treatment in an on-site facility and discharge to the unnamed tributary. The remedy would then require regular maintenance and monitoring. These alternatives will therefore be highlighted in the discussion of the evaluation criteria which follows.

However, as previously noted, announcement of plant closure by the company on June 21, 1988 changed or eliminated some of the remedial alternatives under consideration in the feasibility study. As stated previously, Velsicol had informed the agencies that it is their intention to: remove all chemicals from the facility, move or salvage all equipment, and demolish remaining structures for on-site disposal. Velsicol had also initially stated it was their intention to properly plug and abandon the two existing on-site deep injection wells and the observation well. That action would have eliminated consideration of the company's deep injection well No. 2 as a long-term groundwater disposal option. It is anticipated that the active deep well may, however, at a minimum be used in the short-term for disposal of contaminated surface water generated through construction of the site remedy.

These changed conditions, known prior to issuance of the proposed plan, are incorporated into the discussion of alternatives and evaluation criteria which follows. Further modifications of the design details of the preferred alternative (2A-1 modified with GW-2) as given in the proposed plan are under consideration as the result of RD/RA settlement negotiations with Velsicol. These details are outlined and evaluated in Section X., Selected Remedy.

Overall Protection

All of the alternatives, with the exception of the no action alternative, would provide adequate protection of human health and the environment by eliminating, reducing or controlling risks through various combinations of treatment and/or engineering controls, and institutional controls.

The preferred alternative includes excavation/backfilling of contaminated soil and sediment areas with consolidation on top of the existing 5/6 Pond unit. This allows for management and monitoring of only one hazardous waste unit on the site. The consolidation of wastes on top of the 5/6 Pond is accompanied by treatment through chemical stabilization, followed by capping with a highly impermeable multimedia cover system. This preferred source alternative, in combination with groundwater interceptor trench systems which collect all releases from the disposal unit and plant areas with residual contamination for subsequent treatment and discharge, mitigates existing and/or potential threats from direct contact and groundwater/surface water exposures.

Compliance with ARARs

All alternatives, except the no action alternative, would conceptually meet all identified applicable or relevant and appropriate State and Federal requirements which are outlined in Section XI., Statutory Determinations.

Long-Term Effectiveness and Permanence

The preferred soil and sediment alternative proposes to treat wastes on top of the 5/6 Pond through chemical stabilization to significantly reduce the mobility of the contaminants in conjunction with consolidation in controlled, compacted lifts on top of the 5/6 Pond. Mobility is further proposed to be reduced through use of a highly impermeable multimedia cover system. Additionally, any leachate from this unit would be collected and treated through the proposed interceptor trench and treatment/disposal system. This combination of treatment and engineering control, as well as normal access and deed restrictions, provides for complete control of the environmental situation at the site. Permanence would, in effect, be achieved with proper management of the remedy, which would include operation and maintenance of the groundwater collection/treatment system, maintenance of the soil covers/caps, and groundwater and treatment facility effluent sampling. The other soil and sediment alternatives utilizing the new RCRA cell would conceivably require additional operation and maintenance and monitoring activities.

Reduction of Toxicity, Mobility, or Volume

The preferred soil and sediment alternative, and others utilizing the chemical stabilization process, will achieve an estimated greater than 90% average reduction in mobility of volatile contamination over those alternatives involving only containment. Semi-volatile and pesticide contamination becomes practically unleachable. Toxicity and volume differences among alternatives are not a significant factor. However, the addition of reagents in the stabilization process will increase the volume of materials to be contained on the 5/6 Pond. The 22 acre 5/6 Pond conceptually covers enough area to make feasible vertical expansion of this unit for the estimated waste volume in the proposed plan of 80,000 cubic yards. If utilized, the groundwater treatment alternative

effectively reduces the toxicity of contaminated groundwater by primarily adsorbing organic contamination onto granular activated carbon. This system will require periodic maintenance by regenerating or replacing the spent carbon. Use of the deep injection well system will effectively limit mobility of contaminants by placing them in an isolated injection zone.

Short-Term Effectiveness

All of the soil and sediment alternatives present some degree of risk to laborers, the community, and the environment during the two-to-three season remedial construction phase. The relative remoteness of the site, the use of standard health and safety equipment/procedures, and engineering controls such as dust suppression and clean water diversion, will minimize these threats. An air monitoring program will be implemented during remedial construction to monitor the effectiveness of controls for worker and public protection. The preferred alternative will conceptually take less time to implement than alternatives proposing construction of an additional new on-site RCRA landfill cell.

Implementability

All soil and sediment alternatives, and the groundwater alternatives, propose to utilize proven engineering and construction technologies and are readily implementable. Ease of implementability is, therefore, not a significant factor in selection among alternatives.

Cost

The capital engineering and construction costs, and the present worth costs for: operation and maintenance, normal replacement, and monitoring for a nominal 30-year operating life are given in the remedial alternative summary table. The total estimated cost for implementation of alternative 2A-1, modified, with increased plant soil excavation as estimated in the proposed plan, is $8,342,510. In combination with alternative GW-2 which is costed at $738,400, the total remedial action plan cost is estimated at $9,080,910. Additionally, long-term groundwater monitoring costs must be considered.

Support Agency Acceptance

USEPA, Region V, supports the preferred alternative. The Illinois/Indiana section of the Remedial Enforcement Response Branch has been intimately involved in the development and implementation of this state-lead RI/FS. Additionally, USEPA and the State are jointly involved in RD/RA settlement negotiations with Velsicol. The Region is, therefore, fully informed and supportive of modifications to the preferred alternative which have taken place as a result of those negotiations.

Community Acceptance

As noted previously in the Community Relations section (III), a comprehensive program has been undertaken for this RI/FS. Project

information has been distributed to an extensive list of public officials, the media and concerned private individuals, as well as Velsicol Chemical Corporation and their representatives. Small group and open public meetings were held at the completion of both the RI and FS reports.

The responsiveness summary attached to this ROD Decision Summary details oral comments received at the recent public hearing from citizens and the Marshall Chamber of Commerce, as well as the only written comments received, from Velsicol and their consultants. For conciseness and clarity, these comments are paraphrased and grouped together where possible, before a response is given.

In general, no comments were received from the general public which conceptually disagreed with the components of the agencies' preferred alternative identified in the proposed plan. Nor were any comments received which promoted any other remedial alternative developed in the FS, or variation thereof. Velsicol Chemical Corporation has, however, submitted extensive comments on the scope of the remedial action required for this site. These comments have been carefully considered and promptly addressed throughout the study, as well as at this stage in the responsiveness summary. The technical details of a negotiated settlement on an approvable responsible party site remedy are the subject of the following section.

X. SELECTED REMEDY

Before recent remedy discussions from RD/RA settlement negotiations can be outlined, the agencies' preferred alternative as presented in the proposed plan should be reviewed. It consisted of soil and sediment alternative 2A-1, modified, in combination with groundwater alternative GW-2. The elements of that preferred alternative are highlighted below.

- Excavation of all contaminated soils and sediments identified in the FS, with optimum soil removal in plant area "hotspots" that will become accessible due to proper structure demolition and elimination of unnecessary service roadways. The total soil excavation quantity under this modified alternative was estimated to be approximately 80,000 cubic yards.

- Backfilling of excavated areas with clean clay, regrading for positive surface drainage and establishment of a vegetative cover to facilitate off-site stormwater runoff.

- Consolidation of contaminated wastes on top of the existing 5/6 Pond, with treatment in-place provided by chemical stabilization by controlled mechanical mixing of reagents and wastes by conventional construction equipment during placement of lifts of material.

- Vertical extension of the existing localized leachate collection system on the western edge of the unit. Capping of the modified 5/6 Pond with a RCRA compliant multimedia cover system.

- Collection of contaminated groundwater through installation of two interceptor trench systems in the shallow aquifer: one immediately downgradient of the 5/6 and 2/4 Ponds and one downgradient of the highly contaminated plant process areas.

- Treatment of extracted groundwater in an on-site system and subsequent discharge to the unnamed tributary. The potential exists for use of deep injection well No. 2 for direct disposal of contaminated groundwater, and surface water through the initial remedial construction phase.

- Evaluation of the effectiveness of the remedy through regular monitoring and reporting on: shallow and deeper groundwater at the perimeter of the site, effluent from the groundwater treatment facility, and the cover systems (particularly over the 5/6 Pond unit); development of contingency plans to address any environmental problems.

- Access and land use restrictions.

This remedial action plan, with proper operation and maintenance, permanently reduces primarily the mobility of site contamination through a combination of treatment, engineering and institutional controls. The existing and potential threats associated with direct contact with wastes or migration through the shallow groundwater and/or surface water pathways is effectively mitigated. The technologies proposed are well proven, and the necessary construction, labor, equipment and materials are readily available.

In summary, the IEPA and USEPA believe this preferred alternative would be protective of human health and the environment, would attain ARARs and would be cost-effective while implementing a permanent, environmentally sound solution for the entire Velsicol/Marshall site, that employs alternative treatment technology.

As indicated previously, modifications to the scope of work of the various remedial components outlined above have been discussed with Velsicol in the context of settlement for voluntary implementation of the selected remedy. Conceptually, the goals of the agencies' preferred remedial alternative are not compromised. The ensuing discussion documents changes in the conceptual design and implementation of the selected remedy from that in the proposed plan, and provides the rationale for those changes.

Unnamed Tributary and East Mill Creek

The RI identified significant contamination of creek sediments from the facility to Velsicol's western property boundary (see attached site map, Figure 3). The site-specific clean-up objectives developed for various media by the IEPA Clean-up Objectives Team (COT) are also attached to this Decision Summary (Table 8). Additional information on this process is included in the FS. Sediment sampling further downstream in the unnamed tributary and East Mill Creek into which it empties was not

undertaken during the RI. However, fish analytical results from these reaches indicate elevated levels of chlordane compared to background levels established in the adjacent Mill Creek.

Remediation of this off-site area will include excavation of contaminated sediment in the unnamed tributary from the southeastern edge of the facility to Velsicol's western property line. Initially, a boundary survey will be completed on this section of the creek to establish its exact course through the property. The approach to excavation will be construction oriented. The depth of excavation will be six inches below the 18 inch depth of contamination observed in the RI. This would result in approximately 2,200 c.y. of creek sediment to be consolidated and stabilized in-place on top of the 5/6 Pond.

In order to minimize downstream impacts associated with excavation of the creek, and then to eliminate surface water flow through that section, a permanent diversion channel will be constructed prior to excavation of contaminated sediments (see final remedy conceptual plan, Figure 5). This side channel would parallel the existing one, crossing it at midpoint through this section due to the given facility and stream configuration. Any clean stormwater during construction would be pumped across this intersection. Contaminated water collected in the existing creek excavations would be dealt with as other on-site stormwater is. Excavated clayey soil from the new channel will be used to backfill the existing one in discrete, compacted lifts to meet the surrounding field grade. Positive drainage patterns will be established and the entire affected area revegetated or farmed. Sensitive sections of the new channel will be protected with appropriately sized rock.

A conservation dry dam exists on East Mill Creek approximately three miles downstream of Velsicol's western property boundary. This man-made feature acts as a sediment trap and appears to be a likely end point for contaminant build-up. The FS proposes additional sediment sampling in this section at 1,000 ft. intervals with three depth composites (0-6", 6"-12" and 12"-18") for the primary contaminant of concern, chlordane, during remedial design. Samples will be taken at each interval in local areas of sediment deposition, as opposed to swift moving channel areas. It is also proposed that background stream sediment chlordane concentrations be established in East Mill Creek, above its confluence with the unnamed tributary. Available data suggests that the average concentration of chlordane in local stream sediments ranges from 10-20 ug/kg. Any sediment excavation beyond Velsicol's western property boundary will focus only on stream sections with sediment build-up, as opposed to sections of exposed bedrock. Additionally, consideration will be given when evaluating the limits of the scope of this work to minimizing damage to the stream and the surrounding property. Velsicol has assumed an excavation quantity of approximately 8,000 c.y. from this section in their RD/RA technical proposal. This sediment would also be consolidated and stabilized in-place on top of the 5/6 Pond.

Agricultural Land Soils

An extensive soil sampling program was implemented in agricultural lands west and north of the facility during the RI. Clean-up objectives based

on protection of human health and the environment have been established for off-site soils, as for other media, by IEPA COT (see attached summary, Table 8). However, the background concentration of chlordane in central Illinois agricultural soils has been observed at 50 ppb.

The proposed plan advocated removal of surface soils to a depth of one foot (10,000 c.y.) for soil borings with chlordane concentrations above background, and consolidation of these soils with stabilization in-place on top of the 5/6 Pond. The impacted area would then be regraded for positive drainage and revegetated or placed back into crop production.

The selected alternative instead of excavation of these minimally contaminated soils involves in-situ management with crop restrictions for the fields controlled by Velsicol. A regular program of pH testing and amendment with agricultural ground limestone to maintain a minimum pH of 6.5 will be implemented. Conservation practices such as no-fall-tilling will be used to minimize surface erosion. Additionally, land use restrictions as agreed, will allow growth of only corn, soybeans or wheat. No vegetable crops for direct human consumption will be grown. The land may also be used for forage crop production, but no direct grazing of livestock will be allowed. This management program will effectively mitigate contaminant transport through groundwater or surface water and limit translocation to crops.

2/4 Ponds

The 2 Pond ultimately receives all stormwater runoff from the plant area. The 4 Pond currently serves as a back-up to the 2 Pond, being connected by a culvert. These ponds were visibly "cleaned" to the underlying natural clay liner in preliminary reclamation work performed by Velsicol in the early 1980's.

The RI sampling indicated some contamination above established clean-up levels in the bottom six-inch sediment layer. There was also contamination of similar constituents observed in the pond waters and on-line oily-water separator. This contamination appears to be the result of plant production area runoff subsequent to recent cleaning activities.

The 2 Pond will be the logical impoundment in which stormwater should be collected during remedial construction. As such, work will be sequenced around its use until the initial remedial action is complete, and surface water runoff is of a quality to directly discharge off-site.

The remedial action identified for this area in the proposed plan assumed continued plant use of this impoundment to contain stormwater prior to deep well pretreatment and injection. The plan included excavation of the six-inch contaminated sediment layer below the high water-line, plus an additional six-inches (one foot total depth) which amounted to approximately 15,200 c.y. This material would then be consolidated and stabilized in-place on top of the 5/6 Pond.

However, Velsicol has indicated in recent settlement discussions that these ponds (as well as the north stormwater pond which requires no

An alternative to this intensive sampling process is adopted in conjunction with the proposed groundwater restoration program. In lieu of verification sampling, each plant area will be excavated to the observed depth of significant contamination plus an additional six-inches to insure removal of gross contamination. The exception to this plan is area 4, where excavation will be to a depth of six feet as the saturated zone will have been encountered. Residual contamination left in-place at this depth will be addressed by the groundwater interceptor trench system.

This excavation scheme yields approximately 86,000 c.y. of source material. Velsicol asked the agencies to consider partial excavation credit in plant areas 4 and 6 where preliminary remedial action was taken during the initial 5/6 Pond stabilization work. Preliminary information provided indicates that soil removal has occurred from approximately 16,500 s.f. in area 4 along an abandoned railroad spur, and 120,000 s.f. in area 6 which was formerly used for tanks. Volume calculations using corresponding depths for each area result in a total excavation reduction of 8,100 c.y. Minimal soil sampling will be included in the RD for these areas only, to confirm this previous removal of significant contamination. An additional 10,000 c.y. of excavation will be available during the remedial action to remove other significantly contaminated pockets, most likely around former process areas. A total of approximately 87,900 c.y. of source materials may therefore be excavated from the plant production area and consolidated and stabilized in-place on top of the 5/6 Pond (see attached removal volume summary, Table 9). Disturbed plant production areas will be backfilled to grade with clean clay from other Velsicol property, regraded to drain, topsoil added and vegetation established.

5/6 Pond

A site total of approximately 97,700 c.y. (without consideration of off-property creek sediments) of contaminated soils/sediments originating from the unnamed tributary, 2/4 Ponds and plant production area are currently identified for consolidation with in-place stabilization on top of the existing 22 acre 5/6 Pond. This disposal unit contains approximately 300,000 c.y. of wastes from previous manufacturing activities. These highly contaminated sludges were subjected to chemical stabilization with cement-type materials and fly-ash and temporarily covered with 18 inches of clay with vegetation by Velsicol between 1982 and 1985.

The scope and sequencing of excavation, incorporation of stabilizing agents and compaction in controlled lifts on top of the pond will be developed in the RD workplan. Extensive testing of admixtures and mechanical mixing procedures was completed by Velsicol in their original sludge stabilization effort. An abbreviated field pilot program will be completed during the RD to tailor the optimum proportion of reagents, moisture and mixing sequence for the specific soils and sediments to be stabilized during this final remedy.

It is estimated that addition of stabilizing agents to contaminated soils/sediments on top of the 5/6 Pond will result in a 20 percent increase in the volume of material to be accommodated by the 5/6 Pond. Assuming that maximum compactive effort is used to eliminate any excavation "swell", final placement of the stabilized waste would amount to an increase of approximately 3.5 ft. to the existing pond elevation. It has been determined by Velsicol that the integrity of the impoundment berms will be maintained under this load plus that of the final cap, and that direct runoff can be handled properly.

The proposed plan called for a RCRA Subtitle C compliant final cap to be constructed over the completed 5/6 Pond. A multimedia cap provides the greatest degree of protection among caps from the elements over this above-grade impoundment by minimizing infiltration into the stabilized waste. With the stabilization treatment providing further protection by severely limiting the leachability of contaminants, minimal groundwater releases can be expected from the unit. What leachate that will be generated will be addressed through the groundwater interceptor trench system.

The proposed plan recommended the following geographical region-specific RCRA model cap cross-section:

- 24" of compacted clay
- overlain by minimum 20 mil thick synthetic liner
- overlain by 12" drainage layer
- overlain by filter fabric
- overlain by 24" of topsoil
- graded to drain (2-4% slope) and finished with low maintenance vegetation

The selected modification of this cap design involves reducing the thickness of the drainage layer (by six inches), and increasing the thickness of the upper soil layer (by six inches) while substituting a lesser quality soil material for topsoil. These changes reduce the estimated cost of this cover system but maintain the proper freeze-thaw protection over the bottom clay layer, while allowing for proper internal drainage.

The profile for the modified multimedia cap is therefore as follows:

- 24" of compacted clay
- overlain by minimum 30 mil thick (HDPE) synthetic liner
- overlain by 6" drainage layer
- overlain by filter fabric
- overlain by 24" of clean soil fill
- overlain by 6" of topsoil
- graded to drain (2-4% slope) and finished with low maintenance vegetation

An operation and maintenance program for the 5/6 Pond cover will be developed in the RD work plan. It will include regular inspection and erosion repair, as well as optimal liming, fertilization, reseeding and mowing by the Velsicol maintenance crew present on-site.

On-Site Groundwater

An extensive groundwater monitoring well network was installed and sampled during the RI. Two areas of contamination were observed. Groundwater within the plant production area is significantly contaminated in comparison to site-specific IEPA COT clean-up/discharge objectives. This contamination is generally limited to the uppermost aquifer below the surface, as it moves westward with upgradient flows toward recharge of the unnamed tributary. No actual measurements of groundwater quality were taken beneath the 5/6 Pond, nor was a transport modeling effort undertaken as part of this study. Groundwater immediately west of the impoundments was found to be contaminated with low level organics and inorganics, compared to COT objectives. A plume of mobile chlorides has been tracked several hundred feet away from that area. The FS estimated 40-60 percent of water from the upper hydrogeologic unit in the vicinity of the 5/6 and 2 Ponds would discharge to the unnamed tributary based on horizontal flow patterns and vertical gradients. Therefore, the potential for contaminant release from shallow groundwater to surface water has been established and should be addressed.

The primary goal of the groundwater remedial action is to prevent the release of contaminated groundwater from the site. The other goal is to restore the affected environment beneath the facility, with use of institutional controls until restoration is achieved.

The groundwater collection plan developed in the FS and recommended in the proposed plan involved interception of contaminated water from each of the areas identified, through the use of shallow pipe and gravel backfilled trench drains. One trench would be located immediately downgradient of the 5/6 and 2 ponds, being approximately 2,450 ft. long and 15 ft. deep (bottom of till layer). An estimated steady-state flow rate of 1,870-3,000 gallons/day was expected. The other trench was proposed to be located immediately upgradient of the 5/6 and 4 ponds, being approximately 940 feet long and 15 feet deep with an expected flow rate of 600 to 1,350 gallons/day. These two trench systems would be sloped to drain by gravity toward sumps in the center of each, with transmission pumps and lines from the sumps to the treatment system.

The on-site treatment system conceptually designed for the FS and proposed plan relied primarily on carbon adsorption to meet the IEPA/COT clean-up objectives prior to controlled discharge to the unnamed tributary (see attached list of, and rationale for, chemical-specific objectives for groundwater and surface water, Table 8). The storage tank and treatment columns were tentatively located next to the creek in a diked containment area in agricultural land west of the 5/6 and 2 Ponds. The combined groundwater influent, and effluent, would be regularly monitored to evaluate the effectiveness of the system. The FS costed operation and maintenance of this system is over a nominal thirty year period, although the actual lifetime will be dictated by the field effectiveness of the system to restore the quality of groundwater to below the established objectives.

presence throughout plant decommissioning and remedial activities. The plant perimeter fence, with controlled access points, will remain; with adjustments made during and after construction. The groundwater remedy will conceivably require routine inspection and maintenance. This factor, coupled with the potential liabilities associated with the site and a desire to protect the sensitive cover systems, will most likely lead Velsicol to permanently employ a small resident staff at the former facility.

The details of land use restrictions will be finalized in the Consent Decree. A notation on the deed to the facility will indicate that the land has been used to manage hazardous waste and its use is restricted according to 40 CFR Subpart G regulations. In addition, Velsicol owns and controls a large amount of agricultural land around the plant, particularly to the north and west. They have indicated that they do not intend to sell any of those holdings at this time. However, the potential exists for industrial/commercial development to the north near Interstate 70 where several businesses have recently located. The Agencies will recommend, through the Consent Decree, that an adequate buffer zone be maintained by the company around the site. Of particular concern would be control of the agricultural lands identified with special in-situ management requirements, and the capped quarter-mile long section of the unnamed tributary to the current western Velsicol property boundary.

Summary of Selected Remedy

Conceptually, the selected remedy put forth in this Decision Summary is identical to that recommended in the proposed plan. The technical details of some of the remedial components have been modified, without compromising their environmental purpose. These modifications are logical outgrowths of that originally developed in the feasibility study as presented for public comment. The agencies believe this final alternative will be protective of human health and the environment, will attain ARAR's and will be cost-effective while implementing a permanent, environmentally sound solution for the entire Velsicol/Marshall site, that employs alternative treatment technology.

XI. STATUTORY DETERMINATIONS

Protection of Human Health and the Environment

The selected remedy reduces risks to human health and the environment by excavating contaminated soils and sediments, treating them through chemical stabilization, and then covering them with an impermeable multimedia cap. Collection of groundwater through a trench system will prevent off-site migration and reduce the threat of direct contact with contamination in surface water.

Health based chemical specific clean-up objectives for groundwater, soils and sediments were developed by IEPA's Clean-up Objectives Team (COT). As previously noted, clean-up objectives are listed for each contaminant found on-site in Table 8, Appendix A.

The Illinois Environmental Protection Agency has developed a process in which the agency's various divisions follow procedures similar to classic risk assessment/risk management in order to develop chemical-specific clean-up objectives for contaminated sites which the agency addresses through its various programs. Two teams of specialists, the Clean-up Objectives Team (COT) and the Coordinated Permit Review Committee (CPRC), establish site-specific health-based clean-up objectives for types of regulated clean-ups such as RCRA closures, clean-up of spills and leaks and remediation of Superfund Sites. The COT/CPRC process was used to establish site-specific clean-up levels for the following media that will be addressed in this remedial action:

1. Plant soils and 2/4 Pond sediments;

2. Unnamed tributary sediments and surface water;

3. Groundwater

Since all remediation activities will take place within a secure area owned by Velsicol, it is believed that the general Marshall community will not be affected in the short term by the remedial action. Prudent construction and operation practices such as dust suppression, air monitoring, and clean water diversion and sediment trapping during remediation will minimize off-site migration of contaminants via the air or surface water pathways.

Attainment of Applicable or Relevant and Appropriate Requirements

Section 121(d) of SARA requires that remedial actions meet legally applicable or relevant and appropriate requirements (ARARs) of other environmental laws. These laws may include: the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Clean Air Act (CAA), the Safe Drinking Water Act (SDWA), and any state law which has stricter requirements than the corresponding Federal law. A "legally applicable" requirement is one which would legally apply to the response action if that action were not taken pursuant to Section 104 or Section 106 of CERCLA. A "relevant and appropriate requirement" is one that, while not legally applicable to the remedial action, addresses problems or situations sufficiently similar to those encountered at the site that their use is well suited to the remedial action.

Non-promulgated advisories or guidance documents issued by federal or state governments do not have the status of ARARs; however, where no applicable or relevant and appropriate requirements exist, or for some reason may not be sufficiently protective, non-promulgated advisories or guidance documents may be considered in determining the necessary level of clean-up for protection of human health and the environment.

The clean-up levels identified by COT for the tributary surface water and groundwater are also ARARs -- i.e. promulgated State water quality standards and Federal Ambient Water Quality Criteria which are

applicable or relevant and appropriate to the remedial action. However, there are no State or Federal ARARs for the contaminants found in the soils and sediments at the Velsicol site. The COT/CPRC clean-up levels for these soils and sediments fall into the category of non-promulgated advisories, which were considered by the Agencies in determining the volumes of soils and sediments to be excavated from the unnamed tributary, 2 and 4 Ponds and plant production area to assure protection of human health and the environment.

The following is a description of the ARARs for the different components of the remedy and an explanation of how this remedial action meets those requirements:

Soils and Sediment Excavation

The selected alternative calls for the excavation of contaminated soils from the plant production area and sediments from the unnamed tributary and 2 and 4 Ponds for consolidation and in-place stabilization on the 5/6 Pond. The ponds, tributary and plant production area are contiguous to the 5/6 Pond and constitute a single area of contamination.

RCRA Subtitle C closure requirements are applicable to areas of a site that contain RCRA characteristic or listed hazardous waste and that waste was received or managed after November 19, 1980, the effective date of RCRA. If the 2 and 4 Ponds, unnamed tributary and plant production area meet this definition they must be closed in accordance with RCRA closure requirements.

The 2 and 4 Ponds are used to collect and store storm water prior to its disposal by deep well injection. The storm water is not considered a "hazardous waste" as defined under RCRA. The unnamed tributary sediments became contaminated prior to the effective date of RCRA from discharges of plant process waste and storm water runoff. Thus, the RCRA closure requirements are not applicable to the 2 and 4 Ponds or the unnamed tributary. The plant production area includes hazardous waste storage and pretreatment tanks, a drum storage area, former tank farm and chemical manufacturing facilities. Soils beneath the production area are contaminated with hazardous constituents. This contamination is due to leaks and spills from these facilities over the history of plant operation. It is not known whether contamination occurred before or after the effective date of RCRA; nor was the soil contamination attributable to any specific hazardous waste management unit. The RCRA Subtitle C closure requirements are applicable to the RCRA-regulated hazardous waste management facilities in the plant production area, such as the storage and pretreatment tanks; these requirements would not be applicable to those portions of the plant production area not used for management of RCRA hazardous waste.

Nevertheless, the entire production area as well as the 2 and 4 Ponds and tributary sediments contain RCRA hazardous constituents that have been released, or have the potential to be released to

groundwater or surface water offsite. Therefore, the Agencies determined that RCRA closure requirements are relevant to remediation of these areas. After consideration of RCRA Subtitle C closure requirements, it was determined that "clean closure" is the appropriate standard for the unnamed tributary. The on-site portion of the tributary and the off-site portion of the tributary will be excavated until background levels of chlordane and heptachlor in Illinois streams has been attained. For the plant. production and the 2 and 4 Pond areas, "clean closure" is not possible because of existing groundwater contamination beneath the facility. "Closure in-place" is not deemed appropriate because the contaminants in the plant area soils and 2 and 4 Pond sediments are the primary source of this groundwater contamination, and one of the goals of CERCLA is removal to the maximum extent practicable of source materials. Leaving these materials in-place would greatly increase the time necessary for groundwater remediation. It was determined that a "hybrid closure" approach is more appropriate under the circumstances at the facility. This approach combines certain appropriate aspects of RCRA "clean closure" with appropriate aspects of RCRA "closure in-place." At this site, all equipment and structures in the production area will be decontaminated or disposed of as hazardous waste; contaminated soils as identified by sampling in the RI will be removed to the 5/6 Pond and a groundwater collection and treatment/disposal system will capture and treat/dispose of contaminated groundwater. The excavation of plant soils and 2 and 4 Pond sediments will remove the threat to human health from exposure through contact, as well as minimize the source of groundwater contamination to be remediated.

RCRA Section 3004(u) and 3004(v) and 40 CFR Part 264, Subpart F require corrective action for releases of hazardous wastes or constituents from any "solid waste management unit" (SMU) at facilities requiring a RCRA operating permit, including a post-closure permit. Velsicol operated under RCRA interim status until August 30, 1988, and SMUs at the facility are subject to these corrective action requirements as a part of closure of the facility. The 2 and 4 Ponds are not SMUs because the storm water runoff is not a "solid waste" under RCRA. The tributary is a SMU, which is defined by USEPA as "any discernable waste management unit from which hazardous constituents may migrate, irrespective of whether the unit was intended for the management of solid or hazardous waste." Prior to 1964, and during uncontrollable storm events thereafter, the unnamed tributary was used to receive discharges from waste management units. USEPA has also interpreted the term "solid waste management unit" to include areas associated with production processes at facilities which have become contaminated as a result of "routine and systematic" release of wastes or hazardous constituents from wastes." A product may become a waste if it is abandoned or discarded. The production area soils at the Velsicol site have become contaminated from releases from production processes; it is not known whether these

releases were "systematic" or "routine." Nevertheless, RCRA corrective action authorities are relevant and appropriate to the remediation of the plant production area because releases of hazardous constituents to the soils and groundwater in this area have occurred which threaten human health and the environment, and releases to the groundwater will continue to occur unless the source material is removed. In conformance with these authorities, contaminated soils in the tributary and plant production area are being removed and contaminated groundwater under the plant area will be remediated (see discussion below pertaining to groundwater collection and treatment/disposal).

Groundwater Collection and Treatment/Disposal

This component of the remedial action consists of collection of groundwater in a trench system situated between the plant production area and the 5/6 Pond. This system will capture contaminants migrating from the 5/6 Pond, as well as the plant production area. As stated above, RCRA Section 3004(u) and Subpart F regulations apply to releases from solid waste management units at RCRA facilities.

The RCRA Subpart F regulations require the establishment of concentration limits for hazardous constituents released from solid waste management units and the treatment of groundwater exceeding those limits at the "point of compliance" as defined at 40 CFR 264.95. The "point of compliance" for groundwater migrating from the plant production area is its western boundary. The COT health-based clean-up levels for the groundwater were determined by the Agencies to constitute appropriate alternate concentration limits (ACLs). USEPA/IEPA may adopt an ACL as the groundwater protection standard in lieu of "background levels" or "maximum concentration limits" if the ACL "will not pose a substantial present or potential hazard to human health or the environment as long as the (ACL) is not exceeded". Groundwater collected from the trench system at the point of compliance will be treated to achieve the COT levels. Since the affected groundwater is not used for drinking water, Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) under the Safe Drinking Water Act are not "applicable" standards. Further, since there is no potential for future use of the affected groundwater as drinking water between the source of contamination and the point of discharge to the unnamed tributary, MCLs and MCLGs are not "relevant and appropriate" standards.

The discharge of treated groundwater to the unnamed tributary is regulated by the Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES). Discharge to the tributary is an on-site action; as such the site is exempt from the procedural and administrative requirements of the NPDES (including the requirement to have a discharge permit from the state). However, substantive requirements of the Clean Water Act must be complied with. Thus,

for this site, discharge limits must be established which are based on application of Best Available Technology (CWA Section 301(b)) or more stringent limits, if necessary, to assure that the receiving water meets applicable state water quality standards (CWA Section 302). The CWA also requires monitoring of the discharge to assure that the discharge limits are being met (40 CFR Part 122.44(i)). The COT clean-up levels for groundwater referred to above satisfy the CWA requirements for discharge limits for the discharge of groundwater to the unnamed tributary. Since the COT levels are based on the state water quality standards, where available, and, Federal Ambient Water Criteria, they will ensure that the general use water quality standards are maintained in the unnamed tributary.

(An alternative to treatment of contaminated groundwater and discharge to the unnamed tributary proposed by Velsicol, is to discharge the groundwater directly to deep injection well No. 2 on-site. In this case that injection well must meet the operating requirements of the Safe Drinking Water Act, Underground Injection Control (UIC) Program, 40 CFR Parts 144-147. Also, the disposal of the groundwater in injection well No. 2 must be in compliance with all land disposal restrictions promulgated in 40 CFR Part 148 which are currently in effective or may become effective during the course of the groundwater remediation process).

Section 303 of the CWA requires States to promulgate state water quality standards for surface bodies of water in the state, based on designated uses of the water bodies. The state water quality standards are based on Federal Ambient Water Quality Criteria developed by USEPA. CERCLA remedial actions involving surface bodies of water must ensure that applicable state water quality standards are met. CERCLA also provides that Federal Ambient Water Quality Criteria should be met where relevant and appropriate to the circumstances at the site. The unnamed tributary and East Mill Creek are designated general use waters under Illinois Administrative Code (IAC) Section 303.201 and must meet general use water quality standards specified in 35 IAC Section 302, Subpart B. (The general use standards protect aquatic life from toxic substances but do not apply to waters used for public water supplies.) Thus, the general use water quality standards are applicable clean-up standards for remediation of the tributary, where available, and are supplemented by Ambient Water Quality Criteria for protection from consumption of fish which were determined to be relevant and appropriate.

Consolidation of Contaminated Soils and Sediments on Existing 5/6 Pond

Excavated soils and sediments will be consolidated and stabilized in-place on top of the 5/6 Pond. Hazardous waste was managed in the 5/6 Pond after July 26, 1982; therefore, the 5/6 Pond is a RCRA "regulated unit" subject to all Subtitle C requirements. The 5/6 Pond will be closed leaving previously disposed wastes and the

excavated soils and sediments from this CERCLA action in place. Therefore, pursuant to 40 CFR 264.310, the 5/6 Pond must have a final cover which minimizes liquid migration, minimizes maintenance, promotes drainage, accommodates subsidence and has a permeability less than or equal to the permeability of the natural subsoils present. This remedial action provides for a final cover with a synthetic liner that meets these requirements, having a permeability of 10^{-11} cm/sec. This permeability is much greater than that of the bottom clay layer of the 5/6 Pond.

In addition to a final cover, the regulation requires long-term maintenance and monitoring to maintain the cap's integrity, ensure collection of leachate, prevent damage from run-on and runoff and ensure operability of a RCRA-complaint groundwater monitoring system. RCRA land disposal restrictions govern the disposal of hazardous wastes in landfills. Because contaminated soils and sediments will be consolidated and stabilized within the same area of contamination, specifically on top of the 5/6 Pond, "disposal" will not occur and these requirements would not be applicable to this remedial action. Moreover, the concentration of the hazardous constituents in the soils and sediments to be consolidated and stabilized on the 5/6 Pond is significantly lower than that of the hazardous wastes previously disposed of and stabilized in the 5/6 Pond. Therefore, the addition of this remedial volume of stabilized material will have no significant effect on the mobility of contaminants from the unit. For this reason any land disposal restrictions affecting hazardous constituents found in these soils and sediments, which may become effective prior to completion of this remedy, are determined not to be relevant and appropriate to consolidation of the CERCLA soils and sediments on the 5/6 Pond.

RCRA Subpart F groundwater protection regulations also apply to the 5/6 Pond. When hazardous constituents are detected at the "point of compliance", a groundwater monitoring system must be maintained and groundwater protection standards established and met.

For the 5/6 Pond the "point of compliance" is the western boundary of the 5/6 Pond. Since hazardous constituents have been detected at this boundary, existing groundwater monitoring wells will continue to be used for compliance monitoring pursuant to 40 CFR 264.99. This existing system complies with the requirements of 40 CFR 264.97. The ACL levels identified above are the concentration limits that will trigger corrective action if monitoring shows they are being exceeded. At the present time, these levels have not been exceeded.

The groundwater collection trench located between the 5/6 Pond and the plant production area is calculated to create a zone of capture which will include any releases from the 5/6 Pond. However, the monitoring wells on the western boundary of the 5/6 Pond will identify any migration of contaminants that might evade capture in the trench system. If such migration occurs at levels exceeding the ACLs, appropriate corrective action will be implemented.

Cost Effectiveness

The total present worth cost of the preferred alternative in the proposed plan was $9,080,910. The cost of the selected remedy as negotiated with Velsicol in their good faith proposal has not been calculated, but is comparable to the preferred alternative. This preferred alternative was selected over less expensive alternatives which do not provide for treatment of soils and groundwater because the additional protection provided by treatment was judged to outweigh the cost. The more expensive alternatives, including construction of a new on-site RCRA compliant cell for disposal of treated soils, were not judged to be significantly more protective than use of the existing 5/6 Pond as proposed in the selected remedy.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy includes treatment of excavated soils with chemical stabilization and provides for treatment of collected groundwater prior to discharge from the site. This remedy was judged to provide the best balance of protectiveness, effectiveness and cost. It was selected and has been modified to be compatible with overall plans for closure of the site. This remedy utilizes treatment technologies to the maximum extent practicable for this site and offers a greater degree of permanence than capping without treatment.

Preference for Treatment as a Principal Element

The selected remedy treats both contaminated soils and groundwater under an off-site discharge scenario; thus, it utilizes treatment to address the principal threats posed by the site.

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TABLE 6

SUMMARY OF RISK ASSESSMENT
VELSICOL SITE

Exposure Pathway	Risk Characterization
Fish Consumers	
No-Action Alternative	Excess cancer risk for maximum levels of contaminants is 6.00×10^{-6} for adults. Sensitivity analysis indicates this risk may be as high as 2.3×10^{-5}. Noncarcinogenic risks were not elevated.
Abandonment Alternative	Excess Cancer risk for maximum levels of contaminants is 7.23×10^{-4} for adults. Noncarcinogenic risks were significantly elevated.
Trespassers under Abandonment Alternative	Excess cancer risks for maximum levels of contaminants were 1.25×10^{-5} for dermal absorption and 1.0×10^{-5} for inhalation exposures. Noncarcinogenic risks were not elevated.

TABLE 7

SUMMARY OF DEVELOPED REMEDIAL ALTERNATIVES FOR THE VELSICOL/MARSHALL SITE

Number	SOIL AND SEDIMENT ALTERNATIVES (4)		REMEDY DESCRIPTION					
	Plant Soil Ag. Soil 2/4 Pond Sediment	Creek Sediment	Remedial Component	Containment Location	Cover System 5/6 Pond	Cover System New RCRA Cell	Estimated Total Cost(1) ($ Present Worth)	Estimated Implementation Period (Months)(2)
1A-1	Excavation	Excavation	Containment Eng. Controls	on 5/6 pond	Multimedia	-	5,554,800	24
1A-2				"	Single Layer Clay	-	4,692,100 (6)	24
1B-1				New on-site RCRA cell	Multimedia	Multimedia	7,128,000	36
1B-2				"	Single layer clay	Multimedia	6,265,300	36
1C-1		In-place containment and creek diversion		on 5/6 pond	multimedia	-	5,677,500	24
1C-2				"	single layer clay	-	4,814,600	24
1D-1				New on-site RCRA cell	multimedia	multimedia	7,250,600	36
1D-2				"	single layer clay	multimedia	6,387,800	36
2A-1		Excavation	Treatment chemical stabilization	on 5/6 pond	Multimedia	-	7,584,100 (5)	24
2A-2				"	single layer clay	-	6,721,600	24
2B-1				New on site RCRA cell	Multimedia	Multimedia	9,932,600	36
2B-2				"	single layer clay	Multimedia	9,069,400	36
2C-1		In-place containment and creek diversion		on 5/6 pond	multimedia	-	7,644,000	24

TABLE 7 (continued)

2C-2	~	~	~	"	single layer clay	-	6,781,200	24
2D-1	↓	↓	↓	new on site RCRA cell	multimedia	multimedia	9,992,300	36
2D-2				"	single layer clay	multimedia	9,129,300	36
3 (No action source)	left in place	left in-place	none	none	-	-	-	-

GROUNDWATER ALTERNATIVES

Number		Groundwater	Remedial Component	Estimated Total Cost[1] ($ Present Worth)	Estimated Implementation Period (Months)[2]
GW-1		collection french drains	disposal in existing deep well	310,300	6
GW-2		collection french drains	on site treatment; off-site discharge	738,400	6
GW-3	(no action groundwater)	left in-place	none	710,700	-[3]

(1) Estimated total remedial costs include capital construction costs and the present worth costs for: operation and maintenance, normal replacement and monitoring for an assumed 30 year operating life. The FS report should be consulted for further details.

(2) Estimated implementation period is for actual construction of remedial components following detailed design and contractor procurement activities

(3) Involves no remedial work but regular groundwater monitoring of site perimeter.

(4) Total remedial action plan involves combination of one source action with one groundwater action alternative.

(5) The costs of alternative 2A-1, modified for additional plant soil excavation estimated in the proposed plan due to removal of facilities is $8,342,510.

(6) The costs for alternatives utilizing a single layer cap have been revised from those presented in the proposed plan due to omission of the cost fa a geotechnical filter fabric liner.

INTRODUCTION TO TABLE 8

CLEANUP OBJECTIVES RATIONALE

This case concerns an NPL site for which a Remedial Investigation (RI) and Endangerment Assessment (EA) have been submitted by an Agency contractor. The case has been referred to COT for the establishment of ARARs and "To be considered" cleanup objectives in order to proceed with the Feasibility Study. The RI has documented some areas of heavy contamination within the boundaries of the still-operating plant and areas of minor contamination within the facility's boundaries which are not part of the plant's daily operations. Off-site areas of contamination also exist, mainly as a result of past breaches in the water containment system. It is proposed that all RCRA and CERCLA concerns be addressed in one Record of Decision for the site. Therefore, cleanup objectives for clean closure are proposed for on-site and off-site areas of concern (soils, sediments, surface water, and groundwater).

Since the site is not known to be in the vicinity of any active wells, COT is proposing cleanup objectives based on general use water quality standards or Ambient Water Quality Criteria (AWQC) for protection of ingestion of contaminated aquatic organisms, where available. Illinois general use standards protect the state waters for aquatic life, agricultural use, primary and secondary contact use, industrial use and aesthetic quality, as defined in 35 IAC 302.208. Where a chemical has been detected in off-site surface waters or sediments, the more stringent of the general use standard or the AWQC is the preferred cleanup objective, while for the on-site areas of concern, the general use values are the proposed cleanup objectives. The chemicals of concern in each medium and the ranges of concentrations detected during the RI are listed in the contractor's "Request for ARARs" document. COT's recommendations for cleanup objectives will be limited to: (1) the indicator chemicals selected for the EA; (2) those chemicals found in the RI to be within two orders of magnitude of previously-established general use cleanup objectives or AWQCs for protection of ingestion of contaminated aquatic organisms; (3) those chemicals found in the RI which have not previously been addressed by COT (given for CPRC's consideration, even if the chemical may not exceed the proposed cleanup objective); and, (4) for inorganics, those chemicals found in the RI to be more than twice the background concentration in the same medium or to be above Illinois general use water quality standards. Where proposed objectives are below Acceptable Detection Limits (ADLs), the ADL is given for comparison.

Relevant data was not found to permit recommending cleanup objective for 2-hexanone, di-n-octylphthalate, dibenzofuran, alpha- and delta-BHC, cis- and trans-nonachlor, and oxychlordane. COT suggests that if these compounds are detected after the other cleanup objectives have been achieved, the appropriate objectives should be determined at that time.

TABLE 8

CHEMICAL-SPECIFIC OBJECTIVES FOR GROUNDWATER AND SURFACE WATER

VELSICOL SITE

Parameter	Objective (µg/l)	Decision Basis	ADL (µg/l)
Benzene[1]	2,000	1/10 TLm-96	NA[2]
Bromomethane	1,100	1/10 TLm-96	NA
Carbon Disulfide	13,500	1/10 TLm-96	NA
Carbon Tetrachloride	4,300	1/10 TLm-96	NA
Chlorobenzene	1,600 and Mixture 1	1/10 TLm-96	NA
Chloroform[1]	15.7 (Off Site)	AWQC, 10^{-6} Risk Level	NA
	1,300 (On Site)	1/10 TLm-96	NA
Ethylbenzene	3,200 (On & Off Site)	1/10 TLm-96	NA
2-Hexanone	ND[3]	---	---
4-Methyl-2-Pentanone	50,900	1/10 TLm-96	NA
Styrene[4]	2,505 (On & Off Site)	1/10 TLm-96	NA
Toluene	1,300 (On & Off Site)	1/10 TLm-96	NA
Xylenes (Total)	2,100 (On & Off Site)	1/10 TLm-96	NA
Benzoic Acid	18,000	1/10 TLm-96	NA
Benzyl Alcohol[4]	1,000	1/10 TLm-96	NA
Bis(2-Ethylhexyl)Phthalate	69 (On & Off Site)	1/10 TLm-96	NA
Butylbenzyl Phthalate	232	1/10 TLm-96	NA
Di-n-butyl Phthalate	73 (On & Off Site)	1/10 TLm-96	NA
Di-n-octyl Phthalate	ND	---	---
Dibenzofuran[4]	ND	---	---
Dinitro-orthocresol (4,6-Dinitro-2-Methylphenol)	23	1/10 TLm-96	50
1,2-Dichlorobenzene	560 and Mixture 1	1/10 TLm-96	NA
1,3-Dichlorobenzene	620 and Mixture 1	1/10 TLm-96	NA
1,4-Dichlorobenzene	430 and Mixture 1	1/10 TLm-96	NA

TABLE 8 (Continued)

CHEMICAL-SPECIFIC OBJECTIVES FOR GROUNDWATER AND SURFACE WATER

VELSICOL SITE

Parameter	Objective (µg/l)	Decision Basis	AQL (µg/l)
Hexachlorocyclopentadiene[1,4]	0.7	1/10 TLm-96	4.0
Hexachloroethane[4]	98	1/10 TLm-96	NA
Isophorone[4]	14,500	1/10 TLm-96	NA
Naphthalene	230 (On & Off Site)	1/10 TLm-96	NA
2-Methyl Naphthalene	900 (On & Off Site)	1/10 TLm-96	NA
Carcinogenic PNAs (Total)[1,5]	0.031 (Off Site)	AWQC, 10^{-6} Risk Level	---
Benzo(a)anthracene	1.0 (On Site)	1/10 TLm-96	0.13
Benzo(a)pyrene	0.5 (On Site)	1/10 TLm-96	0.23
Benzo(b)fluoranthene	ND	---	0.18
Chrysene	ND	---	1.5
Dibenzo(a,h)anthracene	ND	---	0.3
Non-carcinogenic PNAs (Total if no carcinogenic PNAs detected)[1,6]	54 (Off Site)	AWQC	---
Non-carcinogenic PNAs (Total if other carcinogenic PNAs detected)[1,6]	5.4 (Off Site)	1/10 AWQC	---
Acenaphthene	60.8 (On Site)	1/10 TLm-96	18
Acenaphthalene	ND	---	10
Anthracene	2.3 (On Site)	1/10 TLm-96	6.6
Benzo(g,h,i)perylene	ND	---	0.76
Benzo(k)fluoranthene	ND	---	0.17
Fluoranthene	398 (On Site)	1/10 TLm-96	NA
Fluorene	ND	---	2.1
Indeno(1,2,3-c,d)pyrene	ND	---	0.43
Phenanthrene	10 (On Site)	1/10 TLm-96	6.4
Pyrene	ND	---	2.7

TABLE 8 (Continued)

CHEMICAL-SPECIFIC OBJECTIVES FOR GROUNDWATER AND SURFACE WATER

VELSICOL SITE

Parameter	Objective (µg/l)	Decision Basis	AQL (µg/l)
Nitrobenzene[4]	4,300	1/10 TLm-96	NA
N-Nitrosodiphenylamine	16.1 (Off Site)	AWQC, 10^{-6} Risk Level	10
	585 (On Site)	1/10 TLm-96	NA
Pentachlorophenol	2.4 (On & Off Site)	1/10 TLm-96	36
Phenols (Total)[1,7]	100	35 IAC 302.208	NA
Chlordane[1]	0.00048 (Off Site)	AWQC, 10^{-6} Risk Level	0.5
	0.2 (On Site)	1/10 TLm-96	
Alpha-BHC[4]	ND	---	0.03
Delta-BHC[4]	ND	---	0.09
t-Nonachlor[4]	ND	---	---
Barium	5,000	35 IAC 302.208	---
Boron	1,000	35 IAC 302.208	---
Copper	20	35 IAC 302.208	---
Lead[1]	100	35 IAC 302.208	---
Zinc	1,000	35 IAC 302.208	---

Mixture 1: In order to protect aquatic life against potential additive toxicity, no compound should exceed its individual cleanup objective. In addition, the following equation should also be satisfied (all values in µg/l):

$$\frac{[\text{Chlorobenzene}]}{1{,}600} + \frac{[\text{1,2-Dichlorobenzene}]}{560} + \frac{[\text{1,3-Dichlorobenzene}]}{620} + \frac{[\text{1,4-Dichlorbenzene}]}{430} \leq 1.0.$$

TABLE 8 (Continued)

CHEMICAL-SPECIFIC OBJECTIVES FOR GROUNDWATER AND SURFACE WATER
VELSICOL SITE

Notes:

[1] Selected as indicator chemical.

[2] Not applicable; cleanup objective greater than ADL.

[3] Not determined; aquatic toxicity data not found.

[4] Chemical not previously addressed by COT.

[5] Cleanup objective for off-site surface waters is for the sum of the concentrations of listed carcinogenic PNAs. Cleanup objective for on-site groundwater and surface waters are the aquatic toxicity values for listed carcinogenic PNAs.

[6] Cleanup objective for off-site surface waters is for the sum of the concentrations of listed non-carcinogenic PNAs if no carcinogenic PNAs are detected at appropriate ADLs. If carcinogenic PNAs are detected, cleanup objective will incorporate a 10-fold safety factor to protect against additive effects of non-carcinogenic PNAs (cleanup objective = 5.4 µg/l). Cleanup objective for on-site groundwater and surface waters are the aquatic toxicity values for listed non-carcinogenic PNAs.

[7] Total phenols includes phenol (indicator chemical), 2-methylphenol, and 2,4-dimethylphenol.

TABLE 8 (continued)

CHEMICAL-SPECIFIC OBJECTIVES FOR SOIL AND SEDIMENT

VELSICOL SITE

Parameter	Objective (mg/kg)	Decision Basis	AQL (mg/kg)
Benzene[1]	2.0	1/10 TLm-96	NA[2]
Ethylbenzene	3.2	1/10 TLm-96	NA
Toluene[1]	1.3	1/10 TLm-96	NA
Styrene[3]	2.5	1/10 TLm-96	NA
Xylenes (Total)	2.1	1/10 TLm-96	NA
Bis(2-Ethylhexyl) Phthalate	0.069	1/10 TLm-96	0.330
Butylbenzyl Phthalate	0.232	1/10 TLm-96	0.330
Di-n-butyl Phthalate	0.073	1/10 TLm-96	0.330
Di-n-octyl Phthalate	ND[4]	---	---
Diethyl Phthalate	ND	---	---
Dibenzofuran[3]	ND	---	---
Hexachlorobutadiene	0.45	1/10 TLm-96	0.230
Hexachlorocyclopentadiene[1,3]	0.0007[5]	1/10 TLm-96	0.330
N-Nitrosodiphenylamine	0.585	1/10 TLm-96	0.330
Naphthalene	0.230	1/10 TLm-96	0.330
2-Methylnaphthalene	0.900	1/10 TLm-96	0.330
Carcinogenic PNAs (Total)[1]	0.010	20 x TCLP	---
Benzo(a)anthracene	0.020	20 x TCLP	0.087
Benzo(a)pyrene	0.010	20 x TCLP	0.015
Benzo(b)fluoranthene	ND	---	0.012
Chrysene	ND	---	0.100
Dibenzo(a,h)anthracene	ND	---	0.020

TABLE 8 (Continued)

CHEMICAL-SPECIFIC OBJECTIVES FOR SOIL AND SEDIMENT

VELSICOL SITE

Parameter	Objective (mg/kg)	Decision Basis	ADL (mg/kg)
Non-carcinogenic PNAs (Total)[1]	0.046	20 x TCLP	---
Acenaphthene	1.216	20 x TCLP	1.200
Acenaphthalene	ND	---	---
Anthracene	0.046	20 x TCLP	0.660
Benzo(g,h,i)perylene	ND	---	0.061
Benzo(k)fluoranthene	ND	---	0.011
Fluoranthene	7.960	20 x TCLP	0.140
Fluorene	ND	---	0.140
Indeno(1,2,3-c,d)pyrene	ND	---	0.029
Phenanthrene	ND	---	0.560
Pyrene	ND	---	0.180
Phenols (Total)[1,5]	100 ug/l (EP Tox)	35 IAC 302.208	NA
Chlordanes (Total)[1,6]	0.0002	1/10 TLm-96	0.080
Heptachlor[1,3,7]	0.0013	1/10 TLm-96	0.008
Oxychlordane[3]	ND	---	---
Cis-, Trans-Nonachlor[3]	ND	---	---
Barium	5,000 ug/l (EP Tox)	35 IAC 302.208	---
Boron	1,000 ug/l (EP Tox)	35 IAC 302.208	---
Copper	20 ug/l (EP Tox)	35 IAC 302.208	---
Lead[1]	100 ug/l (EP Tox)	35 IAC 302.208	---
Zinc	1,000 ug/l (EP Tox)	35 IAC 302.208	---

NOTES:

[1] Selected as indicator chemical.

[2] Not applicable; cleanup objective greater than ADL.

TABLE 8 (Continued)

CHEMICAL-SPECIFIC OBJECTIVES FOR SOIL AND SEDIMENT

[3] Chemical not previously addressed by COT.

[4] Not determined; aquatic toxicity data not found.

[5] Total phenols includes phenol (indicator chemical), 2-methylphenol, and 2,4-dimethylphenol.

[6] Total chlordanes includes cis and trans isomers. Background residues are above cleanup objectives.

[7] Background residues may be above cleanup objectives.

TABLE 9

PLANT SITE SOIL EXCAVATION VOLUMES
MARSHALL PLANT SITE

AREA	(1) GROSS SURFACE AREA TO BE EXCAVATED (S.F)	SURFACE AREA PREVIOUSLY REMEDIATED	NET SURFACE AREA TO BE EXCAVATED	DEPTH OF EXCAVATION (FT.)	(2) VOLUME OF SOIL EXCAVATION (C.Y.)
1	83,000	--	83,300	1.0	3,074
2	213,000	--	213,000	1.0	7,889
3	77,000	--	77,000	3.5	9,981
4	185,000	16,500	168,500	6.0	37,444
5	158,000	--	158,000	2.0	11,704
6	220,000	120,000	100,000	1.0	3,704
7	54,000	--	54,000	2.0	4,000
			SUBTOTAL		77,796
			CONTINGENCY		10,000
			TOTAL VOLUME OF SOIL EXCAVATION		87,796 (87,800)

IEPA FIGURE (87,900 C.Y.)

Note:

(1) Surface areas taken from Table A-3 of Public Comment Feasibility Study by Roy F. Weston, Inc., July 15, 1988

(2) Table from CRA RD/RA SOW August 29, 1988.

APPENDIX B

RESPONSIVENESS SUMMARY

VELSICOL/MARSHALL, ILLINOIS SITE

APPENDIX B

IN THE MATTER OF	)	
VELSICOL CHEMICAL CORPORATION	)	
REMEDIAL INVESTIGATION,	)	IEPA File 9048
FEASIBILITY STUDY AND	)	
PROPOSED PLAN	)	
PUBLIC HEARING	)	

Responsiveness Summary

RESPONSIVENESS SUMMARY OVERVIEW

The Illinois Environmental Protection Agency (IEPA) and the U.S. Environmental Protection Agency (USEPA) recently held a public comment period from June 23, 1988 through August 12, 1988 for interested parties to comment on the Proposed Plan and the Remedial Investigation/Feasibility Study (RI/FS) for resolving contamination problems at the Velsicol/Marshall site. The required public hearing on July 27, 1988 focused on the results of the FS and the Agencies' preferred remedial alternative (proposed plan). The public comment period was held in accordance with the Federal Superfund Law (CERCLA Section 117) and applicable Illinois state law.

The purpose of this responsiveness summary is to document the agencies' responses to comments received during the public comment period. These comments were considered prior to selection of a final remedy for the Velsicol/Marshall site which is detailed in the agencies' Record of Decision (ROD).

BACKGROUND ON COMMUNITY INVOLVEMENT

As the lead agency for the RI/FS, the IEPA was responsible for conducting the community relations program for this project. A community relations plan was approved by USEPA for this site in November 1985. It established a process to develop a two-way flow of project information between local officials, concerned citizens, the media and the IEPA. A comprehensive information repository was maintained at the Marshall public library with the assistance of their staff. Numerous press releases and fact sheets were issued to announce field activities and the findings of both the RI and the FS. The local media were instrumental in responsibly reporting these details. A public meeting on the findings of the RI was held in Marshall in February 1988. Community relations activities are summarized in the ROD, if additional information is desired.

PUBLIC HEARING

The required public hearing on the proposed plan was held from 6:30 p.m. - 9:00 p.m. on July 27, 1988, at the Colonial Kitchen Restaurant on the northwest side of Marshall, Illinois. Approximately forty persons attended (not counting governmental officials) including several local officials or their representatives, Velsicol officials and members of the press (television and newspaper).

SUMMARY OF SIGNIFICANT COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCIES' RESPONSES

Questions and comments received during the public comment period are paraphrased and organized into two discrete sections within this summary: those received at the hearing and the written comments from Conestoga-Rovers and Associates Limited for Velsicol. The agencies' response is given after each individual question or comment.

Responses to Comments and Questions Received at Public Hearing

Question 1:

What are the agencies going to do for the plant employees now that the facility is closing?

Response:

The agencies can do nothing to directly compensate employees for either loss of employment or job related health problems. Concerns should be directed to Velsicol. The agencies are proceeding with a Remedial Action program to mitigate current and potential risks associated with the site.

Question 2:

Why was off-site landfilling considered as a remedial alternative?

Response:

The Feasibility Study process reviews a wide range of technologies to address the identified environmental problems. Off-site landfilling of hazardous substances in a compliant, permitted facility is a viable disposal option. In this specific case, other on-site remedial technologies were available at a much lower cost without potential risks from transportation of these wastes to such a facility.

Question 3:

Why should people of the community believe the agencies' study (particularly the Risk Assessment) when plant employees have not shown adverse health effects?

Response:

The Risk Assessment completed for the site did not calculate exposures for plant employees. It is assumed they are healthy individuals who follow company health and safety protocol in carrying out their job functions. The site-specific assessment focused on involuntary exposures to the public (youth/adults) and the environment under a plant operation and abandonment scenario.

Question 4:

Why don't the agencies spend funds at more hazardous sites, rather than the Velsicol/Marshall facility?

Response:

There is a rigorous process for scoring sites and placing them on the National Priority List (NPL). Once finalized on that list, a Remedial Investigation (RI) and possibly a Feasibility Study (FS) is required. The Velsicol/Marshall site was among the first eleven in Illinois to be placed on the NPL and is currently being addressed along with these others in an orderly manner.

Question 5:

Are there any chemicals associated with the site that are acutely toxic to a passerby?

Response:

Without consideration for releases from the active manufacturing operations, the contaminants at their concentrations identified in the study promote long-term chronic health effects from repeated direct exposures. Therefore, acute effects from inhalation exposures off-site are highly unlikely.

Question 6:

Why couldn't the agencies have directed Velsicol to undertake Remedial Actions a long time ago?

Response:

Over the years, several agencies have identified deficiencies in the Velsicol plant operation and have directed the company to take action to protect the environment. In 1972, the Illinois Pollution Control Board (IPCB) ordered Velsicol to deepwell inject all plant process waste following discharges of contaminants to the East Mill Creek system. In 1973, the IPCB ordered Velsicol to deepwell all waters that collect on the site following more incidents of contamination of the creek. The Superfund program which gives the agencies authority to negotiate settlements with responsible parties or undertake actions themselves came into existence in 1980. No superfund activities can be initiated until a site is placed on the NPL. Superfund discussion on this site with Velsicol began in 1984. Velsicol had the opportunity to undertake the remedial investigation in 1985 but the company was unwilling to meet the state and federal regulatory requirements. Thereafter in late 1985, the IEPA began fund-financed investigation at the site.

Question 7:

Is it possible for Velsicol's Marshall facility to remain open and also complete this Superfund remedial action?

Response:

Yes, the Remedial Investigation and Feasibility Study was completed on the premise that the plant would remain in operation. The preferred alternative recommended in the proposed plan was only modified to account for additional plant production area soils after Velsicol confirmed plant closure in a letter to the Agency dated June 30, 1988. This letter stated that the company, "had unsuccessfully spent tremendous effort to find replacement products which could fill the capacity of the facility. As a consequence, we have come to the conclusion that it is far too uneconomical to continue manufacturing operations at the [Marshall] facility."

Question 8:

Is Velsicol responsible for all costs associated with the remedial action even if the agencies perform the work?

Response:

Yes, the principal responsible parties (PRPs) at a Superfund site, in this case the Velsicol Chemical Corporation, are ultimately responsible for all response costs in accordance with CERCLA/SARA and the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). Under a fund-lead action, the government usually completes the study and implements the remedy, then seeks recovery of costs (with an option for treble damages) from the responsible party. The responsible party has limited opportunity to take over the response action at the conclusion of the RI/FS, which is the point at which the Velsicol/Marshall project is currently at, providing they have the resources and capability to implement the selected remedy and reimburse government costs.

Question 9:

If Velsicol committed the resources to implement the selected remedy, could they stay in operation at the facility?

Response:

Yes, as emphasized in a previous response, the RI/FS was completed under the premise that the facility would remain in operation. Even if Velsicol elected not to directly participate in the Superfund remedial action, the facility could have continued to operate. The work would be completed by the agencies, and cost recovery actions pursued.

Question 10:

Does the Superfund program address environmental problems associated with municipal landfills and other types of sites?

Response:

Yes, the Superfund program addresses a wide range of sites that possess significant existing or potential threats to public health or the environment. However, as stated in a previous response, these sites are subjected to a rigorous scoring system once a preliminary assessment and site investigation has been completed. If they score above a cutoff point of 28.5, they are eligible for inclusion on the NPL and subsequent superfund monies (assuming the responsible parties do not take the lead). If they score below that cutoff point they will be addressed on a priority basis by state Superfund programs, if available. Illinois has a very active state Superfund program.

Question 11:

What agencies/departments are responsible for responding to releases from a low level nuclear waste site, such as the one under consideration for Clark County?

Response:

The owner/operator of such a facility is ultimately responsible for corrective actions at their site. They are regulated by specific federal and state entities, namely the nuclear regulatory commission and the Department of Nuclear Safety, respectively. It is assumed that these programs would provide assistance in emergency response actions.

Question 12:

If additional soil contamination is found through the sampling work planned during the remedial design phase, will there be sufficient funding to address it?

Response:

Yes, under the scenario that the agencies would undertake the remedial action work, excavation and other quantities would be refined during the remedial design phase, and appropriate funds, including construction contingency monies, would be allocated to address actual field conditions. The FS only attempts to develop order of magnitude costs so that comparisons can be made among the range of remedial alternatives under consideration.

Question 13:

Should Velsicol be held accountable for contaminant exposures to plant workers?

Response:

This is not an appropriate question for the agencies, but rather should be taken up between the employer and employee. Velsicol has offered employment to workers, who have voluntarily accepted it. Velsicol has implemented a site-specific health and safety program to protect them to the level the company feels necessary, and the worker presumably have at the minimum followed that plan.

Question 14:

Will Velsicol be compensated for two years of lost productivity in their agreement to withdraw chlordane from the U.S. market?

Response:

USEPA Region 5 and IEPA have limited knowledge of the voluntary agreement on chlordane between Velsicol and USEPA. This information is being sought, and a response will be provided at a later time. To our knowledge the agreement only allowed Velsicol to use up existing stocks of chlordane, but did not compensate them for future lost production.

Comment 15:

The Marshall area Chamber of Commerce urged the agencies to:

1. Conduct hazadous waste training for local contractors, costs to be absorbed by IEPA/USEPA.

2. Use local contractors, when available and practical, during the clean-up process.

3. Remain cognizant of current and former Velsicol employees with hazardous waste training and utilize their talents in the clean-up process.

Response:

Response actions at Superfund sites containing hazardous wastes/substances requires specialty construction contractors. They must possess the proper equipment to carry out such work, as well as a staff that is highly trained in personal/site safety procedures and is physically fit and under medical surveillance. The agencies cannot directly fund these training activities.

If this project proceeds using Superfund monies, the agencies will be required to competitively let a construction contract following federal procurement regulations. The selected lowest responsible, responsive contractor would be awarded the job. That firm would be able to utilize local subcontractors as appropriate, if so desired. Under this arrangement, it would seem logical to utilize former plant employees with hazardous waste training in some labor positions, if possible.

Under the scenario where Velsicol carries out the remedial action, the company would not be constrained by federal procurement regulations, however, health and safety requirements would still apply. Velsicol has told the agencies that they remain committed to utilizing former employees and local services where possible, if they implement the selected remedy.

Question 16:

What will the agencies do with the product that is going to replace chlordane?

Response:

Those products will also be regulated by USEPA, requiring proper registration and use.

Question 17:

Isn't the replacement product for chlordane acutely toxic?

Response:

Yes, this product has been shown in laboratory testing to be more acutely toxic than chlordane, however, its persistance in the environment is much less than chlordane.

Question 18:

Isn't this replacement product significantly more expensive than chlordane?

Response:

Yes, at this time it apparently is more expensive.

Question 19:

Does the government allow chlordane, or a variation thereof, to be imported for use in the U.S?

Response:

USEPA Region 5 and IEPA have no knowledge of this activity at this time. An inquiry has been made to USEPA headquarters, and any other information will be made available at a later time.

RESPONSES TO VELSICOL'S COMMENTS ON THE PUBLIC COMMENT FEASIBILITY STUDY

Connestoga-Rovers & Associates (CRA) on behalf of Velsicol Chemical Corporation submitted the only written technical comments to the Public Comment Feasibility Study report and proposed plan.

Velsicol and the regulatory agencies exchanged draft information regularly throughout the RI/FS process. Velsicol received an agency draft copy of the FS report on 15 June 1988, and provided comments on that version of the FS report on 30 June 1988. Velsicol's preliminary comments made on the agency draft FS are similar to those made on the public comment FS and therefore are not addressed in this addendum.

The following is a point-by-point response to the comments submitted by CRA on the Public Comment FS report. Each comment is briefly recapped, referenced to its location in the original transmittal, and followed by the agencies' response.

Comment 1:

After the plant is decommissioned, the abandonment scenario will be changed entirely. As a consequence, risks will be far lower. (pp. 1-3, item a)

Response:

The site remediation is based on reducing risks associated with existing contamination at the site for both the no-action and abandonment conditions. Although increased risks were projected under the abandonment scenario, IEPA has determined that reduced remedial effort will not result from the proposed plant closure. Therefore, it is not necessary to revise the risk assessment as suggested by Velsicol.

Comment 2:

The unnamed tributary and East Mill Creek contain few fish large enough to eat and could not sustain a yield of seven pounds of fish per person per year for local residents. (pp. 3-4, item b)

Response:

It is true that the fish caught during the RI in the unnamed tributary and East Mill Creek are generally small, however of edible size. Conversations with Marshall Community officials and the public during

the public meeting on 10 February 1988 and actual observation of fishermens' debris during fish sampling indicates that the unnamed tributary is a viable spot for fishing. As presented in the RI report, it is likely that larger fish may not have been collected due to the limited width of seine net and obstructions within the tributary. The matter of sustainable yield from the tributary is not relevant to the risk assessment because risk is calculated on a per-person basis. Even if only a limited population were eating the contaminated fish, the risk from that exposure would be equal to the reported value. Consumption of seven pounds of fish per year was used in the sensitivity analysis to determine what additional risk would result by fish consumption of approximately twice the amount considered for the low average intake in the risk assessment. Seven pounds of fish consumption per year per person is considered reasonable given the fishing activities in the unnamed tributary.

Comment 3:

There is no proof that groundwater contaminates the unnamed tributary. (p.4, item c)

Response:

The groundwater near the stream is known to be contaminated, (See Table 6-4 of the FS) and the contaminants are known to leach and migrate. The tributary's status as a low-flow intermittent stream prevents rigorous calculation of a mass flux of contaminant into the stream, but the low flow of the stream guarantees that contaminants that enter the tributary by groundwater recharge have a low dilution factor.

Comment 4:

The FS must consider the effect of the dismantling of the facility and securement of the property. (p 5, item a)

Response:

The implications of decommissioning the plant and on-site remediation are presented in Section 2.0 of the Public Comment FS addendum report.

Comment 5:

The chlorides in the groundwater west of the 5/6 pond may have come from above-ground releases. (p 5, item b)

Response:

Chlorides in groundwater are related to past waste disposal activities in the 5/6 pond prior to stabilization and could also be attributed to

intentional and accidental releases of wastes from storage ponds most recently during 1976 and 1979. The EM survey also confirmed the presence of an irregular plume of elevated conductivities in groundwater west of Pond 2 and 5/6 Pond. If this contamination was due to only surface infiltration, the contaminant front would move downgradient only from the defined surface water course to which it was released.

Comment 6:

The groundwater contamination is only potential; transport is not demonstrated; and only infrequent monitoring is needed. (p. 5, item c)

Response:

At the time of RI sampling, groundwater west of the ponds exhibits levels of contamination. Leachable organic contamination is present within the 5/6 Pond, and the groundwater flows westward beneath the 5/6 Pond. Therefore, reference to potentially contaminated groundwater is appropriate. The observed elevated contamination in groundwater (especially east of the 5/6 Pond) and the westward groundwater movement strongly indicate the need for groundwater remediation, and therefore consideration of "no-action" alternative with infrequent long term monitoring as suggested by Velsicol is not appropriate.

Comment 7:

No compelling evidence indicates that the agricultural soil contamination came from the facility. (p. 6, item d)

Response:

The agricultural soil, especially at several contiguous locations west of the 5/6 Pond, had higher levels of pesticides than typically found in agricultural soils in central Illinois. In addition, these soils have non-pesticide contamination, as presented in Table 1-3 and Appendix A of the FS report. Therefore, Velsicol's conclusion that residuals in agricultural soils are the consequence of typical agricultural practices is not supported by the results of soil sampling.

Comment 8:

The lack of sediment samples downstream from the Velsicol property prevents adequate analysis of risk and invalidates the selected cleanup area. (p. 7, item e)

Response:

The RI clearly established that the sediments up to Velsicol's western property boundary are highly contaminated. The FS clearly states that

the extent of contamination further downstream from the Velsicol property needs to be assessed by sampling (Section 6.4, Page 6.23 of FS report). The ROD will address the need to sample creek sediments beyond Velsicol's property, as well as to establish local background pesticide levels. The results will be used to define the extent of sediment removal beyond the Velsicol property. The uncertainty surrounding sediment removal only affects the precise area to be restored which is a design function and not the general need to restore the creek.

Comment 9:

The pond area sediments are relatively clean. Only minute concentrations of contaminants were found. (p. 7, item f)

Response:

The purpose of pond sediment sampling was to determine the presence or absence of hazardous substances. Hazardous substances are confirmed to be present in pond sediments.

Comment 10A:

The chlordane found in fish samples probably came from agricultural samples. (p. 7, first part of item g)

Response:

The fish downstream of the Velsicol facility exhibited increased chlordane contamination compared to the chlordane concentration found in similar fish from the background location on the adjacent watershed.

Comment 10B:

The inability of the highly trained field team to catch many fish demonstrates the irrelevance of fish contamination. (p 7, second part of item g)

Response:

The general fish issue was addressed in the RI report, but the point regarding the field team's small catch merits special attention. A number of factors contribute to the fish yield. First, the seine net did not form an impassable barrier due to obstructions in the stream and depth of pools. Second, the crew seined only one pass over all locations in an eight hour sampling and processing event.

Comment 11:

The decommissioning of the manufacturing facility invalidates the assumptions of the abandonment scenario's risk assessment. (p. 8-9, item h)

Response:

This comment is addressed in response to comment 1.

Comment 12:

The effect of contaminated groundwater on surface water must be rigorously calculated. (p. 9-10, item i)

Response:

The technical obstacles to rigorous calculation of contaminant flux and the compelling reasons to expect contamination for the purposes of the FS were discussed previously in response to comment 3.

Comment 13A:

It is unreasonable to increase the assumed fish consumption from 3 to 7 pounds for risk assessment. (p. 10, first part of item j)

Response:

The standard mathematical modeling practice of sensitivity analysis requires that input variables (such as fish consumption) be varied to determine their influence on the output variables (such as risk). Consumption of seven pounds of fish by an individual during the period of one year is considered reasonable.

Comment 13B:

The fish in East Mill Creek are too small and too few for people to eat. (p. 11, second part of item j)

Response:

The fish size and quantity issues were discussed in response to comment 10B. It must be stressed that risk is calculated on an individual basis, and the quantity of fish that would be necessary to feed the entire local community is irrelevant.

Comment 13C:

Access to East Mill Creek is limited. (p. 12, third part of item j)

Response:

Easy access to the stream is available at bridges. The field crew, for instance, required no exceptional effort to reach the creek at the locations sampled. The presence of pop cans and fishermen's debris demonstrates that people do fish in the creek.

Comment 14:

Rigorous evaluation of contaminant flux from groundwater to the unnamed tributary is needed. (p. 12-13, item k)

Response:

The issue of transport of contaminants from groundwater to the tributary was previously addressed in response to comment 3. Risks have been identified only for fish consumption due to contaminated sediments in the unnamed tributary. No risks have been identified for surface water within the unnamed tributary although there is a theoretical contribution.

Comment 15:

Monitoring, not remediation is needed for groundwater from the site. (p. 13, item l)

Response:

Remediation and monitoring are required by CERCLA regulations, given the extent of contamination and potential transport in groundwater.

Comment 16:

The agency has no factual basis to assume that sediments west of the Velsicol property are contaminated. (p. 14, item m)

Response:

These issues were previously discussed in response to comment 8.

Comment 17:

Groundwater does not contaminate the creek. (p. 14, item n)

Response:

Groundwater recharges the unnamed tributary. Although the contamination is low at the present time, the contaminant movement through the groundwater and subsequent recharge of the unnamed tributary has the potential for significant contaminant release.

Comment 18:

The abandonment scenario is impossible. (p. 15, item o)

Response:

The contamination present in the plant area soil requires remediation regardless of abandonment scenario. If remedial action doesn't occur, and off-site surface water and on-site access is allowed, the abandonment scenario would be realized.

Comment 19:

The 2 and 4 Ponds are not demonstrated to contaminate groundwater or surface water. (p. 15, item p)

Response:

The pond sediments contain hazardous substances as does the water, and the bottom of the ponds are not lined. Contamination is observed immediately downgradient of the ponds. These factors taken together indicate that Ponds 2 and 4 have at a minimum the potential to release contaminants to the groundwater. The issue of adversely impacting human health and the environment on their own is not appropriate. As considered in the FS evaluation, the removal of pond sediments would eliminate this potential pathway.

Comment 20:

If barrier walls are eliminated in the technology screening, then they must be eliminated from the extraction system. (p. 16, item q)

Response:

The reference to barrier walls used in extraction system discussion in Table 3-4 is not correct. There is no barrier wall in the proposed extraction system.

Comment 21:

Groundwater need not be evaluated for collection and treatment/ disposal. (p 16, item r)

Response:

The need for groundwater treatment has been addressed in response to comment 6.

Comment 22:

Diversion should be carried forward to the detailed analysis of alternatives. (p. 16, item s)

Response:

This technology is commonly used as part of capping of the site and should not be considered an applicable technology by itself.

Comment 23:

Capping of the entire plant site is a reasonable technology to consider. (p. 17, item t)

Response:

Capping of the entire site, although possible, has not been considered due to the clear technical superiority and regulatory preference of consolidation of wastes in a single location. Also, the presence of an existing waste disposal unit requiring capping (the 5/6 Pond) provides a sound technical basis to consolidate and cap contaminated materials at a single location.

Comment 24:

In-situ stabilization of the plant soils and creek and pond sediments is a reasonable technology to consider. (p. 17, item u)

Response:

Stabilization is considered, but only after consolidation. Successful stabilization requires a homogeneous, intimate and complete mixture of soil with a stabilizing agent. Such a mixture is far easier to achieve in a compact reworked soil mass than in the spatially dispersed native state.

Comment 25:

Based on the preceding comments, the table for screening available remedial technologies should be revised. (p. 17, item v)

Response:

Based on the preceding responses, the table does not require revision.

Comment 26:

The FS states there are "no significant human health risks identified for the groundwater west of the impoundments." Therefore, there is no need to evaluate groundwater technologies. (p. 18, item w)

Response:

Actually, the FS states, "No present significant human health risks are identified for groundwater west of the impoundments. However, migration of contaminants from the ponds has been observed. The primary remediation action goal for groundwater will be to prevent recharge of contaminated groundwater to the unnamed tributary." (Emphasis added.)

Comment 27:

The Assembled Alternatives should include in-situ treatment and tributary realignment. (p. 18, item x)

Response:

In-situ treatment was, and should be, screened out at the preliminary screening as discussed earlier. Tributary realignment with in-situ capping of sediments in the unnamed tributary was carried through detailed evaluation of alternatives.

Comment 28:

Screening of soil and sediment must include in-situ treatment and diversion of the tributary. (p. 18, item y)

Response:

In-situ treatment was, and should be, screened out as discussed above. Diversion of the tributary with in-situ capping of the sediment was carried forward through detailed evaluation.

Comment 29:

COT criteria have been elevated to the level of ARAR's. Such an elevation is inconsistent with CERCLA guidelines (p. 19, item z)

Response:

The COT criteria[1] are not ARAR's but instead objectives to be considered. They are used because there are no federal standards or criteria for soil and sediment contamination remediation. The criteria are not arbitrary, but instead the result of an established

(1) Reference to COT soil/sediment objectives only

process within IEPA that develops site-specific objectives for all affected media. The criteria inherently receive peer review because they are the consensus of several offices within IEPA. Additionally, they have been reviewed and approved for use by USEPA through the FS process. The public has been given an opportunity to comment on the chemical specific cleanup objectives through the FS public comment process. Velsicol has been given that same opportunity, as well as advance review during the agency draft FS period. No specific comments have been received on the appropriateness of the established criteria or alternatives, therefore, no responses are necessary.

Comment 30:

The FS does not account for prior remedial activities in Areas 4 and 6 of the plant. (p. 20, item aa)

Response:

Prior remedial activities conducted by Velsicol in Areas 4 and 6 will be considered in soil removal from plant areas. This will be based on documentation provided by Velsicol on the exact location and extent of removal accomplished in these areas which has not been received at this time.

Comment 31:

Pesticides in agricultural soils probably came from agricultural chemicals. (p. 20, item bb)

Response:

This was discussed in response to comment 7.

Comment 32:

Additional creek sediment samples are needed to define the length of creek remediation. (p. 20, item cc)

Response:

The steps that will be taken to address this concern were previously addressed in response to comment 8.

Comment 33:

How were the COT criteria determined? (p. 21, item dd)

Response:

As stated in the FS, the multidisciplinary COT group considers "what must be protected..., whether there is an especially sensitive population to be protected, whether contamination in one medium may pose a problem in another medium, and whether there is enough information to propose cleanup objectives." Tables 6-7 of the FS explicitly state the "decision basis" for each criterion with a site-specific rationale provided in Appendix C.

Comment 34:

In-situ stabilization should be carried forward for further analysis. (p 21, item ee)

Response:

As previously discussed, in-situ stabilization of plant soils and pond/stream sediment was eliminated from detailed consideration, and therefore there is no need to identify the associated processes and costs.

Comment 35:

The cover design should be modified to include a less expensive mix of locally available materials. (p. 21-22, item ff)

Response:

It is acceptable to alter the precise composition of the multilayer cap to use inexpensive, locally available materials, provided that the impermeability of the cap and establishment of a protective vegetative cover is not changed. The revised cap design proposed by Velsicol will be considered and could be used instead of the "model" multilayer cap specified in the FS report if it is determined to be applicable.

Comment 36:

The groundwater treatment system requires bench-scale tests, a pretreatment system, air stripping, and possibly pretreatment for iron and manganese removal. Also, the FS makes no provision for monitoring and control. (p. 22-23, item gg)

Response:

The conceptual design for the FS determined by comparison of the level of contaminants present in groundwater with the clean up objectives, that the proposed treatment system utilizing activated carbon is adequate. Factory-assembled activated carbon units are

equipped with proper controls and monitoring instrumentation such as pressure gauges. Based on the contaminant levels and cleanup objectives, air stripping is not determined to necessary. Extracted groundwater is not likely to have high suspended solids warranting filtration prior to activated carbon absorption.

Comment 37:

No groundwater collection system should be built, but if one must be built, it should eliminate the proposed western French drain. The western drain would induce migration of contaminants from beneath the 5/6 Pond and contaminate the areas west of the pond. (p. 23, item hh)

Response:

The groundwater interception system does influence groundwater contaminant migration. It cannot be true, however, that the western trench can mobilize contaminants which are otherwise immobile. Like the eastern trench, the western trench only captures mobile, liquid-phase contaminants. It also cannot be true that the western trench could induce additional groundwater contamination west of the 5/6 Pond and the trench itself which would be located immediately adjacent to the waste unit, in an area already affected by contaminant migration. The trench would create a local groundwater divide, across which contaminants would not travel. As for the proposal to build a single trench only to the east of the 5/6 Pond, it has not been demonstrated by Velsicol at this time that the east trench could capture contaminants from the west side of the 5/6 Pond.

Comment 38:

FS cost estimates should show quantities and unit cost for each line item. Costs should reflect the local prices for local labor and materials rather than national averages. (p. 23-24, item ii)

Response:

At the remedial design stage it will indeed be necessary to show explicit quantities, unit costs, and local prices. For the FS stage, however, such an exercise would contribute little to the alternative screening process. The goal in the FS is to develop order-of-magnitude costs to assist in relative comparison of the alternatives. A refined cost analysis would not be necessary to achieve the goal of the FS.

Comment 39:

The Cleanup Objectives are not sufficiently documented, (p. 24, item jj)

Response:

Cleanup Objectives presented in Table 6-7 and 6-8 and the rationale in Appendix C are based on the evaluation of site contamination by the COT and CROPA groups within IEPA. The decision basis for each chemical is cited in these tables.

Comment 40:

Hazardous substances - not hazardous waste - is the proper term for the materials at the Velsicol site. (p. B1, item 1)

Response:

The more general term is hazardous substances. No determination has been made for the purposes of this CERCLA study if soil/sed. contamination would qualify as "hazardous waste". RCRA "Hazardous Wastes" have been utilized, generated and disposed of within the plant area.

Comment 41:

The proper reference to CERCLA is not Subpart F Section 300.66, but instead Section 300.68. (p. B2, item 2)

Response:

The comment is correct. Appendix B contains correction pages for the affected pages.

Comment 42:

Velsicol will no longer be a chlordane production facility, so references to active manufacture will not be correct. (p. B2, item 3)

Response:

At the time the FS was written, the facility was to remain open. It would require unnecessary expenditures of resources and time to retroactively prepare an altered FS to reflect the closing. Instead, this addendum, the ROD, and the remedial design will address the impact of the plant closing.

Comment 43:

Process wastes, not hazardous wastes, were stored in the ponds. (p. B3, Item 4)

Response:

The process wastes may or may not be hazardous wastes, but clearly are hazardous substances for the purposes of this CERCLA study.

Comment 44:

The word significant is an unduly vague description of soil contamination. (p. B3, item 5)

Response:

Table 1-3 of the FS contains quantitative measures of the extent of soil contamination.

Comment 45:

The 2 and 4 Ponds are not RCRA hazardous waste ponds, even if they have RCRA-compliant monitoring wells. (p. B3, item 6)

Response:

Regardless of whether the ponds are RCRA hazardous waste ponds, their monitoring system does conform to RCRA compliance monitoring requirements. The RCRA monitoring requirements are relevant and appropriate.

Comment 46:

The excavated soil will not contain hazardous waste, so it need not be stored in a RCRA cell. (p. B4, item 7)

Response:

The agency could offer arguments for classification of these soils as hazardous waste, but in any case, the RCRA requirements are relevant and appropriate, regardless of applicability.

Comment 47:

The soils are not hazardous waste, so RCRA land bans would not apply. (p. B4, item 8)

Response:

The reference to land ban restrictions is included as a consideration for acceptance of wastes by an off-site land disposal facility. Landfill operators may tend to be cautious in their interpretation of land ban regulations.

Comment 48:

The soils are not hazardous waste, so RCRA landfill groundwater monitoring requirements would not apply. (p. B4, item 9)

Response:

The RCRA requirements are relevant and appropriate.

Comment 49:

The soils are not hazardous waste, so RCRA landfill minimum technology requirements would not apply. (p. B5, item 10)

Response:

The RCRA requirements are relevant and appropriate.

Comment 50:

The soils are not hazardous waste, so RCRA landfill requirements would not apply. (p. B5, item 11)

Response:

Again, the RCRA requirements are relevant and appropriate for consideration of the new on-site cell.

Comment 51:

The soils are not hazardous waste, so RCRA landfill groundwater monitoring requirements would not apply. (p. B5, item 12)

Response:

Again, the RCRA requirements are relevant and appropriate and can be used as a basis for groundwater monitoring.

Comment 52:

The soils are not hazardous waste, so RCRA requirements would not apply. (p. B6, item 13)

Response:

This has been addressed previously in response to several comments. The RCRA requirements are relevant and appropriate.

Comment 53:

Regulatory uncertainty is no reason to view deep well injection unfavorably. (p. B6-B7, item 14)

Response:

Deep well injection has historically fallen under complex restrictions. Because the groundwater treatment scheme is envisioned to last at least 30 years, it is prudent to consider whether the implemented solution will remain feasible for many years into the future. More specifically in the near-term, there are concerns about the integrity of the existing injection wells at the Velsicol facility. If the wells are not secure, their regulatory acceptability for permitted operation could not be guaranteed.

Comment 54:

The words heavy and minor are vague. (p. B7, item 15)

Response:

Table 1-3 of the FS contains quantitative measures of soil contamination.

* *

Copies of this responsiveness summary were mailed in October 1988 to those who registered at the hearing, to all who sent in written comments and to anyone who requested a copy.

The following items are available for examination and review:

1. Copies of the Public Hearing Notice,
2. Proposed Project Plan,
3. Transcript of Hearing,
4. Public Hearing Attendance Record,
5. Hearing Record Exhibit List of all letters, documents and notices, and
6. All letters, documents and notices contained in the Hearing Record.

<u>For Further Information</u>

Questions about the hearing process and about access to exhibits should be directed to the IEPA Hearing Officer, John Williams, 217/782-5544.

Questions about the RI (Remedial Investigation), the FS (Feasibility Study) and the Proposed Plan should be directed to the IEPA Project Manager, Kurt Neibergall, 217/782-6760.

Copies of the transcript of the July 27, 1988, hearing can be purchased from Maninfior Reporting, 1612 Lafayette, Box 1036, Mattoon, Illinois 61938, or phone 800/346-2986.

Additional copies of this responsiveness summary are available from Bill Hammel, IEPA Community Relations, 217/782-5562.

Signed: [signature]
IEPA Project Manager

Signed: John D. Williams
Agency Hearing Officer

Date: September 26, 1988

Illinois Environmental Protection Agency
2200 Churchill Road
Post Office Box 19276
Springfield, Illinois 62794-9276
Phone: 217/782-3397

BH:bjh/sp/2666j/1,8

APPENDIX C

ADMINISTRATIVE RECORD

VELSICOL/MARSHALL, ILLINOIS SITE

APPENDIX C

ADMINISTRATIVE RECORD

As of September 21, 1988

The following list of documents were available for public inspection at the Superfund public repository located at the Marshall Public Library in Marshall and at the IEPA Community Relations Office in Springfield. Draft documents that were shared with Velsicol (responsible party) were also placed in the public repository. Draft documents in the repository were subsequently replaced with final documents.

TITLE	AUTHOR	DATE	PAGES
Various Background Articles		00/00/00	8
Site Maps		00/00/00	4
Site Inspection Report	CEMays - USEPA	82/09/07	14
Velsicol Chemical Site Visit June 17, 1983	MO Toole	83/06/27	1
Why Velsicol?	Greenpeace	84/00/00	2
Newsclip Series Marshall Independent	GGravemier	84/05/07-24	15
Review of Velsicol materials re Capping Program for 5/6 Pond	JPGibb - IENR	84/08/27	4
Preliminary Assessment	RLang - IEPA	84/09/20	28
Letter to W. Child - IEPA re: Review of Site Activities re 5/6 pond	JSBrown - Velsicol	84/10/03	9
Hydrogeologic Study Monitor Well Installation Velsicol Site Marshall, IL		85/00/00	113
Illinois Fish Contaminant Monitoring Program Memorandum of Agreement		85/05/00	38
Memo to file re: Velsicol - Technical Reports 4/16/85 Meeting	MNienkerk - IEPA	85/05/01	3

TITLE	AUTHOR	DATE	PAGES
Statement of Work for a RI/FS at Velsicol Chemical Corp. Attachment I	IEPA	85/05/10	31
Memo to file re: Agency Position regarding Disposal Water from IEPA Well Installation Activities at Velsicol	JFrank - IEPA	85/09/26	13
Newsclips from Marshall Independent	GGravemier	85/10/03	4
Personnel Safety Plan Velsicol Chemical Plant Revision 2	IEPA	85/10/28	96
Community Relations Plan with cover letter	BHammel - IEPA	85/10/29	19
Hydrogeological Work Plan RI/FS Velsicol Site	IEPA	85/11/01	16
Letter to WRadlinski-IEPA re: Approval of Site Safety Plan with minor changes	KDYeates - USEPA	85/11/05	2
Field Sampling Protocols		86/02/00	12
Newsclip from Marshall Independent		86/05/05	1
Press Release: Start of geophysical investigations	BHammel - IEPA	86/05/06	2
Geophysical Survey Report Velsicol Chemical	RFWeston, Inc.	86/06/00	200
Work/QA Plan Short Form Velsicol Chemical Corp.	RFWeston, Inc.	86/07/18	61
Health and Safety Plan for Velsicol Site	RFWeston, Inc.	86/07/25	129
Project Outline and Proposal Report for RI/FS at Velsicol Chemical, Marshall, IL	RFWeston, Inc.	86/07/30	66

TITLE	AUTHOR	DATE	PAGES
Preliminary Report for Velsicol, Marshall, IL	RFWeston, Inc.	86/07/30	108
Sampling and Analysis Plan Velsicol Chemical Corp. Marshall, IL	RFWeston, Inc.	86/10/00	54
QAPP Velsicol Chemical Corp. Marshall, IL Site	RFWeston, Inc.	87/01/08	196
Press Release: Start of phase II of environmental investigation	BHammel - IEPA	87/02/05	2
Chlordane Chemical Information Sheet	IEPA	87/03/00	2
Phase I Hydrogeological Memorandum for Velsicol Marshall Site	RFWeston, Inc.	87/04/09	185
QAPP Addendum for Air Sampling and Analysis Velsicol Chemical Corp. Marshall, IL Site	IEPA	87/06/00	22
Press Release: Final phase of environmental investigation	BHammel - IEPA	87/06/18	2
QAPP Addendum for Fish Sampling and Analysis Velsicol Chemical Corp. Marshall, IL Site	RFWeston, Inc.	87/07/24	82
Phase II Technical Memorandum for Velsicol, Marshall Site	RFWeston, Inc.	87/07/31	192
Mini-air QAPP	RFWeston, Inc.	87/08/25	31
Environmental Risk	USEPA	87/11/00	50
Fact Sheet #1 RI report	BHammel - IEPA	88/01/00	2
Press Release: RI Public Meeting	BHammel - IEPA	88/02/03	2
Remedial Investigation Report, Velsicol Site, Marshall, Illinois	RFWeston, Inc.	88/02/19	300

TITLE	AUTHOR	DATE	PAGES
Remedial Investigation Report, Velsicol Site, Appendices	RFWeston, Inc.	88/02/19	300
Request for Applicable, or Relevant and Appropriate Requirements for Remedial Alternatives, Velsicol Site, Marshall, Illinois	RFWeston, Inc.	88/03/03	42
Addendum to Remedial Investigation Report, Section 8, Velsicol Site, Marshall, Illinois	RFWeston, Inc.	88/03/10	60
Newsclips from Marshall Independent	GGravemier	88/06/16	2
Newsclip from Paris Beacon News	TBear	88/06/22	1
Newsclip from Casey Reporter	RHarrison	88/06/23	1
Fact Sheet #2 Proposed Plan	BHammel - IEPA	88/07/00	12
Proposed Plan	KNeibergall - IEPA	88/07/12	22
Public Comment Feasibility Study, Velsicol Site Marshall, Illinois	RFWeston, Inc.	88/07/15	165
Newsclip from Marshall Independent	GGravemier	88/07/18	2
Press Release: FS Public Hearing	BHammel - IEPA	88/07/19	2
Transcript of FS Hearing		88/07/27	58
Newsclip from Tribune Star	SLoughlin	88/07/28	1
Comments on RI from Conestoga-Rovers and Associates Limited with Responses from RFWeston, Inc., 9 documents, beginning January 12, 1988.		88/08/12	122

TITLE	AUTHOR	DATE	PAGES
Newsclip from Marshall Independent	RHarrison	88/07/28	2
Draft Statement of Work* RD/RA, Velsicol Plant Site Marshall, IL	CRA, Ltd.	88/08/29	36
Proposed Groundwater Collection Drain Design Calculations Velsicol Plant Site, Marshall, IL	CRA, Ltd.	88/08/29	23
Addendum to Public Comment Feasibility Study, Velsicol Site, Marshall, IL	RFWeston, Inc.	88/09/02	72
CRA Drain Design Evaluation* Velsicol/Marshall Site	RFWeston, Inc.	88/09/02	2
Final Statement of Work* RD/RA, Velsicol Plant Site Marshall, IL	CRA, Ltd.	88/09/12	38

*These documents are not in Marshall Repository but are available for inspection at IEPA (Springfield) and USEPA (Chicago).

WH:dls/2656j,sp

APPENDIX A

FIGURES AND TABLES
FOR
ROD DECISION SUMMARY

VELSICOL/MARSHALL, ILLINOIS SITE

WESTON

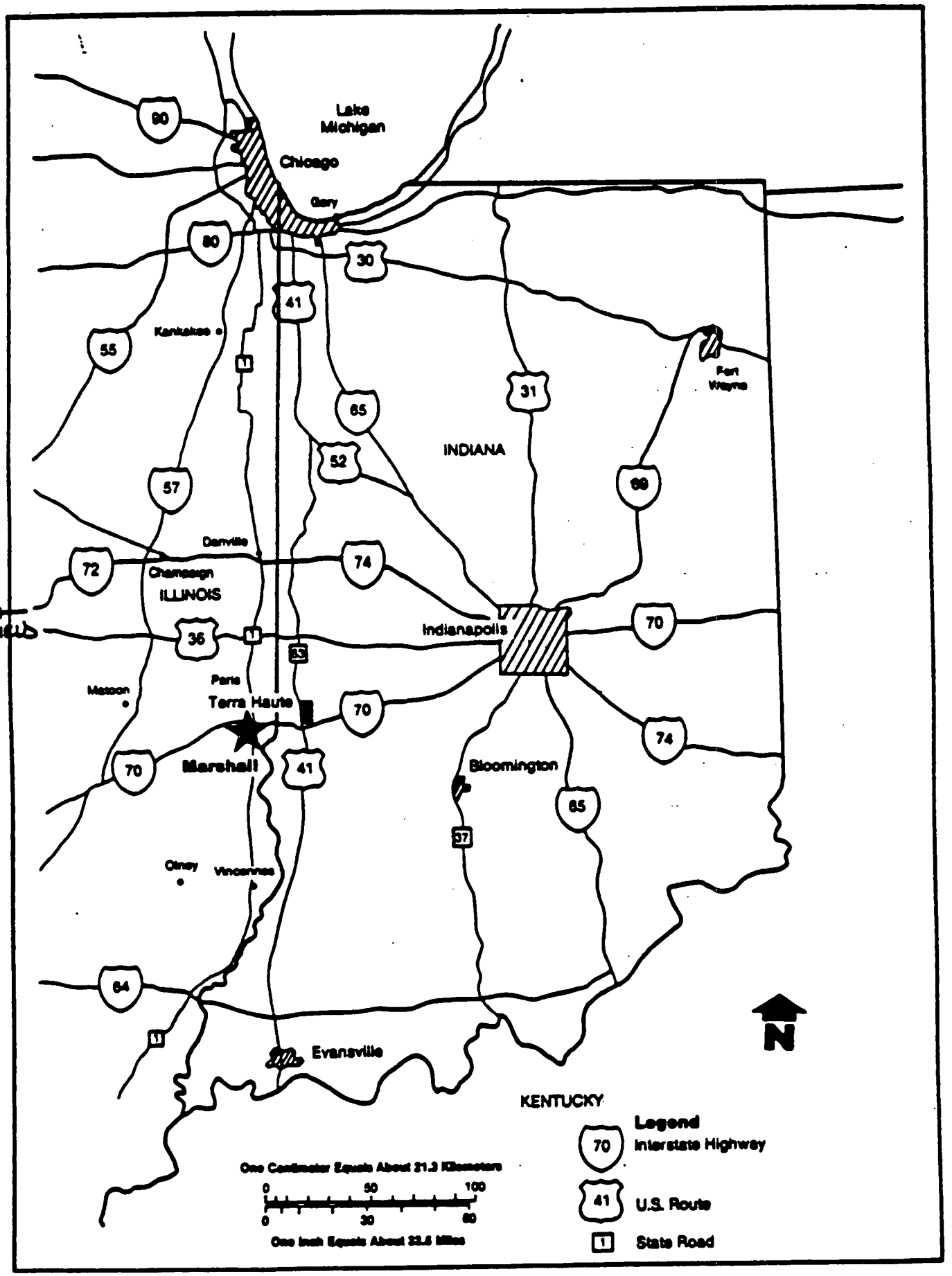


FIGURE 1 LOCATION MAP, VELSICOL CHEMICAL CORP., MARSHALL IL.

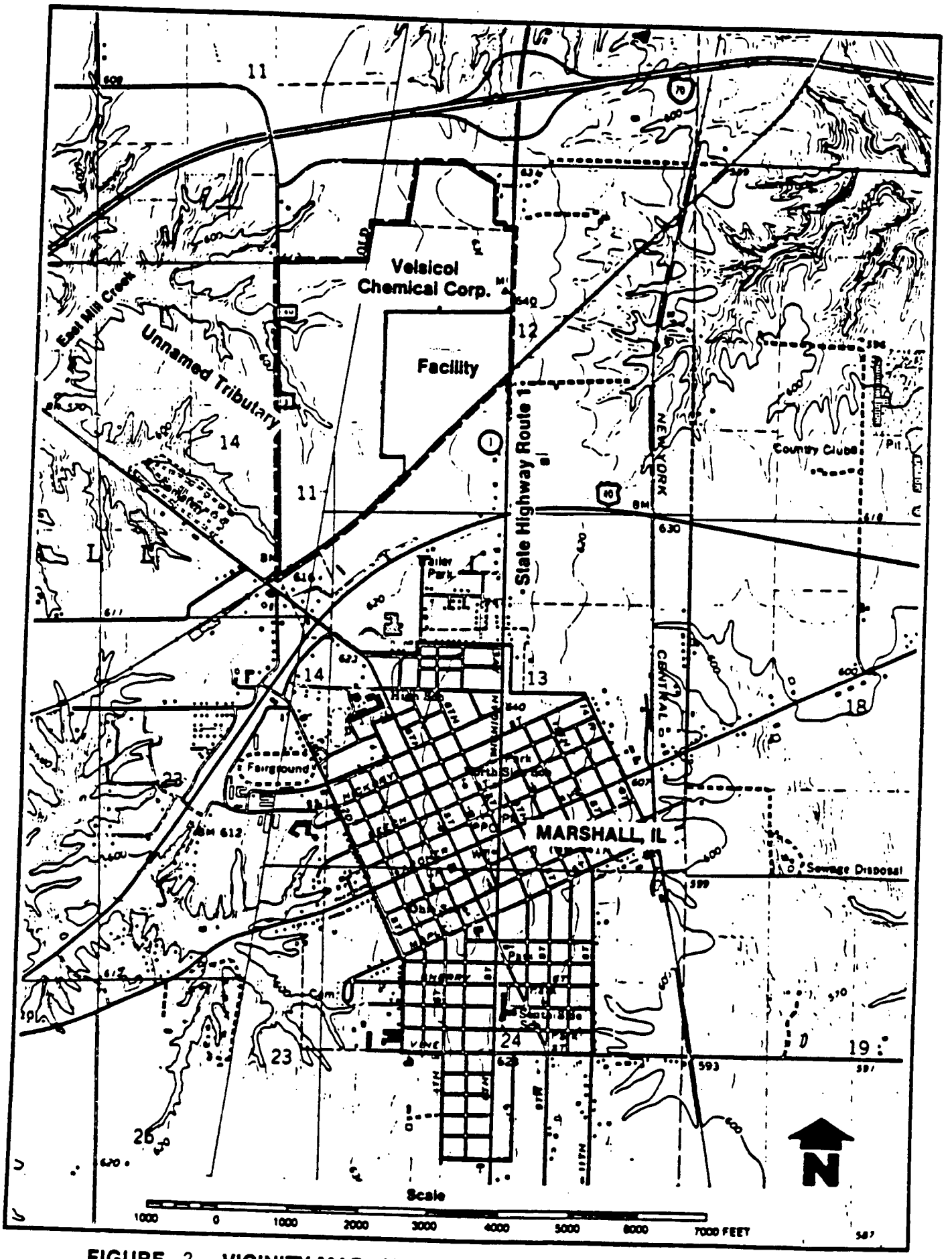


FIGURE 2 VICINITY MAP - VELSICOL CHEMICAL CORP., MARSHALL, IL

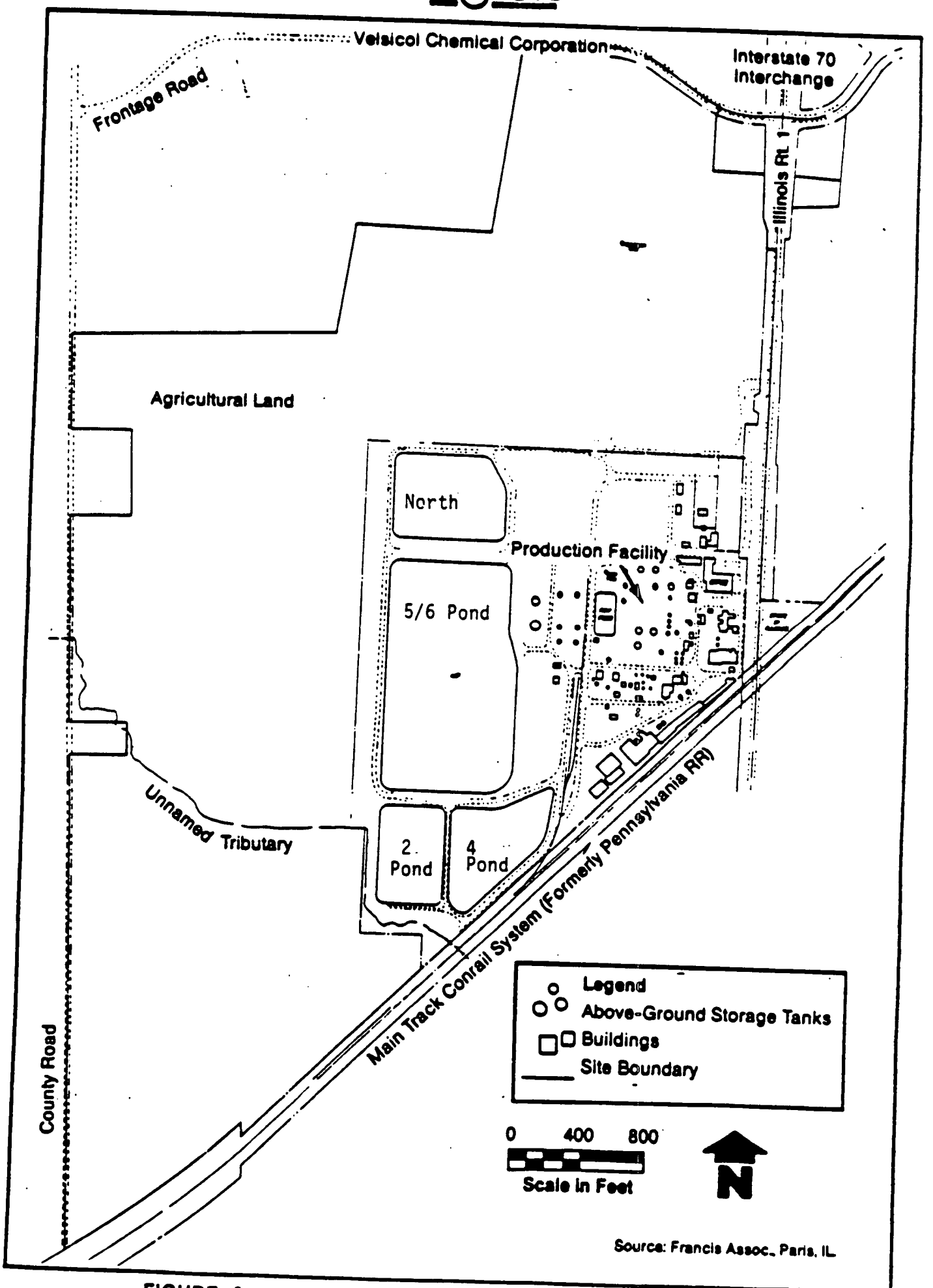
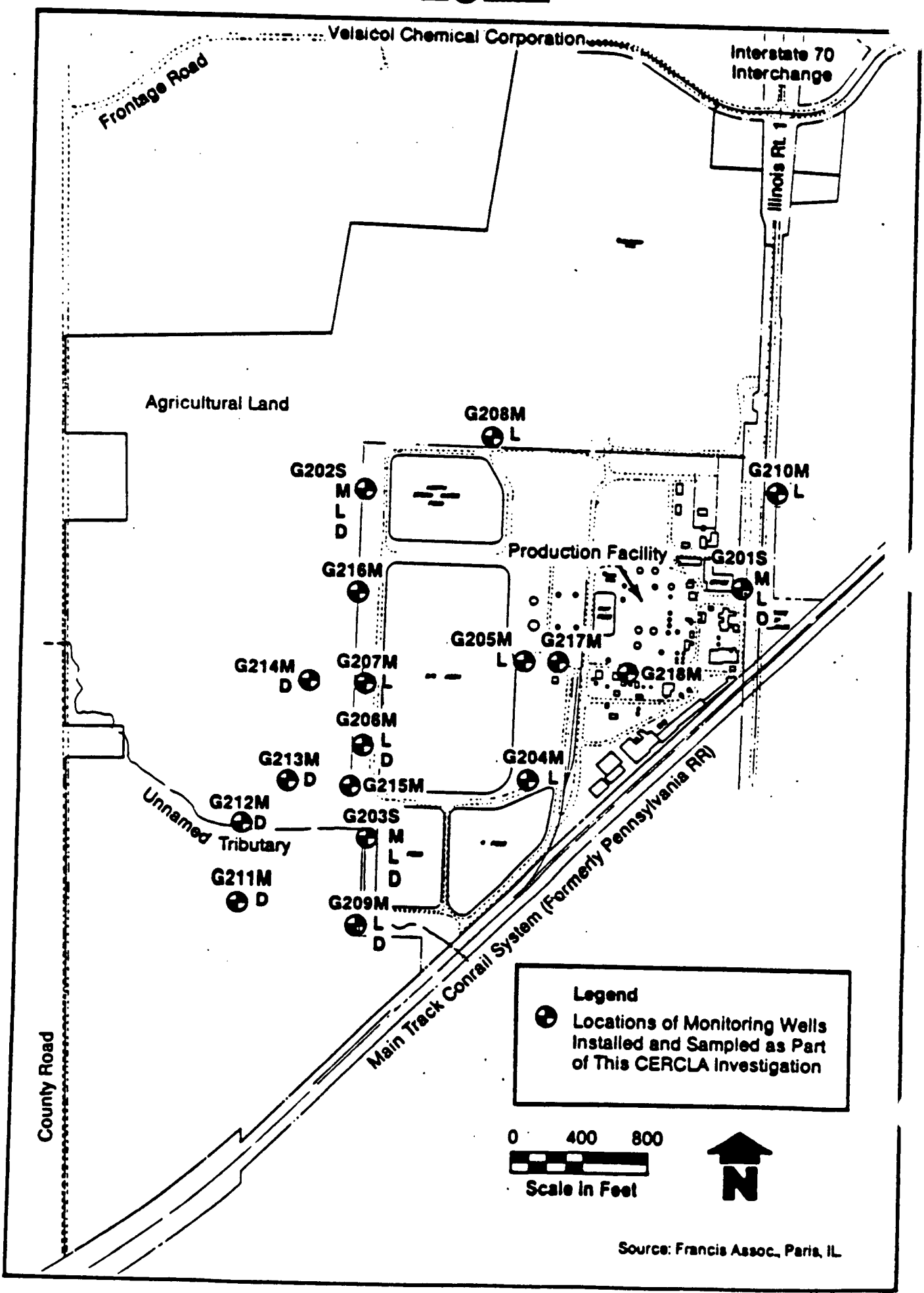


FIGURE 3 - SITE MAP VELSICOL CHEMICAL CORPORATION.


WESTON
Velsicol Chemical Corporation
Interstate 70 Interchange
Frontage Road
Illinois Rt. 1
Agricultural Land
G208M L
G202S M L D
G210M L
Production Facility
G201S M L D
G216M
G205M L
G217M
G214M D
G207M L
G218M
G206M L D
G213M D
G204M L
G215M
G212M D
G203S M L D
Unnamed Tributary
G211M D
G209M L D
Main Track Conrail System (Formerly Pennsylvania RR)
County Road
Legend
Locations of Monitoring Wells Installed and Sampled as Part of This CERCLA Investigation
0 400 800
Scale in Feet
N
Source: Francis Assoc., Paris, IL

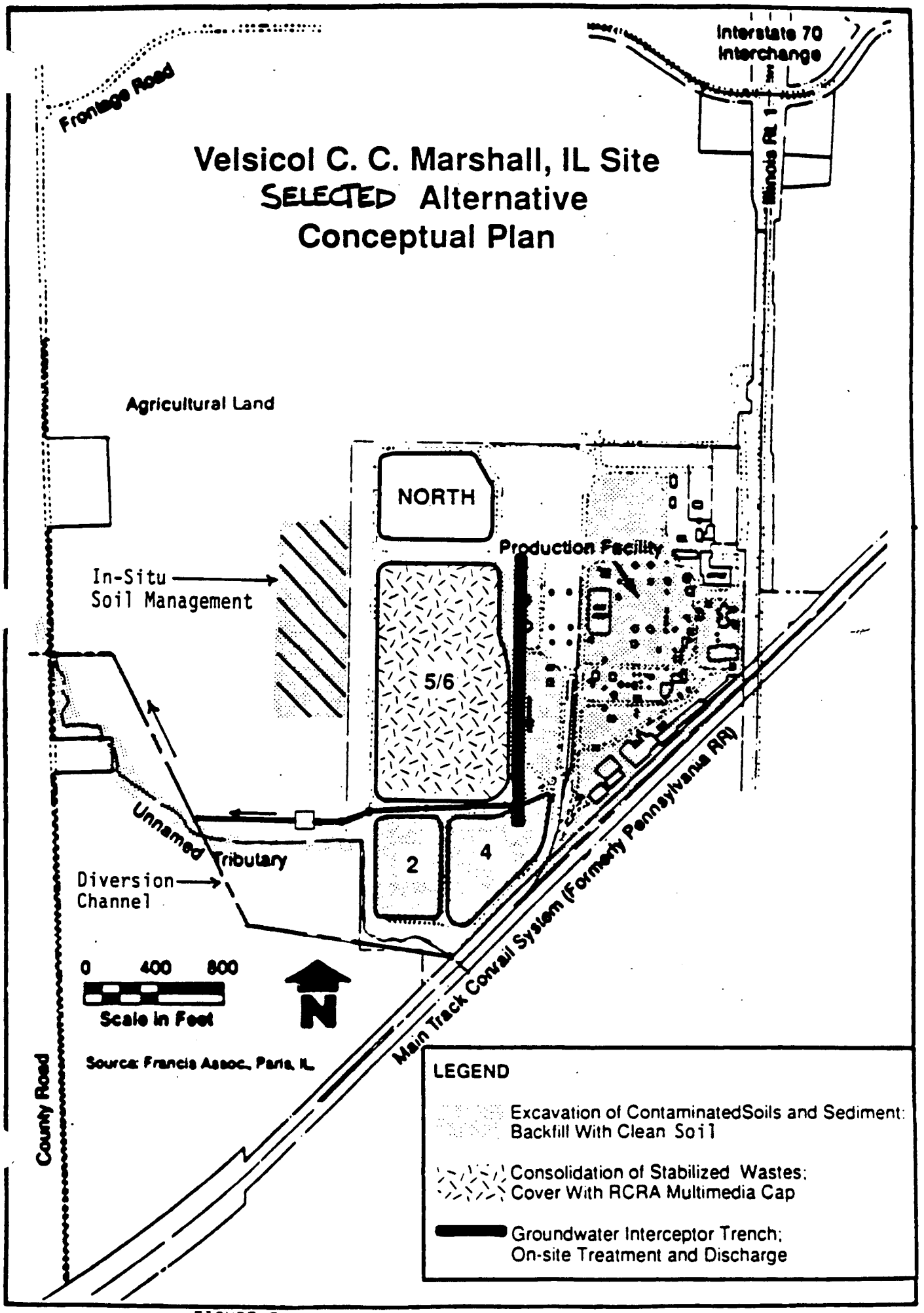

Velsicol C. C. Marshall, IL Site
SELECTED Alternative
Conceptual Plan
Interstate 70 Interchange
Frontage Road
Illinois Rt. 1
Agricultural Land
NORTH
Production Facility
In-Situ Soil Management
5/6
2
4
Unnamed Tributary
Diversion Channel
Main Track Conrail System (Formerly Pennsylvania RR)
County Road
0 400 800
Scale in Feet
N
Source: Francis Assoc., Paris, IL
LEGEND
Excavation of ContaminatedSoils and Sediment: Backfill With Clean Soil
Consolidation of Stabilized Wastes; Cover With RCRA Multimedia Cap
Groundwater Interceptor Trench; On-site Treatment and Discharge

FIGURE 5

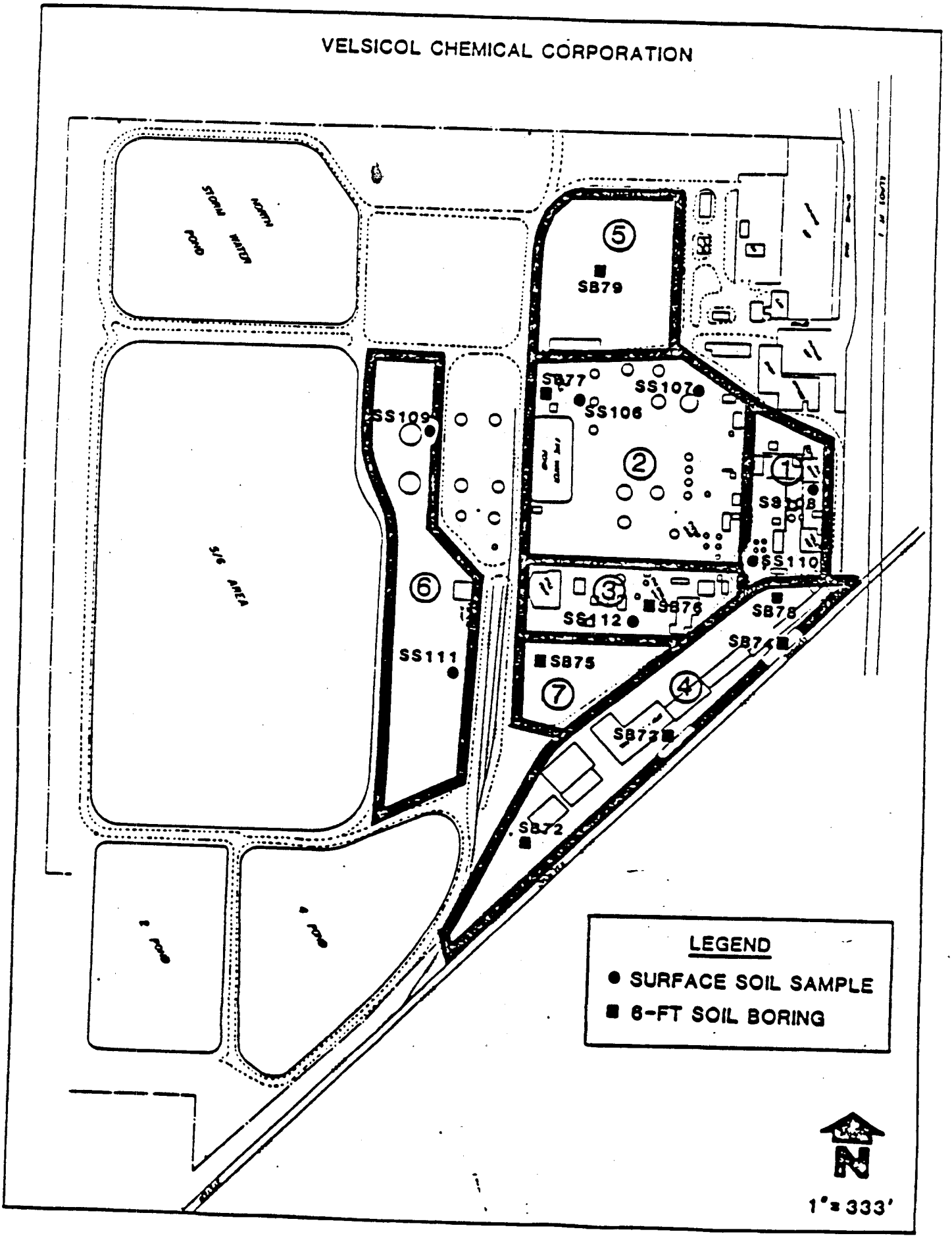


FIGURE 6 DIVISION OF PLANT AREA FOR SOILS REMOVAL

FIGURE 6 - EXPLANATION

DIVISION OF PLANT AREA SOILS

Section	Description	Sample Taken From Section
1	RMC Area	SS108, SS110
2	Central Production Area	SS106, SS107, SB77
3	Chlordane Production Area	SS112, SB76
4	Resin/Blending/Storage/Loading	SB72, SB73, SB74, SB78
5	Former RMC Storage Tanks	SB79
6	Dicyclo Storage and Former RMC Storage Area	SS109, SS111
7	BF_3 Area	SB75

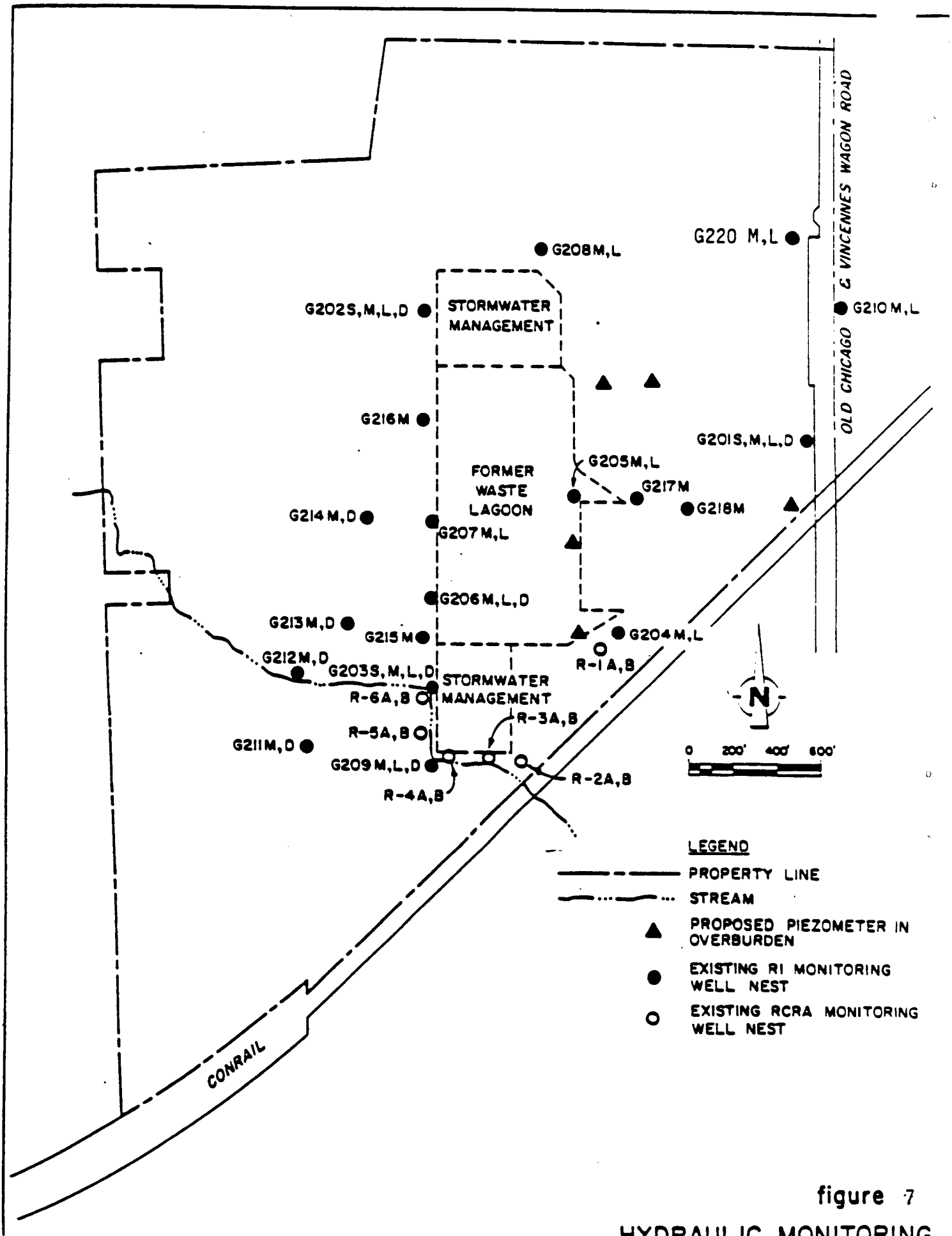


figure 7

HYDRAULIC MONITORING

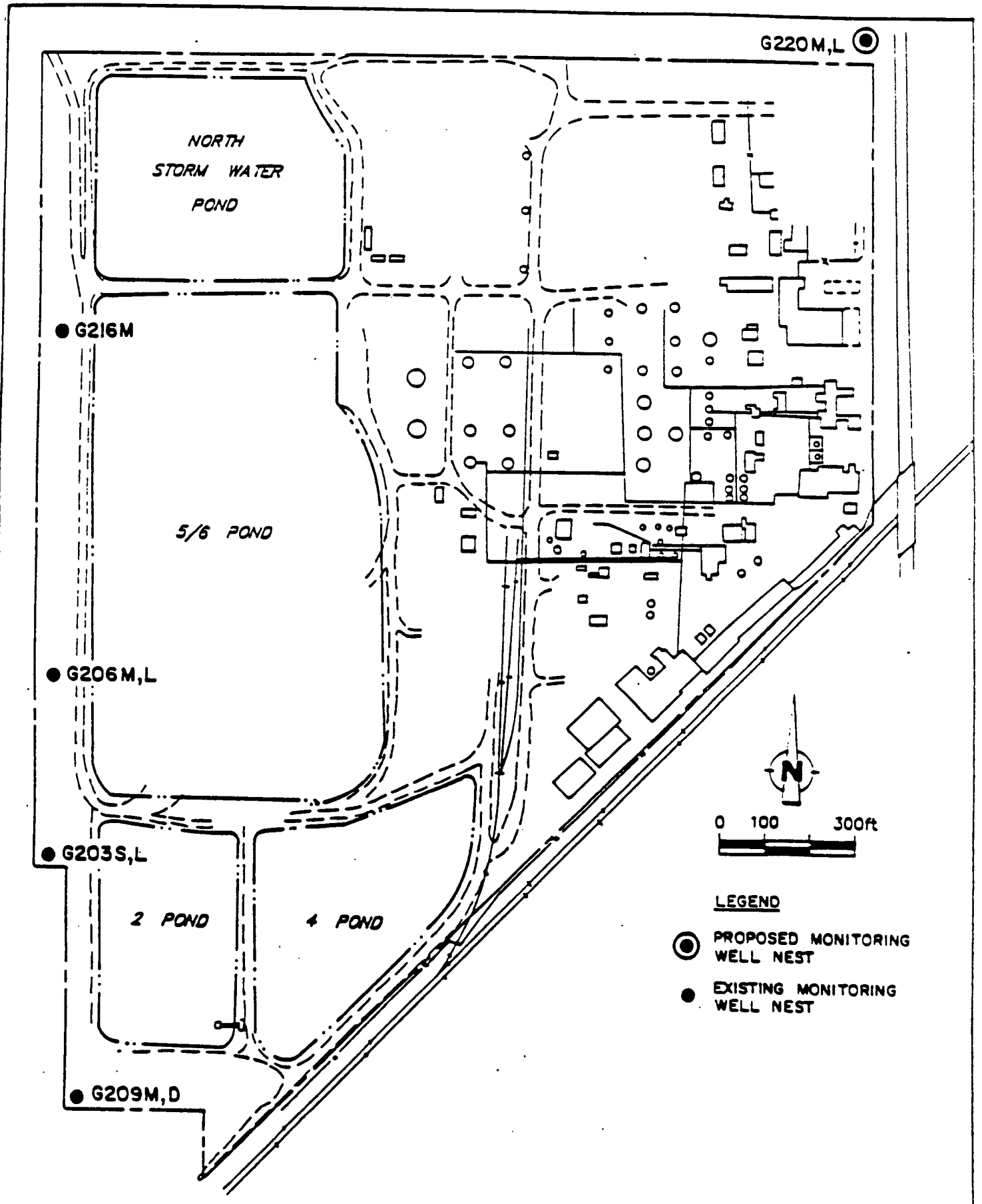


figure 3

WATER QUALITY MONITORING

TABLE 1

RANGE OF SELECTED CHEMICAL CONSTITUENTS
DETECTED AT THE VELSICOL SITE IN GROUNDWATER

	West of Plant Area*		Plant Area**	
	Shallow Wells	Deep Wells	Shallow Wells	Deep Wells
Volatile Organics	(ug/l)	(ug/l)	(ug/l)	(ug/l)
1,2-Dichloroethane	ND	ND	ND-15J	ND
1,2-Dichloroethane	ND	ND	ND-14J	ND
Benzene	ND-11	ND-2J	ND-280,000	ND-3.3J
Bromomethane	ND	ND	ND-67	ND
2-Butanone	ND	ND-66	ND-120	ND-210
Carbon Disulfide	ND	ND	ND-1300	ND
Carbon Tetrachloride	ND	ND-1J	ND-210,000	ND
Chlorobenzene	ND-2.8J	ND-2.1J	ND-1100	ND
Chloroform	ND-4.9	ND-6	ND-14,000	ND
Ethylbenzene	ND	ND	ND-1100	ND-1.1J
2-Hexanone	ND	ND	ND-130	ND
4-Methyl-2-pentanone	ND	ND	ND-470	ND
Styrene	ND	ND	ND-1800	ND
Toluene	ND-5.7	ND-2J	ND-12,000	ND-1.9J
Trichloroethylene	ND	ND	ND-6.8J	ND
Xylenes (Total)	ND	ND	ND-3000	ND
Semivolatile Organics				
Acenaphthene	ND	ND	ND-6J	ND
Benzo(a)pyrene	ND	ND	ND-2	ND
Benzoic Acid	ND	ND	ND-220J	ND
Benzyl Alcohol	ND	ND-12	ND-170	ND
Bis(2-ethyl hexyl)phthalate	ND-890(1)	ND-430(1)	ND-14J	ND-2J
Butylbenzylphthalate	ND-22	ND-25	ND-4J	ND-2.1J
Dibenzofuran	ND	ND	ND-3J	ND
1,2-Dichlorobenzene	ND	ND	ND-56	ND
1,3-Dichlorobenzene	ND	ND	ND-12	ND
1,4-Dichlorobenzene	ND	ND	ND-110	ND
2,4-Dimethylphenol	ND	ND	ND-4J	ND
Dimethylphthalate	ND-1J	ND	ND	ND-19
4,6-Dinitro-2-methylphenol	ND	ND-6	ND	ND
Di-n-Butylphthalate	ND-2J	ND-2J	ND-6J	ND
Di-n-octylphthalate	ND-9J	ND-15	ND-14	ND-21
Fluorene	ND	ND	ND-5J	ND
Hexachlorocyclopentadiene	ND	ND	ND-100	ND
Hexachloroethane	ND	ND	ND-13	ND
2-Methylnaphthalene	ND	ND	ND-1100	ND-2J
Isophorone	ND	ND	ND-220	ND-2J
Naphthalene	ND	ND-0.58J	ND-2200	ND-5J
Nitrobenzene	ND	ND	ND-40	ND

TABLE 1 (continued)

RANGE OF SELECTED CHEMICAL CONSTITUENTS
DETECTED AT THE VELSICOL SITE IN GROUNDWATER

	West of Plant Area*		Plant Area**	
	Shallow Wells	Deep Wells	Shallow Wells	Deep Wells
Semivolatile Organics	(ug/l)	(ug/l)	(ug/l)	(ug/l)
Pentachlorophenol	ND	ND	ND-3J	ND-2J
Phenanthrene	ND	ND	ND-6J	ND
Phenol	ND	ND	ND-610	ND
Pesticides				
Chlordane	NS	ND	ND-0.25J	ND-0.65
A-BHC	NS	ND	ND-9.7	ND
D-BHC	NS	0.18	ND-85	ND
Transnanochlor	ND	ND	ND	ND-0.23
Inorganics				
Antimony	ND	ND	ND	ND
Arsenic	ND-2.8	ND-25	ND	ND
Barium	ND-325	ND-192	ND-586	ND-51
Beryllium	ND-2.2	ND-3.1	ND-2.5	ND
Boron	ND-41,700	ND-455	ND-157	ND-179
Cadmium	ND-5.5	ND-3.0	ND	ND
Chromium	ND-18	ND-11	ND-15	ND-14
Cobalt	ND-0.6	ND-6.0	ND-60	ND
Copper	ND-32	ND-14	ND-12	ND-12
Lead	ND-13	ND-18	ND-7.7	ND
Mercury	ND-0.4	ND-0.3	ND-0.4	ND
Nickel	ND-9.9	ND-104	ND-300	ND-104
Selenium	ND-6.3	ND	ND	ND
Thallium	ND	ND-5.5	ND-2.0	ND
Vanadium	ND-14	ND-10	ND-13	ND-4.4
Zinc	ND-2160	ND-148	ND-114	ND-114

NOTE: *Groundwater monitoring wells west of the plant area include the following well locations: G202, G203, G206, G207, G209, G211, G212, G213, G214, G215 and G216.

**Groundwater monitoring wells in the plant area include the following locations: G201, G204, G205, G208, G210, G217 and G218.

NS - Not sampled.

ND - Not detected.

J - Value reported is greater than the instrument detection limit, but less than the required contract detection limit.

(1) G214M and D wells had high values only during one phase of sampling and was not detected during the other round of sampling. High values obtained may be due to sample contamination.

TABLE 2

RANGE OF SELECTED CHEMICAL CONSTITUENTS
DETECTED AT THE VELSICOL SITE IN SOILS

	Agricultural Land		Plant Area	
	0-1.5 ft	>1.5 ft	0-1.5 ft	>1.5 ft
Volatile Organics	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
Benzene	ND	1	ND-180,000	ND-5700
2-Butanone	ND	ND	ND-14J	ND-860J
Carbon Disulfide	ND	ND	ND-2J	ND-7
Ethylbenzene	ND	ND	ND-340,000	ND-5200
Tetrachloroethylene	ND	ND-1	ND	ND
Toluene	ND	ND-2.1	ND-710,000	ND-8800
Styrene	ND	ND	ND-180,000	ND-6600
Xylenes (Total)	ND	ND	ND-280,000	ND-4100
Semivolatile Organics				
Acenapthene	ND	ND	ND	ND-970
Acenapthylene	ND-67	ND	ND	ND-800
Anthracene	ND	ND	ND	ND-280J
Benzo(a)anthracene	ND	ND	ND	ND-190J
2-Chlorophenol	ND	ND	ND-82J	ND-82J
Di-Ethylphthalate	ND	ND	ND	ND-180J
Hexachlorobutadiene	ND	ND	ND	ND-87J
bis(2-ethylhexyl)phthalate	ND	ND	ND-220J	ND-4600
Butylbenzylphthalate	ND	ND	ND-280J	ND-230J
Chrysene	ND	ND	ND	ND-990J
Dibenzofuran	ND	ND	ND	ND-1500
Di-n-butylphthalate	ND-170	ND-130	ND-210J	ND-320J
Di-n-octylphthalate	ND	ND	ND-320J	ND-860
Fluoranthene	ND	ND	ND-81J	ND-140J
Fluorene	ND	ND	ND-52J	ND-3600
Hexachlorocyclopentadiene	ND	ND	ND	ND-1600
2-Methylnapthalene	ND-160	ND-79	ND-760	ND-30,0
2-Methylphenol	ND	ND	ND	ND-110J
Naphthalene	ND-300	ND-160	ND-120,000J	670-52K
N-Nitrosodiphenylamine	ND	ND-96	ND-200,000J	ND-42J
Phenanthrene	ND-200	ND-110	ND-370J	ND-10K
Phenol	ND	ND	ND	ND
Pyrene	ND-98	ND-57	ND-130J	ND-1[illegible]0

TABLE 2 (continued)

RANGE OF SELECTED CHEMICAL CONSTITUENTS
DETECTED AT THE VELSICOL SITE IN SOILS

	Agricultural Land		Plant Area	
	0-1.5 ft	>1.5 ft	0-1.5 ft	>1.5 ft
Pesticides	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)
Aldrin	ND-77	ND	ND	ND
Dieldrin	ND-110	ND-24	ND	ND
Chlordane	ND-760	ND-120	ND-69,000	ND-10,50
Heptachlor	ND-17	ND-18	ND-4300	ND-370
Heptachlor Epoxide	ND-56	ND-17	ND-1100	ND-240
Alpha Chlordane	ND-9.6	ND-13	720-4200	ND-6400
Gamma Chlordane	ND-25	ND-5.3	860-7200	ND-4500
Oxychlordane	ND-3J	ND	ND	ND
Cis-nanochlor	ND-93.J	ND-0.3J	ND-1000	ND-150J
Transnanochlor	ND-9.3	ND-16	280-4400	ND-1100
Polychlorinated Biphenyls (PCBs)				
None detected				
Inorganics	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Antimony	ND	ND	ND	ND
Arsenic	ND-6.6	ND-15	X	X
Barium	68-194	64-234	X	46-310
Beryllium	ND-0.9	ND-1.0	ND	ND
Boron	ND-64	ND-67	X	21-83
Cadmium	ND-6.3	0.3-11	X	1-7.2
Chromium	4.4-30	ND-41	X	ND-23
Cobalt	ND-28	ND-19	ND-8.9	ND
Copper	7.2-13	5-20	X	5.6-19
Lead	13-15	10-15	X	X
Mercury	ND-0.38	0.1-0.2	0.12-1.2	ND-0.42
Nickal	ND-21	3.7-22	X	9.6-25
Selenium	ND-2.4	2-4	ND	ND
Silver	ND	ND	ND	ND
Thallium	ND	0.3-0.5	ND	ND
Vanadium	13-47	24-44	X	16-49
Zinc	20-54	16-61	X	40-125

K - Multiply the results by 1,000.
ND - Not detected.
J - Value reported is greater than the instrument detection limit but less than required contract detection limit.
X - Results are invalid due to spike and duplicate analyses not within control limits.

TABLE 3

RANGE OF SELECTED CHEMICAL CONSTITUENTS
DETECTED AT THE VELSICOL SITE IN
POND WATER AND SEDIMENTS

	Pond 2		Pond 4	
	Water	Sediment	Water	Sediment
Volatile Organics	(ug/l)	(ug/kg)	(ug/l)	(ug/kg)
Benzene	8.2-8.8	110	ND	3J-7J
Carbon Disulfide	ND	ND	ND	ND-25
Chloroform	1.1J-1.2J	ND	ND	ND
Ethylbenzene	ND	120	ND	ND
Toluene	4-4.2	ND	ND	ND
Xylenes (Total)	ND	350	ND	ND
Semivolatile Organics				
Acenapthene	ND	380J	ND	ND
Bis(2-ethylhexyl)phthalate	1J-4J	ND	ND	ND-71J
Chrysene	ND	ND	ND	ND-55J
Di-n-butylphthalate	ND	ND	ND	41J-48J
Fluoranthene	ND	ND	ND	38J-51J
Fluorene	ND	760J	ND	ND-53J
2-Methylnaphthalene	ND	4600	ND	ND-220J
Naphthalene	ND	15000	ND	440J-920
Phenanthrene	ND	1400	ND	96J-170J
Phenol	ND	ND	ND	ND
Pyrene	ND	340	ND	83-110
Pesticides				
Chlordane	45-50	24,000J	ND	ND
Inorganics	(mg/l)	(mg/kg)	(mg/l)	(mg/kg)
Arsenic	ND	ND	ND	7.5
Barium	ND	143	ND	170
Beryllium	ND	ND	ND	ND
Boron	337-346	ND	502	45
Chromium	53	ND	37	ND
Cobalt	ND	ND	ND	ND

TABLE 3 (continued)

RANGE OF SELECTED CHEMICAL CONSTITUENTS
DETECTED AT THE VELSICOL SITE IN
POND WATER AND SEDIMENTS

	Pond 2		Pond 4	
Inorganics	Water (ug/l)	Sediment (ug/kg)	Water (ug/l)	Sediment (ug/kg)
Copper	ND	19	ND	14
Lead	ND	30	ND	ND
Mercury	ND	ND	ND	ND
Nickel	ND	ND	ND	25
Selenium	ND	ND	ND	ND
Silver	ND	ND	ND	ND
Thallium	ND	ND	ND	ND
Zinc	ND-31	76	ND	ND

ND - Not detected.
J - Value reported is greater than the instrument detection limit but less than the required contract detection limit.

TABLE 4

RANGE OF SELECTED CHEMICAL CONSTITUENTS
DETECTED AT THE VELSICOL SITE IN UNNAMED CREEK
WATER AND SEDIMENTS

	Creek Water (ug/l)	Background (ug/l)*	Sediment (ug/kg)	Background (ug/kg)**
Volatile Organics				
Carbon Disulfide	ND	ND	2J-9J	ND
Ethylbenzene	ND	ND	2J-48	ND
Styrene	ND	ND	ND-98	ND
Toluene	ND	ND	ND-5.9J	2J
Tetrachloroethene	ND	ND	ND	2J
Xylenes (Total)	ND	ND	ND-100	ND
Semivolatile Organics				
Acenapthene	ND	ND	210J-4600	ND
Anthracene	ND	ND	53J-560	ND
Benzo(a)anthracene	ND	ND	53J-560	ND
Benzo(b)fluoranthene	ND	ND	72J-180J	56J-100
Bis(2-ethylhexyl)phthalate	ND-41	ND-18	ND-310	ND-110J
Chrysene	ND	ND	ND-97J	ND-38J
Dibenzofuran	ND	ND	ND-250J	ND
Di-n-butylphthalate	ND-132	ND	1J-132	110J-31(
Di-n-octylphthalate	ND-2J	ND	ND-45J	ND-56J
Fluoranthene	ND	ND	ND-280J	ND-82J
Fluorene	ND	ND	ND-4300	ND
2-Methylphenol	ND	ND	ND-910	ND
Naphthalene	ND	ND	ND-99K	ND
N-Nitrosodiphenylamine	ND-4J	ND-3J	ND-750	52J-92J
Pentachlorophenol	ND-5J	ND	ND	ND
Phenanthrene	ND	ND	ND-5500	ND
Phenol	ND-51	ND	ND	ND
Pyrene	ND-1J	ND	ND-2300	ND
Pesticides				
Chlordane	ND	ND	ND-250,000	350-635

TABLE 4 (Continued)

RANGE OF SELECTED CHEMICAL CONSTITUENTS
DETECTED AT THE VELSICOL SITE IN UNNAMED CREEK
WATER AND SEDIMENTS

Inorganics	Creek Water (ug/l)	Background (ug/l)*	Sediment (mg/kg)	Background (mg/kg)**
Antimony	ND	ND	ND	ND
Arsenic	ND	ND	ND-11	ND
Barium	ND-130J	ND	42-196	111-196
Beryllium	ND	ND	ND	ND-1.3
Boron	ND-561	ND	ND-80	ND-60
Cadmium	ND	ND	3.9-11	ND-9.2
Chromium	ND	ND	ND-31	ND
Cobalt	ND	ND	ND-32	ND-9.3
Copper	ND	ND	6.5-20	9.7-24
Lead	ND-4.6J	ND-3.2J	ND-21	ND
Mercury	ND-0.21	ND-0.26	ND-0.13	ND
Nickel	ND	ND	ND-42	12-26
Selenium	ND	ND	ND	ND
Silver	ND	ND-10	ND-1.5	ND
Thallium	ND	ND	ND	ND
Vanadium	ND	ND	10-49	34-210
Zinc	ND-123	21-53	ND-105	58-82

ND - Not detected.
J - Value reported is greater than the instrument detection limit but less than the required contract detection limit.
* - Upstream of Velsicol site (sample SW80).
** - Upstream of Velsicol site (sample SD93).
K - Multiply the results by 1000.

TABLE 5.

POTENTIAL EXPOSURE PATHWAYS
VELSICOL SITE

Contaminant Source	Contaminant Release	Contaminant Transport	Exposure Point	Exposure Route	Exposed Population
Contaminated sediments	Sediments to water column	Creek water	Unnamed tributary	Absorption/ingestion	Swimmers and children wading in creek
	Sediments to water column	Fish	Unnamed tributary	Ingestion/bioconcentration	Aquatic organisms and people who consume fish
Contaminated soils	Direct contact	Trespassers	On site	Ingestion/dermal absorption	Trespassers and other future site users
	Wind or mechanical erosion	Air	On site	Inhalation	Trespassers and other site users
	Run-Off	Solubilized in water and suspended in water	Unnamed tributary	Ingestion/bioconcentration	Aquatic organisms and people who consume fish