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Office of
Emergency and
Remedial Response

EPA/ROD/R05-85/026
September 1985

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Superfund Record of Decision:

Acme Solvents, IL

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16. ABSTRACT

The Acme Solvents Reclaiming, Inc. facility is located approximately five miles south of Rockford, Illinois. From 1960 until 1973, the facility served as a disposal site for paints, oils and still bottoms from the solvent reclamation plant located in Rockford. In addition, empty drums were stored onsite. Wastes were dumped into depressions created from either previous quarrying activities or by scraping overburden from the near surface bedrock to form berms. In September 1972, the Illinois Pollution Control Board (IPCB) ordered Acme to remove all drums and wastes from the facility and to backfill the lagoons. Follow-up inspections revealed that wastes and crushed drums were being left onsite and merely covered with soil. Sampling of the site revealed high concentrations of chlorinated organics in the drinking water. The major source of hazardous substances at the facility are the waste disposal mounds. These mounds contain volatile and semi-volatile organic compounds and concentrations of PCBs up to several hundred mg/kg.

The selected remedial action includes: a provision for an interim alternate water supply to affected residences by installation of home carbon treatment units; excavation and incineration of waste materials and contaminated soils, with disposition of non-incinerable wastes to an offsite RCRA landfill; continued investigation of bedrock contamination and remediation; continued investigation of contaminated ground water;
(continued on separate page)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Acme Solvents, IL Contaminated Media: gw, soil Key contaminants: VOCs, PCBs, vinyl chloride, TCE, inorganics		

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and performance of pump tests to evaluate the effectivenss and cost of plume control. Estimated capital costs will be determined during the design phase once an incineration technology has been selected.

REMEDIAL ALTERNATIVE SELECTION

SITE

Acme Solvents Reclaiming Incorporated, Site, Morristown, Illinois

Documents Reviewed

The following documents which describe the physical characteristics of the Acme Solvents Reclaiming, Inc., Facility and which analyze the cost-effectiveness of various remedial alternatives have been reviewed by U.S. EPA and form the basis for this Record of Decision (ROD).

- Field Investigation Team Report, March 1983
- Acme Solvents Remedial Investigation Report, November 1984
- Acme Solvents Feasibility Study, February 1985
- Review of RI/FS work on the ACME Solvents Site, June 1985
- Summary of the Remedial Alternative Selection
- Community Relations Responsiveness Summary

Description of Selected Remedy

The selected remedy consists of the following major components:

- Provision of an interim alternate water supply to affected residences by installation of home carbon treatment units
- Excavation and incineration of waste materials and contaminated soils, with disposition of non-incinerable wastes to an off-site RCRA approved hazardous waste landfill
- Continued investigation of bedrock contamination and feasibility work to analyze the effectiveness of bedrock remediation
- Continued investigation of contaminated ground water and performance of pump tests to evaluate the effectiveness and cost of plume control

Cost

The estimated cost of the above actions will not exceed a present worth cost of $24.0 million as itemized in the attached Summary of Remedial Alternative Selection.

Declarations

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (NCP) (40 CFR Part 300 et. seq., 47 Federal Register 31180, July 16, 1982), I have determined that incineration of hazardous materials, disposal of non-incinerable hazardous wastes at a licensed landfill and installation of home carbon treatment units for the affected residents is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. As part of this decision, bedrock grouting will be analyzed for its effectiveness in blocking the migration of contaminants located in the bedrock, the effectiveness of ground water plume control will be evaluated and further ground water monitoring will be conducted. The results of this feasibility work will serve as a basis for a future Record of Decision regarding final remediation of the bedrock and ground water. The State of Illinois has been consulted and agrees with this remedy.

The action will require future operation and maintenance (O/M) activities which will be funded by the State of Illinois. EPA will fund 90% of the O/M cost for the remedial actions approved in this ROD for one year.

I have also determined that the actions decribed herein are cost-effective when compared to other remedial actions reviewed in accordance with the National Contingency Plan, and is appropriate when balanced against the availability of Trust Fund monies. Additionally, in the event that a small quantity of soils and drums or other hazardous materials are not incinerable, the off-site transport and secure disposition of a relatively small amount of waste has been evaluated as cost-effective in the feasibility study cited in this ROD.

Sept. 27, 1985
Date

Alan Levin (Acting)
Valdas V. Adamkus
Regional Administrator

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

ACME SOLVENTS RECLAIMING, INCORPORATED MORRISTOWN, ILLINOIS

SITE LOCATION AND DESCRIPTION

The Acme Solvents Reclaiming, Inc. Facility is located approximately five miles south of Rockford, Illinois near Morristown, in Winnebago County, Illinois (Figure 1). The approximately twenty acre parcel is located in an area of broad, rolling uplands that exhibit 10 to 200 feet of relief and is drained by the Rock River and its triburaries. The surrounding land use consists of agriculture, quarries, and low density single family residences.

The access road to the site is adjacent to a private residence. However, the waste deposits are nearly one quarter of a mile from the nearest residence. A substantial number of homes exist on Lindenwood, Edson, and Baxter Roads (Figure 2). Horses graze in the pasture immediately south of the facility.

An intermittent stream runs south of the site and cuts across the access road. This stream is a tributary to Killbuck Creek which in turn empties into the Kishwaukee River which shortly thereafter empties into the Rock River. With the exception of the Rock River, surface waters downstream from the facility are not used as a public water supply.

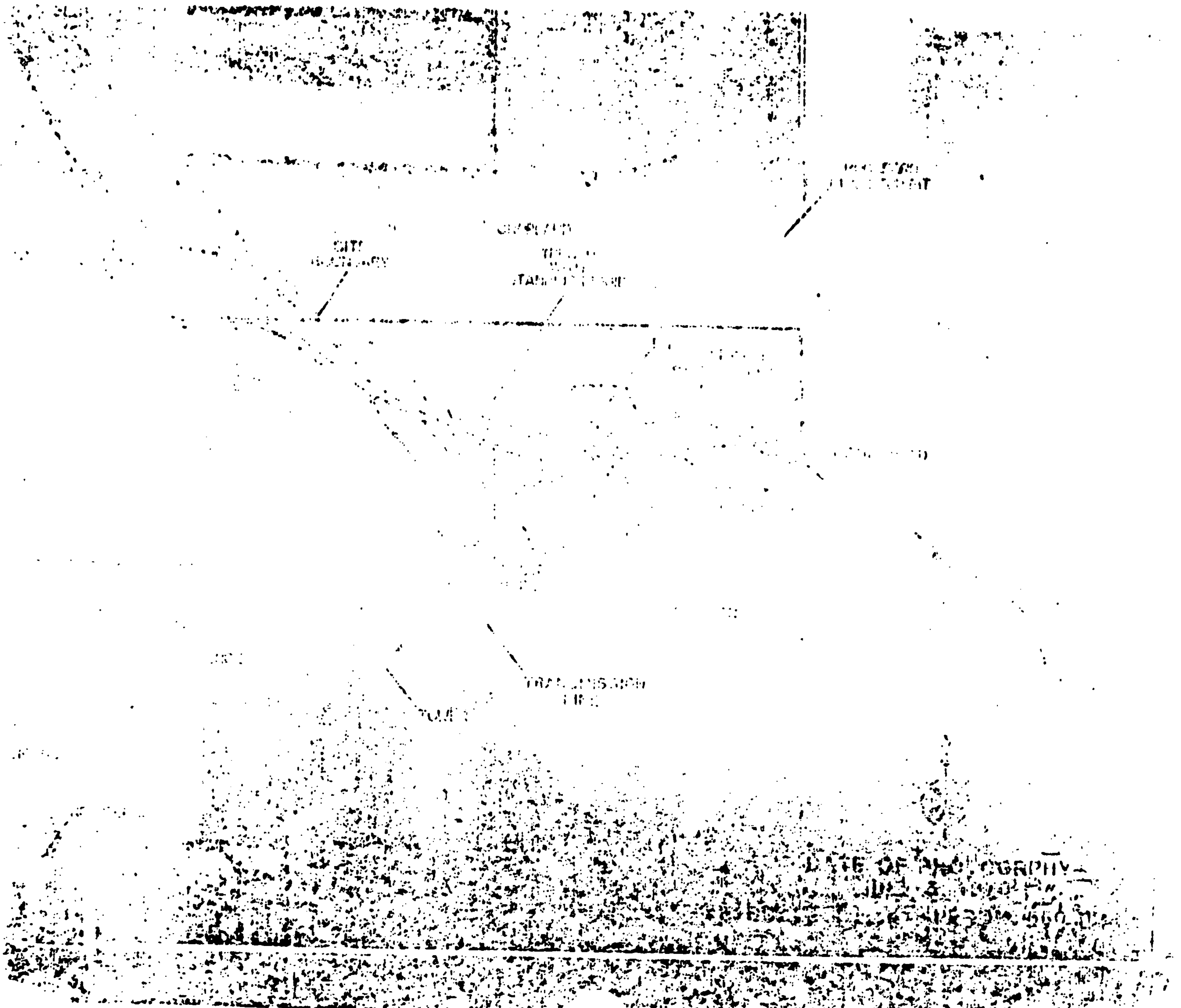
Directly beneath the site, and even exposed at some locations, is the Galena-Platteville Dolomite. This formation is extensively used for private domestic water supply wells. Regionally, the Galena-Platteville is hydrologically connected to the lower more productive aquifers that are used for public and industrial water supplies. Therefore, the lower aquifer is also endangered by the contamination migrating from the Acme facility.

SITE HISTORY

Acme Solvents Reclaiming, Inc. operated the facility from 1960 to 1973. The facility served as a disposal site for paints, oils and still bottoms from the solvent reclamation plant located in Rockford, Illinois. In addition, empty drums were also stored on site. Wastes were dumped into depressions that were created from previous quarrying activity or by scraping overburden from the near surface bedrock to form berms.

In September of 1972, the Illinois Pollution Control Board (IPCB) ordered Acme to remove all drums and wastes from the facility and to backfill the lagoons after such waste removal. Follow-up inspections subsequent to this Order revealed that the wastes and crushed drums were being left on-site and merely covered with soil.

Releases from the facility were first documented when nearby residents experienced a sulphide-like smell emanating from their drinking water which was obtained from private wells. Sampling and analyses revealed high concentrations of chlorinated organics in the drinking water. The concentration of some of these chemicals in four of the private wells exceeded available health advisories set by the U.S. Environmental Protection Agency (USEPA) Office of Drinking Water. The IEPA recommended these wells not be used. An alternate water supply (bottled water) has been supplied since 1981 by the owner of Pagel's Pit Landfill which is located



ACME

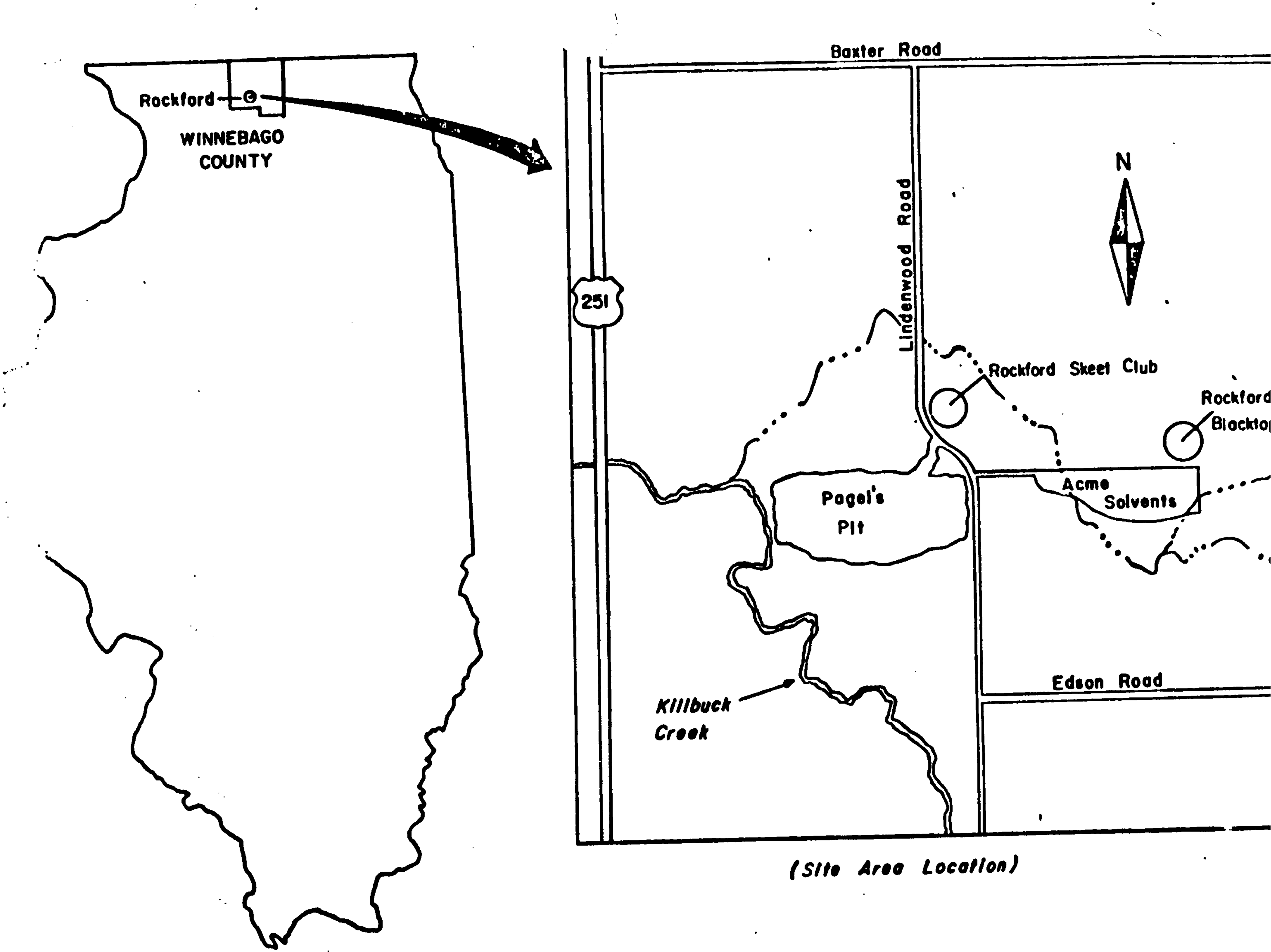


FIGURE 1. Site Location Map for Acme Solvents Reclaiming Inc. ● Not drawn to scale

across the street from Acme. Pagel's Pit was included on the second proposed update to the NPL due to potential and measureable ground water contamination. The relationship between Acme Solvents and Pagel's Pit in regard to the ground water contamination in the area in not fully understood. However, the Acme Solvents Remedial Investigation states that there appears to be two distinct plumes.

CURRENT SITE STATUS

The major source of hazardous substances at the facility are the waste disposal mounds (i.e., covered lagoons and drums). The primary waste deposits are shown in Figure 2. These waste disposal mounds contain volatile and semi-volatile organic compounds in concentrations ranging up to several thousand milligrams per kilogram (mg/kg) and concentrations of PCB up to several hundred mg/kg. Materials with flash points as low as 25°C were found in some locations within the mounds. In addition, concentrations of arsenic, lead, cadmium and chromium above background levels were detected within the upper two feet of surface soil. The total volume of the contaminated materials is estimated to be approximately 26,000 cubic yards, if cleanup to background were implemented. This estimated volume was based on contamination measured during the remedial investigations in the area, depth to bedrock, extent of disturbed soil and height of mounds. Drummed materials are included in this volume estimate. Based upon inspection reports prepared by the IEPA, both when the facility was in operation and when it had been closed, most drums were empty and were crushed prior to burial. There is no readily apparent pattern to the type, concentration, or distribution of chemicals in the surface mounds. A summary of concentration data for chemicals found in the test pit samples is presented in Table 1 in the Appendix.

The type and concentration of the contaminants as described above pose a high hazard to any person who would make direct contact with the buried wastes. Continued weathering of the earthen mounds covering the buried wastes increases the chances of exposure and promotes the spread of contamination overland and into the nearby creek. In a few places the wastes are actually exposed. Typically, the contaminants exhibit a hazard potential as little as two feet beneath the surface of the mounds. This hazard is expected to increase sharply with depth into the mounds. The waste material, then, acts as a constant source for ground water contamination in the Galena/Platteville aquifer and eliminates any utility of the facility for the future. This contamination, if left unremediated can only further degrade the environment.

The highly permeable soils and weathered dolomite bedrock directly underlying the waste disposal mounds are likely to contain high concentrations of chemical contaminants due to downward percolation of contaminated aqueous leachate and organic solvents. The depth of contamination in the unsaturated zone in the bedrock is not documented, but likely extends to the water table, as has been indicated by the nearest monitoring well which has shown concentrations of contaminants known to have been deposited at the Acme Facility of several parts per million. Because of varying topography the depth to groundwater varies but is generally 25 feet. Therefore, the soil above the bedrock, and bedrock itself are contaminated to groundwater. The general horizontal flow directions in the area are west, southwesterly with some local radial dispersion.

Off-site contamination consists of a groundwater contamination plume migrating from the facility. The distribution of total volatile organic chemicals affects 9 domestic wells now and possibly 7 more in the near future. Concentration data for organic compounds in groundwater is shown in Table 2 in the Appendix.

Based on the RI data and data provided in the Field Investigation Team and IEPA Department of Public Health reports, many of the volatile compounds provide chronic health risks and some are carcinogens, such as vinyl chloride and benzene or suspected carcinogens such as trichlorethylene (TCE). Data provided in the early 1980's, from the Illinois EPA show that residential drinking water had been contaminated by volatile organics similar to those found at and beneath the Acme Solvent site. Concentrations of vinyl chloride and TCE have exceeded health risks of 10^{-5} unit cancer risk level in the aquifer beneath the site and off-site. This theoretically means that 1 to 2 persons out of 100,000 people drinking this quality of water, 2 liters per day, over a 70 year period would contract cancer. Trace metals, such as lead, arsenic, and barium are some of the metals found in the ground water but not in the drinking water in substantial amounts. However, these inorganic compounds also provide a health risk if they migrate to the drinking water wells. Some volatile organic compounds were detected in air samples, especially when test pits were opened. These results are summmarized in Table 3 in the appendix. There is no threat to public health or the environment from air releases from the site as it currently exists. However, during excavation of waste materials air emissions will need to be monitored and controlled if necessary.

No surface water or creek sediment contamination was discovered during the RI, but trace levels of organic compounds were found during the 1983 Field Investigation Team sampling effort at a spring near Pagel's Pit landfill. This spring contains water coming through both the Acme and Pagel's Pit sites and empties into Killbuck Creek.

The most obvious receptors of any release of hazardous substances from the facility are the nearby residences located within 1/2 mile from the site. Currently, there are nine affected private wells with the potential of nine additional private wells becoming contaminated. Most or all of these wells draw water from the contaminated upper aquifer. Also, the highly productive aquifer beneath the shallow aquifer may potentially be a receptor of contaminants migrating with the ground water thus damaging future use of that aquifer.

In addition, humans and wildlife may come into direct contact with the hazardous waste materials on-site and in the creek if this becomes contaminated in the future.

Similarly, at least 20 acres of the Galena/Platteville (surficial) aquifer, off-site, is now documented as contaminated and could be much more (higher than 100 acres) if the contamination around Pagel's Pit is attributable to the Acme Solvent site. This will be better understood with further ground water investigation.

Because of the above hazards the site scored 31.98 on the Hazard Ranking System.

ENFORCEMENT ANALYSIS

There have been over 60 Potentially Responsible Parties (PRP) identified for this site. A group of approximately forty of these have organized for the purpose of negotiations. Factors that seem encouraging in regard to reaching a settlement are the number and financial resources of the PRP. Currently, negotiations are underway and a decision to settle or provide fund financing on the ROD response objectives seems possible within a short time. The negotiations status is Attacment 2 to the Appendix to the ROD and is enforcement confidential.

RESPONSE OBJECTIVES

Six response objectives to be met by the remedial action proposed by this ROD for the Acme Solvents site are:

(1) To provide drinking water that meets appropriate Federal drinking water criteria in the surficial aquifer.

(2) To ensure that drinking water quality, that satisfies objective 1, will be maintained at the currently affected homes along Lindenwood and Edson Roads and other nearby residences not currently affected by the contaminant plume

(3) To prevent degradation of the deeper aquifer in the area, chiefly the St. Peter sandstone and the Eau Claire formation

(4) To maintain the surface water quality in Killbuck Creek at levels designated by the State of Illinois

(5) To eliminate health risks associated with contacting hazardous materials on the surface and in subsurface soils for current receptors and possible future onsite receptors

(6) To maintain ambient air quality for on-site and off-site receptors

To meet these 6 response objectives, a variety of remedial alternatives were developed to meet the response objectives by combining technologies that had passed an initial screening process. Combining different technologies was necessary because individual technologies would not in themselves remediate the release of hazardous substances from the site. The alternatives that remained after the initial screening and went through the detailed evaluation are shown in Table 5 in the appendix. The initial screening and the detailed evaluation processes are consistent with 40 CFR Part 300.68 (g), (h) and (j). The detailed evaluation process consisted of cost and non-cost analyses. The first step of the cost analysis was to develop cost estimates within a range of -30 percent to +50 percent. Cost estimates were broken down into capital and operating costs. All costs were expressed on a present worth basis, which considered the technical and monetary cost-effectiveness. Non-cost related evaluations included three major factors; technical, environmental and institutional. Ten specific parameters were identified as evaluation criteria and evaluated for effectiveness in meeting site response objectives. This detailed analysis is provided in the FS. The final step of the evaluation process was to combine the results of the cost and non-cost evaluation to develop an overall ranking of cost-effectiveness. The combination of source control and migration management remedial alternatives that most effectively comply with the National Contingency Plan (NCP) and is cost competitive with other alternatives is considered the most cost effective remedial action.

ALTERNATIVES ANALYSIS

A number of alternatives were analyzed to meet the response objectives and to comply with the NCP and pertinent environmental laws. Various combinations of alternatives were evaluated for source control including treatment of the soils, sludges and drum contents; the ground water beneath the site; and the residences' wells.

1) No Action Alternative

The No-Action alternative would essentially condemn future land use at the facility by allowing a continued release of contamination into the environment; provide a hazard to a receptor by direct contact with wastes that would through weathering, become exposed over time; and would adversely affect the ground water quality such that expansion of the plume with time would further degrade the drinking water quality to a chronic health risk level exceeding a 10^{-5} unit cancer risk for users and potential users of the aquifer. This health risk is higher close to the site boundary. Also, within time, the area surrounding the facility may become less rural and more suburban; thus, future population would be exposed to the health risks exhibited in the aquifer. The tributary to Killbuck Creek which runs by the site may have been slightly contaminated runoff from the Acme Facility and with the passage of time due to weathering the probability of contamination will increase. The tributary feeds into Killbuck Creek, about 4000 feet away from the site, at which point surface water quality criteria apply.

2) Residential Well Contamination (Interim Measure)

Four of the nine affected residences in the vicinity of the Acme Facility have been receiving bottled water from Pagel's Pit. The FS evaluated three viable alternatives that would remedy drinking water for the currently affected users and the 7 potentially affected residences. The alternatives are: (1) extension of the City of Rockford's water main to service the residences, (2) home carbon treatment units for treatment of water for all domestic uses for 9 currently affected residences and ground water monitoring and (3) construction of a deeper or appropriately located community well. The carbon units are less costly than the water main but the water main provides a permanent remedy for all future users and is a reliable source of acceptable drinking water quality. Carbon units can remove organic compounds properly but are dependent on individual home owner's knowledge and operation. Institutional controls are necessary to ensure acceptable operation of the carbon units to meet drinking water quality.

The Winnebago County Health Department has the responsibility to monitor private well water quality and is aware of the proposal to install carbon treatment units in the County. The County is aware of the range of Volatile Organic Compounds (VOC) in the drinking water supplies and has the instrumentation necessary to monitor these compounds shown in Table 2 in the Appendix, at levels that will assure compliance with appropriate Federal water quality standards or ambient water quality criteria. Due to the cost difference between the Rockford water main and the maximum of 16 home treatment units, estimated as potentially contaminated, the Agency has decided to fund the home units until a permanent water supply in the locally affected area is implemented. A permanent water supply alternative may be selected after additional ground water information is obtained.

COSTS OF RESTORATION OF RESIDENTIAL WATER SUPPLY

	Capital Cost	Operating Cost per year	Total Present Worth	Comment
A] Installation of Carbon Home Treatment Units, (for 9 contaminated residences)	23,625	15,500	146,103	Publicly acceptable, but uncertain for
B] Development of Upgradient Well and New Community Water Supply System	388,730	8,710	467,120	Publicly acceptable, easier to monitor and thus more reliable to operate and maintain.
C] Extension of Rockford Water Supply System	915,000	560	920,000	Most reliable but also most expensive alternative. Requires 4 mile force main.

NOTE: Present Worth is determined on a 30 year basis at 10%. Operating cost for Alternative A includes monitoring costs for nine affected wells and seven potentially affected wells.

3) Groundwater Contamination (Feasibility Study)

Off-site contamination has been well documented through sampling by the IEPA, E.C. Jordan (RI), FIT, and recently by U.S. EPA. The groundwater requires field studies to test the cost-effectiveness of a pump and treat option. The containment protection provided by slurry walls are not practical for the site because no continuous clay substratum or confining bed exists that would allow a foundation for the slurry wall. Pump and treat options allow containment of the plume by hydraulically controlling its spread. Pumping also desorbs the organic contaminants attached to the aquifer interstices, thereby removing contaminants that would otherwise have a longer residence time in the aquifer. The RI/FS could not evaluate the hydraulic flow regime in sufficient detail to optimally locate pump-out wells. This effort is time-consuming and costly and can be accomplished with further on-site work at which time more intense field work possibly including drilling additional wells and performing pump tests of sufficient duration can be accomplished. This effort will provide sufficient information to determine the location of wells, sizes of pumps and range of concentrations to hydraulically control and remove the plume at or near the source (on site). A comprehensive ground water remedy for the entire contaminated aquifer in the vicinity will be deferred until further study is completed. This Record of Decision provides for funding further feasibility study and the necessary field work attendent to optimally locating those wells; determining their proper depth as required for pump tests; and, the chemical analyses provided by steady state values of chemical concentrations for measurement of compliance with criteria developed in accordance with the Clean Water Act. This will provide the necessary documentation for selection of a unit treatment process or processes for treatment of the water.

4) Bedrock Contamination (Feasibility Study)

There is a direct relationship between the chemicals deposited in the bedrock, their release to the ground water, and the length of time required for the ground water should become clean. Ground water contamination is well documented. The rate of release of contamination from the bedrock can be estimated from literature sources provided by the RCRA program. The volume of contaminants and particularly the depth of contamination in the nonaqueous phase located in the bedrock itself is not known. Since the groundwater beneath the facility is contaminated the bedrock beneath the waste must serve as a conduit for the transport of organic phase liquids and aqueous phase contamination into the aquifer. The bedrock also serves as a storehouse for future contamination as the ground water and infiltration penetrate the fractures and dissolve and disperse the contamination.

As discussed previously, a slurry wall is not feasible to contain the contaminants at the site; however, using a cement grout, the bedrock could be solidified in such a manner as to prevent migration of water into the contaminated zones and thus isolate the contaminants. This concept is theoretically plausible but must be further evaluated. If proven feasible, and necessary; and, later implemented, the release of contamination into the environment should be measureably decreased by the grout. Thus, this ROD recommends that further feasibility work be conducted that would analyze and estimate the depth and volume of contamination in bedrock which will determine the depth and volume of grout, if found necessary and cost-effective to restrain migration of water into the contaminated zone. That contamination already solubilized and migrating beneath the highly contaminated zone of bedrock will be concurrently evaluated through further ground water feasibility study previously described. Further study of the bedrock, which will be performed by the IEPA under the existing Cooperative Agreement (CA) with U.S. EPA, will determine the following: (1) estimated depth and volume of dense contamination, (2) estimated volume of grout necessary to contain contaminants, (3) the efficacy of grouting the bedrock, (4) the analysis of the compatibility of the grout and contaminants, (5) the estimated effect of grouting on the duration of pumping on the site, (6) the estimated reduction of costs associated with grouting versus the duration of pumping the aquifer. The IEPA will amend the CA to fund this on-site investigation. By performing the above tasks, the contractor can define the cost-effective trade-off between the costs to remediate the bedrock to the costs for treatment of the aquifer.

If shown effective, the grout will serve as an impermeable layer to retard both horizontal and vertical flow of water infiltrating through the site. If grouting is determined to be infeasible as a result of the tests performed in the feasibility study, longer term ground water remediation, or other options would be considered for treatment of the ground water.

5) Surface Contamination

With respect to the solid contamination existing above the bedrock on the site, the greatest amount of treatment permutations exists. The combinations of treatments for the source material were related to compliance with other environmental laws.

Special consideration is given to the analysis of alternatives pertinent to treatment of the source, primarily, the waste pits and lagoons. Removal and containment methods were considered for source control. No action and site capping were eliminated since either action prolonged the problem and health risks in the area. Costs for off-site landfilling and off-site incineration were compared to on-site landfilling and on-site incineration. The quantities of source material to be treated are not precisely known since it would be necessary to remove the mounds where contamination was measured and excavate the material beneath the mounds. Therefore, volume of contamination was calculated by measuring the physical volume of the mounds containing hazardous wastes above the bedrock. Thus, the quantity of 26,000 cubic yards represents the physical volume of the mounds and contaminated soils within the mounds and appear to be a worst case estimate for the quantity of contamination. For calculation purposes 26,000 cubic yards is used in the feasibility study. Only during the removal process will exact quantities be known. A more precise estimate will be determined during the design phase. Costs will be reduced proportionately if the actual amount of waste found at the site is less than this estimate.

5) (a) Site Capping

The least cost alternative that, arguably, may comply with the Resource Conservation and Recovery Act closure regulations, 40 CFR 264 Subpart G, is site capping, monitoring and pumping ground water to an Alternate Concentration Limit (ACL). This alternative is only slightly better than No-Action for the surface since it limits future use of the site and prolongs the duration of hazardous wastes in the environment. Also, due to the presence of PCB concentrations greater than 50 parts per million, the Toxic Substances Control Act requires disposal in a facility designed in accordance with criteria that would not allow simple site capping. Due to the location of the facility - directly above fractured bedrock, it is likely that capping would minimally affect the horizontal and hydraulic transport of contaminants. The Federal ground water policy provides guidance for protection of this aquifer as a class II aquifer for the protection of current and future drinking water use. Additionally, the State of Illinois policy discourages the placement of unsuitably sited landfills which the Acme Solvent facility would become if closure would take place. It places a burden on the State to monitor the facility for contamination and would defer a permanent remedy to a later date. Also, with closure, the land at the facility would remain hazardous, thus posing a threat to human health, welfare, and the environment.

Therefore, alternatives other than capping were developed to meet the response objectives previously stated that would comply with the RCRA landfill requirements, including proper siting, (not directly atop of bedrock).

5) (b) Incineration/Disposal in RCRA Facility

5(b)(1) Costs of Incineration vs. RCRA Facility Disposal

The costs for a range of technically viable on-site alternatives are shown on the next page. It can be seen that an on-site RCRA facility is the least cost alternative but due to the technical limitations resulting from the geology, limiting the construction of an on-site facility, it is unlikely that this alternative could be implemented. However, given the dictates of recent U.S. EPA off-site policy for CERCLA remedial actions the costs to implement an incineration alternative are comparable to off-site waste disposal at a RCRA approved landfill or one that will exist in a short time. Therefore, these alternatives were considered in more detail by the IEPA and U.S. EPA due to their long term environmental soundness.

As evaluated in the FS, off-site incineration is the most costly alternative. Furthermore, the length of time and the number of trucks necessary to haul the wastes to an off-site incinerator or to a landfill make these alternatives impractical for a large amount of waste. More than 1500 truckloads of wastes would be hauled away if 26,000 yds^3 of contamination exists at the site. Because of the logistical difficulty and cost-disadvantage of the off-site incineration or disposal alternative, on-site incineration was screened in more detail. However, for a relatively small amount of selected waste, off-site incineration or disposal may be practical.

COSTS FOR ON-SITE SOURCE CONTROL, ACME SOLVENT RECLAIMING SITE, MORRISTOWN, ILLINOIS

ALTERNATIVE DESCRIPTION	TOTAL CAPITAL COST	TOTAL OPERATION AND MAINTENANCE	TOTAL PRESENT WORTH	COMMENT
Excavation, on-site landfill (RCRA facility)	1,776,500	3,668,000	5,444,500	Unfavorable siting; community disfavors alternative; Land use is agricultural; violates IEPA landfill policy.
Excavation, on-site infrared incineration	8,719,000	116,000	8,835,000	Mobile incinerator; public acceptance; complete treatment.
Excavation, on-site rotary kiln incineration	21,587,000	116,000	21,703,000	Same as above with more proven incinerator technology.
Excavation, off-site disposal (RCRA facility)	8,166,000	116,000	From 8,282,000 to 10,600,000	Cost dependent on availability of nearby facility.
Excavation, off-site incineration	33,000,000	116,000	33,116,000	Time consuming to remove and transport

NOTE: Present worth is determined for 100 years, at 10%, for comparison of total destruction alternatives to permanent disposal alternatives. Costs ar ermined for maximum quantities.

The Illinois EPA has been seriously pursuing methods for procuring an incinerator for cleanup of the site and has met with vendors who are capable of providing the technology necessary to screen the waste, crush it, feed it into the incinerator and burn it in compliance with environmental regulations. Along with the State of Illinois, the U.S. EPA has expressed the preference for remedial actions that would provide complete destruction of hazardous wastes in lieu of transporting the wastes to a different RCRA approved location. The costs of incineration vary widely with respect to quantities of wastes and type of incinerator used. These costs are shown in the attached chart provided by the Feasibility Study engineers. This cost variation requires that a careful analysis be done during the design stage so that proposals for cleanup adequately address the existing contamination problem and provide costs with substantial confidence. It also follows that EPA set forth the rationale for implementation of an incinerator alternative that is more costly but provides more environmental benefits than the least cost alternative.

The RCRA compliant alternative for landfilling all of the 26,000 cubic yards of the hazardous substances found at the Acme Facility is approximately $5.4 million. This cost includes an on-site, double lined landfill with monitoring wells and pump-out wells for 100 years. This cost does not include bedrock grouting. In developing this figure, siting requirements were not considered and it is not likely that the geology at the site would be suited for a landfill due to the near surface penetration of fractured bedrock. The community near the site would also prefer not to have a hazardous waste landfill. Hauling to a double lined landfill off-site, providing that an existing facility can construct a RCRA compliant cell, would range in cost from approximately $8.3 million to $10.6 million.

Therefore, the most optimistic cost for landfilling, complying with today's requirements would be about $5.4 million. By comparison, the Feasibility Study shows that it would cost about $8.8 million to incinerate all of the 26,000 cubic yards of wastes by an infra-red incinerator and $21.7 million for incineration of the wastes by the more proven rotary kiln method. Therefore, the highest cost to incinerate the wastes is about 1.6 to 4.0 times greater than the most optimistic cost to build an on-site RCRA compliant landfill if it were implementable.

However, the disposal alternatives that more likely could be implemented would be those that haul the hazardous materials to an off-site RCRA landfill. The costs for these alternatives are dependent on many variables some of which are still unknown, such as whether sufficient capacity exists and whether the facilities are in compliance with new RCRA requirements. The costs for off-site disposal range from $8.3 million to $10.6 million.

The costs for incineration range from $8.8 million for an infrared incinerator to $21.7 million for a rotary kiln incinerator. Infrared incineration is equivalent to costs of off-site disposal and is, therefore, equivalent to the least cost, implementable alternative. However, this alternative provides substantially higher benefits as discussed later in this ROD. The ratio of costs for rotary kiln incinerator technology to off-site disposal is between 2.0 to 2.6. Thus the highest cost to incinerate the material found at the site is between 2 to 2.6 times greater than the off-site disposal alternative. The

EPA's enunciated policy with respect to the use of treatment over land disposal remedial options (see Memo from Jack W. McGraw dated May 6, 1985 entitled, "Procedures for Planning and Implementing Off-Site Response Actions") states that, to the greatest extent practicable, consistent with CERCLA requirements for cost-effective remedial actions, EPA pursue response actions that use treatment, reuse or recycling over land disposal. The policy states further that treatment, reuse, and recycling options should not be screened out on the basis of cost alone but should be considered if their cost does not exceed an order of magnitude above the cost of the other alternatives. In this case, while costs would not range beyond two to three times the cost of land disposal, and may in fact be equivalent to such costs, substantially greater protection of human health, welfare, and the environment would result from the permanent destruction of on-site contaminants if the incineration option recommended in this ROD is implemented.

The following considerations should be reviewed with respect to funding this project:

1) During the design stage some, or possibly all, of the mounds should be further analyzed to determine the depth of hazardous wastes, their quality, quantity and physical appearance (drums, sludges, liquids, or soils). The objective is to determine better quantity estimates and quality estimates for the purpose of bid specifications so that overall costs for remediation can be developed with less uncertainty. Additionally, test burns of the waste material should be performed at an existing incinerator that would be similar to one that would be used to incinerate the hazardous materials at the site in accordance with RCRA requirements. The data acquired through these test burns should provide the ash characteristics for the purpose of delisting pursuant to applicable RCRA requirements. Physical parameters of the wastes are necessary to be ascertained due to the potential amount of preincineration processes needed to prepare the hazardous materials for incineration. The State will submit a program for further in-depth borings and chemical analyse to be performed on the mounds at the site.

2) As a result of 1, above, it may be shown that some of the contamination cannot and should not be incinerated or that the ash cannot be delisted and another method of treatment or disposal evaluated in the FS as being cost-effective for a selected waste would be employed. The FS shows, as does this ROD, that off-site disposal at a RCRA compliant landfill is approximately equivalent in cost or less than the cost estimates for on-site incineration. Therefore if some of the hazardous wastes are extremely difficult to incinerate due to their form or texture, and the costs to burn these wastes are also extreme compared to the preliminary cost estimates, a disposal option may be necessary.

3) Bid documents can then be developed with more precision with respect to specifications for cleanup, thus reducing the uncertainty of costs. During the design, value engineering screening should be conducted in accordance with Superfund Remedial Design and Remedial Action Guidance, February 1985 in order to assess the total cost of the incineration in detail. The sensitive parameters that most affect the costs should be analyzed for best case and worst case situations. The worst case, though, should not exceed the estimate of approximately $21.7 million provided in the FS.

5(b)(2) Environmental Considerations of Incineration vs RCRA Facility Disposal

Section 101(24) of CERCLA states that remedial actions should not include the off-site transport of hazardous substances, or the storage, treatment, destruction or secure disposition off-site of such hazardous substances or contaminated materials unless the President determines that such actions (A) are more cost-effective than other remedial actions, (B) will create new capacity to manage, in compliance with subtitle C of the Solid Waste Disposal Act, hazardous substances in addition to those located at the affected facility, or (C) are necessary to protect public health or welfare or the environment from a present or potential risk which may be created by further exposure to the continued presence of such substances or materials.

EPA emphasizes the need to consider treatment, recyling and reuse before off-site land disposal of hazardous substances from CERCLA sites is used. However, as provided in Section 300.68(h)(1) of the NCP, remedial alternatives should not be eliminated on the basis of cost alone. Therefore, other longer term benefits should be analyzed when comparing alternatives.

Environmental benefits which accrue as a result of selecting an incineration option over disposal of waste materials in a RCRA Facility are:

1) at least 99.9999% removal from the environment, of Polychlorinated Biphenyls (PCB) found in the waste at the facility,

2) at least 99.99% removal of all other RCRA classified organic hazardous wastes found at the facility,

3) a project that would terminate within 3 years after start-up, and

4) elimination of the risk of release of hazardous substances to the environment and consequently the complete reduction of the health risk associated with this exposure, and

5) elimination of the need for governmental authorities to perform the environmental monitoring that would be necessary if the wastes were contained on-site or relocated to another site.

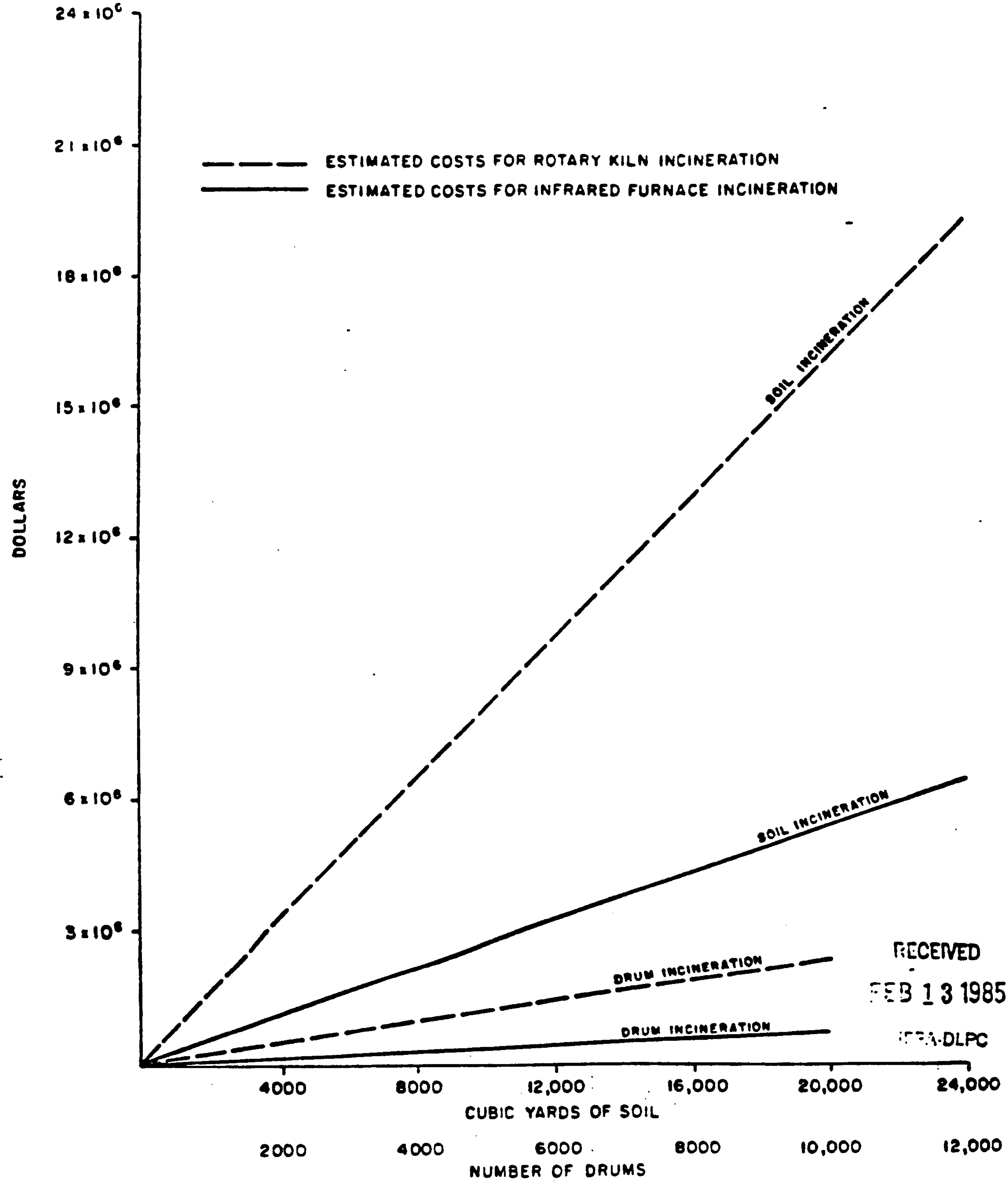
5(b)(3) Administrative and Technological Benefits of Incineration vs RCRA Facility Disposal

In addition to the above environmental benefits of incineration, various administrative and technological benefits are to likely to accrue. These are:

1) The establishment in U.S. EPA, Region V, for the first time of a complex administrative process to implement the requirements of RCRA, CERCLA, TSCA, and Air Quality programs at an incineration project on an NPL site. The Acme project can further establish a long-term program for the review and approval of other incineration projects that are expected to be carried forward in the next several years.

   Thus, the Agency will have begun to establish criteria to fund the design and construction of future incinerator projects in an expeditious manner.

2) The cost-effectiveness analysis for future incineration projects will be determined with much more confidence once we complete test burns at the site during the design stage. If the incinerator performs well at a reasonable cost there is an extremely good possibility that the



GRAPH OF VOLUME vs. COSTS FOR ON-SITE INCINERATION

E.C. JORDAN CO.

concept will apply to many other CERCLA sites. The liability to the Agency is minimal since a relatively small amount of the total project cost will be spent up to the test burn stage. At that time the technology can be reassessed, if necessary.

3) Implementation of this technology along with a few other incineration projects throughout the country will advance the state of the art so as to make this technology cheaper in the future.

DEGREE OF TREATMENT FOR SURFACE WASTES

The total extent of the cleanup for soil and ground water needs to be continually evaluated, as more data are generated during design and cleanup. Criteria for the determination of the extent of cleanup must be developed to protect public health.

There are many methods to determine the safe concentration of substances that can remain at the site. One method, which is still tentative but likely to be of value is the Soil Contaminant Evaluation Methodology (SOCEM). Using this model, ultimate clean-up levels on the site may be determined. Due to their persistence in the soil environment PCB are thought to be the compound that may determine the safe level of cleanup in the soil. Vinyl chloride, methylene chloride, benzene and trichloroethylene are four more organic compounds that will be evaluated to determine the safe level of residual wastes that can remain in the soil. The metals arsenic, lead, cadmium and hexavalent chromium are also considered in the SOCEM model since these compounds as the aforementioned organic compounds theoretically exhibit chronic health risks to a receptor who ingests the ground water in the vicinity of the site. The appendix to this ROD explains the levels selected by the SOCEM model which are derived to comply with drinking water criteria off-site. These levels are target levels of treatment and will be further analyzed and amended as necessary when excavation occurs or when more analytical data are provided.

The RI documents that the concentrations of hazardous wastes in the mounds are high enough to be toxic upon direct contact or ingestion at the source on the site. The wastes are also highly flammable and ignitable in the dense distribution inside the mounds. Similarly, the wastes appear more consolidated toward the deeper portion of the mounds and likely have a relatively high heat value. Due to the above reasoning, the waste disposal mounds containing highly contaminated soils, sludges, liquids, drums and their contents will be incinerated.

Existing chemical data and company records indicate that an estimated minimum of 8,600 cubic yards of hazardous wastes will be incinerated. This number represents about 1.77 acres contaminated to a depth of three feet, which is a reasonable volume considering the area of the site used for burial of drums and volume of lagoons storing liquid solvents. The area was determined from a photo taken from a flight over the site in 1970.

The feasibility study calculates that as much as 26,000 cubic yards of contamination exists at the site. This number serves as an upper bound, and the difference between the 26,000 cubic yards and 8,600 cubic yards represents the maximum amount of material that will be evaluated for health risks by SOCEM. As stated previously, the ROD presents the worst case, 26,000 cubic yards of contamination, for which incineration costs are determined. In the feasibility study a 26,000 cubic yard quantity was used for comparison of all treatment technologies evaluated for cost effectiveness.

SUMMARY OF RECOMMENDED ALTERNATIVES AND FURTHER ACTION

Source Control

On-site incineration of contaminated materials will not exceed a quantity of 26,000 cubic yards. For this quantity, rotary kiln incineration is estimated at a present worth cost of $21.7 million and infra red incineration is estimated at a present worth cost of $8.8 million dollars. Costs and type of incinerator will be determined in the design phase of this project at a precision of - 10 to + 15% of estimated value and will include off-site incineration estimates.

Bedrock will be evaluated by the State in further RI/FS work to measure the effectiveness, the amount and the type of remediation necessary for blocking the migration of contaminants found in the unsaturated bedrock and the impact of this measure on ground water treatment. The decision for funding the bedrock remediation is deferred until the study is complete.

Continued RI/FS of ground water beneath the source is recommended at this time. During the feasibility study a deeper well recently constructed will measure the extent of vertical contaminant migration, if any, and will monitor the deeper portion of the aquifer thereafter. Also, pump tests will be performed to hydraulically stress the aquifer to determine optimum location of pump-out wells and the need for treatment of the pumped water. Costs will be determined with a - 10/+ 15 percent precision of the estimated value developed in the design phase. The decision for funding a ground water remedy is deferred until completion of this study.

Off-site Treatment

A comprehensive program for treatment of contaminated ground water is deferred until additional data are provided.

Restoration of drinking water quality will occur by installing 9 home carbon treatment units as an interim measure to the 9 affected residences as well as future homes if necessary over the next 3 to 5 years. Monitoring of drinking water supplies in the vicinity of the site will continue.

Community Relations

The Illinois Environmental Protection Agency (IEPA) has been responsible for conducting a community relations program at this site beginning in February, 1983. U.S. EPA acted as advisor and coordinator, attending public meetings and hearings, and providing oversight.

During the Remedial Investigation/Feasibility Study, IEPA conducted 3 "livingroom" small group meetings, 1 public meeting and 1 public hearing. This was supplemented by nearly 70 phone calls to citizens and the news media, and approximately 12 one-to-one contacts with area residents and local officials. Written materials (news releases, letters and fact sheets) and other activities identified in the Community Relations Plan were completed as scheduled.

The primary concerns of the community are access to a safe drinking water supply and removal of contamination from the site. Public water supply connections are not available to residents of Lindenwood and Edson Road; hence, those residents desire provisions for safe drinking water. Developing the site into a RCRA-permitted disposal facility, even if only for the waste on-site, is not acceptable. However, residents indicated they would accept on-site incineration or chemical treatment. The presence of Pagels Pit landfill across the street from the Acme Solvents site also concerns residents of the immediate vicinity. They feel that Pagels Pit is contributing to the groundwater contamination. That site was recently added to the National Priorities List. The successful completion of technical activities and communications during the RI/FS has established credibility in the community. It also provides a strong foundation for the community relations program for design and construction of the Acme Solvents site as well as future work on Pagels Pit.

Consistency With Other Environmental Laws

The recommended alternative will require source control and restoration of drinking water supplies as remedial actions. Several environmental statutes, apart from CERCLA, including, the Resource Conservation and Recovery Act (RCRA), the Toxic Substance Control Act (TSCA) and the Clean Air Act (CAA), are applicable to the remedial action.

RCRA - The requirements of RCRA are applicable with respect to the treatment of hazardous wastes on-site and to disposal off-site, in which case RCRA transportation regulations apply. Contaminated soils and wastes will be excavated, incinerated in a RCRA approved facility. Hazardous substances remain in the unsaturated zone of the fractured bedrock and the groundwater. The remedy for these potential releases will be evaluated in the future FS work for bedrock and ground water remediation.

Ash created by the incineration of hazardous materials at the facility will comply with delisting requirements of 40 CFR 260. If, after test burns are performed, it appears that delisting the incinerator ash will not be possible, the Agency will reevaluate its proposed action to determine whether to pursue the incinerator option or whether to take other actions. If, at that point, the incineration alternative is selected, any ash not able to be delisted will be deposited in an acceptable off-site RCRA facility, treated so as to render it non-hazardous, or covered on-site with a provision for ground water monitoring in accordance with 40 CFR 264 Subpart G.

The RCRA regulations for hazardous waste incineration, 40 CFR 264.343, are applicable to on-site incineration. These requirements include a Destruction Removal Efficiency (DRE) of 99.99%, 99% hydrochloric acid (HCL) removal efficiency or less than 4 pounds per hour of HCL emissions, particulate emissions less than 180 milligrams per day standard cubic meter (with appropriate correction factor) and trial burn criteria. In addition there are operating and monitoring requirements that will be followed. Costs for incineration were based on these requirements and requirements of TSCA.

TSCA - Because of the presence of PCB in the waste, the incinerator must be able to meet a DRE of 99.9999% for the PCB and approved by EPA. Similarly, requirements for disposal of PCB greater than 50 ppm apply.

CAA - The emission control requirements of the CAA may be applicable to emissions from the incinerator depending on the magnitude of the emissions. Parameters of concern are sulphuric (SO_x), nitric oxides (NO_x) gases and particulates. Cost for air pollution control equipment have been included in the total cost for the recommended remedial action.

Based on review by the State, no control, besides fugitive emissions control, would be necessary during excavation.

OPERATION AND MAINTENANCE (O & M)

O & M activities required during and after the on-site remedy include health and safety monitoring and maintenance over a thirty year period. Total present worth cost for these activities is $116,220.

The IEPA is the designated State Agency that is responsible for O & M. The State currently has two sources for funding O & M. The first is a Hazardous Waste Fund. The fund is generated from taxes on the disposal, treatment, and injection of hazardous waste . The second funding source is a state approp- iation of general revenue fu s for $9 million that is to be used for matching Federal funds on Superfund a istance projects.

EPA will fund the O&M for si cleanup for one year. The total O&M cost for this period is estimated to $6,200.

This discussion of O&M requi ents and costs is based on the interpretation of current policy that woul nclude the O&M costs for on-site incineration as a part of construction cc .

FUTURE ACTIONS:

1) Feasibility Study for evaluating effectiveness of grouting the bedrock
2) Feasibility Study for optimizing the effectiveness of ground water pumping on plume control
3) Remedial Action using incineration
4) Interim Remedial Action for restoring drinking water quality
5) Final Remedial Action for Restoration of Drinking Water

SCHEDULE

The following is a projected schedule for key milestones for project implementation :

Milestone	Projected Date
ROD Approval	September, 1985
CA approved	October, 1985
Start design on incinerator, and carbon treatment units	December, 1985
Complete remedial action for home units	June, 1986
Complete RI/FS on bedrock and ground water	June, 1986
Complete ROD on RI/FS	August, 1986
Start remedial action	June, 1986
Complete remedial action for source control	December, 1988

Responsiveness Summary

The Community Relations Responsiveness Summary is included as Attachment 1.

Appendix

Table 1	Concentration Data for Chemicals Detected in Subsurface Exploration
Table 2	Concentration Data for Chemicals Detected in Ground Water
Table 3	Concentration Data for Chemicals Detected in Air
Table 4	List of Alternatives Considered in Detail (in FS)
Attachment 1	Community Relations Responsiveness Summary
Attachment II	Negotiation Status Report (Enforcement Confidential)
Attachment III	Soil Contamination Evaluation Methodology for this site

NOTE: Data are presented for demonstration purposes. The tables are not a comprehensive data display, they represent data collected during the remedial investigation only.

TABLE 1

CONCENTRATION DATA FOR CHEMICALS DETECTED IN SUBSURFACE EXPLORATIONS (TEST PITS)

Class	Compound	Maximum Concentration (mg/kg)	Total Sampling Points	Number of[a] Contaminated Samples	Average[b] Concentration (mg/kg)
Volatiles	ethylbenzene	420	54	27	79.4
	benzene	>4,400	54	16	685
	1,2 dichloroethylene	--	54		
	1,1 dichloroethane	30	54	5	12
	1,1,1 trichloroethane	83	54	23	18.7
	methylene chloride	20,000	54	20	1,132
	1,1,2 trichloroethane	1.0	54	1	1.0
	tetrachloroethlylene	220	54	23	21.1
	trichloroethylene	120	54	19	30.7
	toluene	4,200	54	37	>388
	xylene	>5,000	54	28	>907
	trans 1,2 dichloro-ethylene	20	54	4	6.5
	1,1 dichlooethylene	2.0	54	1	2.0
	vinyl chloride	.45	54	1	.45
	chlorobenzene	--	54	--	
Semi-Volatiles	isophorone	18,000	54	29	1,696
	bis(2-ethylhexyl) phthalate	7,600	54	44	349
	butyl benzyl phtha-late	1,100	54	3	512
	naphtalene	2,300	54	29	413
	di-n-butyl phtha-late	780	54	33	123
PCB	PCB-1254	274	54	16	87

a. Total number of samples showing quantifiable concentrations.

b. Samples with non-quantifiable concentrations were not included in computation of average concentration.

Note: mg/kg = milligrams per kilogram

TABLE 2

CONCENTRATION DATA FOR CHEMICALS DETECTED IN GROUNDWATER

Class	Compound	Maximum Concentration (ppb)	Total Sampling Points	Number of[a] Contaminated Samples	Average[b] Concentration (ppb)
Volatiles	ethylbenzene	31	46	2	21
	benzene	7.9	46	1	7.9
	1,2 dichloroethylene		46		
	1,1 dichloroethane	150	46	17	18.8
	1,1,1 trichloroethane	240	46	12	32.2
	methylene chloride	--	46		
	1,1,2 trichloroethane	--	46		
	tetrachloroethlylene	470	46	10	63
	trichloroethylene	170	46	15	24.7
	toluene	40	46	1	40
	xylene	280	46	1	280
	trans 1,2 dichloro-ethylene	>2,400	46	23	143.4
	1,1 dichlooethylene	13	46	1	13
	vinyl chloride	160	46	1	160
	chlorobenzene		46		
Semi-Volatile	isophorone	--	46		
	bis(2-ethylhexyl) phthalate	220	46	10	52.9
	butyl benzyl phth-alate naphtalene				
	di-n-butyl phthalate	22		1	22
PCB	PCB-1254		46		

a. Total number of samples showing quantifiable concentrations.

b. Samples with non-quantifiable concentrations were not included in computation of average concentration.

TABLE 3

CONCENTRATION DATA FOR CHEMICALS DETECTED IN AIR

Class	Compound	Maximum Concentration (ppmV) BG/TP[c]	Total Average[b] Sampling Points BG/TP[c]	Number of Contaminated Samples	Average[b] Concentrati (ppmV) BG/TP[c]
Volatiles	ethylbenzene				
	benzene	.07/35[d]	16/17	2/6	.06/5.9
	1,2 dichloroethylene	<1/2,500[d]	16/17	0/1	--/2,500
	1,1 dichloroethane	<.5/250[a]	16/17	0/1	--/250
	1,1,1 trichloroethane	--	16/17	--	--
	methylene chloride	1.8/500[d]	16/17	5/2	1.24/250.15
	1,1,2 trichloroethane	--	16/17	--	--
	tetrachloroethlylene	1.6/400[d]	16/17	7/9	.77/45.9
	trichloroethylene	--	16/17	--	--
	toluene	.6/1,500[d]	16/17	6/13	.47/121.9
	xylene	39/500	16/17	6/13	9.5/57.6
	trans 1,2 dichloro- ethylene	--	16/17	--	--
	1,1 dichloroethylene	--	15/17	--	
	vinyl chloride	--	16/17	--	
	chlorobenzene	1.0/ 5[e]	16/17	6/3	
Semi Volatiles	isophorone				
	bis2-ethylhexyl) phthalate				
	butyl benzyl phthalate				
	naphtalene talate				
	naphtalene				
	di-n-butyl phtha- late				
PCB	PCB-1254				

. Total number of samples showing quantifiable concentrations.

. Samples with non-quantifiable concentrations were not included in computation of average concentration.

. BG= Background
TP= Test Pit Analyses

. From soil headspace analysis.

. From spoils pile analysis.

LIST OF ALTERNATIVES CONSIDERED IN DETAILED EVALUATION

SOURCE CONTROL REMEDIAL ALTERNATIVES

1. No Action.
2. Site Capping and Monitoring.
3. Soil and Drum Excavation, Off-Site Land Disposal (RCRA Approved Facility) and Bedrock Grouting.
4. Soil and Drum Excavation, Off-Site Incineration and Bedrock Grouting.
5. Soil and Drum Excavation, and On-Site Land Disposal (RCRA Approved Facility) and Bedrock Grouting.
6. Soil and Drum Excavation, On-Site Incineration and Bedrock Groutimg.
7. Soil and Drum Excavation, On-Site Incineration, Bedrock Grouting and On-Site Ash Disposal in a RCRA Approved Facility.
8. Soil and Drum Excavation, On-Site Land Disposal of Soils (RCRA Approved Facility), and Off-Site Land Disposal of Drums (RCRA Approved Facility) Bedrock Grouting.
9. Soil and Drum Excavation, On-Site Incineration of Soils, Off-Site Land Disposal of Drums (RCRA Approved Facility), and Bedrock Grouting.
10. Soil and Drum Excavation, On-Site Incineration of Soils, Off-Site Land Disposal of Drums (RCRA Approved Facility), Bedrock Grouting and On-Site Ash Disposal in RCRA Approved Facility.

MIGRATION MANAGEMENT REMEDIAL ALTERNATIVES

1. Installation of Home Water Treatment Units.
2. Development of Upgradient Well and New Community Water Supply System.
3. Groundwater Extraction and Treatment by Air-Stripping.
4. Groundwater Extraction and Treatment by Activated Carbon.
5. Groundwater Extraction and Treatment with Home Water Treatment Units.
6. Groundwater Extraction and Treatment with Installation of Upgradient Wells and New Community Water Supply System.
7. Groundwater Extraction and Treatment with Extension of the Rockford Public Water Supply system.*
8. Extension of the Rockford Public Water Supply.*

*This alternative is included based upon the recommendation of the State.

ATTACHMENT 1

Community Relations Responsiveness Summary

COMMUNITY RELATIONS RESPONSIVENESS SUMMARY
ACME SOLVENTS
MORRISTOWN, ILLINOIS

The Illinois Environmental Protection Agency (IEPA) has been responsible for conducting a community relations program for this site. Community relations activities have been conducted throughout the remedial investigation and feasibility study. During the feasibility study a seven week public comment period which included informal meetings and a public hearing were held to receive public comment. This Community Relations Responsiveness Summary documents milestone community relations activities along with citizen comments and questions and the IEPA response.

COMMUNITY RELATIONS

Remedial Investigation

A community relations plan was submitted to and approved by the United States Environmental Protection Agency (USEPA) in May, 1983. The emphasis of this first phase of the community relations program was directed at one-to-one contact and informal meetings with local officials and citizens responding to community concerns about drinking water. Quarterly sampling and analyses of private drinking water wells was coordinated between the Illinois Department of Public Health and the IEPA. Milestone activities conducted during the remedial investigation include:

- Notification letters
- News release announcing the start of the remedial investigation and feasibility study)
- Informal meetings with area residents
- Fact Sheet #1 explaining history and problems at the site
- Public meeting to discuss cleanup process/early in RI phase

Feasibility Study

The start of the public comment period and the date and location of a public hearing was announced through a paid legal notice, news release, feature story appearing in the Rockford Register Star, and Fact Sheet #2.

Fact Sheet #2, a summary of the cleanup options, was mailed to those on the community relations plan mailing list and was available along with a copy of the feasibility study at the IEPA's Rockford Field Office. Two meetings with interested groups were held before the public hearing.

The public hearing was held at the Howard Johnson Motor Lodge Route 251, on Thursday, December 6, 1984, to discuss the cleanup options. Approximately 50 people were in attendance. Following 30 minutes of presentations, IEPA staff responded to comments and questions.

In response to a request, the public comment period was extended to Friday, December 28, 1984, and notifications were mailed to those who attended the hearing. IEPA received seven statements. Five of the seven are from legal firms representing responsible parties. The Winnebago Public Health Department and the League of Women Voters provided the other two written statements.

CITIZEN QUESTIONS AND CONCERNS

Questions and comments are grouped together by issue.

Issue: Drinking Water and Groundwater

QUESTION: What are the major contaminants found in the groundwater?

RESPONSE: The major contaminants are largely cleaning and degreasing solvents which include trichloroethylene, tetrachloroethylene, trans 1,2 dichloroethylene, 1,1 dichloroethylene 1,1,1 trichloroethane.

QUESTION: What are the concentration levels found in drinking water wells?

RESPONSE: Drinking water wells directly affected by the underground plume have concentrations as high as several hundred parts per billion (ppb), while wells near the edge of the plume show trace levels between 1 and 15 ppb.

QUESTION: Are most of the contaminants water soluble?

RESPONSE: All of the contaminants are water soluble to various degrees.

QUESTION: How long could it take for contaminants in the groundwater to reach a wider area?

RESPONSE: The contaminants will continue to spread if no action is taken. Based upon estimates by the contractor conducting the Remedial Investigation/ Feasibility Study, E.C. Jordan Company, significant concentrations could reach drinking water wells on Edson Road within the next 50 years.

QUESTION: If buried wastes are removed, will the contaminated plume be stopped?

RESPONSE: No. Contaminants already in the groundwater, will dissipate while continuing to migrate in a westerly direction.

QUESTION: Where will contaminants already in the groundwater ultimately travel? Are they reaching Killbuck Creek?

RESPONSE: Some contaminants from Acme Solvents appear to be entering Killbuck Creek; however, the bulk of the contamination is moving under Killbuck Creek and may ultimately discharge into the Rock River.

QUESTION: Which direction is groundwater flowing in this area?

RESPONSE: The general direction of groundwater flow is westerly towards Killbuck Creek. Some mounding occurs at the site which results in groundwater flowing radially for several hundred feet before changing to a westerly direction.

COMMENT: Recent groundwater monitoring data indicate that off-site contamination of drinking water wells has decreased from that reflected in earlier monitoring.

RESPONSE: Chemical concentrations in groundwater can change due to a variety of factors. Recent groundwater monitoring is insufficient by itself to conclude that contamination in groundwater will continue to decrease. Remedial action should be taken as soon as possible to provide safe drinking water and prevent the release of more contaminants into the groundwater because of the presence and concentration of chemical contaminants found on-site.

QUESTION: What is the maximum or minimum concentration of chemicals found at this site allowed by the federal government in drinking water?

RESPONSE: For the major contaminants found in these wells, the federal government does not have any regulations. U.S. EPA guidelines provide procedures to calculate acceptable concentrations of substances found in drinking water with no expected adverse effects. Some residents were notified by the IEPA not to use their drinking water. These notifications were based on U.S. EPA guidelines and information the IEPA has on groundwater flow, area geology, and site history.

Issue: Cleanup Options

COMMENT: Taxpayers should not be stuck paying for the cleanup of the Acme Solvents site.

QUESTION: Who will pay for the cleanup options selected by the USEPA?

RESPONSE: The responsible parties may participate in the cleanup. Responsible parties include generators, haulers, as well as the owners. However, should the responsible parties decline to voluntarily participate, Superfund money would be used to finance the cleanup. Through the Superfund program, 90% of the cleanup money would be federal and 10% would come from the State Hazardous Waste Fund. Superfund legislation provides that up to three times the cost of the cleanup may be assessed against the responsible parties.

QUESTION: How deep under the surface of the site will the contaminants be removed?

RESPONSE: The barrels and sludges are within several feet of the surface, but the contractor proposes to use water pumps to extract contaminated groundwater down to approximately 400 feet.

QUESTION: Is there any experience elsewhere with the use of high pressure grouting?

RESPONSE: Yes, it has been used successfully at various locations throughout the nation. High pressure grouting is one method of building a wall in the soil to prevent contamination from moving. In this instance, the contractor recommends injecting a portland cement mix into the bedrock to prevent liquid waste from entering the groundwater.

QUESTION: Is there any threat of the grout process causing additional contamination?

RESPONSE: Yes. A short-term release of contaminants may occur because of the high pressure used to force the grout into the cracks and fractures of the bedrock. If used, the contractor proposes that grouting begin beyond the perimeter of the waste deposits, working toward the center, to reduce the possibility of contaminants being forced away from the site.

QUESTION: Has above ground storage been evaluated?

RESPONSE: Yes. It was dismissed because there was no adequate way to store these wastes above ground over a long period of time, above ground storage is only a temporary measure. Furthermore, the IEPA prefers options designed to detoxify the waste rather than on-site storage so that the site can be eventually returned to some productive use.

QUESTION: Would an on-site portable incinerator be purchased or rented?

RESPONSE: No decision has been made on the financing or operation of an incinerator.

QUESTION: What is the procedure to dispose of ash generated by incineration?

RESPONSE: The ash will be analyzed to determine content. A decision will then be made as to disposal procedures. It may remain on-site and covered, or it may have to be transported off-site.

COMMENT: Capping is not effective option.

RESPONSE: The IEPA agrees that capping, by itself, would not prevent buried waste from contaminating groundwater in the future. Capping should only be used in combination with some other alternative.

COMMENT: Some of the evidence in the remedial investigation tends to indicate that excavation of the contaminated soil could increase the environmental hazards and present severe questions of safety for workers performing the cleanup.

RESPONSE: Air emissions are the potential environmental hazard from excavation. However, no adverse health effects to area residents from air emissions are expected either during or after site cleanup. Ambient air monitoring will be conducted during excavation and safety provisions will be made before excavation begins in case concentrations of chemicals in the air were to exceed safe levels. Any off-site effects from excavation, if they occur, are expected to be sporadic and temporary, but should not pose a health threat to area residents. A safety plan will be developed to protect workers at the site. IEPA intends to hire a firm experienced in waste excavation and will require workers to wear proper safety equipment and follow mutually agreeable procedures. In addition, IEPA's representatives will be on-site for the duration of the excavation.

COMMENT: The question of the influence of Pagel's Pit on the groundwater beneath and adjacent to the Acme Solvents site has not been adequately determined.

COMMENT: Without knowing the extent to which Pagel's Pit contributes to groundwater that may also be contaminated by the Acme Solvents site and without differentiating the contribution from the two sites, EPA will be unable to choose an appropriate final remedy for the Acme Solvents site that would adequately address the groundwater problem.

QUESTION: Is contamination in the groundwater under the Acme Solvents site worse than that under Pagel's Pit?

RESPONSE: As a result of the Remedial Investigation/Feasibility Study, IEPA has considerably more information on the Acme Solvents site than Pagel's Pit. Pagel's Pit was not part of the RI/FS because it was not on the National Priority List when the remedial investigation began. IEPA does not have enough information on Pagel's Pit to conclusively say that contamination at this site is as bad or worse than at Acme Solvents.

It is apparent from the remedial investigation that the Acme Solvents site is contaminating groundwater which is migrating beyond the boundaries of the site. The underground chemical plume from this site has contaminated nearby drinking water wells and the potential exists for this plume to contaminate deeper aquifers and wells serving homes on Edson Road. Therefore, safe drinking water and groundwater restoration will be recommended independent of action taken at Pagel's Pit.

It is possible groundwater treatment will remove contaminants contributed by Pagel's Pit. When an RIFS is completed on Pagel's Pit, it may be possible to apportion the costs between the two sites.

COMMENT: This proposed mix of remedial actions may not satisfy the requirements of the National Contingency Plan.

COMMENT: On-site land disposal was apparently rejected for the contaminated soil.

COMMENT: There is no basis in the feasibility study for the apparent rejection of on-site landfilling.

RESPONSE: The feasibility study evaluates the advantages and potential problems with each remedial action. The evaluation process developed by the E.C. Jordan Company is consistent with the criteria in the National Contingency Plan for determining appropriate remedial action. After all the factors were considered, the IEPA determined that the on-site incineration option will be recommended to the USEPA.

QUESTION: In how many homes would carbon treatment units be used?

RESPONSE: Based upon the location of the underground chemical plume and drinking water criteria, approximately 6 to 8 homes would immediately receive home carbon treatment units if this option is selected. Monitoring will be conducted on other drinking water wells. If significant concentrations of contaminants are detected, those homes would also receive these units.

QUESTION: Couldn't the manufacturers who generated the waste at this site treat or dispose of this waste themselves?

RESPONSE: Yes. Responsible parties will be requested to conduct the cleanup.

COMMENT: If indeed incineration is an option, there is every possibility that the local Intergovernmental Solid Waste Committee would be most willing to discuss cost sharing of an adventure of this sort because industry in Winnebago County generates a large quantity of hazardous waste. Maybe an incinerator could have multiple uses.

RESPONSE: Although responsible parties will be requested to finance site cleanup, it is unlikely that they would be willing to negotiate cleanup costs for an option that would handle wastes from other sites.

If Superfund money is used to finance the incinerator, federal legislation precludes Superfund financed options from handling wastes from other sources.

Issue: Site Background

QUESTION: How much higher in elevation is the Acme Solvents site than Killbuck Creek?

RESPONSE: About 80 feet.

QUESTION: In 1972, the Illinois Pollution Control Board ordered Acme Solvents to cleanup the site. Between 1975 and 1980 it appears that no cleanup action was taken. What actions were taken by the IEPA to monitor the site?

RESPONSE: The IEPA conducted resistivity surveying and installed two groundwater monitoring wells.

Congress responded to the need to take action at hazardous waste sites like the Acme Solvents site by enacting the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980. Commonly known as the "Superfund" law, CERCLA filled a gap by providing legal and financial means to federal and state governments to respond to closed or abandoned hazardous waste sites. Superfund is supported largely by taxes on producers and importers of petroleum and 42 basic chemicals.

QUESTION: Did Acme Solvents ever pay a fine imposed during the 1970's?

RESPONSE: IEPA records indicate that Acme Solvents paid $2,000 in fines.

Miscellaneous

QUESTION: Will potential buyers of the site be warned or restricted as to future uses of this site?

RESPONSE: A question of local zoning or other restriction on the use of the site should be directed to the Winnebago County Board and local zoning officials. In addition, state law requires that the owner of the property must record information on the deed to the property that the land has been used to dispose of hazardous waste.

QUESTION: What is the cause of the concentration of contamination found in the groundwater southeast of Pagel's Pit?

RESPONSE: The cause is uncertain. The contamination could be from the Acme Solvents site, Pagel's Pit, or both. However, it appears that contamination comes from Pagel's Pit with some contribution from Acme Solvents.

QUESTION: Was Pagel's Pit monitored after a permit by the IEPA was issued?

RESPONSE: Yes. A monitoring system was established under the original permit, but the information obtained from this system, is limited.

BM:jd/0135E/18-24

ENFORCEMENT CONFIDENTIAL

ATTACHMENT II

Negotiations Status Report

ATTACHMENT III

Soil Contamination Evaluation Methodology

A proposed rule to 40 CFR Part 261 published in the Federal Register Volume 50, No. 38, Tuesday February 26, 1985, presents a two dimensional ground water flow model, called the Vertical Horizontal Spread (VHS) model. This was published by P.A. Domenico and V.V. Palciauskas in Groundwater magazine, May-June 1982 issue. The Superfund Office will apply this model for determining levels of cleanup for contaminated soil at Superfund sites. To do this, a leachate equation is also necessary and together these two equations constitute the Soil Contamination Evaluation Methodology (SOCEM). Whereas, the SOCEM model may apply appropriately to the determination of soil cleanup levels at Superfund sites, the VHS component of the model can also be utilized to determine in the aquifer, the Alternate Concentration Limit (ACL) (as defined under 40 CFR Part 264 Subpart F). The VHS model can also be used to determine the point in time at which ground water treatment can be discontinued by establishing criteria that reflect the level of source concentrations that are sufficient to protect the ACL at the site boundary or other pre-determined location. However, for the purpose of the remedial actions recommended in this ROD, the VHS model will not be used for either of the above purposes but will only be used for the purpose of assisting in the determination of the concentration of contaminants allowable near the site boundary (C_o).

The VHS equation as utilized in SOCEM is the following:

$C_x = C_o \; ERF\,[Z/2(DZ)^{1/2}] \; ERF\,[Y/4\,(DY)^{1/2}]$ where, C_x = concentration of the contaminant at the receptor well or compliance well
C_o = initial concentration of contaminant at the source or site boundary
x = distance to receptor well from the site boundary or source
D = transverse dispersivity
Y = width of contaminated zone, at waste boundary, measured perpendicular to the direction of ground water flow
Z = thickness of contaminated zone at the waste boundary measured downward from the surface of the water table
ERF= error function, a coefficient that varies with the value in parentheses

The following assumptions apply to the model:

Steady State flow in the aquifer
Constant source of contamination in the aquifer
No loss due to biological transformation of contaminants
No longitudanal dispersion affecting dilution in the direction of flow
No molecular diffusion affecting dilution
No recharge of the aquifer due to precipitation in area of model application

Due to the above assumptions, the model is inherently conservative in estimating the concentration at a receptor.

Using the VHS model, one can demonstrate that the contamination down-gradient, C_x, from the source is a function of the initial concentration of the contaminant, C_o, at the source or site boundary, multiplied by the spread (dilution) of the contaminant in the vertical direction, the error function in terms of Z multiplied by the spread (dilution) of the contaminant in the horizontal direction perpendicular to ground water flow, and the error function in Y.

These values, then, represent the dilution of a contaminant in the horizontal and vertical directions as the contaminant is transported downgradient from the source. Dispersion is essentially dilution by a mixing process caused by the physical characteristics of the aquifer. Longitudinal dispersion is an indication of the spread of the contaminants in the direction of flow and is generally high compared to transverse dispersion. However, longitudinal dispersion is not considered in the VHS model, thus providing a degree of conservatism, in this case, to wells B-4 on the site boundary and B-16 and B-9, somewhat west of the site as shown on the map on the next page.

For purposes of utilizing the model, this analysis of contaminant migration assumes that the wastes are located in the ground water. Since the wastes are primarily above the ground water table this assumption on first impression may seem invalid and a pulse loading model may appear to be more appropriate. However, since bedrock is highly fractured and likely acts as a conduit for contaminant migration to the aquifer, there is little retardation of the organic and inorganic solute as it migrates downward. This analysis assumes that bedrock beneath the site is saturated with hazardous substances because of the contaminant migration which has occurred over the years. Additionally, it is assumed that the contaminated bedrock which is in contact with the ground water serves as a continual source of contamination. Since the source of contamination is the hazardous material in the pits and this contamination is incorporated into the soil above the bedrock, the values obtained by the VHS model for C_o will be applied to the soil leachate, not to the bedrock. Since it is difficult to measure or monitor bedrock contamination, monitoring wells must be used to provide access for measurement of ground water quality, beneath the bedrock. Thus, it is conceivable that although levels of contaminants in the soil may be decreased, in accordance with values for ground water generated by the VHS model, contamination in the bedrock may still be higher than soil contamination levels for an as yet undetermined period of time. The FS for ground water and bedrock remediation will consider this in the determination of cost-effectiveness of treatment alternatives.

Tables 1 and 2 on the following page indicate the values used in the VHS equation to determine C_o, the allowable concentration for the target list of contaminants in the ground water. The values generated by the VHS model for C_o are tentative and based on available information but are as precise as the assumptions used in the SOCEM model presently allow. The model can be further refined as more data are generated at the site.

TABLE 1. Concentrations Allowed at Source to protect B-4

Contaminant	Proposed MCL (ppb)*	B-4 (X) Meters	B-4 (Y) Meters	(Z) Meters	C_0 (source) ppb
Lead	50	15	30	3	332
Arsenic	50	15	30	3	332
Chromium	50	15	30	3	332
Cadium	10	15	30	3	66
Benzene	5	15	30	3	33
Vinyl Chloride	1	15	30	3	7
Trichloroethylene	5	15	30	3	33
1,1-Dichloroethylene	7	15	30	3	46

TABLE 2. Concentrations Allowed at Source to Protect B-9 and B-16

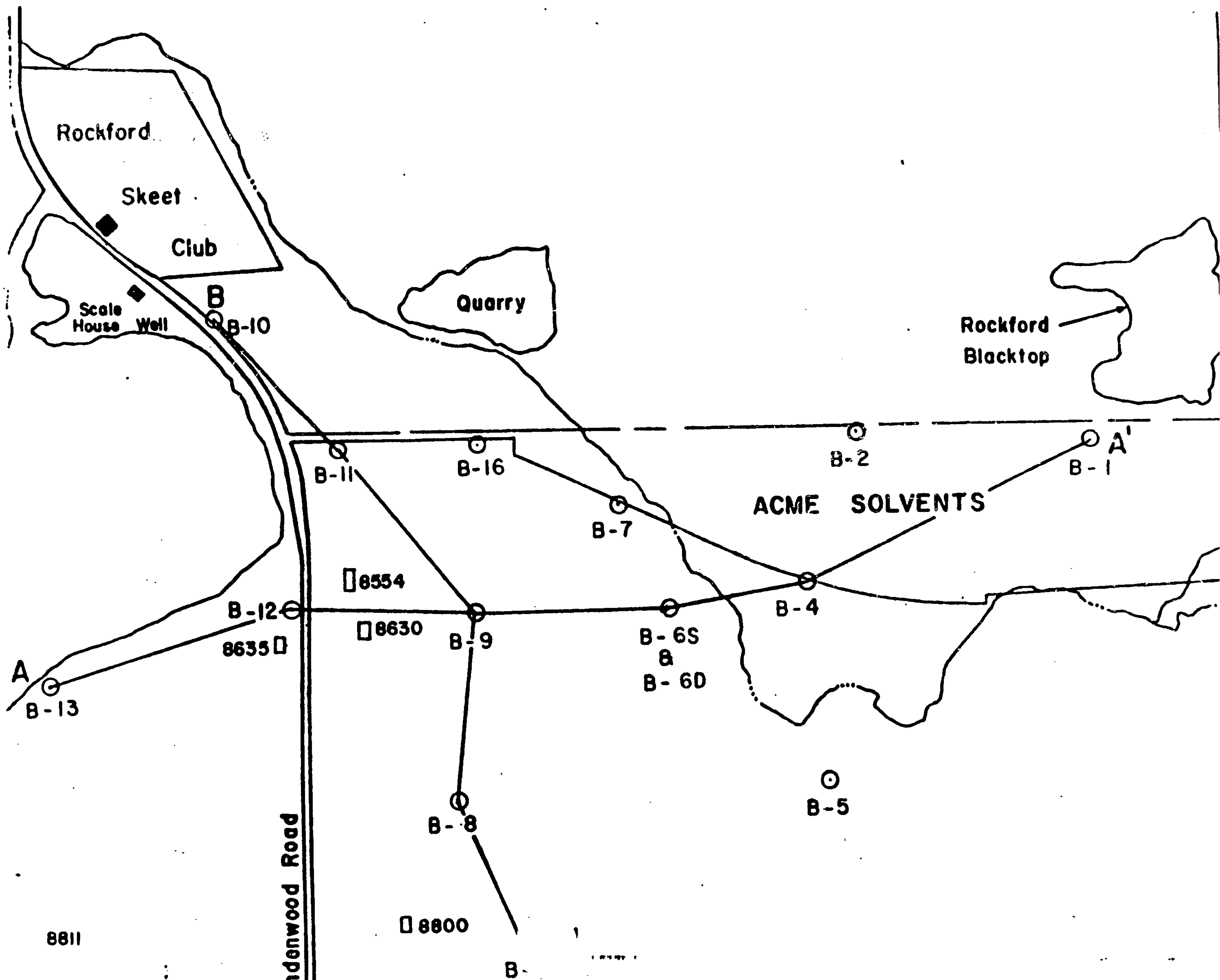
Contaminant	Proposed MCL (ppb)*	B-10 (X) Meters	B-10 (Y) Meters	(Z) Meters	C_0 (sourc ppb
Lead	50	250	30	3	4,431
Arsenic	50	250	30	3	4,431
Chromium	50	250	30	3	4,431
Cadium	10	250	30	3	886
Benzene	5	250	30	3	443
Vinyl Chloride	1	250	30	3	89
Trichloroethylene	5	250	30	3	443
1,1-Dichloroethylene	7	250	30	3	620

Note: B-9 has approximately the same values as those provided for B-16. Therefore, Co for protection of B-16 = Co for protection of B-9.
D = transverse dispersion = 5 meters.

*to be published in the Federal Register

The results of Tables 1 and 2 show allowable contaminant levels at the source--the area beneath the mounds--that should protect drinking water use at B-4, B-9, and B-16. At this time it is more critical to protect the drinking water at the distance closer to B-9 and B-16 since those wells are in the proximity of residential wells. Well B-4 may not be a representative drinking water monitoring well due to its proximity to the site and due to other means of contaminant migration to that well which may not be simulated by the VHS model. The means of migration may also be through diffusion processes and the assumption of steady state flow may not apply here due to apparent local perturbations in the grounwater hydrology. Therefore, well B-4 is still under consideration as a monitoring well, and wells B-9 and B-16 are tentatively used in this analysis as compliance monitoring wells.

If the soils are saturated down to bedrock with hazardous waste then the Co values are those values that also apply to the MCL in the soil. However, other means of determining the leachate from the soil into the groundwater should be tested during the design phase. The soil will be distrubed and substantially mixed during excavation. Soil that is not-visually contaminated or by some sensing device (such as, a photo ionization meter, portable GC or other instruments) is determined to be suitable for retention on the site, should be analyzed by a leaching test that simulates natural conditions at the site. The results of the leaching test i.e., the leachate concentrations, should be compared for compliance purposes to those values determined by VHS, i.e., C_o, for each compound of concern. If the leachate values exceed the values generated by VHS, then more soil must be removed or incinerated. The leachate test will be developed by U.S. EPA and IEPA as part of the design Scope of Work. The values of C_o determined herein are not final values. The compounds are the target list of compounds and others may be added as the mounds on the site are further evaluated and the ground water further analyzed as specified in this ROD. The Y values used in VHS are particularly subject to change as new data are produced, and thus C_o would also change. Nevertheless, the values produced herein represent the precision available to interpret the data, and the precision allowable by the assumptions in the VHS model.



Rockford
Skeet
Club
Scale
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Well
B
B-10
Quarry
Rockford
Blacktop
B-2
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B-1
B-11
B-16
B-7
ACME SOLVENTS
8554
B-12
B-9
B-6S
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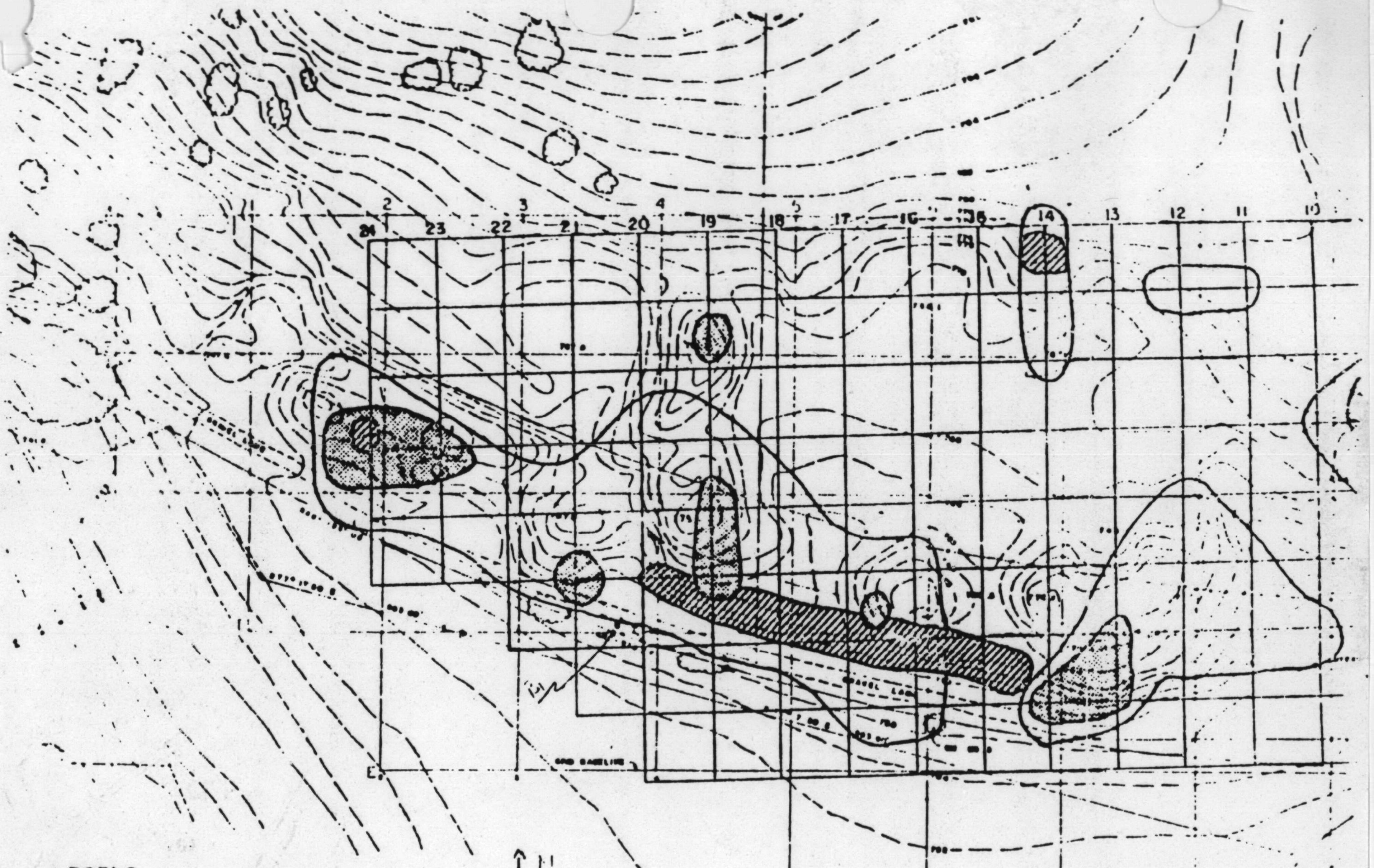

LEGEND

AREAS WHERE DRUMS ACTUALLY FOUND BY JORDAN

MAGNETIC ANOMALIES (Fit Contractor)

STRONG MAGNETIC ANOMALIES (Fit Contractor)

NOTE

50 FOOT GRID LABELED A THROUGH I AND I THROUGH 24