United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-91/165
June 1991

EPA

Superfund Record of Decision:

Pagel's Pit, IL

U.S. Environmental Protection Agency
Region 5, Library (PL-12J)
77 West Jackson Boulevard, 12th Floor
Chicago, IL 60604-3590

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R05-91/165	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Pagel's Pit, IL First Remedial Action			5. Report Date 06/28/91 6.
7. Author(s)			8. Performing Organization Rept. No.
9. Performing Organization Name and Address			10. Project/Task/Work Unit No. 11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The 100-acre Pagel's Pit site is an active sanitary landfill facility in a predominantly rural area of Winnebago County, Illinois. Surrounding land use is mixed agricultural, rural residential, commercial, and industrial. The site is bounded on the west by Killbuck Creek. Another Superfund site, Acme Solvent Reclaiming, Inc., is located east and upgradient of Pagel's Pit. The Acme Solvent site has been shown to have contaminated the ground water in the downgradient direction. The landfill at the Pagel's Pit site is a former sand and gravel quarry with a sealed asphalt liner that covers about 47 acres. The landfill, which began operating in 1972, accepted primarily municipal waste, sewage sludge, and limited amounts of Illinois special wastes. Beginning in 1980, a network of gas extraction wells was installed to remove landfill gas that is generated by the wastes. Gas collected from the wells is used as a fuel source for a sludge drying operation. Some of these wells also are used for leachate collection along with the manholes installed in the landfill. In 1990, it was estimated that the landfill contained about 4,700,000 cubic yards of waste and had 5 to 7 years of operating capacity remaining. It has been determined that the landfill has caused contamination of the

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Pagel's Pit, IL
First Remedial Action
Contaminated Media: gw
Key Contaminants: VOCs (1,2-dichloroethene, vinyl chloride, xylenes), metals (arsenic, barium, manganese, thallium, zinc)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
	None	72
	20. Security Class (This Page)	22. Price
	None	

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

ground water. This Record of Decision (ROD) addresses the landfill wastes and contaminated ground water at the downgradient side of the site as Operable Unit 1 (OU1). A future ROD will address ground water contamination in the southeast corner of the site that is undergoing further study. The primary contaminants of concern affecting the ground water are VOCs including 1,2-dichloroethene and vinyl chloride; and metals including arsenic, barium, manganese, thallium and zinc.

The selected remedial action for this site includes constructing a sanitary landfill cover for the waste disposal area; pumping ground water along the west side of the site; removing inorganics by treating with ion exchange or coagulation/flocculation, if necessary, prior to onsite treatment using carbon adsorption or air stripping, followed by carbon polishing of the treated water, with onsite discharge to surface water; removing spent carbon offsite for regeneration or disposal; extracting and treating leachate offsite at a publicly owned treatment works (POTW); extracting landfill gas and using the gas for fuel, or flaring the gas; monitoring ground water, leachate, and air; maintaining all remedial action components; and implementing institutional controls including deed restrictions. The estimated present worth cost for this remedial action is $9,800,000 or $11,000,000, which includes O&M costs of $310,000 or $248,000 for 30 years, depending on the process selected.

PERFORMANCE STANDARDS OR GOALS: Ground water goals are based on currently promulgated MCLs or non-zero MCLGs, except for arsenic and 1,1,-dichloroethene, or a risk level of 10^{-5} or an HI=1 for contaminants without MCLs. Chemical-specific goals were not provided.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Pagel's Pit Site
Winnebago County, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Pagel's Pit site in Winnebago County, Illinois, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (hereinafter CERCLA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record file for this site.

Although the State of Illinois has agreed in principle that the remedy would address contamination at the site, it does not concur with this decision. The State has concerns over their possible loss of some control over the State permitted solid waste landfill.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This remedy is the first of potentially two operable units at the site. It provides for interception of contaminated groundwater for the purpose of preventing it from leaving the site; use of contaminated groundwater as a water supply posed the risk identified at the site that exceeded criteria used by the United States Environmental Protection Agency (USEPA). It also addresses the wastes contained at this operating sanitary landfill. The groundwater will be treated, the wastes will be contained.

The second operable unit will address contaminated groundwater located primarily on the Pagel's Pit site in the southeast corner. The potentially responsible parties (PRPs) who have done the remedial investigation for the Pagel's Pit site contend that another National Priorities List site, upgradient of the

Pagel's Pit site, may contribute to this contamination.

The major components of the selected remedy include:

- a sanitary landfill cover for the waste disposal area;
- groundwater extraction along the west side of the site;
- on-site groundwater treatment by carbon adsorption or air stripping following pretreatment with a solids filter, with the treated water being discharged to surface water;
- removal of inorganics by treatment, if necessary, prior to carbon adsorption or air stripping;
- leachate extraction and transfer to the local publicly owned treatment works for treatment;
- gas extraction and the use of the gas for fuel or the flaring of the gas;
- deed restrictions; and
- site monitoring and maintenance of all remedial action components.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, for this site. The large size of the landfill and the apparent lack of on-site hot spots representing major sources of contamination thwart use of the statutory preference for a remedy requiring permanent treatment as a principal element. A principal threat, which the Agency would expect to treat, has not been indicated. Instead, as discussed in 40 CFR 300.430(a)(1)(iii)(B), USEPA expects to use engineering controls, such as containment, for this operable unit because the wastes pose a relatively low-level, long-term threat and because permanent treatment of the entire landfill is impracticable.

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.

6/28/91
Date

Valdas V. Adamkus
Regional Administrator
Region V

RECORD OF DECISION SUMMARY
PAGEL'S PIT SITE

I. SITE LOCATION AND DESCRIPTION

The Pagel's Pit site (Winnebago Reclamation Landfill or WRL) occupies about 100 acres on the west side of Lindenwood Road, south of Baxter Road and about 5 miles south of Rockford, Illinois (see Figure 1). The landfill has been in operation since about 1972 and the operator has estimated that 5 to 7 years of capacity remain. Municipal refuse and sewage treatment plant sludge have been the primary wastes accepted at the site. Illinois special wastes (industrial process wastes, pollution control wastes, or hazardous wastes, except as determined pursuant to the Illinois Environmental Protection Act) have also been disposed of at the facility.

The site is located in a predominately rural unincorporated area. It is bounded on the west by Killbuck (or Kilbuck) Creek and on the east by Lindenwood Road. Killbuck Creek, a perennial stream, merges with the Kishwaukee River about 2.5 miles northwest of the site. The Kishwaukee River merges with the Rock River about 1.5 miles northwest of the confluence of Killbuck Creek and the Kishwaukee River. The site is located on a topographic high between Killbuck Creek to the west and unnamed intermittent streams to the north and the south. Land use around the site is a mix of agricultural, rural residential, commercial, and industrial.

The topography surrounding the landfill area is relatively flat to gently rolling. The ground surface elevation is approximately 706 feet mean sea level (MSL) at Killbuck Creek. The landfill lies outside of the 100-year floodplain of Killbuck Creek and is not within any designated wetland area. A small jurisdictional wetland area, rated low in quality because of its artificial nature, has been delineated south of the landfill. Although an inventory of terrestrial plant and animal species has not been performed, the site is not known to be inhabited by endangered or threatened species.

Access to that part of the site closest to Lindenwood Road is restricted by a chain link fence. Access to the rest of the site is restricted by other fencing and the topography, which includes steep slopes and heavily wooded areas.

The surficial unconsolidated deposits in the area of the site are predominantly glacial drift ranging from a thin mantle over the dolomite in the bedrock uplands to the east of the site to greater than 70 feet in the bedrock valley west of the site.

The unconsolidated deposits are predominantly sand and gravel underneath and north of the site with a silty clay to the south of the site. The underlying bedrock surface is highly variable. A bedrock map, based on available data, is shown in Figure 2. The dolomite bedrock is generally fractured but the intensity is variable. Chert layers or nodules were commonly noted on boring logs as were vugs (void spaces), but cavernous zones were not reported.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The landfill is located at a former sand and gravel quarry. It has been sequentially constructed and filled in several sections. Development has generally occurred in an east to west direction, first in the southern half and then in the northern half. The base of the landfill is now complete and the landfill wastes cover approximately 47 acres. The landfill liner was constructed by grading and compacting the base and side walls of the landfill. Asphaltic concrete was installed over the sides and floor and compacted, resulting in a two inch thick layer. The surface of the asphalt was sealed with a cationic coal tar sealer. This sealed asphalt liner was covered with eight inches of sand. A network of perforated pipes was installed in the sand on the sloping base. The pipes were connected to manholes in which the liquid that drains from the wastes (leachate) collects. The leachate is pumped from the manholes to a leachate pond located on top of the landfill. The leachate is aerated in the pond and periodically trucked to the wastewater treatment plant in Rockford.

Wastes to be disposed of in the landfill enter through the gate where there is a scale. The hauler takes the wastes to the working face of the landfill where they are unloaded. Since 1985, however, sewage sludge has first been taken to the on-site sludge drying plant where it is dried before being placed in the landfill. The operator at the working face compacts the wastes into the active section of the landfill. A six-inch cover is applied over the wastes daily; this generally consists of sand and clay with some gravel. When an area has been filled to an intermediate elevation (the area will not be receiving wastes for sixty days and the final permitted elevation has not been reached), a compacted layer of additional suitable material is placed on the surface. Much of the present landfill is covered with this intermediate cover. Further filling of the landfill is expected to bring the western end of the landfill to the elevation of the eastern part, which is at about 790 feet MSL. Then most of the surface will have additional wastes placed upon it and the final top grade of the central portion of the landfill will be brought to 820 feet MSL. At that time, the landfill will have reached its capacity, which is estimated at

about 6 million cubic yards of wastes; it has been estimated that the landfill contained about 4.7 million cubic yards of wastes in April 1990. The proper side slopes will be maintained with the final filling.

Around 1980, landfill gas, consisting primarily of methane and carbon dioxide, was discovered to be escaping from the landfill near Lindenwood Road. Five gas extraction wells were installed in the southeast corner of the landfill. A few months later, four additional wells were installed in the northeast corner. These wells were connected to a flare, where the gas was burned. In 1981, it was learned that landfill gas was still escaping to the northeast of the landfill. Following this determination, the gas extraction system's operation and maintenance were upgraded. In 1984, these wells were replaced by a network of 70 wells located in the eastern, non-active portion of the landfill. The gas is collected from the wells through the use of blowers and a system of header pipes and is used as a fuel source in the sludge drying operation. In November 1988, 21 additional wells were installed in the central section of the landfill and connected to the system. The gas extraction wells are also used for the removal of leachate from the landfill. When used for this purpose, a gas extraction well is disconnected from the system and a portable pump is placed in the well. The pump transfers the leachate to the leachate pond.

Because the nearby groundwater was found to be contaminated with arsenic, cadmium, and bis(2-ethylhexyl)phthalate, the site was proposed for inclusion on the U.S. Environmental Protection Agency's (USEPA's) National Priorities List (NPL) in October 1984. The NPL is the list of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response. The site was added to the NPL in June 1986.

The USEPA and several of the potentially responsible parties (PRPs) for this site reached agreement embodied in an Administrative Order by Consent, with an effective date of October 16, 1986. This Order requires the Respondents to conduct a remedial investigation (RI) and a feasibility study (FS) at the site. Portions of these studies were carried out by Warzyn Inc., and the reports for the RI and the FS for the work that has been done were submitted in March 1991. At least one additional study is planned.

The Acme Solvent Reclaiming, Inc. site (Acme Solvent site) is located east of the Pagel's Pit site (see Figure 1). The Acme Solvent site was proposed for the NPL in December 1982 and was placed on this list in September 1983.

III. COMMUNITY RELATIONS ACTIVITIES

Community relations activities for the Pagel's Pit site have been conducted for a number of years, at least since 1987 when several fact sheets were issued and the Community Relations Plan was released. In the early years, community relations for this site were combined with those for the Acme Solvent site.

A Proposed Plan was released to the public on April 16, 1991, which presented a number of alternatives as possible remedies for the problems that had been identified at the Pagel's Pit site and informed the public of USEPA's and IEPA's preferred remedy. It also informed the public that the reports for the RI and the FS and the other documents comprising the administrative record were available for review at the information repository located at the Rockford Public Library and at the offices of USEPA, Region V, in Chicago. The Administrative Record Index is included here as Appendix A. A public comment period was held from April 16, 1991 through May 16, 1991, and a public meeting was held on April 25, 1991. At this meeting representatives of USEPA and IEPA discussed the proposed alternatives for remediating the site, answered questions about the site and the problems there, and were prepared to receive verbal comments. A notice of the availability of the Proposed Plan and an announcement of the public comment period and the public meeting was published in the Rockford Sunday Register Star on April 14, 1991.

A response to the comments received during the comment period is contained in the Responsive Summary which is included as part of this Record of Decision as Appendix B.

IV. SCOPE AND ROLE OF RESPONSE ACTION

This Record of Decision addresses the first of potentially two response actions at the Pagel's Pit site. The selected remedial action that is described in this ROD addresses the wastes that have been disposed of at the site and the contaminated groundwater at the downgradient side of the site. This remedial action does not address the groundwater contamination that has been found in the southeast corner of the site.

The second response action at the site will address this southeast corner of the site. Further studies will be undertaken to address the contamination there.

No principal threat has been found at the site. The response action for this site includes containing low level threats. No documentation or physical evidence has been found to indicate the presence and approximate locations of hot spots.

V. SITE CHARACTERISTICS

During the remedial investigation for the Pagel's Pit site, the areas on and around both the Acme Solvent site and the Pagel's Pit site were studied. Additional monitoring wells were installed; groundwater from the shallow aquifer was sampled and analyzed at these wells and many of the other wells in the areas of the two sites; samples of leachate were analyzed; samples of water and sediments from Killbuck Creek were analyzed; and the air at the Pagel's Pit site was monitored. In addition, water levels in many of the groundwater wells were measured several times and permeability testing was performed at some of the monitoring wells. It should be noted that there are no monitoring wells that allow access to the groundwater directly beneath the wastes.

There were four rounds of groundwater sampling; the first two rounds consisted of samples from wells throughout the areas of the two sites and the last two rounds consisted of samples from the wells on or near the Pagel's Pit site. There were five rounds of leachate sampling. During the first three rounds of leachate sampling and the first two rounds of groundwater sampling, the samples were analyzed for volatile organic compounds (VOCs) by gas chromatography (GC) with ten percent of the samples being confirmed by gas chromatography/mass spectroscopy (GC/MS). Analytical difficulties (matrix interference) were observed with these leachate samples, so the final two rounds of leachate samples and the final two rounds of groundwater samples were analyzed by GC/MS. Samples were not analyzed for all parameters in all rounds.

The water table occurs in the fractured dolomite bedrock east of and below the eastern quarter of the Pagel's Pit site. Under the remaining three quarters of the site and west of the site, the water table occurs in the unconsolidated materials. Groundwater flow in the area of the two sites is generally from east to west in the upper aquifer. Beneath the northern portions of the site, groundwater flow is towards the northwest, while beneath the southern portions of the site, the groundwater flow is towards the southwest. North of the site, near Killbuck Creek, groundwater flow appears to be west to southwest towards the creek. South of the site, groundwater flow appears to be west to southwest towards the creek. A potentiometric map using data obtained in June 1988 (the time during which Round 2 groundwater samples were taken) is shown in Figure 3. The groundwater flow direction is perpendicular to a groundwater contour line. (The groundwater elevations in parentheses on this figure are generally for wells screened at elevations below the water table.)

Leachate samples from the Pagel's Pit site were found to contain relatively high levels of chloride ion. Chloride ion was selected by the remedial investigation contractor as an indicator of areas of groundwater that may have been affected by leachate from the landfill; chloride ion is generally recognized as a conservative, non-reactive parameter in groundwater systems. Based on the presence of elevated chloride ion concentrations in the groundwater, leachate from the landfill has been shown to be affecting the groundwater. Figure 4 shows the chloride results for Round 2 of groundwater sampling. Later sampling rounds showed generally similar results, but the chloride concentrations decreased in wells P1, P4R, and G116A and increased in wells P3R, G115, G110, and G114; see Table 1. As can be seen from the figure, the area found to contain elevated chloride ion concentrations extended from about midway along the north border of the landfill (east of well B15R), around the western end of the landfill, and along the south border of the landfill to at least the southwest area (well G115), and probably back into the southeast area of the site as well. Generally, the affected area was relatively close to the waste boundary, but a well on the other side of Killbuck Creek (well G116A) also exhibited elevated chloride concentrations. The depiction of the chloride concentrations with contour lines under the wastes is speculative since no sampling of the groundwater was done there; it is probable that the levels under the wastes do not decrease to the extent shown.

VOCs were found in the shallow aquifer on and in the vicinity of both sites. They were found both inside and outside of the area defined by elevated chloride concentrations. An example of the distribution of these VOCs is shown by the results for chlorinated ethenes, the dominant group of VOCs that were found in the area, for Round 2 of sampling for the Pagel's Pit study (Figure 5). The concentrations of chlorinated ethenes in wells on the Pagel's Pit site and near the waste boundary are shown in Table 1. Note that these chlorinated ethenes were found in a well (well G116A) on the west side of Killbuck Creek. Other groups of VOCs that were found in the groundwater were chlorinated ethanes, BETX (benzene, ethylbenzene, toluene, and xylenes), and 1,2-dichloropropane. The detection of VOCs from the easterly to the westerly direction was as follows: the VOCs detected at well B4, the well in this study with the highest contamination, included chlorinated ethenes, chlorinated ethanes, 1,2-dichloropropane, chloromethane, and BETX; the VOCs associated with wells near Lindenwood Road that are upgradient of the landfill with respect to the general groundwater flow, and not found at well B4, included chlorobenzene, trans-1,3-dichloropropene, and dibromochloromethane; the VOCs detected only in locations downgradient of the waste area included carbon tetrachloride, bromoform, chloroform, bromodichloromethane, and

acetone.

The investigation of the Pagel's Pit site and the recent investigations at the Acme Solvent site revealed that the highest concentrations of VOCs were found in several wells on and close to the Acme Solvent site. The next highest concentrations were found in several wells in the southeast corner of the Pagel's Pit site. However, a connection has not been established between the contamination on and near the Acme Solvent site and the contamination in the southeast corner of the Pagel's Pit site since wells between these two areas either contained no VOCs or contained VOCs at concentrations much lower than those in these two areas. Because a connection was not established with the contamination at the Acme Solvent site and because the southeast corner of the Pagel's Pit site is side-gradient of the waste area, USEPA has decided to treat that area of contamination separately from the rest of the groundwater contamination area. It will undergo further study before a remedial action is chosen to address the contamination there.

None of the dichlorobenzenes were found in well B4 during the first two rounds of sampling, when this well was sampled; no other analyses were done for semi-volatile organic compounds (SVOCs) in this well. The general group of SVOCs associated with wells near Lindenwood Road included 1,2-dichlorobenzene and 1,4-dichlorobenzene; however, all but two of the detections of the two dichlorobenzenes were in wells west of Lindenwood Road. The SVOCs generally detected only in wells downgradient of the waste area were bis(2-ethylhexyl)phthalate (there was one detection near the road), 1,3-dichlorobenzene, acenaphthene, and dibenzofuran. No pesticides or polychlorinated biphenyls (PCBs) were detected in any of the groundwater samples during this RI.

The leachate samples generally contained BETX compounds at higher concentrations than chlorinated compounds, whereas groundwater samples generally showed the opposite. Some SVOCs were detected in limited testing of leachate samples. Some PCBs and pesticides at low levels were also found in some leachate samples. Besides having higher than typical chloride concentrations, the leachate also had higher than typical sodium concentrations.

The groundwater which contained elevated chloride concentrations also tended to contain elevated sodium, potassium, magnesium, manganese, and iron. Other constituents sometimes associated with the same groundwater area included total phenolics, cyanide, arsenic, barium, cobalt, copper, lead, nickel, silver, vanadium, and zinc.

Generally, elevated levels of specific conductance and

alkalinity were found in the groundwater in the wells around the landfill. These wells included some that are nominally upgradient and sidegradient of the landfill, and some of these wells did not contain elevated levels of chloride ion. The increased conductivities indicate that some substances are being added to the groundwater from the landfill, even in the upgradient and sidegradient directions. Since conductivity depends on the presence of ions, among other things, an increase in the conductivity indicates an increase in the presence of inorganic acids, bases, or salts; molecules of organic compounds that do not dissociate in aqueous solution, and this is the case for many of the organics, do not contribute appreciably to the conductivity. Specific conductance data for Round 1 is shown in Figure 6. Specific conductance results are also presented in Table 1.

The shallow aquifer in the area of the two sites serves several nearby residences as a source of water. Five residences with contaminated groundwater, all located along Lindenwood Road, have been supplied with home carbon treatment units under a Consent Order with some of the Acme Solvent PRPs.

No upstream-downstream trends were noted in the results of the sampling of water and sediment from Killbuck Creek. This indicated that the Pagel's Pit site was not having an impact on the water quality there.

During air monitoring, fifteen VOCs were found to be present. However, the data was of limited value because sample holding times were exceeded. The total of the highest concentrations of each of these VOCs found at any location was below the National Ambient Air Quality Standards for hydrocarbons.

VI. SUMMARY OF SITE RISKS

A baseline risk assessment was performed which characterized the extent of contamination and determined the potentially exposed human and ecological population(s) sufficiently to evaluate which risks need to be prevented. The baseline risk assessment was composed of a human health evaluation and an endangerment assessment. The Risk Assessment Guidance for Superfund (RAGS) (USEPA, March 1989 and December 1989) was used in the preparation of the baseline risk assessment which has been reviewed by a regional toxicologist for consistency with guidance pursuant to OSWER Directive No. 9835.15.

The objective of the baseline risk assessment was to assess risks at the Pagel's Pit site regardless of the source(s) of the contamination. For the baseline risk assessment,sampling locations for groundwater west of Lindenwood Road were generally

considered to represent the Pagel's Pit site.

A. Human Health Risks

The human health evaluation was conducted to estimate the risks that people might incur as a result of exposure to contamination from or at the site. The risk assessment was made for both current and potential future site conditions.

Chemicals of potential concern were selected on the basis of the following criteria: a.) positively detected in at least one sample in a medium; b.) detected at levels significantly above the levels in blank samples; c.) detected at levels elevated above naturally occurring levels; d.) only tentatively identified, but which may be associated with the site; and e.) transformation products of chemicals demonstrated to be present. Those chemicals that met one of these five initial selection criteria were considered chemicals of potential concern. The exceptions to this were those chemicals detected in landfill leachate but not in other media and chemicals for which critical toxicity values had not been developed; these latter were evaluated qualitatively.

The chemicals of potential concern identified at the Pagel's Pit site were:

<u>Volatile Organic Compounds</u>

acetone
benzene
bromoform
bromodichloromethane
carbon tetrachloride
chlorobenzene
chloroethane
chloromethane
chloroform
dibromochloromethane
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
1,2-dichloroethene (both)
1,2-dichloropropane
1,3-dichloropropene
ethylbenzene
methylene chloride
tetrachloroethene
1,1,2,2-tetrachloroethane
toluene
1,1,1-trichloroethane
trichloroethene
vinyl chloride

<u>Semi-Volatile Compounds</u>

bis(2-ethylhexyl)phthalate
di-n-butylphthalate
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
diethylphthalate
PAHs (noncarcinogenic)

<u>Metals/Inorganics</u>

arsenic
barium
cadmium
chromium
cobalt
copper
iron
lead
manganese
nickel
nitrate & nitrite
silver
sodium
thallium
vanadium

xylenes (o-, m-, p-)

zinc
cyanide

Pesticides/PCBs

none

Note: PAHs are polynuclear aromatic hydrocarbons.

The Pagel's Pit site is an operating landfill that is expected to be closed in accordance with the regulations that apply to its operations. These regulations require a sanitary landfill cap for closure. It presently has a gas collection system and a leachate removal system, and these are to be operated and maintained after closure in accordance with the regulations. Access to the site is controlled. The primary problem identified for this site and which led to its inclusion on the NPL is possible contamination of the groundwater. Therefore, it has not been necessary to consider certain possible present and future exposure conditions. For example, since the landfill has yet to be finally covered (most of the surface is presently covered by an intermediate cover) and the landfill operations are similar to most operating landfills, consideration of present and future exposure to the soil on the landfill has not been done and this soil has not been tested for chemical contamination.

Under current land use conditions, only one potential exposure pathway was quantified. This was the exposure of children to contact with surface water and sediment and ingestion of sediment during recreation at Killbuck Creek. For the analysis, it was assumed that the children would be exposed once each week for eight months of the year for a period of 10 years. The exposure point concentrations for the surface water and sediments were determined from the lesser of either the 95 percent upper-bound confidence limit of the arithmetic mean or the maximum concentration detected for the four downstream sampling locations. Another pathway, the one arising from inhalation exposure to fugitive chemical emissions released to the air, was qualitatively addressed.

Under future land use conditions, the above two conditions apply in addition to possible exposure to the groundwater, through ingestion, inhalation, and dermal contact, from local wells downgradient of the site. This latter pathway results from the potential installation of new water supply wells near the site or the possible movement of the contaminated groundwater to private wells that exist downgradient of the site or may be installed there. This is not a current pathway because the closest private well (well PW1 which is about 0.4 miles southwest of the landfill) is not presently contaminated. For this analysis it was assumed that the residents would be exposed for 30 years on a daily basis. The exposure point

concentrations were determined from the lesser of either the 95 percent upper-bound confidence limit of the arithmetic mean or the maximum concentration detected. The groundwater data used for these concentration determinations were for the on-site and downgradient wells as well as well G112, which is just east of Lindenwood Road, except for wells B14 and PW1, which did not appear to be affected by artificial sources; this represents a total of 28 wells.

Exposure point concentrations are combined with estimates of media intake rates for the receptors in each exposure pathway to arrive at the receptor's intake. The media intake rates were generally based on USEPA procedures and suggested values.

The relationship between the level of chemical exposure and the magnitude of the toxic effect (dose-response relationship) for each chemical has been determined by applying critical toxicity values (e.g., reference doses (RfDs) and carcinogenic slope factors (SFs)) developed by USEPA. The toxicity values used have been obtained from the Integrated Risk Information System, the fourth quarter Health Effects Assessment Summary Tables (September 1990), or from the Environmental Criteria and Assessment Office (for interim values).

SFs have been developed for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. The product of the SF and the estimated intake provides an upper-bound estimate of the excess lifetime cancer risk associated with exposure to a potential carcinogen at a particular intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SFs. Use of this approach makes underestimation of the actual cancer risk highly unlikely. SFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors are applied.

RfDs have been developed for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. A chronic RfD is an estimate of a lifetime daily exposure level for humans, including sensitive humans, that is likely to be without an appreciable risk of deleterious effects during a lifetime. Estimated intakes of chemicals from environmental media are compared to chronic RfDs. These RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors are applied. These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

Excess lifetime cancer risks (probabilities) are determined by multiplying the intake level by the cancer SF for each chemical of concern. An excess lifetime cancer risk of $1x10^{-6}$ for a specific chemical indicates that, as a plausible upper bound, an individual has a one in a one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ), the ratio of the estimated intake to the RfD. Adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed gives the hazard index (HI). The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

For current and future site conditions, exposure of children to chemicals in Killbuck Creek sediment and water was evaluated. The cumulative HI due to exposure to sediment via both incidental ingestion and dermal contact and to surface water by dermal contact was 0.01, based on reasonable maximum exposures to noncarcinogenic chemicals present. The cumulative cancer risk for the same pathway was calculated to be $6x10^{-7}$ based on reasonable maximum exposures to carcinogenic chemicals present. USEPA recommends that HQs and the HI should be less than one. USEPA recommends that remedies considered should reduce ambient chemical concentrations to levels associated with a carcinogenic risk range of $1x10^{-4}$ to $1x10^{-6}$. Thus, for this pathway, noncarcinogenic health effects are not expected and cancer risks are low.

For current and future site conditions, the release of chemicals to air via volatilization was not considered a substantial route of exposure to humans. This was based mainly on a comparison of the ambient air data, which has limited usefulness, to safe exposure levels for workers. Also, the data did not indicate any increase in the levels of the chemicals downwind from those levels upwind.

For potential future site conditions, noncarcinogenic health effects may be of concern and cancer risks are substantially greater than the USEPA's suggested risk range when the groundwater at the site is considered as a water supply. The cumulative HI due to exposure to chemicals of potential concern in the groundwater was 5 based on reasonable maximum exposures to the noncarcinogenic chemicals present; thus, adverse health effects might be caused by exposure to the groundwater. The majority (84%) of the HI was associated with the potential

exposure to 1,2-dichloroethene (26%), arsenic (5%), barium (7%), manganese (7%), thallium (22%), and zinc (17%). (This HI does not include the contribution from cobalt, which would increase the HI to 100 if it were included. It has not been included because cobalt was detected infrequently (only at two wells in Round 1, and one of these samples was the duplicate) and because only an interim value oral RfD was available and it appeared to be unrealistically low.) The cumulative cancer risk for the same pathway was calculated to be $1x10^{-3}$ based on reasonable maximum exposures to carcinogenic chemicals present. The majority (91%) of the cancer health risk was associated with the potential exposure to vinyl chloride (74%) and arsenic (17%).

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

B. Environmental Risks

The environmental evaluation portion of the baseline risk assessment was done to characterize the natural habitats which may be influenced by the Pagel's Pit site and to estimate the actual or potential effects contaminants might have on these habitats. Killbuck Creek and the nearby wetlands were assumed to be the most sensitive ecological habitats near the landfill. Killbuck Creek is rated a "Class B Stream--Highly Valued Aquatic Resource".

Fish were considered the group of aquatic species that would be the most susceptible to chemical exposure in Killbuck Creek. Effects on fish are not expected based on the concentrations in the water in comparison to the Ambient Water Quality Criteria. Since this sensitive group of organisms appears to be safe from health effects, other aquatic ecosystem effects are not anticipated.

Health risks to the terrestrial environment could not be compared to applicable criteria because floodplain sediment and surface soil samples were not analyzed during the remedial investigation. Visual observations did not reveal any signs of impacts on the terrestrial ecosystem. Also, because of the nature of the contamination at the site (primarily in the groundwater), impacts on the terrestrial ecosystem would not be expected.

VII. DESCRIPTION OF ALTERNATIVES

A. Common Elements

Some components are common to several of the alternatives and these are described here. With all alternatives, it is planned that the landfill would continue to operate until it reaches capacity as long as the rate of filling does not fall below the level specified in this document. If it is decided to close the landfill early, then those components of the remedy that were to be implemented at final closure would be implemented at the time of actual closure. All future operations will be governed by applicable State permits and State regulations. The following alternatives have been evaluated:

Alternative 1	No Action
Alternative 2	Planned Closure
Alternative 3	Clay-Synthetic Membrane Cap
Alternative 4	Off-Site Treatment of Groundwater and Leachate
Alternatives 5 and 5a	On-Site Carbon Adsorption Treatment of Water
Alternatives 6 and 6a	On-Site Air Stripping of Water
Alternatives 7 and 7a	On-Site Photolysis/Oxidation Treatment of Water
Alternative 8	In-Situ Landfill Waste Fixation

Alternatives 2, 4, 5, 5a, 6, 6a, 7, and 7a include an Illinois sanitary landfill final cover system for the wastes that have been deposited at the site. This cover system would meet the recent regulations adopted by the State of Illinois. The cover would be constructed of a low permeability layer followed by a final protective layer. The low permeability layer would consist of a compacted earth layer at least 3 feet thick and would have a permeability that would be no greater than 10^{-7} cm/s. Any alternative to this cover would have at least the performance of this system. The protective layer would consist of soil capable of supporting vegetation, would be at least 3 feet thick, and would protect the low permeability layer from freezing. The final slopes of the cover system would be at a grade that would be capable of supporting vegetation and limiting erosion and would prevent accumulation of water on the cover. The cover would be maintained after installation.

In all of the alternatives except Alternatives 1 and 8, the current landfill gas extraction system would be upgraded. The newest 21 wells would probably be retained, but would be extended upward to accommodate the increased height of the landfill. The other extraction wells would be replaced with new wells, and additional new wells would be placed in the newer portions of the landfill. It is expected that the current system for handling the gas (for example, the blowers and the incinerator) would be able to handle the increased amounts of gas; if this would not be the case, additional handling capacity would be installed. Gas monitoring at selected perimeter

locations would be installed to detect gas migration from the landfill. The need for a perimeter gas recovery system would be evaluated, and it would be installed if necessary. Landfill gas would continue to be used as a fuel or it would be flared. It would be flared if the amount of gas exceeded that which could be used or if the gas were no longer needed for sludge drying or some other appropriate use.

Alternatives 4, 5, 5a, 6, 6a, 7, 7a, and 8 include a groundwater extraction system. The purpose of the system would be to prevent the migration of contaminated groundwater to the west from the waste disposal area. Groundwater would be extracted in a series of wells installed near the western boundary of the site. Further study of the contamination in the groundwater and the flow of the groundwater would be necessary in order to define both the vertical and horizontal extent of the groundwater contamination at the western boundary and beyond so that the extraction system designed would intercept the flow of contaminated groundwater and would recover the contaminated groundwater that exceeds the specified cleanup levels and that had already passed beyond the western boundary. The wells would be sized and spaced to capture the contaminated groundwater flowing from the vicinity of the waste disposal area. They would be operated in a manner that would lead to an efficient blocking operation. The line of extraction wells would stop the advance of the contaminated groundwater. It is expected that the groundwater extraction system would have to operate many years before the contamination in the groundwater at the site boundary would decrease to acceptable levels. At the present time, it is not possible to satisfactorily estimate this time period. The water taken from these wells would be disposed of in different ways in the various alternatives. The descriptions of the alternatives provide further details for this.

In Alternatives 3, 4, 5, 5a, 6, 6a, 7, and 7a, deed restrictions for property development and new well development on and adjacent to the landfill would be sought. Where restrictions on groundwater use because of the contamination from the Pagel's Pit site would result in an inadequate water supply, provisions would need to be made for an alternative water supply. Monitoring of groundwater, surface water, landfill gas, leachate, and the cover system would be carried out and all systems would be properly maintained.

B. Alternative 1: No Action

The Superfund program requires that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, no further action would be taken at the site to address the problems that have been

identified.

At this site, this no action alternative could occur if the landfill suddenly shut down operations and failed to close as required by its permit. The leachate collection and gas management systems would no longer be operated. The contaminating of the groundwater would continue, and there would be no provisions for preventing future development on or very near the site. Funds derived from the financial assurance provisions of Winnebago Reclamation Service, Inc., the operator of the landfill, would be used to place a minimal cover on the landfill and possibly provide additional monitoring.

C. Alternative 2: Planned Closure

Under this alternative, the site would be properly closed when it reached capacity, or a decision was made by the operator to close it early. The Illinois sanitary landfill final cover system and the upgraded landfill gas extraction system described previously would be installed at the site. The leachate collection system would be operated, and the leachate would be sent to the local publicly owned treatment works (POTW) for treatment before being discharged, as is done now; pretreatment of the leachate by the current aeration system would continue with modifications as necessary to continue meeting the POTW's pretreatment requirements. The groundwater would be monitored. The site would be properly cared for according to the terms of its operating permit.

D. Alternative 3: Clay-Synthetic Membrane Cap

The wastes would be covered by a Resource Conservation and Recovery Act (RCRA) Subtitle C compliant hazardous waste cap that would reduce the infiltration of water into the wastes to very low levels and, therefore, reduce the amount of leachate. This cap might consist of two feet of compacted clay on top of the wastes, covered by a synthetic membrane, a sand drainage layer, a geotextile fabric, a soil layer (root zone), top soil, and grass.

The upgraded landfill gas extraction system described previously would be installed. The current leachate extraction system would be upgraded by installing permanent pumps in the manholes and selected gas extraction wells. The leachate would be sent to the local POTW by means of a sanitary service line connected to an existing sanitary sewer; pretreatment of the leachate by the current aeration system would continue with modifications as necessary to continue meeting the POTW's pretreatment requirements. The POTW would treat the leachate before final discharge.

Deed restrictions and monitoring and maintenance, as described in the common elements section, would apply.

E. Alternative 4: Off-Site Treatment of Groundwater and Leachate

In this alternative, contaminated groundwater and landfill leachate would be extracted and sent to the local POTW for treatment. The combined stream would be sent to the POTW by means of a sanitary service line connected to the sanitary sewer. The groundwater extraction system described previously would be used to extract the groundwater. The leachate would be extracted using the system described in Alternative 3.

The Illinois sanitary landfill final cover system and the upgraded landfill gas extraction system described previously would be constructed at the site. Deed restrictions and monitoring and maintenance, as described in the common elements section, would apply.

F. Alternatives 5 and 5a: On-Site Carbon Adsorption Treatment of Water

In Alternative 5, extracted groundwater would be treated on site to remove VOCs and semivolatile organic compounds (SVOCs) by carbon adsorption. The contaminated water would be pumped through two vessels containing the activated carbon, operated in series. Spent carbon would be shipped off site for regeneration or disposal. A solids filter would be used to pretreat the water going to the carbon adsorption vessels to remove suspended solids. The solids removed would be disposed of as their characteristics allow. Ion exchange or coagulation/flocculation would be added for removal of inorganics if this were determined to be necessary to meet discharge requirements or to prevent interference with the organic treatment process. Again, the solids would be disposed of as their characteristics allow. The treated water would be discharged to Killbuck Creek. The discharged water would be sampled periodically to ensure that discharge requirements were being met. The discharge requirements would be those for a National Pollutant Discharge Elimination System (NPDES) permit. The leachate would be transferred to the local POTW as described in Alternative 3.

In Alternative 5a, both the groundwater and the leachate would be treated on-site by carbon adsorption preceded by solids filtration. The leachate would be pretreated for removal of turbidity, solids, and inorganics by pH adjustment, precipitation, flocculation, and sedimentation and these solids would be disposed of as their characteristics allow.

Except for the treatment that replaces transfer to the local POTW, these two alternatives are the same as Alternative 4.

G. Alternatives 6 and 6a: On-Site Air Stripping of Water

Alternatives 6 and 6a are identical to Alternatives 5 and 5a, respectively, except that air stripping would be used in place of carbon adsorption. In addition to the air stripping, carbon polishing of the water leaving the air stripper would be included if it were determined to be necessary to meet discharge limits. The air stripping system would remove volatile contaminants from the groundwater by passing the water through a packed column through which air flows countercurrently to the water. The volatile contaminants in the water would be transferred to the air. It is expected that the air emissions from the column would be low enough that treatment of the vapors would not be required. However, the air emissions would be studied further during the design of the system, and if that study determined that controls would be necessary, controls would be added. This study would include modeling to predict air emissions from the site and might include further air monitoring studies since those done previously had limited value. The discharges from the air stripper would be subject to IEPA approval, could not exceed health-based levels (an excess cancer risk of $1x10^{-5}$ at the nearest residence or business), and would have to meet all federal and state requirements. All solids removed from the fluids being treated would be disposed of as their characteristics allow.

H. Alternatives 7 and 7a: On-site Photolysis/Oxidation of Groundwater

Alternatives 7 and 7a are identical to Alternatives 5 and 5a, respectively, except that photolysis and oxidation would be used in place of carbon adsorption. An ultraviolet photolysis process enhanced by the introduction of ozone or hydrogen peroxide would be used to oxidize the organic contaminants in the water. The treatment unit would consist of a tank with ultraviolet fixtures installed inside.

I. Alternative 8: In-Situ Landfill Waste Fixation

In this alternative, the landfill wastes would be solidified in place (in-situ) by injection of a reagent slurry into the closed landfill. In this fixation process, the wastes are treated by boring into a landfill and adding the reagents. Each boring creates a column of treated material circular in cross section. The wastes are transformed into a stable, solidified mass by the process.

Groundwater would be extracted and treated on site by air stripping as in Alternative 6. There would be no cap with this alternative or gas or leachate extraction systems since these should not be necessary. Deed restrictions, as described in the common elements section, would be sought and groundwater monitoring and care of the site would be performed.

J. Costs

The estimated capital costs, costs for annual operation and maintenance (O&M), and total present net worth costs for the alternatives are given below:

Alternative	Capital Costs	Annual O&M Costs	Present Worth
1	0	0	0
2	$ 5,170,000	$149,000	$ 7,500,000
3	10,850,000	147,000	13,100,000
4	5,850,000	293,000	10,400,000
5	6,240,000	310,000	11,000,000
5a	6,620,000	439,000	13,400,000
6	5,960,000	248,000	9,800,000
6a	6,400,000	296,000	11,000,000
7	6,360,000	327,000	11,400,000
7a	6,940,000	463,000	14,100,000
8	985,000,000	204,000	989,000,000

Note: Alternative 1 (No Action) has no specific capital costs. It has been assumed that there will be no periodic sampling and analysis.

K. Time Required for Implementation

The periods of time required to implement the various remedial actions are comparable. The cover system would be constructed after waste capacity had been reached or a decision to close early had been made. If, however, the rate of waste disposal fell significantly so that the time for closure would extend more than a few years (approximately three years) beyond the presently estimated years of remaining capacity, USEPA would order that closure be implemented before capacity had been reached. The cover system would be installed as the wastes would reach final elevations so that the beginning of the construction of the cover system would be well before final closure of the entire landfill would have to be accomplished. The landfill would be operated according to the terms of its permit and the rules of the State of Illinois during its remaining life. The cover system would be maintained as long as necessary. The fixation process would be implemented on much the same schedule as the final cover system.

The groundwater extraction system would be installed within an estimated two to three years after the decision was made in the

ROD that the extraction system would have to be installed. The length of time this system would have to operate cannot be estimated at this time. However, it would be operated at least until it was demonstrated to USEPA's satisfaction by the results of four quarters of monitoring that the concentrations in the groundwater beyond the extraction area were not exceeding the applicable standards and that the concentrations in the groundwater upgradient of the extraction area were not exceeding values that would, as shown by modeling, lead to an exceedance of the applicable standards in the downgradient groundwater. The system for handling the extracted groundwater would be left in a stand-by condition until at least the following five-year review or for three years, whichever is longer. However, monitoring of the groundwater would continue even beyond that time, and should monitoring indicate that the applicable standards were being exceeded, groundwater extraction would have to be reinstituted to control the contaminated groundwater.

The landfill gas extraction system would be operated until the waste has stabilized enough to no longer produce methane in quantities that exceed the minimum allowable concentrations stated in 35 IAC 811.311. The leachate management system would be operated until treatment would no longer be necessary according to the requirements of 35 IAC 811.309.

Since wastes are being left at the site, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) (hereinafter CERCLA) requires that a review of the remedial action selected be conducted at least every five years after the beginning of the remedial action. This will require that groundwater, leachate, and landfill gas monitoring be continued in order to furnish data for the reviews. With the no action alternative, this review would probably require some minimal amount of sampling and analysis of the groundwater and other media, but the costs for this sampling have not been included for this alternative.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The National Contingency Plan (NCP) requires that an explanation be presented as to how the nine evaluation criteria were used to select the remedy. These criteria are categorized into three groups: threshold criteria (overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs)); primary balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost); and modifying criteria (state acceptance and community acceptance).

The NCP states that containment technologies will generally be appropriate remedies for wastes that pose a relatively low low-level threat or where treatment is impracticable. Containment has been identified as the most likely response action at municipal landfills because: municipal landfill are primarily composed of municipal, and to a lesser extent hazardous, wastes, and therefore, they often pose a low-level threat rather than a principal threat; and the volume and heterogeneity of waste within a municipal landfill often makes treatment impractical. As shown earlier in this document, the Pagel's Pit site is a municipal landfill.

A. Threshold Criteria

1. Overall Protection of Human Health and the Environment

All of the alternatives except Alternative 1 (No Action) and Alternative 2 (Planned Closure) and Alternative 3 (Clay-Synthetic Membrane Cap) provide adequate protection of human health and the environment. Alternatives 1, 2, and 3 do not include groundwater extraction and treatment and consequently do not protect against exposure to contaminated groundwater; Alternative 3 does include institutional controls as protection against exposure to contaminated groundwater in place of an active response measure. The groundwater would be remediated generally until maximum contaminant levels (MCLs) and non-zero maximum contaminant level goals (MCLGs) are reached, as appropriate. When necessary, a carcinogenic risk of 10^{-5} and a cumulative hazard index of one would be used. All of the alternatives except Alternative 1 provide adequate protection against contact with the wastes. All of the alternatives except Alternative 1 provide some protection against the release of contaminants from the landfill by means of gas and leachate extraction; however, Alternative 2 might not provide this protection for as long a period as the other alternatives.

2. Compliance with Applicable or Relevant and Appropriate Requirements

All alternatives except Alternatives 1, 2 and 3, and possibly Alternative 4, should be able to meet the identified ARARs. Alternatives 1, 2, and 3 leave contaminated groundwater in place and do not provide means for preventing its movement away from the site. MCLs and MCLGs set under the Safe Drinking Water Act (SDWA) and National Pollutant Discharge Elimination System (NPDES) limits set under the Clean Water Act (CWA) are ARARs for this site. Alternatives 1, 2, and 3 would not meet the MCLs and non-zero MCLGs in the aquifer, but the groundwater extraction system with the other alternatives would be operated to meet

these requirements or more stringent requirements presented below. On-site treatment units for either groundwater or leachate would meet the NPDES requirements for discharge of the treated water to surface water. If RCRA wastes have contaminated the groundwater at the Pagel's Pit site, then RCRA ARARs may apply to the remediation of the groundwater. This would mean that any residue from the treatment of this groundwater would be a listed waste under RCRA and would have to be treated accordingly. The on-site treatment of the groundwater would be able to meet these ARARs, but these ARARs might make it impossible to send the groundwater to the local POTW for treatment (Alternative 4). The sanitary landfill cover designed to meet the requirements of the applicable Illinois regulations for solid waste landfills would meet the identified ARARs. The exact quantity of RCRA hazardous wastes that may be present in the landfill is not ascertainable. The bulk of the wastes disposed of at the site were household wastes. While consideration of a RCRA Subtitle C cap is relevant, requiring the installation of such a cap would not be appropriate in view of the predominance of solid wastes and lack of evidence of a RCRA hazardous waste problem within the landfill. The RCRA land disposal regulations are not relevant to the selected remedy as no wastes are required to be excavated and disposed of.

B. Primary Balancing Criteria

1. Long-term Effectiveness and Permanence

Alternative 8 could provide the highest degree of long-term effectiveness and permanence because the fixation process could greatly reduce the mobility of the contaminants in the wastes. However, this is a relatively new technology and testing would be required to determine its effectiveness at this site, particularly whether it would fix all of the material in the landfill. The final landfill cover systems included with all alternatives except Alternatives 1 and 8 provide long-term effectiveness with proper maintenance. The covers reduce the mobility of the contaminants by covering the wastes and reducing water infiltration. The covers provide protection against contact with wastes and contaminated soils. Groundwater extraction and treatment provide long-term effectiveness by removing contaminants from the groundwater and preventing the spread of this contamination. Air stripping and carbon adsorption are processes that have been proven to be generally reliable. Management of the landfill gas and leachate provides long-term effectiveness by reducing the migration of contaminants to the groundwater. Since wastes will remain at the site in all of the alternatives, five-year reviews of the protectiveness of the remedy will be required.

2. Reduction of Toxicity, Mobility, or Volume (TMV) Through Treatment

Alternatives 4, 5, 5a, 6, 6a, 7, 7a, and 8 provide extraction and treatment of the groundwater. This will reduce the mobility and volume of the contaminants. Carbon adsorption may reduce the toxicity of the contaminants in the groundwater if these contaminants are destroyed during carbon regeneration. Alternative 7 reduces toxicity by oxidizing VOCs and SVOCs that are present in the groundwater. Treatment of leachate at the POTW reduces toxicity by destroying some of the VOCs and SVOCs. Burning landfill gas reduces its toxicity. Extraction of leachate and gas from the landfill for treatment reduces their mobility. The fixation of the wastes in Alternative 8 may greatly reduce mobility, but testing would have to be done to determine if this would be the case.

3. Short-term Effectiveness

The groundwater extraction in Alternatives 4 through 8 prevents the migration of contaminated groundwater and provides the greatest short-term effectiveness. There is the possibility of a slight impact on local residents from the air stripper emissions in Alternatives 6 and 6a. This would be managed by means of emissions controls, if necessary. Handling of the exhausted carbon in Alternatives 5 and 5a and the wastes from the pretreatment units in Alternatives 5, 5a, 6, 6a, 7, and 7a may present some slight risks to the workers and to others when wastes from these processes are hauled off site for proper disposal. The amount of wastes to be handled would be expected to be greater in the alternatives that are also treating leachate on-site. Installation of the groundwater extraction wells and gas extraction wells and modification of the leachate extraction system might present some risks to the workers. There are some possibilities of risks to residents and workers if the sanitary service line or sanitary sewer being used to transport leachate and contaminated groundwater were to leak. The extraction of gas and leachate from the wastes provides added protection against spreading of contamination. The waste fixation system in Alternative 8 might pose some risks for the workers and the local residents during its implementation since the wastes must be penetrated.

In each of the alternatives involving application of a final cover system and in the alternative involving the fixation process, the landfill would continue to operate until it is full. This should not expose the workers or local residents to excess risks. The present operation of the landfill includes leachate and gas extraction, and the areas of the landfill that are not currently being filled have an intermediate cover that

prevents contact with the wastes. The principal risk identified would be addressed within a short period of time if the groundwater extraction system was installed and operated as soon as possible after the selection of the remedy. This would result in control of the migration of contaminated groundwater. Such control would not be present in the cases of Alternatives 1, 2, and 3.

4. Implementability

Among the alternatives requiring active remedies, Alternatives 2 and 3 would be the simplest to implement. All of the alternatives should be fairly easy to implement except for the fixation process of Alternative 8. A possible future implementation problem might arise in the alternatives in which leachate is sent to the POTW if changes in the content of the leachate occur or regulations regarding waste streams that can be sent to a POTW change. Alternatives 5, 5a, 6, 6a, 7 and 7a require that NPDES requirements be met for discharge of the treated water to Killbuck Creek. There should be no problem meeting these requirements. Alternatives 6 and 6a require that IEPA air requirements be met, which should pose no problem; these alternatives would have to meet all federal and state requirements related to air discharges. The photolysis/oxidation process and the fixation process are fairly new and would have to be tested before they could be implemented. The air stripping and the carbon adsorption processes are well established and should present few technical problems that have not arisen and been solved elsewhere.

5. Cost

The costs of the various alternatives have been presented in Section VII.J. Alternatives 4, 5, 6, 6a, and 7 all cost about the same (from $9,800,000 to $11,400,000 for the present net worth costs). Alternative 1 has essentially no costs associated with it. Alternative 8 is much more than an order of magnitude more expensive than the other alternatives ($989,000,000 for the present net worth cost).

C. Modifying Criteria

1. State Acceptance

IEPA has been involved with the investigations at the Pagel's Pit site throughout the RI/FS process. The State will not concur on this Record of Decision, however. They agree in principle that the selected remedy will address contamination at the site. However, they believe that they will not have the necessary approval rights over the landfill closure and post-

closure activities when implementation occurs because they will not be a party to any settlement that is negotiated. The letter stating their position is in Appendix C.

2. Community Acceptance

Community acceptance of the selected remedy is discussed in the Responsiveness Summary (Appendix B).

IX. SELECTED REMEDY

Based on the comparative analysis of the alternatives, which is summarized above, and the information obtained from the remedial investigation and the feasibility study, USEPA and IEPA have selected either Alternative 5 or Alternative 6 as the most appropriate remedial action for the Pagel's Pit site. The two remedies are very similar, differing only in the manner in which the extracted groundwater is treated at the site. The actual selection of the treatment system to be used will be made during the design of the system. Permitting the choice to be made at that time will allow the selection of the most appropriate system for the task to be performed by allowing for additional information to be used in the decision. The selection will be made using good engineering practice. The treatment system that best meets the removal requirements in a cost effective manner will be chosen. The effectiveness of the carbon adsorption system in removing the contaminants of most concern (for example, single chain chlorinated compounds are not easily adsorbed), the possible inability to remove the more nonvolatile contaminants to the required degree in an air stripper, and the ability of activated carbon to remove some inorganics are some of the items that will have to be considered in the selection. Because of the presence of vinyl chloride in the groundwater, at this time it appears likely that Alternative 6 will be used.

Alternative 5 includes a sanitary landfill cover for the waste disposal area; groundwater extraction along the west side of the site; on-site groundwater treatment by carbon adsorption following pretreatment with a solids filter and treatment for removal of inorganics, if necessary, with the treated water being discharged to Killbuck Creek; leachate extraction and transfer to the local POTW for treatment; gas extraction and use of the gas for fuel or the flaring of the gas; and deed restrictions. Alternative 6 is the same except that air stripping, possibly followed by carbon polishing, is used in place of carbon adsorption. The cost estimates for these two alternatives are presented in Table 2.

As a reminder, the remedial action being selected here does not address the groundwater contamination that was found in the

southeast corner of the site; that contamination will be addressed after additional studies have been conducted.

The sanitary landfill cover has been described in Section VII.A. It will meet the requirements presented in 35 IAC Part 811. However, if, during the period that the landfill continues to operate, the State issues new regulations for landfills of this type that contain requirements for a more protective cap than the one specified here, and these regulations apply to this landfill, then the new cap shall be used. The cap will be installed according to the schedule given in Section VII.K and it will be maintained.

During the remaining years of operation, the landfill will be operated according to the terms of its permit(s) and the regulations of the State of Illinois. This applies to the continuation of present practices and to any future operating practices that may be required, such as the control of runoff from the site. Section 121(e)(1) of CERCLA states that, "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section." During the continued operation of the landfill, the operator will have to develop and operate the site in compliance with all applicable laws and will have to obtain various permits from time to time, when these laws require them. The continued operation of the landfill, involving the placement of wastes in the landfill and the operations associated with this, are not part of the remedial action. Only those actions that are part of the final remedy selected in this ROD and that are conducted entirely on-site are exempt from having permits. Placement of the final cover system and modification of the leachate and gas extraction systems are some of the actions that do not require permits because they are part of the implementation of the final remedy. Placement of wastes, operation of the leachate and gas extraction systems prior to final cover placement, and groundwater monitoring required of an operating landfill are some of the activities that will need permits if they are required by Federal, State, or local authorities because they are part of the day-to-day operations of an operating landfill. Conditions of the current IEPA operating permit must be satisfied.

The groundwater extraction system has been described in Section VII.A. The duration of operation and the conditions under which its operation can be discontinued are discussed in Section VII.K. This system will be installed and operated to prevent the migration of contaminated groundwater from the western edge of the site and to remove any contaminated groundwater that exceeds the levels specified below and that has passed beyond

the western boundary. This will necessitate the full determination of the extent of the contaminated groundwater along that boundary. This extraction system will be operated to maintain the concentrations of contaminants in the groundwater downgradient of the line of wells below the specified levels.

These specified levels are MCLs or non-zero MCLGs, except that a cumulative carcinogenic risk of $1x10^{-5}$ and a cumulative HI of 1.0 will be used for 1,1-dichloroethene, arsenic, and those contaminants without MCLs; groundwater cleanup standards below detection limits using USEPA approved methods for analysis of drinking water may be modified. MCLs and the $1x10^{-5}$ risk level have been selected because concentrations in the neighborhood of a $1x10^{-6}$ risk are often below reasonably achievable detection levels.

This aquifer has been classified as a Class II aquifer under the USEPA's Groundwater Protection Strategy and is widely used as a source of drinking water. The proposed containment of contaminated groundwater is consistent with USEPA's goal of returning usable aquifers to their beneficial use.

The groundwater along the sides and the upgradient boundary of the waste disposal area will be monitored to ensure that contamination is not leaving the site in directions other than along the western boundary.

In Alternative 5 (see Section VII.F), the extracted groundwater will be treated on-site by carbon adsorption to remove VOCs and SVOCs. Extracted groundwater (estimated at roughly 100 gpm from about 6 recovery wells) is first routed to a pretreatment process consisting of a solids filter where the particulate concentration is reduced to an acceptable level. The water then goes to a two-vessel granular carbon adsorption system operating in a series mode. Spent carbon will be transported off-site for thermal regeneration at an approved regeneration facility. Because of the presence of chlorinated compounds, some of which are not easily adsorbed, it may be necessary to add a pretreatment step for their partial removal in order to reduce carbon usage rates. Other treatment, such as coagulation/flocculation or ion exchange, may be used for removal of inorganics if needed to meet discharge requirements or prevent interference with the organics treatment process. These additional treatment steps have not been included in the cost estimate. The treated water (effluent) will be discharged to Killbuck Creek and will be monitored periodically. All solid waste products will be disposed of as their characteristics allow.

In Alternative 6 (see Section VII.G), the extracted groundwater

will be treated on-site by air stripping to remove volatile contaminants. The extracted groundwater first flows through a solids filter and then flows downward through the stripping column. Air blowers will provide counter-current air for stripping of the volatile contaminants. Air emissions from the column are expected to be low enough that treatment will not be required. The discharges from the air stripper will be subject to the approval of IEPA, will not be allowed to exceed health-based levels, and will have to meet all federal and state requirements. Carbon polishing of the water effluent from the stripper and treatment for removal of inorganics will be added to the treatment system if they are needed; they have not been included in the cost estimate. The treated water will be discharged to Killbuck Creek and will be monitored periodically. All solid waste products will be disposed of as their characteristics allow.

The current leachate collection system will be upgraded by installing dedicated pumps in some of the gas extraction wells. The manholes connected to the perforated pipe for leachate collection will be equipped with dedicated pumps. These pumps will be equipped with automatic level switches that will keep the level of leachate no more than one foot above the bottom of the manhole or well. The extracted leachate will be pretreated at the site by the current aeration system; the pretreatment system will be modified as necessary in order to continue to meet the POTW's pretreatment requirements. The extracted leachate will be sent to the POTW for treatment and disposal via a sanitary service line connected to an existing sanitary sewer. The leachate management system will be operated for the length of time specified in Section VII.K.

The gas extraction system will be modified as described in Section VII.A. It will be operated for the length of time specified in Section VII.K. It will be operated so that the standards in 35 IAC 811.311 will not be exceeded.

Institutional controls may be employed. Deed restrictions limiting the development of the property and the placement of new wells on the property and adjacent to the site may be sought voluntarily from owners or compelled to the extent authorized under any applicable local and state laws. If any property with groundwater contamination that is attributable to the Pagel's Pit site requires an alternate water supply, an alternate water supply will be provided. The groundwater, surface water, landfill gas, leachate, and landfill cap will be monitored. The cover system, the gas and leachate extraction, handling, and disposal systems, the groundwater extraction, treatment, and disposal systems, and any other systems installed as part of the remedial action will be properly operated and maintained.

There has been a proposal that a new landfill be constructed on land immediately south of the Pagel's Pit site. This proposal includes the future placing of wastes in the space between the two landfills once the new landfill to the south has been filled. It is further proposed that additional wastes be placed on top of both landfills to a specified elevation. This placement of wastes on the top of the Pagel's Pit site is not part of the wastes that have been mentioned previously which will be placed to reached the presently permitted elevations and capacity. When the presently permitted capacity has been reached, the final cover system will be installed.

Whether additional wastes will be placed on the Pagel's Pit site at the time the south landfill reaches capacity will be reviewed as part of the five-year review process. The deed restrictions for property development will include a prohibition on the use of the land covered by the cover system for any future development that might interfere with the effectiveness of the cover system unless such use is approved by USEPA; this would include the construction of a landfill or the placement of wastes. Construction of a landfill on top of the closed landfill (Pagel's Pit) will require approval of USEPA and the permitting authorities.

X. STATUTORY DETERMINATIONS

The Proposed Plan for the Pagel's Pit site was released for public comment in April 1991. The Proposed Plan identified Alternatives 5 and 6 as the preferred alternatives. USEPA reviewed all written comments received (no oral comments were received) during the comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

A. Protection of Human Health and the Environment

The baseline risk assessment performed for the Pagel's Pit site identified one exposure scenario that resulted in noncarcinogenic health effects that may be of concern and cancer risks that are substantially greater than the USEPA's suggested risk range. This scenario was for the use of the contaminated groundwater at the site as a water supply, and the exposures were due to ingestion of and dermal contact with the water and inhalation of vapors that might arise from the water. These risks are addressed by the selected remedy by extracting the contaminated groundwater before it leaves the site and treating it before discharging it to surface water. This groundwater extraction system will be operated until groundwater leaving the site will result in a cancer risk of no more than $1x10^{-5}$ and a HI

of no more than 1.0 or the contaminant concentration will be less than the MCL (modified in the case of some contaminants).

Since it was known that it was necessary to install a landfill cover system over the wastes, no sampling of the surface soils was done and no risk assessment for exposure to these soils was performed. The landfill cover system and gas and leachate extraction systems will provide the required protection from the wastes that are being left in place.

Use of air emissions controls on the air stripper, if they are required, will protect against exposures during the remedial action. Discharges of treated water to Killbuck Creek will be regulated by the NPDES requirements, which will ensure that the remedial action does not adversely affect the stream.

Based on the present levels of contaminants detected in the aquatic ecosystem, ecological effects are not expected. Based on the fact that the groundwater is the main means by which contamination is transported, terrestrial ecosystem effects are not expected.

B. Compliance with Applicable or Relevant and Appropriate Requirements

Either of the selected remedies will meet all identified applicable or relevant and appropriate requirements, both Federal and State. The following ARARs have been identified.

Chemical specific

- SDWA national primary drinking water standards (40 Code of Federal Regulations (CFR) 141)
- Clean Air Act (CAA) national ambient air quality standards (NAAQS) (40 CFR 50)
- CAA national emission standards for hazardous air pollutants (NESHAPs) (40 CFR 61)
- Illinois water quality standards (35 Illinois Administrative Code (IAC) 302)
- Illinois general effluent standards (35 IAC 304)
- Illinois sewer discharge criteria (35 IAC 307)
- Illinois air quality standards (35 IAC 243)

Action specific

- CWA NPDES administered permit programs (40 CFR 122)
- CWA NPDES standards (40 CFR 125)
- CWA pretreatment standards (40 CFR 403)
- RCRA definition and identification of hazardous waste (40 CFR 261)
- RCRA standards for generators of hazardous waste (40 CFR 262)

- RCRA standards for transport of hazardous waste (40 CFR 263)
- Occupational Safety and Health Act (OSHA) general industry standards (29 CFR 1910)
- OSHA safety and health standards for construction (29 CFR 1926)
- Department of Transportation (DOT) rules for transportation of hazardous materials (49 CFR 107, 171)
- Illinois regulations for solid waste (35 Part 807)
- Illinois regulations for special waste hauling (35 IAC 809)
- Illinois regulations for solid waste disposal (35 IAC 810)
- Illinois standards for new solid waste landfills (35 IAC 811)
- Illinois regulations for permit application (35 IAC 812)
- Illinois procedural requirements for permitted landfills (35 IAC 813)
- Illinois standards for existing landfills and units (35 IAC 814)
- Illinois procedural requirements for exempt landfills (35 IAC 815)
- Illinois waste disposal regulations (35 IAC 700, 702, 703, 705, 720, 721, 722, 723, 724)
- Illinois landfill regulations (35 IAC 729)
- Illinois regulations for prohibition of air pollution (35 IAC 201)
- Illinois regulations for emissions of fugitive and particulate matter (35 IAC 212)
- Illinois organic air emission standards (35 IAC 215)
- Illinois NPDES permit regulations (35 IAC 309)
- Illinois pretreatment programs (35 IAC 310)
- Illinois treatment plant operator plant certification (35 IAC 312)
- Illinois recommended standards for sewer works (35 IAC 370)
- Illinois regulations for major stationary sources construction and modification (35 IAC 203)
- Illinois sulfur limitations (35 IAC 214)
- Illinois carbon monoxide emissions for incinerators (35 IAC 216)
- Illinois nitrogen oxide emissions, fuel combustion (35 IAC 217)
- Illinois sound emission standards and limitations (35 IAC 901)

Location specific

- National Environmental Policy Act, wetlands and floodplains and fish and wildlife (40 CFR 6)
- Illinois floodplains construction permits (Ill. Revised Statutes, Chapter 19, Paragraph 65(f))

To Be Considered Criteria

- SDWA maximum contaminant level goals (40 CFR 141.50)
- CWA proposed sludge disposal criteria and state sludge programs (40 CFR 258, 501, and 503)

C. Cost-Effectiveness

The lowest cost alternative involving some remedial action is Alternative 2, Planned Closure, at $7,500,000 for the total net present worth. This cost approximately represents the cost for the normal closure of the landfill and, therefore, represents a base cost for the remedial action. This alternative does not provide a means for stopping the movement of the contaminated groundwater from the site. The total net present worth for Alternative 6, $9,800,000, is the least costly alternative that provides a barrier to the migration of the contaminated groundwater, something which the remedial action must provide. Alternative 5, with a total net present worth of $11,000,000, is slightly more costly, based upon the assumptions made in the cost estimates, but it might be found during the design to provide some advantages in the treatment of the water. Thus, either alternative is cost effective for providing the protection that is required at the site. No benefit was apparent in treating the leachate on site rather than at the POTW in view of the increased cost. The leachate has been going to the POTW for a number of years, and no adverse effects from this practice have been demonstrated. Treating the groundwater at the POTW has the disadvantage of sending a water to the plant that contains low levels of contamination; the POTW does not allow such materials as stormwater, groundwater, and surface drainage to be sent to the POTW.

D. Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable (MEP)

USEPA and IEPA believe that the alternatives selected represent the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner. The selected alternatives provide the best balance of long-term effectiveness and permanence, reduction of TMV through treatment, short term effectiveness, implementability, and cost, taking into account the statutory preference for treatment as a principal element as well as state and community acceptance.

E. Preference for Treatment as a Principal Element

This site is a sanitary landfill, and it is generally recognized that containment will be the main method of addressing the wastes, which pose only relatively low, long-term threats to human health and the environment.

Treatment on-site is being used to address the contaminated groundwater, which represents the greatest identified health risk. Leachate will be sent to the POTW for treatment. Landfill gas will be burned on-site.

This remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The size of the landfill and the fact that no on-site hot spots representing major sources of contamination have been located preclude a remedy in which contaminants could be excavated and treated effectively. No principal threat has been identified at the site.

Table 1

Selected Groundwater Results, Four Rounds of Sampling												
Well	Chlorinated Ethenes, ug/l				Chloride Ion, mg/l				Specific Conductance, umho/cm			
B15	0.6	3.0	--	--	609.	860.	--	--	4390	5620	--	--
B15P	17.3	15.2	15.0	18.0	14.	15.	13.	10.	660	630	585	610
B15R	22.8	19.8	6.6	10.0	477.	348.	529.	459.	4130	3300	3840	3365
P1	12.0	21.6	7.0	9.0	252.	176.	65.	80.	2200	1610	1220	1255
MW106	18.9	21.2	--	--	430.	378.	--	--	3310	2980	--	--
P3R	16.2	12.1	6.0	7.0	47.	46.	72.	77.	1010	1090	535	1240
P4R	53.9	47.1	30.0	30.0	149.	188.	25.	28.	1380	1360	680	790
G116	0.0	0.0	0.0	0.0	7.	7.	7.	7.	530	625	645	645
G116A	12.3	27.5	12.0	22.0	41.	99.	39.	38.	780	1030	875	950
G115	21.4	23.0	1.0	8.0	40.	48.	178.	191.	1510	1410	1620	1840
B13	243.	268.	219.	215.	28.	32.	33.	34.	1180	1400	1260	1220
P6	89.2	164.	51.0	80.0	16.	18.	16.	20.	640	665	615	655
G110	23.0	127.	8.0	25.6	166.	234.	379.	523.	1420	1820	2380	3590
G114	14.8	11.6	3.0	1.0	42.	44.	176.	134.	1550	1540	2080	1910
B12	137.	116.	--	--	22.	25.	--	--	1550	1510	--	--
G109	24.1	18.6	33.0	4.0	28.	27.	20.	10.	1410	1390	1470	1260
G109A	99.0	115.	107.	73.0	62.	60.	73.	70.	1640	1520	1590	1450
G113	34.4	24.0	--	--	30.	29.	--	--	1680	1620	--	--
G113A	310.	534.	--	--	30.	28.	--	--	1430	1480	--	--

Selected Groundwater Results, Four Rounds of Sampling												
Well	Chlorinated Ethenes, ug/l				Chloride Ion, mg/l				Specific Conductance, umho/cm			
G111	--	57.1	59.0	50.0	--	22.	22.	26.	--	670	755	685
B14	0.0	0.0	--	--	10.	12.	--	--	630	660	--	--
G107	2.2	10.2	--	--	20.	16.	--	--	690	620	--	--
G118R	--	0.0	--	--	--	33.	--	--	--	730	--	--
G118A	0.2	0.0	--	--	12.	14.	--	--	410	617	--	--
G117	0.0	0.0	--	--	28.	26.	--	--	780	770	--	--
B10	23.6	27.7	--	--	15.	17.	--	--	1230	815	--	--
G108	27.7	16.0	--	--	9.	11.	--	--	1010	1080	--	--
B11	1.1	0.8	--	--	5.	6.	--	--	680	760	--	--
B11A	14.1	16.4	--	--	9.	11.	--	--	840	840	--	--
G112	1.1	1.0	--	--	29.	34.	--	--	1310	1430	--	--

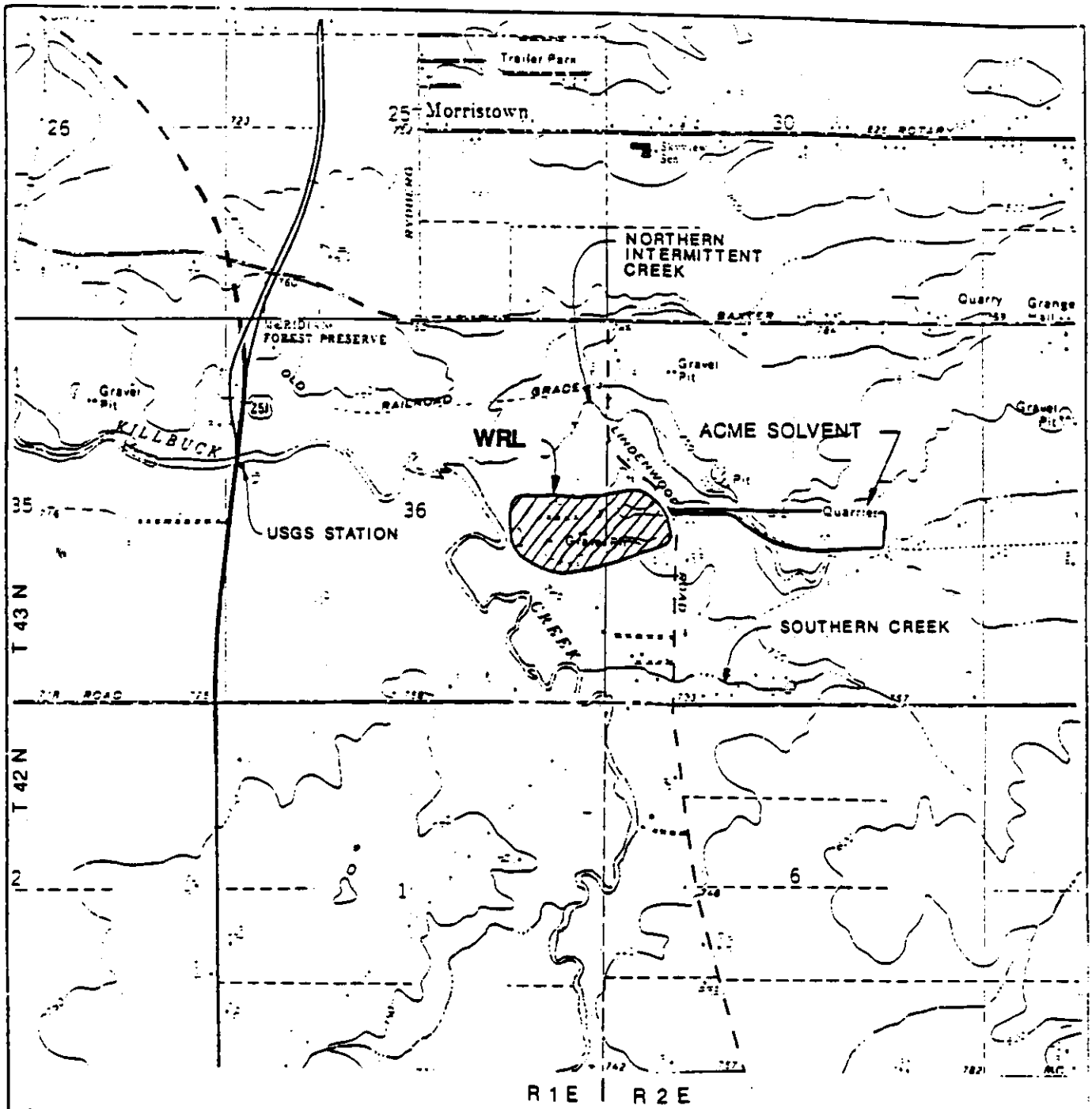
Notes:
- The chlorinated ethenes include vinyl chloride, 1,1-dichloroethene, trichloroethene, tetrachloroethene, trans-1,2-dichloroethene, and cis-1,2-dichloroethene.
- For each parameter, the data are shown for the four rounds of sampling in the order in which the sampling was done.
- Well locations are shown on Figure 4.

Table 2
Cost Estimates for Remedial Action

Alternative 5: On-Site Carbon Adsorption of Groundwater
Alternative 6: On-Site Air Stripping of Groundwater

		Alt. 5	Alt. 6
Direct Capital Costs		**Cost**	**Cost**
IAC 811 Compliant Cap (47 acres)		$2,863,000	$2,863,000
Upgraded Gas Collection System (53 wells)		$412,000	$412,000
Enhanced Leachate Collection System (42 pumps)		$335,000	$335,000
Service Pipeline to POTW Sewer (5000 feet)		$556,000	$556,000
Groundwater Extraction/Collection System (6 wells)		$120,000	$120,000
Groundwater Treatment System		$150,000	$72,000
Organic Pretreatment Contingency		$100,000	--
Groundwater Monitoring Wells (9 wells)		$48,000	$48,000
Total Direct Capital Costs		$4,620,000	$4,410,000
Indirect Capital Costs	**% of Capital**		
Mobilization	5%	$231,000	$221,000
Health & Safety	10%	$462,000	$441,000
Engineering Design	5%	$231,000	$221,000
Startup Costs	5%	$231,000	$221,000
Permits and Documents	10%	$462,000	$441,000
Total Indirect Capital Costs		$1,620,000	$1,550,000
TOTAL CAPITAL COSTS		$6,240,000	$5,960,000
Annual Operation &Maintenance Costs			
Site Maintenance and Monitoring		$41,400	$41,400
Gas Extraction/Treatment System		$25,000	$25,000
Leachate Collection/Treatment System		$16,300	$16,300
Groundwater Collection/Treatment System		$157,300	$95,300
Insurance		$10,000	$10,000
Reserve Fund		$10,000	$10,000
Administrative		$50,000	$50,000
Total Annual O & M Costs		$310,000	$248,000
Total O & M Net Present Worth		$4,770,000	$3,810,000
TOTAL NET PRESENT WORTH		$11,000,000	$9,800,000

Note: Net present worth is based on a 5% discount rate and 30 years.



BASE MAP DEVELOPED FROM ROCKFORD SOUTH, ILLINOIS
7.5 MINUTE USGS TOPOGRAPHIC QUADRANGLE MAP
DATED 1971 PHOTOREVISED 1976

Figure 1. Location of Pagel's Pit Site (Winnebago Reclamation Landfill (WRL))

north

SCALE: 1"=2000'

WARZYN ENGINEERING INC

SITE LOCATION MAP

WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS

DWN | APP'D | DATE | 13160 | A1

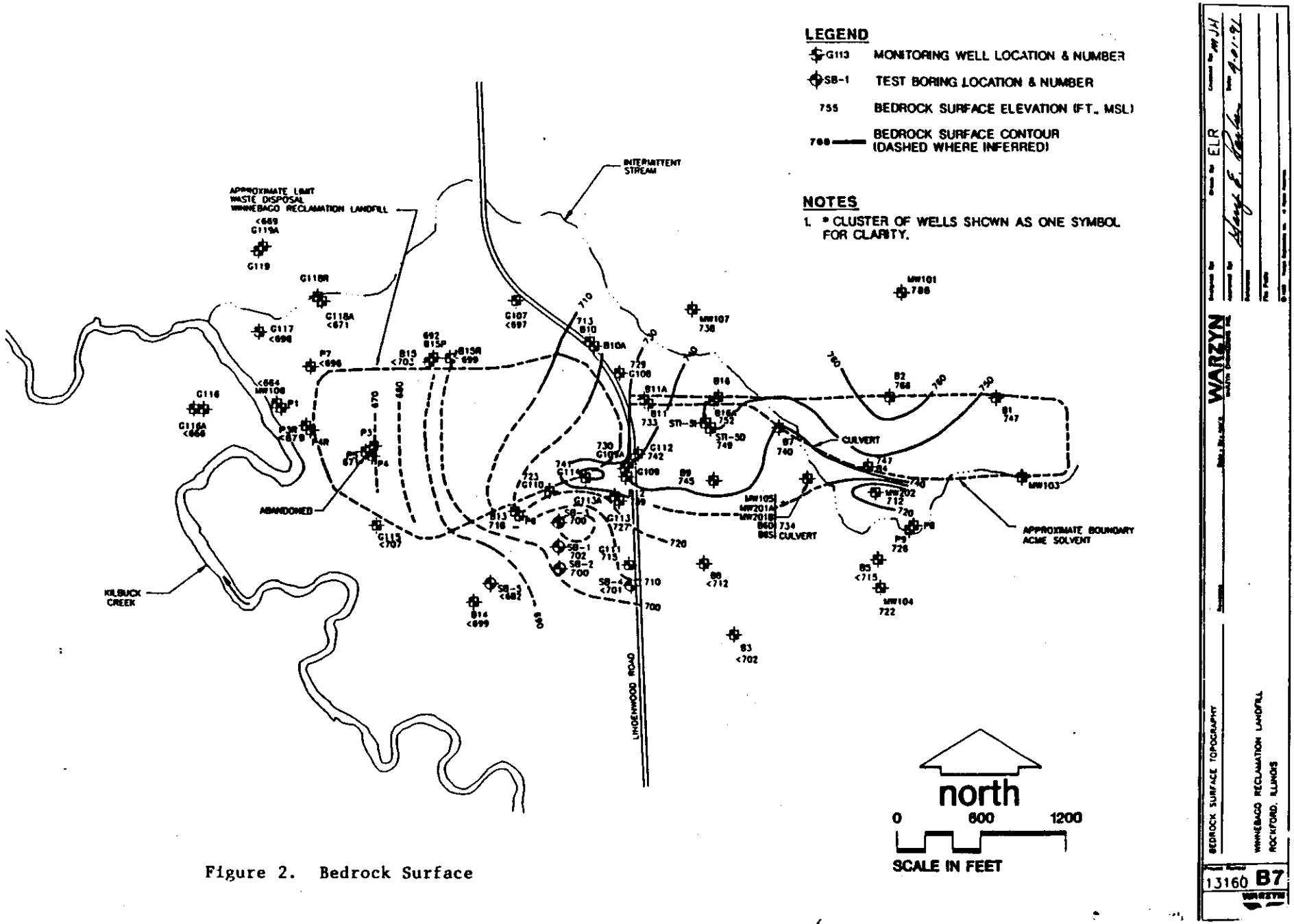


Figure 2. Bedrock Surface

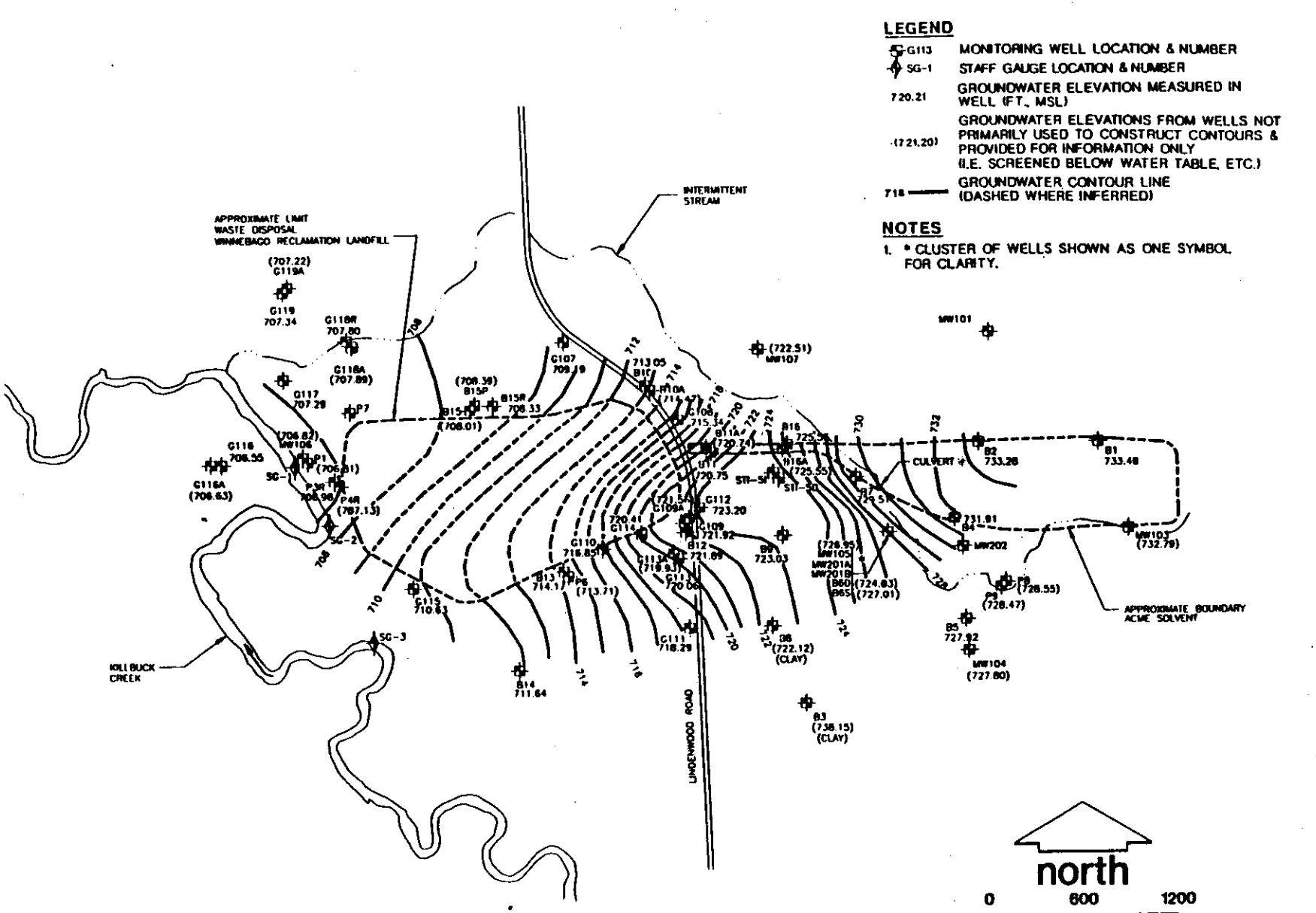


Figure 3. Potentiometric Map, June 16, 1988

WARZYN

POTENTIOMETRIC MAP (JUNE 16, 1988)

WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS

13160B10

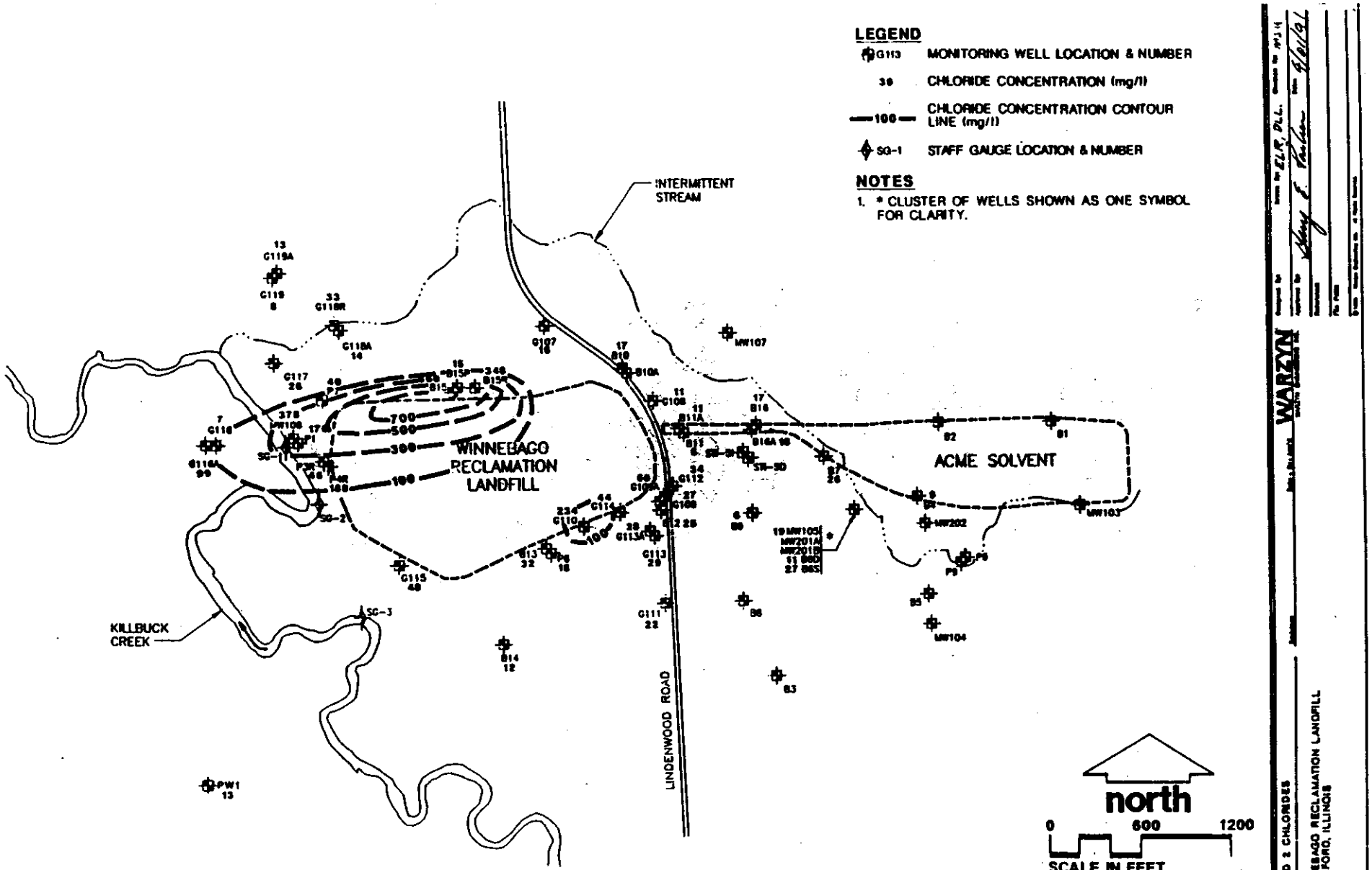


Figure 4. Chloride Concentrations, Round 2

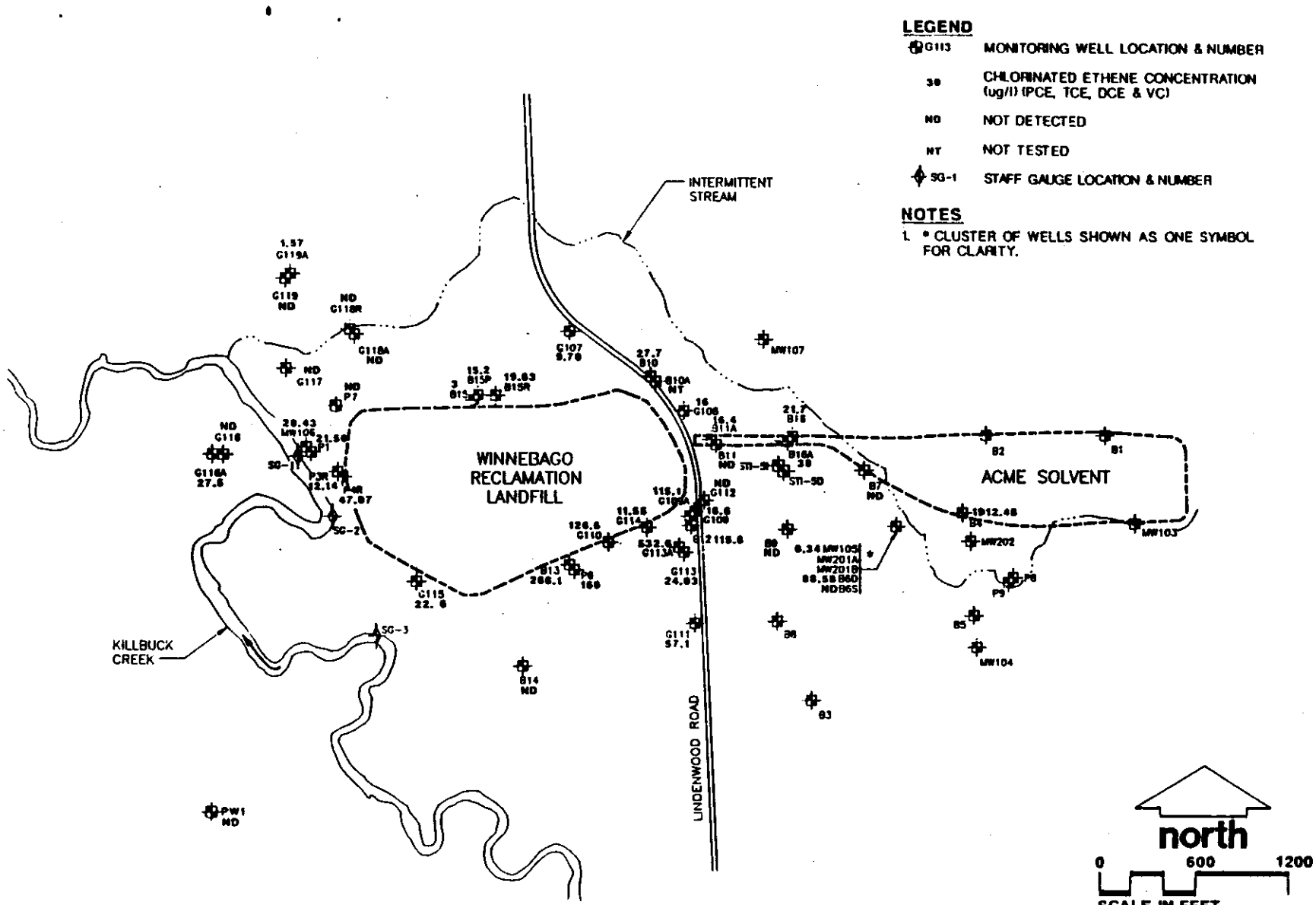


Figure 5. Chlorinated Ethenes Concentrations, Round 2

ROUND 2 CHLORINATED ETHENES
WINNEBAGO RECLAMATION LANDFILL
ROCKFORD, ILLINOIS

13160 B29

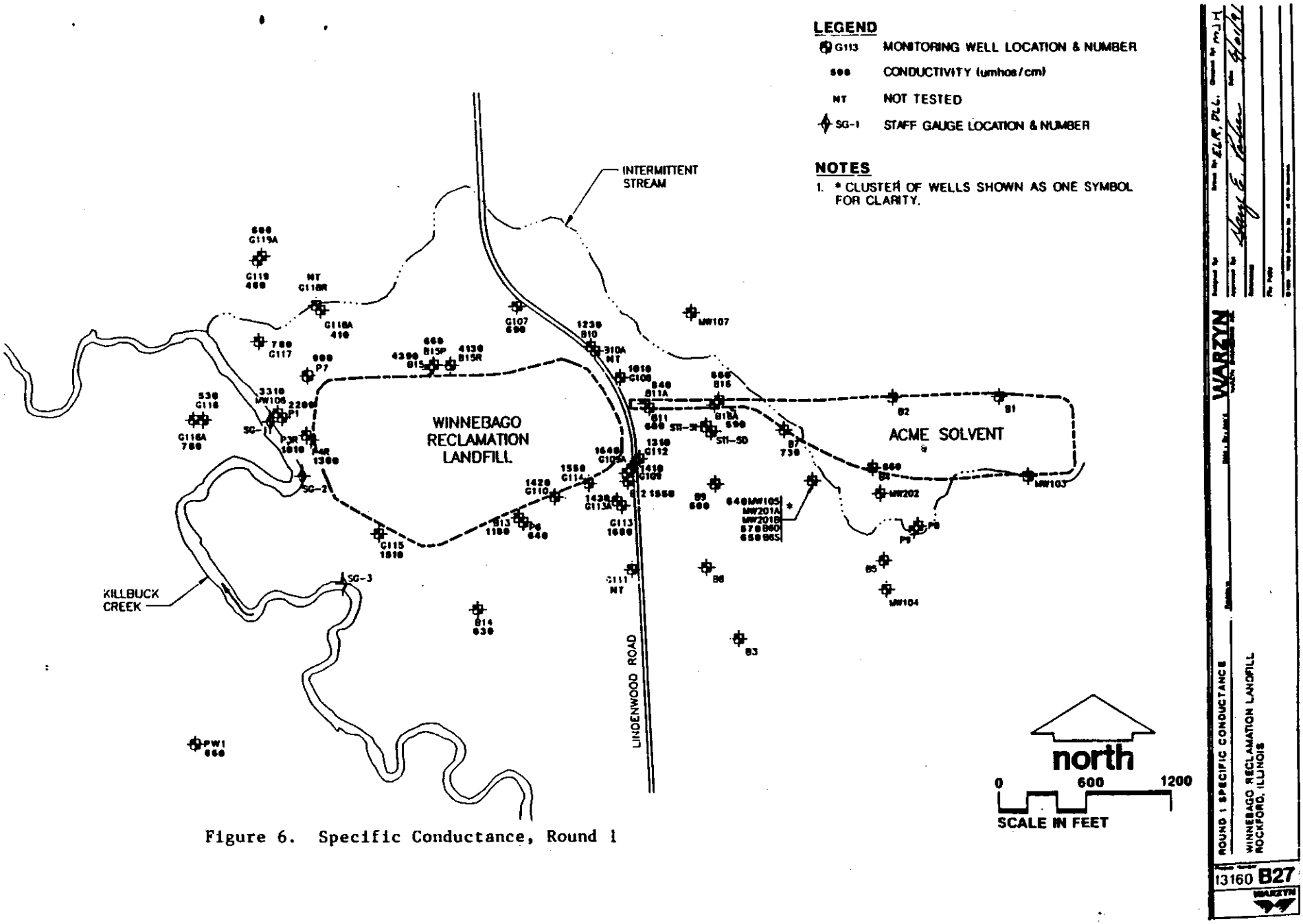


Figure 6. Specific Conductance, Round 1

Appendix A

ADMINISTRATIVE RECORD INDEX
PAGEL'S PIT LANDFILL SITE
ROCKFORD, ILLINOIS

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	3	75/11/20	Letter re: Receipt of series of requests for issuance or renewal of certain supplemental permits	Michael W. Rapps, USEPA	Rockford Blacktop Constr.	Correspondence	1
	5	80/04/28	Letter Re: Hydrogeologic Investigation, Pagel Pit Landfill	Steven G. Wittmann and Daniel R. Viste, Warzyn Engineering, Inc.	C.Howard, Blktop Constr.	Correspondence	2
	4	80/10/10	Letter re: Leachate for the EP Toxicity Test for Pagel Pit	Violet Chen, Sanitary District of Rockford	W. Foristal, RSSI	Correspondence	3
	9	84/04/30	Letter re: Attached copies of Pagel Pit leachate analysis	Richard W. Eick, Sanitary District of Rockford	D. Favero, IEPA	Correspondence	4
	2	84/10/19	Letter re: Proposed Amendment to CERCLA National Priorities List	Ridgway M. Hall, Crowell & Moring	W. Hedeman, USEPA	Correspondence	5
	2	84/10/22	Letter re: Proposed Amendment to CERCLA National Priorities List	Ridgway M. Hall, Crowell & Moring	L. Friedman, USEPA	Correspondence	6
	1	84/10/22	Letter re: Proposed Addition of Pagel's Pit to the National Priorities List	Ridgway M. Hall, Crowell & Moring	R. Bartlett, USEPA	Correspondence	7
	3	84/12/06	Letter re: Proposed Amendment to the CERCLA National Priorities List	Ridgway M. Hall, Crowell & Moring	W. Hedeman, USEPA	Correspondence	8
	7	85/03/27	Letter re: Supplement to Comments in Response to EPA's Notice of Proposal to Add Sites to the CERLCA National Priorities List (Proposed October 15, 1984)	Ridgway M. Hall, Jr., Crowell & Moring	D. Favero, USEPA	Correspondence	9
	9	85/07/12	Letter re: Groundwater level monitoring	James A. Hill and Daniel W. Hall, Warzyn Engineering	C. Howard, Winnebago	Correspondence	10

ADMINISTRATIVE RECORD INDEX
PAGEL'S PIT LANDFILL SITE
ROCKFORD, ILLINOIS

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
				Inc.			
	1	86/08/28	Letter re: Administrative Order by Consent and the date of the press release	Lisa Seglin, USEPA	R. Hall, Crowell & Moring	Correspondence	11
	2	86/10/09	Letter re: Comment period on the Administrative Consent Order (receipt attached)	Lisa S. Seglin, USEPA	G. Marzorati	Correspondence	12
	2	87/01/21	Letter re: Pagel's Pit Administrative Order by Consent, USEPA's comments on Receptor/Pathway Analysis	David Favero, USEPA	G. Marzorati, Winnebago	Correspondence	13
	1	87/10/08	Letter re: Warzyn Project Manager for the Remedial Investigation activities	James A. Hill and Daniel W. Hall, Warzyn Engineering, Inc.	D. Favero, USEPA	Correspondence	14
	2	88/04/22	Letter re: Comments concerning sampling at Pagel's Pit	Robert T. Kay, United States Department of Interior	K. Waldvogel, USEPA	Correspondence	15
	6	89/05/25	Letter re: Enclosed copies of stream flow and water quality data for Killbuck Creek south of New Milford	Robert Kay, United States Department of Interior	B. Schorle, USEPA	Correspondence	16
	3	89/05/31	Letter re: Round IV Leachate Sampling Pagel's Landfill	James A. Hill, Warzyn Engineering, Inc.	B. Schorle, USEPA	Correspondence	17
	15	89/10/16	Letter re: Comments concerning technical matters at Pagel's Pit	Robert Kay	B. Schorle, USEPA	Correspondence	18
	[illegible]	89/10/20	Letter re: Locations of additional wells	Bernard J. Schorle, USEPA	G. Marzorati, Winnebago	Correspondence	19
	3	89/10/24	Letter re: Project Status, Winnebago Reclamation Landfill, Remedial Investigation	James A. Hill and Gary E. Parker, Warzyn Engineering Inc.	B. Schorle, USEPA	Correspondence	20

ADMINISTRATIVE RECORD INDEX
PAGEL'S PIT LANDFILL SITE
ROCKFORD, ILLINOIS

FICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
	2	89/10/25	Letter re: Certified Letter of October 20, 1989 Winnebago Reclamation (Pagel Pit) Landfill	Gary L. Marzorati, Winnebago Reclamation Service, Inc.	B. Schorle, USEPA	Correspondence	21
	4	89/11/13	Letter re: Response to letter of October 20, 1989 requesting Respondents undertake certain additional work	James A. Hill and Gary E. Parker, Warzyn Engineering Inc.	B. Schorle, USEPA	Correspondence	22
	3	90/01/15	Letter re: Update of Table 3 in QAPP, Winnebago Reclamation Landfill	Gary E. Parker, Warzyn Engineering, Inc.	B. Schorle, USEPA	Correspondence	23
	-	90/03/09	Letter re: Additional wells in the area between Winnebago Reclamation Landfill and the Acme Solvent sites	Ridgway M. Hall, Jr. Crowell & Moring	S.Kaiser, USEPA	Correspondence	24
	2	90/05/03	Letter re: March 9, 1990 letter setting forth proposal to share costs and responsibility for the installation of additional groundwater sampling wells	Steven P. Kaiser, USEPA	R. Hall, Crowell & Moring	Correspondence	25
	2	90/10/01	Letter re: Update on status of plan to develop additional landfill space in area south of existing Pagel's Landfill	Gary L. Marzorati, Winnebago Reclamation Service, Inc.	B. Schorle, USEPA	Correspondence	26
	1	90/10/05	Letter re: Request for ARARs and TBCs	Bernard J. Schorle, USEPA	P. Takacs, IEPA	Correspondence	27
	5	90/11/27	Letter re: Identification of ARARs	Paul E. Takacs, Illinois Environmental Protection Agency	B. Schorle, USEPA	Correspondence	28
	7	90/11/30	Letter re: Pagel's Pit Site--ARARs	Bernard J. Schorle, USEPA	G. Parker, Warzyn Eng.	Correspondence	29
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	2	90/11/05	Memo re: Alternatives Array Document(AAD)	William Beyer, USEPA	B. Schorle, USEPA	Memorandum	35
	2	90/11/09	Memo re: TSCA ARARs review of Pagel's Pit NPL Site, Winnebago Reclamation Landfill, CERCLA Alternatives Array Document	Stephen M. Johnson, USEPA	B. Schorle, USEPA	Memorandum	36
	7	90/11/09	Memo re: Toxicity Values (Pagel's Pit/Illinois)	Pei-Fung Hurst, USEPA	B. Schorle, USEPA	Memorandum	37
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	16	83/08/22	Potential Hazardous Waste Site Inspection Report	USEPA		Reports/Studies	49
	163	85/03/27	Report Entitled: Supplemental Investigation Winnebago Reclamation Landfill	Warzyn Engineering, Inc.	USEPA	Reports/Studies	50
	120	85/06/00	Review of RI/FS Work on the Acme Solvents Site	Eugene A. Hickok and Associates	Acme Technical Committee	Reports/Studies	51
	14	86/11/00	QA/QC Data Review - Technical Memorandum	Warzyn Engineering, Inc.		Reports/Studies	52

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	296	87/12/00	Quality Assurance Project Plan, Remedial Investigation/Feasibility Study	Warzyn Engineering, Inc.	Respondent'sSteering Comm.	Reports/Studies	56
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	466	91/03/00	Remedial Investigation Report, Winnebago Reclamation Landfill Volume 2 of 2	Warzyn, Inc.	Pagel's Pit PRPs	Reports/Studies	62
	409	91/03/00	Feasibility Study Report, Winnebago Reclamation Landfill	Warzyn, Inc.	Pagel's Pit PRPs	Reports/Studies	63

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DOCUMENTS LISTED MAY BE FOUND IN THE ACME SOLVENT (AR)
AT THE ROCKFORD PUBLIC LIBRARY, 215 N. WYMAN, ROCKFORD, IL.

DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE
85/02/00	Preliminary Feasibility Study, Technical Report, Acme Solvents Superfund Site	E.C. Jordan Co.	IEPA	Reports/Studies
87/09/00	Final Community Relations Plan, Acme Solvent Site and Pagel's Pit Site	Jacobs Engineering Group, Inc.	USEPA	Reports/Studies
90/02/23	Supplemental Technical Investigation Final Report, Acme Solvents Site	Harding Lawson Associates	USEPA	Reports/Studies
90/08/06	Engineering Evaluation/Cost Analysis Final Report	Harding Lawson Associates	USEPA	Reports/Studies
90/09/20	Remedial Action Alternatives Evaluation Final Report, Acme Solvent Site	Harding Lawson Associates	USEPA	Reports/Studies

GUIDANCE DOCUMENTS INDEX
PAGEL'S PIT LANDFILL SITE
Guidance Documents are available for review at
USEPA Region V-Chicago IL

TITLE	AUTHOR	DATE
Superfund Remedial Design and Remedial Action (RD/RA) Guidance	USEPA	86/06/01
Superfund Federal-Lead Remedial Project Management Handbook	USEPA	86/12/00
Data Quality Objectives for Remedial Response Activities: Example Scenario: RI/FS Activities at a Site with Contaminated Soils and Ground Water (Volume 2)	USEPA	87/03/00
Data Quality Objectives for Remedial Response Activities: Development Process (Volume 1)	USEPA	87/03/00
A Compendium of Superfund Field Operations	USEPA	87/12/01
Community Relations in Superfund: A Handbook (Interim Guidance)	USEPA	88/06/00
Standard Operating Safety Guides	OSHA	88/07/05
CERCLA Compliance with Other Laws Manual, Part I (Interim Final)	USEPA	88/08/00
Guidance for Conducting Remedial Investigations and Feasibility Studies (RI/FS) Under CERCLA	USEPA	88/10/00
Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites	USEPA	88/12/00
Risk Assessment Guidance for Superfund, Volume II: Environmental Evaluation	USEPA	89/03/00

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TITLE	AUTHOR	DATE
Manual		
Applicable or Relevant and Appropriate Requirements (ARARs) Qs & As	USEPA	89/05/00
Control of Air Emissions from Superfund Air Strippers at Superfund Ground Water Sites	USEPA	89/06/15
Guidance on Preparing Superfund Decision Documents: The Proposed Plan, the Record of Decision, Explanation of Significant Differences; The Record of Decision Amendment (Interim Final)	USEPA	89/07/00
Superfund LDR Guide #5: Determining When Land Disposal Restrictions (LDRs) are "Applicable" to CERCLA Response Actions	USEPA	89/07/00
Superfund LDR Guide #4: Complying with the Hammer Restrictions Under Land Disposal Restrictions (LDRs)	USEPA	89/07/00
Superfund LDR Guide #3: Treatment Standards and Minimum Technology Requirements Under Land Disposal Restrictions (LDRs)	USEPA	89/07/00
Superfund LDR Guide #2: Complying with the California List Restrictions Under Land Disposal Restrictions (LDRs)	USEPA	89/07/00

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TITLE	AUTHOR	DATE
Superfund LDR Guide #1: Overview of RCRA Land Disposal Restrictions (LDRs)	USEPA	89/07/00
CERCLA Compliance with Other Laws Manual, Part II: Clean Air Act and other Environmental Statutes and State Requirements	USEPA	89/08/00
Getting Ready: Scoping the RI/FS	USEPA	89/11/00
The Feasibility Study: Development and Screening of Remedial Action Alternatives	USEPA	89/11/00
A Guide to Developing Superfund Records of Decision	USEPA	89/11/00
The Remedial Investigation: Site Characterization and Treatability Studies	USEPA	89/11/00
A Guide to Developing Superfund Proposed Plans	USEPA	89/11/00
Notification of Out-of-State Shipments of Superfund Site Wastes	USEPA	89/11/14
Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part A	USEPA	89/12/00
CERCLA Compliance with Other Laws Manual: CERCLA Compliance with the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA)	USEPA	90/02/00
The Feasibility Study:	USEPA	90/03/00

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USEPA Region V-Chicago IL

TITLE	AUTHOR	DATE
Detailed Analysis of Remedial Action Alternatives		
Guide to Selecting Superfund Remedial Actions	USEPA	90/04/00
Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part A	USEPA	90/04/00
Streamlining the RI/FS for CERCLA Municipal Landfill Sites	USEPA	90/09/00
CERCLA Site Discharges to POTWs: Guidance Manual	USEPA	90/09/00
Basics of Pump and Treat Ground Water Remediation Technology	USEPA	90/09/00

ACRONYM GUIDE for the Administrative Record
Pagel's Pit Landfill Site
Rockford, Illinois

ACRONYM	DEFINITION
AAD	Alternatives Array Document
ARARs	Applicable or Relevant and Appropriate Standards, Limitations, Criteria and Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
HRS	Hazardous Ranking Score
IEPA	Illinois Environmental Protection Agency
LDR	Land Disposal Restriction
NPL	National Priority List
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party
QA/QC	Quality Control/ Quality Assurance
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/ Feasibility Study
RSSI	Raltech Scientific Services, Inc.
TSCA	Toxic Substances Control Act
USEPA	United States Environmental Protection Agency

Administrative Record Update No. 1
Pagel's Pit Site

Preliminary Health Assessment for Pagel's Pit, Rockford, Illinois, January 13, 1989

Memorandum, April 22, 1991, to David Ullrich, Director, (Hazardous) Waste Management Division, Region 5, from Sally Mansbach, Acting Director, CERCLA Enforcement Division, USEPA, Washington, Containment-Only Consultation, Pagel's Pit, Winnebago County, IL

Letter, April 2, 1991, from Paul E. Takacs, IEPA, to Bernard J. Schorle, USEPA, Draft of Proposed Plan

Proposed Plan for the Pagel's Pit Superfund Site, Winnebago County, Illinois, April 1991

Proposed Plan for the Pagel's Pit Superfund Site, Winnebago County, Illinois (Fact Sheet), April 1991

Declaration for the Record of Decision and Record of Decision Summary, Acme Solvent Reclaiming, Inc., December 31, 1990

Transcript of the Public Meeting, Pagel's Pit, (Meeting Date: April 25, 1991), May 1, 1991

Letter, April 20, 1991, from James Lightcap to USEPA, Comments on the Proposed Plan

Letter, May 9, 1991, from Ben Costello, Applied Hydrology Associates, Inc. to Bernard J. Schorle, USEPA, Acme Solvents Site PRPs Comments on the Proposed Plan for the Pagel's Pit Superfund Site Winnebago County, Illinois

Letter, May 13, 1991, from Betty Johnson, The League of Women Voters of Rockford, Comments on EPA Proposed Plan for the Pagel's Pit Superfund Site, April, 1991

Letter, May 15, 1991, from Ridgeway M. Hall, Jr. and Susan R. Koehn, Crowell & Moring, to Bernard J. Schorle, USEPA, transmitting the report "Comments by Pagel's Pit Landfill Participating PRPs in Response to EPA's Proposed Plan for the Winnebago Reclamation Landfill Superfund Site", by The Pagel's Pit Landfill Participating PRPs, May 15, 1991.

Letter, June 3, 1991, from Ridgeway M. Hall, Jr. and Susan R. Koehn, Crowell & Moring, to Bernard J. Schorle, USEPA, Winnebago Reclamation Landfill, and enclosed EPA Guidance, OSWER Directive 9285.6-03 dated March 25, 1991

Memo, June 11, 1991, from Erin Moran, USEPA, to Bernard Schorle, USEPA, Pagel's Pit, Winnebago County, Illinois, Risk Assessment Review

APPENDIX B

RESPONSIVENESS SUMMARY
PAGEL'S PIT SITE
WINNEBAGO COUNTY, ILLINOIS

I. RESPONSIVENESS SUMMARY OVERVIEW

In accordance with CERCLA Section 117, the USEPA and IEPA held a public comment period from April 16, 1991 through May 16, 1991 to allow interested parties to comment on the reports for the remedial investigation and the feasibility study and on the Proposed Plan for remedial action at the Pagel's Pit site. At a public meeting that was held on April 25, 1991, representatives of USEPA and IEPA discussed the proposed alternatives for remediating the site, answered questions about the site and the problems there, and were prepared to receive verbal and written comments.

The purpose of this responsive summary is to document the comments received during the public comment period and the response of USEPA to these comments. All comments summarized in this document were considered in USEPA's final decision for remedial action at the Pagel's Pit site.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The residents on Lindenwood Road near the site have been concerned about this site and the Acme Solvent site since at least 1981. Groundwater wells of some of the residences are contaminated, and this is presently being addressed by some of the PRPs for the Acme Solvent site who have furnished home carbon treatment units for these residences. Being neighbors of an operating landfill causes some concern to the people in the neighborhood, as does the proposal to open another landfill to the south of the present site.

Generally, the site does not appear to cause much concern to people who are not immediate neighbors. News about the site is published, but the attention that is paid to it does not appear to be any greater than one would expect.

At the April 1991 public meeting, no comments were presented. The questioning generally dealt with the Acme Solvent site, the groundwater contamination, the methane gas, the proposed landfill to the south of the present landfill, the continued operation of the Pagel's Pit site as a landfill until it reaches capacity, the future study in the southeast corner of the site, the sludge going to the landfill, and the land purchases by the operators of the Pagel's Pit site in the area.

III. SUMMARY OF SIGNIFICANT COMMENTS RECEIVED DURING THE COMMENT PERIOD AND THE RESPONSES OF USEPA

The comments have been organized into the following categories:

A. Comments from the general public
   1. Comments from the community (including The League of Woman Voters of Rockford)
   2. Comments from the Acme Solvent site PRPs

B. Comments from the Pagel's Pit site PRPs

The comments have been summarized for presentation in this document. The reader is referred to the public repository for the full comments.

A. Comments From the General Public

1. Comments From the Community

COMMENT: A Rockford resident said that it was foolish to place a burden on Rockford for a landfill, apparently referring to the cost of the remedial action.

RESPONSE: When a site may present an imminent and substantial endangerment to public health, welfare, and the environment, USEPA must take some action. The Pagel's Pit site is such a site. Whether taking action at this site will place a financial burden on the citizens of Rockford will depend upon the parties that are named as being potentially responsible and that participate in the remedial design and remedial action, and whether they pass their share of the costs on to the citizens of Rockford.

COMMENT: Alternative 5a is better than 5 because this would result in the reduction of both toxicity and volume for the leachate by destroying most of the volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The report for the feasibility study is quoted, stating that it says that Alternative 5a is one of the simplest to construct and operate because it does not involve discharging leachate to the publicly owned treatment works (POTW) for treatment. It is pointed out that future regulations might make it difficult or impossible to send the leachate to the POTW and this should be anticipated.

RESPONSE: The leachate has been going to the POTW for a number of years, and no adverse effects from this practice have been demonstrated. The quantity of leachate generated at the site is expected to decrease significantly as the final cover is placed on the landfill. This will greatly complicate the design and operation of a process for the treatment of leachate since most processes have only a restricted range of capacity over which optimum results are obtained. Treatment at the POTW will result in the destruction of some of the organics through biological

oxidation, which will be a reduction in toxicity. It is debatable that Alternative 5a is simpler to construct and operate than Alternative 5. It would appear that it would be easier to send a material, with a small amount of pretreatment, through a pipe to another facility than it would be to operate a plant at the site for full treatment, particularly when the plant would not be very large. And, although it is true that regulations might change and cause a significant change in the way the leachate must be handled in the future, this is something that can be addressed at the time that it happens. This is not believed to be reason enough at this time to discontinue a system that has been working for a number of years.

COMMENT: Alternatives 6 and 6a do not include the advantages of Alternative 5a and should not be used. The concern here is with the emissions of VOCs to the atmosphere if no activated carbon is used for removal of VOCs from the stripping gas. It is pointed out that there is no reliable data on ambient air pollution testing at the site.

RESPONSE: It is expected that the air emissions from the air stripping column would be low enough that treatment of the vapors would not be required. If an air stripper is used, the air emissions will be examined further during the design of the system, and if that study determines that controls are necessary, the controls will be added. This study will include modeling to predict air emissions from the site and might include further air monitoring studies since those done previously had limited value. The discharges from the air stripper will be subject to the approval of IEPA, will not be permitted to exceed health-based levels (an excess cancer risk of $1x10^{-5}$ at the nearest residence or business), and will have to meet all federal and state requirements.

COMMENT: A clay-synthetic membrane cap should be used for closure rather than an Illinois sanitary landfill cap in order to reduce the infiltration of water into the wastes to very low levels and therefore reduce the amount of leachate, which could be increased by long-term subsidence.

RESPONSE: The Pagel's Pit site is a sanitary landfill. There is no evidence that RCRA hazardous waste has been disposed of at the site, so a RCRA subtitle C cap would not be required. For these reasons, a sanitary landfill cap has been chosen for the closure. This sanitary landfill cap will be maintained until it can be shown that the maintenance is no longer needed.

COMMENT: The risk analysis does not include other health effects besides cancer, which include non-fatal tumors, birth and genetic defects, and diseases, such as those affecting

kidney and liver functions that may be caused by toxic and hazardous substances in the landfill. Cumulative and synergistic effects on human health and in the environment also need to be considered. Bioaccumulation seems to be ignored when calculating risk of contamination from Killbuck Creek.

RESPONSE: Health effects other than cancer are considered in the reference doses (RfDs) and in the calculations of the hazard quotients (HQs) and hazard indices (HIs). Such effects of concern as effects on the kidney, liver, nervous system, heart, brain, body weight, and reproduction are included. See, for example, Health Effects Assessment Summary Tables, January 1991 for other effects of concern that are considered. Also, Risk Assessment Guidance for Superfund (RAGS), Volume I, Part A (December 1989), on page 8-15 says that the hazard indices include such major effect categories as "neurotoxicity, developmental toxicity, reproductive toxicity, immunotoxicity, and adverse effects by target organs (i.e., hepatic, renal, respiratory, cardiovascular, gastrointestinal, hematological, musculoskeletal, and dermal/ocular effects)."

Adding the HQs to get an HI does add together the effects even though the effects of concern from the various substance might be different. This procedure assumes dose additivity in the absence of information on specific mixtures, which is rarely available.

"Uncertainties associated with summing risks or hazard indices for several substances are of particular concern in the risk characterization step. The assumption of dose additivity ignores possible synergisms or antagonisms among chemicals, and assumes similarity in mechanisms of action and metabolism. Unfortunately, data to assess interactions quantitatively are generally lacking. In the absence of adequate information, EPA guidelines indicate that carcinogenic risks should be treated as additive and that noncancer hazard indices should also be treated as additive. These assumptions are made to help prevent an underestimation of cancer risk or potential noncancer health effects at a site." (RAGS, Vol. I, Part A, p. 8-22)

In the environmental portion of the baseline risk assessment, maximum surface water concentrations were compared to lowest reported toxic chemical concentration for freshwater, ambient water quality criteria. For the VOCs, it appeared that there was little potential for adverse effects based on this comparison, and these substance are not expected to biomagnify. Exposure of fish to inorganic chemicals is not expected to cause adverse health effects based on acute exposure criteria. The chronic criteria is marginally exceeded for cyanide, but the average cyanide concentration was below the criteria. Therefore, deleterious health effects on fish are not expected.

Since the fish appear to be safe from health effects, other aquatic ecosystem effects are not anticipated.

COMMENT: Regulations need to be changed to exclude special wastes from sanitary landfills and reduce and reuse the toxic materials so that they do not contaminate the land, air, and water.

RESPONSE: Sending of these special wastes to sanitary landfill is not the purview of the USEPA.

2. Comments From the Acme Solvent Site PRPs

These comments were submitted by a party who stated that it was the Technical Manager for the remedial design and remedial action, employed by the Acme Solvents PRP Steering Committee. The comments have been presented here as submitted.

COMMENT: "The Proposed Plan contains no indication that the ground water in the St. Peter Sandstone was sampled and analyzed. Without sampling and analysis of the St. Peter Sandstone it may not be possible to accurately characterized the potential for vertical migration of materials from the Pagel's Pit site. We do not understand how it is possible to adequately '...characterize the nature and estimate the magnitude of potential risks to public health and the environment.' from the Pagel's Pit site without information on the potential for vertical migration of materials from the Pagel's Pit site."

RESPONSE: Not all of the studies and information that were in the report for the remedial investigation could be discussed in the few pages of the Proposed Plan, and there never is an attempt to do so. The upper aquifer was sampled at various depths to determine how the concentrations of substances changed with depth. Also, water levels in wells at different depths at essentially the same locations were measured to determine the vertical directions of groundwater flow. During the design of the groundwater extraction system, additional groundwater sampling will be done to make sure that the full extent of the groundwater contamination has been determined so that the needed extraction system can be designed.

COMMENT: "The alternatives that are presented as having been evaluated under the 'Summary of Alternatives' do not seem to address the full range of remedial alternatives that are required by the National Contingency Plan. Specifically, there does not appear to have been any evaluation of an alternative that addresses restoration of any affected ground water resources not immediately adjacent to the Pagel's Pit site. The lack of an evaluation of an aquifer restoration alternative seems unusual in light of the evidence presented that materials

have migrated from the Pagel's Pit site and the potential future use of ground water as a water supply is presented as a primary consideration in the baseline risk assessment."

RESPONSE: The groundwater contamination downgradient of the site that has been found will be addressed by the design and installation of the groundwater extraction system. Of course, the groundwater contamination in the southeast corner of the site will be addressed in the future.

COMMENT: "The elevated levels of conductivity and alkalinity that were reportedly found in the wells '...nominally upgradient and sidegradient from the landfill' could be an indication that the development of the landfill may have altered the local hydrologic regime with the landfill acting as a ground water recharge mound for the shallow aquifer. This is not an uncommon situation around municipal solid waste landfills. Such a condition might easily lead to the contamination identified in the southeast corner of the Pagel's Pit site. However, the statement that '[a] connection has not been established between the contamination on and near the Acme Solvents site and the contamination in the southeast corner of the Pagel's Pit site' could cause a reviewer to believe that there is reason to suspect a more significant connection between the Acme Solvents site and the southeast corner of the Pagel's Pit site than any data seems to support. The Acme Solvents PRPs do not believe such a connection exists and should not be implied."

RESPONSE: The groundwater contamination in the southeast corner is to undergo additional studies in order to further define it. In these studies, an attempt will be made to determine the source(s) of the contamination there. The ROD issued for the Acme Solvent site (signed on 12/31/90) also mentions these further studies.

The level of VOCs in the groundwater in the southeast corner of the site is higher than at any other place near the Pagel's Pit site. However, upgradient of the southeast corner is the highly contaminated well B4, located at the Acme Solvent site. There are elevated levels of VOCs in well G111 which is some distance away from the landfill in a sidegradient direction and which does not have elevated levels of specific conductance. These are some of the reasons that additional studies must be carried out to attempt to determine the source(s) of the contamination in the southeast corner. Since there is the possibility that the extent of the movement through the fractured bedrock of the contamination in well B4 has not been adequately characterized, this is one item that has to be looked at for the additional studies of the southeast corner of the Pagel's Pit site. There is no data that has been generated that shows that there could not be a connection between the contamination in the southeast

corner and the Acme Solvent site.

COMMENT: "The ground water control system described in the Proposed Plan seems to only address affected ground water in the unconsolidated deposits near the western boundary of the site. We are interested in how EPA plans to control any other affected ground water from the Pagel's Pit site, specifically the ground water that may be in the unconsolidated deposits beneath the site but not along the western boundary of the site and the fractured bedrock below the eastern quarter of the site."

RESPONSE: The groundwater at the site is moving generally toward the west and the contaminated groundwater moving in that direction will be intercepted at the western boundary of the site. Reduction in the amount of infiltration into the landfill and time should result in a decreased rate of contamination of the groundwater under the site. The extraction system will be operated until contamination in the groundwater leaving the site does not exceed the criteria specified.

COMMENT: "It may be incorrect to assume that the only source of leachate from the landfill is infiltration of precipitation through the landfill contents. Decomposition of the landfilled materials, in situ moisture content of the landfilled materials and precipitation that falls on the landfill contents during placement will all contribute to leachate formation. As a result it will be necessary to maintain and operate the leachate extraction system until leachate is no longer generated rather than until infiltration is controlled as stated in the Proposed Plan."

RESPONSE: It is recognized that infiltration is not the only source of leachate. The Proposed Plan does not say that the leachate extraction system will be maintained and operated "until infiltration is controlled". In the Proposed Plan in the "Time Required for Implementation" section, it says, "The leachate extraction system would be operated until rainwater no longer leached contaminants out of the wastes." In the "Summary of the Preferred Alternative" section, it says, "Ongoing extraction of gas and leachate until these substances no longer pose a problem should significantly reduce the levels of groundwater contamination."

B. Comments From the Pagel's Pit Site PRPs

These comments were submitted by a law firm that stated that it was representing the Pagel's Pit Landfill Participating PRPs. The comments were submitted in the form of a report that contained a considerable amount of background and claimed supporting material. In much of this, the work done for the remedial investigation and feasibility study was attacked. This

background and supporting material is generally not presented here; their original report is to be consulted for that. What follows are the comments made along with some of the supporting material.

In much of the background and claimed supporting material there are some misstatements of the facts as presented in the reports for the remedial investigation and feasibility study. There are some incorrect references and unsupported claims and conclusions. Generally, no attempt has been made here to comment on these.

COMMENT: "In addition, while the source of vinyl chloride contamination may not be particularly relevant to the effects of the contamination itself, the Pagel's Pit Landfill PRPs do point out that vinyl chloride is a biodegradation product of precisely those solvents, i.e., tetrachloroethene (PCE), trichloroethene (TCE), and 1,1- and 1,2-dichlorethenes (DCE), that were disposed of at the Acme Solvents site and detected in wells between the WRL and Acme Solvents sites. (RI, pp. 4-40 to 4-45). Therefore, any discussion of the hydrogeology in the WRL area that EPA decides to include in the Record of Decision must recognize this fact. (See Section 4 of the Remedial Investigation Report for a detailed discussion of groundwater releases from the Acme Solvents site and their degradation products)."

RESPONSE: There are chlorinated ethenes in many of the wells throughout the area. The remedial investigation did show that leachate from the landfill was affecting the groundwater. There are chlorinated ethenes in the leachate. The report for the remedial investigation did not consider all of the possible mechanisms that could have caused chlorinated ethene contamination in the groundwater. The report for the remedial investigation did not establish that none of the chlorinated ethene contamination in the groundwater in the neighborhood of the landfill could have come from the landfill. The remedial investigation and the feasibility study for the site must address the contamination that exists at the site. This is being done, except for the contamination in the southeast corner of the site.

What is requested to be included in the Record of Decision is not clear. Certainly not all of the results of the remedial investigation and the feasibility study can be put in the Record of Decision. It is generally more appropriate to use the limited room available for reporting the facts that have been determined rather than the speculation that has been put forth.

COMMENT: The baseline risk assessment was not properly done, and the risks for the future use of groundwater are not as great

as what has been determined. A very lengthy discussion is presented to back up this claim. One of the main arguments is that the toxicity values used should not have been used.

RESPONSE: The baseline risk assessment was generally done in accordance with the requirements of the Risk Assessment Guidance for Superfund (RAGS) (USEPA, March 1989 and December 1989). While someone may not agree with this guidance, this is what is to be used in the Superfund program. The critical toxicity values were taken mostly from the Integrated Risk Information System or the fourth quarter Health Effects Assessment Summary Tables, September 1990. These are the correct sources (see RAGS, Volume I, Part A, pp. 7-13ff).

COMMENT: Alternative 2 should be chosen. To say that this alternative would not provide adequate protection of human health and the environment has no merit.

RESPONSE: The baseline risk assessment showed that future possible use of the groundwater at the site as a water source will result in unacceptable risks to the users. Therefore, the groundwater must be addressed in any acceptable alternative. Alternative 2 does not address this groundwater.

Also, section 300.430(a)(1)(iii)(F) of the NCP states, "EPA expects to return usable ground waters to their beneficial uses whenever practicable, within a timeframe that is reasonable given the particular circumstances of the site. When restoration of ground water to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated ground water, and evaluate further risk reduction." Alternative 2 would not prevent further migration of the plume.

COMMENT: Alternative 2 does not meet the ARARs because it leaves contaminated groundwater in place. There has been debate over the effectiveness of groundwater extraction and treatment. Support exists for an ARAR waiver because "compliance with such requirements is technically impracticable from an engineering perspective" and because "the remedial action selected [in this case planned closure] will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method or approach". Thus Alternative 2 is consistent with the remedial requirements of Superfund.

RESPONSE: An ARAR waiver because compliance is technically impracticable is not supported. It is technically practicable to block the further migration of contaminated groundwater. An ARAR waiver because planned closure alone will result in the same performance as planned closure plus groundwater extraction

is not supported. Planned closure, which will not occur for a number of years, will not result in the relatively quick checking of the movement off the site of the contaminated groundwater that groundwater extraction will. Planned closure will probably not prevent the further transfer of leachate to the groundwater, only reduce the amount. Alternative 2 does not meet the remedial requirements of Superfund because it does not prevent migration of contaminated groundwater.

COMMENT: Alternative 2 plus institutional controls on new well development in contaminated zones and deed restrictions for property development provide reasonable measures to eliminate future risks.

RESPONSE: These institutional controls will not prevent the migration of the contaminated groundwater. There is a reasonable, cost-effective method for doing that, groundwater extraction, and no convincing reason for not using this method has been presented.

COMMENT: If USEPA does not adopt Alternative 2, then it should select Alternative 6 rather than Alternative 5. Alternative 6 would achieve each of USEPA's nine criteria. Alternative 6 is not as costly as Alternative 5.

RESPONSE: In the Record of Decision, USEPA and IEPA are choosing both Alternatives 5 and 6. The decision as to which should be used will be made during the design when more information is available for the decision. Each has some advantages and disadvantages, and these can better be weighed later.

COMMENT: USEPA is wrong in claiming that a connection between the contamination at the Acme Solvent site and the contamination in the southeast corner of the Pagel's Pit site has not been established. Measurable levels of VOCs have been found in the groundwater between the sites. The presence of significant levels of VOCs "upgradient of the WRL between the area south of the WRL site and west of Lindenwood Road and at well B4 at the Acme Solvents site" are indicated. The majority of the VOCs present in the area of the WRL are the same types of VOCs that were disposed of in the 1960's and early 1970's at the Acme Solvent site, and their degradation products.

RESPONSE: It is recognized that measurable concentrations of VOCs have been found between the Acme Solvent site and the southeast corner of the Pagel's Pit site. However, concentrations found between these areas are much lower than concentrations at the two areas. Thus, it is difficult to make a convincing case that the two areas are connected.

COMMENT: It is claimed that it is unfounded to say, as the Proposed Plan states, that the "chloride leachate plume" probably extends back to some of the southeast corner.

RESPONSE: Wells G109A, G110, and G114 in the southeast corner definitely have elevated levels of chloride. Wells B13, G113, and G113A probably have elevated levels of chloride. Thus, the statement in the Proposed Plan is supported.

COMMENT: The Proposed Plan is quoted with regard to the statement that if RCRA wastes have contaminated groundwater at the Pagel's Pit site, then RCRA ARARs would apply to the remediation of the groundwater. The commenter says that there is no evidence of RCRA wastes going to Pagel's Pit.

RESPONSE: The statement in the Proposed Plan about RCRA wastes did not state that RCRA wastes have gone to Pagel's Pit. What is being referred to here is the fact that listed wastes did go to the Acme Solvent site, and if some of the VOCs in the groundwater at the Pagel's Pit site are due to the contamination at the Acme Solvent site, then remedial action on the groundwater may be subject to RCRA ARARs.

Illinois Environmental Protection Agency P.O. Box 19276, Springfield, IL 62794-9276

217/782-6760

Refer to: L2018080001 -- Winnebago County
Pagel's Pit -- New Milford
Superfund/Compliance

June 26, 1991

Mr. David A. Ullrich, Director
Waste Management Division
United States Environmental Protection Agency, Region V
230 South Dearborn Street
Chicago, Illinois 60602

Dear Mr. Ullrich:

The Illinois Environmental Protection Agency (IEPA) is in receipt of the proposed Record of Decision (ROD) for the Pagel's Pit Superfund Site. IEPA has found that the selected remedy proposed by the United States Environmental Protection Agency (USEPA) 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.

Although IEPA has agreed in principle that the proposed remedy would effectively address contamination at this site, we are unable to concur on this ROD because of serious concerns over the manner in which a portion of the remedy would be administered. The section of the ROD concerning landfill closure and post-closure activities should be administered by IEPA since Illinois regulations govern. Because the State will not be participating in settlement negotiations addressing remediation due to the unacceptable role in which the State would be placed under the current Model CERCLA RD/RA Consent Decree, IEPA will not have the necessary approval rights over the landfill closure and post-closure activities when implementation is proposed. In effect, IEPA's ability to enforce Illinois regulations would be eliminated.

In the spirit of cooperation, IEPA will assist USEPA to the best extent possible in the implementation of the remedy. Please do not hesitate to contact us should the need arise.

Respectfully,

William C. Child

William C. Child, Manager
Division of Land Pollution Control
Illinois Environmental Protection Agency

cc: Mary Gade
Bernie Killian
Roger Kanerva
William Child
Gary King
Administrative Record

DATE DUE

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