



EPA Superfund Record of Decision:

Kummer Sanitary Landfill, MN



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16. Abstract (Limit: 200 words) <p>The 35-acre Kummer Sanitary Landfill site is an inactive mixed municipal waste landfill in Northern Township, Beltrami County, Minnesota, approximately one mile west of Lake Bemidji. A large residential area lies approximately 1,000 feet east of the site, and there is a hospital directly southwest. The privately owned landfill was operated from 1971 until 1985; however, business records for the site are virtually nonexistent. Operations at the landfill caused the State to take a number of administrative and enforcement actions. Following the discovery of ground water contamination in Northern Township in 1984, the State issued a public health advisory concerning the well water and provided a temporary water supply. Two previous Records of Decision (RODs) in 1985 and 1988 documented the provision of an alternative water supply for the Northern municipal water system as Operable Unit 1 (OU1), and a source control Operable Unit (OU2), which included a cover system to control the source of contamination (OU3). This final ROD addresses ground water contamination. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and vinyl chloride.</p> <p>(See Attached Page)</p>			
17. Document Analysis a. Descriptors Record of Decision - Kummer Sanitary Landfill, MN Third Remedial Action - Final Contaminated Media: gw Key Contaminants: VOCs (benzene, PCE, TCE) b. Identifiers/Open-Ended Terms c. COSATI Field/Group			
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EPA/ROD/R05-90/134
Kummer Sanitary Landfill, MN
Third Remedial Action - Final

Abstract (Continued)

The selected remedial action for this site includes ground water pumping and treatment using advanced oxidation processes (e.g., ozone, hydrogen peroxide, or ultraviolet light), and lime soda softening, as necessary, to precipitate alkalinity and other inorganic compounds, followed by disposal of the precipitate sludge, polishing the effluent stream with granulated activated carbon, and discharging treated ground water to an onsite infiltration pond; and ground water monitoring. Treatability studies for bioremediation as a more cost-effective remedy are planned; however, the ROD will be amended if the treatment is changed to biotreatment. The estimated present worth cost for this remedial action is \$1,800,000-\$6,200,000, which includes an annual O&M cost of \$240,000-\$510,000 for 30 years.

PERFORMANCE STANDARDS OR GOALS: Contaminants of concern in the ground water will be reduced to meet current and proposed Maximum Contaminant Levels (MCLs) including PCE 5 ug/l (proposed MCL), TCE 5 ug/l (MCL), and benzene 5 ug/l (MCL); thereby reducing cumulative residual carcinogenic risk due to ingestion to 10^{-6} .

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Kummer Sanitary Landfill
Northern Township, Beltrami County, Minnesota

Statement of Basis and Purpose

This decision document presents the selected remedial action for the Kummer Sanitary Landfill, Northern Township, Minnesota, 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 and, to the extent practicable, the National Contingency Plan.

This decision is based on the contents of the administrative record for the Kummer Sanitary Landfill site. The attached index identifies the items that comprise the administrative record upon which the selection of this remedial action is based.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action in this Record of Decision, may present current or potential risks to public health and welfare and to the environment.

Description of the Selected Remedy

This operable unit is the final action of three operable units for the site. The first operable unit at this site involved installation of a municipal drinking water system. The second operable unit involved a final cover for the landfill. The third operable unit involves the contaminated ground water. The selected remedy consists of the following components:

- Extraction of contaminated ground water
- Treatment of contaminated ground water by advanced oxidation processes
- Discharge of treated ground water using an infiltration pond

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. This remedy utilizes permanent solutions and alternative treatment technology, to the maximum extent practicable, and satisfies the statutory

preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element.

However, the size of the landfill precludes a remedy in which possible contaminants in the landfill could be excavated and treated effectively. Thus, this remedy may result in hazardous substances remaining on-site above health-based levels. A review will therefore be conducted within five years of commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

State Concurrence

The Minnesota Pollution Control Agency (MPCA) played a major role in the Remedial Investigation/Feasibility Study (RI/FS) process as the lead agency and concurs on the selected remedy. The MPCA has indicated that research in bioremediation of contamination similar to that found at Kummer is underway and may, in the future, provide a reasonable alternative or an additional component of remediation to that which is selected in this document. The MPCA believes that a timely and appropriate bioremediation study is warranted for the Kummer Sanitary Landfill Site.

MPCA believes that Alternative III - ground water extraction and treatment via a plume barrier system for aquifer restoration - presents the best balance among the nine evaluation criteria.



Valdas V. Adamkus Date
Regional Administrator
- U.S. Environmental Protection Agency, Region V



Gerald L. Willet Date
Commissioner
Minnesota Pollution Control Agency

**RECORD OF DECISION SUMMARY
KUMMER SANITARY LANDFILL
OPERABLE UNIT 3**

I. SITE NAME, LOCATION AND DESCRIPTION

The Kummer Sanitary Landfill is located in Northern Township, Beltrami County, Minnesota, approximately one mile west of Lake Bemidji. The site is located along the north side of Anne Street, N.W., and midway between U.S. 71 and County State-Aid Highway 15. The northern corporate limits of the City of Bemidji are one-half mile south of the site (Figure 1.).

Northern Township has a population of 4,095 (1986 data) and is generally sparsely populated. Most of the township residents live in the southeastern section of the township near the City of Bemidji and along the western shore of Lake Bemidji. To the north and west of the site the land is sparsely settled with isolated residences. The closest residential building is the Kummer residence located on-site in the extreme southeast corner of the property. A large residential area lies approximately 1,000 feet further to the east and a hospital is located directly southwest of the landfill.

The property is over 40 acres in size, with the actual landfill occupying approximately 35 acres. The landfill has relatively steep outslopes and a gentle sloping to flat upper surface. The present landfill cover is very permeable, consisting of material excavated from sand and gravel deposits from the extreme northern portion of the site.

The terrain in the immediate vicinity of the site is very gently rolling. The site is bounded on the east and west by pasture, and on the north by woodlands and a bog. To the south, Anne Street provides a boundary between the landfill and wooded area containing a gravel pit. Surface elevations at the site range from about 1,360 to 1,380 feet above mean sea level (MSL). Local surface drainage is generally northward. Approximately one-half mile to the north, a modified stream channel or ditch carries runoff to Lake Bemidji, but runoff from the site infiltrates into the soil before reaching this ditch.

The region is characterized by flat to gently rolling terrain to the north and gently rolling terrain to the south. Surface elevations range from approximately 1,050 to 1,550 feet above MSL. The area contains numerous wetlands and lakes.

The Kummer Sanitary Landfill is located within the Mississippi River Headwaters Watershed. The ground water reservoir contains the largest quantity of water available within the area. Ground water discharge provides at least part of the base flow of streams and uniform lake stages.

The landfill site is underlain by glacial outwash deposits of

sand and gravel mixed with some silt and clay. The sands of the glacial outwash deposits continue approximately 100 feet below the average site elevation. Well logs from on-site monitoring wells and residential wells located within two or three miles of the site indicate the top of a discontinuous clay layer at a depth of 36 to 45 feet.

Ground water in the glacial outwash sands flows generally to the east, where it eventually discharges into Lake Bemidji. Water from Lake Bemidji is used for fisheries, recreation, industrial consumption, agricultural purposes and by wildlife. The average linear velocity is .075 feet per day to 7.2 feet per day, calculated from an estimated hydraulic conductivity of 10 to 120 feet per day for the outwash sands of the aquifer. The hydraulic gradient of the water table ranges from 0.0024 feet/foot to .0030 feet/foot.

Ground water use in the Bemidji area is limited to the unconsolidated deposits above bedrock. The City of Bemidji's primary water supply wells are located one and one-quarter miles west and hydrologically upgradient of the site and are pumped from a depth of about 160 feet. An aquifer test analysis completed by Barr Engineering in 1989 concluded that pumping at Bemidji's well field would neither reverse the gradients at nor pull in contamination from the landfill. The depth of contamination at the landfill is limited to the upper 30 to 50 feet of the aquifer.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Kummer Sanitary Landfill was opened in 1971 with solid waste permit number 31 from the Minnesota Pollution Control Agency (MPCA). Until 1983, the landfill accepted material described only as "mixed municipal waste".¹ The waste was deposited in the landfill using a trench and fill technique, and early trenches were located along the southern, western and northern borders. Cover material was excavated from borrow areas within the landfill property, and these borrow areas later became active landfill disposal sites. The landfill area occupied a major portion of the property by 1984. A demolition debris disposal area near the eastern edge of the site was opened in 1974, and is known to contain fly ash and sawdust.

During the pre-RI investigation, ground water samples were collected from the landfill monitoring wells and residential wells by MPCA staff. Twenty-five volatile organic compounds (VOCs) were found, including 1,1,2,2-tetrachloroethene, benzene,

¹ / The Minnesota Waste Management Act of 1980 includes certain industrial wastes in this definition.

1,2-dichloroethane and 1,1,2-trichloroethene (Table 1).

Enforcement History

During the operating life of the landfill, poor operations at the site caused the MPCA to take a number of administrative and enforcement actions.

On March 6, 1979, a Notice of Noncompliance was issued to Jon Kummer for failing to comply with MPCA Solid Waste Rule 6 (SW-6).² A Notice of Violation was then issued to Jon Kummer on May 15, 1979, for his failure to comply with Rule SW-6. Jon Kummer failed to comply with the requirements of corrective action set out by both these notices.

On December 18, 1979, Jon and Charles Kummer entered into a Stipulation Agreement with MPCA in order to bring the landfill into compliance with Minnesota rules and regulations. However, the MPCA later found that conditions in the Stipulation Agreement were being violated, and that there were continued violations of MPCA Rule SW-6.

On April 19, 1983, the State commenced legal action against Jon and Charles Kummer for alleged violations of Minnesota statutes, MPCA solid waste and water quality rules, and the December 18, 1979 Stipulation Agreement. The lawsuit was dismissed with prejudice but without costs in April, 1988.

Under the Minnesota Environmental Response and Liability Act (MERLA), a Request for Response Action (RFRA) was issued by MPCA on June 26, 1984. This document requested Charles, Ruth and Jon Kummer to undertake a Remedial Investigation/Feasibility Study (RI/FS) at the landfill, as well as to produce plans for remedial action, closure/continued operation and long-term ground water monitoring. Charles and Ruth Kummer then indicated that they were not financially able to conduct the work required by the RFRA, and would voluntarily close the landfill. Therefore on August 28, 1984, a Determination of Inadequate Response was issued for failure to conduct the RI/FS. At this time, authorization was also given to negotiate and enter into a cooperative agreement with the United States Environmental Protection Agency (U.S. EPA) and to negotiate and enter into

²/ Minnesota Solid Waste Rule 6 (1973) provided rules and regulations for the maintenance and operation of sanitary landfills. The rule requires, among other things, that deposited wastes be covered daily with at least 6 inches of cover material, that windblown debris be collected daily, that surface water drainage be diverted away from the operating area and that the deposited material not cause pollution of ground water.

contracts to expend State and/or Federal superfund monies to conduct response actions at the site.

A temporary restraining order was issued by Beltrami County on April 4, 1985, because an inspection showed that the permittee had reopened the landfill. The MPCA then issued an Administrative Order on June 25, 1985 which closed the landfill and revoked the permit.

Section 122(a) of the Superfund Amendments and Reauthorization Act of 1986 (SARA) gives the President the authority to enter into agreements with Potentially Responsible Parties (PRPs) to perform response actions if he determines the actions will be done properly. If the President determines that it is inappropriate to enter into an agreement or to initiate negotiations, the PRPs shall be notified of this decision and the reasons behind it. Charles and Ruth Kummer, the owners and operators of the landfill, were sent a letter dated September 28, 1988, notifying them of the decision not to enter into negotiations with them, consistent with this requirement of Section 122(a).

On September 29, 1984, the U.S. EPA and MPCA executed a Cooperative Agreement for implementing a RI/FS for the Kummer Landfill. In October 1984, the site was proposed for the National Priorities List (NPL). In June 1986 the site's inclusion on the NPL was finalized by the U.S. EPA.

Following the discovery of ground water contamination, a Determination of Emergency was issued by the MPCA on July 17, 1984. This permitted the expenditure of State Superfund money for a temporary water supply for affected residents. The Minnesota Department of Health (MDH) and MPCA delineated a three and one-half block area east of the landfill as a well advisory area. On August 28, 1984, the MPCA authorized the expenditure of State Superfund money for a focused FS on a water system for the well advisory area. Eighty-one property owners received letters from MDH on August 29, 1984, which notified them that they should discontinue the use of their private wells for drinking and cooking purposes.

On June 12, 1985, a Record of Decision (ROD) was signed which selected an alternative water supply as the remedial action. The selected remedy provided for an extension of the existing public water supply from the City of Bemidji. Because the additional area between the well advisory area and Lake Bemidji was downgradient of the landfill and potential for contamination of wells in that area was thought to be very high, the entire area east of the landfill to the lake was included in the water supply system. Construction of the water system began in June 1987, and was completed in the summer of 1990. A total of 198 connections to individual homes, businesses, and a mobile home

park were completed in this operable unit (Operable Unit 1).

Due to the complexity of the site, the RI investigation was completed in phases. The Final RI Report was approved in May 1990. The Source Control Operable Unit (Operable Unit 2) FS was received in September 1988. On September 30, 1988, a ROD was signed which selected a cover system for the landfill as the remedial action for Operable Unit 2. The selected remedy included a low permeability cap, site deed restrictions, fencing and long-term operation and maintenance to provide inspections and repairs to the cap.

As business records for the site are virtually nonexistent, the PRPs were identified primarily through responses to Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 104(e) information requests, and responses to the MPCA requests for information, MPCA disclosure files, and MPCA site inspection files. Pursuant to its authority under Section 104(a) of CERCLA, the U.S. EPA issued General Notice letters to 10 PRPs.

The Ground Water Operable Unit (Operable Unit 3) FS was received in July 1990, and is the subject of this ROD.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Superfund activities at the Kummer Sanitary Landfill site have been followed closely by local community and press. To date, there have been public meetings, fact sheets, update letters and press releases regarding the activities at the site. There is an active mailing list of local citizens interested in the activities at the site. A chronology of past community relations activities at the site is listed in the Responsiveness Summary as an attachment to this ROD.

A public information repository has been established in the Northern Township Town Hall. The administrative record for the site has been placed in the repository. When the RI/FS for this Ground Water operable unit was completed a proposed plan was prepared stating MPCA's and U.S. EPA's recommendation for remedial action at the site. Notice of the availability of the RI/FS and proposed plan was published in the Bemidji Pioneer on July 29, 1990, initiating a thirty day public comment period. Notice of the public meeting held on August 9, 1990, was included. Additionally, a fact sheet and a separate letter providing notification of the public meeting were sent to interested parties.

A public meeting was held on August 9, 1990, where the MPCA presented the alternatives to a group of interested citizens. The attached Responsiveness Summary (Appendix A) addresses specific comments raised at the August 9 public meeting and during the public comment period. The official public comment

period ended on September 5, 1990, following the granting of an extension of time for submittal of comments.

IV. SCOPE AND ROLE OF OPERABLE UNIT

Because of the complexity of work at the Kummer Sanitary Landfill, the activities at the site have been divided into three operable units, which are:

- | | |
|------------------|--|
| Operable Unit 1. | Northern Township Municipal Water System |
| Operable Unit 2. | Source control of contaminants emanating from the landfill |
| Operable Unit 3. | Management of the contaminated ground water |

Operable Unit 1, which is operating, provided for an extension of the City of Bemidji municipal water supply system into the affected area, thereby providing a safe drinking water source to affected residents.

The landfill cover system planned for Operable Unit 2 is currently in the remedial design phase. Actual construction on the cover is planned to begin in the spring of 1991.

The principal threat of Operable Unit 3 is the contaminated ground water beneath and down gradient of the Kummer Sanitary Landfill. The contaminated ground water contains VOCs, including vinyl chloride, a known human carcinogen, which threatens human health because of possible ingestion of contaminated water, as well as possible dermal contact and inhalation during showering and bathing. The center of the plume straddles the eastern boundary of the landfill. As indicated in Figure 2, the critical portion of the present plume does not extend past Irvine Avenue.

This operable unit represents the final remedy for the site and in combination with the two previous operable units is intended to address the entire site with regards to the principal threats to human health and the environment posed by the site as indicated in the risk assessment for the site. The findings of the risk assessment are included in the RI Report and are summarized in a later section of this document.

V. SITE CHARACTERIZATION

The problem of primary importance is the contamination of ground water with VOCs by leachate from the Kummer Sanitary Landfill. The Kummer Sanitary Landfill is the only known source of contamination of ground water in the area. The compounds of concern and the range of concentrations detected in ground water

at the site are listed below.

COMPOUND OF CONCERN	RANGE DETECTED
Tetrachloroethene	1.0-12 ug/l
Trichloroethene	1.0-6.8 ug/l
Trans-1,2-dichloroethene	1.3-35 ug/l
Vinyl chloride	5.9-94 ug/l
Benzene	1.0-6.0 ug/l

Contaminants observed during investigative activities of the RI were solely found dissolved in ground water samples. With the exception of benzene, all these compounds may be related as part of the degradative transformation of tetrachloroethene to vinyl chloride through both chemical and biological processes. These contaminants were found at locations both outside and within the boundaries of the landfill. Due to the limited amount of subsurface work conducted in the landfill, it is not possible to determine with certainty the actual physical state(s) of waste materials which may have caused contamination of the ground water. Identifiable cuttings of the waste mass consisted of typical household waste such as plastic, paper, wood and carpet scraps, mattress springs and automotive parts. The observations are based upon landfill trenching completed at the site in May 1990 and described in the FS.

The ground water contamination is most likely the result of precipitation infiltrating through the permeable landfill cover and coming in contact with the waste. Specific contaminants may also result from the degradation of waste products.

The compounds of concern can be classified as to carcinogenicity. A "Group A compound" means that sufficient information exists to correlate it as a human carcinogen. "Group B2 compounds" are classified as probable human carcinogens because sufficient epidemiological evidence does not exist, but there is sufficient evidence from animal studies to support the classification of "probable" human carcinogen. "Group D compounds" are not classifiable as to human carcinogenicity. The classes of the compounds of concern are listed below.

1,1,2,2-tetrachloroethene	Group B2
Trichloroethene	Group B2
Trans-1,2-dichloroethene	Group D
Vinyl chloride	Group A
Benzene	Group A

The plume is defined using the extent of detectable vinyl chloride. The lateral extent of the vinyl chloride plume is shown in Figure 2. The ground water contamination extends to a depth of 50 feet; the vertical extent of vinyl chloride, however, is limited to the B zone (which is approximately 42 feet deep) in

the area of concern (see Figure 2).

Migration of VOCs through surface water is unlikely to occur because of their volatility. As a matter of fact, the surface water pathway was found to be unlikely for migration of any VOCs attributable to the Kummer Landfill since surface water was not present on the site during remedial investigations. Wetlands to the north of the site are not downgradient of the waste-filled area of the landfill and, therefore, should not be impacted by contaminants migrating from the site.

Risk has been calculated for the above-mentioned compounds of concern, and three pathways for incurring risk were evaluated. These pathways were: (1) ingestion of ground water, (2) inhalation during showering and (3) contact with ground water during bathing. Risk is based on the concentrations found in the center of the plume located at the eastern boundary of the landfill. Risk exposure through inhalation and contact with ground water contaminated with contaminants of concern was calculated to be three in one thousand.

Ecological exposure was not considered significant because ground water was the primary pathway identified. Exposure to waste at the landfill was not considered because exposed waste is not present for direct contact to occur. In addition, the soils at the landfill have low organic carbon content, and the compounds of concern will not readily absorb them.

The concentrations of certain inorganic compounds are significantly higher in downgradient monitoring wells along the eastern boundary of the landfill than in the upgradient monitoring wells. The inorganic compounds of concern are aluminum, arsenic, barium, iron, manganese, nickel, and nitrate. Only barium concentrations are greater than the Maximum Concentration Levels (MCL) set under RCRA. The inorganic compounds are relatively immobile, and as such pose no significant threat to human health and the environment. The extent of the concentrations of inorganic contaminants exceeding drinking water standards appear to be confined to the area encompassed by the Kummer Landfill.

VI. SUMMARY OF SITE RISKS

A baseline risk assessment of the Kummer Sanitary landfill is detailed in Chapter 8 of the RI Final Report. The only media found to be of concern at the site was ground water. Three ground water monitoring programs were completed, and eight rounds of data were collected. The results revealed that VOCs are being introduced into the shallow ground water by the landfill. However, ground water monitoring has shown that the plume does not extend to Lake Bemidji.

The area affected by the ground water contamination is between the landfill and Lake Bemidji, an area of approximately one mile by one-third mile. The current population of this area is 960 persons with a projected population of 2,240.

The ground water is the pathway of concern, and human exposure may occur from ingestion of the ground water for drinking and cooking, skin contact during bathing, and inhalation exposure to contaminants volatilizing from the water during bathing. Table 4 summarizes the exposure data for the three pathways examined at the site.

The risk levels (probabilities of an individual developing cancer) are summed to predict the combined impact of chronic exposure to a mixture of the compounds of concern. The values are detailed in Table 5. As discussed in the RI Report, the estimated cancer risks from individual chemicals range from $7\text{E}-10$ to $3\text{E}-03$. The summed risk is relatively high, three in one thousand, because of the high concentration of vinyl chloride detected in the ground water (94 ug/l found in well 12B) and its carcinogenic potency. The risk level is conservative because it is based on people ingesting ground water from the center of the plume. However to date the highest concentrations of contamination have not reached the residential wells. The non-cancer impact varies from $1\text{E}-4$ to $1\text{E}-7$.

Deer, rabbits, raccoons, skunks and small rodents which may utilize the landfill and adjacent wetland area for feeding are at minimal risk, as well as various bird species. These animals would most likely become contaminated through contact with vegetation growing on the landfill or fill materials and then pass through the food chain. However, the compounds of concern are highly volatile both in the water and in soils with low organic content such as the sand at the landfill. Therefore, the risk of uptake of contaminants by vegetation growing on the landfill's surface is considered low.

The other pathway of exposure would be through Lake Bemidji. This pathway is considered low risk because of its distance from the landfill, the volatile nature of the contaminants of concern, and the low bioaccumulation potential of these compounds.

VII. DESCRIPTION OF ALTERNATIVES

Three alternatives were developed to meet the remedial action goal of controlling migration of contaminated ground water from the Kummer Sanitary Landfill Site to minimize the potential risk to public health from future consumption of contaminated ground water. The first alternative to be described involves no further action at the site besides that which will be performed for Operable Units 1 and 2. Alternatives II and III involve pumping and treating contaminated ground water. Alternative II would

provide for discharge of treated water to Lake Bemidji, whereas Alternative III would discharge treated water to an on-site infiltration pond.

Alternative I - No Further Action

The no further action alternative consists of allowing contaminated ground water to eventually discharge to Lake Bemidji. Off-site monitoring wells no longer required for long-term monitoring of the plume may be removed, and ground water quality will be monitored annually for 30 years. Some new monitoring wells may also be installed near Lake Bemidji which will be monitored for surface water quality parameters.

The aquifer is considered to be a Class II aquifer, having potential as a source of drinking water. The area of cleanup considered under this alternative includes the plume from the landfill east to Lake Bemidji, as Surface Water Quality Criteria (SWQC) must be met upon discharge to the lake. Using numerical computer ground water modelling, if the hydrodynamic processes in the aquifer are left to run their course, the present contaminant plume will reach Lake Bemidji in approximately 34 years with concentrations of contaminants at levels below surface water quality standards. This discharge of contaminants would constitute a non-point source discharge into surface waters and, therefore, SWQC would have to be met. Any increase in contamination above the surface water quality criteria (SWQC) would require the implementation of other alternatives to bring the ground water into compliance. It appears that more than 80 years will elapse before the plume dissipates to the point where the aquifer can be utilized again as a potable water supply.

Applicable or relevant and appropriate requirements (ARARs) are SWQC for the surface water and MCLs for the ground water (Table 4). The discharge of the plume to Lake Bemidji must meet the SWQC. The center of the plume does not comply with the MCLs and this alternative is inconsistent with the U.S. EPA ground water protection strategy. The discharge to Lake Bemidji appears to comply with SWQC.

Total Cost of Alternative I: \$300,000 (in present net worth)

Alternative II - Active Downgradient Hydraulic Controls and Surface Water Discharge

Ground water will be collected in a series of pumping wells located within the present plume of VOC contamination. An on-site treatment facility will be constructed with removal of inorganic compounds by lime-soda softening and filtration which produces a sludge, and removal of organic compounds by an advanced oxidation processes (AOP) and granulated activated carbon for polishing of the effluent stream. Plans are to

landfill the inorganics treatment sludge off-site. Treated ground water is discharged to Lake Bemidji via a dedicated line and a below-water discharge structure.

The area of cleanup considered under this alternative includes the plume defined in Figure 2. The ground water modelling indicates that sixty percent of the plume can be recovered in 3.5 years and it will take 10 years before the plume will comply with MCLs. The point source discharge to Lake Bemidji is regulated by SWQC under NPDES permit requirements. A portion of the plume will escape the pumping wells and reach Lake Bemidji after 36 years at concentrations below SWQC.

The cleanup criteria in the pumping area will be drinking water MCLs because they are the most stringent criteria in the area of concern. However, the alternative as presented considers the average VOC concentration to drive the ground water treatment. Treatment operations may continue from 4 to 30 years, depending on long-term effectiveness of the cover system in blocking future contaminant migration to the ground water under the landfill.

The extraction of ground water with high concentrations of metals may also involve managing a hazardous waste sludge. Modelling has shown that it may take 10 years before the plume would comply with MCLs. The portion of the plume that is not captured by the pumping wells would reach Lake Bemidji in 36 years at a total VOC concentration of approximately 2 ppb. This amount complies with SWQC, and with the MCLs. The pumped water must also comply with SWQC under the NPDES permit.

In a general sense, the risk associated with this alternative is lower than that of Alternative I because of implementation of active ground water treatment. Through treatment of the contaminated ground water, the risk range associated with this alternative will be reduced from $3E-3$ to $1E-6$. However, because of the low transmissivity of the aquifer immediately downgradient of the east boundary of the landfill, not all of the plume can be captured. This indicates that a drilling advisory must be implemented in order to ensure that licensed well drillers are aware of the presence of a contaminated aquifer and wells are not developed in the contaminated aquifer.

The ARARs, relevant and appropriate for this alternative, include MCLs and SWQC (Table 4). The concentration of contaminants in the treated ground water will comply with MCLs. Based on ground water modelling, the concentration of the plume when it discharges into Lake Bemidji will comply with SWQC. The sludge may require management as a hazardous waste and appropriate Resource Conservation and Recovery Act (RCRA) rules may apply for land disposal. A notification of pumping must be issued to the Minnesota Department of Natural Resources (MDNR).

Total Cost of Alternative II: \$6,000,000 (in net present worth dollars)

Alternative III - Active Downgradient Hydraulic Controls and On-site Infiltration Pond Discharge

Ground water will be collected in a series of pumping wells located within the present plume of VOC contamination. An on-site treatment facility will be constructed for removal of organic compounds by AOP. Inorganics treatment (lime-soda softening) may be provided if barium concentrations exceed drinking water quality guidelines, the pumping out of ground water with high concentrations of inorganic contaminants may also involve managing a hazardous waste sludge. A notification of pumping must be issued to the MDNR. Treated ground water is placed in an on-site pond for recharge to the aquifer.

The area of cleanup considered under this alternative includes the plume defined in Figure 2. The ground water modelling indicates that sixty percent of the plume can be recovered in 3.5 years and it will take 10 years before the plume will comply with MCLs. Because the treated ground water is then discharged into an on-site infiltration pond, no NPDES permit is required. SWQC are applicable to that portion of the plume which escapes the pumping wells and is discharged as a nonpoint source into Lake Bemidji. The portion of the plume which escapes the pumping wells will reach Lake Bemidji after approximately 36 years at concentrations below SWQC. The pumped ground water will be treated to comply with MCLs prior to discharge to the infiltration pond.

Treatment operations may continue from 4 to 30 years, depending on long-term effectiveness of the cover system (Operable Unit 2) in blocking future contaminant migration into ground water beneath the landfill.

The ARARs, appropriate and relevant for this alternative, include MCLs and SWQC (Table 4). The concentration of treated ground water will comply with the MCLs. Based on the results of ground water modelling, the concentration of the portion of the plume, which will escape the extraction system, will comply with SWQC when it discharges into Lake Bemidji. The sludge produced from treatment of inorganics may require management as a hazardous waste and appropriate RCRA rules may apply for disposal (40CFR Part 268).

Total Cost of Alternative: \$6,200,000 (in present net worth dollars)

VIII. SUMMARY OF THE COMPARATIVE ANALYSIS

The nine criteria used for evaluating the remedial alternatives

listed above include: overall protection of human health and the environment; compliance with ARARs; long-term effectiveness; reduction of toxicity, mobility, and volume; short-term effectiveness; implementability; cost; State of Minnesota and Community acceptance. The advantages and disadvantages of each alternative were compared to identify the alternative providing the best balance among the nine criteria.

1. Overall Protection of Human Health and the Environment

Alternatives II and III considered for the Kummer Sanitary Landfill ground water remediation are protective of human health and the environment by eliminating, reducing or controlling risks through combinations of treatment and engineering controls. Alternative I (No Further Action) does not provide for protection of human health and the environment. Although this alternative would include institutional controls, these controls are non-enforceable and only encourage residents to refrain from using contaminated ground water. At the present time almost fifty people are still using private wells which extract ground water from the contaminated aquifer.

Alternatives II and III both reduce the risks associated with ground water contamination by pumping and treating contaminated ground water. A ground water monitoring program will also be implemented to evaluate the effectiveness of the ground water remediation activities.

2. ARARs Compliance

SARA requires that remedial actions meet legally applicable or relevant and appropriate requirements (ARARs) of other environmental laws. A "legally applicable" requirement is one which would legally apply to the response action if that action were not taken pursuant to Sections 104, 106 and 122 of CERCLA. A "relevant and appropriate" requirement is designed to apply to problems sufficiently similar that their application is appropriate.

Alternative I will not meet MCLs before 80 years and does not comply with GWPA or 7060 (see Section X(2)). Since Alternative I is not protective of human health and the environment and does not comply with ARARs it is not eligible for selection and shall not be discussed further in this document.

Alternatives II and III for the Kummer Site meet or exceed ARARs as discussed in Section X(B). Alternative II and III are expected to meet MCLs within 10 years of treatment.

3. Long Term Effectiveness and Permanence

Both Alternatives II and III utilize the same ground water pump and treatment component. By eliminating the contaminants present in the ground water, each of the alternatives achieves a certain degree of long-term effectiveness and permanence.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Since both Alternatives II and III use the same treatment technology for organic contaminant destruction they equally reduce the toxicity, mobility and volume of organic contamination in the ground water.

5. Short Term Effectiveness

Both Alternatives considered have similar impacts on short-term effectiveness resulting from a ground water treatment system being utilized.

It is anticipated that Alternative II or III would require one construction season to complete. During well development and near ground water treatment facilities workers could be exposed to VOC emissions. Air monitoring will be required to assure levels are within applicable National Ambient Air Quality Standards.

6. Implementability

While both alternatives considered are implementable, Alternative III is technically and administratively easier to implement than Alternative II, based on design, complexity, land purchasing/leasing and permitting requirements.

Alternative II, which includes point discharge to a surface water body, will be required to meet NPDES permitting requirements which may be more stringent for treatment of the inorganics in the ground water than for Alternative III which would discharge to an on site infiltration pond which would not be subject to NPDES permitting requirements. Additionally, for Alternative II it may be difficult even obtain a NPDES permit because some metals in the Mississippi already exceed standards set for its protection.

7. Cost

The estimated capital, annual maintenance and monitoring, and present worth value costs are evaluated by this criterion. Present worth costs are calculated using a 10 percent discount rate over the expected period of operation.

	Alternative I	Alternative II	Alternative III
Construction Cost	\$73,000	\$1,300,000	\$1.0-1,400,000
Present worth Cost	\$300,000	\$3.0-6,000,000	\$1.8-6,200,000
Annual O&M Cost	\$24,000	\$510,000	\$240,000-510,000

8. State Acceptance

The Minnesota Pollution Control Agency (MPCA) played a major role in the RI/FS process as the lead agency, and concurs on the selected remedy. MPCA also recognizes their 10% cost share and O&M responsibilities. The MPCA has indicated that research in bioremediation of contamination similar to that found at Kummer is underway and may, in the future, provide a reasonable alternative to that which is proposed in this document and merits further studies. The MPCA has submitted an application to the U.S. EPA Superfund Innovative Technology Evaluation Program (SITE) to have a bioremediation treatability study performed at Kummer. The Office of Research and Development within the U.S. EPA contemplates future participation in evaluation of bioremediation for the Kummer Sanitary Landfill.

MPCA believes that Alternative 3 - ground water extraction and treatment via a plume barrier system for aquifer restoration - presents the best balance among the nine evaluation criteria.

9. Community Acceptance

The public generally accepted the ground water extraction and treatment remedy selected in this Record of Decision, but expressed some concerns regarding the treatment process. See the attached Responsiveness Summary for a detailed discussion of comments received.

IX. The Selected Remedy

The selected remedy in Alternative III, active downgradient hydraulic controls and infiltration pond discharge.

1. Ground water extraction

The goal of this remedial action is aquifer restoration to a drinking water aquifer. Based on information obtained during the remedial investigation and on careful analysis of all remedial alternatives, U.S. EPA and MPCA believe that the selected remedy will achieve this goal. It may become apparent, during implementation or operation of the ground water extraction system, that contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation goal. In such a case, the system performance standards and/or the remedy may be reevaluated.

The selected remedy will include ground water extraction for an estimated period of 30 years, during which the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. The operating system may include:

- a) discontinuing operation of extraction wells in areas where cleanup goals have been attained;
- b) alternating pumping at wells to eliminate stagnation points; and
- c) pulse pumping to allow aquifer equilibration and encourage absorbed contaminants to partition into ground water.

Ground water extraction within the VOC plume is selected as the active downgradient hydraulic control technology most applicable to the Kummer site. The intent of this alternative is to extract the VOC plume and intercept the flow of any additional contaminated ground water leaving the landfill. Pumped ground water will require treatment to remove the contaminants. The effluent will have to be managed.

The ground water "sink" will be formed by installation and operation a series of about five extraction wells near the eastern perimeter of the landfill. Conceptual design of the withdrawal network is based on numerical computer ground water modelling. Figure 3 depicts potential well locations, the location of treatment system, and the recharge system.

Wells will be up to 60 feet deep and equipped with screens along the 10 to 60 foot interval. Most wells will extract water from the A (15 to 28 foot depths) and B (23 to 47 foot depths) zones, shown to be contaminated in vicinities of wells MW-12, MW-2 and MW-3. Wells located at the southern end of the array will extract water from the A, B and C zones in the general vicinity of MW-1, the only monitoring well showing contamination at the C depth. These wells will be screened from 53 to 104 feet.

2. Ground Water Treatment

Advanced Oxidation Process (AOP) is the chosen treatment for the contaminated ground water. AOPs are chemical treatment technologies which involve the addition of one or more of the following to contaminated ground water: ozone, hydrogen peroxide and ultraviolet light. They are most effective in treating unsaturated organic straight-chain and ringed compounds. Lime-soda softening as a pretreatment is desirable to remove alkalinity and other inorganic compounds, which increase ozone dosages and treatment costs. Treatment for organics takes place in a fiber-reinforced plastic or a stainless steel reaction

vessel. Contaminated water and hydrogen peroxide are fed through the vessel, and ozone is continuously supplied. The vessel is vented through an ozone destruct unit for low temperature thermal treatment of the exhaust air. An ozone dosage 5 to 30 mg/l will likely be required to oxidize VOCs. The hydrogen peroxide to ozone ratio (by weight) selected for conceptual design is 0.5.

Effluent polishing by activated carbon is also included in the conceptual design of AOP for the following reasons:

1. Incomplete oxidation can result in organic intermediates which also may be toxic. Carbon will likely remove organic compounds which result from incomplete oxidation.
2. The types of wastes present in the landfill are unknown. Carbon contactors provide a low-cost contingency for treatment of a possibly variable suite of organic compounds which may not be destroyed by AOP.

The ground water may have to be treated to remove the inorganics depending on chemical composition of the ground water and the distribution of inorganic compounds at the initiation of pumping. Lime-soda softening is a chemical treatment process involving converting bicarbonate alkalinity to carbonate alkalinity, and then removing divalent ions as precipitates of carbonate and/or hydroxides. During the process the pH is raised to above 10, causing the precipitation of arsenic, nickel and barium. Other ionic compounds may also be removed by adsorption to the carbonate and/or hydroxide precipitates. The disadvantage of softening is that sludge is produced, which is the result of precipitation of divalent cations to compounds such as calcium carbonate. This sludge must therefore be handled and disposed of, increasing the cost. The system may also require sophisticated controls, as the pH ranges are narrow for optimal removal of arsenic, nickel and barium. Arsenic removal is complicated further by several possible valence states.

3. Ground Water Discharge

On-site discharge is planned to an infiltration pond. The design of the infiltration pond is based on permeability data for the unsaturated zone and hydraulic conductivity data. Additional field tests including infiltration capacity will be required during preliminary engineering. Existing data indicate the strata are extremely permeable so that pond size is minimal. The exact location will be determined during remedial design for maximizing performance of the pumping network. Depth is set at 10 feet to allow for continued operation during extended sub-freezing temperatures characteristic of the Bemidji winters. Based on average annual conditions, detention time in the pond is

expected to be less than one hour. Pond design is based on a water balance calculation which includes: discharge rate of water into the pond, evapotranspiration, runoff, infiltration, percolation and interlayer drainage.

4. Ground Water Monitoring

During the time of remedial design and remedial action the ground water will continue to be monitored on a regular basis. Two additional monitoring wells will be installed near Lake Bemidji to monitor advancement of the portion of the plume which escapes the extraction well system. These wells will be monitored using Surface Water Quality Criteria for Lake Bemidji. Sampling of ground water from monitoring wells near Lake Bemidji will be done on an annual basis, or as determined by the MPCA Water Quality Division staff. The surface water sampling parameters will include total phosphorous, ortho phosphorous, total Kjeldahl nitrogen, total alkalinity, chloride, pH, temperature and ammonia. In addition, VOCs and priority pollutant metals will be tracked twice a year.

5. Remediation Goals

The ground water shall be extracted and treated until MCLs for all contaminants are obtained. When these standards are met the cumulative residual carcinogenic risk due to ground water ingestion is estimated to be $1E-6$.

Although all VOCs will trigger cleanup levels, the primary focus will be on vinyl chloride because its high concentration and its carcinogenic potency (see the Final RI report).

6. Costs

Costs for the three components of the remedy are shown in Tables 5, 6, 7 and 8.

X. STATUTORY DETERMINATION

The implementation of Alternative III at the Kummer Sanitary Landfill site satisfies the requirements of Section 121(a to e) of CERCLA as detailed below.

1. Protection of Human Health and the Environment

Implementation of the selected alternative will reduce and control potential risks to human health and the environment posed by exposure to contaminated ground water. Extraction and treatment of contaminated ground water to meet State and Federal standards will reduce the potential excess cancer risk to $1E-6$. The selected remedy also protects the environment by reducing the potential risks posed by the site chemicals discharging to Lake

Bemidji.

2. Attainment of Applicable or Relevant and Appropriate Requirements.

Section 121(d) of SARA requires that remedial actions meet legally applicable or relevant and appropriate requirements (ARARs) of other environmental laws. These laws may include: the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Clean Air Act (CAA), the Safe Drinking Water Act (SDWA), and any state law which has more stringent requirements than the corresponding Federal law. "Legally applicable" requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site. "Relevant and appropriate" requirements are those requirements that, while not legally applicable to the remedial action, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the remedial action.

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

The selected alternative calls for the extraction of ground water to a facility on-site for treatment and eventual discharge into an infiltration pond. The following is a description of the ARARs for the selected remedy and an explanation of how this remedial action meets these requirements.

The Safe Drinking Water Act of 1974 (SDWA), as most recently amended in 1986, requires the establishment of standards to protect human health from contaminants in drinking water. Maximum Contaminant Levels (MCLs) for specific contaminants have been promulgated under the SDWA. [CERCLA §121(d)(2)(A)(i) requires on-site CERCLA remedies to attain MCLs where they are applicable or relevant and appropriate.] Additionally SDWA maximum contaminant level goals (MCLGs), which are non-enforceable health-based goals, have been set at levels at which no known or anticipated adverse effects on the health of persons occur and which will allow an adequate margin of safety. CERCLA §121(d)(2)(A) requires on-site remedies to attain MCLGs where relevant and appropriate under the circumstances of the release.

MCLs and MCLGs are not applicable at the site because the aquifer does not serve a public drinking water system. Because approximately 49 residents drink from this aquifer through private wells, however, MCLs and MCLGs are relevant and appropriate. Non-zero MCLGs and, where the MCLG equals zero, the corresponding MCL will be met by implementation of the selected remedy.

One possible situation where more stringent standards than MCLs may be appropriate for ground water used as drinking water is where multiple contaminants in the ground water present extraordinary risk, so that the single, chemical-specific requirements may not adequately protect human health or the environment. A risk of $1E-6$ serves as the point of departure for cumulative risk due to carcinogens that represent an excess upperbound lifetime cancer risk to an individual of $1E-4$ to $1E-6$. See Preamble to National Contingency Plan (NCP), 55 Fed. Reg. at 8713. It is believed that the cumulative risk due to the contaminants present at the site will not, upon completion of remediation, exceed this risk range.

Minnesota Rules Chapter 7035.2815, Subpart 4 similarly provide ground water protection standards at solid waste treatment, storage and disposal facilities. These standards, called intervention limits (ILs), are not applicable because the landfill was filled prior to the effective date of the ILs. While ILs are relevant because they pertain to landfills, they are not appropriate because they were set at such levels as only those landfills designed in accordance with recent regulations and technology can meet.

The Minnesota Department of health has established health based criteria for contaminants in drinking water referred to as Recommended Allowable Limits (RALs). These RALs are not ARARs because they are not promulgated. Rather, they are criteria to be considered and are based on a cumulative risk of $1E-5$.

The 1989 Ground Water Protection Act (GWPA) (Minn. Stat. 103H) was promulgated in 1989. Implementation of the act is being carried out by different state agencies which are currently in rulemaking. The GWPA strives for nondegradation of ground water or, in instances where degradation has occurred, no further degradation. The GWPA is not applicable because cleanup standards have not been promulgated, but is considered.

Minnesota Rule 7060 (7060) discusses nondegradation of underground water. It is not applicable because no enforceable standards are currently promulgated, but is considered.

Regarding surface waters, the Federal Clean Water Act (CWA), 33 U.S.C. Sections 1251, et seq., as amended, requires USEPA to establish water quality criteria (WQC) for bodies of water based

on effects of pollutants on human health and aquatic life and on the potential or designated uses of the waters. Federal WQC are non-enforceable guidelines used by States to set water quality standards for surface waters, as required under Section 303 of the CWA. WQC may be relevant and appropriate to cleanup of surface and ground water at CERCLA sites. See CERCLA Section 121(d)(2)(B)(i). Since a minor portion of the contaminated plume will eventually reach Lake Bemidji, the Federal Ambient WQC are relevant and appropriate. The National Wild and Scenic Rivers Act (PL 90-542, USC 1271) applies to the Upper Mississippi Headwaters Watershed. However, Lake Bemidji is exempt from the Act.

CERCLA remedial actions involving surface bodies of water must also ensure that applicable state water quality standards are met. Minnesota has existing and proposed surface water quality standards for Lake Bemidji and the Mississippi River. See MN Rules, Chapter 7050. The existing water quality standards are applicable. Because the proposed standards have not yet been promulgated, they are not ARARs. Because these standards are proposed specifically for the particular waters which may be affected by the selected remedy, however, they have been considered. The portion of the plume expected to reach Lake Bemidji will not cause either the proposed or the existing water quality standards for Lake Bemidji and the Mississippi River to be exceeded.

(Unlike the selected remedy which calls for discharge of the treated ground water into an infiltration pond, an alternative is the discharge of the treated ground water into Lake Bemidji via a dedicated discharge line. In this case, Alternative II, the direct discharge into Lake Bemidji would require a National Pollutant Discharge Elimination System (NPDES) permit because the action would constitute an off-site discharge from a point source (the discharge line) into surface water. See Section 402 of the CWA and 40 CFR Parts 122, 123 and 125. Effluent limitations are specified in NPDES permits based on the application of best available technology economically achievable, or more stringent limits as necessary to achieve applicable toxic pollutant effluent standards promulgated at 40 CFR 129, Subpart A or to maintain applicable state water quality standards. Additionally, the Federal Ambient WQC would have to be met. Had this alternative been selected, these requirements would have been satisfied.)

Air quality must also be protected in carrying out remedial actions. Pursuant to Section 109 of the Clean Air Act (CAA), National Ambient Air Quality Standards (NAAQS) have been promulgated at 40 CFR Part 50. The selected remedy will not exceed any NAAQS or emission limitations or standards under the CAA.

In addition to chemical-specific requirements, action-specific requirements must be met. The treatment facility and infiltration pond will be designed in accordance with Minnesota solid and hazardous waste regulations, MN Rules, Chapters 7035 and 7045. Minnesota Statute 115.063, the State Potable Water Protection Policy is not an ARAR because it imposes no substantive requirements, but it will be considered because it provides guidance as to areas in which solid/hazardous waste facilities should be prohibited.

If the inorganic sludge that is created during the treatment process tests RCRA "characteristic", then 40 CFR Part 268 is applicable and the disposal of the sludge will be conducted accordingly.

The selected remedy will satisfy all ARARs and will be protective of human health and the environment.

3. Cost Effectiveness

An analysis of cost effectiveness of the alternative selected indicates that the remedy chosen is not the most cost effective. Alternative I is the least costly alternative considered, but Alternative I does not satisfy all ARARs and is not protective. Between Alternatives II and III, Alternative III is the most cost effective and also satisfies the appropriate ARARs and is protective.

4. Utilization of Permanent Solutions

The U.S. EPA and MPCA believe that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final remedy at the Kummer Sanitary Landfill Site. Of the alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA and MPCA have determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility or volume achieved through considering the statutory preference for treatment as a principal element and considering the State and community acceptance.

Organic contaminants of concern will be destroyed by the AOP process, intermediate compounds present in the effluent after AOP treatment will be removed with GAC. Contaminants captured by the GAC are destroyed during regeneration of spent carbon at elevated temperatures. Although residual material (sludge) will result from treatment of ground water for inorganic constituents, the material that remains can be contained with a high degree of certainty over the long term by proper placement in an appropriate landfill.

5. Preference for Treatment

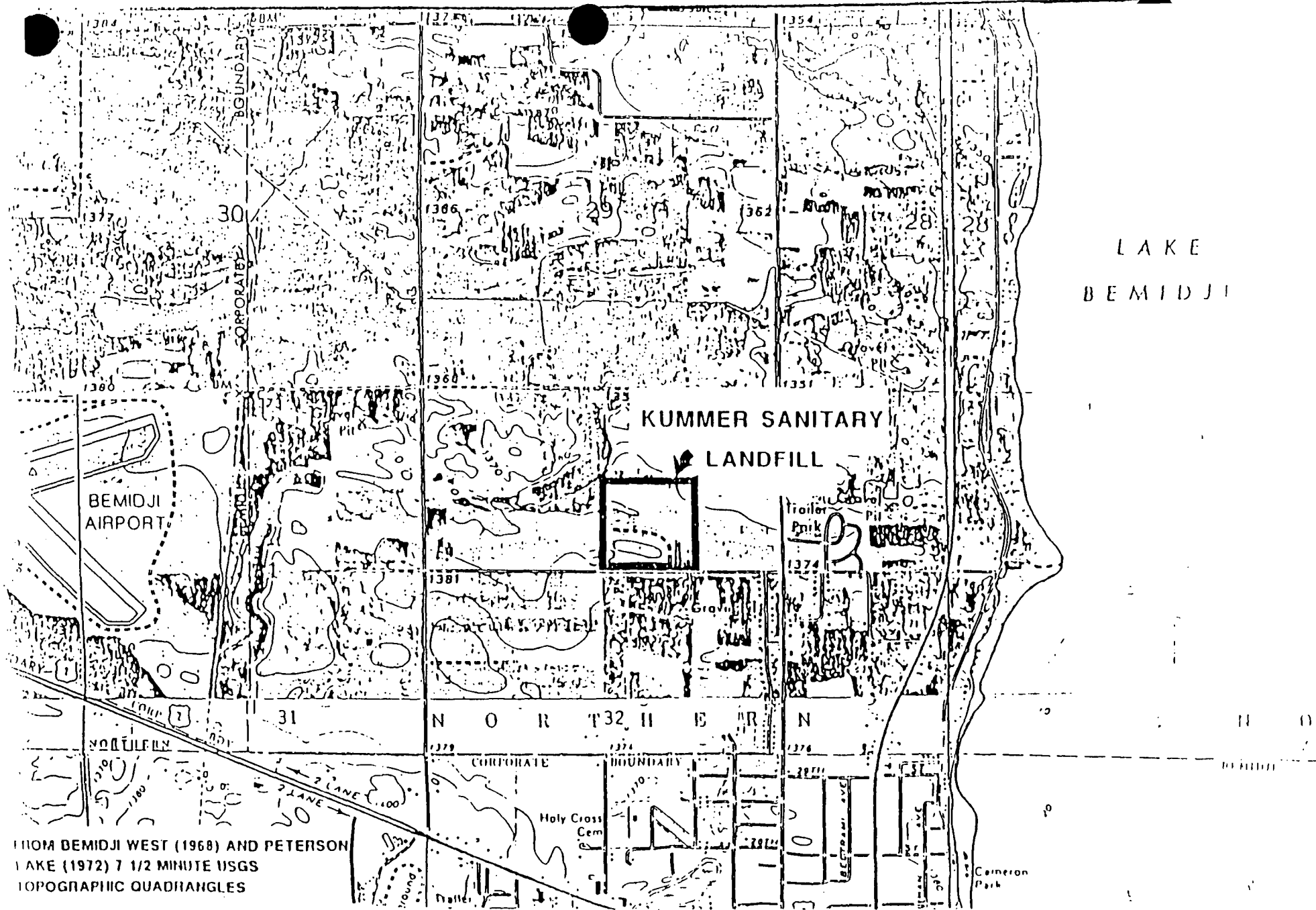
This satisfies the statutory preference for treatment as a principal element of the remedy through extraction and treatment of the contaminated ground water plume by AOP to achieve State and Federal standards.

XI. ADDITIONAL STUDIES

Section 311 of CERCLA, 42 U.S.C. Section 9660 provides that USEPA shall conduct "research, evaluation, testing, development, and demonstration of alternative or innovative treatment technologies which may be utilized in response actions to achieve more permanent protection of human health and welfare and the environment." These tasks are carried out through a program within the Office of Research and Development (ORD).

Bioremediation is an innovative technology which involves utilizing the indigenous microflora in the degradation of contaminants in the ground water. Subsurface and sediment samples are collected from the field, and indigenous microorganisms capable of degrading the compounds of concern are isolated and characterized. Treatability testing is then done in the laboratory in a bench-scale reactor, and the nutrient requirements of the microflora and gas stream composition (percent methane in air) are determined. A pilot scale bioreactor is then set up in the field, using the information gathered during the laboratory investigations. The research to date suggests that bioremediation is a technology that warrants further study as it may prove to be a preferable alternative, given site-specific characteristics, to those alternatives currently available for the treatment of ground water.

If it is demonstrated that implementation of bioremediation would be as protective of human health and the environment as the treatment method selected in this ROD, and if the cost of replacing the AOP treatment system or modifying the AOP treatment system to include a biological treatment component were desirable, then this ROD may be amended, if necessary, to reflect such findings.



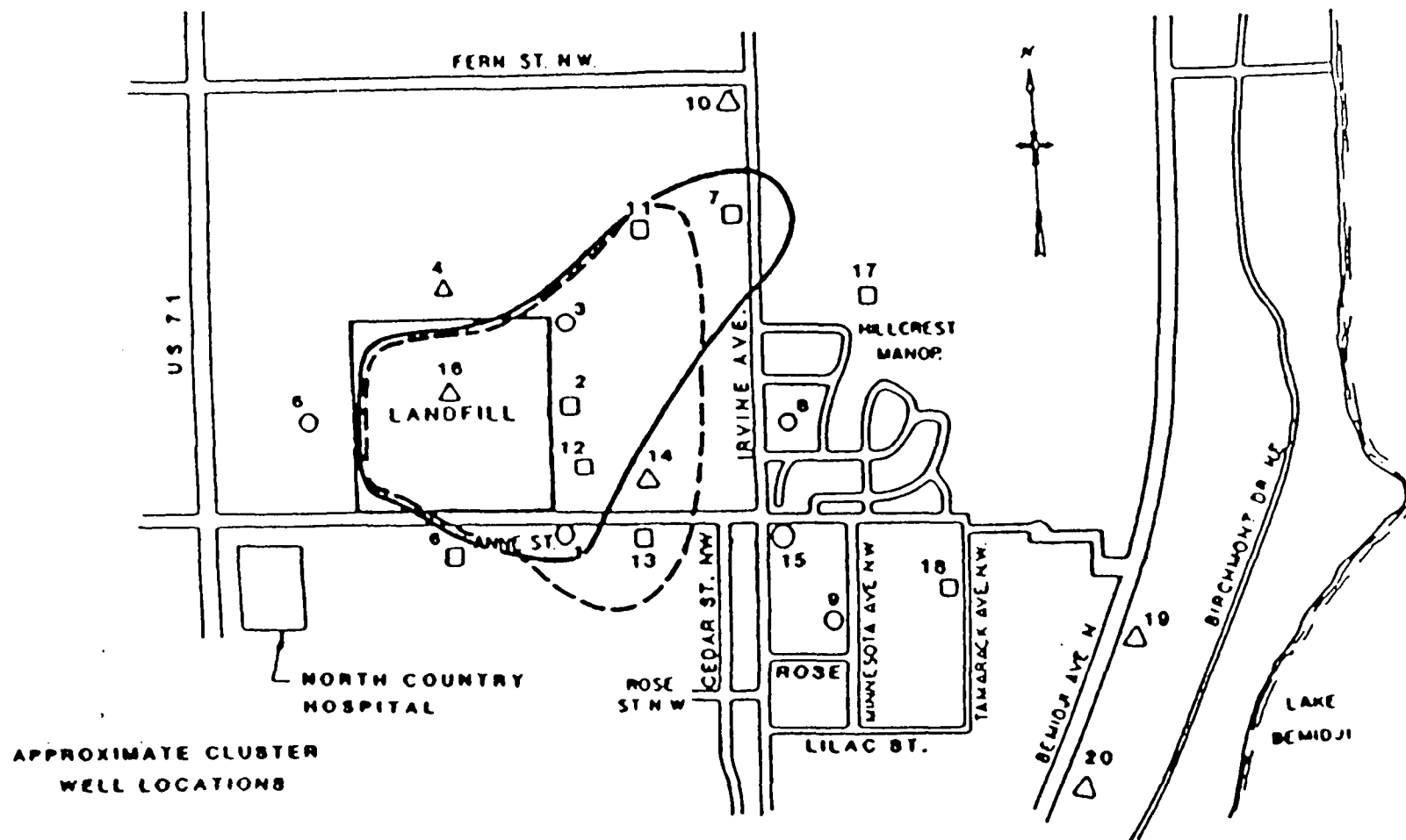
MALCOLM
PIRNIE

KUMMER LANDFILL

SITE LOCATION

MALCOLM PIRNIE

FIGURE



APPROXIMATE CLUSTER
WELL LOCATIONS

- ABC
- AB ONLY
- △ A ONLY

0 500 1000
250 250 750
GRAPHIC SCALE IN FEET

EXTENT OF VINYL CHLORIDE PLUME

- A ZONE
- - - B ZONE

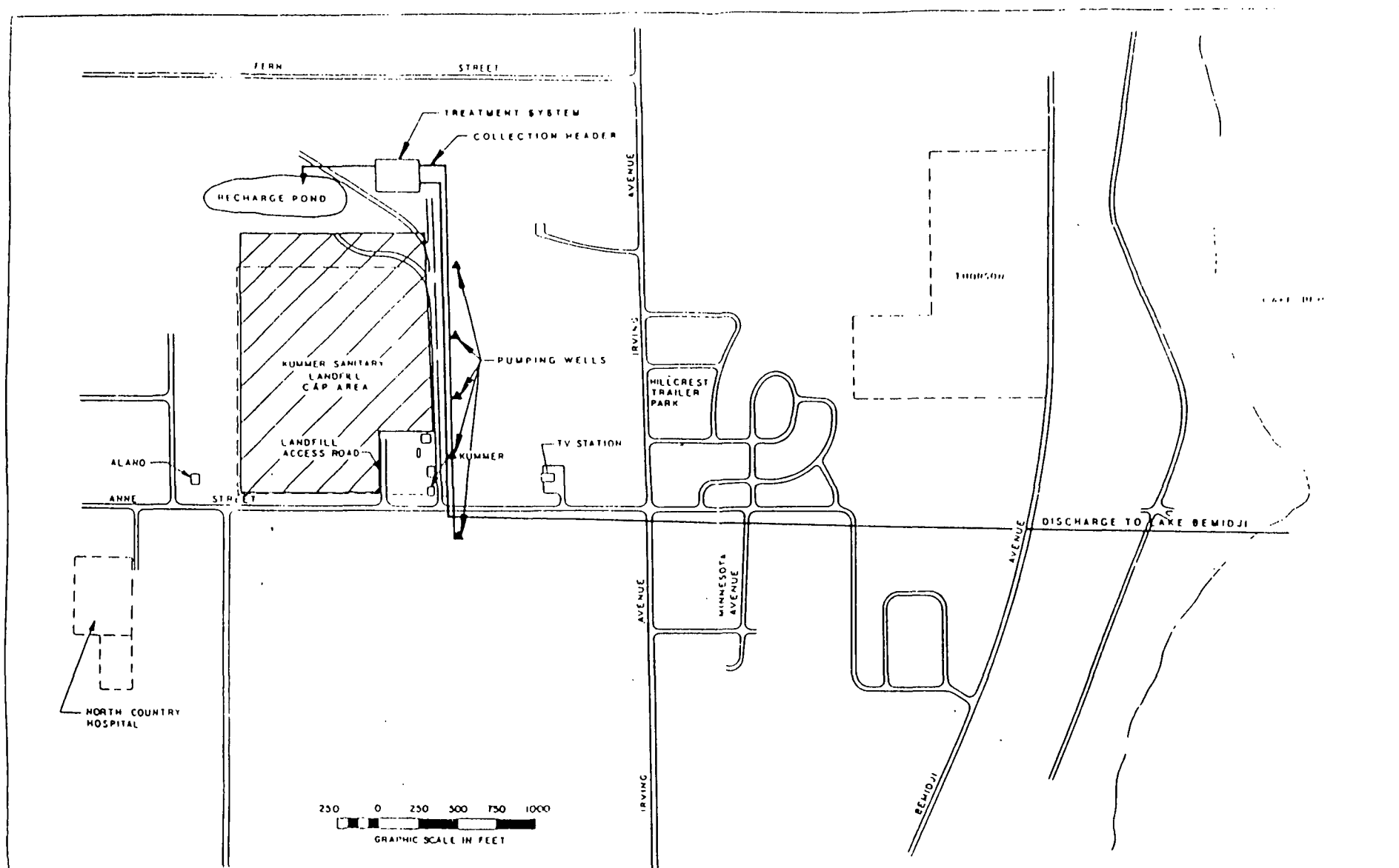
THE C ZONE IS ALSO INCLUDED AT WELL LOCATION 1
VINYL CHLORIDE, DCE, AND PCE WERE ALSO DETECTED IN SAMPLING
ROUND 8 AT WELL LOCATION 18 B

MALCOLM
BARNIE

KUMMER LANDFILL GROUND WATER FEASIBILITY STUDY
RESPONSE BOUNDARIES

MALCOLM BARNIE

FIGURE 2



MALCOLM
PIRNIE

KUMMER LANDFILL GROUND WATER FS

ACTIVE DOWNGRADIENT HYDRAULIC CONTROLS PLAN

MALCOLM PIRNIE INC.

FIGURE 3
JULY 1980

TABLE 1
KUMMER SANITARY LANDFILL, MINNESOTA
VOLATILES FOUND IN GROUND WATER PRIOR TO 1986

	<u>Lowest</u>	<u>Highest</u>
Methylene Chloride	1.0	46.0
1,1-Dichloroethane	0.2	5.4
1-2-Dichloroethylene (total)	0.2	27.0
1,1,2-Trichloroethane	0.2	2.7
Trichlorofluoromethane	0.2	5.6
1,1-Dichloroethylene	0.2	1.7
1-2-Dichloropropane	0.2	1.7
Vinyl Chloride	*	*
Chloromethane	*	*
Dichlorofluoromethane	*	*
Bromomethane	*	*
1,2-Dichloroethane	0.1	4.2
1,1,1-Trichloroethylene	0.2	8.8
Dichlorodifluoromethane	*	*
Acetone	16.0	100.0
Ethyl Ether	0.1	60.0
Benzene	0.3	3.1
Toluene	0.5	6.8
Total Xylenes	0.6	8.2
Tetrahydrofuran	0.5	130.0
Ethyl Benzene	0.5	8.0
1,1,2,2-Tetrachloroethylene	2.0	16.0
Chloroform	0.2	2.4
Chloroethane	*	*
1,1,2,2,-Tetrachlorethane	2.0	4.6
1,2-Dibromomethane	0.4	0.7
Bromodichloromethane	0.2	0.7
1,2-Dibromoethane	0.4	0.7
Trichloroethylene	0.2	2.8
Methyl Isobutyl Ketone	5.0	6.0
1,1-Dichloro-1-Propane	0.2	1.8

All values in micrograms/liter.

* If no Lowest-Highest value is given, the volatile organic compound was detected as a peak below the detection level.

TABLE 2
SUMMARY OF EXPOSURE DATA

Population	Exposure Pathway	Chemical (1)	Chronic Daily Intake (CDI) (mg/kg/day)	
			Carcinogenic Effects	Noncarcinogenic Effects
Residents	Ingestion of groundwater that has migrated from the site to downgradient local wells	Benzene	7.35E-05	1.71E-04
		t-1,2-Dichloroethylene	4.29E-04	1.00E-03
		Tetrachloroethylene	1.47E-04	3.43E-04
		Trichloroethylene	8.33E-05	1.94E-04
		Vinyl Chloride	1.15E-03	2.69E-03
	Skin absorption of chemicals from ground water during bathing	Benzene	2.56E-08	5.97E-08
		t-1,2-Dichloroethylene	1.49E-07	3.48E-07
		Tetrachloroethylene	5.12E-08	1.19E-07
		Trichloroethylene	2.90E-08	6.77E-08
		Vinyl Chloride	4.01E-07	9.35E-07
	Inhalation of chemicals that have volatilized from ground water during use	Benzene	2.94E-05	6.86E-05
		t-1,2-Dichloroethylene	1.69E-04	3.94E-04
		Tetrachloroethylene	5.88E-05	1.37E-04
		Trichloroethylene	3.31E-05	7.71E-05
		Vinyl Chloride	4.63E-04	1.08E-03

Notes:

- (1) Maximum concentrations detected in ground water were used in this analysis (see Table 8-1 for values), in order to provide a conservative exposure estimate.

TABLE 3
CANCER RISK ESTIMATES

Chemical	CDI (mg/kg/day)	CDI Adjusted for Absorption	SF(a) (mg/kg/day)	Weight of Evidence	Type of Cancer	SF Source	SF Basis (Vehicle)	Chemical Specific Risk	Total Pathway Risk	Total Exposure Risk
Exposure Pathway: Ingestion of Contaminated Ground Water										
Benzene	7.35E-05	No	2.9E-02	A	Leukemia	IRIS	Air			
1,1,2-Dichloro- ethylene	4.29E-04	No	--	--	--	--	--	--	--	--
Tetrachloroethylene	1.47E-04	No	5.1E-02	B2	Liver	HEA	7E-06			
Trichloroethylene	1.33E-05	No	1.1E-02	B2	Liver	HEA	9E-07			
Vinyl Chloride	15E-03	No	2.3E+00	A	Liver	HEA	3E-03	3E-03		
Exposure Pathway: Skin Absorption of Contaminants from Ground Water										
Benzene	1.56E-08	No	2.9E-02	A	Leukemia	IRIS	Air	7E-10	7E-10	
1,1,2-Dichloro- ethylene	1.49E-07	No	--	--	--	--	--	--	--	--
Tetrachloroethylene	5.12E-08	No	5.1E-02	B2	Liver	HEA	--	3E-09	--	
Trichloroethylene	2.90E-08	No	1.1E-02	B2	Liver	HEA	--	3E-10	--	
Vinyl Chloride	4.01E-07	No	2.3E+00	A	Lung	HEA	--	9E-07	9E-07	
Exposure Pathway: Inhalation of Chemicals Volatilizing from Ground Water										
Benzene	2.94E-05	No	2.9E-02	A	Leukemia	IRIS	Air	9E-07		
1,1,2-Dichloro- ethylene	1.69E-04	No	--	--	--	--	--	--	--	--
Tetrachloroethylene	5.88E-05	No	3.3E-03	B2	Leukemia, Liver	HEA	--	2E-07	--	
Trichloroethylene	3.31E-05	No	1.7E-02	B2	Lung	HEA	--	6E-07	--	
Vinyl Chloride	4.63E-04	No	2.95E-01	A	Liver	HEA	--	1E-04	1E-04	3E-03

NOTES:

(a) Slope factor based on dose administered in drinking water; assumed absorption fraction of 1.0.

TABLE 4
KUMER SANITARY LANDFILL, MINNESOTA
COMPARISON OF ARARS AND OTHER CRITERIA
TO BE CONSIDERED FOR ORGANIC CONTAMINANTS

Pathway	Contaminant	ARARS			Units	TBC		
		Range Detected	Cleanup Level	MCL PMCL MCLG		Ug/L	RALs ILs	10 ⁻⁵ CA
Ground Water	1,1,2,2-tetrachloroethylene (PCE)	1.0-12	5	5* 0			6.6 1.7	8
	1,1,2-trichloroethylene (TCE)	1.0-6.8	5	5 0			31 7.8	27
	trans-1,2-dichloroethylene (tDCE)	1.3-35	100	100* 100			70 17	NA
	vinyl chloride	5.9-94	2	2 0			0.15 0.037	20
	benzene	1.0-6.0	5	5 0			7 3	6.0
Surface Water		* NPDES-Chronic SWQC			Ug/L	AWQC	PWQS	
	1,1,2,2-tetrachloroethylene (PCE)	NA	9	9		0.8	8.9	
	1,1,2-trichloroethylene (TCE)	NA	123	123		2.7	120	
	trans-1,2-dichloroethylene (tDCE)	NA	449	449		NA	50	
	vinyl chloride	NA	3.3	3.3		2.0	7.6	
	benzene	NA	38	38		0.66	38	
Air	NAAQS				Ug/m ³	1X TLV	Cancer Risk 10 ⁻⁵ 10 ⁻⁶	
	1,1,2,2-tetrachloroethylene (PCE)	NA				3350	4.1	0.41
	1,1,2-trichloroethylene (TCE)	NA				2700	1.5	0.15
	trans-1,2-dichloroethylene (tDCE)	NA				NA	NA	NA
	vinyl chloride	NA				100	0.28	0.02
	benzene	NA				300	0.27	0.02

Notes:

- NA = Not Available
- SWQC = MPCA Surface Water Quality standards for Lake Bemidji and the Mississippi River (Minnesota Rule 7050).
- TBC = Other criteria to be considered
- MCLs = Safe Drinking Water Act Maximum Contaminant Levels.
- RALs = Minnesota Department of Health Recommended Allowable Limits (1988).
- ILs = Minnesota Rules mixed municipal solid waste landfill ground water performance intervention limits (7035.2815 Subpart 4).
- 10⁻⁵, 10⁻⁶ = Concentration correspondence to a lifetime incremental cancer risk of 10⁻⁵ or 10⁻⁶ (ground water number from EPA 440/5-86-001, USEPA quality criteria for water 1986).
- CA Risk
- NPDES = National Pollutant Discharge Elimination System (also Minnesota Rules Chapter 7001 and Minnesota Statutes Chapter 115 and 116).
- AWQC = USEPA Ambient Water Quality Criteria-drinking water and fish consumption (10⁻⁶ increment cancer risk).
- TLV = Threshold Limit Value work-shift time-weighted average.
- NAAQS = National Ambient Air Quality Standard
- 40CFR-268 = Land ban on disposal of untreated and certain liquid wastes in land-based waste management units may be applicable for inorganic sludge discussion of ARARs in Section XB).
- PWQS = Proposed Water Quality Standards for Lake Bemidji and the Mississippi River.
- MCLG = Maximum Contaminant Limit Goals
- PMCL = Proposed Maximum Contaminant Levels
- * = NPDES Permit required only for Alternate II. NPDES requirements under Minnesota law are equal to the SWQC.
- GWPA = Minnesota Ground Water Protection Act, Minnesota Statue 103H is a TBC.

TABLE 5
GROUND WATER COLLECTION CAPITAL COST

Ground water collection

well construction & testing	\$70,000
well pump equipment	\$10,000
Ground water collection pipeline	\$36,000

Miscellaneous

remove monitoring wells	\$50,000
Land Acquisition ⁽¹⁾	\$40,000

SUBTOTAL CAPITAL COSTS	\$206,000
CONTINGENCY @ 25%	\$51,500
ENGINEERING @ 20%	\$41,200

TOTAL CAPITAL COST	\$300,000
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GROUND WATER COLLECTION OPERATING AND MAINTENANCE COST

Annual Cost Item

Maintenance Materials & Labor 15% of Equipment Capital Cost	\$1,500
--	---------

Auxiliary Materials and Labor

Electricity ⁽²⁾ for Ground water pumping	\$2,500
--	---------

Purchased Services

Water Well Analysis ⁽³⁾	\$15,000
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Insurance, Taxes & Licenses 5% of Capital Cost	\$15,000
---	----------

SUBTOTAL ANNUAL O&M COST	\$34,000
CONTINGENCY @ 25% OF ANNUAL O&M COST	\$8,500

TOTAL ANNUAL O&M COST	\$43,000
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PRESENT WORTH OF O&M COST ⁽⁴⁾	\$410,000
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<u>PRESENT WORTH COST</u>	<u>\$710,000</u>
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(1) Based on \$2,000/acre

(2) Based on \$0.08/kwhr.

(3) Based on annual ground water sampling for HSL volatiles, metals, conventional parameters.

(4) Present worth cost

TABLE 6
KUMMER LANDFILL, MINNESOTA
SOFTENING/AOP/ACTIVATED CARBON TREATMENT
CAPITAL COST ESTIMATE

CAPITAL COSTS: INORGANICS REMOVAL	TOTAL COST	SOURCE/COMMENTS
Line Feed/Mixing System	\$50,000	Gary Huebner, WAWCON
Line Storage Tank		
Metering Feed Pump		
Rapid Mix Tanks		
Mechanical Mixer		
Solids Handling Equipment		
Clarifier & Internals	\$50,000	Gary Huebner, WAWCON
Centrifuge	\$75,000	Ken Lindgren, Bird Machine Company
CO2 pH Adjustment System	\$10,000	
Sparger		
pH Probe		
Polymer Feed System	\$10,000	
Mixing Tank		
Metering Feed Pump		
Filtration System		
Multi-Media Pressure Sand Filter	\$8,000	Jeff Hughes, Bob J. Johnson & Assoc.
Backwash Tank	\$5,000	
Pumps		
Pressure Filter (2)	\$8,000	
Filter Backwash (1)	\$4,000	
Sludge Pump (2)	\$8,000	
Centrifuge Filtrate (1)	\$2,000	
Filter Backwash Tank (1)	\$2,000	
Piping & Valves @ 10%	\$23,000	
Electrical & Instrumentation @ 10%	\$23,000	
SUBTOTAL CONSTRUCTION COST	\$278,000	
CONTINGENCY @ 20%	\$55,600	
CONTRACTOR OVERHEAD & PROFIT @ 10%	\$27,800	
ENGINEERING @ 15%	\$41,700	
TOTAL CAPITAL COST	\$400,000	

CAPITAL COSTS: ORGANICS REMOVAL	Total Cost	Source
Ozone Generator System	\$90,000	Jerry Gruber, Griffin Technics, Inc.
Air Dryers/Filters		
Diffuser		
Power Supply		
Ozone Leak Monitor		
Packed Column Ozone Decomposer		
Start-up and Training		
Hydrogen Peroxide System	\$10,000	PulsaFeeder
Hydrogen Peroxide Storage Tank		
Metering Feed Pump		
Diffuser		
Ozone Contactor	\$10,000	
Carbon Contactor	\$50,000	
Initial Carbon (20,000 lb)	\$10,000	
Piping & Valves @ 10%	\$16,000	
Electrical & Instrumentation @ 10%	\$16,000	
Sitework	\$3,000	
Foundation	\$10,000	
Building	\$90,000	
SUBTOTAL CONSTRUCTION COST	\$305,000	
CONTINGENCY @ 20%	\$61,000	
CONTRACTOR OVERHEAD & PROFIT @ 10%	\$30,500	
ENGINEERING @ 15%	\$45,750	
TOTAL CAPITAL COST	\$442,250	

NOTES: Columns may not add due to rounding

TABLE 7
KUMMER LANDFILL, MINNESOTA

SOFTENING/AOP/ACTIVATED CARBON TREATMENT
ANNUAL O&M COST ESTIMATE

OPERATING COSTS: INORGANICS REMOVAL	UNITS	QUANTITY	UNIT COST	TOTAL COST
Power	KWHR		\$0.08	\$10,000
Labor	HOURS	2000	\$25	\$50,000
Maintenance Materials @ 5%				\$11,500
Lime	LBS	220,000	\$0.05	\$11,000
Carbon Dioxide	LBS	7,000	\$0.40	\$2,800
Polymer	LBS	1,000	\$2.50	\$2,500
Solids Disposal	CY	400	\$200	\$80,000
Monitoring			LS	\$30,000
Insurance, Taxes, & Licenses @ 5%				\$20,000
SUBTOTAL ANNUAL O&M COST				\$218,000
CONTINGENCY @ 25%				\$55,000
TOTAL ANNUAL O&M				\$270,000
PRESENT WORTH O&M (1)				\$2,500,000

OPERATING COSTS: ORGANICS REMOVAL	UNITS	QUANTITY	UNIT COST	TOTAL COST
Power	KWHR		\$0.08	\$13,000
Labor	HOURS	2,000	\$25	\$50,000
Maintenance Materials @ 5%				\$8,000
Liquid Phase GAC (0.10 lb/1000 gal)	LBS	6,000	\$1.00	\$6,000
Hydrogen Peroxide	LBS	16,000	\$0.50	\$8,000
Monitoring			LS	\$30,000
Insurance, Taxes, & Licenses @ 5%				\$22,000
SUBTOTAL ANNUAL O&M COST				\$137,000
CONTINGENCY @ 25%				\$34,000
TOTAL ANNUAL O&M				\$170,000
PRESENT WORTH O&M (1)				\$1,600,000

NOTES: (1) Present worth cost based on 30 year project life and 10% discount rate.

Columns may not add due to rounding.

TABLE 8
GROUND WATER DISCHARGE COST

Capital Cost	\$230,000
Excavation	
Erosion control	
Pumping	

Annual O&M Cost	\$29,000

PRESENT WORTH OF O&M COST	\$300,000

<u>PRESENT WORTH COST</u>	<u>\$500,000</u>

APPENDIX A
RESPONSIVENESS SUMMARY

**RESPONSIVENESS SUMMARY
KUMMER SANITARY LANDFILL
OPERABLE UNIT 3**

I. RESPONSIVENESS SUMMARY OVERVIEW

In accordance with CERCLA Section 117, the United States Environmental Protection Agency (U.S. EPA) and the Minnesota Pollution Control Agency (MPCA) recently held a public comment period from July 24, 1990 to September 5, 1990, for interested parties to comment on U.S. EPA's and MPCA's Proposed Plan and Feasibility Study for addressing the ground water contamination problems at the Kummer Sanitary Landfill. At a public meeting held on August 9, 1990, MPCA and U.S. EPA presented their Proposed Plan for the Kummer Sanitary Landfill site.

Based on the findings of the environmental investigation, the MPCA and U.S. EPA have selected a remedy for ground water contamination related to the Kummer Landfill Site involving a ground water pump and treat system with discharge to an on-site infiltration pond. The selected alternative includes an advanced oxidation process for treatment of organic contaminants. An additional study will be completed to determine if in the future bioremediation may be a more feasible treatment process.

The purpose of this responsiveness summary is to document U.S. EPA's and MPCA's response to comments, criticisms and new data received during the public comment period. All of the comments summarized in this document were considered prior to U.S. EPA and MPCA's final decision.

II. BACKGROUND AND COMMUNITY INVOLVEMENT

Under a cooperative agreement with U.S. EPA, the MPCA has conducted a community relations program for the remedial investigation and feasibility study. This is the final of the three operable units in this investigation to reach the Proposed Plan stage, so the public in the area has by now seen a number of news stories and been invited to several public meetings in connection with the site over the last few years.

At the conclusion of the remedial investigation for this operable unit, a fact sheet on the findings was distributed to local media, interested parties, and the information repository. A news release announcing the findings was also sent to local media. During this

time, the location of the information repository was changed from the library at Bemidji State University to Northern Township Town Hall, in response to complaints about the hours of access and availability of documents at the former location. This change was announced by news release and a letter mailed to interested parties.

Two months after the completion of the remedial investigation, the Feasibility Study/Proposed Plan was completed. A 30 day public comment period and public meeting were announced through a newspaper advertisement in the Bemidji Pioneer newspaper, and also by new releases to local media. A fact sheet on the Proposed Plan was again distributed to local media, interested parties, and the Information Repository. Additionally, a letter was mailed to interested parties to make sure they were aware of the meeting date and location. Copies of the Proposed Plan were made available at the information repository. The public meeting was held August 9, 1990 in Northern Township.

1. General comments

Several commentators questioned how the movement of the groundwater and the chemicals in the ground water were monitored.

Response. Ground water in the area of the landfill flows generally eastward, and discharges into Lake Bemidji. This is determined by using monitor wells. The elevations of the wells above sea level are surveyed. Then the depth to water is measured for each well, and the elevation of the water table is determined for that location. Generally, ground water flows from higher to lower elevations; the water table elevation at the Kummer site is higher on the west side than the east, so ground water flows from west to east.

Movement and concentrations of chemical constituents in the ground water are monitored by collecting ground water samples from monitoring wells. These samples are collected using stringent quality assurance/quality control procedures, and then sent to a laboratory for analysis. Analytical data is reviewed to determine changes in concentrations of chemicals in individual wells that may have occurred since the last sampling event.

Several commentators asked what precautions were taken to assure the treatment method is destroying all the harmful compounds in

the ground water.

Response. Regular monitoring and sampling of the treated ground water will be an integral part of the remedial action. If at any time it is demonstrated that the treatment process is ineffective, prompt corrective action will be taken to assure effluent will meet cleanup standards.

Ground water modelling has indicated a portion of the contaminant plume will not be captured by the extraction well system and will eventually discharge to Lake Bemidji. The modelling has indicated, however, that this discharge will be well below Surface Water Quality Criteria.

The US EPA commented that one table included in the Feasibility Study Report contained incorrect data. In Table 2-2, the maximum contaminant level (MCLs) of 5 ug/l for 1,1,2,2-tetrachloroethylene and 100 ug/l for trans-1,2-dichloroethylene should be shown as proposed MCLs and Safe Drinking Water Act MCLs are relevant and appropriate and, therefore, should be eliminated from the list of "other criteria to be considered" and identified as an ARAR. While Proposed MCLs are only to be considered they have been selected as the cleanup level for 1,1,2,-tetrachloroethylene and trans-1,2,-dichloroethylene as the most appropriate standards because the water is used for drinking water and if cleaned up to this level, it will not pose a substantial present or potential hazard to human health and the environment; rather, this level is protective of human health and the environment.

Response. The corrected table is part of this responsiveness summary and Table 4 of the ROD.

2. Treatment alternatives

Several commentators had questions regarding specifics of the proposed additional study on bioremediation, such as what it will cost, how long will it take, and how does bioremediation work.

Response. Bioremediation is considered an innovative technology. At the present time there are no cost estimates on how much bioremediation would cost at the Kummer Site. It is anticipated that to fully study the cost-effectiveness and protectiveness of bioremediation treatment at the Kummer Site may take two to three years.

Bioremediation makes use of naturally occurring microorganisms that use the contaminants of concern as a food source. However, in their natural state they usually aren't present in sufficient

number to have much of an impact. So, in bioremediation, nutrients and oxygen are added to help the microorganisms multiply. Bioremediation is discussed in more detail in the Feasibility Study and the ROD.

Two commentators stated that chemical treatment was not appropriate at the Kummer Site because 1) one of the main contaminants (vinyl chloride) can not be removed with granulated activated carbon (GAC); 2) chemical treatment is less cost effective than bioremediation; and 3) chemical treatment creates a sludge, which only transfers the problem and does not solve it.

Response. Advanced Oxidation Process is the main treatment and is effective for the removal of vinyl chloride. The GAC will be additional treatment used to "polish" effluent from the treatment plant prior to discharge to the infiltration pond. Because bioremediation is considered an innovative technology, there are no cost estimates available. Two or three years will probably be needed to fully study bioremediation at the site.

Sludge that will be produced during treatment will be from treatment of inorganic constituents while the Advanced Oxidation Process or bioremediation treatment will only destroy the organic constituents. Inorganic treatment may be needed regardless of the organic treatment process.

One commentator inquired whether the bioremediation studies would be an additional charge to Potentially Responsible Parties (PRPs).

Response. Currently, the Agencies are investigating funding for the bioremediation treatability studies through the U.S. EPA Office of Research and Development. If a PRP agrees to implement the selected remedy for this operable unit they will be given the opportunity to participate in the study.

One Commentator recommended not to let the bioremediation study, proposed as an additional study, delay the start up of remedial action.

Response. The bioremediation study will not interfere with the implementation of the selected remedy. After a negotiation period with any potentially responsible parties, design of the remedy will commence. If the proposed additional study demonstrates that implementation of bioremediation is favorable, then the ROD may be amended to

reflect such findings.

One commentator asked how can we be assured that the northern part of the contaminant plume won't move farther north.

Response. The predicted plume migration is based on a ground water model that took into account the properties of the soil and ground water flow for each well in the northern part of the plume. The model also incorporated the properties of the chemicals of concern and how they interact with the soils to determine how they would move in the ground water.

Three commentators recommended Alternative I as the preferred remedy because of previous actions undertaken at, or planned for the site (i.e., the installation of the water distribution system and the planned capping of the landfill).

Response. Alternative I is not protective of human health and the environment and does not satisfy ARARs. The Safe Drinking Water Act Maximum Contaminant Levels must be complied with because residents are currently drinking water from the contaminated aquifer. Selection of Alternative I is inconsistent with CERCLA and the NCP.

Three commentators asked how much water will be pumped out. They also expressed concern about any negative affects the selected remedy would have on private water wells, natural springs and wetlands in the area.

Response. Using numerical computer ground water modelling it is estimated that five ground water extraction wells will be needed with a total discharge ranging between 8,000 and 16,800 gallons per day. An aquifer test completed during the remedial investigation showed each extraction well would not have an influence beyond a 150 foot radius of influence for each well. In other words, the area of influence by the wells would not extend even eastward to Irvine Avenue. No natural springs exist in this area, and most private wells have been abandoned in this area. Additionally, the modelling did not indicate any wetlands would be adversely affected.

One commentator asked how long will it be necessary to pump the ground water to before it is cleaned up.

Response. Cleanup of the ground water may take anywhere from four to thirty years dependent on the effectiveness of the Landfill cover which was the remedy selected for Operable Unit 2. Once

monitoring has demonstrated that the ground water has reached cleanup levels, additional monitoring will still be done at least once every five years, as required by CERCLA, since waste will be left in place under the landfill cap.

One commentator pointed out that if the infiltration pond is placed close to the landfill, the possibility exists that a "short circuit" of the extraction well system would occur, resulting in treated water being re-pumped and the contaminated water getting away.

Response. The placement of the infiltration pond has not been defined. The on-site location shown at the public meeting and in the FS was for conceptual purposes only and was not intended to represent the actual placement. Placement will be determined after further study of soils and pump capacities so that infiltration will not interfere with capture of contaminants.

One commentator asked how capping of the landfill will prevent further degradation of the ground water.

Response. Presently, rain and snowmelt percolate through the landfill and carry contaminants down into the ground water. A permanent cap would halt most of this process. Further, the water table under the landfill is slightly elevated because the surface of the landfill itself is higher than the surrounding area. With the cap in place, the water table elevation should become lower and this would effectively remove waste in the landfill from direct contact with the ground water.

One commentator asked if there will be monitoring wells in the landfill.

Response. Currently there is one monitoring well in the landfill itself (well 16A). This well has shown that the center of the contaminant plume is at the east edge of the landfill. There are numerous monitoring wells around the landfill and in the path of the plume, and the MPCA will continue to sample some of these wells on a regular basis throughout the period of remedial action.

Several commentators asked what are the potential negative effects of Alternative III and whether a possibility exists that hazardous waste may be produced at the site.

Response. Alternative III provides overall protection for human health and the environment because contaminated ground water is removed and treated

to drinking water quality standards. Organic contaminants of concern will be destroyed by AOP and inorganic compounds will be removed by chemical treatment. There is a possibility that there may be some hazardous waste generated during the inorganic treatment process which produces a sludge, but this will depend on the concentration of the compounds in the plume and the volume of the contaminated ground water. This sludge will be disposed of in accordance with waste disposal regulations.

One commentator asked if the job is done when all the components in the plume meet the standards of potable water.

Response. It is desirable to clean all components in the plume to meet drinking water quality standards. It may require ten years to meet those standards.

One commentator noted that barium was the only inorganic compound that exceeded the acceptable levels and asked what will be done with barium sludge if they are generated.

Response. Barium will be removed by the chemical treatment process by means of pH elevation and precipitation. Any sludge that is produced at this site will be disposed of at an appropriate landfill.

One commentator asked why the Kummer site was being singled out for cleanup when there are other dumps in the area that are not being cleaned up.

Response. In 1982 and 1983 MPCA sampled groundwater from on-site monitoring wells and found nineteen volatile compounds (VOC's). The VOC's were found in the down-gradient wells while the up-gradient wells were uncontaminated, indicating groundwater contamination as a result of the landfill operation. Based on this information the site was included on the Superfund National Priorities List in May 1986. MPCA has an ongoing monitoring program that looks for potential sites that may pose a risk to the environment and human health.

One commentator pointed out that it was stated the chlorinated compounds would be broken down into carbon dioxide and water by the treatment process, but it was not indicated what happened to the chlorine molecules.

Response. After destruction of the chlorinated compounds the chlorine molecules will occur as free ions in the water, well below drinking water standards and therefore will pose no significant threat.

TABLE 1
Summary of Community Relations Activities
Operable Unit 3

September 5, 1990	Public Comment Period closes
August 9, 1990	Public meeting regarding FS/Proposed Plan
July 31, 1990	Reminder letter to interested residents regarding upcoming meeting
July 29, 1990	Publication of newspaper ad regarding public comment period and public meeting on FS/Proposed Plan
July 24, 1990	Fact sheet and news release regarding FS/Proposed Plan (mailed to local media and interested parties)
May 15, 1990	Fact sheet and news release regarding results of RI (mailed to local media and interested parties)
May 25, 1989	Letter to Northern Township clerk regarding update on overall investigations
May 23, 1989	News release regarding start of Ground Water RI (mailed to local media and interested parties)
December 8, 1988	Letter to Northern Township clerk regarding on overall investigation
March, 1986	Community Relations Plan for Kummer Landfill site

APPENDIX B
ADMINISTRATIVE RECORD INDEX

ADMINISTRATIVE RECORD INDEX
KUMMER SANITARY LANDFILL
BEMIDJI, MINNESOTA



ICR/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
1	00/00/00		Letter responding to request for information	D.DeSchane	MPCA	Correspondence	
2	00/00/00		Letter commenting on plans and specifications for water distribution system	D.Fwickler	S.Riner	Correspondence	
7	00/00/00		Response to request for information	P.Norgren, Attorney	MPCA	Correspondence	
4	81/12/08		Letter re: Solid Waste Disposal Facility, SW-31	G.Meyer	C.Kummer	Correspondence	
2	84/01/17		Response to request for information	D.Moe	MPCA	Correspondence	
6	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	K.Peterson	Correspondence	
6	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	M.Antle	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	Bemidji AVPI	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	Bemidji State University	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	D.Crepeau/Arctic Enterpr.	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	D.DeSchane	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	D.Dowhower	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	D.Wicks	Correspondence	

**ADMINISTRATIVE RECORD INDEX
KUMMER SANITARY LANDFILL
BEMIDJI, MINNESOTA**

THE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			responsible party, transmitting request for info.				
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	P.Haas/Haas Printing	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	G.Stevens, Coca-Cola	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	G.Svenson	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	Magnetic Peripherals	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	NEI Bottling	Correspondence	
7	84/05/31		Letter to potentially responsible party, transmitting request for info.	L.Thorvig	R.W.Riley	Correspondence	
2	84/06/05		Letter responding to letter dtd 5/31/84 and request for information	K.Peterson	D.Wikre	Correspondence	
2	84/06/06		Response to request for information	HAAS Printing	D.Wikre	Correspondence	
7	84/06/11		Letter to potentially responsible party, transmitting request for info.	R.Lupin	W.Dondelinger	Correspondence	
1	84/06/13		Response to request for information	G.Stevens/Coca-Cola Co.	D.Wikre	Correspondence	
1	84/06/15		Response to request for information	G.Nei/Nei Bottling Co.	D.Wikre	Correspondence	
1	84/06/18		Letter in regard to conversation with recipient concerning disposal of waste by author	T.Faecke, Bemidji State University	R.Lupin	Correspondence	

ADMINISTRATIVE RECORD INDEX
KUMMER SANITARY LANDFILL
BEMIDJI, MINNESOTA

ICHE/FRANK	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
5		84/06/22	Various Letters to Bemidji residents, re: results of residential well samples	NPCA	Bemidji residents	Correspondence	
1		84/06/28	Response to request for information	D.Dowhower	L.Thorvig	Correspondence	
4		84/06/29	Letter responding to information request	J.Petterson	D.Wikre	Correspondence	
1		84/06/29	Letter responding to request for information	R.Kaiser	D.Wikre	Correspondence	
1		84/07/16	Letter responding to request for information	G.Svenson	D.Wikre	Correspondence	
2		84/07/17	Letter responding to request for information	W.Dondelinger	NPCA	Correspondence	
3		84/07/18	Letter informing recipient of Determination of Emergency regarding the use of ground water; attachment	R.Lupin	Gail Skari	Correspondence	
3		84/07/18	Copy of Letter sent to Gail Skari	R.Lupin	Mayor Douglas Peterson	Correspondence	
9		84/07/23	Various Letters to Minnesota residents, informing them that parties at 8 residences in Northern Township have been advised by MN Dept. of Health to discontinue use of their private wells as a water supply	T.Kalitowski	Various MN residents	Correspondence	
1		84/07/30	Letter re: Request for	R.Massey	Bemidji AVTI	Correspondence	

ADMINISTRATIVE RECORD INDEX
KUMMER SANITARY LANDFILL
BEMIDJI, MINNESOTA

CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Information - recipient had not responded as of date of this letter				
1	84/07/31		Letter re: response to request for information, asking for additional information	R. Lupin	R. Kaiser	Correspondence	
1	84/08/02		Letter stating that recipient never responded to information request	R. Massey	D. Crepeau	Correspondence	
3	84/08/02		Letter re: Request for Information	R. Massey	D. Wicks	Correspondence	
5	84/08/02		Letter re: Warner Mfg. Company (response to request for information)	F. Butler	NPCA/L. Thorvig	Correspondence	
1	84/08/09		Letter re: Warner Mfg. Company - responding to request for information	G. Panallo	NPCA/L. Thorvig	Correspondence	
2	84/08/27		Letter re: Request for Info.	R. Kaiser	R. Lupin	Correspondence	
9	84/12/06		Letter to G. Reese, Aero Ski Mfg., transmitting 5/31/84 request for info. and follow-up letter dtd. 8/2/84 stating no response was received	R. Lupin	G. Reese	Correspondence	
4	84/12/21		Letter to potentially responsible party, transmitting request for info.	R. Lupin	Ottertail Power Co.	Correspondence	
5	84/12/21		Letter to potentially responsible party, transmitting request for info.	R. Lupin	B. Berg/Chester Berg Motor	Correspondence	
5	84/12/21		Letter to potentially responsible party, transmitting request for info.	R. Lupin	Pine Ridge Services	Correspondence	
5	84/12/21		Letter to potentially responsible party, transmitting request for info.	R. Lupin	Schopper's Disposal	Correspondence	

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KUMMER SANITARY LANDFILL
BENIDJI, MINNESOTA

ICHS/PAGE	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			responsible party, trans- mitting request for info.				
6		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	Lakehead Pipeline Co.	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	A.Doran	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	B.Lowth	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	Benidji Sign	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	Benidji Welders Supply	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	D.Walters	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	Don Hoe's Sanitation Svc.	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	E.Status	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	Johannesson's Inc.	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	Kaliber Homes	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	North Central Door	Correspondence	
7		84/12/21	Letter to potentially responsible party, trans- mitting request for info.	R.Lupin	North Central	Correspondence	

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BENIDJI, MINNESOTA

ICB/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			responsible party, transmitting request for info.		Workshop		
7	84/12/21		Letter to potentially responsible party, transmitting request for info.	R.Lupin	Northwood Panelboard Co.	Correspondence	
7	84/12/21		Letter to potentially responsible party, transmitting request for info.	R.Lupin	Pat's Body Shop	Correspondence	
7	84/12/21		Letter to potentially responsible party, transmitting request for info.	R.Lupin	R.Lockner	Correspondence	
7	84/12/21		Letter to Potentially Responsible Party, transmitting request for info.	R.Lupin	Spaulding Motors	Correspondence	
7	84/12/21		Letter to potentially responsible party, transmitting request for info.	R.Lupin	United Bldg. Centers	Correspondence	
7	84/12/21		Letter to potentially responsible party, transmitting request for info.	R.Lupin	V.Wittinger	Correspondence	
8	84/12/21		Letter to potentially responsible party, transmitting request for info.	R.Lupin	R.Lyman	Correspondence	
9	84/12/21		Letter transmitting copy of request for information and follow-up letter stating that recipient never responded to request	R.Lupin	S.Haley/Arrow Printing	Correspondence	
3	84/12/21		Letter re:Public Meeting; T.Roushar Northern Township		R.Lupin	Correspondence	
1	84/12/24		Response to request for information	Herton Larsen	NPCA	Correspondence	
3	84/12/28		Letter re:N.Township Ground Water	S.Riner	R.Edvold	Correspondence	

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			(response to letter from recipient dtd 12/21/84)				
1		84/12/31	Response to request for information	Benidji Welders Supply Inc.	NPCA	Correspondence	
1		85/01/07	Response to request for information	D.Schnell/North Central Door Co.	R.Lupin	Correspondence	
2		85/01/09	Letter responding to request for info.	A.Doran/Doran Company	R.Lupin	Correspondence	
1		85/01/09	Response to Request for Information	P.Lavalier/ODC, Inc.	R.Massey	Correspondence	
18		85/01/15	Letter re:Meetings of 1/10/85;Central Water Supply Feasibility Study,Northern Township. Attachments	T.Rousbar	R.Lupin	Correspondence	
1		85/01/16	Letter confirming extension granted for response to info. request	A.Lindahl	R.Lupin	Correspondence	
1		85/01/18	Letter responding to request for information	M.Klein	R.Lupin	Correspondence	
1		85/01/18	Letter responding to request for info. (Smith,Carpenter,Benshoof & Klein Law Offices, on behalf of Benidji Sign Co.)	M.Klein	R.Lupin	Correspondence	
1		85/01/18	Response to request for information (Smith,Carpenter,Benshoof & Klein Law Offices, on behalf of Johanneson's, Inc.)	M.Klein	R.Lupin	Correspondence	
1		85/01/18	Letter responding to info. request, stating that	M.Klein	R.Lupin	Correspondence	

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KUNNER SANITARY LANDFILL
BENIDJI, MINNESOTA



ICBE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
10		90/08/22	Comment on Proposed Plan	Gebhard, A., P.E. Barr Engineering Co.	Pribble, MPCA	Correspondence	1
1		90/08/30	Comment on Proposed Plan	Chang, F.H., Ph. D. Professor of Environmental Microbiology	Horneff, MPCA	Correspondence	2
1		90/09/05	Comment on Proposed Plan	Boell, D., P.E. City of Benidji	Horneff, MPCA	Correspondence	3
2		90/09/05	Comment on Proposed Plan	Wolski, C., Leonard, Street and Deinard	Pribble, MPCA	Correspondence	4
14		90/09/05	Comment on Proposed Plan	Jacques, E., P.E. Dames & Moore	Pribble, R., MPCA	Correspondence	5
80		90/08/22	Public Meeting On FS/PP for Ground Water Contamination	Minnesota Pollution Control Agency, USEPA	Kunner Landfill Superfund	Transcripts	6
2		90/06/26	Memo re: Surface Water Quality Standards for Lake Benidji (Kunner Landfill)	Soderbeck, G., Minnesota Pollution Control Agency	Dunn, A.	Memorandum	7
12		90/07/00	Superfund Program Proposed Plan Ground Water Unit			Reports/Studies	8
180		90/07/00	Final Report FS for Ground Water Operable Unit Kunner Sanitary Landfill	Malcom Pirnie Environmental Engineers Scientists and Planners	Minnesota Pollution	Reports/Studies	9

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ICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Pat's Body Shop is unwilling to respond until further documentation is provided				
1		85/01/18	Response to request for information	M.Klein, Attorney	R.Lupin	Correspondence	
2		85/01/18	Response to request for information	R.Lockner/Lockner Sheet Metal Co.	R.Lupin	Correspondence	
3		85/01/21	Response to Request for information pursuant to the environmental response and liability act-from D.Schueppert, attorney for V.Whitinger	D.Schueppert	NPCA	Correspondence	
3		85/01/21	Response to Request for Information	V.Menze/Otter Tail Power Co.	R.Lupin	Correspondence	
1		85/01/22	Response to request for information	R.Lowth/Bob Lowth Ford	R.Lupin	Correspondence	
1		85/01/24	Letter transmitting copy of Request for Info. sent on 5/31/84	R.Lupin	Bemidji AVTI	Correspondence	
3		85/01/24	Letter regarding N.Town- ship Ground Water Contami- nation-Background/Summary of Events	R.Scott Lupin	G.Kulma	Correspondence	
2		85/01/28	Response to request for information	T.Langan/Bemidji AVTI	R.Lupin	Correspondence	
6		85/01/30	Response to request for information	A.Lindahl	R.Lupin	Correspondence	
1		85/02/05	Letter re:NPCA Request for Information Dated 12/21/84	R.Lupin	Johannesson's, Inc.	Correspondence	
10		85/02/05	Letters (10) to Bemidji residents re:results from residential well sampling	R.Lupin	Various Bemidji residents	Correspondence	

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
2	85/02/07	Letter to request for information	B.Lindsey Sims	M.Kline	Correspondence		
2	85/02/07	Letter re:Request for Information from Bemidji Sign Company	B.Lindsey Sims	M.Kline	Correspondence		
2	85/02/07	Letter re:Request for Information from Pat's Body Shop	B.Lindsey Sims	M.Kline, attorney	Correspondence		
2	85/02/07	Letter re:Request for Information from Chester Berg Motors	B.Sims/Special Asst. Att.General	M.Kline	Correspondence		
1	85/02/10	Response to request for information	Pine Ridge Service	NPCA	Correspondence		
1	85/02/18	Letter expressing support of grant application made by W.Township for a water distribution system	W.Forsetti	R.Lupin	Correspondence		
2	85/02/22	Letter from Bemidji resident, regarding a possible solution to the water contamination problem	R.Conway	A.Strangeland	Correspondence		
3	85/02/25	Letter transmitting a summary table of volatile organic hydrocarbon data from NPCA's residential sampling	R.Scott Lupin	G.Kilma	Correspondence		
2	85/03/14	Letter responding to request for information	Pat's Body Shop	NPCA	Correspondence		
4	85/03/18	Response to information request	M.Klein	R.Lupin	Correspondence		
3	85/03/21	Letter responding to request for information	D.Malocky	R.Lupin	Correspondence		

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
2		85/03/21	Letter notifying recipient of proposed superfund project	R.Massey	J.Ghostley	Correspondence	
2		85/03/21	Letter notifying recipient of proposed superfund project	R.Massey	R.Edvold	Correspondence	
1		85/03/26	Letter responding to request for information	F.Folman	F.Jackson	Correspondence	
4		85/03/28	Response to request for information (M.Klein, attorney, on behalf of Chester Berg Motors)	M.Klein, Attorney	NPCA	Correspondence	
3		85/03/29	Letter regarding Northern Township Ground Water Contamination		A.Stangeland	Correspondence	
1		85/03/29	Letter re:Northern Township Letter re:Ground Water Contamination (response to letter from recipient)	R.Lupin	G.Nichol	Correspondence	
7		85/04/04	Letter responding to correspondence received from recipient	A.Stangeland	F.Kalitowski	Correspondence	
5		85/04/09	Letter responding to request for information	F.Kalitowski	A.Stangeland	Correspondence	
6		85/04/19	Letter responding to request for information	F.Kalitowski	R.Boschwitz	Correspondence	
8		95/04/19	Letter responding to	F.Kalitowski	D.Durenberger	Correspondence	

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CBS/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			request for information				
3		85/04/26	Letter re:Auto Salvage Yards,Northern Township	D.Wikre	G.Skare	Correspondence	
7		85/05/03	Letter to potentially responsible party, transmitting request for info.	R.Lupin	Far North Auto	Correspondence	
7		85/05/03	Letter to potentially responsible party, transmitting request for info.	R.Lupin	Hensley Auto Supply	Correspondence	
5		85/05/13	Response to request for information	Far North Auto	NPCA	Correspondence	
3		85/05/29	Letter re:Kunner Sanitary Landfill, N.Township Drinking Water Operable Unit	B.Constantelos	C.Kunner	Correspondence	
2		85/06/14	Letter re:NPCA Citizen Board Memorandum	R.Lupin	C.Kunner	Correspondence	
7		85/06/26	Letter re:March 14,1985 and April 23,1985 Inspections (Memo dtd 4/8/85 to L.Thorvig from J.Matlock, & Letter dtd 1/15/85 to C.Kunner from R.Lupin pertaining to same inspections are attached)	W.Regan	Charles Kunner	Correspondence	
16		85/07/08	Letter informing recipient that Permit Number SW-31 is revoked; ordering the Kunner Sanitary Landfill closed (Closure Order enclosed)	T.Kalitowski	Charles Kunner	Correspondence	

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CEE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
1	85/10/14	Letter re:Removal/Remedial Action Contract with MPCA	L.Thorvig	R.Beckman	Correspondence		
1	85/10/17	Letter re:Northern Township Contract	F.Roushar	L.Thorvig	Correspondence		
3	85/11/18	Letter transmitting newspaper articles-"PCA: Northern should share water cost" and "Landfills expected to be source of future ground- water contamination"	F.Roushar	S.Riner	Correspondence		
1	85/11/25	Letter responding to inquiry of 11/12/85 public meeting	B.Nelson	E.Berglund	Correspondence		
6	86/01/23	Letter re:Request for Information, Kummer Sanitary Landfill Investigation	S.Riner	B.Hensley/Hensley Auto	Correspondence		
1	86/02/21	Response to request for information	B.Hensley/Hensley's Auto Supply	S.Riner	Correspondence		
4	86/03/04	Letter transmitting reso- lution regarding N.Township water system, and a memo concerning in-kind contri- bution towards proposed system	H.McCurdy	L.Thorvig	Correspondence		
4	86/03/04	Letter transmitting a resolution regarding N.Township water system, and a memo re:City's	H.McCurdy	L.Thorvig	Correspondence		

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			in-kind contribution towards proposed system				
3		86/03/11	Letter responding to Bemidji resident's request for comments on issues relating to proposed drinking water system	S.Riner	G. Skare	Correspondence	
3		86/03/21	Letter summarizing progress, discussing a proposed change in water distribution system	S.Riner	K. Faini	Correspondence	
2		86/04/07	Letter re:Construction of S.Riner Drinking Water System		J. Ghostley	Correspondence	
1		86/04/11	Letter re:Phase 1 Water- main Construction;Northern Township	F. Roushar	S.Riner	Correspondence	
1		86/04/21	Letter re:questions/con- cerns of people who attended public meeting	M. Stromberg	F. Roushar	Correspondence	
2		86/04/24	Letter re:concerns expressed by the Board of Supervisors of Northern Township	G. Skare	F. Roushar	Correspondence	
1		86/05/02	Letter re:Access agreements for drinking water distri- bution system	S.Riner	N. Township Property Owner	Correspondence	
4		86/05/13	Letters to Bemidji residents regarding Well Sample	J. Blum	Various Bemidji residents	Correspondence	

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Results				
2	86/05/13	Letter to Benidji resident, describing the ground water investigation to be conducted by the MPCA	S. Riner	G. Huffman	Correspondence		
2	86/05/22	Letter responding to questions raised by Steve Riner regarding revisions to ROD	G. Vanderlaan	G. Pulford	Correspondence		
3	86/06/26	Letter advising of further steps needed to assure residents most affected by contamination are hooked up to municipal water system	S. Riner	J. Ghostley	Correspondence		
3	86/06/26	Letter re: update on progress toward constructing water system for N. Township	S. Riner	J. Ghostley	Correspondence		
2	86/07/21	Letter requesting assistance in ensuring that necessary reviews and approvals occur as quickly as possible	F. Kalikowski	V. Adankus	Correspondence		
1	86/07/24	Letter on behalf of Benidji homeowners requesting USEPA approval of new plan	L. Conway	D. Durenberger	Correspondence		
2	86/08/22	Letter to potentially responsible party, requesting information	L. Johnson	M. Johnson	Correspondence		

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ICHH/FRANK	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
2		86/09/24	Letter responding to Bemidji resident's concern over delays in constructing N. Township drinking system	S. Riner	G. Skare	Correspondence	
5		86/10/13	Letter detailing a study conducted at several residences and a business to gather information to be used to apply to the USEPA for the cost of in-house hookups.	Stephen Riner - NPCA	Allen Wojtas - USEPA	Correspondence	
2		87/01/23	Letter responding to a request to utilize the monitoring wells as part of the RI in a research project	NPCA	F. Chang	Correspondence	
2		87/02/03	Letter to Bemidji resident, regarding selection of his well as a possible monitoring site	S. Riner	T. Detschman	Correspondence	
2		87/02/05	Letter in response to 01/08/87 letter, regarding five aspects of SARA and related impacts on Minnesota	T. Kalitowski	V. Adankus	Correspondence	
10		87/04/02	Letter to Bemidji residents, regarding results of water analysis	S. Riner	Bemidji residents	Correspondence	
2		87/04/10	Letter to Bemidji	S. Riner	H. Moberg	Correspondence	

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			resident, regarding results on water analysis				
3		87/04/16	Letter to J.Ghostley, responding to request for information on the construction of water distri- bution system in Northern Township	J.Warner	J.Ghostley	Correspondence	
2		87/05/18	Letter regarding Proposed S.Riner Benidji-Northern Township water system interconnection		J.Ghostley/D.Peterso n	Correspondence	
3		87/05/26	Letter to Congressman in answer to constituent's question regarding the progress of the installation of the water supply system.	Valdas Adankus-USEPA	Rep. Arlan Straneland	Correspondence	
8		87/07/25	Letter to eight residences detailing the results of the well sampling conducted in May 1987.	Stephen Riner-MPCA	See letters	Correspondence	
2		87/07/31	Response by the MPCA to resident's questions regarding the Northern Township Water Project.	Stephen Riner - MPCA	Bertha Johnson	Correspondence	
3		87/08/13	Letter detailing the ROD schedule	Basil Constantelos-USEPA	Richard Svanda-MPCA	Correspondence	

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
3		87/08/31	Request to the USEPA for approval of participation by the City of Bemidji, Minnesota in the Northern Township water system project.	Thomas Kalitowski-MPCA	Valdas Adankus-USEPA	Correspondence	
3		87/10/12	Three letters sent to area residents on status of water system project.	Stephen Riner-MPCA	No. Twsp. Res. or Prop. Owner	Correspondence	
1		87/10/22	Notification that a local resident alleges that construction activities have damaged two trees on her property.	Stephen Riner-MPCA	Pat Arlig-HNTB	Correspondence	
2		87/10/87	MPCA request to local landowner for concurrence in a change in the number of monitoring wells upon their property.	Stephen Riner - MPCA	Eugene Brooks	Correspondence	
2		87/11/02	MPCA request to landowners for permission to install monitoring wells upon thier property	Stephen Riner - MPCA	Mr. & Mrs. Charles Denardo	Correspondence	
2		87/11/02	MPCA request to landowner for permission to install monitoring wells upon his property.	Stephen Riner - MPCA	Walter Pankhanel	Correspondence	
3		84/07/24	Fact Sheet "Kummer Landfill Ground Water Contamination Problem"	MPCA		Fact Sheet	

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
4		88/01/13	Northern Township Water System Fact Sheet Update	Liz Gelbmann - MPCA	Jenny Hall - USEPA	Fact Sheet	
4		00/00/00	Memo regarding Authorization for Supplemental Funding for the MSCA with the MPCA adding a State-lead RD/RA for Kumner	B.Constantelos	V.Adankus	Memorandum	
3		82/02/17	Site Inspection Report	MPCA		Memorandum	
3		82/06/10	Memo re:Kumner Sanitary Landfill (SW Permit #31) Inspection June 1,1982	L.Olson	G.Meyer	Memorandum	
2		82/08/05	Memo re:Kumner Sanitary Landfill (SW Permit #31) Beltrami County	MPCA		Memorandum	
1		84/02/10	Memo re:Site Inspection Reports for the Months of September, October, November 1983, and January 1984	L.Olson	J.Warner	Memorandum	
2		84/03/14	Memo re:Kumner Landfill (site background,contaminants found,etc.)	E.Jurczak	File	Memorandum	
4		84/06/28	Memo re:Inspection of Kumner Sanitary Landfill SW 31	L.Olson	R.Hassey	Memorandum	
2		84/07/10	Memo re:Emergency Action on Contaminated Residential Wells Around the Kumner Sanitary Landfill	L.Thorwig	File	Memorandum	

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
3		84/09/13	Memo re: Belated response of an inspection of Kumner Sanitary Landfill date June 20, 1984	L. Olson	L. Thorvig	Memorandum	
3		84/11/20	Memo re: Site Inspection on 10/8/84	L. Olson	R. Massey	Memorandum	
2		84/12/17	Memo re: Inspection of Kumner Sanitary Landfill on 11/15/84	L. Olson	R. Massey	Memorandum	
1		85/02/07	Memo re: RFI Response Status	R. Lupin		Memorandum	
1		85/03/21	Memo re: Operable Unit Public Comment Period	J. Beck	D. Gennill	Memorandum	
2		85/09/19	Memo re: Kumner Sanitary Landfill Inspection	L. Olson	L. Thorvig	Memorandum	
3		86/08/26	Memo re: Meeting with EPA on the Kumner Landfill Drinking Water Operable Unit	L. Thorvig	S. Riner	Memorandum	
4		86/08/26	Letter transmitting a memo outlining agreements reached during a (NPCAG/EPA) meeting on 8/14/86	L. Thorvig	S. Riner	Memorandum	
16		86/11/18	Quarterly Reports	C. Wakat	A. Wojtas	Memorandum	
9		86/12/29	Monthly Progress Reports	C. Wakat	A. Wojtas	Memorandum	
13		87/02/06	Monthly Progress Reports	Cindy Wakat	Aller Wojtas	Memorandum	

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7		87/02/09	Monthly Progress Reports	Cindy Wakat	Allen Wojtas	Memorandum	
10		87/05/07	Quarterly Progress Reports	Cindy Wakat-MN Proj. Officer	Allen Wojtas-USEPA	Memorandum	
4		87/06/29	Action Memorandum-Authorization to Amend the Multi-Site Cooperative Agreement with the MPCA	Basil Constantelos-USEPA	Valdas Adankus-USEPA	Memorandum	
12		87/12/03	Quarterly Progress Report for FY 1987 Fourth Quarter	Cindy Wakat - USEPA	Allan Wojtas - USEPA	Memorandum	
2		88/01/04	Memo re:EPA Consideration of Northern Township-Benidji Water System Interconnection	R. Massey	G. Willet	Memorandum	
1		88/01/06	Memo re:Kunner Landfill-response to meeting held on 12/23/87 regarding process outlined for water supply	J. Nye	S. Riner	Memorandum	
2		00/00/00	Newspaper Article			Newspaper Article	
1		84/06/28	Newspaper Article "Kunner's Landfill given Superfund Status"	The Pioneer		Newspaper Article	
1		85/01/11	Newspaper Article "PCA seeks Superfund money to correct water problem"	The Pioneer		Newspaper Article	
1		85/01/11	Newspaper Article "Tax relief likely for property owners"	The Pioneer		Newspaper Article	
8		00/00/00	Community Relations Plan-DRAFT			Other	

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ICR/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
23	00/00/00	Various Site Inspection Reports from '83, '84, '82	MPCA			Other	
3	00/00/00	Site Summary with HRS Score review attached	S. Forrest (reviewer)			Other	
37	00/00/00	Various Material Health and Safety Bulletins	Union Chemicals Division			Other	
2	80/02/10	Site Inspection Report	MPCA			Other	
1	82/01/12	Site Inspection Report	MPCA			Other	
2	82/03/02	Site Inspection Report	MPCA			Other	
3	82/04/27	Site Inspection Report	MPCA			Other	
1	92/05/04	Site Inspection Report	MPCA			Other	
3	82/07/14	Site Inspection Report	MPCA			Other	
6	83/09/15	Site Inspection Reports for 09, 10 & 11/83 and 1 & 2/84	MPCA			Other	
7	84/02/15	Site Inspection Reports for 2-15-84, 1-27-84, 11-16-83	MPCA			Other	
2	84/03/23	Site Inspection Report 3/23/84	MPCA			Other	
106	84/06/26	Meeting Agenda Item Control Sheet, re: Request for	MPCA			Other	

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SCHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Issuance of a Request for Response Action Attachments				
1	85/05/07	Power of Attorney	J. Finn		Other		
17	85/06/25	MPCA Agenda Item Control Sheet; Attachments-Proposed Findings of Fact, Conclusion and Order; Permit SW-31	R. Lapin		Other		
2	86/04/00	MPCA Permanent List of Priorities	MPCA		Other		
3	87/03/00	Amendment to change the project period and budget period	USEPA		Other		
12	79/12/18	Stipulation Agreement	MPCA/Kummer Sanitary Landfill		Pleadings/Orders		
12	83/04/19	County of Beltrami Court Complaint	L. Tiegel, Asst. Attorney General		Pleadings/Orders		
5	84/05/17	County of Beltrami's (Plaintiff) first request for production of documents	M. Senechal, Asst. Attorney General		Pleadings/Orders		
3	84/07/14	Director's Determination of Emergency	T. Kalitowski		Pleadings/Orders		
3	84/07/17	Director's Determination of Emergency	T. Kalitowski		Pleadings/Orders		
18	85/05/03	Notice of Intent of MPCA to request permit revocation and issuance of closure			Pleadings/Orders		

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			order				
9		85/06/25	MPCA Issue Statement	MPCA		Pleadings/Orders	
1		85/06/25	Press Release "MPCA Board Revokes Kummer Landfill Permit, Orders Final Closure"	MPCA		Press Release	
1		85/10/30	News Release "MPCA Staff to Discuss Water Supply System at Northern Town- ship Board Meeting	MPCA		Press Release	
1		84/01/02	Conversation record regarding N. township test borings water quality	S. Forrest		Record of Comm.	
1		84/12/04	Record of Conversation regarding request for information	R. Lupin		Record of Comm.	
1		84/12/04	Record of Conversation regarding request for info.	R. Lupin		Record of Comm.	
1		85/01/21	Conversation Record regarding Arrow Printing- information request			Record of Comm.	
1		85/02/07	Conversation record, regarding request for info. response status	R. Lupin		Record of Comm.	
1		85/02/07	Conversation Record- RPI Response Status	R. Lupin		Record of Comm.	
1		85/05/08	Record of Conversation regarding request for info.	R. Lupin		Record of Comm.	
1		86/05/27	Record of Conversation	J. Blum		Record of Comm.	

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ICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			regarding use of private wells after water supply is installed				
30	00/00/00		Summary of Remedial Alternative Selection			Reports/Studies	
4	00/00/00		Community Relations Responsiveness Summary			Reports/Studies	
8	00/00/00		Record of Decision Delegation Analysis Summary			Reports/Studies	
8	00/00/00		Community Relations Plan			Reports/Studies	
8	00/00/00		Delegation Briefing/ Delegation Analysis Summary			Reports/Studies	
14	00/00/00		Site Inspection Report	USEPA		Reports/Studies	
47	80/09/00		Report to Mr. J. Kunner - Evaluation of the Kunner Sanitary Landfill	Gerald Sunde, Consulting Engineer	Jon Kunner	Reports/Studies	
21	84/06/14		HRS Score	S. Forrest		Reports/Studies	
57	84/11/21		Preliminary Alternatives Evaluation Report	Howard Needles Tammen & Bergendoff	NPCA	Reports/Studies	
93	85/01/21		Final Report of the Feasibility Study Central Water Supply Northern Township, Beltrami County, Minnesota	Howard Needles Tammen & Bergendoff	NPCA	Reports/Studies	
8	85/04/00		Endangerment Assessment			Reports/Studies	

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ICBE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
9	85/04/00		Endangerment Assessment			Reports/Studies	
40	85/08/00		RI/FS Work Plan Scope of Work for: Kummer Sanitary Landfill	Malcolm Pirnie	USEPA	Reports/Studies	
37	85/09/18		RI/FS Work Plan Scope of Work	Malcolm Pirnie	MPCA	Reports/Studies	
177	86/01/00		RI/FS Work Plan-DRAFT	Malcolm Pirnie	USEPA	Reports/Studies	
9	86/03/11		Modification to Work Plan	Malcolm Pirnie	MPCA	Reports/Studies	
33	86/05/00		Various Progress Reports			Reports/Studies	
91	86/04/00		RI/FS Work Plan (With Drawings/Diagrams)	Malcolm Pirnie	MPCA	Reports/Studies	
317	86/06/00		Quality Assurance Project Plan; Vol II, Appendices G-K	Malcolm Pirnie	USEPA	Reports/Studies	
357	86/06/00		Quality Assurance Project Plan; Vol I, Appendices A-F	Malcolm Pirnie	USEPA	Reports/Studies	
86	86/06/00		Quality Assurance Project Plan	Malcolm Pirnie	USEPA	Reports/Studies	
30	86/06/27		Addendum to RI/FS Work Plan of April, '86	Malcolm Pirnie	MPCA	Reports/Studies	
159	86/09/00		Quality Assurance Project Plan	Malcolm Pirnie	MPCA	Reports/Studies	

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ECHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
9		87/01/30	Sampling and Analytical Plan Kunner/Round 2	Malcolm Pirnie	Steve Riner	Reports/Studies	
13		87/03/16	Draft of the Multisitse Cooperative Agreement Amendment from MPCA			Reports/Studies	
10		87/04/09	Sampling and Analytical Plan/Round 3	Malcolm Pirnie	MPCA	Reports/Studies	
13		87/07/22	Draft Supplemental RI Scope of Work with cover letter.	Harry Bhatt-Malcon Pirnie	Stephen Riner-MPCA	Reports/Studies	
10		87/08/07	Quarterly Progress Report MPCA to the USEPA for the FY 1987 Third Quarter		Cindy Wakat - USEPA	Reports/Studies	
25		87/09/03	Technical Specifications for residential service connections as part of the Northern Township Water Project.	Stephen Riner - MPCA	Allen Wojtas-USEPA	Reports/Studies	
65		84/06/20	HRS Scoring			Reports/Studies	
2		90/08/18	Letter re: to inconfirm that the MPCA has given client, American Linen Supply Company, a two-week extension of time to comment on the Proposed Plan for remediation of the above referenced site	Wolski, Carolyn V.	Horneff, M.	Correspondence	
9		90/08/22	Superwood Corporation Reply Division Comments July 1990 Proposed Plan for Groundwater Operable Unit Kunner Sanitary	Gebhard, A., P.E.	Pribble, Ralph	Correspondence	

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
			Landfill				
1		90/08/30	Comments on Proposed Plan	Chang, F., Ph.D.	Horneff, MPCA	Correspondence	
1		90/09/05	Kummer Superfund Project Remedial Action Proposals	Boell, D., P.E., City Engineer	Horneff, MPCA	Correspondence	
2		90/09/05	Comment on Proposed Plan	Wolski, C., Leonard Street & Deinard	Pribble, MPCA	Correspondence	
14		90/09/05	Letter re: cover letter attached, American Linen Supply Co. Comments July 1990 Proposed Plan for Groundwater Operable Unit Kummer Sanitary Landfill	Jacques, J., P.E., Dames & Moore	Pribble, R., MPCA	Correspondence	



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ICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
2	88/08/29	Letter re:Comments on Draft Proposed Plan for Oak Grove Sanitary Landfill Site	Donald Bruce	James Warner,MPCA	Correspondence	1	
230	88/04/00	Remedial Investigation Final Report	MPCA		Reports/Studies	2	
18	88/09/00	Proposed Plan	MPCA		Reports/Studies	3	
77	88/09/00	Feasibility Study	MPCA		Reports/Studies	4	

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SHEET/PAGE	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCUMENT NUMBER
1	87/10/12	Letter providing update on water system construction	S. Riner, NPCA	Residents/Property Owners	Correspondence	1
1	88/08/30	Transmittal letter for news release and legal ad to appear in the Bemidji Pioneer; stating public meeting will be held on 9/15/88	E. Gelbmann, NPCA	Interested Persons	Correspondence	2
3	88/12/08	Letter providing information to Northern Township Board on site activities, stating USEPA signed the ROD on 9/30/88	E. Gelbmann, NPCA	K. Miller, Township Clerk	Correspondence	3
3	88/01/00	Fact Sheet: "Northern Township Water System Fact Sheet Update"	NPCA		Fact Sheet	4
1	88/09/00	Fact Sheet for public comment on FS and Proposed Plan	NPCA		Fact Sheet	5
2	88/09/00	Fact Sheet: "Kunner Landfill Final Cover FS"	NPCA		Fact Sheet	6
1	88/10/28	Fact Sheet: "NPCA Announces Decision on the Final Cover for Kunner Landfill Superfund Site"	NPCA		Fact Sheet	7
2	89/01/00	"Landfills and Superfund" Fact Sheet #2	NPCA		Fact Sheet	8
2	89/01/00	"Landfills and Superfund" Fact Sheet #6	NPCA		Fact Sheet	9
2	89/01/00	"Landfills and Superfund" Fact Sheet #7	NPCA		Fact Sheet	10

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ICR/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
2		89/01/00	"Landfills and Superfund" Fact Sheet #1	NPCA		Fact Sheet	11
3		89/01/00	"Landfills and Superfund" Fact Sheet #3	NPCA		Fact Sheet	12
3		89/01/00	"Landfills and Superfund" Fact Sheet #4	NPCA		Fact Sheet	13
3		89/01/00	"Landfills and Superfund" Fact Sheet #5	NPCA		Fact Sheet	14
1		85/03/21	Memo re: Operable Unit Public Comment Period	J. Beck, USEPA	D. Gemmill, USEPA	Memorandum	15
1		88/09/20	Transmittal memo for fact sheets and agendas used at public meetings to describe alternatives and NPCA's proposed alternative for the landfill cover operable units	L. Gelbmann, NPCA	S. Pastor, USEPA	Memorandum	16
1		85/03/26	Affidavit of Publication (legal advertisement for public comment on Final FS and risk assessment)	NPCA	State of MN, Beltrami Other Cty.		17
1		88/09/02	Affidavit of Publication (legal advertisement for public comment on FS and Proposed Plan)	NPCA	State of MN, Beltrami Other Cty.		18
1		88/09/15	Agenda for Public Meeting	NPCA		Other	19
54		88/09/15	Transcript of Public Meeting	Jacobson Reporting and Video Services		Other	20
1		88/08/23	News Release: Northern Township Water Main Construction Proceeding on Schedule; Birchmont Drive Construction	NPCA		Press Release	21

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ICHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCHNUMBER
			May Cause Temporary Local Traffic Detour"				
2		88/08/30	News Release: "MPCA to Hold Meeting on Proposed Kumner Landfill Cover System; Public Comment Period Scheduled"	MPCA		Press Release	22
2		88/10/26	News Release: "MPCA and EPA Select Final Cover for Kumner Landfill"	MPCA		Press Release	23
2		88/11/16	News Release: "Water Main Instal- lation in Northern Township Complete"	MPCA		Press Release	24
8		00/00/00	Community Relations Plan	USEPA and MPCA		Reports/Studies	25
79		88/09/30	Record of Decision	MPCA and USEPA		Reports/Studies	26

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CHE/FRAME	PAGES	DATE	TITLE	AUTHOR	RECIPIENT	DOCUMENT TYPE	DOCNUMBER
530	90/01/00		Remedial Investigation Final Report Kummer Sanitary Landfill with maps attached	Malcolm Pirnie, Inc.	MPCA	Reports/Studies	1