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May 1997

EPA Superfund Record of Decision Amendment:

Kummer Sanitary Landfill, Operable Unit 3, Beltrami County, MN 11/21/1995

Minnesota Pollution Control Agency

August 17, 1995

O: WATER
CC: RA/RF
LTR. ONLY

Mr. Valdus Adamkus
Regional Administrator
U.S. Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

RE: Record of Decision Amendment
Kummer Sanitary Landfill

Dear Valdus:

The Minnesota Pollution Control Agency (MPCA) is submitting the enclosed Record of Decision (ROD) Amendment for your review and signature. The ROD Amendment concerns the ground water operable unit (OU3) for the Kummer Sanitary Landfill (Landfill) in Bemidji, Minnesota. MPCA staff formally raised the issue of amending the ROD for OU3 in a letter to EPA dated September 21, 1993. The original OU3 ROD called for an Advanced Oxidation Process (AOP) to be installed as the ground water remedy. The ROD Amendment proposes a bioremediation remedy as an alternative to the AOP.

A public meeting was held on June 5, 1995, in Bemidji and comments received at that meeting and during the public comment period are included in the Responsiveness Summary. MPCA staff is confident that the proposed bioremediation option will accomplish agreed upon cleanup goals and meet the expectations of the public. EPA staff has reviewed the ROD Amendment and suggested language changes have been incorporated into the text of the ROD Amendment.

MPCA staff appreciates your consideration and approval of this ROD Amendment and requests your signature. If you have any questions regarding the ROD Amendment or any of the attached documents, please feel free to contact Doug Wetzstein, Project Manager at 612/296-7277.

Sincerely

James L. Warner

James L. Warner, P.E.
Division Manager
Ground Water and Solid Waste Division

11/21/95

JLW:dmh

Enclosure

DECLARATION FOR THE RECORD OF DECISION AMENDMENT

SITE NAME AND LOCATION

Kummer Sanitary Landfill
Northern Township
Beltrami County, Minnesota

STATEMENT OF BASIS AND PURPOSE

This decision document, together with the Record of Decision (ROD) dated September 29, 1990, for Operable Unit 3 (OU3) presents the final remedial action for the Kummer Sanitary Landfill (Site) developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. The selection of the remedial action is consistent with the Minnesota Environmental Response and Liability Act of 1983. The purpose of the final remedial action at the Site is to implement a remedy that will protect human health and the environment.

The decision to amend the OU3 ROD is based upon the contents of the ROD Amendment summary. The appendices also comprise information upon which the decision to amend the 1990 OU3 ROD and the selection of the alternative remedial action are based.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, which may present current or potential risks to public health and welfare, or the environment, will be addressed by implementing the response action selected in this ROD Amendment.

DESCRIPTION OF THE REMEDY

Operable Unit 1 (OU1) addressed an alternate water supply for the affected residents in Northern Township, Minnesota consisting of constructing two wells in a deep uncontaminated aquifer and a water distribution system. Operable Unit 2 (OU2) is a source control in the form of a low permeability cap that covers the Site. OU3 addresses the remaining threat of ground water contamination and is the final remedial action for the Site. OU3 initially called for a Advanced Oxidation Process (AOP) system to address contaminated ground water leaving the Site. The amended OU3 ROD calls for the use of other measures to assume no exposure of contaminated ground water to potential receptors.

The major components of the amended remedy for OU3 include:

- installation of a pilot scale field demonstration to determine feasibility of insitu biodegradation of the chemicals of concern;

- installation of a full scale insitu bioremediation system after one year of operation if it is necessary to meet the Maximum Contaminant Level (MCL) for chemicals of concern. This is dependent on the field scale demonstration proving effective at lowering contaminate levels that have not yet reached the appropriate cleanup goal. If the pilot scale field demonstration is determined to be infeasible, an active gas extraction system will be designed and installed;

- long term monitoring of ground water to verify that chemicals of concern are continuing to decline and to measure performance of the pilot scale field demonstration and or full scale insitu bioremediation system;

- continued observance of the Minnesota Health Department Well Advisory which regulates the location of future potable wells near the Site;

- institutional controls in the form of Site access restrictions that protect the remedy; and operation and maintenance of the remedy, including periodic inspection of the Site to ensure protectiveness.

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 scope of this remedial action, and is cost-effective and utilizes permanent solutions and alternative treatment or resource recovery technologies 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.

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

FEDERAL AND STATE CONCURRENCE:

11/21/95 — Valdus V. Adamkus [signature]
Date — Valdus V. Adamkus
Regional Administrator
Region V

8/15/95 — for [signature]
Date — Charles Williams
Commissioner
Minnesota Pollution Control Agency

RECORD OF DECISION AMENDMENT SUMMARY
KUMMER SANITARY LANDFILL
BELTRAMI COUNTY, MINNESOTA

I. Introduction

The Kummer Sanitary Landfill (Site) 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 NW, and midway between US 71 and State Highway 15 (Figure 1).

Northern Township has a population of about 4,000. Most of the township residents live east of the Site near the City of Bemidji and along the western shore of Lake Bemidji. The land north and west of the Site is sparsely settled but residential and commercial development is beginning to occur immediately west of the Site. The closest occupied building is the Kummer residence located in the extreme southeast corner of the property.

On September 29, 1984, the U.S. Environmental Protection Agency (USEPA) executed a Cooperative Agreement for implementation of a Federal/State funded Remedial Investigation/Feasibility Study (RI/FS). The Site was placed on the National Priorities List (NPL) in June of 1986, due to contamination by volatile organic compounds (VOCs) in the surficial aquifer used for drinking water by Northern Township residents. The USEPA initiated the Potentially Responsible Party (PRP) search or enforcement lead and the Minnesota Pollution Control Agency (MPCA) took the lead for remedial activities.

The purpose of this Record of Decision Amendment is to present a change for the Final Site Remedy (FSR) or third operable unit (OU3) for the Site. The original FSR for OU3 was described in a Record of Decision (ROD) issued on September 29, 1990. Previously, a ROD was issued on June 12, 1985, for a municipal water system (OU1) in Northern Township and a source control ROD was issued on September 29, 1988, for a low permeability cap over the Site (OU2). OU1 and OU2 have been constructed and are operational and functional at this time.

The circumstances leading to a need for a OU3 ROD Amendment are summarized as follows:

- all affected receptors have been connected to the water distribution system constructed as part of OU1;
- institutional controls are in place to prevent potential receptors from exposure to contaminated ground water;
- ground water monitoring data trends indicate a continued decrease in concentration of chemicals of concern, especially since the low permeability cap was installed;
- bioremediation study indicates natural anaerobic bacteria are degrading VOCs;
- FSR selected has feasibility and technological complications; and
- cost (capital and operation & maintenance).

The OU3 ROD Amendment was public noticed (CERCLA 117) and subject to the public participation and documentation procedures specified in NCP 300.435(c)(2)(ii). The OU3 ROD Amendment will become part of the Administrative Record File [NCP Section 300.825(a)(2)].

A complete and through history of the Site can be obtained by consulting the Kummer Sanitary Landfill Administrative Record File, which is available for public viewing at the Bemidji City Library, 6th and Beltrami, Bemidji, Minnesota.

II. Reasons for Issuing the OU3 ROD Amendment

The proposed Site remedy, described in the 1990 OU3 ROD, was an active downgradient hydraulic control and infiltration pond discharge and was to include:

- five ground water extraction wells near the eastern perimeter of the landfill;
- pretreatment of extracted ground water with lime-soda to remove alkalinity and other inorganic compounds (both leached from the landfill and naturally occurring);
- handling and disposal of sludge caused by the precipitation of divalent ions of carbonate and/or hydroxides and metals;
- chemical treatment of the extracted ground water through an Advanced Oxidation Process (AOP), which involves the addition of ozone, hydrogen peroxide and ultraviolet light;
- discharge of the ground water effluent to an infiltration pond;
- installation of two additional monitoring wells near Lake Bemidji; and
- long-term ground water monitoring.

In the 1990 OU3 ROD, the estimated present net worth for the AOP was given as $6,200,000. This included $1,370,000 for capital costs and $512,000 for annual operation and maintenance (O&M) costs.

The rationale for changing the remedy selected in the 1990 OU3 ROD is summarized as follows:

1. All affected receptors have been placed on the municipal water system installed in Northern Township for OU1. Domestic wells in the area down gradient of the Site have been sealed and abandoned according to code. The Minnesota Department of Health (MDH) has established a well advisory or institutional control for the affected area to prevent potential new receptors. The MPCA, through the State Attorney General's staff, has actively supported this effort.
2. Quarterly ground water monitoring has shown a steady decrease in the contaminants of concern since the low permeability cap was installed in 1991. The AOP was selected as the FSR in 1990, when contaminant levels were significantly higher (Table 1). When the 1990 ROD was first developed, there were 5 (five) compounds of concern: 1,1,2,2-tetrachloroethene, trichloroethene, trans-1,2-dichloroethene, vinyl chloride, and benzene. Presently, only one of the five compounds, vinyl chloride, is still detected in ground water downgradient of the landfill. Since the installation of the low permeability cover and passive venting system, the level of vinyl chloride has been approaching the cleanup goal or Maximum Contaminate Level (MCL) of 2 ug/l. This has been accomplished without remediating ground water through the AOP. For example, in two wells at the heart of the plume and immediately adjacent to the fill area (MW-3A and MW-12B), the concentrations now detected are 7 and 3 ug/l respectively. In comparison, the historic maximum concentration of vinyl chloride detected in these wells were 20 and 94 ug/l respectively (Figure 2). The only inorganic compound found in elevated concentrations is barium. Figures 3A and 3B graph the trend of barium in the A and B horizon respectively. The Health Risk Limit (HRL) for barium is only exceeded in one monitoring well, MW-2A. The trend is fairly consistent in this well, however, it is directly downgradient (approximately 100 feet east) of the area of the landfill that received the waste (boiler ash) containing the barium. Since other downgradient monitoring wells are in compliance, the issue of barium appears to be insignificant.
3. There are technical and feasibility complications with the installation and operation of an AOP that make it less desirable. First, the sludge generated by the system is likely to be hazardous and its proper disposal would greatly increase the cost of O &M. Second, the hydrogeologic information on the area immediately east of the Site does not support the ground water pumping rates necessary to efficiently operate the AOP. Third, the treated ground water would have to be discharged to an infiltration basin located near a protected seasonal wooded wetland. Changes in the local ground water table due to infiltration may cause damage to this sensitive ecosystem. The only other

alternative is a surface discharge to a pond on adjacent property which will increase costs due to easement leases and National Pollutant Discharge Elimination System (NPDES) requirements.

4. A two (2) year Bioremediation Study conducted by the University of Minnesota for the MPCA has determined bioremediation is a viable remedy for this Site to decrease the amount of vinyl chloride below the MCL. There are naturally occurring methanotrophic bacteria in the soil and ground water beneath and immediately east of the Site, which are degrading chemicals of concern under anaerobic conditions. The Bioremediation Study has concluded that injecting oxygen into the ground water immediately east of the Site will allow naturally occurring aerobic bacteria to degrade the vinyl chloride in the ground water to a level below the MCL.
5. The cost of installing and operating the AOP is very high in comparison to the remedy being proposed as an amendment to the ROD. The estimated present worth of the AOP in 1990, was $6,200,000 versus an estimated present worth of $575,000 for the remedy proposed in this amendment.

III. Description of New Alternatives

Remedy proposed in 1990 OU3 ROD

The remedy selected in the 1990 OU3 ROD is described as an Active Downgradient Hydraulic Controls and On-Site Infiltration Pond Discharge. Ground water would be collected in a series of pumping wells located within the plume of VOC contamination. An on-site treatment facility would be constructed for removal of organic compounds by AOP. Inorganic treatment (lime-soda softening) was to be provided if barium concentrations exceed drinking water quality standards. Ground water with high concentrations of inorganic contaminants may also involve managing a hazardous waste sludge. Treated ground water would then be placed in an on-Site pond for recharge to the upper aquifer.

The area of clean up considered under this remedy includes the plume defined in Figure 4. Ground water modeling (at the time of the 1990 OU3 ROD) indicated that sixty percent of the plume would be recovered in 3.5 years but it would take 10 years before the plume would comply with MCLs. Since the treated ground water would then be discharged into an on-Site infiltration pond, no NPDES permit is required. Surface Water Quality Criteria (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 would reach Lake Bemidji after approximately 36 years at concentrations below SWQC. The pumped ground water would be treated to comply with MCLs prior to discharge to the infiltration pond.

Treatment could continue from 4 to 30 years, depending on long-term effectiveness of the low permeability cover system (OU2) in blocking future contaminant migration into ground water beneath the landfill.

The applicable, relevant and appropriate requirements (ARARs), relevant for this remedy in 1990, include MCLs and SWQC (Table 4). The concentration of treated ground water will comply with the MCLs. Based upon ground water modeling at that time, the concentration of the portion of the plume, which will escape the extraction system, would comply with SWQC when it discharges into Lake Bemidji. The sludge produced from treatment of the inorganics may require management as a hazardous waste.

Total Cost of this Alternative: $6,200,000 (1990 present net worth dollars)

Remedy proposed in OU3 ROD Amendment

The remedy being proposed as an amendment to the 1990 OU3 ROD is described as an Active Downgradient Hydraulic Control with Insitu Leachate Containment by Subsurface Oxygen Addition (ILC).

The MPCA is proposing to install a pilot scale field demonstration of this remedy to fully evaluate insitu biodegradation of VOCs by oxygen addition to the plume area immediately east of the Site. The pilot scale field demonstration is necessary to ensure that sufficient oxygen is made available and that the oxygenated ground water is capable of achieving the complete breakdown of the contaminants of concern. A full scale system will be installed after one year of operation if the field scale demonstration proves effective at lowering concentrations of the chemicals of concern and the MCLs are not attained. Ground water will be collected in a series of extraction wells located along the east side of the Site within the plume of VOC contamination. A membrane oxygenator located in the extraction well will add oxygen to the ground water. The oxygenated ground water will flow through buried lateral pipes to two (2) injection wells located on each side of the extraction well (Figure 5) for injection back into the upper aquifer. The pilot study will involve 11 wells (5 extraction wells and 6 injection wells). An oxygenator will only be installed in one extraction well for the pilot project; a full scale system would involve placing an oxygenator in all 5 extraction wells. The pilot study will have all 11 wells installed as a cost-savings measure since there will be one mobilization/demobilization. Pilot study feasibility of the diffusive capability of the oxygenated water can be assessed with the entire well system in place. Aerobic biodegradation of the VOCs by naturally occurring bacteria in the ground water will effectively treat the contamination (see Appendix B " Bioremediation Study of Leachate Contaminated Soil and Aquifer Materials from Kummer Sanitary Landfill").

Based on historical ground water monitoring data, the area of cleanup as defined in Figure 4 has diminished significantly in areal extent. The only compound of concern detected, vinyl chloride, is no longer present in monitoring wells MW-7A and MW-7B, MW-11B, MW-1A, MW-2A and MW-2B, and MW-3C. This reveals that the plume has retracted from its original position and that it is breaking up because of the absence of vinyl chloride in a few wells at the former heart of the plume. This has all been accomplished in the past four years and suggests that the low permeability cover and the passive venting system along with naturally occurring aerobic and anaerobic biodegration have all contributed to partial remediation of the ground water.

Bioremediation may continue from 1 to 5 years, depending upon the long-term effectiveness of the low permeability cover system (OU2) to reduce contamination from leaching into the ground water beneath the Site. The bioremediation that is currently ongoing (that will be enhanced with the ILC) has been remediating ground water (aided by the low permeability cover and passive venting system) at a rate that is accelerated from what modeling in 1990 suggested as stated previously. Evidence to show that remediation is still necessary is provided by examining the graph of the behavior of ethyl ether (Figure 6). Ethyl Ether has been detected in ground water beneath the site since 1986. It is a compound that behaves like a conservative tracer in that it does not become adsorbed by the porous media but travels at the same rate as the ground water. Figure 6 shows that a new plume containing ethyl ether at its leading edge was detected at the Site in the Fall of 1994. The concentration gradient of ethyl ether during the Fall 1994 sampling round decreases as you move west toward the center of the landfill. The previous plume had equilibrated during the past two years as can be seen by the consistent behavior of ethyl ether in all wells prior to Fall 1994. The VOCs in the new plume do not represent an additional health threat but indicate that leachate continues to be generated by the Site. For example, the HRL for ethyl ether is 1000 micrograms per liter and the levels detected are below the HRL (20-120 micrograms per liter).

The ARARs include the MCLs and SWQC (Table 4). The ground water subject to ILC will comply with the MCLs. It appears that the leading edge of the plume is in equilibrium and has not moved farther than monitoring well nest 18. This may be because ground water in this locality and downgradient of monitoring well nest 18 is enriched in dissolved oxygen that is greater in concentration than that found upgradient of the facility (Figure 7). These oxygenated waters provide a natural aerobic environment to continue bioremediating the ground water that was not remediated adjacent to the landfill. However, if a portion of ground water escapes bioremediation it will comply with SWQC when it discharges to Lake Bemidji. There will be no sludge or hazardous waste generated by this system.

If the pilot scale remediates the ground water so that levels of vinyl chloride fall below the MCL for three consecutive sampling events (samples collected quarterly) then the pilot system will be turned off and ground water will continue to be monitored. If the pilot scale demonstration proves to be infeasible, an active gas extraction system to remove VOCs from the landfill will be designed and installed as a contingency. MPCA staff has already conducted gas extraction pre-design work at this landfill for evaluation of methane migration.

Total Cost of this Proposed System: $575,000 (1995 present net worth dollars).

IV. Evaluation of Alternatives

The nine criteria used for evaluating AOP and ILC are: 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. AOP and ILC will be compared to identify the remedy which provides the best balance among the nine criteria in 1995.

1. Overall Protection of Human Health and the Environment

Both AOP and ILC are protective of human health and the environment by eliminating, reducing or controlling risks through a combination of pumping and treating contaminated ground water. At the present time, no people are using private wells which extract ground water from the contaminated aquifer.

Since all receptors have been removed and potential receptors eliminated by institutional controls, the level of treatment technology can be lowered in order to address remediating the environment. This can best be served with the ILC. A ground water monitoring program will be maintained to evaluate the effectiveness of ILC.

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.

Both remedies will meet or exceed the ARARs as presented in Table 4. MCLs for all chemicals of concern are expected to be met within 3 years of treatment.

3. Long Term Effectiveness and Permanence

Both remedies use ground water extraction wells to intercept and contain the plume. ILC does more than just contain the plume, it also attempts to enhance the natural chemical and biological reactions occurring within the aquifer by providing a catalyst for the indigenous aerobic bacteria population to destroy and consume the remaining chemicals of concern. Because all the remediation occurs within the aquifer, the area of influence is more widespread since ground water flow will transport oxygen to all downgradient portions of the plume. The AOP process is limited by the capture zones of the extraction wells since all remediation occurs to the water after it is pumped out of the ground. In addition, a drawback to AOP is that both contaminated and uncontaminated water may be treated since the capture zone of outlying wells would also include the capture of uncontaminated water. This makes the AOP process less efficient. Only ILC achieves long-term effectiveness and permanence because areas of the aquifer that are not within the capture zones of the wells will be treated through transport of the oxygen to downgradient portions of the plume.

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

The remedies use different technologies for organic contaminant destruction and both reduce the toxicity of the contaminants. However, ILC reduces both the mobility and the volume of the plume because treatment occurs within the porous media. The oxygen is diffused into the porous media with little loss, so more oxygen is available for the indigenous aerobic bacteria to consume and likewise break down the contaminants in the leachate. In addition, since this remediation is taking place in the aquifer, the ground water flow will transport some of the oxygen to a larger area and ensure a more thorough remediation of VOCs. Since the AOP process occurs at the surface, the treatment of the contaminants takes place outside of the porous media and is limited to the capture zones of the pumpout wells. In addition, AOP wastes water (by treating contaminated water with natural background concentrations of many inorganics at the surface), energy and chemicals used to remediate the extracted water.

5. Short Term Effectiveness

ILC could be installed and fully operational in one season (target date is Spring 1996). ILC would require one year of pilot scale field demonstration to fully evaluate the system to measure performance, establish operating parameters and evaluate its effectiveness. For this reason, only a portion of the plume will be subject to treatment. It is expected that insitu aerobic biodegradation would begin very soon after oxygen is added to the ground water with efficiency improving as aerobic bacteria populations increase. AOP would take one construction season to install and require a longer startup/shakedown period because of more complex equipment. The effectiveness of the AOP may not be known until after 1.5 years of operation.

6. Implementability

While both remedies are considered implementable, ILC is technically and administratively easier to implement than AOP. This is based upon design, construction and operational complexity; land purchasing/leasing and permitting requirements.

ILC discharges right back into the ground water and as such would not be subject to NPDES permitting requirements. However, a variance to Minn. Rules Chapter 4725 would be needed to install the 6 injection wells. The AOP design requires discharge into an infiltration pond. The infiltration pond would have to be constructed on adjacent property and may have hydrogeologic ramifications on a nearby seasonal wooded wetland. Because there would be a possible impact to an adjacent wetland, other government agencies both on the state and federal level would have to review the design and a permit may be necessary, which could delay the implementation process. The only other choice is to discharge to surface water which would subject this remedy to the NPDES permitting requirement.

7. Cost

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

	ILC 1995 Calculation	AOP 1990 Calculation
Construction Cost	$50,000	$1.0 - $1,400,000
Present Worth Cost	$ 575,000	$1.8 - $6,200,000
Annual O&M Cost	$5,200	$240,000 - $510,000

The estimated costs for the AOP are in 1990 dollars, so the same remedy in 1995 dollars would cost even more. A 20% percent contingency has been added to all the ILC costs since the technology is innovative.

8. State Acceptance

The MPCA played a major role in the RI/FS process, construction of both OU1 and OU2, and supports ILC. The MPCA will fund 100% of the remedy including O&M. The MPCA indicated in the original 1990 OU3 ROD that if in the future, bioremediation proved to be a reasonable alternative, the MPCA would seek to amend the OU3 ROD.

MPCA believes that ILC - ground water extraction and treatment via insitu aerobic biodegradation presents the best balance among the nine criteria.

9. Community Acceptance

The public generally accepted AOP in the 1990 OU3 ROD. A public information meeting was held by the MPCA on June 5, 1995, in Northern Township to inform interested parties on ILC and MPCA's desire to amend the 1990 ROD. See Appendix A " Responsiveness Summary" for a detailed discussion of questions and comments.

IV. The Significant Change With the Selected Remedy

ILC has been selected because it provides the optimum balance among the nine evaluation criteria in 1995. It is the most cost-effective, is quick to install and maintain, is acceptable to the community, provides overall protection of human health and the environment, and complies with the ARARs. This proposed new remedy is significantly different from the AOP chosen in the 1990 OU3 ROD. The primary changes are as follows:

- **Insitu biodegradation of ground water contamination versus expensive, complex exsitu chemical degradation .**
- **Treated ground water is injected (below the ground surface) back into the ground on-site versus reinfiltration through a basin or surface water discharge.**

The remaining changes that will result from ILC are minor in nature .

V. Statutory Determinations

USEPA and MPCA believe that ILC satisfies the statutory requirements of Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986 (CERCLA) to protect human health and the environment , to attain ARARs, to be cost-effective, and to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

Protection of Human Health and the Environment. ILC will reduce and control potential risks to human health and the environment posed by exposure to contaminated ground water. This same remedy also protects the environment by reducing or eliminating the potential risks posed by the Site chemicals discharging to Lake Bemidji. In-situ biodegradation will prevent trespassers and wildlife from coming into contact with the contamination being treated at the Site. The access restrictions and required maintenance will ensure the continued effectiveness of the treatment system. Even after the aerobic in-situ biodegradation of ground water by oxygenation is concluded, there will be continuing reduction in the amount of contamination at the Site through naturally occurring aerobic and anaerobic degradation because the reaction vessel is the aquifer. This would also be the case if the AOP system had been installed and shut off.

Short-term impacts to nearby residents and workers at the Site during construction are expected to be insignificant. Air monitoring will be used during construction activities when emissions may occur.

ILC will eliminate the amount of ground water that would have to be removed from the Site and discharged. This will help prevent disruption of the existing nearby seasonal wooded wetlands and other surface waters. which provide habitat for a variety of wildlife.

Attainment of Applicable or Relevant and Appropriate Requirements. ILC meets Federal and state ARARs that have been identified. The ARARs and other criteria to be considered (TBCs) were indicated in the 1990 OU3 ROD in Table 4 (Kummer Sanitary Landfill. Minnesota - Comparison of ARARs and other Criteria to be Considered for Organic Contaminants). However. since the 1990 OU3 ROD was issued. some of the criteria cited have been updated. Those changes are:

The HRLs have been added as an ARAR (under the Ground Water pathway) because they are promulgated drinking water standards set by the Minnesota Department of Health. The HRLs for the chemicals of concern are: 1,1,2,2-tetrachloroethylene 7 micrograms per liter; 1,1,2-trichloroethylene 30 micrograms per liter; trans-1,2-dichloroethylene 100 micrograms per liter; vinyl chloride 0.2 micrograms per liter; and benzene 10.0 micrograms per liter. Under the TBC Column the RALs have been discontinued. This means that the only remaining chemical of concern which is vinyl chloride, will have to meet a HRL of
0.2 micrograms per liter versus an MCL of 2.0 micrograms per liter.

ILC will satisfy all ARARs and will be protective of human health and the environment.

Cost Effectiveness. ILC has a distinct advantage in being much more cost effective than AOP treatment system. The AOP would meet all of the threshold and balancing criteria but ILC will permanently and significantly reduce the contamination which is present at the site, and do so for a relatively small cost.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable. ILC provides the best balance of protectiveness, permanence, and cost. ILC utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. There are no benefits that can be gained by installing the AOP sufficient enough to justify the extreme costs. Both the AOP and ILC result in hazardous substances, pollutants, or contaminants remaining at the site, so a review of the remedial action will be conducted no less than every five years. However, ILC has another distinct advantage in that no potentially hazardous waste sludge will be generated.

Preference for Treatment as a Principal Element. ILC will result in significant reduction in the remaining amount of contamination at the Site. The naturally occurring anaerobic biodegradation in combination with the low permeability cover and an improved passive landfill gas venting system, has already significantly reduced levels of the chemicals of concern at the Site. Given the change in Site conditions since the 1990 OU3 ROD was issued, ILC provides adequate treatment at a much lower cost.

Kummer Sanitary Landfill
OU3 Record of Decision Amendment

List of Appendices

Appendix A
Kummer Sanitary Landfill
Responsiveness Summary

A Proposed Plan in the form of a draft Record of Decision (ROD) Amendment Document was issued on June 5, 1995. A public meeting was held on June 5, 1995, at the Northern Township Hall for the purpose of presenting information on the proposed changes for the final site remedy and to answer questions and receive public comment. Copies of the draft ROD Amendment were distributed to interested parties at the public meeting and placed in the Administrative Record at the Bemidji Public Library. A public comment period was held from June 5, 1995, through July 6, 1995. The public meeting and comment period were advertised in the *Bemidji Pioneer* and on the following radio stations: KBSB, KCRB and KKBJ (Bemidji).

Several oral comments were received during the public meeting from members of the audience, a written record of the proceedings and a sign-up sheet was kept, and this record has been made part of the Administrative Record.

During the public comment period, no phone calls or letters were received concerning the Kummer Sanitary Landfill.

In this responsiveness summary, the comments that were received during the public meeting on June 5, 1995, are being addressed. All comments being responded to here were considered by the Minnesota Pollution Control Agency (MPCA) while making its final decision. The oral comments received are paraphrased and then the response is presented.

I. Oral Comments

1. **Comment** (Audience). The Commenter asked how were we going to be sampling or monitoring the bioremediation treatment system.

Response. The pilot scale field demonstration to determine feasibility of insitu bioremediation will be monitored in several ways. First, the MPCA contractor will be regulating the oxygen level in the ground water being reinjected to around 7-8 ug/l or saturation. Oxygen and volatile organic compounds (VOCs) will be monitored in existing wells along the east side of the site and immediately down gradient of the treatment system in piezometers P-1 and P-2.

2. **Comment** (Audience). The Commenter asked what purpose the "lagoon" served on George Hoffman's property adjacent to the site.

Response. The "lagoon" is a sand borrow pit from when the landfill was covered in 1991 that has since filled with water. The landfill cover required a large volume of intermediate fill material and it was most cost effective to negotiate the sale of sand with the adjacent landowner than to truck material from a distant source. The borrow pit is located west and up-gradient of the site and is not contaminated with leachate from the landfill. A ground water monitoring well nest is located in between the "lagoon" and the landfill and is free of contaminants.

3. **Comment** (Audience). The Commenter asked what came of the "plastic" barrier MPCA was going to put around the landfill a few years ago.

Response. The "plastic" barrier was a methane barrier trench which used a geomembrane on the far wall of the trench to prevent off-site underground migration of landfill decomposition gases (methane). The barrier trench was not installed due to its high cost and the fact that it could not be guaranteed to work 100%. MPCA conducted extensive subsurface monitoring and decided to install a temporary landfill gas extraction and flare system on the west side of the landfill in 1994. The landfill gas extraction system removed all of the gas found off-site and continued monitoring has indicated little or no return to previous levels in perimeter gas sampling wells. The MPCA has a long term landfill gas and ground water monitoring plan for the Site. If landfill gas problems redevelop, the MPCA has a contingency plan with a predesign ready to implement. As an additional precaution, methane alarms have been placed in the Kummer residence and the nearby Alanon building.

4. **Comment** (Audience). The Commenter asked about landfill gas on the east side of the site.

Response. Perimeter gas sampling wells and additional monitoring have indicated that underground migration of landfill gas is not a problem on the east side of the site. This may be due to the fact that more demolition material was placed in this area of the landfill. If a problem develops over time, MPCA will either add more passive vents on the east side or install a temporary gas extraction and flare system similar to that used on the west side of the landfill.

5. **Comment** (Audience). The Commenter asked what hazard does vinyl chloride pose to people.

Response. Vinyl chloride is a known carcinogen. Therefore, drinking 2 liters a day for 70 years would increase your risk of contracting cancer to 1 in 100,000. This is at the Health Risk Limit (HRL) of 0.2 ug/l. The HRL is the drinking water standard promulgated by the Minnesota Department of Health that applies to the groundwater supplies. The Maximum Contaminant Level (MCL) of 2ug/l has been set by the U.S. Environmental Protection Agency and is the standard for cleanup at the site. Any level above that standard is deemed unsafe in public drinking water supplies.

6. **Comment** (Audience). The Commenter stated that the Northern Township Planning Commission was considering a request to rezone some of George Hoffman's property to the west of the site from commercial to residential. It was not clear if this was property immediately adjacent to the Site.

Response. The MPCA has discussed the possibility of purchasing the lots which border the site as a buffer area and holding them until such time as the landfill no longer poses a threat.

7. **Comment** (Audience). The Commenter asked how long would it take before landfill gas is no longer a problem.

Response. Studies indicate that the decomposition of organic matter which causes landfill gas continues after "capping" with a gradual drop in methane generation over time. Estimates are in the range of 15-20 years depending upon factors such as volume of waste, amount of organic material, etc. However, landfill gas generation is very site specific as evidenced by sites closed in the 1970's still emitting large volumes of landfill gas.

8. **Comment** (Audience). The Commenter asked what is the ground water quality at this time.

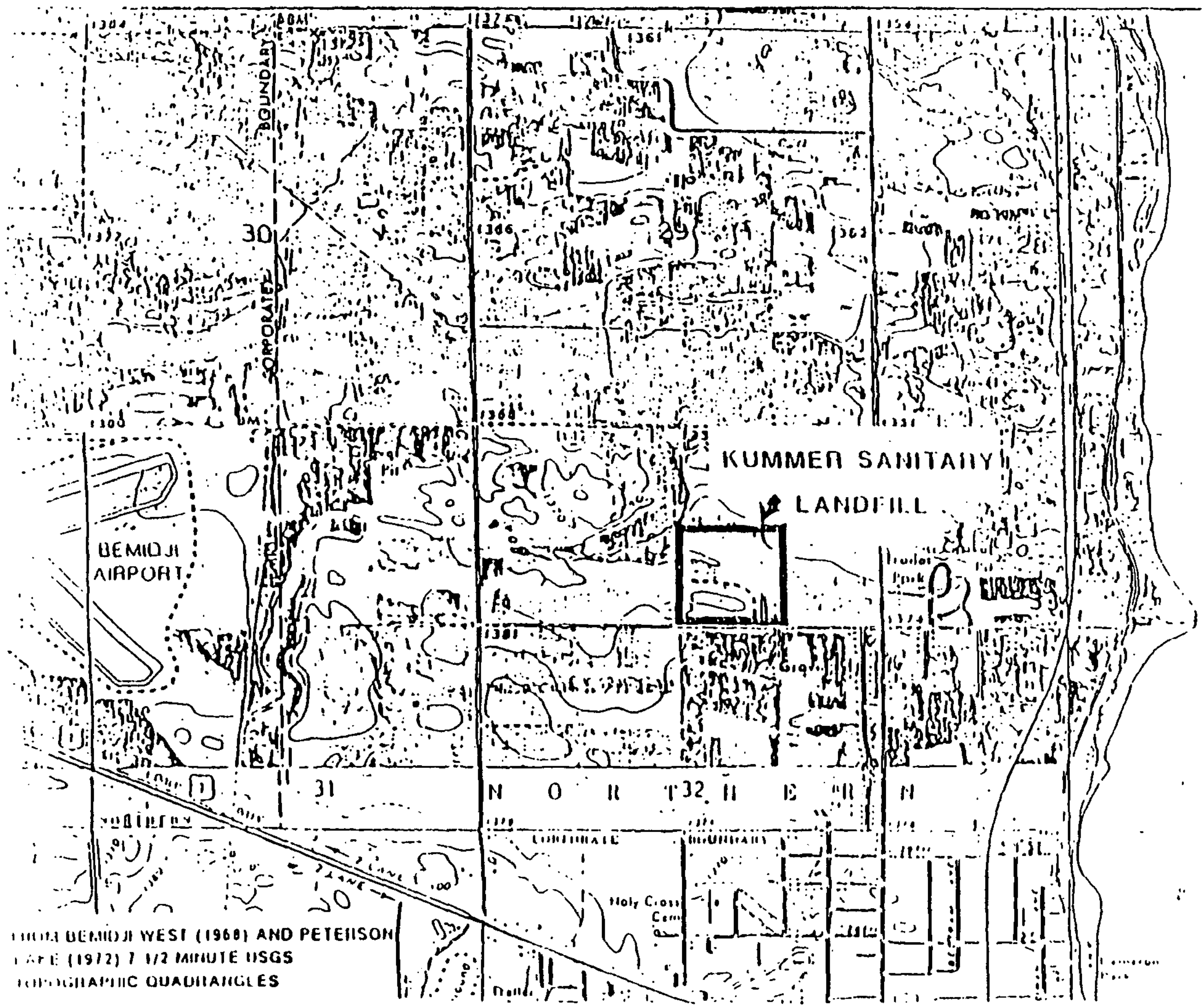
Response. Of the original chemicals of concern, only vinyl chloride remains at levels above the MCL in monitoring wells down gradient of the site. There are inorganic contaminants from natural biodegradation such as chloride and sulfate. While these inorganic contaminants are not found in concentrations high enough to be of concern, they do alter ground water from its natural or background quality. The HRL for inorganics is only exceeded in one monitoring well, MW-2A due to the presence of barium. The trend is fairly consistent in this well, however, it is directly downgradient (approximately 100 feet east) of the area of the landfill that received the waste (boiler ash) containing the barium. Since other downgradient monitoring wells are in compliance and do not pose a health risk, the barium problem appears to be highly localized and of little significance. There are also low levels of metals present in the ground water below the drinking water standard that are attributable to the landfill. The quality of the ground water has obviously been changed by the landfill and even after reducing all the chemicals of concern to levels below the MCLs, the quality of the ground water will not be the same for a very long time.

9. **Comment** (Audience). The Commenter asked that the bioremediation oxygenation process be described.

Response. The oxygenation process is the heart of the ground water treatment system being proposed in the ROD Amendment. It involves extracting ground water immediately down gradient of the site through a recovery well, diffusing pure oxygen into the ground water up to a level of 7-8 ug/l or saturation and then re-injecting the ground water back into the contaminated aquifer. The ground water that is being extracted comes from an area of naturally occurring anaerobic or oxygen starved biodegradation. That is to say, that all the available oxygen has been consumed by chemical reactions and bacteria. Only those bacteria species that can tolerate an oxygen free environment are thriving. These anaerobic bacteria are efficient at breaking down or mineralizing most contaminants but vinyl chloride is not degraded and may well be a degradation by-product of other chemicals. By oxygenation of the ground water, the level of oxygen is increased and aerobic bacteria capable of degrading vinyl chloride are able to proliferate or thrive. The goal is to stimulate enough aerobic bacteria to degrade the remaining vinyl chloride to levels below the MCL.

10. **Comment** (Audience). The Commenter asked when people would be able to utilize their domestic wells.

Response. The drinking water advisory/domestic well restriction is regulated by the Minnesota Department of Health under advisement by the Minnesota Pollution Control Agency. If the water quality in the aquifer improves in the future, a joint decision will be reached about domestic well utilization. Currently, the level of contamination in the aquifer does not meet drinking water standards and leachate continues to be generated from the fill area. In addition, not every portion of the aquifer is monitored so a guarantee of a safe drinking water supply can only be assured through utilization of the municipal system.



KUMMER LANDFILL

TABLE 1
KUMMER SANITARY LANDFILL, MINNESOTA

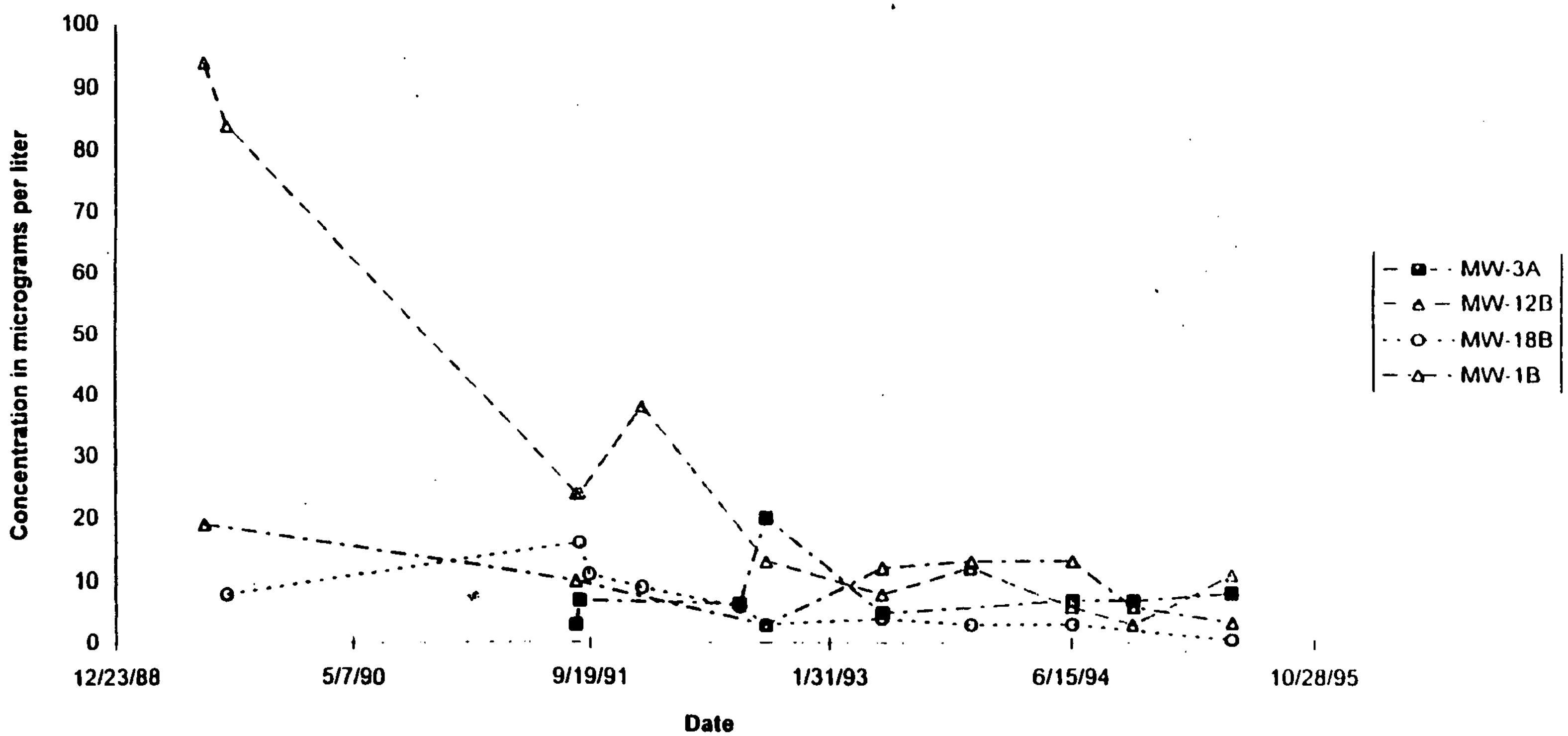
VOLATILES FOUND IN GROUND WATER PRIOR TO 1986

	Lowest	Highest
Methylene Chloride	1.0	46.0
1,1-Dichloroethane	0.3	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.

Figure 2: Concentration versus time for vinyl chloride in wells at Kummer Landfill



Prepared by GWSW Staff 7/26/95

Figure 3A: Barium trends in groundwater around Kummer SLF, SW-31, at the water table

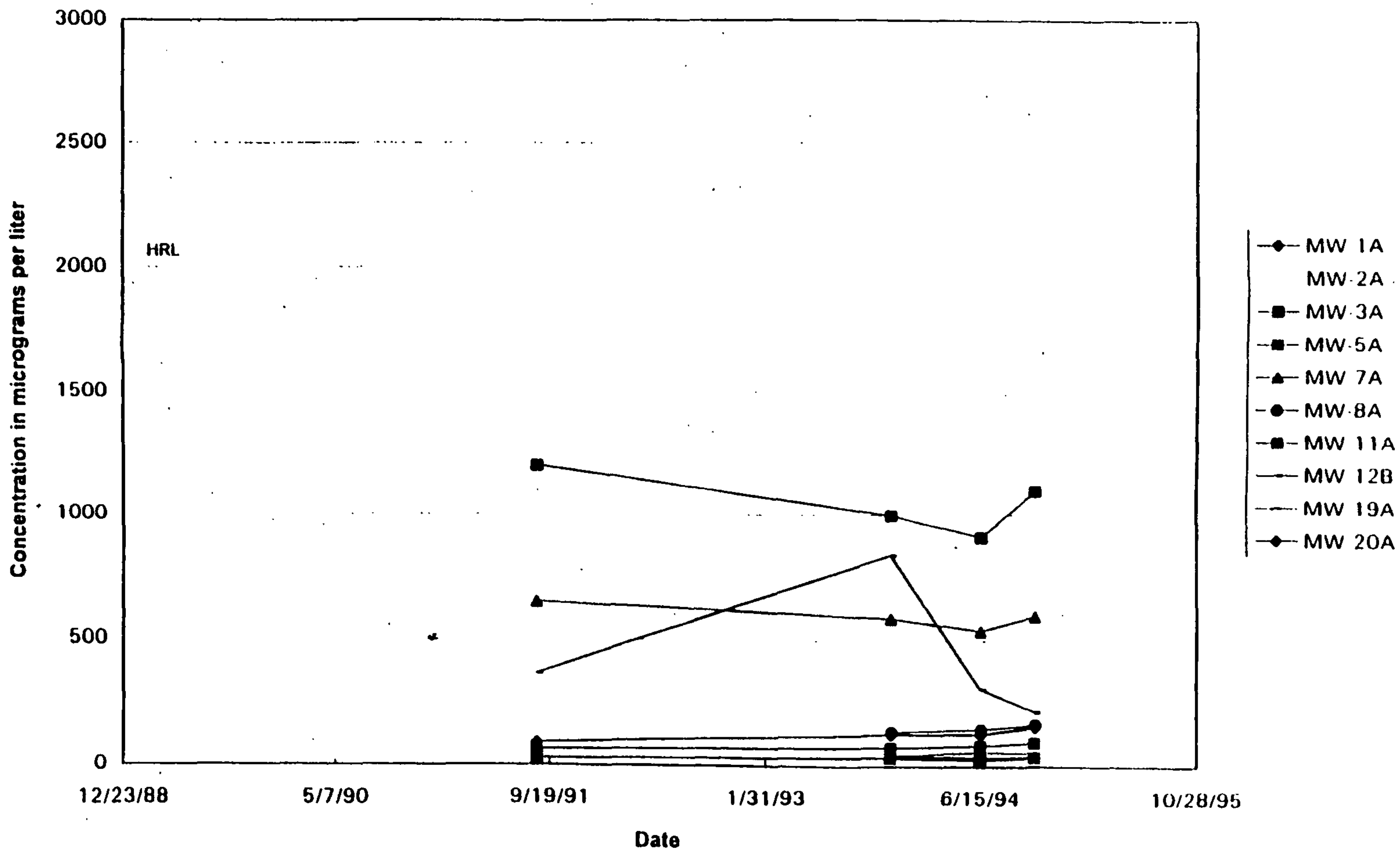


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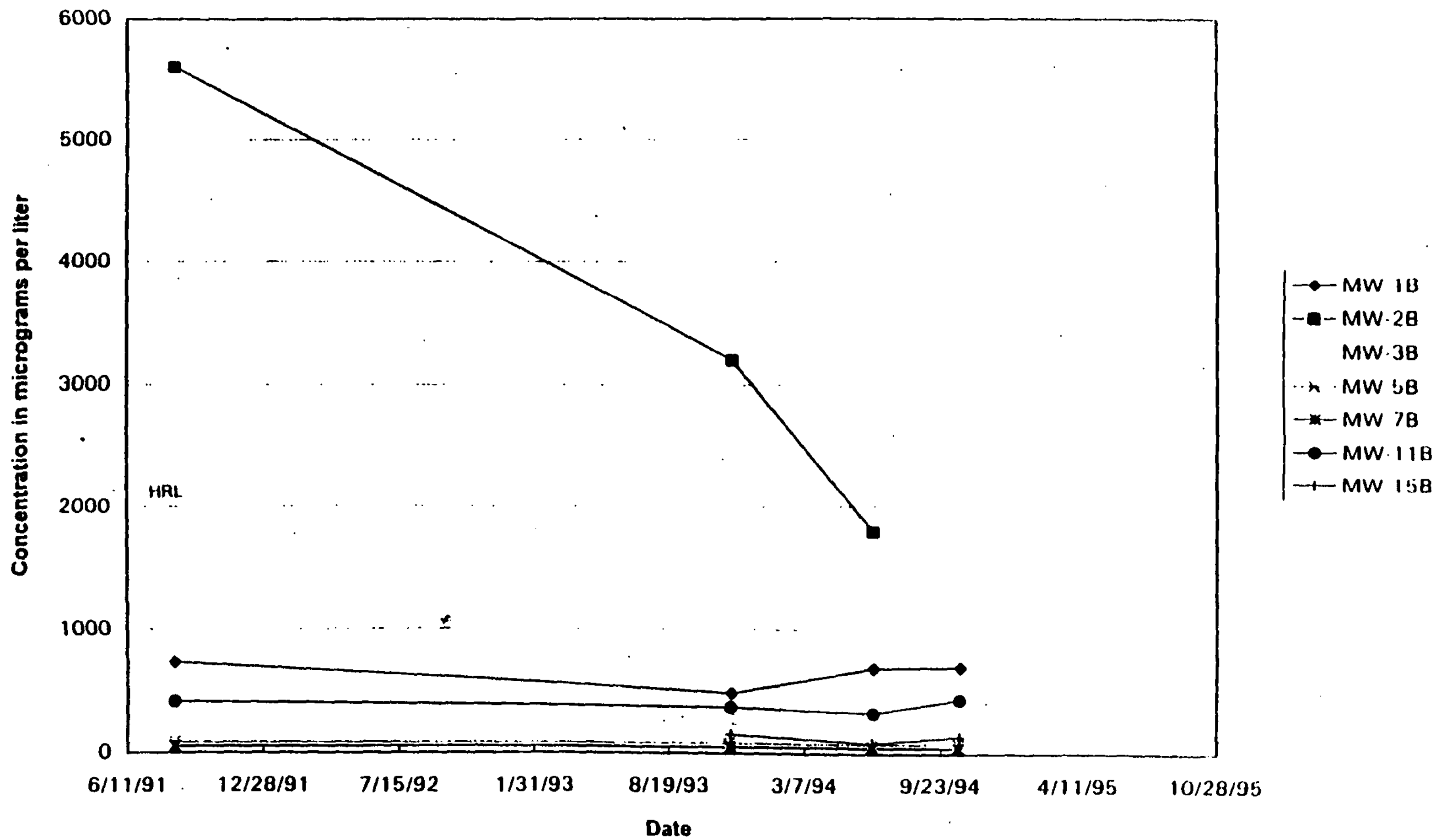
Figure 3B: Barium trends in the B horizon around the Kummer SLF, SW-31



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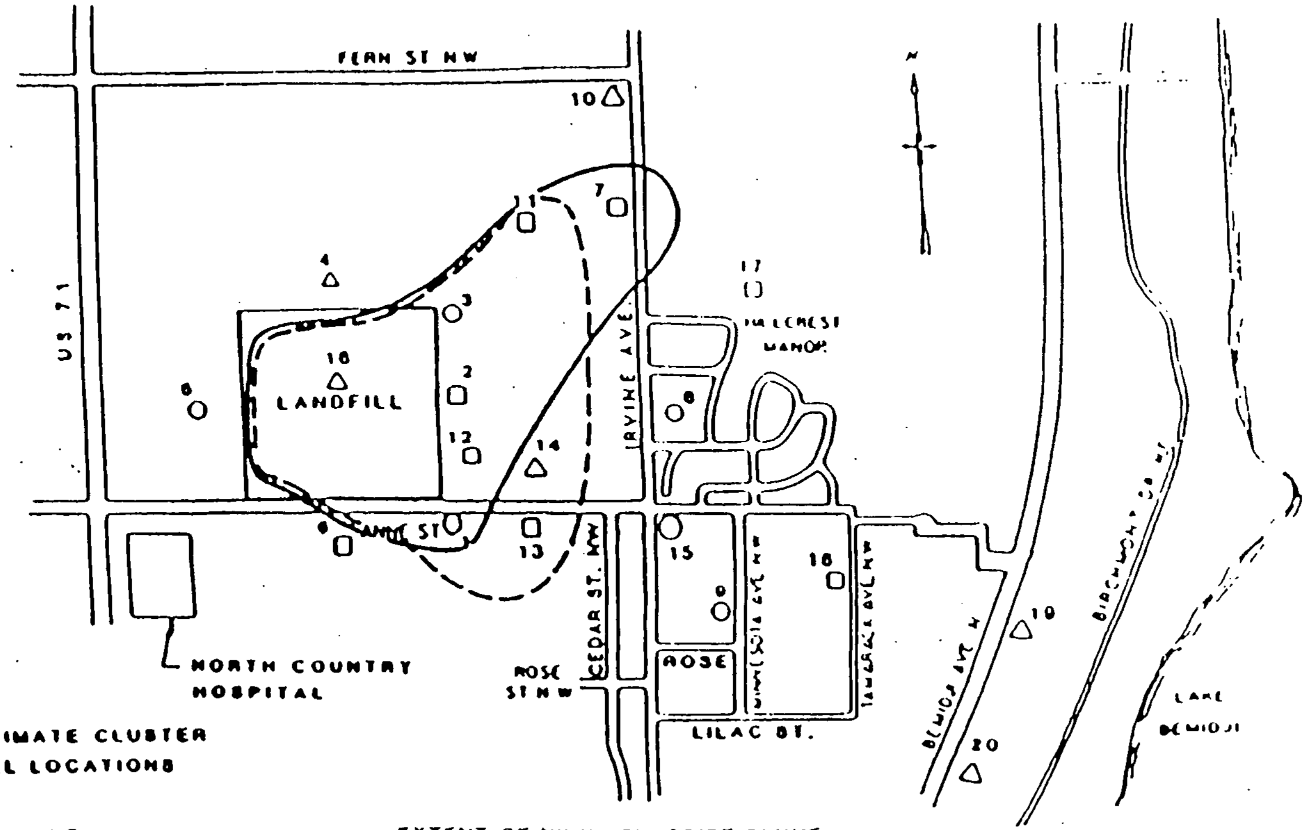


APPROXIMATE CLUSTER WELL LOCATIONS

O ABC

□ AB ONLY

Δ A ONLY

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

0 500 1000

GRAPHIC SCALE IN FEET

MALCOLM

KUMMER LANDFILL GROUND WATER FEASIBILITY STUDY

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

Pathway	Contaminant	Range Detected	Cleanup Level	ARARs MCL	ARARs PMCL	ARARs MCLG	Units	TBC			
Ground Water		Range Detected	Cleanup Level	MCL	PMCL	MCLG	Ug/L	RALs	ILs	10^{-5} CA Risk	
	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.[illegible]	
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 chlorine	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-tetrchloroethylene (PCE)	NA						3350		4.1	41
	1,1,2-trichloroethylene (TCE)	NA						2700		1.5	[illegible].15
	trans-1,2-dichloroethylene (tDCE)	NA						NA		NA	[illegible]
	vinyl chloride	NA						100		0.28	[illegible].028
	benzene	NA						300		0.27	[illegible].027

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} CA Risk = 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).
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 [illegible] 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 require[illegible]ts under [illegible]
[illegible]WPA = Minnesota Ground Water Protect[illegible]

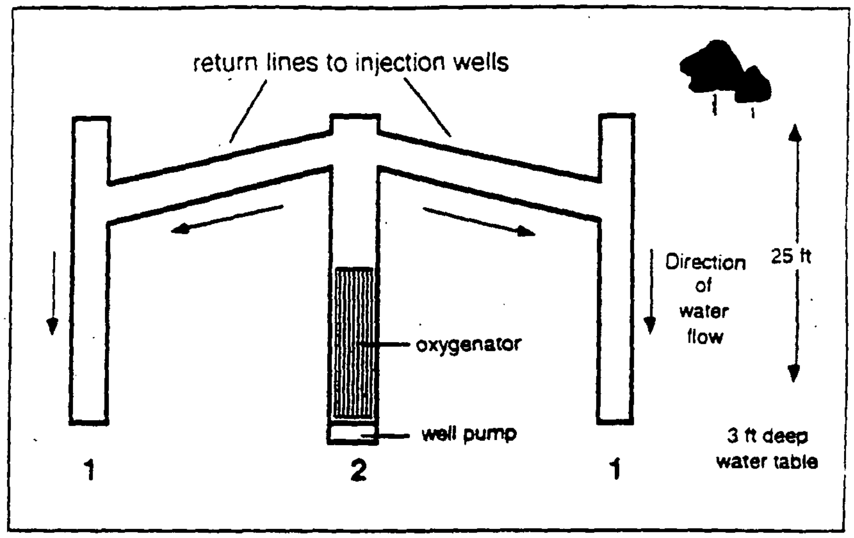
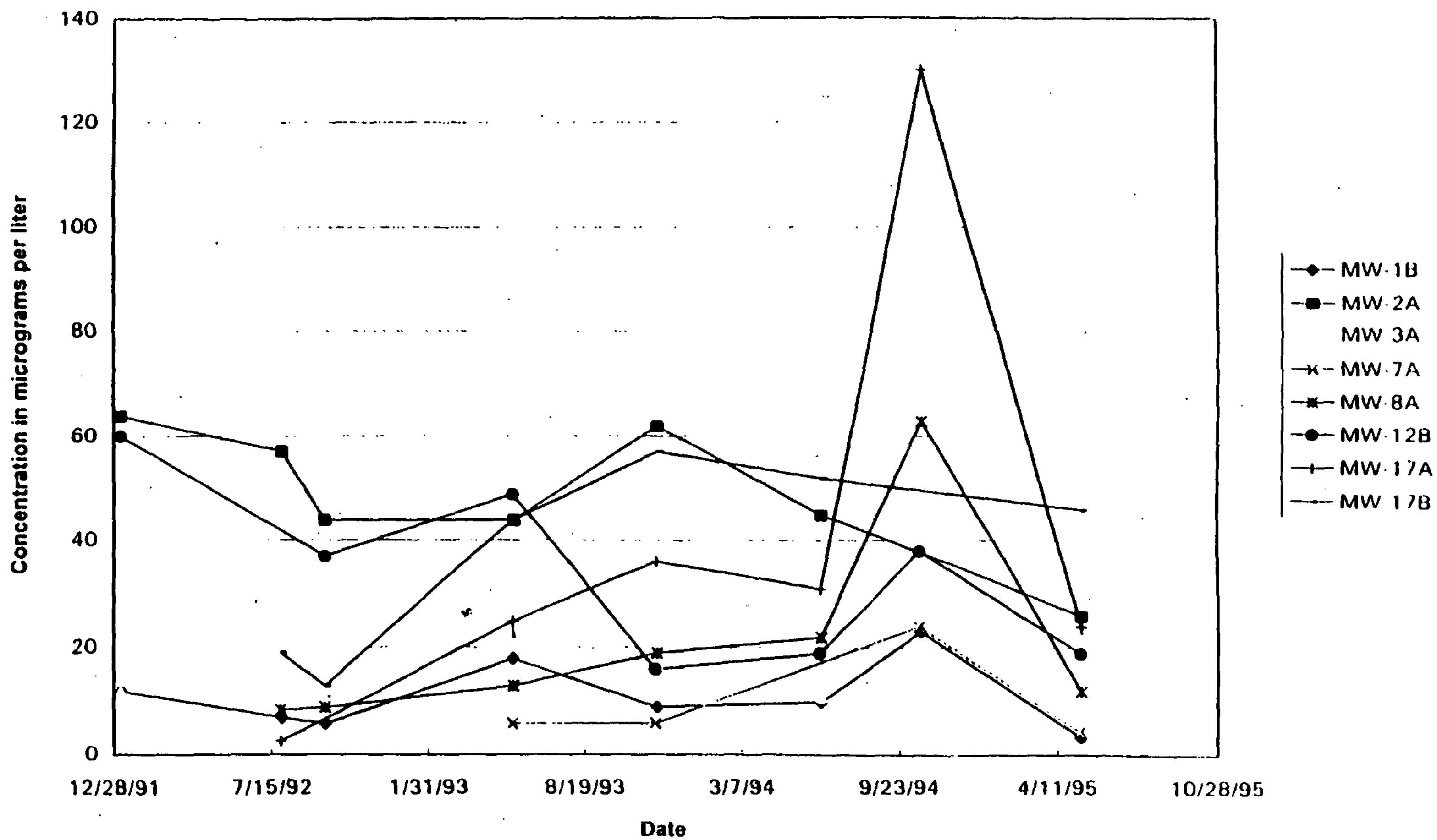


Figure 5 A side elevation showing the way in which water is drawn from the center suction well (2) and returned to the injection wells (1). The suction well is equipped with a well pump and oxygenator.

Figure 6: Behavior of Ethyl Ether downgradient of Kummer SLF



Prepared by GWSW Staff 7/26/95

Figure 7: Dissolved Oxygen on October 18, 1994