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# Superfund Record of Decision:

# Oak Grove Sanitary Landfill, MN

50272-101

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16. Abstract (Limit: 200 words)

The 45-acre Oak Grove Sanitary Landfill is a former municipal and industrial solid waste landfill in Oak Grove Township, Anoka County, Minnesota. Land consists of low regions of uplands and sand dunes interspersed among numerous lakes and wetlands. The nearby developed land use in the area is agricultural and residential. The site overlies two aquifers, which are separated by a semi-confining layer. The deeper aquifer provides regional potable water and supplies many area residential wells. Landfill operations began in 1967 and continued until 1984, when the operating license was suspended. An estimated 2.5 million cubic yards of waste is present in the landfill including acidic oil sludge, paint and solvent waste, foundry sands and sludge, inorganic acids, metal sludge, and chlorinated and unchlorinated organic compounds from pesticide manufacturing. In addition, lime sludge was used as a cover material on two thirds of the landfill. A 1988 Record of Decision (ROD) addressed the sources of contamination by containing the onsite waste and contaminated soil with a cover. EPA investigations in 1989 determined that the contaminated shallow aquifer discharges directly to the surface water of the adjoining wetlands where ground water contamination is being reduced by natural attenuation, and thus, limiting migration of

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Oak Grove Sanitary Landfill, MN
Second Remedial Action - Final
Contaminated Medium: gw
Key Contaminants: VOCs (benzene, toluene, xylenes) and metals (arsenic)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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contaminants to the surface water. This ROD addresses remediation of contaminated shallow ground water, prevention of significant impacts on surface water from the discharge of contaminated shallow ground water, and provides for continued use of the deep aquifer as a drinking water supply. The primary contaminants of concern affecting the ground water are VOCs including benzene, toluene, and xylenes; and metals including arsenic.

The selected remedial action for this site includes long term monitoring of the shallow and deep aquifers, surface water, and sediment at a frequency of three times per year for the first year and semi-annually thereafter; natural attenuation of shallow ground water; abandoning non-essential wells; and implementing institutional controls including ground water use restrictions. The estimated present worth cost for this remedial action is $800,000, which includes an annual O&M cost of $90,000 for the first year and $70,000 for subsequent years.

PERFORMANCE STANDARDS OR GOALS: Sediment, ground water, and surface water monitoring will assure that contaminant levels do not exceed SDWA MCLs, CWA AWQCs, and State surface water quality standards.

# OAK GROVE SANITARY LANDFILL

## DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Oak Grove Sanitary Landfill,
Oak Grove Township, Anoka County, Minnesota.

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected ground water operable unit remedial action for the Oak Grove 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, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300). This decision is also in accordance with the Minnesota Environmental Response and Liability Act of 1983.

The decision is based upon the contents of the administrative record for the Oak Grove Sanitary Landfill site.

The State of Minnesota and the United States Environmental Protection Agency (U.S. EPA) agree on the selected remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

This operable unit is the second of two operable units for the site. The first operable unit addresses the source of contamination by containing the on-site wastes and contaminated soil with a cover. This particular cover system was documented in a September 1988, ROD. The operable unit described in this decision document addresses ground water contamination.

The remedy selected for ground water contamination includes continued monitoring of both aquifers present at the site as well as monitoring of surface water and sediments. The selected remedy also incorporates institutional controls on the placement of drinking water wells and natural attenuation of shallow contaminated ground water. This remedy when used in conjunction with the final cover system, addresses the threat posed by contaminated ground water by eliminating or reducing the risks posed by the site, through engineering controls.

The major components of the selected remedy include:

Long term monitoring of the shallow and deep aquifers for volatile organic compounds, arsenic, barium, nickel, zinc, pesticides, PCBs and nutrient parameters. A minimum of twelve wells will be monitored.

Long term monitoring of surface waters for the same constituents which are monitored for in ground water. Surface water monitoring points will be established based on a conductivity survey.

Long term monitoring of sediments for arsenic, barium and nickel. Sediment sample points will be located where surface water sampling occurs.

Sediments, ground and surface waters will be sampled at a frequency of three times per year for the first year and semi-annually thereafter.

Institutional controls will be implemented and non-essential wells would be abandoned.

Natural attenuation of shallow ground water.

This action will require operation and maintenance activities to ensure continued effectiveness of the remedial alternative. The action being taken is consistent with Section 121 of CERCLA as amended by SARA, 42 U.S.C. Section 9621.

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 considers alternative treatment (or resource recovery) technologies to the maximum extent practicable for this site.

The results of the Remedial Investigation and Feasibility Study indicate that the toxicity, mobility and volume of contaminants in the ground water are being addressed via natural attenuation. Thus, treatment of ground water to permanently and significantly reduce the toxicity, mobility and volume of contaminants was not found to be necessary to protect human health and the environment, or to be practical at the site at this time.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. If, however, the analytical results generated as a result of monitoring ground water indicate the presence of contaminants above health based levels in the deep aquifer before the five year review, this particular remedy may be replaced by a treatment system. Additionally, if surface water contaminant levels exceed State water quality standards prior to the five year review, then a treatment system may replace this remedy.

12/21/90
Date

Valdas V. Adamkus
Regional Administrator
U.S. EPA, Region V

12-20-90
Date

for Gerald L. Willet
Commissioner
Minnesota Pollution Control Agency

ADMINISTRATIVE RECORD INDEX
OAK GROVE SANITARY LANDFILL
ANOKA COUNTY, MINNESOTA

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# SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

Oak Grove Sanitary Landfill
Oak Grove Township, Anoka County, Minnesota

## I SITE NAME, LOCATION AND DESCRIPTION

The Oak Grove Sanitary Landfill is located in Oak Grove Township, Anoka County, Minnesota (figure 1) near the intersection of Eidelweiss Street and County Road 22 (Viking Boulevard) as shown in Figure 2. The site is approximately 38 miles northwest of St. Paul.

The site encompasses approximately 104 acres, of which 45 have been actively landfilled. The landfilled area of the site is roughly rectangular in shape and extends to a maximum height of approximately 50 feet above the grade elevation of the surrounding areas. The topography of the area immediately surrounding the landfill is relatively level, with a maximum relief of approximately 40 feet. The topography of the surrounding area consists of low regions of uplands and sand dunes interspersed among numerous lakes and wetlands. Elevations vary from approximately 900 feet above mean sea level to approximately 870 feet above mean sea level.

The site is located within the Cedar Creek watershed, an 85.9 square mile subwatershed of the Rum River drainage basin. Cedar Creek, which at its nearest point is located approximately 3,000 feet south of the landfill, runs through the larger wetland adjacent to the landfill and discharges to the Rum River approximately two and a half miles southwest of the site. Surface water runoff from the landfill drains generally southward into the wetland.

The nearby developed land consists of agricultural and residential property. The nearest residences include a home within 300 feet along the western boundary and the residence and facilities of the landfill owner along the northern boundary. The total population estimated to reside within a four-mile radius of the site is 9,821, while the total population estimated to reside within a one-mile radius is 335. It is estimated that well water is the drinking water supply for almost all of the homes within the four-mile radius of the site. The remaining residents are supplied by public or private utilities.

The site hydrogeology consists of 250 feet of sediments beneath the site which includes two aquifers separated by a semi-confining layer. The first aquifer is a shallow sand aquifer, which ranges in thickness from 13.5 feet to 54 feet. Ground water can be found at a depth ranging from 40 feet to near surface in this particular aquifer. At the southern edge of the landfill, the shallow sand aquifer is overlain by a peat deposit and ground water is found within the peat. The shallow sand aquifer is underlain by a layer of glacial till ranging in thickness from 40 to 80 feet. This till has a lower hydraulic conductivity than either of the two aquifers. Consequently, the till acts as a semi-confining layer between the shallow sand aquifer and the second aquifer which consists of an underlying sand and gravel formation. This lower sand and gravel formation is referred to as the valley train aquifer because it is deposited within a bedrock valley. The valley train aquifer extends to a depth of approximately 250 feet and is used regionally for potable water that supplies many of the residential wells in the area.

## II SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Oak Grove Sanitary Landfill began operations in 1967 as an open dump receiving mixed municipal and industrial solid waste. A solid waste landfill permit was issued to the owner of the site, Mr. Joseph Egan, in 1971 by the Minnesota Pollution Control Agency (MPCA). In 1976, landfill operations were assumed by a group of nine refuse haulers known as Northwest Disposal, Inc. Landfilling operations ceased in January 1984, when the operating license was suspended.

The landfill was filled from the center outwards in all directions. It is estimated that currently there are at least 2.5 million cubic yards of waste in the landfill. Most of the waste present in the landfill can be classified as commercial and municipal solid waste. However, industrial solid and liquid waste, some of which may be classified as hazardous, are also present in the landfill. The wastes disposed of at the site are believed to include at a minimum:

2,050 tons of acidic oil sludge;

1,225 tons of paint and solvent wastes;

unkown quantities of :

- foundry sands and sludges,
- inorganic acids,
- metal sludges,

chlorinated and unchlorinated organic compounds from pesticide manufacturing,

cutting oils and lubricants,

cleaning solvents, and

inks.

The oil sludge was disposed of at the landfill between 1970 and 1975. It is believed that most of the oil sludge was placed in what is currently the central portion of the landfill. The paint and solvent wastes were landfilled during the same time period and may have been placed in the same general area of the fill as the oil sludge, however, the exact location of all these wastes is unknown.

During the permitted operating period of the landfill, routine inspections of the landfill were conducted at a frequency of two or three times per month by the Anoka County Health Department and also periodically by the MPCA. In 1983, Northwest Disposal, Inc. submitted a permit application to expand the landfill. The MPCA requested that additional soil and ground water data be gathered for review of the application, and the MPCA and the Metropolitan Council also requested additional information be gathered for preparation of an Environmental Impact Statement. Stating that they were financially incapable of funding the additional requested studies, Northwest Disposal did not further pursue the proposed expansion permit and the landfill operating permit was suspended in January 1984.

After disposal operations ceased at the landfill, Northwest Disposal, Inc. requested permission from the MPCA to cover the landfill with waste water treatment sludges (lime sludge) generated by the St. Paul, Minnesota, Department of Public Works. Permission was granted in March 1985 and the eastern two-thirds of the landfill received the lime sludge. The calcium carbonate, lime sludge was allowed to be used as a base material for the final cover in an attempt to obtain proper closure of the site under conditions of the permit. In November 1985 the MPCA withdrew its permission to use the lime sludge when it was discovered that the sludge was being stockpiled on top of the landfill. Additionally, the lime sludge was not applied to the landfill properly. As a result, water was ponding on the surface of the landfill creating more environmental damage by generating leachate and contaminated surface water run-off.

Previous investigations at the site included the first operable unit study. The first operable unit addresses the source of the contamination by containing the on-site wastes and contaminated soil. The function of this operable unit is to provide a final cover for the Oak Grove Sanitary Landfill which will prevent or minimize ground water contamination and risks associated with exposure to the contaminated materials.

The United States Environmental Protection Agency (U.S. EPA) is the lead agency with regards to enforcing the final remedy at the site. Enforcement activities began with the issuance of CERCLA 104(e) information request letters to numerous parties in 1986. Between 1986 and 1989 there was sporadic contact with a small number of potentially responsible parties (PRPs) who were connected with the site. In February 1989, U.S. EPA filed a lien on the property where the Oak Grove Sanitary Landfill is situated. In May, 1989, a Final Demand of Payment of Site Costs letter was sent to several PRPs. The purpose of the letter was to recover costs incurred by the U.S. EPA for work performed at the site. The letter was sent to fourteen PRPs most of whom were past and current owner/operators and transporters. In the winter and spring of 1990, additional CERCLA 104(e) information requests were issued to a substantial number of individuals and companies.

U.S. EPA will next issue a Special Notice letter to the PRPs and to other parties who may be potentially responsible at the site. The purpose of this letter is to provide the PRPs with 90 days to submit a good faith offer to U.S. EPA to implement remedial action at the site. Failure on the part of the PRPs to negotiate or submit a good faith offer to U.S. EPA can result in either a CERCLA 107 enforcement action or a CERCLA 106 unilateral order. U.S. EPA anticipates the issuance of these letters by February 1991.

## III HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Remedial Investigation/Feasibility Study (RI/FS Report) and the Proposed Plan for the Oak Grove Sanitary Landfill Site were released to the public for comment on October 15, 1990. These two documents were made available to the public in an information repository maintained at the U.S. EPA Docket Room in Region V, Chicago, Illinois. These documents were also maintained as part of the administrative record at the following locations: Oak Grove Township Hall located in Cedar, Minnesota; the St. Francis Branch of the Anoka Public Library located in St. Francis, Minnesota; and the Minnesota Pollution Control Agency located in St. Paul, Minnesota.

The notice of availability for the RI/FS Report and the Proposed Plan was published in the October 11, 1990 edition of the Anoka County Union, the local newspaper. This notice also included a news release which provided the dates of the public comment period as well as the date of the public meeting. This news release along with a fact sheet which described the preferred alternative, was sent to all individuals on the Oak Grove site mailing list. The mailing list includes interested residents, township and county officials, elected officials, and site owners and operators.

The public comment period originally began on October 15th and ended on November 14, 1990. It was then extended till November 30, 1990. A response to the comments received during this period as well as during the public meeting, is included in the Responsiveness Summary, which is part of this Record of Decision. This decision document represents the selected remedial action for the Oak Grove Landfill site, in Anoka County, Minnesota, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the National Contingency Plan. The decision for the site is based on the administrative record. A public meeting was held on October 24, 1990 at the Andover Elementary School. At this meeting, representatives from U.S. EPA, MPCA and the Minnesota Department of Health answered questions about problems at the site and the remedial alternatives under consideration.

## IV SCOPE AND ROLE OF OPERABLE UNIT WITHIN SITE STRATEGY

The remedy for the Oak Grove site has been divided into two units or discrete actions, referred to as "operable units" (OU). They are as follows:

OU One: Source control of contaminants from the landfill.

OU Two: Remediation of contaminated ground water.

The first operable unit addressed the source control of contaminants from the landfill by installing a final cover system. A cover system will substantially reduce the amount of surface water infiltration and hence leachate generation. By installing a cover system U.S. EPA and MPCA intend that leachate production will be decreased so ground and surface waters will no longer be impacted by landfill contaminants contained within the leachate.

The operable unit under consideration is Operable Unit Two: Ground Water. The remedial action objectives for ground water are two-fold. The first is to prevent significant impacts on surface water from the discharge of contaminated shallow ground water and to remediate the contaminated shallow ground water. The Remedial Investigation (RI) report has determined that ground water contained within the shallow aquifer discharges directly into the surface water of the adjoining wetland. The ARARs for the first objective are Maximum Contaminant Levels (MCLs) as defined under U.S. EPA's Safe Drinking Water Act, MPCA surface water quality standards for the Rum River watershed, and U.S. EPA's Ambient Water Quality Criteria for Protection of Aquatic Life (AWQCs). The second objective is to provide for continued use of the deep valley train aquifer as a drinking water supply.

The ARARs for the second objective are the MCLs. MPCA Recommended Allowable Limits (RALs) were also considered in determining the necessary clean up of the ground water at the site.

Although ground water is the quantified pathway for contaminants at the Oak Grove Sanitary Landfill, remedial action objectives are defined for ground water and surface water. Each objective is designed to meet the overall goal of protecting human health and the environment. The alternatives under consideration address ground water remediation. They are analyzed using U.S. EPA's nine criteria, listed later in this document, for effective Superfund action.

The remedial action for this second operable unit is consistent with the action described in the September 1988 Record of Decision (ROD). The September 1988 ROD addresses the source of contamination by containing the on-site wastes and contaminated soil with a capping system. This capping system when used in conjunction with the ground water alternative selected in this ROD, will comprise the final remedy for the site. Also, the alternative selected will aid in the determination of the effectiveness of the source control remedy. This is so because the selected alternative involves the long-term monitoring of sediments, surface and ground waters. Although remediation of sediments was not the focus of this operable unit, results of the RI/FS indicate that sediments may be impacted by the discharge of ground water in the surface water at the site. Accordingly, the selected alternative also includes long term monitoring of sediments to evaluate and refine any ecological risks posed by such sediments.

## V SUMMARY OF SITE CHARACTERISTICS

The U.S. EPA and the MPCA have determined that the Oak Grove Sanitary Landfill contains hazardous substances and that the potential exists for uncontrolled releases of these substances to the environment. The primary route of contaminant migration from the landfill appears to be ground water. The primary concern at this site is the drinking water supply of private residences in the vicinity of the landfill, all of which have private water wells. Also of concern is the wetland bordering the southern edge of the landfill, which may be an environmentally sensitive receptor for the contaminants.

The site hydrogeology is defined by four types of deposits. Three of these four deposits comprise a shallow and deep aquifer system, the remaining deposit acts as a semi-confining layer between the two aquifer systems.

Across the southern portion of the site, peat deposits overlie a outwash sand. The peat deposits are only a few feet thick and are not laterally extensive across the entire site. The outwash sand is present across the entire site and ranges in thickness from 13.5 feet along the southern portion of the site to 54 feet along the northern portion of the site. The outwash sand and peat deposits comprise the first aquifer system, referred to as the shallow sand aquifer. Ground water can be found at a depth ranging from 40 feet to near surface in the outwash sand aquifer.

The outwash sand overlies a series of fine grain gray and red till units ranging in thickness from 40 to 80 feet. This material has a low hydraulic conductivity so it acts as a semi-confining layer between the overlying shallow sand aquifer and the underlying valley train deposits. The valley train deposits are made up of sand and gravel. The valley train deposit was the deepest unit investigated and it comprises the second, deep aquifer system at the site. Local private well logs, all of which are screened in this deep aquifer or lower, show this aquifer to extend to a depth of at least 250 feet.

Figure 3 shows the locations of the monitoring wells used during the RI. Figure 4 is a cross section from north to south across the site illustrating the geology beneath the site.

The ground water flow beneath the site moves from a north to south direction (Figure 5). There is a general downward, vertical movement to ground water flow in the northern half of the site and an upward, vertical movement to ground water once it reaches the southern half of the site. Figure 6 illustrates the vertical component of ground water as it moves from north to south across the site. As can be seen, when ground water reaches the southern half of the site, it discharges into the surface water. This mechanism along with the semi-confining till layer, inhibits the transport of contaminants from the shallow sand aquifer to the deep valley train aquifer.

Based on the frequency of occurrence in both ground and surface waters, concentrations, and health effects, the major contaminants at the site are: arsenic, barium, benzene, 1,2-dichloroethane, ethylbenzene, nickel, toluene, vinyl chloride, and xylene. Virtually all of the contaminants are found only in the shallow aquifer, along the southern side of the landfill. The estimated dimensions for the shallow ground water plume are 20 feet deep, 1600 feet long and 200 feet wide. Estimates on the volume range from 1 to 5 million gallons. Table 1 provides a concise summary of all the contaminants detected at the Oak Grove Site, the media they were detected in, the maximum value detected, the frequency of detection, U.S. EPA's MCL and MPCA's RAL for the contaminant.

The source of these contaminants appears to be the waste mass contained in the landfill. All of these compounds except vinyl chloride are associated with petroleum based fuels and lubricating oils, and are potentially present in a large volume of oil sludge known to have been placed in the landfill. Vinyl chloride is a degradation product of chlorinated ethenes such as trichloroethene and dichloroethene which are wastes typically found landfills. Vinyl chloride may also have been placed as a waste in the landfill.

Contaminants were found in the surface water immediately south of the landfill. The contaminants detected were chloroethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,2-dichloropropane, benzene, ethylbenzene, xylenes, arsenic and barium, several of which are major contaminants at the site. The levels at which these contaminants were detected are below U.S. EPA AWQCs and MPCA surface water quality standards. Leachate breakouts along the southern slope of the landfill flow directly to the surface water in the wetland. Shallow ground water also discharges to the wetland, providing another source of contaminants to the wetland's surface water and sediments. The high organic carbon content of the peat adsorbing the organic contaminants and volatilization of the organic contaminants appear to be effective at limiting the migration of the contaminants. This is evidenced by the limited size of the plume which extends approximately 400 feet from the toe of the landfill (Figure 7). This natural attenuation process may also explain why contaminants found in the surface water of the wetland are below MPCA surface water quality standards and U.S. EPA (AWQCs). The MPCA surface water quality standards for the site can be found in Table 2. The U.S. EPA AWQCs can be found in Table 3. No contaminants appear to have migrated to Cedar Creek located approximately 3000 feet from the landfill.

Contaminants were found in the shallow sand aquifer immediately downgradient and south of the landfill (Figure 8). Shallow ground water contaminants include vinyl chloride, benzene, ethylbenzene, toluene, xylene, 1,2-dichloroethane, arsenic, barium and nickel. The following contaminants were detected at levels which were at or above Federal and State drinking water standards (MCLs & RALs): vinyl chloride, 1,2-dichloroethane, benzene, arsenic and nickel. This shallow sand aquifer, however, is not currently used for drinking water. The possibility exists that these contaminants may be present beneath the landfill in the shallow aquifer, however, no wells have been installed through the landfill to sample ground water underneath it. The highest contaminant concentrations in the shallow aquifer were found midway along the southern edge of the landfill. It is this location where leachate seeps occur. These contaminant levels may be the result of wastes which were placed in direct contact with the water table.

Toluene, xylene, ethylbenzene, arsenic and barium were detected at low levels in the deep valley train aquifer. However, these contaminants were found at levels one or more orders of magnitude below Federal and State drinking water standards (MCLs and RALs). Also, these contaminants were found in wells upgradient of the landfill at concentrations similar to the concentrations found in the wells downgradient of the landfill. Therefore, it has been concluded that the low level contamination found in the deep valley train aquifer is not attributable to the landfill. The organic contaminants detected are all volatile organic compounds (VOCs). These contaminants are volatilized to the atmosphere via overland flow of surface water and discharge from the shallow ground water aquifer to surface water. Once in the atmosphere, VOCs are rapidly degraded by a combination of photo-oxidation and hydrolysis. Organic compounds are not expected to adsorb to soils. The peat, however, may adsorb some of the VOCs due to its high organic carbon content.

Arsenic may be metabolized to organic arsenicals by a number of organisms. This increases the mobility of arsenic compounds and arsenic is recycled through the environment. The ultimate fate of arsenic is probably the deep ocean, where it will be persistent in the sediments.

Barium is extremely reactive, decomposes in water and readily forms insoluble salts. Bioaccumulation is not a significant process for barium.

Nickel is highly mobile in aquatic systems. Much of the nickel entering the aquatic environment will be transported to the oceans. Bioaccumulation is not a significant process for nickel.

## VI SUMMARY OF SITE RISKS

### Human Health Risk

The following contaminants were detected in the shallow aquifer: vinyl chloride, chloroethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,2-dichloroethene, benzene, chlorobenzene, ethylbenzene, toluene, trichloroethene and xylenes. A similar complement of chemicals were detected in the surface water. Surface water and ground water from the shallow aquifer are not used for drinking water.

The contaminants detected in the valley train aquifer were toluene, ethylbenzene, xylene, barium and arsenic. These contaminants are present both upgradient and downgradient of the site at similar concentrations which suggests that these compounds may be "regional" or "background" contaminants. Ground water in the valley train aquifer is used for drinking water.

The human exposure pathways of concern at the Oak Grove Sanitary Landfill site are from ground water; exposure may occur from drinking or non-drinking water use of the ground water. Exposure from ingestion involves use of the ground water for drinking and cooking; bathing may result in skin contact; and inhalation exposure to contaminants volatilized from the water may occur during showering. The dermal and inhalation pathways are not significant for the inorganics, as these contaminants are not readily absorbed through the skin and are not volatile. Thus, the ingestion pathway is considered for arsenic and barium only.

The monitoring data relevant for the human health risk assessment are those values from wells screened in the deep valley train aquifer. Consequently, the human health risk assessment was determined using those contaminants which were detected in the deep valley train aquifer (ethylbenzene, barium, toluene, xylene and arsenic). This aquifer represents the potential potable water supply. Since the plume from the landfill occurs only in the shallow sand aquifer and there is an upward gradient causing the shallow aquifer to discharge to surface water, and there is a semi-confining layer between the two aquifers, there is no pathway for contaminants in the shallow aquifer to reach the potable water supply. Institutional controls already in place will preclude the installation of any wells in the shallow aquifer.

Arsenic is a carcinogen. Its carcinogenic effects were determined using the exposure assumption of a 70 kg adult drinking water from the deep valley train aquifer at a rate of two liters per day, 365 days a year for a lifetime of 70 years. The dermal route was calculated using a 70 kg adult showering 12 minutes a day, 365 days a year for 70 years.

Cancer potency factors (CPFs) have been developed by U.S. EPA's Carcinogenic Assessment Group for estimating lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of mg/kg-day, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Excess lifetime cancer risks are determined by multiplying the intake level with the cancer potency factor. These risks are probabilities that are generally expressed in scientific notation (e.g. 10EE-6). An excess lifetime cancer risk of 1 X 10EE-6 indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70 year lifetime under the specific exposure conditions at a site.

The upper bound cancer risk due to the ingestion of ground water from the valley train aquifer is 2 X 10EE-4, based on a maximum arsenic value of 7.5 ppb. The MCL and RAL for arsenic, however, is 50 ppb. The maximum value of arsenic detected is therefore an order of magnitude less than the enforceable drinking water standard.

Toluene, xylene, ethylbenzene and barium are not carcinogens but can affect human health. The U.S. EPA has developed a standard for measuring the potential for adverse health effects from exposure to noncarcinogenic chemicals. This standard is called a reference dose (RfDs). RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g. the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g. to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

The RfD for toluene is 3 X 10EE-1 mg/kg-day. Xylene's RfD is 2 X 10EE mg/kg-day. Ethylbenzene has an RfD of 1 X 10EE-1 mg/kg-day. Barium's RfD is 5 X 10EE-2 mg/kg-day.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The combined noncancer HI of toluene, xylene, ethylbenzene and barium is 0.069 with the effects of barium predominant. The HI is below U.S. EPA's recommended level of 1.0, indicating no adverse effects are anticipated.

Ecological Risk

The potential ecological risks are posed via contaminated ground water from the shallow aquifer discharging into the surface water of the wetland. The scope of work for this operable unit was to assess remedies for ground water contamination. During the RI it was determined that a direct hydrologic connection exists between the ground water in the shallow aquifer and surface water in the wetland.

As stated earlier an estimated 1 to 5 million gallons of contaminated ground water is contained in the shallow aquifer. The dimensions of this plume are 20 feet deep, 1600 feet long and 200 feet wide. Because the shallow aquifer is not used for a potable supply of water its impact to human health was not assessed. Consequently, the carcinogenicity of the various contaminants found in the shallow aquifer were not determined. What was determined in the RI/FS was the ecological risk presented by shallow ground water contaminants discharging into the surface water of the wetland.

Results from the RI indicate that the ecological risk from volatile organic compounds in the surface water is low due to the volatility of the compounds, their low concentrations, and low bioaccumulation potential. Surface water contaminant levels in the vicinity of the site are significantly lower than the fresh water criteria and chronic toxicity values established under MPCA's surface water quality criteria and U.S. EPA's AWQCs.

Limited historical data exists on surface water analyses. Consequently, it was difficult to thoroughly evaluate the environmental risks associated with surface water. However, the alternative selected for this site provides for the collection and analysis of surface water and sediment to further refine this ecological risk.

## VII DESCRIPTION OF ALTERNATIVES

The alternatives under consideration for ground water contamination were developed by examining a number of possible remedial technologies and compliance of these alternatives with applicable or relevant and appropriate requirements (ARARs) of federal and state environmental statutes.

The goals of the remedial action are two-fold. The first is to prevent significant impacts on surface water from the discharge of contaminated ground water from the shallow aquifer into the wetland, as well as clean-up of the shallow aquifer by preventing the generation of leachate from the landfill and by natural attenuation. The ARARs for this goal are the Maximum Contaminant Levels (MCLs) under U.S. EPA's Safe Drinking Water Act, the MPCA surface water quality standards and U.S. EPA's AWQCs.

The second goal of the remedial action is to ensure continued use of the deep valley train aquifer as a drinking water supply. The ARARs for this goal are the Maximum Contaminants Levels (MCLs) under U.S. EPA's Safe Drinking Water Act. The combined noncancer hazard index is below U.S. EPA's recommended level of 1.0, indicating that no adverse effects are anticipated from the consumption of ground water from the deep valley train aquifer.

Additionally, the highest concentration of arsenic found in a downgradient well was 7.5 ppb. Arsenic is a known carcinogen and has an MCL of 50 ppb. The RAL for arsenic is also 50 ppb.

A total of four alternatives were evaluated in detail for remediating ground water. Each alternative was evaluated in conjunction with the final cover system which was defined in the September 1988, ROD. The alternatives analyzed are as follows:

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| Alternative 1: | No action. |
| Alternative 2: | Long term monitoring of the shallow sand aquifer, surface water and sediments; institutional controls; and natural attenuation. |
| Alternative 3: | Long term monitoring of the shallow sand aquifer, deep valley train aquifer, surface water and sediments; institutional controls; and natural attenuation. |
| Alternative 4: | Pump and treat the shallow sand aquifer, plus long term monitoring of the deep valley train aquifer, surface water and sediments; institutional controls; and natural attenuation. |

ALTERNATIVE 1: NO ACTION.

Capital Cost: $0.
Annual Maintenance and Monitoring Cost: $0.
Estimated Present Worth: $0.

The Superfund program requires that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, no further action would be taken to remediate or monitor ground water.

ALTERNATIVE 2: LONG TERM MONITORING OF SHALLOW SAND AQUIFER, SURFACE WATER AND SEDIMENTS.

Capital Cost: $40,000.
Annual Maintenance and Monitoring Costs: $80,000 for the first year and $60,000 for subsequent years.
Estimated Present Worth: $700,000.

The second alternative involves monitoring ground water quality at selected wells in the shallow sand aquifer, monitoring surface water quality, analysis of sediment samples, implementing institutional controls concerning placement of drinking water wells, abandoning non-essential wells and natural attenuation of shallow ground water to reduce concentrations of contaminants to levels which satisfy ARARs. The institutional controls referenced, are found under Minnesota Rule., Chapter 4725. Chapter 4725 governs where drinking water wells can be placed. It states that drinking water wells can not be located in an area between a landfill and point of ground water discharge to a surface water source and that drinking water wells can not be placed where the possibility of intercepting leachate exists.

Another component of this alternative involves the monitoring of existing wells and surface water for volatile organic compounds, pesticides, PCBs, arsenic, barium, nickel, zinc and nutrient parameters. Sediment samples would be analyzed for arsenic, barium and nickel. A minimum of eight shallow wells would be monitored. Surface water monitoring points would be established based on a conductivity survey. Sediment samples would be collected at the surface water monitoring points. The monitoring program would consist of sampling sediments, ground and surface waters at a frequency of three times per year for the first year and semi-annually thereafter.

ALTERNATIVE 3: LONG TERM MONITORING OF SHALLOW SAND AQUIFER, DEEP VALLEY TRAIN AQUIFER, SURFACE WATER AND SEDIMENTS.

Capitol Cost: $40,000.
Annual Maintenance and Monitoring Costs: $90,000 for the first year and $70,000 for subsequent years.
Estimated Present Worth: $800,000.

Alternative 3 adds long term monitoring of the deep valley train aquifer. Selected wells in the shallow and deep aquifers and surface water will be monitored for volatile organic compounds, arsenic, barium, nickel, zinc, pesticides, PCBs and nutrient parameters. Sediments would be analyzed for arsenic, barium and nickel. Chapter 4725 of Minnesota State Law concerning the placement of drinking water wells, will be implemented and non-essential wells will be abandoned. Natural attenuation would continue to take place on the shallow ground water to reduce concentrations of contaminants to levels which satisfy ARARs. A minimum of twelve shallow and deep wells would be monitored. Surface water monitoring points would be established based on a conductivity survey. Sediment sample points would be located where surface water sampling occurs. The monitoring program would consist of sampling sediments, ground and surface waters at a frequency of three times per year for the first year and semi-annually thereafter.

ALTERNATIVE 4: PUMP AND TREAT SHALLOW SAND AQUIFER; LONG TERM MONITORING OF VALLEY TRAIN AQUIFER, SURFACE WATER AND SEDIMENTS.

Capitol Cost: $1,000,000.
Annual Maintenance and Monitoring Costs: $250,000.
Estimated Present Worth: $3,400,000.

Alternative 4 involves the installation of approximately eight pumping wells spaced at 200 feet intervals. The composite discharge would be approximately 100 gpm. Onsite treatment would consist of oxidation of organics by an advanced oxidation process and precipitation of inorganics with specialized polymers. Ion exchange polishing may be required to remove barium and beryllium. Sludge may require stabilization prior to dewatering and disposal in a landfill. Treated water would be discharged to Cedar Creek. This evaluation also includes monitoring of the deep valley train aquifer and surface water, sediments; State Law, Chapter 4725 institutional controls and abandonment of non-essential wells. The parameters to be monitored for in the deep aquifer, surface water and sediments along with their frequency, would be the same as those described in Alternative 3. A total of four existing deep valley train aquifer wells would be monitored. Surface water monitoring points would be based on a conductivity survey. Sediment samples would be collected at surface water monitoring points.

## VIII SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The National Contingency Plan and Section 121 of the Superfund Amendments and Reauthorization Act of 1986 (SARA) form the regulatory basis for the nine evaluation criteria to be utilized in determining the appropriate remedial action at a CERCLA site. Specifically, Section 121 of SARA requires that the selected remedy is to be protective of human health and the environment, cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

The following is a summary of the nine evaluation criteria used to evaluate remedial alternatives:

Overall Protection of Human Health and the Environment addresses whether or not a remedy provides adequate protection and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

Long-term Effectiveness and Permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Reduction of Toxicity, Mobility, or Volume through Treatment is the anticipated performance of the treatment technologies that may be employed in a remedy.

Short-term Effectiveness refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost includes capital, operation and maintenance costs.

State Acceptance indicates whether, based on its review of the Remedial Investigation, Feasibility Study and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.

Community Acceptance indicates the public support of a given alternative. This criteria is discussed in the Responsiveness Summary.

**Overall Protection of Human Health and the Environment**

Alternative 1 may be protective of human health and the environment because source control measures are being implemented under the 1988 ROD, natural attenuation is reducing contaminants in the shallow aquifer and contaminant levels in the valley train aquifer and surface water are below applicable or relevant and appropriate standards. While the shallow aquifer is not a current drinking water source, and the site geological characteristics indicate contaminants will not migrate to the deep aquifer, the deep aquifer is a drinking water source.

The long-term monitoring described in Alternatives 2 and 3 will provide information on whether or not contaminant concentrations in ground water in the valley train aquifer and surface water continue to be within acceptable human health and environmental standards. With a long-term monitoring alternative, contaminants may continue to migrate to surface waters and potentially accumulate in the adjacent wetlands. However, surface and ground water quality will likely improve in the long-term as leachate generation is decreased due to the construction of the final cover system. These leachate seeps are the primary cause of shallow ground water and surface water contamination. Additionally, the wetland peat deposits act as a filter for the organic contaminants thereby reducing contamination in the shallow aquifer via natural attenuation. The high organic carbon content of the peat captures and absorbs the contaminants from the shallow ground water as it discharges into the surface water of the wetland. The inorganic contaminants, as determined in the RI/FS, have a low potential for bio-accumulation in the wetlands. Thus, contamination in the shallow aquifer is being reduced via natural attenuation. As a result of this natural attentuation, U.S. EPA and MPCA believe contaminants in the shallow aquifer will be reduce to the levels required by MCLs in a timeframe comparable to that which could be achieved through active remediation. Long term monitoring of the shallow aquifer will provide further information regarding the effectiveness of this treatment.

Alternative 4 provides the maximum protection of the four alternatives because contaminants are removed and treated.

Alternatives 2, 3, and 4 will also reduce risks through the implementation of institutional controls. Specifically, those which are found under Minnesota Rule, Chapter 4725. Under this provision, it is recommended that drinking water wells not be located in an area between a landfill and point of ground water discharge to a surface water source. Consequently, drinking water wells can not be installed on the downgradient side of the Oak Grove Sanitary Landfill within the shallow ground water plume. Subpart 2 of Chapter 4725 also states that any well which intercepts leachate from a landfill can not be used for potable water. This institutional control ensures that the shallow ground water contaminated by leachate from the Oak Grove Sanitary Landfill can not be used for drinking water.

**Compliance with ARARs**

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 long term monitoring and the use of institutional controls. The following is a description of the ARARs for the selected remedy and an explanation of how this remedial action meets these requirements.

It is the policy of U.S. EPA to evaluate the appropriate remediation of ground water based upon U.S. EPA's Ground Water Protection Strategy, See 55 Fed. Reg. 8732, March 8, 1990. This policy establishes different degrees of protection for ground water based on their vulnerability, use and value. Pursuant to the Ground Water Protection Strategy, the ground water located in both the shallow and the valley train aquifers are classified as Class I or Class II ground water. At this site, preliminary remediation goals for Class I and II ground waters are set at Maximum Contaminant Levels (MCLs) under the Federal Safe Drinking Water Act.[1]

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.] Pursuant to the Ground Water Protection Strategy, MCLs are relevant and appropriate for the shallow aquifer and the valley train aquifer at the site.

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

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1. For purposes of this Record of Decision, U.S. EPA and MPCA have not found it necessary to determine whether the shallow aquifer may be considered Class III ground water due to the presence of contaminants not related to the landfill. In the event that the remedial measures authorized for this site do not achieve SWDA levels, U.S. EPA and MPCA will reconsider this classification to determine whether furhter remedial action is required.

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; however these criteria have been considered, and U.S. EPA and MPCA have determined that all of the alternatives satisfy the RALs.

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 (AWQC) 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 AWQC are non-enforceable guidelines used by States to set water quality standards for surface waters, as required under Section 303 of the CWA. AWQC may be relevant and appropriate to cleanup of surface and ground water at CERCLA sites. See CERCLA Section 121(d)(2)(B)(i).

CERCLA remedial actions involving surface bodies of water must also ensure that applicable state water quality standards are met. Minnesota has existing surface water quality standards for the Rum River watershed. See MN Rules, Chapter 7050. The existing water quality standards are applicable.

The selected remedy will satisfy all ARARs and will be protective of human health and the environment. Ground water in the valley train aquifer and surface water meet or exceed ARARs. Contaminant levels in the shallow aquifer do not currently satisfy ARARs, however, construction of the landfill cap, in conjunction with natural attenuation will reduce contaminants to concentrations consistent with ARARs within a timeframe comparable to that which could be achieved through active remediation. Additionally, the selected remedy is in compliance with 40 CFR Part 6, which concerns protection of wetlands. In keeping with Part 6, the selected remedy will avoid adverse impacts associated with the destruction or loss of the wetlands and will not support new construction in the wetlands.

Alternatives 1, 2 and 3 meet MPCA surface water quality standards for the Rum River watershed. Long-term monitoring will provide a direct indication that remedial action criteria are achieved. Alternative 4 meets MPCA surface water quality standards, although construction requirements may require a waiver of wetlands regulations.

All the alternatives proposed for the Oak Grove Sanitary Landfill site meet or exceed ARARs.

## Long-term Effectiveness and Permanence

Alternatives 1, 2 and 3 do not increase the magnitude of residual human health risk because human contact is minimized by site access controls included under the cover system operable unit. A cover will also reduce the likelihood of leachate seeps occurring. These leachate seeps are the primary cause of shallow ground water and surface water contamination. Contaminants present in the shallow ground water and surface water do not appear to be migrating into the deep valley train aquifer. Water quality will likely improve in the long-term as a result of a final cover system. Long-term monitoring alternatives (2 & 3) will determine the need for additional future actions.

Alternative 4 is effective because organic contaminants are removed from ground water and destroyed. Inorganic compounds are removed and the resultant sludge is taken to a permitted facility for long-term management.

## Reduction of Toxicity, Mobility and Volume

Alternative 4 provides reduction of toxicity, mobility and volume of site contaminants. Organic compounds are destroyed. The toxicity and mobility of inorganic compounds are reduced by chemical and physical processes during treatment.

Alternatives 1, 2 and 3 allow a limited reduction of contaminant toxicity and mobility due to the natural adsorption and degradation occurring in the wetlands. An organic system exists at the site which appears to be reducing the volume and toxicity of the contaminants via natural attenuation. Specifically, the peat deposits found in the wetland act as a filter. The high organic carbon content of the peat filters and absorbs organic contaminants from the shallow ground water as it discharges into the surface water of the wetland. Also, additional treatment occurs as organic compounds volatilize once they enter the surface water.

U.S. EPA's and MPCA's reliance on natural attenuation does not imply that the ground water will not be cleaned up. Instead biodegradation, dispersion, dilution and adsorption will effectively reduce contaminants in the ground water to a protective level in a timeframe comparable to that which could be achieved through active restoration. Additionally, institutional controls will be used at the site to ensure that ground water is not used before levels protective of human health and the environment are reached.

In addition to the natural attenuation process occurring at the site and the institutional controls, the final cover system will reduce the volume and mobility of leachate produced. The monitoring of surface water and the shallow sand aquifer will confirm or negate the effectiveness of the final cover system.

**Short-term Effectiveness**

Alternatives 1, 2 and 3 are likely effective in the short-term because site access is controlled under the cover system operable unit. Specifically, a fence will be installed as part of the final cover system. Minimal risk to workers and the public will result from monitoring activities. Short-term impacts on worker health and safety are possible under Alternative 4 because treatment plant workers are required to handle caustic chemicals and inorganic treatment sludges.

**Implementability**

Alternatives 1, 2 and 3 are implementable because ground water will be monitored using existing wells. Surface water monitoring stations will be established using a conductivity survey. Alternative 4, however, will be difficult to implement without destroying portions or the wetland by pumping.

**Cost**

The present worth cost range of the alternatives are as follows:

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|---|---|
| Alternative 4: | $3,400,000 |
| Alternative 3: | $800,000 |
| Alternative 2: | $700,000 |
| Alternative 1: | $0 |

**State Acceptance**

U.S. EPA and MPCA agree on the preferred alternative. Both Agencies have been involved in the technical review of the Remedial Investigation Report, Feasibility Study (RI/FS) and the development of the Proposed Plan and the ROD.

**Community Acceptance**

Community acceptance is assessed in the attached Responsiveness Summary. The Responsiveness Summary provides a thorough review of the public comments received on the RI/FS and Proposed Plan, and U.S. EPA's and MPCA's responses to the comments received.

**IX SELECTED REMEDY**

The U.S. EPA and MPCA each independently select Alternative 3 as the most appropriate alternative for ground water remediation at the Oak Grove Sanitary Landfill site. Alternative 3 involves the long-term monitoring of the shallow sand aquifer, the deep valley train aquifer, surface water and sediments; institutional controls concerning the placement of wells drinking water wells;

and natural attenuation.

Alternative 3 is implementable and provides a direct indication that surface water quality standards are being met. Additionally, Alternative 3 monitors both aquifers to ensure that continued use of the deep valley train aquifer as a potable water supply may continue.

Finally, the natural filtering process of ground and surface waters by on-site peat deposits provides a mechanism for satisfying ARARs for the shallow aquifer and substantially reducing risk via treatment. Institutional controls regarding placement of drinking water wells are in place at the site which provides an additional reduction of risk to human health.

The combination of Alternative 3 and the final cover described in the September 1988 ROD, would provide a substantial risk reduction through containment of wastes and contaminated soils.

The risk assessment has concluded that potential human health risks could occur via the ground water ingestion pathway. Ground water from the deep valley train aquifer is used for drinking water. However, no contaminants were found in the deep valley train aquifer which exceeded U.S. EPA's MCLs or MPCA's RALs contaminants from ground water in the shallow aquifer are being treated via natural attenuation. The potential ecological risks are posed via contaminated, shallow ground water discharging into the adjacent surface water. Compounds found in surface water near the site are significantly lower than the fresh water criteria and chronic toxicity values established under the State of Minnesota's Surface Water Quality Criteria. Monitoring of sediments, surface and ground waters will assure that these remediation goals are not being exceeded.

The monitoring system described in Alternative 3 will also determine the effectiveness of the selected cover system in protecting ground and surface water quality at the site as well as monitor the effectiveness of the natural attenuation process. Alternative 3 will establish a data base of sediment, ground and surface water analytical results which would be used in the five year review of the final cover remedy. Also, if future analytical results reveal contaminants exceeding health based levels in the deep aquifer or if surface water contaminant levels exceed State water quality standards then this long-term monitoring remedy may be replaced by a treatment system. This replacement of remedies may occur prior to the five year review.

With regards to cost, Alternative 3 provides the best overall effectiveness proportional to its costs. Alternative 3 has an estimated present worth of $800,000. The initial capitol cost is $40,000 with annual operational and maintenance costs being $90,000 for the first year and $70,000 for subsequent years.

Therefore, the selected alternative is believed to provide the best balance of trade-offs among the alternatives with respect to the nine evaluation criteria. Based on the information available at this time, U.S. EPA and MPCA believe the selected alternative would be protective of human health and the environment, would comply with ARARs, would be cost effective, and would utilize permanent solutions when used in conjunction with the final cover system defined in the September 1988 ROD.

## X STATUTORY DETERMINATIONS

### Protection of Human Health and the Environment

The selected remedy is protective of human health as there is little opportunity for contact with contaminated shallow ground water. Ground water in the shallow sand aquifer is not used for potable water, and U.S. EPA and MPCA believe that ground water in the shallow aquifer will be effectively remediated via natural attenuation and construction of the landfill cap. Ground water in the deep valley train aquifer, however, is used for potable water. No contaminants were found in the deep valley train aquifer which exceeded U.S. EPA MCLs or MPCA RALs. The results of the RI/FS indicated that contamination from the shallow aquifer does not enter into the lower, deep valley train aquifer. This condition exists due to an upward gradient present in the shallow aquifer system.

The preferred alternative, Alternative 3, will ensure that ground water in the deep valley train aquifer can continue to be used as a potable water supply. Monitoring results from the deep valley train aquifer, will also be used to develop a data base of ground water quality at the site. This data base will be used in the five year evaluation of the final cover system as well as to determine if a treatment remedy needs to be implemented prior to the five year review.

Contaminated ground water from the shallow sand aquifer discharges into the adjacent surface water. Compounds found in the surface water are lower than U.S. EPA AWQCs and MPCA surface water quality criteria. Alternative 3 is protective of the environment because long-term monitoring of the surface water and sediments will assure that Federal and State surface water quality standards aren't being exceeded and bio-accumulation of compounds in the sediments isn't occurring. Analytical results from this monitoring will also be used in the five year evaluation of the final cover system and in the determination of whether or not to implement a treatment system prior to the five year review. No unacceptable short term risks or cross media impacts will be caused by implementation of the selected remedy.

### Attainment of Applicable or Relevant and Appropriate Requirements

Alternative 3 meets all applicable and relevant and appropriate requirements (ARARs) of Federal and more stringent State environmental laws. The pertinent ARARs for this remedial action are the MCLs established under the Federal Safe Drinking Water Act; surface water quality standards under Minnesota Rules, Chapter 7050; and Federal Ambient Water Quality Criteria for Protection of Aquatic Life (AWQCs). The Land Disposal Restrictions of RCRA do not apply to this remedial action because no RCRA hazardous wastes are being generated as a result of this remedy.

The deep valley train aquifer is a source of potable water. The shallow sand aquifer is not used for drinking water. The objective of the remedial action is to allow continued use of the deep valley train aquifer as a drinking water source. Any contaminant found in this lower aquifer must be at a level which is lower than or equal to those values established under the U.S. EPA's Safe Drinking Water Act. Compounds found in the deep valley train aquifer are below these standards.

Ground water contained in the shallow sand aquifer, discharges into the surface water downgradient from the site. Contaminants found in the surface water are below the fresh water criteria and chronic toxicity values established under Chapter 7050 Minnesota Rules as well as below those levels recommended in the Federal AWQCs.

Cost Effectiveness

The selected remedy is cost-effective because it has been determined to provide overall effectiveness proportional to its costs, the net present worth value being $800,000. The selected remedy is the second most expensive alternative; however, it is the most consistent with the overall site strategy for remediating ground and surface waters.

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

U.S. EPA and the State of Minnesota believe the selected remedy when used in conjunction with the final cover system described in the September 1988 ROD, represents the maximum extent to which permanent solutions can be utilized in a cost-effective manner for the final remedy at the Oak Grove Sanitary Landfill site. Of the alternatives that are protective of human health and the environment and comply with ARARs, U.S. EPA and the State have determined that the selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction of toxicity, mobility or volume, short-term effectiveness, implementability, cost, also considering the statutory preference for treatment as a principal element and considering State and community acceptance.

Based on the results of the RI/FS, a pump and treat ground water extraction system is not warranted at this time. Ground water in the deep valley train aquifer is not contaminated to the extent that it can not be used as a potable water supply. Ground water in the shallow sand aquifer is not used for drinking water and discharges into the adjacent surface water. Contaminants found in the surface water are below enforceable levels. If future analytical results indicate the presence of contaminants above health based levels in the deep aquifer, this particular remedy may be replaced by a treatment system. Additionally, if contaminant levels in the surface water increase to a level above State water quality standards or U.S. EPA AWQCs then this remedy may require a treatment system.

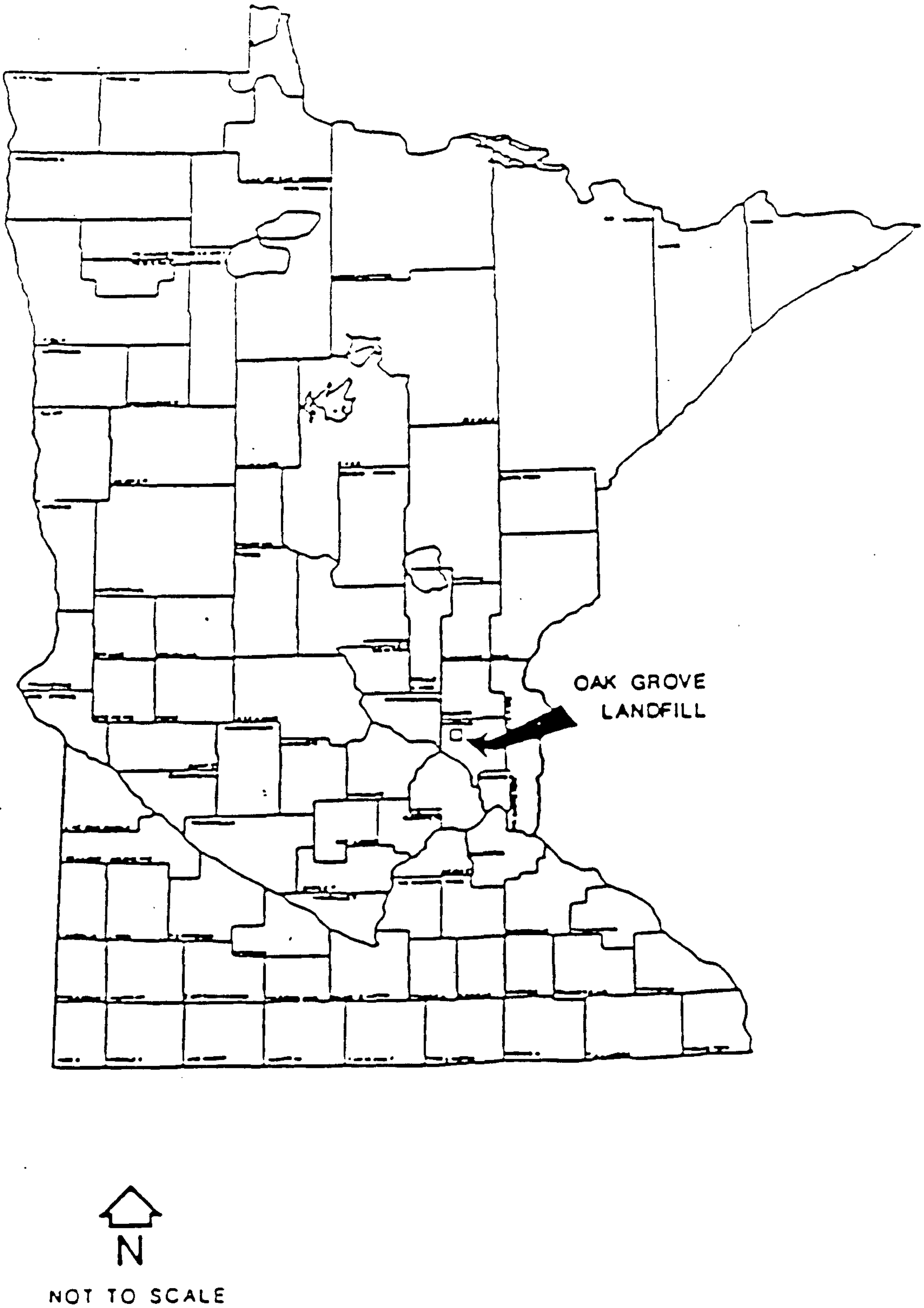
The selected alternative is therefore considered to be the most appropriate solution to ground water contamination at the site because it provides the best trade-offs with respect to the nine criteria and represents the maximum extent to which permanent solutions and treatment are practicable.

<u>Preference for Treatment as a Principal Element</u>

Based on the results of the RI/FS, artificial treatment of ground water to permanently and significantly reduce toxicity, mobility, or volume of contaminants was not found to be necessary to protect human health and the environment, or to be practicable at the site at this time. However, if future analytical results indicate the degradation of surface and potable ground water to levels which are not protective of human health or the environment, then this remedy may have to be modified to include a treatment system.

## XI DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes have been made since the publication of the Feasibility Study or Proposed Plan.




Ref: IT Corp, 1987b.

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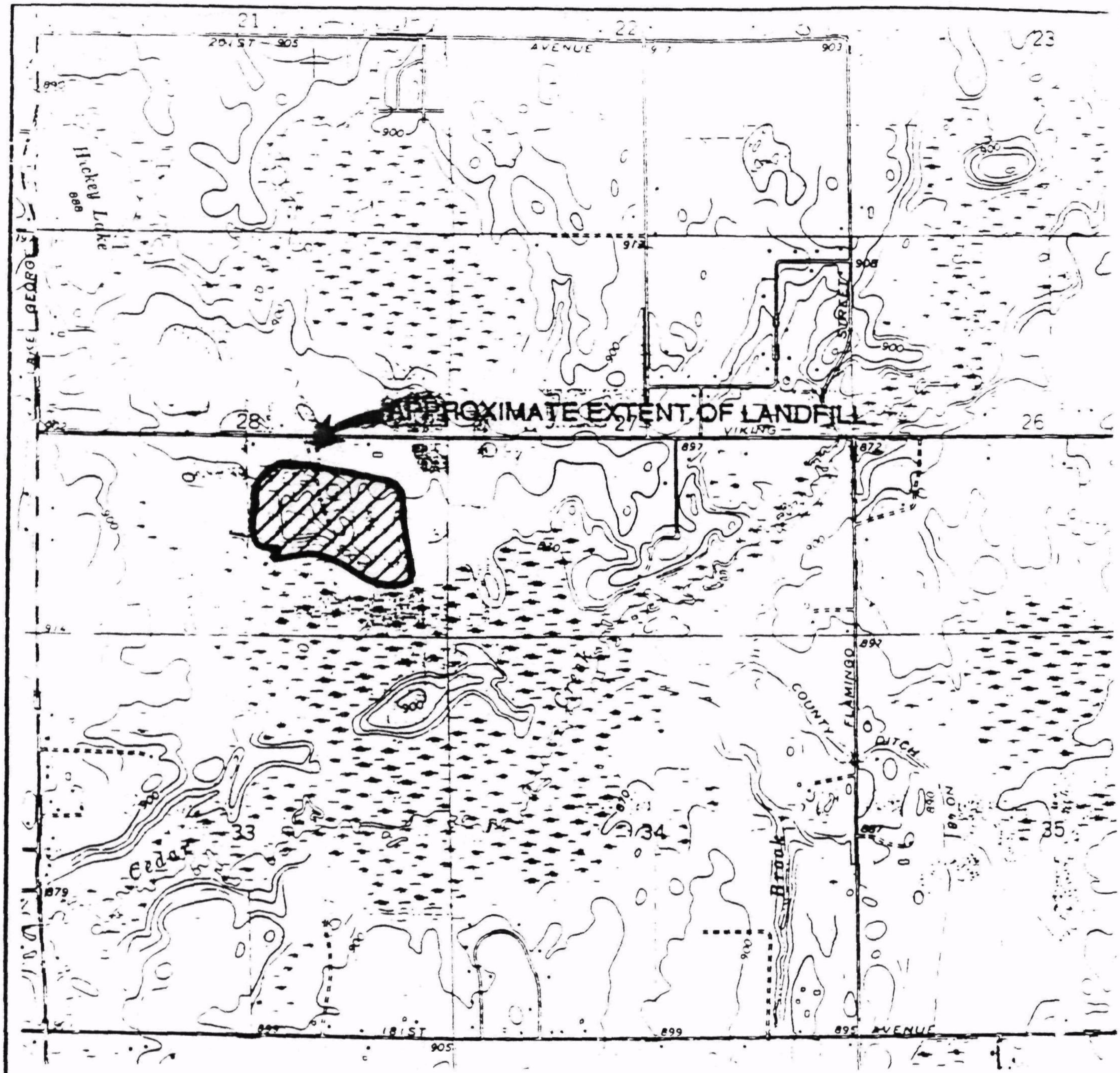
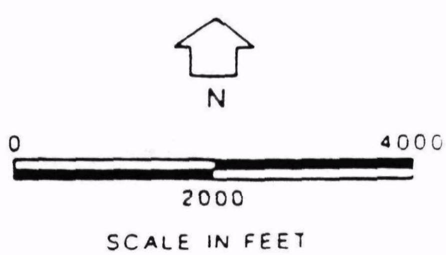
|---|---|---|
| MALCOLM PIRNIE | GENERAL SITE LOCATION MAP<br>OAK GROVE SANITARY LANDFILL RI | FIGURE 1 |




Ref: Cedar, Minnesota USGS 7.5 Minute (Topographic) Quadrangle

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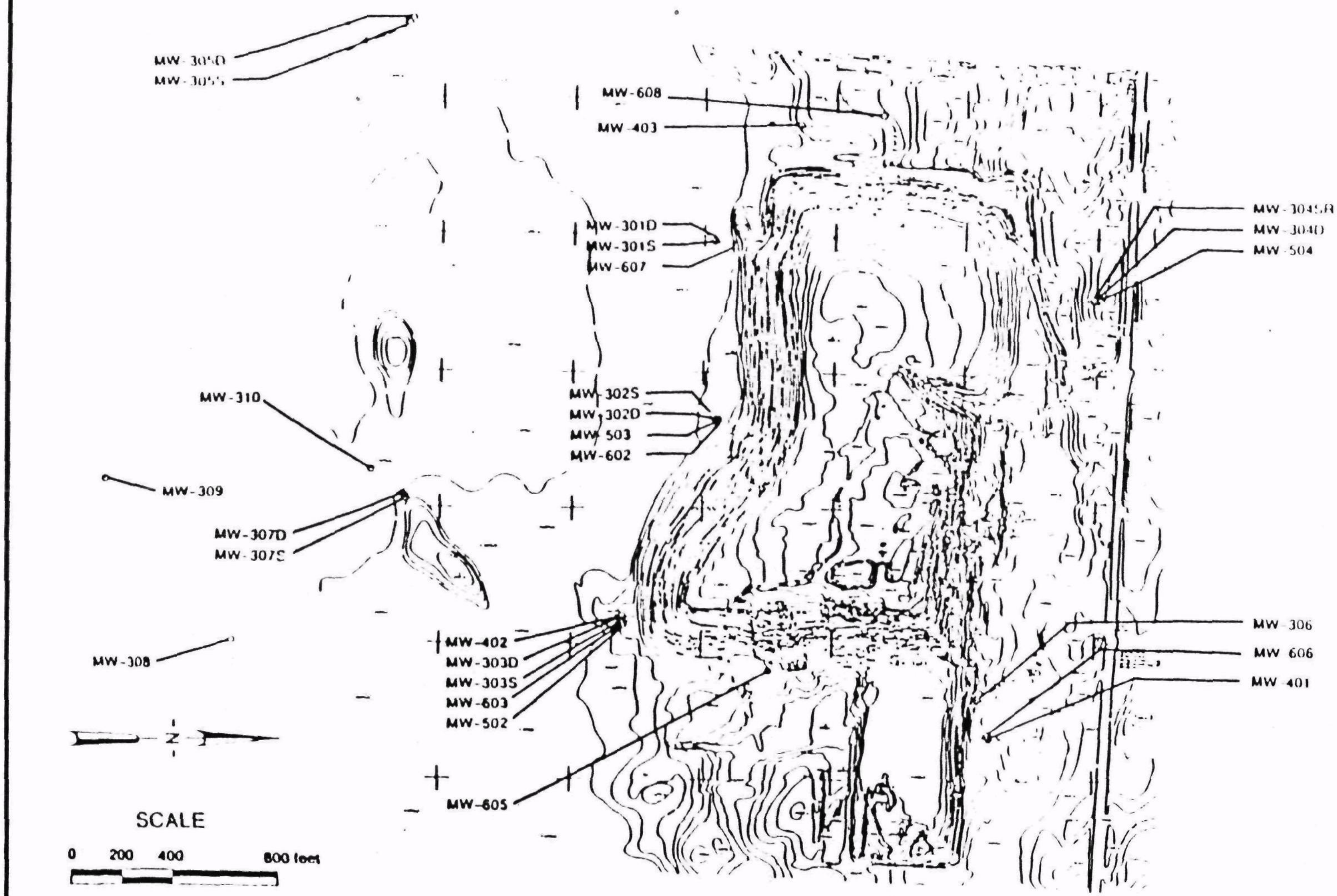
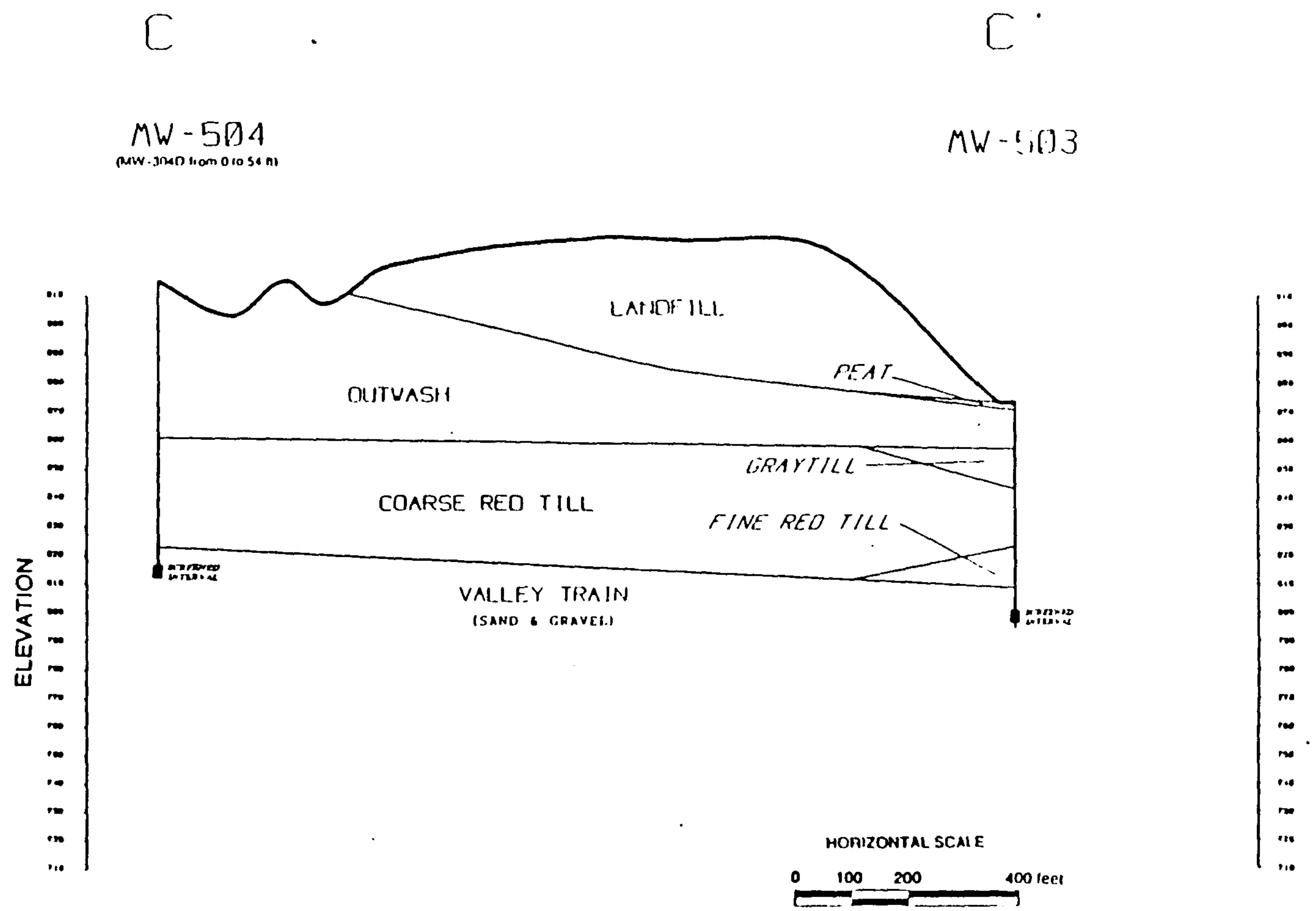
|---|---|---|
| MALCOLM PIRNIE | SITE LOCATION MAP<br>OAK GROVE SANITARY LANDFILL RI | FIGURE 2 |




MALCOLM PIRNIE

SOIL BORING AND MONITORING WELL LOCATIONS
IT CORPORATION AND MALCOLM PIRNIE, INC. REMEDIAL INVESTIGATIONS
OAK GROVE SANITARY LANDFILL RI

FIGURE 3

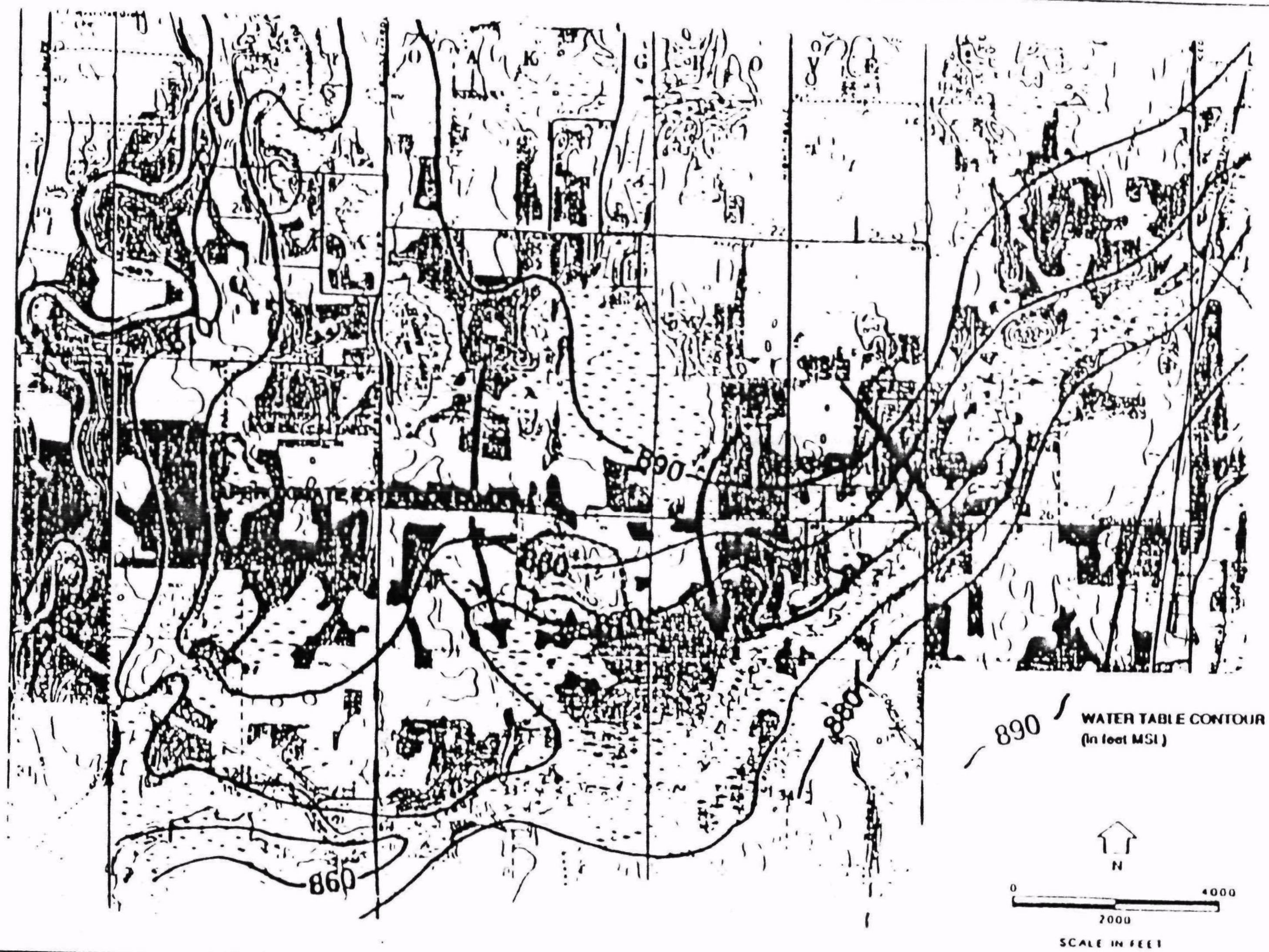



MALCOLM PIRNIE

**CROSS-SECTION C - C'**

**OAK GROVE SANITARY LANDFILL RI**

FIGURE 4

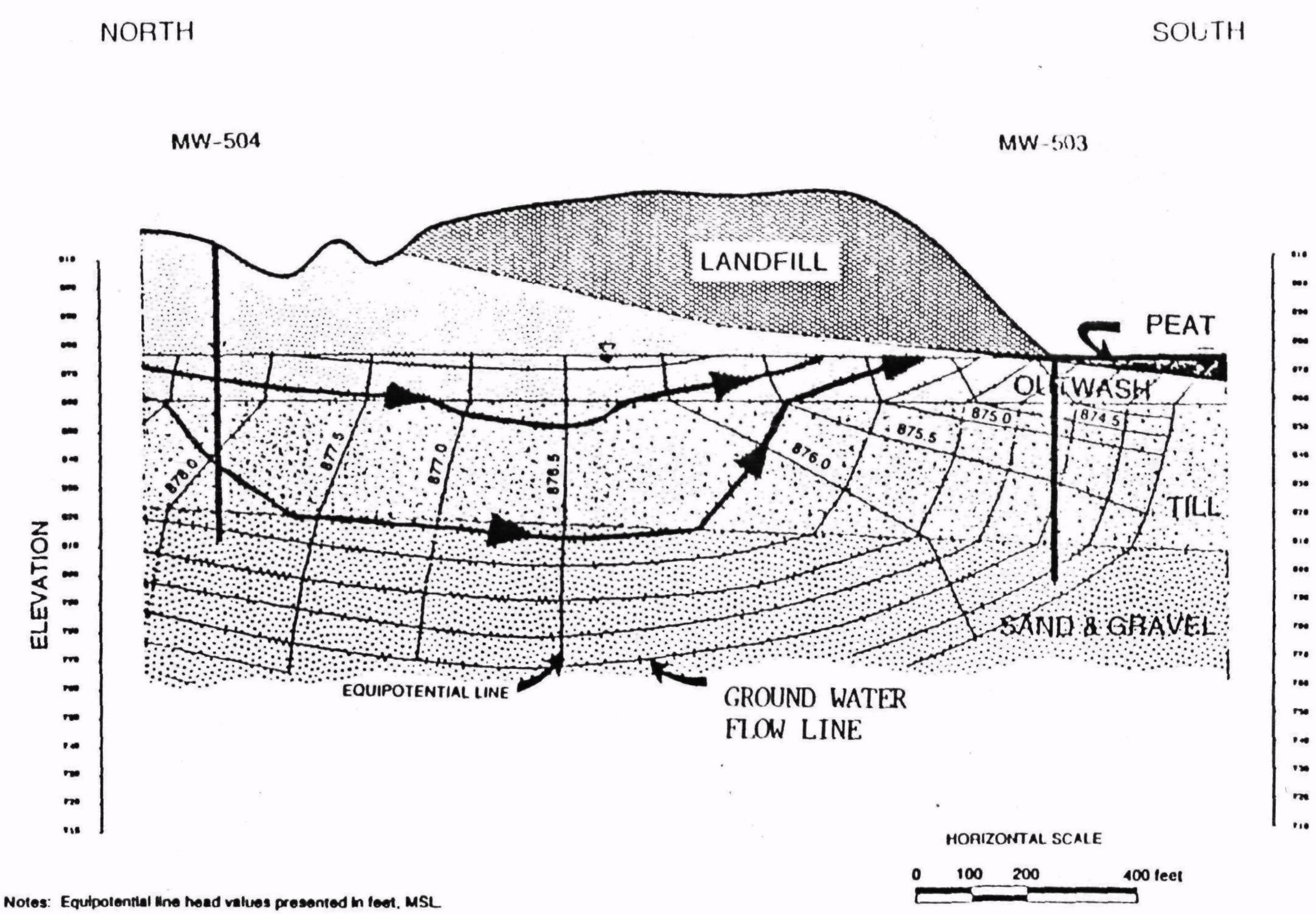



MALCOLM PIRNIE

REGIONAL SHALLOW GROUND WATER FLOW

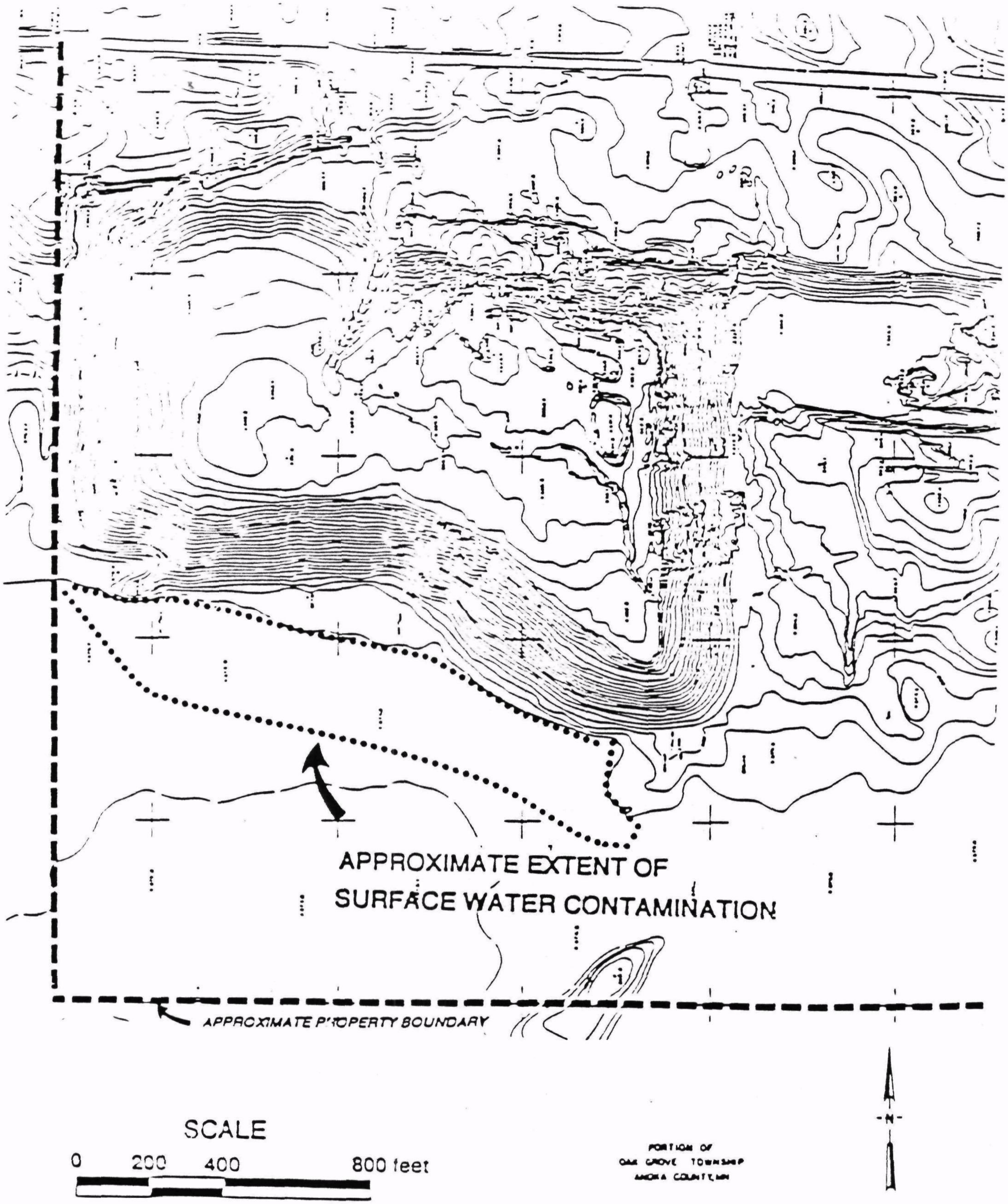
OAK GROVE SANITARY LANDFILL RI

FIGURE 5

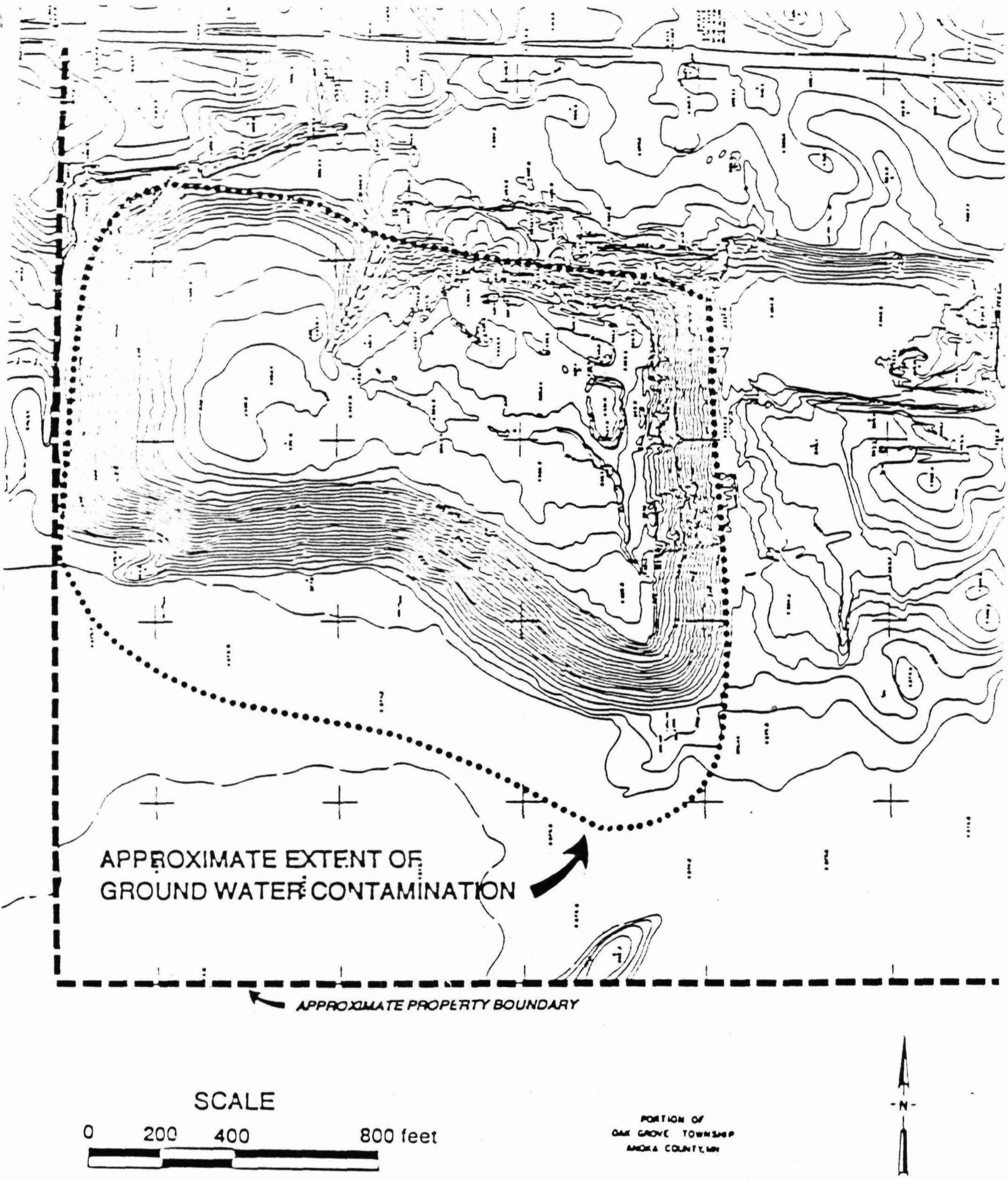



Notes: Equipotential line head values presented in feet, MSL.
Data from Round 3 (November, 1989) sampling event.

| MALCOLM PIRNIE | GENERALIZED HYDROGEOLOGIC CROSS-SECTION<br>OAK GROVE SANITARY LANDFILL RI | FIGURE 6 |
| --- | --- | --- |




| | | |
|---|---|---|
| MALCOLM PIRNIE | APPROXIMATE EXTENT OF SURFACE WATER CONTAMINATION<br>OAK GROVE SANITARY LANDFILL RI | FIGURE 7 |




MALCOLM PIRNIE

APPROXIMATE EXTENT OF
GROUND WATER CONTAMINATION
OAK GROVE SANITARY LANDFILL RI

FIGURE 8

# TABLE 1

## SUMMARY OF CONTAMINANT OCCURRENCE
## OAK GROVE SANITARY LANDFILL RI

| COMPOUND | FREQUENCY OF DETECTION: GROUND-WATER | FREQUENCY OF DETECTION: SURFACE WATER | FREQUENCY OF DETECTION: SEDIMENT | FREQUENCY OF DETECTION: SOILS | MAXIMUM VALUE DETECTED | RAL** (ug/l) | MCL* (ug/l) |
|---|---|---|---|---|---|---|---|
| Vinyl Chloride | 3/39 | | | | 12 ug/L | 0.15 | 2 |
| | | 0/4 | | | ND | | |
| | | | 0/4 | | ND | | |
| | | | | NA | NA | | |
| Chloroethane | 16/75 | | | | 610 ug/L | NA | NA |
| | | 4/11 | | | 170 ug/L | | |
| | | | 1/18 | | 140 ug/L | | |
| | | | | 0/21 | ND | | |
| 1,2-Dichloroethane | 8/75 | | | | 6.8 ug/L | 3.8 | 5 |
| | | 2/11 | | | 23 ug/L | | |
| | | | 0/16 | | ND | | |
| | | | | 0/21 | ND | | |
| Benzene | 16/75 | | | | 20 ug/L | 7 | 5 |
| | | 1/11 | | | 24 ug/L | | |
| | | | 0/16 | | ND | | |
| | | | | 0/21 | ND | | |
| Acetone | 8/75 | | | | 31 ug/L | 700 | NA |
| | | 2/11 | | | 3500 ug/L | | |
| | | | 15/16 | | 16,000 ug/kg | | |
| | | | | 11/21 | 1200 ug/kg | | |
| Ethylbenzene | 19/75 | | | | 82 ug/L | 680 | 700(p) |
| | | 1/11 | | | 25 ug/L | | |
| | | | 3/16 | | 110 ug/kg | | |
| | | | | 1/21 | 23 ug/kg | | |
| Methylene Chloride | 40/75 | | | | 25 ug/L | 48 | NA |
| | | 7/11 | | | 110 ug/L | | |
| | | | 14/18 | | 880 ug/kg | | |
| | | | | 6/21 | 37 ug/kg | | |
| Toluene | 33/75 | | | | 54 ug/L | 2420 | 2000(p) |
| | | 1/11 | | | 45 ug/L | | |
| | | | 5/16 | | 640 ug/kg | | |
| | | | | 3/21 | 110 ug/kg | | |
| Xylenes | 27/75 | | | | 108 ug/L | 400 | 10,000(p) |
| | | 1/11 | | | 18 ug/L | | |
| | | | 2/16 | | 1000 ug/kg | | |
| | | | | 2/21 | 21 ug/kg | | |
| Arsenic | 43/75 | | | | 212 ug/L | 50 | 50 |
| | | 4/11 | | | 10 ug/L | | |
| | | | 12/16 | | 4.1 mg/kg | | |
| | | | | 11/12 | 19 mg/kg | | |

NOTES.
NA = Not Available
ND = Not Detected
*MCL = USEPA Maximum Contaminant Level in drinking water; (p) = proposed.
**RAL = Minnesota Recommended Allowable Level in drinking water.

# TABLE 1

## SUMMARY OF CONTAMINANT OCCURRENCE
## OAK GROVE SANITARY LANDFILL RI

| COMPOUND | FREQUENCY OF DETECTION | | | | MAXIMUM VALUE DETECTED | RAL** (ug/l) | MCL* (ug/l) |
|---|---|---|---|---|---|---|---|
| | GROUND-WATER | SURFACE WATER | SEDIMENT | SOILS | | | |
| Barium | 50/75 | | | | 3930 ug/L | 1500 | 1000 |
| | | 5/11 | | | 1740 ug/L | | |
| | | | 10/16 | | 118 mg/kg | | |
| | | | | 8/12 | 74 mg/kg | | |
| Nickel | 6/36 | | | | 223 ug/L | 150 | NA |
| | | 3/7 | | | 98 ug/L | | |
| | | | 3/12 | | 2.5 mg/kg | | |
| | | | | 12/12 | 50 mg/kg | | |
| 1,1-Dichloroethane | 13/75 | | | | 7 ug/l | 810 | |
| | | 3/16 | | | 55 ug/l | | |
| | | | 0/11 | | ND | | |
| | | | | 0/21 | ND | | |
| Total 1,2-Dichloroethenes | 7/39 | | | | 21 ug/l | | |
| | | 1/16 | | | 2 ug/l | | |
| | | | 0/11 | | ND | | |
| | | | | 0/21 | ND | | |
| Trans-1,2-Dichloroethene | 4/36 | | | | 6.7 ug/l | 70 | 100 (p) |
| | | 1/16 | | | 12 ug/l | | |
| | | | 0/11 | | ND | | |
| | | | | 1/21 | 13 mg/kg | | |
| Chloroform | 0/75 | | | | ND | 57 | |
| | | 0/16 | | | ND | | |
| | | | 1/11 | | 9 mg/kg | | |
| | | | | 2/21 | 78 mg/kg | | |
| Bromodichloromethane | 0/75 | | | | ND | 140 | |
| | | 0/16 | | | ND | | |
| | | | 0/11 | | ND | | |
| | | | | 1/21 | 6 mg/kg | | |
| 1,2-Dichloropropane | 2/75 | | | | 1 ug/l | 6.6 | 5 |
| | | 1/16 | | | 5 ug/l | | |
| | | | 0/11 | | ND | | |
| | | | | 0/21 | ND | | |
| Trichloroethylene | 3/75 | | | | 1 ug/l | 31 | 5 |
| | | 2/16 | | | 3.2 ug/l | | |
| | | | 0/11 | | ND | | |
| | | | | 0/21 | ND | | |
| 4-Methyl-2-Pentanone | 0/75 | | | | ND | 350 | |
| | | 1/16 | | | 160 ug/l | | |
| | | | 3/16 | | 660 mg/kg | | |
| | | | | 0/21 | ND | | |

NOTES:
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# TABLE 1

## SUMMARY OF CONTAMINANT OCCURRENCE
## OAK GROVE SANITARY LANDFILL RI

| COMPOUND | FREQUENCY OF DETECTION | | | | MAXIMUM VALUE DETECTED | RAL** (ug/l) | MCL* (ug/l) |
|---|---|---|---|---|---|---|---|
| | GROUND-WATER | SURFACE WATER | SEDIMENT | SOILS | | | |
| Chlorobenzene | 5/75 | | | | 6.1 ug/l | 300 | |
| | | 0/16 | | | ND | | |
| | | | 0/11 | | ND | | |
| | | | | 0/21 | ND | | |
| Acrolein | 2/75 | | | | 13 ug/l | | |
| | | 0/16 | | | ND | | |
| | | | 0/11 | | ND | | |
| | | | | 0/21 | ND | | |
| 2-Methylphenol | 0/38 | | | | ND | | |
| | | 0/7 | | | ND | | |
| | | | 1/12 | | 780 mg/kg | | |
| | | | | NA | NA | | |
| 4-Methylphenol | 1/38 | | | | 30 ug/l | | |
| | | 1/7 | | | 48 ug/l | | |
| | | | 4/12 | | 13000 mg/kg | | |
| | | | | NA | NA | | |
| Benzoic Acid | 1/38 | | | | 23.5 ug/l | | |
| | | 1/7 | | | 58 ug/l | | |
| | | | 3/12 | | 7200 mg/kg | | |
| | | | | NA | NA | | |
| Diethyl Phthalate | 2/38 | | | | 24 ug/l | | |
| | | 0/7 | | | ND | | |
| | | | 1/12 | | 560 mg/kg | | |
| | | | | NA | NA | | |
| Bis(2-ethylhexyl) Phthalate | 3/38 | | | | 23 ug/l | 40 | |
| | | 0/7 | | | ND | | |
| | | | 1/12 | | 1300 mg/kg | | |
| | | | | NA | NA | | |
| Phenol | 1/38 | | | | 41 ug/l | 280 | |
| | | 0/7 | | | ND | | |
| | | | 2/12 | | 2000 mg/kg | | |
| | | | | NA | NA | | |
| Bis(2-Chloroethyl) Ether | 0/38 | | | | ND | 0.3 | |
| | | 0/7 | | | ND | | |
| | | | 1/12 | | 850 mg/kg | | |
| | | | | NA | NA | | |
| N-Nitrosodiphenylamine | 0/38 | | | | ND | 70 | |
| | | 0/7 | | | ND | | |
| | | | 2/12 | | 810 mg/kg | | |
| | | | | NA | NA | | |

NOTES.
NA = Not Available
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*MCL = USEPA Maximum Contaminant Level in drinking water; (p) = proposed.
**RAL = Minnesota Recommended Allowable Level in drinking water.

# TABLE 1

## SUMMARY OF CONTAMINANT OCCURRENCE
## OAK GROVE SANITARY LANDFILL RI

| COMPOUND | FREQUENCY OF DETECTION: GROUND-WATER | FREQUENCY OF DETECTION: SURFACE WATER | FREQUENCY OF DETECTION: SEDIMENT | FREQUENCY OF DETECTION: SOILS | MAXIMUM VALUE DETECTED | RAL** (ug/l) | MCL* (ug/l) |
|---|---|---|---|---|---|---|---|
| Di-N-Octyl Phthalate | 1/36 | | | | 13 ug/l | | |
| | | 0/7 | | | ND | | |
| | | | 0/12 | | ND | | |
| | | | | NA | NA | | |
| Chromium | 7/36 | | | | 25 ug/l | 120 | 50 |
| | | 7/7 | | | 72 ug/l | | |
| | | | 11/12 | | 4 mg/kg | | |
| | | | | 12/12 | 16 mg/kg | | |
| Copper | 5/36 | | | | 64 ug/l | 1300 | 1300 (p) |
| | | 0/7 | | | ND | | |
| | | | 8/12 | | 19 mg/kg | | |
| | | | | 12/12 | 264 mg/kg | | |
| Lead | 0/36 | | | | ND | 20 | 50 |
| | | 2/7 | | | 11 ug/l | | |
| | | | 12/12 | | 6.8 mg/kg | | |
| | | | | 11/12 | 7.3 mg/kg | | |
| Mercury | 0/36 | | | | ND | 1.1 | 2 |
| | | 1/7 | | | 0.2 ug/l | | |
| | | | 5/12 | | 0.02 mg/kg | | |
| | | | | 1/12 | 0.02 mg/kg | | |
| Vanadium | 0/36 | | | | ND | | |
| | | 1/7 | | | 43 ug/l | | |
| | | | 2/12 | | 6.6 mg/kg | | |
| | | | | 10/12 | 23 mg/kg | | |
| Zinc | 11/36 | | | | 47 ug/l | | |
| | | 5/7 | | | 43 ug/l | | |
| | | | 12/12 | | 72 mg/kg | | |
| | | | | 12/12 | 29 mg/kg | | |
| Selenium | 1/36 | | | | 5 ug/l | 45 | 10 |
| | | 0/7 | | | ND | | |
| | | | 0/12 | | ND | | |
| | | | | 0/12 | ND | | |
| Beryllium | 4/36 | | | | 8.5 ug/l | | |
| | | 0/7 | | | ND | | |
| | | | 0/12 | | ND | | |
| | | | | 0/12 | ND | | |

NOTES:
NA = Not Available
ND = Not Detected
*MCL = USEPA Maximum Contaminant Level in drinking water; (p) = proposed.
**RAL = Minnesota Recommended Allowable Level in drinking water.

ABLE 2: Surface water criteria for Cedar Creek and the wetland near the Oak Grove landfill in Anoka County.

| PARAMETER | UNITS | CHRONIC STANDARD | ACUTE STANDARD | OTHER STANDARD |
|---|---|---|---|---|
| Inorganic | | | | |
| Ammonia, un-ionized as N | ug/l | 40 | - | - |
| Chloride | mg/l | 230 | 1720 | 100(3B) |
| Cyanide, free | ug/l | 5.2 | 45 | - |
| Oil | ug/l | 500 | 10000 | - |
| pH | low | - | - | 6.5 (2B) |
| | high | - | - | 8.5 (4A) |
| Specific conductance | umhos/cm | - | - | 1000 (4A) |
| Metals and Elements | | | | |
| Aluminum | ug/l | 125 | 2145 | |
| Arsenic | ug/l | 70 | 720 | |
| Cadmium* | ug/l | 1.61 | 110.4 | |
| Chromium, +6 | ug/l | 11 | 32 | |
| Copper* | ug/l | 12.9 | 53.9 | |
| Lead* | ug/l | 5.6 | 208 | |
| Mercury | ug/l | 0.0069 | 4.9 | |
| Nickel* | ug/l | 213 | 4132 | |
| Selenium | ug/l | 5 | 40 | |
| Silver | ug/l | 1 | 8.7 | |
| Zinc* | ug/l | 155 | 341 | |
| Organics | | | | |
| Acenapthene | ug/l | 12 | 81 | |
| Acrylonitrile (C) | ug/l | 0.89 | 2281 | |
| Anthracene | ug/l | 0.029 | 1.6 | |
| Benzene (C) | ug/l | 114 | 8974 | |
| Bromoform | ug/l | 558 | 5800 | |
| Carbon tetrachloride (C) | ug/l | 5.9 | 3500 | |
| Chlordane (C) | ug/l | 0.00029 | 2.4 | |
| Chlorobenzene | ug/l | 10 | 846 | |
| Chloroform (C) | ug/l | 224 | 4471 | |
| Chloropyrifos | ug/l | 0.041 | 0.17 | |
| DDT (C) | ug/l | 0.0017 | 1.1 | |
| 1,2-Dichloroethane (C) | ug/l | 190 | 90100 | |
| Dieldrin (C) | ug/l | 0.000026 | 2.5 | |
| Di-2-ethylhexyl phthalate (C) | ug/l | 2.1 | | |
| Di-n-Octyl phthalate | ug/l | 30 | 1650 | |
| Endosulfan | ug/l | 0.15 | 0.56 | |
| Endrin | ug/l | 0.016 | 0.18 | |
| Ethylbenzene | ug/l | 68 | 3717 | |
| Fluoranthene | ug/l | 4.6 | 398 | |
| Heptachlor (C) | ug/l | 0.00039 | 0.52 | |
| Heptachlor epoxide (C) | ug/l | 0.00048 | 0.53 | |
| Hexachlorobenzene (C) | ug/l | 0.00022 | | |
| Lindane (C) | ug/l | 0.036 | 8.8 | |
| Methylene chloride (C) | ug/l | 1561 | 19200 | |
| Parathion | ug/l | 0.013 | 0.13 | |
| Phenanthrene | ug/l | 2.1 | 58 | |
| Phenol | ug/l | 123 | 4428 | |
| Polychlorinated biphenyls (C) | ug/l | 0.000029 | 2 | |
| 1,1,2,2-Tetrachloroethane (C) | ug/l | 13 | 2253 | |
| 1,1,2,2-Tetrachloroethylene (C) | ug/l | 8.9 | 857 | |
| Toluene | ug/l | 253 | 2703 | |
| Toxaphene (C) | ug/l | 0.0013 | 11.5 | |
| 1,1,1-Trichloroethane | ug/l | 263 | 5256 | |
| 1,1,2-Trichloroethylene (C) | ug/l | 120 | 13976 | |
| 2,4,6-Trichlorophenol | ug/l | 2 | 203 | |
| Vinyl chloride (C) | ug/l | 7.6 | | |
| Xylenes, total | ug/l | 166 | 2814 | |

* based on a hardness of 156 mg/l from one upstream observation

(C) carcinogenic chemical

*** AUGUST 8, 1988 DRAFT ***

# TABLE 3

## SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

| | Potential ARARs b/ | | | | For Use In Special Circumstances |
|---|---|---|---|---|---|
| | CWA Water Quality Criteria for Protection of Human Health | | CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/ | | |
| Chemical Name | Water and Fish Ingestion (mg/l) | Fish Consumption Only (mg/l) | Freshwater Acute/Chronic (mg/l) | Marine Acute/Chronic (mg/l) | SDWA/MCL Goal (mg/l) d/ |
| Acenapthene | | | 1.7*/0.5* | 0.9*/0 7* | |
| Acenaphthylene | | | | 3 0x10-01* | |
| Acrolein | 3.2x10-01 | 7.8x10-01 | 6.8x10-02*/2 1x10-02* | 5 5x10-02* | |
| Acrylonitrile | 5.8x10-05 | 6.5x10-04 | 7 5*/2.6* | | |
| Aldrin | 7.4x10-08 | 7.9x10-08 | 3.0x10-03 | 1.3x10-03 | |
| Anthracene | | | | | |
| Antimony and Compounds | 1.5x10-01 | 45 | 9.0/1.6 | | |
| Arsenic and Compounds | 2.2x10-06 | 1.8x10-05 | | | |
| Arsenic (V) and Compounds | | | 0.8*/4.8x10-02* | 2.3*/1.3x10-02 | |
| Arsenic (III) and Compounds | | | 0.3/0.1 | 6 9x10-02/3.6x10-02 | |
| Asbestos | | | | | |
| Barium and Compounds | 1 | | | | |
| Benz(a)anthracene | | | | | |
| Benz(c)acridine | | | | | 0 |
| Benzene | 6.6x10-04 | 4.0x10-02 | 5.3* | 5.1*/0.7* | |
| Benzidine | 1.2x10-04 | 5.3x10-04 | 2.5* | | |
| Benzo(a)pyrene | | | | | |
| Benzo(b)fluoranthene | | | | | |
| Benzo(ghi)perylene | | | | | |
| Benzo(k)fluoranthene | | | | | |
| Beryllium and Compounds | 6.8x10-06 | 1.2x10-04 | 0.1*/5.3x10-03* | | |
| Bis(2-chloroethyl)ether | | | | | |
| Bis(2 chloroisopropyl)ether | | | | | |
| Bis(chloromethyl)ether | | | | | |

*** AUGUST 8, 1988 DRAFT ***

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|---|---|---|---|---|---|
| | CWA Water Quality Criteria for Protection of Human Health | | CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/ | | |
| Chemical Name | Water and Fish Ingestion (mg/l) | Fish Consumption Only (mg/l) | Freshwater Acute/Chronic (mg/l) | Marine Acute/Chronic (mg/l) | SDWA/MCL Goal (mg/l) d/ |
| Cadmium and Compounds | 1.0x10-02 | | 3.9x10-03+/1.1x10-03+ | 4.3x10-02/9.3x10-02 | |
| Carbon Tetrachloride | 4.0x10-04 | 6.9x10-03 | 3.5x10+01 | 5.0x10+01 | 0 |
| Chlordane | 4.6x10-07 | 4.8x10-07 | 2.4x10-03/4.3x10-06 | 9.0x10-05/4.0x10-06 | |
| Chlorinated Benzenes | | | 2.5x10-01*/5.0x10-02* | 1.6x10-01*/1.2x10-01* | |
| Chlorinated Naphthalenes | | | 1.6* | 7.5x10-03* | |
| Chloroalkyl Ethers | | | 2.3x10+02* | | |
| Chlorobenzene (Mono) | | | | | |
| Chlorodibromomethane | | | | | |
| Chloroform | 1.9x10-04 | 1.8x10-02 | 2.8x10+01*/1.2* | | |
| 2-Chlorophenol | | | 4.3*/2.0* | | |
| Chromium III and Compounds | 170 | 3433 | 1.7+/0.2+ | 1.0x10+01 | |
| Chromium VI and Compounds | 5.0x10-02 | | 1.6x10-02/1.1x10-02 | 1.1/5.0x10-02 | |
| Copper and Compounds | | | 1.8x10-02+/1.2x10-02+ | 2.9x10-03/2.9x10-03 | |
| Cyanides | 2x10-01 | | 2.2x10-02/5.2x10-03 | 1.0x10-03/1.0x10-03 | |
| DDT | 2.4x10-08 | 2.4x10-08 | 1.1x10-03/1.0x10-06 | 1.3x10-04/1.0x10-06 | |
| Dibutyl Phthalate | 35 | 154 | | | |
| Dichlorobenzenes | 4x10-01 | 2.6 | 1.1*/7.6x10-01* | 1.9* | |
| 1,2-Dichlorobenzene | | | | | |
| 1,3-Dichlorobenzene | | | | | |
| 1,4-Dichlorobenzene | | | | | 7.5x10-01 |
| 3,3'-Dichlorobenzidine | 1x10-04 | 2x10-05 | | | |
| 1,2-Dichloroethane (EDC) | 9.4x10-04 | 2.4x10-01 | 1.1x10+02*/2.0x10+01* | 1.1x10+02* | 0 |
| Dichloroethylenes | 3.3x10-05 | 1.9x10-03 | 1.1x10+01* | 2.2+02* | |

*** AUGUST 8, 1988 DRAFT ***

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| | Potential ARARs b/ | | | | For Use In Special Circumstances |
|---|---|---|---|---|---|
| | CWA Water Quality Criteria for Protection of Human Health | | CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/ | | |
| Chemical Name | Water and Fish Ingestion (mg/l) | Fish Consumption Only (mg/l) | Freshwater Acute/Chronic (mg/l) | Marine Acute/Chronic (mg/l) | SDWA/MCL Goal (mg/l) d/ |
| 1,1-Dichloroethylene | 3.1 | | 1.1x10+01* | 2.2x10+02* | 7.0x10-03 |
| 2,4-Dichlorophenol | | | 2.0*/0.3* | | |
| 2,6-Dichlorophenol | | | | | |
| 3,4-Dichlorophenol | | | | | |
| 2,3-Dichlorophenol | | | | | |
| 2,5-Dichlorophenol | | | | | |
| 2,4-Dichlorophenoxyacetic Acid (2,4-D) | | | | | 7.0x10-03 |
| 1,3-Dichloropropene | 8.7x10-02 | 14.1 | 6.0*/0.2* | 0.7* | |
| Dieldrin | 7.1x10-08 | 7.6x10-08 | 2.5x10-03/1.9x10-06 | 0.7x10-03/1.9x10-06 | |
| Diethylphthalate | 350 | 1800 | | | |
| Bis(2-ethylhexyl)phthalate (DEHP) | | | | | |
| Diethylnitrosamine | | | | | |
| 7,12-Dimethylbenz(a)anthracene | | | | | |
| Dimethylnitrosamine | | | | | |
| 2,4-Dimethylphenol | | | 2.1* | | |
| Dimethylphthalate | 313 | 2900 | | | |
| 4,6-Dinitro-o-cresol | | | | | |
| 2,4-Dinitrophenol | | | | | |
| 1,2-Diphenylhydrazine | | | | | |
| Endosulfan | 7.4x10-02 | 1.6x10-01 | 2.2x10-04/5 6x10-05 | 3 4x10-05/8 7x10-06 | |
| Endrin | 1x10-03 | | 1 8x10-04/2 3x10-06 | 3 7x10-05/2 3x10-06 | |
| Ethylbenzene | 1 4 | 3 3 | 3 2x10+01 | 4 3x10 01* | |
| Fluoranthene | 4 2x10-02 | 5 4x10-02 | 3 9* | 4 0x10 02*/1 6x10-02* | |
| Fluorides | | 4.0 | | | |

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# TABLE 3

## SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

| | Potential ARARs b/ | | | | Circumstances |
|---|---|---|---|---|---|
| | CWA Water Quality Criteria for Protection of Human Health | | CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/ | | |
| Chemical Name | Water and Fish Ingestion (mg/l) | Fish Consumption Only (mg/l) | Freshwater Acute/Chronic (mg/l) | Marine Acute/Chronic (mg/l) | SDWA/MCL Goal (mg/l) d/ |
| Heptachlor | 2.8x10-07 | 2.9x10-07 | 5.2x10-04/3.8x10-06 | 5.3x10-05/3.6x10-06 | |
| Hexachlorobenzene | 7.2x10-07 | 7.4x10-07 | | | |
| Hexaclorobutadiene | 4.5x10-04 | 5x10-02 | 9.0x10-02/9.3x10-03* | 3.2x10-02* | |
| alpha-Hexachlorocyclohexane (HCCH) | 9.2x10-06 | 3.1x10-05 | | | |
| gamma-HCCH (Lindane) | | | | | |
| Technical-HCCH | 1.2x10-05 | 4.1x10-05 | | | |
| Hexachlorocyclopentadiene | 2.1x10-01 | | 7.0x10-03*/5.2x10-03* | 7.0x10-03* | |
| Hexachloroethane | 1.9x10-03 | 8.74x10-03 | 9.8x10-01*/5.4x10-01* | 9.4x10-01* | |
| Iodomethane | | | | | |
| Isophorone | | | 1.17x10+02* | 1.2x10+01* | |
| Lead and Compounds (Inorganic) | 5x10-02 | | 8.0x10-02/3.2x10-03+ | 0.1/5.6x10-03 | |
| Mercury and Compounds (Alkyl) | | | 2.4x10-03/1.2x10-05 | 2.14x10-03/2.5x10-05 | |
| Mercury and Compounds (Inorganic) | 1.4x10-04 | 1.5x10-04 | 2.4x10-03/1.2x10-05 | 2.1x10-03/2.5x10-05 | |
| Methoxychlor | 1x10-01 | | 0.3x10-04* | 0.3x10-04* | |
| Methyl Chloride | | | | | |
| 2-Methyl-4-chlorophenol | | | | | |
| 3-Methyl-4-chlorophenol | | | | | |
| 3-Methyl-6-chlorophenol | | | | | |
| 3-Monochlorophenol | | | | | |
| 4-Monochlorophenol | | | | | |
| Nickel and Compounds | 1.3x10-10 | 1x10-01 | 1.4+/1.6x10-01+ | 7.5x10-02/8.3x10-03 | |
| Nitrate (as N) | 10 | | | | |
| Nitrobenzene | 20 | | 2.7x10+01* | 6.6 | |
| Nitrophenols | | | 2.3x10-01*/1.5x10-01* | 4.8* | |

TABI

SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/

* * * AUGUST 8, 1988 DRAFT * * *

| | Potential ARARs b/ | | | | For Use In Special Circumstances |
|---|---|---|---|---|---|
| | CWA Water Quality Criteria for Protection of Human Health | | CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/ | | |
| Chemical Name | Water and Fish Ingestion (mg/l) | Fish Consumption Only (mg/l) | Freshwater Acute/Chronic (mg/l) | Marine Acute/Chronic (mg/l) | SDWA/MCL Goal (mg/l) d/ |
| Nitrosamines | | | 5.8* | 3.3x10+03* | |
| n-Nitrosodiphenylamine | 4.9x10-03 | 1.6x10-02 | | | |
| N-Nitrosopyrrolidine | 1.6x10-05 | 9.2x10-02 | | | |
| Para Dichorobenzene | | | | | |
| Pentachlorinated Ethanes | | | 7.2*/1.1* | 3.9x10-01*/2.8x10-01* | |
| Pentachlorobenzene | 7.4x10-02 | 8.5x10-02 | | | |
| Pentachlorophenol | 1 | | 2.0x10-02/1.3x10-02 | 1.3x10-02/7.9x10-03 | |
| Phenanthrene | | | | | |
| Phenol | 3.5 | | 1.0x10+01/2.5 | 5.8 | |
| Phthalate Esters | | | 9.4x10-01*/3.0x10-03* | 2.9*/3.4x10-03* | |
| Polychlorinated Biphenyls (PCBs) | 7.9x10-08 | 7.9x10-08 | 2.0x10-03/1.4x10-05 | 1.0x10-02/3.0x10-05 | |
| Radionuclides, Gross alpha activity | | 15 pCi/l | | | |
| Radium 226 and 228 | | 5 pCi/l | | | |
| Selenium and Compounds | 1.0x10-02 | 1.0x10-02 | 2.6x10-01/3.5x10-02 | 4.1x10-01/5.4x10-02 | |
| Silver and Compounds | 5.0x10-02 | 5.0x10-02 | 4.1x10-03+/1.2x10-04 | 2.3x10-03 | |
| Strontium-90 | | 8 pCi/l | | | |
| 2,3,7,8-TCDD (Dioxin) | | | <1.0x10-05*/<1.0x10-08 | | |
| Tetrachlorinated Ethanes | | | 9.3* | | |
| 1,2,4,5-Tetrachlorobenzene | 3.8x10-02 | 4.8x10-02 | | | |
| 1,1,2,2-Tetrachloroethane | 1.7x10-04 | 1.1x10-02 | 2.4* | 9.0* | |
| Tetrachloroethanes | | | 9.3* | | |
| Tetrachloroethylene | 8x10-04 | 8.9x10-03 | 5.2*/8.4x10-01* | 1.0x10+01*/4.5x10-01* | |
| 2,3,4,6-Tetrachlorophenol | | | | 4.4x10-01 | |
| Thallium and Compounds | 1.3x10-02 | 4.8x10-02 | 1.4*/4.0x10-02* | 2.1x10-03* | |

## TABLE 3

**SELECTED CHEMICAL-SPECIFIC POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS a/**

| Chemical Name | Potential ARARs b/ — CWA Water Quality Criteria for Protection of Human Health: Water and Fish Ingestion (mg/l) | Fish Consumption Only (mg/l) | CWA Ambient Water Quality Criteria for Protection of Aquatic Life c/: Freshwater Acute/Chronic (mg/l) | Marine Acute/Chronic (mg/l) | For Use In Special Circumstances: SDWA/MCL Goal (mg/l) d/ |
|---|---|---|---|---|---|
| Toluene | 14 | 420 | 1.7x10+01* | 6.3*/5.0* | |
| Toxaphene | 7.1x10-07 | 7.3x10-07 | 7.3x10-04/2.0x10-07 | 2.1x10-04/2x10-07 | |
| Tribromomethane (Bromoform) | | | | | |
| Trichlorinated Ethanes | | | 1.8x10+01* | | |
| 1,1,1-Trichloroethane | 18 | 1000 | | 3.1x10+01* | 2.0x10-01 |
| 1,1,2-Trichloroethane | 6x10-04 | 4.2x10-02 | 9.4* | | |
| Trichloroethylene | 2.7x10-03 | 8.1x10-02 | 4.5x10+01*/2.1x10+01* | 2.0* | 0 |
| Trichloromonofluoromethane | | | | | |
| 2,4,5-Trichlorophenol | 2.8 | | | | |
| 2,4,6-Trichlorophenol | 1.2x10-03 | 3.6x10-03 | 9.7x10-01* | | |
| 2,4,5-Trichlorophenoxypropionic Acid | | | | | |
| Trihalomethanes (Total) b | | | | | |
| Tritium | | | | | |
| Vinyl Chloride | 2x10-03 | 5.3x10-01 | | | 0 |
| Zinc and Compounds | | | 1.3x10-01/1.1x10-01 | 9.6x10-02/8.6x10-02 | |

a/ Additional chemical-specific requirements will be added (e.g. National Ambient Air Quality Criteria) after analysis of additional statutes.

b/ When two or more values conflict, the lower value generally should be used.

c/ Federal water quality criteria (FWQC) are not legally enforceable standards, but are potentially relevant and appropriate to CERCLA actions. CERCLA §121(d)(2)(B)(i) requires consideration of four factors when determining whether FWQC are relevant and appropriate: 1) the designated or potential use of the surface or groundwater, 2) the environmental media affected, 3) the purposes for which such criteria were developed, and 4) the latest information available.

TABLE 3

d/ For water that is to be used for drinking, the MCLs set under the SDWA are generally the applicable or relevant and appropriate standard. A standard for drinking water more stringent than an MCL may be needed in special circumstances, such as where multiple contaminants in ground water or multiple pathways of exposure present extraordinary risks. In setting a level more stringent than the MCL in such cases, a site-specific determination should be made by considering MCLGs, the Agency's policy on the use of appropriate risk ranges for carcinogens (10-4 to 10-7 individual lifetime risk), levels of quantification, and other pertinent guidelines. Prior consultation with Headquarters is encouraged in such cases.

* Lowest Observed Effect Level.

+ Hardness dependent criteria (100 mg/l used); refer to specific criteria documents for equations to calculate criteria based on other water hardness values

Sources: U.S. EPA, Superfund Public Health Evaluation Manual, EPA 540/1-86/060 (OSWER Directive 9285.4-1) October 1986 and U.S. EPA, Quality Criteria for Water 1986, EPA 440/5-86-001, May 1986 (51 Federal Register 43665).

*** AUGUST 8, 1988 DRAFT ***

# Responsiveness Summary
## for the
# Oak Grove Sanitary Landfill Superfund Site
# Oak Grove Township, Anoka County, Minnesota

This community responsiveness summary has been developed to document community involvement and concerns during the Remedial Investigation/Feasibility Study and proposed plan phases of the Oak Grove Sanitary Landfill Superfund Site process and to respond to comments received during the public comment period. Also included as an attachment is a summary of the community relations activities conducted by the Minnesota Pollution Control Agency (MPCA) during the Superfund project at the Oak Grove Sanitary Landfill Site.

## OVERVIEW

Based on the findings of the remedial investigation and feasibility study, the U.S. Environmental Protection Agency (U.S. EPA) and the MPCA recommended long-term monitoring of the shallow aquifer, deep (Valley Train) aquifer, surface water and sediments at the Oak Grove Sanitary Landfill. This proposed plan, designed to address ground water contamination at Oak Grove Sanitary Landfill, received conditional approval from the majority of those who commented during the public meeting, initial 30-day comment period, and 15-day extension of the comment period.

The proposed plan was acceptable to most local residents if:

> The U.S. EPA and the MPCA perform additional testing on the wetlands adjoining the landfill to find out how the wetland may act as a biological treatment system for some of the chemicals found in the ground water; to determine the possible effects of contamination on the wetland and its inhabitants; and to find out more about the surface water movement in the wetland.
>
> The U.S. EPA and MPCA install a system to pump and treat the contaminated ground water if it affects the Valley Train aquifer used by the surrounding community for drinking water.
>
> The cap proposed for controlling the source of the contamination works effectively in combination with long-term monitoring of the landfill.

Several individuals commenting during the public meeting held October 24, 1990 preferred immediate installation of a pump-and-treat system for ground water remediation. Generally, however, members of the public were willing to wait and see if the combined capping and monitoring remedies and the biological treatment provided by the wetland are sufficient to prevent public health and environmental impacts associated with the landfill.

The majority of comments forcefully opposed the use of land adjoining the Oak Grove Sanitary Landfill (called "Site D" by Anoka County and the Metropolitan Council, the responsible governmental units) as the location of a new landfill. Residents cited the Oak Grove Sanitary Landfill's contamination problems and the delays and expense of remediation as reasons for their opposition to use of Site D for a new facility. This strongly felt local issue dominated much of the public discussion on the proposed plan.

## BACKGROUND ON COMMUNITY INVOLVEMENT

A high level of community interest in the Oak Grove site has existed during the time the landfill was operating and continued during the closure of the landfill and throughout the Superfund project. The site is in a residential area, with no surrounding businesses affected by the Superfund process or activities. The primary focus of residents' concerns is ground water contamination and its potential effect on nearby residential wells. The community seems most concerned with potential health effects and environmental quality, although a few people had concerns about residential property values.

Other concerns have arisen more recently about the site and its potential impacts. Anoka County and the Metropolitan Council have undertaken a process to locate a site for a new landfill, and one prospective site, Site D, is a property adjoining the Oak Grove site. The property is owned by the current owners and former operators of the Oak Grove landfill. These circumstances have focussed attention on the Oak Grove site and its ground water contamination problems.

Stronger general environmental concerns (about potential impacts on the wetlands, Cedar Creek and the Rum River) may be attributable to several factors including new residential development in the Andover/ Northern Anoka County area; activity by a new environmental group, the Rum River Conservation Coalition; increased environmental education in the schools; activity at other state and federal Superfund sites in the area; and increased environmental awareness resulting from Earth Day 1990.

The MPCA has served as the lead agency on community relations activities. In November 1985, residents were provided with information on plans for the project through a news release, fact sheet and public meeting. A second public meeting was held and fact sheet provided in December 1986, following approval of the work plan and start of field work. Letters to update interested persons on the progress of the ground water investigation were mailed to those on the mailing list in February and June 1988. These letters also included information on the MPCA's decision to conduct a source control feasibility study and the purpose of the study. A public meeting on the source control operable unit was held September 14, 1988 halfway through the public comment period of September 2 - 23, 1988. Fact sheets were distributed at the meeting and made available at the township hall.

Information on the proposed plan for the ground water operable unit was provided through an October 11, 1990 news release sent to all local and metropolitan media outlets, a fact sheet describing the proposed plan sent to the current mailing list, a display ad in the **Anoka County Union**, and phone calls to several residents and local officials who had expressed interest in landfill activities. In addition, local residents hand-delivered flyers in the neighborhood surrounding the landfill.

## SUMMARY OF PUBLIC COMMENTS AND LEAD AGENCY RESPONSE

### Investigation of the Site

**1. Comment: Not enough investigation has been done of surface water in Cedar Creek.**

During the Remedial Investigation, monitoring wells were installed around the landfill to help the MPCA and the U.S. EPA to define the "plume" or extent of the contamination. Two areas in the wetland, where the ground water discharges, were also sampled. Results from these investigations support the MPCA's and U.S. EPA's belief that the contaminants have not affected Cedar Creek. However, the MPCA and the U.S. EPA plan further sampling of surface water and sediments in the wetland. These results should provide the two agencies with more information about potential impacts on Cedar Creek.

**2. Comment: Not enough investigation has been done of reports of barrels being dumped into the landfill. The MPCA/U.S. EPA should dig into the landfill to locate any barrels buried there.**

The MPCA and the U.S. EPA have reviewed large numbers of records about and slides of the Oak Grove Sanitary Landfill. Although the two agencies believe industrial wastes were disposed of at the site, they do not believe drummed wastes remain at the landfill. In addition, testing on the surface of the landfill at 100 foot intervals revealed no "hot spots," or high levels of organic vapors. These "hot spots" indicate more hazardous or drummed wastes.

There are several reasons why the MPCA and U.S. EPA do not dig into the landfill or plan to remove any of the wastes buried there. The landfill's contents cannot be removed to another location because transferring wastes does not reduce their toxicity, mobility or volume and increases the risk of public exposure to the wastes. Drilling holes into the landfill wastes may pose an explosion hazard if sparks from the drilling equipment ignite methane gases. The safest way to handle the wastes is to contain them by capping and to provide a venting system for methane gases.

**3. Comment: Insufficient investigation has been done of possible impacts of the landfill on wildlife in the area.**

The MPCA and the U.S. EPA plan further sampling of surface water and sediments in the wetlands. This should give the two agencies a better idea about what contaminants from the landfill may be affecting area wildlife.

**4. Comment: The MPCA/U.S. EPA should investigate seepage (leachate) coming from the sides of the landfill.**

The seepage from the landfill's sides (called leachate) results from the wastes being inadequately covered and the landfill possibly being improperly sloped to provide good drainage of rainwater and snowmelt. The landfill cap will solve this leachate problem.

**5. Comment: There is not enough information about what is happening in the wetland and how chemicals are being "treated" there.**

The MPCA and the U.S. EPA need more information about the wetland and how natural treatment of contaminants is taking place. The two agencies will perform more surface water and sediment tests to gather additional information about the wetland.

**6. Comment: The extent of the surface water contamination in the wetland may not be the same as the extent of the ground water contamination. More work needs to be done to determine the flow of chemicals in the surface water.**

The MPCA and the U.S. EPA agree with this comment. The two agencies will perform more surface water and sediment testing in the wetland to gather more information about the surface water.

**7. Comment: Low levels of volatile organic compounds (VOCs) were detected in wells upgradient (upstream in the ground water flow) from the**

landfill. The MPCA and the U.S. EPA should investigate the source of these VOCs.

The levels of VOCs found in the upgradient wells were very low compared with the Minnesota Department of Health's Recommended Allowable Limits. Given this fact, the MPCA and U.S. EPA believe that continued monitoring of these wells seems most appropriate. If VOC levels increase in these upgradient wells, the MPCA would have to investigate further, but this investigation would not involve the Oak Grove Sanitary Landfill.

**8. Comment: The MPCA and the U.S. EPA should make sure that no residents in the area are using the shallow aquifer for drinking water.**

The MPCA and U.S. EPA have discovered no shallow drinking water wells in the area and do not believe that the shallow aquifer is a drinking water source. Additionally, institutional controls which are part of the selected remedy will prohibit any wells from being located in the shallow aquifer.

**9. Comment: Analyses of 1982 - 1983 water samples from a monitoring well in the wetland near the southern boundary of the landfill showed very high VOC levels. The MPCA should explain why VOC levels from 1986 - 1990 (taken from newer monitoring wells) are so much lower and why older monitoring wells are not still sampled.**

The original high concentration of VOCs may have arisen from active seeps that flushed through the wetland system and volatilized (went up in the air). The MPCA and the U.S. EPA feel that the 1986 - 1990 tests reflect the current situation at the landfill, and it is this data the two agencies are using to make decisions about the site. However, wetland investigation will continue. The old monitoring wells are not considered reliable and will be abandoned by the MPCA and U.S. EPA.

**10. Comment: The Water Quality Division of the MPCA has suggested that further information be gathered on surface water quality and impacts of contamination. This should be done.**

The MPCA and the U.S. EPA agree and will obtain additional data about the surface water

**11. Comment: The Feasibility Study said that the technical feasibility of a ground water pump-and-treatment system would be "questionable" when it would only present some technical difficulties. It also said that the community's acceptance of a ground water pump out system would be "unknown" when it is likely that it would be acceptable to the community.**

The MPCA and the U.S. EPA agree with these comments, however, this does not affect the MPCA's or U.S. EPA's preferred remedy. The pump-and-treat system would drain the wetland and be costly to implement, but its main drawback is that this environmental degradation and cost may not be necessary to address the contamination problems. The two agencies believe the most prudent choice is to monitor long-term to see if natural processes continue to work on the contaminants.

**12. Comment: The landfill cap should have a leachate collection system to collect leachate at the toe of the landfill.**

The landfill cap should reduce or eliminate the production of leachate. The MPCA and U.S. EPA believe that a leachate collection system will not be needed if the design and the construction of the cap are properly completed.

**13. Comment: A drain tile should be considered instead of a pumping system along the south boundary of the wetland. This would minimize water removal from the wetland.**

If the additional work on surface water and the wetlands or the long-term monitoring indicate that a ground water collection and treatment system is needed, this alternative will be considered along with many others.

**14. Comment: There is no certainty that the ground water remedy and the cap will actually reduce or eliminate contaminated ground water.**

The long-term monitoring plan proposed by the MPCA and the U.S. EPA will help the two agencies determine how successful the cap is in reducing ground water contamination. If the remedy does not reduce or eliminate ground water contamination, the MPCA and the U.S. EPA will re-open the site for further action, such as a pump-and-treat system for ground water. Federal Superfund sites where hazardous substances, pollutants, or contaminants are left in place are re-evaluated every five years, so that reviews of the remedy's effectiveness will take place long into the future.

**15. Comment: It is not clear from the Remedial Investigation and Feasibility Study reports that shallow and deep ground water does discharge to the wetland.**

Shallow ground water does discharge to the surface water in the wetland, according to all the data collected by the MPCA and the U.S. EPA. Ground water contained within the lower portion of the deep aquifer does not discharge to the wetland, but also does not contain contaminants at any level of concern.

**16. Comment: There is no proof that there is a restraining layer between the aquifers that will prevent contamination of the deep (drinking water) aquifer.**

Hydraulic conductivity is a measurement of how easily water can move through a material. The hydraulic conductivity of the restraining layer is lower than the overlying sand or underlying sand. This indicates that ground water has difficulty moving from the overlying sand through the till and into the underlying sand. Additionally, sample results indicate that contaminants found in the shallow aquifer are not present in the lower aquifer. This indicates the presence of a physical barrier between the two aquifer systems. In addition to the physical barrier, a hydraulic barrier in the form of an upward movement of ground water from the lower aquifer to the upper aquifer protects the lower aquifer from contamination.

**17. Comment: Increasing development in the community may lead to increased drawdown in the lower aquifer. This may change the ground water dynamics (the flow from lower to upper aquifer) and begin to draw water from the more contaminated shallow aquifer downward.**

The long-term monitoring proposed will be able to determine if water movement changes at the site in response to development. If future test results indicate any increase in the contaminant levels in the lower aquifer, both the MPCA and the U.S. EPA can change the remedy and install a system to treat the ground water.

**18. Comment: There may be negative environmental effects from heat production in the landfill as the garbage degrades.**

The MPCA and the U.S. EPA do not believe that heat from the degradation of the landfill wastes will have any adverse environmental impacts.

## Remedy Preference

**19. Comment: A pump-and-treat system with reinjection of treated ground water is the best remedy for the ground water contamination.**

A system for pumping and treating the contaminated ground water would be significantly more expensive than a long-term monitoring program, may not provide more protection for the public and the environment, and may adversely affect the wetland. Reinjection of treated ground water is not currently permitted under Minnesota law except in special cases. In one of these cases, ground water is being reinjected into a calcareous fen (a rare and unique natural environment) to preserve it, with only limited success. It is the MPCA's and U.S. EPA's belief that a pump-and-treat system should only be used if the capping system is not effective in reducing or eliminating ground water contamination.

**20. Comment: A pump-and-treat system is the best remedy for the ground water contamination.**

See response above.

## MPCA/U.S. EPA Process and Public Information Efforts

**21. Comment: The community is concerned about who is going to monitor the work done at the landfill to make sure it is done properly. This is especially an issue if potentially responsible parties take over the cleanup process.**

Technical teams from the MPCA and the U.S. EPA must review and approve all work plans, reports, and engineering plans for the Oak Grove Sanitary Landfill. These technical teams include the project manager, hydrogeologist, and engineer familiar with landfills. The MPCA and/or the U.S. EPA oversee consultants employed by the agencies or the potentially responsible parties in exactly the same way. Through this oversight process, both the MPCA and U.S. EPA can assure that the cleanup meets all state and federal standards and accomplishes the cleanup goals.

**22. Comment: There have been many delays in addressing the landfill's problems, and these delays have made the situation and the risk to the community worse.**

Superfund investigation and cleanup activities are complex and time-consuming, and there have been delays in completing the investigations to date. Among the delays that have slowed completion of the project are: greater review times for documents because two levels of review are involved; staff changes at both the MPCA and the U.S. EPA; changing consultants at one point in the investigation; and inability to gain site access on two occasions.

However, the average length of time from the beginning of the Remedial Investigation to the completion of Remedial Action is 5 1/2 to 6 1/2 years for federal Superfund sites. The Remedial Investigation at Oak Grove Sanitary Landfill began in 1985, so the length of time to complete the work is not unusual for Superfund sites. The MPCA and U.S. EPA do not believe this delay has increased any health or environmental risk to the community.

**23. Comment: The MPCA/U.S. EPA have not provided enough public information about the chemicals found in the ground water or their potential health effects.**

The fact sheet on the site mailed to residents on October 11 and available at the public meeting contained brief overviews of health risk information. The Remedial Investigation and Feasibility Report available at the Oak Grove Township Hall and the public library contained additional data. However, the MPCA and the U.S. EPA did not feel that these two resources provided enough information to residents. A fact sheet, prepared by the MPCA and the Minnesota Department of Health, addressed health issues more specifically. This fact sheet was sent to interested parties and responsible parties on November 15, 1990 along with notice of extension of the public comment period.

**24. Comment: Not enough general information has been given to residents, and many affected people did not know about the public meeting.**

The MPCA and U.S. EPA provided notice of the public meeting in a variety of ways, including: a display ad in the **Anoka County Union**; a news release (used to prepare a large article about the site and the proposed meeting in the **Anoka County Union**) to newspapers and radio stations in the area; a mailing of the fact sheet to all interested parties who attended the previous public meeting in 1988; and calls to specific officials interested in the site. Residents also received notice from the Oak Grove Townshi- Board, and several residents delivered flyers to households. The MPCA and the U EPA will improve the accuracy of the current mailing list for future public notice.

**25. Comment: The efforts of Oak Grove Township to get information to the residents was greatly appreciated.**

The MPCA and the U.S. EPA also appreciate the assistance of the Oak Grove Township Board in getting information to residents.

**26. Comment: The public meeting should have been held in the Oak Grove Township Hall.**

Three factors prevented the MPCA and U.S. EPA from using the Oak Grove Township Hall for the public meeting: the hall was too small for the number of people expected to attend the meeting; the previous MPCA information officer assigned to the site recommended that the meeting be held in a different location; and the meeting moderator suggested the Andover Community School. The MPCA and U.S. EPA will make sure that future meetings are located as close to the site as possible.

**27. Comment: The public comment period should be placed at the end of a public meeting, after the question-and-answer session.**

In any future meetings, the MPCA and the U.S. EPA will place the formal comment period at the end of the meeting, after the question-and-answer period.

**28. Comment: Anoka County staff were not sufficiently informed about the public meeting or about the Remedial Investigation/Feasibility Study results.**

Anoka County has received notices and investigation reports about the site throughout the history of the project. Anoka County's Solid Waste Officer received notice of the proposed plan meeting, but did not receive a copy of the proposed plan or the final Remedial Investigation/Feasibility Study reports. These reports were sent to the Anoka County Solid Waste Officer, and, at his request, the public comment period was extended to allow sufficient time for Anoka County's review and comments.

## Liability Issues

**29. Comment: The potentially responsible parties should pay 100 percent of the costs of investigation and cleanup.**

Both the state and federal Superfund programs are based on a "polluter pays" philosophy. The federal Superfund program has covered the costs of investigation and cleanup to date, but these costs will be recovered later from potentially responsible parties. The U.S. EPA, working with the U.S. Department of Justice, has been identifying additional generators of industrial wastes disposed of at the Oak Grove Sanitary Landfill. Some of these generators have expressed a willingness to cooperate with the two agencies and to assume cleanup responsibilities.

**30. Comment: The community is concerned about who will pay for future problems if the remedy doesn't work.**

The potentially responsible parties who have been identified or who will be identified in the future are liable for all the cleanup costs at the site that result from their activities. If the proposed cap and ground water monitoring do not remedy the problem, the MPCA and the U.S. EPA can always go back to the potentially responsible parties to do more work.

**31. Comment: The community is unsure about whether the MPCA or U.S. EPA will be able to recover costs from potentially responsible parties.**

Both the MPCA and the U.S. EPA will attempt to recover costs from potentially responsible parties, and both agencies have about 75 - 80 percent success rate in recovering costs from potentially responsible parties.

## Health Issues

**31. Comment: One community member living near the site believed that her spouse's esophageal cancer might be attributable to contaminants on the site.**

It is very difficult to determine what causes cancer, especially since so many lifestyle factors (such as smoking and occupational exposure to chemicals) have been implicated in cancer cases. Health risk assessments performed at Superfund sites, however, have commonly looked at how the chemicals reach the person (pathways), how much of the chemical the person is exposed to, how long the exposure has been, and how carcinogenic the chemical is.

Residents living near the Oak Grove Sanitary Landfill can be affected by the chemicals only through ground water and surface water. The primary pathway of exposure would be through drinking contaminated water. Repeated testing of water samples from residential wells in the area has shown no chemicals in levels above the Minnesota Department of Health's Recommended Allowable Limits for drinking water, and in most cases no detectable chemicals. Therefore, it is extremely unlikely that the contaminants detected in the landfill have made their way to residents or have caused cancer.

**32. Comment: Insufficient residential well testing has been done near the site.**

Results of numerous tests on shallow and deep ground water have indicated that no contamination is migrating off-site to nearby residential wells. Deep aquifer wells installed 200 feet downgradient from the edge of the landfill do not show any signs of ground water contamination. There has been sampling conducted at a number of residences near the landfill, none of which showed contamination.

**33. Comment: Residents are concerned about children playing in Cedar Creek.**

The results of surface water testing conducted during the Remedial Investigation do not show any surface water contamination that would be expected to migrate to Cedar Creek. It is the MPCA's and U.S. EPA's belief that there are no contaminants migrating from the landfill to Cedar Creek.

**34. Comment: The site should be fenced to protect children and household pets from coming in contact with the landfill.**

Because the landfill is located in a sparsely populated area and is mostly covered in lime sludge, the MPCA and the U.S. EPA have not believed that fencing the site is necessary. The site will be fenced after the landfill cap is completed, primarily to protect the integrity of the cap.

## Capping Issues

**35. Comment: Capping systems have not been very successful in preventing methane gas buildup.**

Some capping systems are not designed to capture and direct methane gas and, as a result, methane gas buildup can be a problem. The capping system selected for the Oak Grove Sanitary Landfill, however, is designed with a layer which captures and directs methane gas so that buildup won't occur.

**36. Comment: The community is concerned that the weight of the cap will press wastes out of the landfill.**

When the cap was designed, factors such as the final weight of the cap and the equipment used to install the cap were considered. These factors, along with the type and quantity of wastes present at the landfill, were evaluated so that a cover could be designed which best keeps waste materials in place.

**37. Comment: The community wants to know if landfill cover and monitoring systems have been successfully used at other sites.**

Landfill covers, combined with ground water monitoring systems, exist at several sites in Minnesota and have been found to successfully reduce ground water contamination resulting from landfill wastes.

**38. Comment: The residents are concerned about the possibility of methane gas buildup in the landfill.**

See answer to Comment #35.

Site D. Future Landfill Siting

**37. Comment: The residents in the area are opposed to siting a new landfill near the Oak Grove Sanitary Landfill.** (Majority of residents at the public meeting)

Neither the MPCA or the U.S. EPA is the responsible governmental unit deciding on the possible siting of a new landfill in Anoka County. Anoka County officials have been provided information about the Oak Grove Sanitary Landfill investigation. A copy of the public meeting transcript will be provided to Anoka County officials and will be available at the information repository at the Oak Grove Township Hall.

Potentially Responsible Party Comments

**38. Comment: The MPCA and U.S. EPA are failing to work with potentially responsible parties interested in cleaning up the site.**

The MPCA has had a long history of attempting to work with the owners and former operators of the Oak Grove Sanitary Landfill, both before the closing of the facility and afterward. Among the landmarks in the MPCA's enforcement history are:

- August 1971, Joseph Egan received a permit to operate the landfill.
- May 1976, the MPCA Citizens Board voted unanimously to revoke the permit.
- The decision was stayed in District Court in September 1976.
- In October 1977, the Board approved a stipulation agreement between Anoka County, the MPCA, Northwest Disposal Inc. and Joseph Egan which gave consent by the County and the potentially responsible parties to revocation of the permit.
- The landfill closed in December 1983.
- Northwest Disposal ceased ground water monitoring at the landfill in January 1984. Both Northwest Disposal and Joseph Egan were requested to continue monitoring by the MPCA, but neither party responded.
- In August 1984, the MPCA Citizens Board issued a Request for Response Action (a RFRA or enforcement order) to Joseph Egan, Northwest Disposal, and the Egan Family Trust. This gave the potentially responsible parties named the opportunity to indicate willingness to negotiate a Consent Order, or binding legal agreement, until September 11, 1984 and to negotiate with the MPCA until November 10, 1984. Although negotiations took place, there was no agreement.
- In November 1984, the MPCA Board issued a Determination of Inadequate Reponse for the Oak Grove Sanitary Landfill. This determination allowed the MPCA to negotiate an agreement with the U.S. EPA to use federal Superfund money on the site.

No funds have been spent by the potentially responsible parties on the Remedial Investigations or Feasibility Studies conducted so far. Recently, a group of generators who are also considered potentially responsible parties have formed a steering committee to work with the MPCA and the U.S. EPA. Discussions have taken place between U.S. EPA and this steering committee. A consulting firm representing this group of potentially responsible parties has commented, for the most part favorably, on the MPCA's and U.S. EPA's proposed remedy for ground water at the site.

**39. Comment: The MPCA and U.S. EPA are implying that tax dollars are being used to clean up the site.**

The fact sheets and news releases prepared by the MPCA and the U.S. EPA have mentioned that federal Superfund dollars are being used to investigate and clean up the Oak Grove Sanitary Landfill. The federal Superfund monies are collected as a tax on hazardous waste generators and from potentially responsible party reimbursements. This information has not been included in the two agencies' information efforts. Future information will discuss the source of federal Superfund dollars.

**40. Comment: A representative of the steering committee of potentially responsible parties concurs with the MPCA's and U.S. EPA's proposed plan.**

One group of potentially responsible parties has indicated it agrees with the agencies' findings and intend to work with the MPCA and U.S. EPA on the cleanup.

**41. Comment: The October 24, 1990 meeting intentionally misled the community about the potential threat of the landfill to surface water and residential wells.**

The Oak Grove Sanitary Landfill does pose a threat to public health and the environment. The shallow ground water at the site is highly contaminated with VOCs; the deep ground water, which is used for drinking water, is at risk of becoming contaminated; the potential impacts on the wetland and its inhabitants still needs to be investigated. It is also true that the MPCA and the U.S. EPA have not found any residential well contamination or off-site impacts from the landfill. These are the facts which were presented at the public meeting. It is the policy of the MPCA and the U.S. EPA that the public has a right to know about all potential environmental threats to their community.

**42. Comment: The MPCA intentionally misled the public into believing that contaminants had migrated to Cedar Creek.**

Before the public meeting, the MPCA and U.S. EPA distributed a fact sheet and a news release about the proposed plan for ground water. The news release contained an error, indicating that surface water impacts had been detected in Cedar Creek. The fact sheet contained cost figures on the alternative remedies that were lower than actual cost estimates. At the October 24, 1990 meeting, the Public Information Officer who prepared these materials apologized to the 175 - 200 members of the community who had received these materials, including members of the local news media. This apology and corrections are clearly noted in the transcript of the meeting. The presentation contained complete and accurate information. The MPCA and the U.S. EPA apologize for the errors in the public information handouts, but feel that accusations made by potentially responsible parties that impacts of the landfill have been exaggerated with an intent to confuse or panic the public are completely without merit.

**43. Comment: The MPCA said at the public meeting that caps such as the one proposed can be found at other landfills in the state. One group of potentially responsible parties feels that this is misleading, as a cover <u>exactly</u> like the one proposed for Oak Grove Sanitary Landfill has not been built at any other facility in Minnesota.**

The standard procedure for managing landfills in Minnesota is to provide a cover or cap for the landfill and a ground water monitoring system. Many sites in Minnesota have caps, and these caps were built under the state of Minnesota's old solid waste rules which were not as protective as the current rules. The new solid waste rules went into effect in 1988, and the Oak Grove Sanitary Landfill must be constructed under these rules.

If the owners and operators of the landfill had closed the facility properly in 1983, when the landfill ceased operation, they could have built a less protective capping system at a lower cost under the old rules. Because they chose not to address the landfill's problems at that time, the potentially responsible parties will now have to build the more protective cover in compliance with the new rules. Other facilities which have caps similar to the one proposed for Oak Grove include the Anoka County Sanitary Landfill, Kandiohi County Landfill, Olmsted County Landfill, Maple Landfill, Moonlight Rock Landfill, and Potlatch-Cioquet Landfill.

**44. Comment: The MPCA has continued to "harass individuals over a site that... is not now a threat and ... will not be a threat in the future." The MPCA and the U.S. EPA should let the potentially responsible parties address the landfill's problems.**

The Oak Grove Sanitary Landfill is a potential threat to public health and the environment. Although it has not been found to have contaminated drinking water supplies, that potential exists. The landfill has clearly contaminated the shallow aquifer. The statement that the site is harmless and will continue to be so has no basis in fact.

The MPCA and the U.S. EPA have addressed the Oak Grove Sanitary Landfill under federal and state rules and regulations. The MPCA's initial request to the owners and operators of the landfill was that they investigate and address the landfill's problems. These potentially responsible parties chose not to work cooperatively with the MPCA and the U.S. EPA, as is their right under the law. A lien has been filed by the U.S. Department of Justice on the landfill property in an attempt to assure some cost recovery, and this action was taken in compliance with all applicable laws and with due process for the landfill owners and operators. The charge that the MPCA or the U.S. EPA have harassed the owners and operators is without merit.

**45. Comment: The November 1990 fact sheet on health issues related to the Oak Grove Sanitary Landfill described the health assessment prepared by the Agency for Toxic Substances Disease Registry in concert with the Minnesota Department of Health. The health assessment covers physical hazards, such as broken glass and crumbling buildings. The fact sheet misled the public, because there are no buildings on the landfill site proper.**

The description of the health assessment contained in the fact sheet used broken glass and crumbling buildings as general examples of physical hazards and not specific features of the Oak Grove Sanitary Landfill.

**46. Comment: The MPCA should have allowed the potentially responsible parties to do their own Remedial Investigation/Feasibility**

**Study (RI/FS) instead of placing the site on the federal and state Superfund lists.**

The potentially responsible parties at the Oak Grove Sanitary Landfill had many opportunities to negotiate with the MPCA and to perform an RI/FS and cleanup actions. In fact, most landfills in Minnesota are being addressed by responsible parties (in many cases, county and city governments) working cooperatively with the MPCA. The potentially responsible parties chose not to participate in 1984. The site was proposed for the state and federal Superfund list because it posed a potential threat to drinking water supplies and because no potentially responsible party was willing to adequately investigate and undertake a remedy for the site. Recently, a steering committee of potentially responsible parties has indicated willingness to work cooperatively with the two agencies.

**47. Comment: The MPCA and the U.S. EPA are requesting too many samples too frequently in the long-term monitoring plan.**

The MPCA and the U.S. EPA are proposing a long-term monitoring plan that is consistent with the two agencies' goal: to acquire enough data to know if any changes occur in levels of contaminants. The number of samples required will provide the MPCA and the U.S. EPA with a sufficient data base and will also show seasonal variations.

**48. Comment: The MPCA and the U.S. EPA are requesting sampling for pesticides and polychlorinated biphenyls (PCBs) and these tests are not necessary.**

The MPCA and the U.S. EPA are requiring data on pesticides and PCBs because the MPCA Water Quality Division staff had some concerns about these chemicals in ground and surface water based on the Remedial Investigation. After the two agencies have obtained sufficient data about pesticides and PCBs, and if no problems are indicated, the two agencies may not test for pesticides and PCBs in the future.

**49. Comment: The MPCA and the U.S. EPA have underestimated the cost of the long-term monitoring plan and the plan to abandon monitoring wells at the site.**

The MPCA and U.S. EPA's consultant, Malcolm Pirnie, has provided cost estimates based on the company's experience with similar sites. The cost of the long-term monitoring plan are only estimated, and it is likely that the real cost will be different than the estimate provided. It may be more or less.

## REMAINING CONCERNS

There are several outstanding concerns that will be addressed by the MPCA and the U.S. EPA through the Remedial Design and Remedial Action phases of the Oak Grove Sanitary Landfill cleanup process:

1. The MPCA and the U.S. EPA have insufficient information about how the contaminants found at the landfill affect the wetland. The MPCA and U.S. EPA will sample surface water and sediments in the wetland to determine how natural processes are breaking down the contaminants, how contaminants migrate in surface water, and what potential effects contaminants could have on the wildlife in the area.

2. Pursuant to enforcing institutional controls, the MPCA and U.S. EPA may need to do a more through search to make sure that no residents in the area of the landfill are using the shallow aquifer for drinking water.

3. The MPCA and the U.S. EPA will continue testing residential wells as well as long-term monitoring stations to ensure that contaminants are not affecting drinking water or increasing. After the cap and methane venting system are complete, the long-term monitoring will continue for 30 years to ensure that the cleanup remedy is effective in reducing or eliminating ground water contamination.

4. The MPCA and the U.S. EPA will develop a more accurate mailing list and provide regular information about the site to area residents. Any future public information efforts will be coordinated with the Oak Grove Township Board and Anoka County.

5. As U.S. EPA enforcement efforts continue and potentially responsible parties are identified, the MPCA and the U.S. EPA will provide information to interested residents, local officials, local news media, and potentially responsible parties.

6. The MPCA will forward a transcript of the public meeting held on October 24, 1990 to the Oak Grove Township Board and St. Francis Public Library for public review. A copy will also be forwarded to Anoka County so that the comments on Site D can be considered by the responsible governmental unit.

7. The MPCA and U.S. EPA will respond to any additional requests for information about the site.

## ATTACHMENT A

### Community Relations Activities Conducted at the Oak Grove Sanitary Landfill

The MPCA has conducted the following community relations activities for the Oak Grove Sanitary Landfill:

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| November 1985 | Public meeting to describe project; fact sheet. |
| December 1985 | Community relations interviews; information repository established at the Oak Grove Township Hall. |
| Spring 1985 | Community Relations Plan completed. |
| November 17, 1986 | News release announcing beginning of field work. |
| December 3, 1986 | Public meeting, fact sheet on work plan. |
| February 1988 | Update letter to mailing list about separation of source and ground water operable units. |
| June 1988 | Update letter to mailing list. |
| August 30, 1988 | News release announcing source control proposed plan, public meeting. |
| September 2, 1988 | Ad published in **Anoka County Union**; documents |

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| | placed in information repository. |
| September 14, 1988 | Public meeting, fact sheet provided on source control proposed plan; comments accepted from the public. |
| September 23, 1988 | Public comment period ended; responsiveness summary written and attached to Record of Decision. |
| October 10 - 15, 1990 | News release, fact sheet sent to local media, mailing list on proposed plan for ground water operable unit; ad in **Anoka County Union** published to announce meeting; reports delivered to Oak Grove Township Hall and St. Francis Branch of the Anoka Public Library. |
| October 24, 1990 | Public meeting held on ground water operable unit, approximately 175 interested parties attended. |
| November 7, 1990 | Request received to extend the public comment period. |
| November 15, 1990 | Comment period is extended to November 30; paid ad placed in **Star/Tribune** November 18, **Anoka County Union** on November 23; fact sheets and announcements sent to all interested parties on mailing list; Anoka County Solid Waste Officer, attorney for potentially responsible parties, resident associated with the Egan Family verbally informed of extension of comment period. |
| November 30, 1990 | Comment period ended; responsiveness summary prepared. |