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December 2, 1991

Mr. Michael Ioff
Naval Facilities Engineering Command
U.S. Naval Base - Northern Division
Building 77L; Code 1421
Philadelphia, PA 19112

Re: Naval Industrial Reserve Ordnance Plant
Fridley, Minnesota
Contract No. N62472-90-C-1024
RMT Project No. 2333.10

Dear Mike:

Enclosed are 4 copies of the final Ground Water Reuse Study report. Other copies of the report have been distributed, by overnight mail service, according to the attached Distribution List.

The report is being distributed to the regulatory agencies for their review and approval. As you instructed, we are requesting all regulatory agency reviewers to provide any review comments they may have to you in writing within 45 days after their receipt of the report.

Sincerely,

Eric Gredell

Eric Gredell, P.E.
Project Manager

tfr

Enclosures

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GROUND WATER REUSE STUDY

NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT
FRIDLEY, MINNESOTA

DECEMBER 1991

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TABLE OF CONTENTS

Title	Page
1. INTRODUCTION	1-1
1.1 Background	1-1
1.2 Purpose and Scope	1-3
1.3 Study Input Assumptions	1-4
1.3.1 GWTS Effluent Quantity and Quality	1-4
1.3.2 Additional Treatment Required for Reuse	1-5
1.3.3 Reuse Requirements	1-6
1.3.4 Discharge of GWTS Effluent to the Mississippi River	1-6
1.3.5 Conservation of Ground Water Resource	1-7
2. FINDINGS AND CONCLUSIONS	2-1
2.1 Reuse Options	2-1
2.2 Options Evaluation	2-1
2.3 Comparison of Options 1B and 4B	2-2
3. RECOMMENDATIONS	3-1
4. DISCUSSION OF WATER REUSE OPTIONS	4-1
4.1 Introduction	4-1
4.2 Identification of Potential Water Reuse Options	4-2
4.2.1 Base Option - No Water Reuse	4-3
4.2.2 Option 1 - Potable Water Reuse by the City of Fridley	4-4
4.2.3 Option 2 - Water Reuse by the City of Minneapolis	4-5
4.2.4 Option 3 - Potable and Nonpotable Reuse by the NIROP	4-5
4.2.5 Option 4 - Nonpotable Reuse by the NIROP	4-6
4.2.6 Option 5 - Nonpotable Water Reuse at Other Industrial Facilities	4-7
4.2.7 Option 6 - Aquifer Recharge	4-9
4.3 Evaluation Criteria for Reuse	4-10
4.3.1 Technical Feasibility Criteria	4-10
4.3.2 Economics Criteria	4-13
4.3.3 Regulatory Criteria	4-13
4.3.4 Other Criteria	4-13
4.4 Screening of Alternatives	4-14
4.5 Comparison of Options 1B and 4B	4-16
4.5.1 Technical Feasibility	4-17
4.5.2 Regulatory	4-17
4.5.3 Economics	4-17
4.5.4 Other Criteria	4-18
4.6 Recommendations for Reuse	4-19
4.7 MWCC Add-on Service Charge System	4-20
5. REFERENCES	5-1

TABLE OF CONTENTS
(CONTINUED)

Title | Page

List of Tables

Table 4-1 - Treated Ground Water Reuse - Criteria for Evaluation 4-11

List of Figures

Figure 1-1 - NIROP Location Map 1-2
Figure 4-1 - Potential Water Users in the Vicinity of the NIROP 4-8

List of Appendices

Appendix A - Correspondence Concerning the MDNR's Ground Water Reuse Policy
Appendix B - Major Industrial and Commercial Water Users in the Fridley, Minnesota, Municipal Water Supply System

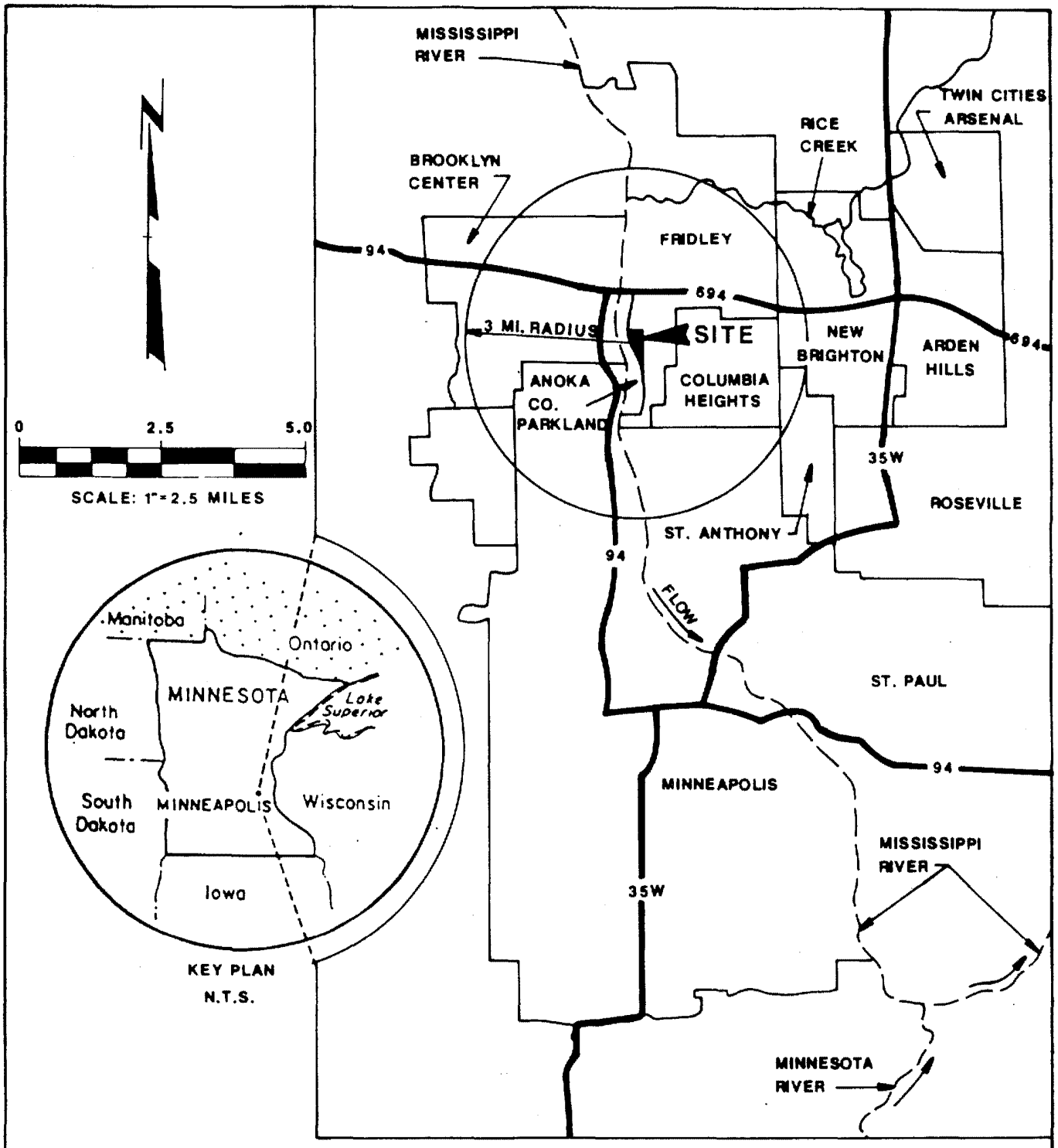
1. INTRODUCTION

1.1 Background

The U.S. Department of the Navy owns and operates the Naval Industrial Reserve Ordnance Plant (NIROP) in Fridley, Minnesota. Figure 1-1 shows the location of the NIROP site. Advanced naval weapons systems are designed and manufactured at the NIROP.

The NIROP site was placed on the United States Environmental Protection Agency (USEPA) National Priorities List (NPL) under CERCLA and SARA due to contamination of soils and ground water at the site, primarily due to trichloroethylene and other volatile organic compounds (VOCs). A Record of Decision (ROD) for ground water remedial action was signed by the USEPA, the Minnesota Pollution Control Agency (MPCA), and the Navy in September 1990 (USEPA, 1990). The selected remedial action for the ground water includes installation and operation of ground water containment and recovery (i.e., pump-out) wells for pumping ground water from the sand and gravel aquifer, with a two-phased plan for disposal of ground water from the well system. Under Phase I, the contaminated ground water will be discharged directly to an existing sanitary sewer for treatment at the local municipal wastewater treatment facility. Under Phase II, a ground water treatment system (GWTS) will be designed, constructed at the NIROP, and operated to treat the contaminated ground water, with the GWTS effluent discharged to the Mississippi River via an existing National Pollutant Discharge Elimination System (NPDES)–permitted storm sewer outfall. The unit operations for the GWTS as described in the ROD will consist of air stripping, with treatment of the off-gas using granular activated carbon.

To implement this ground water remedy, the Navy will obtain various permits and approvals from federal, state, and local agencies, including an NPDES permit from the MPCA for the discharge of the GWTS effluent to the Mississippi River via an existing storm sewer and a permit from the Minnesota Department of Natural Resources (MDNR) for operation of the pump-out wells.



LOCATION MAP

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FIGURE 1-1

On July 2, 1990, the Division of Waters of the Minnesota Department of Natural Resources (MDNR) issued a position paper concerning installation and operation of pump-out wells at ground water remediation sites. The purpose of the MDNR's position on this subject is to conserve the ground water resource and prevent the overuse of aquifers. This position paper states that ground water from pump-out wells at ground water remediation sites (such as the NIROP) should be treated and reused for beneficial purposes, with preference given to reuse in public potable water supply systems whenever feasible. If the water does not meet Minnesota Department of Health (MDH) potable water standards, then reuse of the water for other purposes should be considered. The policy also states that, where new applicants are seeking authorization from the MDNR for new pump-out wells, the MDNR will require the applicant to include a study of options for ground water reuse.

The Navy agreed to perform such a water reuse study for the proposed pump-out wells at the NIROP facility, and to submit a report summarizing the results of the study as part of the Navy's application to the MDNR for a ground water appropriation permit. A copy of the letter from the MDNR to the Navy, dated January 4, 1991, requesting that the Navy submit such a report, and a copy of the July 2, 1990, MDNR position paper are included in Appendix A.

1.2 Purpose and Scope

The purpose of this report is to document the results of the water reuse study performed by RMT for the Navy. This study was performed to comply with the MDNR's request for a water reuse study report. The scope of the study included the following:

- Initial investigations to identify potential users of the GWTS effluent.
- A meeting with the MDNR, the MPCA, and the MDH to identify regulatory and other issues to be addressed when evaluating water reuse options.
- A site visit to the NIROP and discussions with representatives of FMC Corporation (the Navy's operating contractor for the NIROP) to identify and evaluate the potential for water reuse within the NIROP facility.

- Meetings and telephone discussions with other potential users of treated effluent from the GWTS, including the following:
  - Anoka County
  - Minneapolis Water Works
  - Quebecor Corporation
  - General Mills Corporation
  - City of Fridley

Following the initial meetings and NIROP site visit, RMT further evaluated these options based on technical, economic, regulatory, and other factors. Based on the information obtained during the study, RMT developed recommendations for reuse of the treated effluent from the GWTS.

1.3 Study Input Assumptions

The following assumptions regarding ground water quality and quantity were made at the outset of the study to facilitate the identification and evaluation of reuse options.

1.3.1 GWTS Effluent Quantity and Quality

It was assumed that the GWTS effluent flow rate would generally be continuous (i.e., 24 hr/day, 360+ days/year) at a flow rate of up to 650 gal/min. However, there would be periods when the flow rate could be significantly reduced (due to removing one or more pump-out wells or well pumps from service for inspection or maintenance) or completely stopped (due to shutdown of the GWTS equipment for inspection, cleaning, or maintenance).

It was also assumed that the GWTS would be based on air stripping of VOCs, with the GWTS effluent containing VOCs, primarily trichloroethane (TCE), at concentrations above detection limits but below the USEPA Maximum Contaminant Levels (MCLs) for potable water supplies. The GWTS effluent was also expected to contain other parameters (including turbidity and suspended solids; microbiological constituents, such as coliforms; and color,

taste, and odor-producing constituents, such as iron and manganese) which would need to be removed before the GWTS effluent could be reused for either potable or nonpotable purposes or for aquifer recharge.

1.3.2 Additional Treatment Required for Reuse

It was assumed that the following additional treatment processes would be required to upgrade the quality of the GWTS effluent to potable water supply standards prior to reuse in a potable water system:

- Sand filtration (for removal of turbidity, suspended iron, and suspended manganese)
- Activated carbon adsorption (for removal of taste and odors, as well as for additional VOC removal)
- Continuous chlorination (for disinfection)
- Fluoridation

It was assumed that the additional treatment of the GWTS effluent required prior to reuse as a nonpotable water supply would consist of the following:

- In-line strainers (for removal of larger sized solids)
- Intermittent chlorination (for control of biofouling in the user's piping and equipment)
- Addition of chemicals for scale and corrosion control, if needed

It was assumed that the additional treatment of the GWTS effluent required prior to aquifer recharge would consist of the following:

- Sand filtration
- Activated carbon adsorption
- Further removal of suspended solids in the range of 1 - 10μ size (to prevent plugging, if injection wells would be used for aquifer recharge)

For both treatment prior to reuse as a potable water supply and treatment prior to aquifer recharge, it was assumed that the residuals generated by the additional treatment would be managed as follows:

- Backwash from sand filtration would be discharged to the sanitary sewer.
- Spent activated carbon would be regenerated off-site.

1.3.3 Reuse Requirements

It was expected that, due to the economies of scale in the construction and operation of a reuse system, the costs of reuse would greatly outweigh the benefits if only a small portion of the GWTS effluent was reused. Therefore, because the flow rate from the GWTS is expected to be continuous at a rate of up to 650 gal/min, identification of potential water users was restricted to users who met the following requirements:

- Typically had a continuous water demand (i.e., seasonal users or users for fewer than 6 days/week or fewer than 16 hrs/day were excluded from consideration).
- Had a minimum continuous demand of approximately 100 gal/min.

Based on these requirements, seasonal water reuse (such as lawn watering at the NIROP or at the Anoka County Parkland between the NIROP and the Mississippi River) and reuse at various industrial facilities in the vicinity which use only small amounts of water were not evaluated, and are not discussed in this report.

1.3.4 Discharge of GWTS Effluent to the Mississippi River

Some of the ground water reuse options would only be able to use a portion of the water generated by the ground water pump-out system. In addition, it was assumed for all options that there would be periods when the water reuse system would be temporarily out of service due to the following:

- The need to periodically inspect or maintain the system.

- The user temporarily not needing the water (e.g., during a temporary shut-down of the user's facilities and equipment which would use the water).

Therefore, all options included design and construction of a discharge to the Mississippi River via an existing storm sewer per the ROD, with operation of this discharge system whenever the water reuse system cannot reuse 100 percent of the water generated by the ground water pump-out system.

1.3.5 Conservation of Ground Water Resource

As described previously, the proposed pump-out system would pump ground water from the sand and gravel aquifer at the NIROP site, and not from the bedrock Prairie du Chien dolomite/Jordan sandstone (PCJ) aquifer or the St. Peter sandstone. Presently, this shallow aquifer is not used, so the ground water in this aquifer discharges to the Mississippi River. Due to the physiography of the area near the NIROP, the potential for use of the ground water in this aquifer is considered to be unlikely.

However, the City of Fridley uses the bedrock aquifer as the source of water for its municipal water supply system. Therefore, while reuse of the GWTS effluent would provide no direct benefit for the shallow aquifer, it was assumed that reuse would provide an indirect benefit by reducing the water drawn from the bedrock aquifer if the GWTS effluent were reused in lieu of water supplied by the City of Fridley.

2. FINDINGS AND CONCLUSIONS

2.1 Reuse Options

1. Options identified for reuse of the treated GWTS effluent from the NIROP facility included the following potable, nonpotable, and aquifer recharge options:

Option	Description
• 1	Potable Water Reuse by the City of Fridley:
- 1A	Additional treatment of the GWTS effluent by the City.
- 1B	Additional treatment of the GWTS effluent by the Navy.
• 2	Water Reuse by the City of Minneapolis.
• 3	Potable and Nonpotable Water Reuse at the NIROP.
• 4	Nonpotable Water Reuse at the NIROP:
- 4A	Supply water for all nonpotable water uses.
- 4B	Supply water for selected major nonpotable water uses.
• 5	Water Reuse at Other Local Industrial Facilities:
- 5A	Reuse at Quebecor Printing Corporation.
- 5B	Reuse at General Mills Corporation.
• 6	Aquifer Recharge:
- 6A	Recharge by gravity infiltration.
- 6B	Recharge by pressure injection.

2. Options were evaluated based on technical feasibility, economics, regulatory, and other factors (including willingness of the potential user to accept treated effluent from the GWTS for reuse).

2.2 Options Evaluation

1. Options 1B and 4B would be technically feasible, have the potential for being cost effective, are expected to comply with the applicable regulatory requirements, and would be acceptable to the users. However, the acceptability of these options to the Navy has not yet been determined.

2. Option 1A was eliminated from consideration because this option was not acceptable to the user (i.e., the City of Fridley), due to concerns expressed by the City Director of Public Works, about potential impacts of iron, manganese, and TCE on the existing city system. In addition, the same objective could be accomplished by Option 1B at a lesser cost due to the additional cost for Option 1A of conveying the GWTS effluent approximately 3 1/2 miles to an existing city treatment system.

3. Option 2 was eliminated from consideration because the position of the Minneapolis City Engineer is that it would not be acceptable to the user (i.e., the City of Minneapolis).

4. Option 3 was eliminated from consideration because it was not acceptable to the user (i.e., FMC, the operator of the NIROP facility). In addition, Option 1B would accomplish the same objective as this option (i.e., 100% reuse as a potable water supply).

5. Option 4A was eliminated from consideration due to the very high capital cost to construct a completely new segregated nonpotable water supply system for the NIROP facility. In addition, Option 4B would accomplish much of the water reuse of Option 4A, at a significantly lower cost. Representatives of FMC and Anoka County also expressed concern regarding the ability to ensure the complete segregation of potable and nonpotable water systems due to the size, complexity, and extent of the NIROP operations.

6. Option 5A was eliminated from further consideration at this time because the Quebecor facility is planning to shut down in January 1992, thus eliminating the potential for water reuse at this facility. However, Quebecor indicated that they might be interested in reuse of the treated GWTS effluent, should their facility remain in operation. If the Quebecor facility were to remain in operation, Option 5A might be technically feasible, might have the potential to be cost effective, would be expected to comply with applicable regulatory requirements, and might be acceptable to Quebecor.

7. Option 5B was eliminated from further consideration because the facility presently uses approximately 15 gallons/minute of water from the City of Minneapolis water supply system, and reuse was not acceptable to the user (i.e., General Mills). General Mills also indicated that they have no plans to significantly increase water usage at the facility.

8. Option 6A was eliminated from further consideration because sufficient land area is not available for the infiltration system needed for recharge by gravity infiltration. In addition, the technical feasibility and reliability of this option are questionable, due to concerns about system failure caused by the freezing of the system during the winter and the eventual plugging of the infiltration system from scale formation, deposits, and microbiological growth.

9. The MDH indicated that no large-scale pressure ground water reinjection systems have been constructed in Minnesota. The MDH also indicated that, while several small-scale systems (approximately 1% of the capacity of a system required for the NIROP GWTS effluent) have been constructed, they have encountered significant reliability problems due to plugging of the reinjection wells. Therefore, Option 6B was eliminated from further consideration due to concerns about the technical feasibility and reliability of pressure reinjection wells.

2.3 Comparison of Options 1B and 4B

1. Option 4B has the following advantages compared to Option 1B:

   - Less additional treatment required
   - Lower operation and maintenance (O&M) requirements

- More reliable operation because Option 4B requires a significantly lesser amount of treatment equipment with significantly less potential for equipment malfunction and operator error.
- Fewer regulatory requirements to comply with (both to construct and to operate the reuse system)
- No disposal of residuals from the additional treatment required
- More consistent with the requirements of the ROD
- Lower O & M costs
- Easier to implement
- Fewer health and safety risks to the users, and consequently a lesser liability risk to the Navy
- A lesser concern about the long-term acceptability of this option to the Navy, the City of Fridley, and the regulatory agencies.

2. "Order-of-Magnitude" capital costs for Options 1B and 4B are $1 million and $0.1 million, respectively. These costs are in addition to the capital costs for the GWTS facilities needed to produce an effluent quality suitable for discharge to the Mississippi River; these GWTS costs are assumed to be the same for both Options 1B and 4B.

3. Both Option 1B and 4B meet the MDNR's concerns about beneficial use of the treated ground water.

4. The only advantage of Option 1B compared to Option 4B is that Option 1B would be able to use virtually all of the GWTS effluent (i.e., up to 650 gal/min), while Option 4B would only be able to use approximately 150 to 300 gal/min. Therefore, Option 1B would result in greater conservation of the resource, although this incremental benefit is not considered to be significant.

5. While the City of Fridley has indicated that they would be willing to accept the treated GWTS effluent at no cost to the city, other considerations beyond the scope of this study could prevent Option 1B from being implemented. These include the following:

   - Acceptability to the public of using treated GWTS effluent as a potable water supply source
   - Ability of the city and the Navy to successfully negotiate a written agreement covering the design, construction, and operation of the reuse system
   - Ability of the city and Navy to successfully meet all the regulatory requirements needed to allow reuse.

3. RECOMMENDATIONS

Based on the results of this water reuse study, the actions listed below are recommended, if it is determined that reuse of treated ground water should be incorporated into the ground water remedial action.

1. The Navy should implement Option 4B (reuse of the water to supply the major nonpotable water uses at the NIROP facility). To incorporate reuse Option 4B into the GWTS, the following initial tasks should be performed during the design of the GWTS:

    - Confirm the specific water uses in the facility and their water requirements (e.g., flow rates, pressures, additional treatment requirements).
    - Complete the preliminary engineering of the additional piping, equipment, instrumentation, and controls necessary for the reuse system.
    - Prepare preliminary capital cost estimates for construction of the reuse system.

2. Defer consideration of Option 1B (additional treatment followed by reuse as a source of potable water for the City of Fridley) until the GWTS has been in operation for a sufficient period to assess its effectiveness and reliability, and to evaluate the suitability of the GWTS effluent for potable water reuse. If the data (when available) indicate that the GWTS effluent could, after additional treatment, be suitable for reuse as a source of potable water for the City of Fridley, and if the City is still interested in accepting the water, the Navy should then review the advantages and disadvantages of this option.

3. Continue to monitor the water usage requirements at Quebecor. If this facility remains open and continues to have a significant need for nonpotable water on a continuous basis, the Navy should then also further evaluate the potential for reuse at Quebecor (Option 5A).

4. The Navy should evaluate whether the proposed ground water reuse action and associated facilities would constitute an insignificant change to the remedial action described in the ROD, a significant change to the ROD (requiring an Explanation of Significant Differences), or a fundamental change which requires an amendment to the ROD. The results of this evaluation should be reviewed by the USEPA and the MPCA.

4. DISCUSSION OF WATER REUSE OPTIONS

4.1 Introduction

RMT's approach in conducting the water reuse study was to conduct an initial investigation to identify potential users of the treated GWTS effluent. This included a review of the water consumption data of major customers of the City of Fridley's municipal water supply system (included in Appendix B), discussions with FMC concerning water consumption at the NIROP, a review of site maps to identify other potential major industrial water users in the vicinity of the NIROP facility, and a discussion with Mr. Evan Drivas of the MDNR concerning major water supply wells in the vicinity of the NIROP. Water reuse within the FMC Corporation - Naval Systems Division Facility (located directly south of the NIROP) was also considered. However, this option was eliminated from consideration because this facility is not a major water user (see Appendix B) and does not meet the criteria for reuse identified in Subsection 1.3.3.

Based on this information, RMT compiled an initial list of potential users. Based on this list, RMT met with the MDNR, the MPCA, and the MDH to identify regulatory and other issues to be addressed when evaluating water reuse options. RMT also made a 1-day site visit to the NIROP to identify and evaluate the potential for water reuse within the NIROP facility. This site visit included discussions with representatives of FMC Corporation followed by a walk-down of the facility to locate and evaluate specific major water uses at the facility and the potential to use treated GWTS effluent as their water source. RMT also met with and/or had telephone conversations with representatives of other potential water users previously identified, including the following:

- Anoka County
- Minneapolis Water Works
- Quebecor Printing Corporation
- General Mills
- City of Fridley

These meetings and telephone conversations were held to obtain additional information concerning technical, economic, and other factors associated with the potential for reuse of the treated GWTS effluent at these facilities.

Based on the information gathered, RMT then developed evaluation criteria, and evaluated each water reuse option using these criteria. Because the GWTS system has not yet been designed, RMT used the study input assumptions previously described in Subsection 1.2 when conducting the evaluation.

4.2 Identification of Potential Water Reuse Options

Based on the discussions with the representatives of the agencies and industrial facilities identified in Subsection 4.1, the following water reuse options were identified:

Option	Description
Base Option	No Water Reuse
1	Potable Water Reuse by the City of Fridley
2	Water Reuse by the City of Minneapolis
3	Potable and Nonpotable Water Reuse by the NIROP
4	Nonpotable Water Reuse by the NIROP
5	Nonpotable Water Reuse at Other Local Industrial Facilities
6	Aquifer Recharge

The City of Fridley uses ground water as the source of water for the city potable water supply system. Presently, the NIROP and several other local industrial facilities obtain all of their water from the City of Fridley potable water supply system. Reuse of the treated NIROP ground water as a source of water for the City of Fridley (Option 1), or for the NIROP (Option 3 and 4), or other local industrial facilities using the City of Fridley system (Option 5), would reduce the ground water demand by the City of Fridley. Therefore, these options would result in a beneficial reuse by conserving the ground water resource. Similarly, aquifer recharge (Option 6) would result in a beneficial reuse by returning the treated ground water back to its source. An additional benefit of recharging treated ground water to the aquifer could

potentially be an enhancement of on-site soil remediation by accelerated flushing of residual VOCs from contaminated soil areas at the NIROP.

Unlike the City of Fridley, the City of Minneapolis does not use ground water as its source of water; rather it obtains its water supply entirely from the Mississippi River. However, the sand and gravel aquifer from which the ground water will be pumped at the NIROP discharges to the Mississippi River upstream of the raw water intake at the Minneapolis Water Works. The MDNR has indicated that they consider reuse of the treated ground water as a source of water for the City of Minneapolis (Option 2) to be a reuse for "beneficial purposes," as intended in their July 2, 1990, position paper.

All of the above options, except the Base Option, would reuse the ground water after treatment as described previously in Subsection 1.3.

The option of using untreated ground water from the pump-out system for nonpotable, industrial water supplies was also considered. This option was rejected because the quality of this water would be unsuitable for reuse without extensive treatment, and because of health and safety considerations. Therefore, this option is not discussed further in this report.

4.2.1 Base Option - No Water Reuse

This option was included in the ground water remedy selected by the USEPA and the MPCA, as described in the ROD. This option would consist of discharging the effluent from the GWTS to the Mississippi River via an existing storm sewer at the NIROP facility upstream of the Minneapolis Water Works intake. This option would not reuse any of the water generated by the ground water pump-out system. However, representatives of the MDNR have indicated that they consider this option to provide a beneficial use of ground water by providing a treated, high-quality ground water discharge to the river upstream of the water plant intake, thereby improving the overall river water quality at the intake.

However, representatives of the City of Minneapolis have expressed a general concern regarding the discharge of any treated ground water from the NIROP or other remediation sites to the river upstream of the water plant intake. The city representatives stated that the Minneapolis City Engineer is concerned about any discharges which have the potential to contribute any detectable concentrations of VOCs to the Mississippi River upstream of the city's raw water intake. For the GWTS at the NIROP, the city representatives were specifically concerned regarding the level of reliability and safeguards which would be designed into the GWTS, to assure consistent treated water quality.

4.2.2 Option 1 - Potable Water Reuse by the City of Fridley

This option would reuse the water by providing the treated effluent for use as potable water in the City of Fridley's municipal water system. Two suboptions were identified for this option:

- Option 1A - Providing the effluent from the GWTS to the city, with further treatment by the city to achieve standards for potable water prior to introduction of the water into the city's municipal water distribution system. The nearest existing City of Fridley potable water treatment facility is located approximately 3 1/2 miles from the NIROP, and would require extensive construction to cross a railroad line, an interstate highway, and a state highway. An additional alternative is for the city to design, construct, own, and operate a new water treatment facility located in the vicinity of the NIROP, which would treat the GWTS effluent prior to the connection to the city's municipal water distribution system.

- Option 1B - Providing additional treatment of the GWTS effluent by the Navy to achieve standards for potable water, followed by direct introduction of the treated water into the city's municipal water distribution system. The most likely location for connection into the city's municipal water distribution system would be at a large-diameter water main located along the north side of the NIROP property. The distance from the GWTS to the Fridley water distribution system would depend on the exact location of the GWTS on the NIROP site (which has yet to be determined) and the routing from this location to the connection point with the Fridley water distribution system. However, this distance is expected to be approximately 1,500 feet.

The City of Fridley has indicated that, in order for treated NIROP ground water to be allowed into the city's water system, there must be "no detects" for all volatile organic compounds in the treated ground water, and that there be no costs to the city associated with allowing treated NIROP ground water into the city's water system. However, the city and the MDH would generally support the approach defined under Option 1B.

4.2.3 Option 2 - Water Reuse by the City of Minneapolis

This option would reuse the water by pumping the treated effluent to the intake at the Minneapolis Water Works for treatment with the raw Mississippi River water at the Water Works. Representatives of the Minneapolis Water Works have indicated that the option of introducing treated, potable-quality ground water from the NIROP directly into the Minneapolis water distribution system is unacceptable to the City of Minneapolis due to the potential for inadequately treated water entering the water distribution system, and the potential for opposition to this practice from Water Works customers.

4.2.4 Option 3 - Potable and Nonpotable Reuse by the NIROP

This option would be similar to Option 1B, except that the water would only be used by the NIROP. The treated water would be directly introduced into the municipal water supply pipeline which serves only the NIROP, and would be used to supply all the water uses (both potable and nonpotable) at the NIROP. The existing connection to the City of Fridley municipal water supply would be used as a backup when sufficient water was not available from the GWTS, and a backflow prevention device would be used to prevent the treated water from entering the City of Fridley municipal water supply system.

4.2.5 Option 4 - Nonpotable Reuse by the NIROP

This option would reuse the water by providing water only for nonpotable water users (e.g., cooling water, air conditioning water, and process water) at the NIROP. Additional treatment would be provided only as needed to meet the water quality requirements of the nonpotable water users, and, therefore, the water would not meet the standards for potable water. Because the water supply system at the NIROP is a single system for both potable and nonpotable uses, the water supply for the nonpotable water users would need to be segregated from the potable water users. Two suboptions were considered for this option as follows:

- Option 4A - Complete segregation of the potable and nonpotable water systems so that 100 percent of the nonpotable water users could use treated GWTS effluent. This would require construction of a completely new and extensive nonpotable water distribution system at the NIROP to ensure complete segregation of the numerous nonpotable water users from the potable water users in the facility.

- Option 4B - Reuse by selected major nonpotable water users only. Although the NIROP uses a significant amount of water for nonpotable water purposes, most of the individual use points have only small flow rates or operate intermittently. However, a few water users have a significant and usually continuous water demand. Therefore, for this option, GWTS effluent would be piped only to these selected major water users, which would minimize the amount of new piping required compared to Option 4A. The Navy has indicated that a piping distribution system is presently being designed to reuse a portion of the water from the Phase I ground water pump-out system before the ground water is discharged to the sanitary sewer. Although the design is not yet complete, the Navy has indicated that approximately 200 gpm of ground water will be used for noncontact cooling of existing air compressors. It is possible that this system could also be used as part of Option 4B during Phase II. Because the exact location of the GWTS and the specific water users to be connected to the reuse system for this option have not been determined, the amount of reuse piping is unknown. However, because the piping would be located within the NIROP main building, the total amount of piping is expected to be less than 1,000 feet.

For both Options 4A and 4B, potable water from the City of Fridley would continue to provide a backup water supply when a sufficient flow rate of water from the GWTS was not available. Therefore, a backflow prevention device would be included to prevent nonpotable water from entering the potable water system at the NIROP.

4.2.6 Option 5 - Nonpotable Water Reuse at Other Industrial Facilities

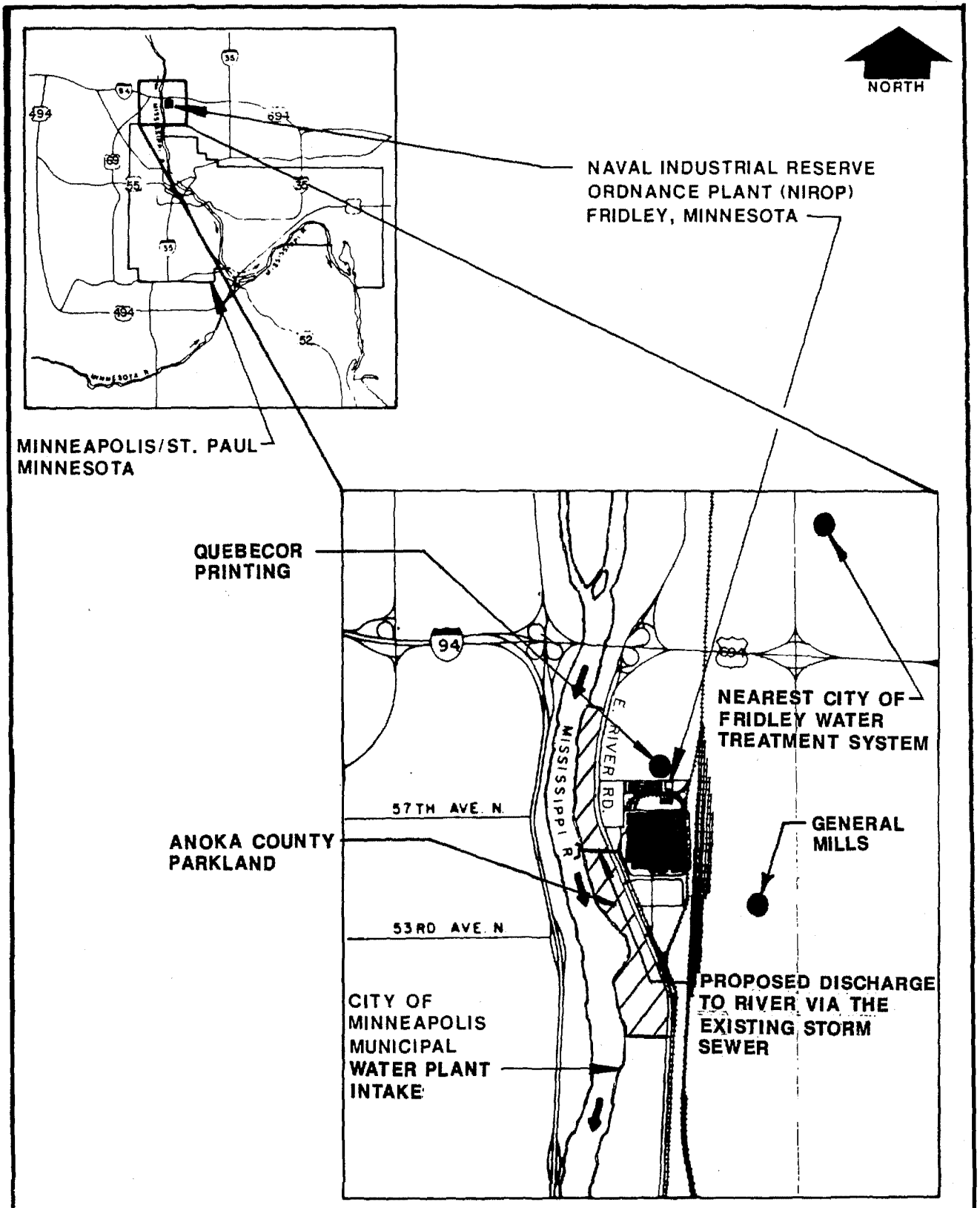
Several industrial facilities near the NIROP presently use or have previously used ground water, either directly from private wells located on-site at these facilities or indirectly via municipal water supplies from the City of Fridley (which obtains its water from municipal wells).

This option would reuse the GWTS effluent by pumping the water to another industrial facility which presently uses a ground water supply, thus reducing the ground water consumption.

Based on information obtained from the MDNR concerning major private wells and from the City of Fridley concerning major industrial and commercial users of the Fridley municipal water supply system, the only other significant water users in the vicinity of the NIROP are the following:

- Quebecor Printing Corporation
- General Mills Corporation

The locations of these facilities are shown on Figure 4-1. Option 5A would be reuse at Quebecor. Presently, Quebecor uses approximately 700 gpm of water for once-through cooling of equipment (a nonpotable water usage), with discharge of the cooling water to the Mississippi River via a storm sewer. Quebecor presently uses potable water from the City of Fridley municipal water supply system as the source of this water. The water for cooling is presently segregated from the potable water usage at the facility, and could be converted to use nonpotable water without extensive segregation, unlike Option 4A. For this option, an underground force main would be constructed to pump the treated GWTS effluent from the NIROP to the Quebecor facility. This force main would be connected to the cooling water system at Quebecor, and a backflow prevention device would be installed to prevent the treated water from entering the potable water supply system at Quebecor. Pumps located at the NIROP would then supply water at a pressure sufficient for Quebecor's cooling water needs.



POTENTIAL WATER USERS IN THE VICINITY OF THE NIROP

RMT	DWN BY: MDZ
	DATE: DEC. 1991
	PROJ.# 2333.10

FIGURE 4-1

Option 5B would be reuse at General Mills. In the past, the General Mills facility has used significant amounts of ground water from on-site wells. However, the plant production processes have since changed; and, presently, the facility uses only small amounts (approximately 15 gpm) of potable water from the City of Minneapolis water supply system. A discussion with General Mills personnel indicates that the facility presently has no plans to change the production processes or water consumption to significantly increase water usage.

4.2.7 Option 6 - Aquifer Recharge

This option would conserve ground water by pumping the GWTS effluent, after additional treatment, to a ground water disposal system, providing recharge of the sand and gravel aquifer. This would allow the water to be reused by municipal or industrial water supply wells in the future, although (as noted previously), due to the physiography of the area near the NIROP, this reuse potential is considered to be unlikely. Two suboptions were identified for this option:

- Option 6A - Infiltration System: A gravity infiltration system (such as a seepage basin, infiltration gallery, or spray irrigation system) would be used to dispose the treated water.
- Option 6B - Pressure Injection System: Several underground injection wells would be required to dispose the treated water.

The MPCA would have jurisdiction over facilities in Option 6A. The MDH would have jurisdiction over facilities in Option 6B. The MPCA and the MDH have both indicated that these options are allowed under their current policies. However, both agencies expressed concerns regarding the long-term reliability and operational problems associated with facilities which would be constructed under both Options 6A and 6B.

4.3 Evaluation Criteria for Reuse

Criteria were developed by RMT for evaluating the potential for reuse based on the following factors:

- Technical feasibility
- Regulatory acceptability
- Economics
- Other factors

The list of criteria developed by RMT is shown in Table 4-1. Several of the criteria in Table 4-1 are "essential" criteria, i.e., it is essential that these criteria be met for the option to be implemented. These criteria are shown in italics in Table 4-1. The other criteria are "desirable" criteria, i.e., while it is desirable that these criteria be met because they can enhance or detract from the acceptability of an option in comparison with other options, these criteria are not essential for an option to be implemented.

These criteria are briefly discussed as follows.

4.3.1 Technical Feasibility Criteria

These criteria consider the technical aspects of design, construction, and long-term operation and maintenance (O&M) of each option.

As discussed previously in Subsection 1.3.3, the supply and demand criteria listed in Table 4-1 are considered essential criteria because the objective of substantial water reuse would be cost-effectively achieved only if the user would be able to accept a substantial percentage of the treated GWTS effluent on a continuous basis.

"Constructability" is an essential criterion because, for an option to be successfully implemented, the following would be required:

- The system must be designed and constructed in a manner which would not unacceptably disrupt ongoing operations at the NIROP facility and the user's facility during construction of the reuse system.

TABLE 4-1

TREATED GROUND WATER REUSE CRITERIA FOR EVALUATION*

Technical Feasibility:

- *Supply and Demand:*
  - *Long-term flow rates required by user*
  - *Variability of demand (seasonal)*
  - *Variability of demand (daily)*

- Treatment and Delivery System Design and Construction:
  - Treated water quality to meet user's requirements
  - Additional treatment equipment required
  - *Constructability*
  - Additional engineering design and construction time required

- Operation and Maintenance:
  - Additional operating labor
  - Additional power consumption
  - Additional chemical consumption
  - Additional maintenance required

- *System Reliability*
  - Frequency of operating problems
  - *Severity of operating problems*
  - Duration of operating problems

Economics:

- Capital Cost to Navy
- O&M Costs to Navy
- Capital Cost to User
- O&M Costs to User

Regulatory:

- Consistency with ROD
- Permits required
- Treated quality to meet regulatory requirements
- Additional regulatory monitoring and reporting requirements
- *Regulatory agency acceptability*

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TABLE 4-1 (CONTINUED)

NIROP TREATED GROUND WATER REUSE CRITERIA FOR EVALUATION

- Regulatory agency involvement
- Operation certification requirements
- Residuals management requirements

Other Factors:

- Acceptable to Navy
- *Acceptable to user*
- Ease of implementation
- Conservation of ground water resource
- Health and safety risk to user
- Liability to Navy
- Long-term acceptability:
  - Technical
  - Regulatory
  - Economic
  - Other factors

* Criteria shown in italics are considered "essential" criteria as discussed in Subsection 4.3. All other criteria are considered "desirable" criteria.

- The system must be designed in a manner which limits the O&M requirements needed for successful operation of the reuse system to a level which is practically achievable by both the Navy and the user.

"System reliability" is an essential criterion because an option will not be successful unless the system operates reliably no matter how much O&M is provided. In particular, an option which results in severe reliability problems will ultimately be abandoned as unworkable.

4.3.2 Economics Criteria

These criteria consider the costs (including both initial capital costs and long-term O&M costs) to both the Navy and the user associated with design, construction, and long-term O&M of each option.

4.3.3 Regulatory Criteria

Various local, state, and federal agencies may need to issue permits and/or approvals or take other agency actions (such as revising the ROD to allow reuse) before certain options could be implemented. Therefore, the "regulatory agency acceptability" criterion is an essential criterion.

The other regulatory criteria listed in Table 4-1, while they can affect the schedule or costs of implementing an option, would not prevent the option from being implemented if the option met the "regulatory agency acceptability" criterion.

4.3.4 Other Criteria

Other factors can also affect the evaluation of each option. Because acceptance of the treated GWTS effluent by the user is strictly voluntary, the "acceptable to the user" criterion is essential to the ability of each option to be implemented.

The "long-term acceptability" criteria are important, because they affect the long-term viability of each option, i.e., will the option be viable in the future, given expected (but

unknown) changes in the technical, economic, regulatory, and other factors in the future. For example, while the "acceptability to the user" criterion may be satisfied now (based on initial discussions with the user), at a later date, the user could decide that the use of the GWTS effluent was not acceptable, effectively ending the implementation of this option. Because the "long-term acceptability" of any option cannot accurately be predicted, these criteria were included as "desirable" rather than "essential" criteria.

4.4 Screening of Alternatives

The first step in the evaluation was a screening of all alternatives based on the essential criteria in Table 4-1.

Based on these essential criteria, the following options were found to be potentially feasible:

Option	Description
1B	Potable water reuse by the City of Fridley
4B	Nonpotable reuse for major water users at the NIROP

Option 1A was eliminated because the City of Fridley indicated that treatment by the city of the GWTS effluent was not acceptable to the city due to the concerns about the impact of iron, manganese, and TCE in the GWTS effluent on the existing city treatment and distribution systems. In addition, the same objective (i.e., reuse as a source of potable water for the City of Fridley) could be achieved by Option 1B at a lesser cost than for Option 1A, due to the costs in Option 1A for conveying the GWTS effluent to an existing city treatment system.

Option 2 was eliminated because the City of Minneapolis indicated that opposed to accepting the GWTS effluent.

Option 3 was eliminated because FMC Corporation indicated that, while they would accept the GWTS effluent as a source of potable water for the NIROP facility, they were

opposed to being the sole potable water user of the GWTS effluent. In addition, Anoka County expressed reservations about using treated GWTS effluent as the sole source of potable water for the cafeteria at the NIROP. Because the NIROP cafeteria is issued a license from the County to operate as a food service facility, the cafeteria is subject to the County's requirements, including requirements concerning potable water usage in the cafeteria.

Option 4A was eliminated from consideration because of the difficulty and cost of constructing, operating, and maintaining a completely new segregated nonpotable water system for the NIROP facility. Because of the size of the NIROP facility, the large number of water users, and their numerous locations throughout the facility, construction of a new segregated nonpotable water system would be expected to cause significant disruption to the facility's operations during the period of construction. In addition, the existing potable water supply system would need to continue to serve as an alternate water supply for periods when treated GWTS effluent is not available or when the reuse system is out of service. Representatives of FMC and Anoka County expressed concern about the ability of NIROP O&M staff to successfully manage the O&M problems associated with operating and maintaining two separate but interconnected systems (e.g., inspection and maintenance of backflow prevention devices to prevent the nonpotable water from entering the potable water system). Therefore, this option would not meet the "constructability" criterion. In addition, Option 4B would accomplish much of the water reuse of Option 4A, at a significantly lower cost.

Reuse at Quebecor (Option 5A) could be technically feasible and potentially cost effective, and could achieve regulatory acceptance. However, this facility is expected to shut down in January 1992, thus eliminating the potential for water reuse at this facility. However, Quebecor indicated that they might be interested in reuse of the treated GWTS effluent, should the facility remain in operation. If the facility remains open and continues to have a

significant need for nonpotable water on a continuous basis, the Navy should then also further evaluate the potential for reuse at Quebecor.

Option 5B was eliminated from further consideration because General Mills indicated that reuse of nonpotable water was not acceptable. In addition, the small amount of water used by the facility makes this reuse technically impractical, and the facility has no plans to significantly increase its water usage.

Option 6A (aquifer recharge by gravity infiltration) was eliminated from further consideration because sufficient land area is not available for the infiltration system needed for recharge by gravity infiltration. In addition, the technical feasibility and reliability of this option are questionable because of concerns about system failure due to the following:

- Freezing of the infiltration system in winter.
- Eventual plugging of the infiltration system due to scale formation, deposits, and/or microbiological growth.

The MDH indicated that no large-scale pressure ground water reinjection systems have been constructed in Minnesota. The MDH also indicated that, while several small-scale systems (approximately 1% of the capacity of the system required for the NIROP GWTS effluent) have been constructed, they have encountered significant reliability problems, due to plugging of the reinjection wells. Therefore, Option 6B (aquifer recharge by pressure reinjection) was eliminated from further consideration, due to concerns about the technical feasibility and reliability of the pressure reinjection wells.

4.5 Comparison of Options 1B and 4B

After the screening evaluation, the remaining options found to be potentially feasible (Options 1B and 4B) were then compared using the "desirable" criteria in Table 4-1. The following summarizes the results of this comparison.

4.5.1 Technical Feasibility

Option 4B would require significantly less additional treatment equipment for reuse due to the less stringent water quality requirements for nonpotable versus potable water reuse. This would result in significantly less O&M required. It would also result in a higher degree of system reliability because the lesser amount of treatment equipment would result in a significantly lower potential for equipment malfunction and operator error. In addition, the time to design and construct the reuse for Option 4B would be less.

4.5.2 Regulatory

Option 4B would result in fewer regulatory requirements because the water would be reused for nonpotable purposes, so compliance with federal, state, and local requirements concerning potable water treatment and supply systems would not be required. Therefore, Option 4B would require a lesser degree of regulatory agency involvement, fewer permits, less additional monitoring and reporting, and no problems with certification for operators for a potable water treatment system. In addition, Option 4B results in no significant additional generation of residuals from the GWTS, while Option 1B results in significant additional requirements associated with disposal of filter backwash and regeneration of spent activated carbon. Option 4B is also more consistent with the requirements of the USEPA ROD, while Option 1B would require an amendment of the ROD.

4.5.3 Economics

"Order-of-magnitude" capital costs were developed for Options 1B and 4B based on the design concepts for these two options as discussed previously in Subsections 1.3 and 4.2. The capital costs included the following:

- Construction costs for the additional treatment systems necessary for reuse.
- Costs for engineering design of the additional treatment systems.

- Costs for legal/financial/administrative activities needed to implement the option
- A contingency for unforseen occurrences

The "order-of-magnitude" capital costs for Options 1B and 4B (expressed as October 1991 costs) are $ 1 million and $ 0.1 million, respectively. Because the locations of the GWTS and the points of treated effluent reuse are not known at this time, it is not possible to estimate the capital costs for piping the treated effluent to the reuse points for both options. However, the differential costs of these two options are expected to be approximately the same, even if the reuse piping costs were included.

Option 4B would have lower capital costs and lower O&M costs to the Navy than Option 1B. Option 4B would have no costs to the City of Fridley, while Option 1B would be expected to result in additional initial costs to the city associated with gaining acceptance of this option as well as continuing costs to the city associated with the expected additional monitoring and reporting needed for demonstrating compliance with state and federal requirements concerning potable water produced by the reuse system.

4.5.4 Other Criteria

The only significant advantage of Option 1B over Option 4B is that Option 1B would be able to use virtually all the GWTS effluent (i.e., up to approximately 650 gpm), while Option 4B would be able to use approximately 150-300 gpm. Therefore, Option 1B would result in a greater conservation of the resource, although this incremental benefit is not considered to be significant. However, the additional regulatory requirements and the need for a much more extensive treatment system would result in greater difficulty in implementation, both initially and over the long term.

Much more important criteria are the health and safety risks to the users and the potential liability to the Navy, should the treatment system not operate effectively and reliably. These criteria strongly favor Option 4B over Option 1B. In addition, the potential for long-term

acceptability of nonpotable reuse within the NIROP facility is high, while the long-term acceptability by the City of Fridley and the regulatory agencies may be of concern (particularly should a situation occur which raises questions about the effectiveness or reliability of the treatment system). Furthermore, other considerations beyond the scope of this study (e.g., acceptability to the public of using treated GWTS effluent as a potable water supply source; ability of the city and the Navy to successfully negotiate written agreements covering the design, construction, and operation of the reuse system; and the ability of the city and the Navy to successfully meet all regulatory requirements needed to allow reuse) could prevent Option 1B from being implemented.

In addition, the acceptability of either option to the Navy has not yet been determined.

4.6 Recommendations for Reuse

Based on the evaluation of water reuse options, if it is determined that reuse of treated ground water should be incorporated into the ground water remedial action, Option 4B (reuse of the water to supply the major nonpotable water uses at the NIROP facility) is recommended. To incorporate reuse Option 4B into the GWTS, the following initial tasks should be performed during the design of the GWTS:

- Confirm the specific water users in the facility and their water requirements (e.g., flow rates, pressures, and additional treatment requirements).
- Complete the preliminary engineering of the additional piping, equipment, instrumentation, and controls necessary for the reuse system.
- Preparing preliminary capital cost estimates for construction of the reuse system.

It is also recommended that consideration of Option 1B (additional treatment followed by reuse as a source of potable water for the City of Fridley) be deferred until the GWTS has been in operation for a sufficient period to evaluate the suitability of the treated GWTS effluent for potable water reuse, and the extent of the additional treatment facilities which would be

required. If the data (when available) indicate that the GWTS effluent could, after additional treatment, be suitable for reuse as a source of potable water for the City of Fridley, and if the city is still interested in accepting the water, the Navy should then review the advantages and disadvantages of this option.

Because reuse of treated GWTS effluent would be a change in the remedial action described in the ROD, (which presently includes discharge of the treated GWTS effluent to the Mississippi River upstream of the Minneapolis Water Works as part of the Phase II remedy), the Navy should also evaluate which of the following scenarios would apply:

- It would be an insignificant change to the ROD, and no further action would be required.
- It would be a significant change, which would require the preparation of an Explanation of Significant Differences.
- It would be a fundamental change, which would require an amendment to the ROD.

The results of this evaluation should be reviewed by the USEPA and the MPCA. Resolution of this issue is beyond the scope of this study.

4.7 MWCC Add-on Service Charge System

On January 1, 1992, the Metropolitan Waste Control Commission (MWCC) will implement a new charge-back system for dischargers of leachate and contaminated ground water to the MWCC sanitary sewer system. This new system is the Add-on Service Charge (AOC) system. It will replace the current Service Availability Charge (SAC) system, which was in effect at the time the Feasibility Study (FS) for ground water remediation was prepared in 1988.

Although the new AOC system is not directly related to ground water reuse options, it affects the basis of the cost criteria used for evaluation of the remedial alternatives presented in the FS Report and FS Addendum Report (RMT, 1988a; 1988b). For this reason, the new

AOC system is considered significant, and a discussion of the impact of the AOC system is warranted.

The FS cost estimates for the remedial alternatives which involved discharge of extracted ground water to the sanitary sewer without treatment included the SAC, as required by the MWCC at the time of the FS. The SAC consisted of a charge calculated at $2 per gallon per day (gpd) of contaminated ground water discharged to the sanitary sewer, if the discharge was to continue longer than three years after the date of the start of discharge to the sewer. The charge was payable in full at exactly three years after the start of discharge. For the ground water discharge volume from downgradient capture wells of approximately 800,000 gpd, as estimated in the FS, the calculated SAC was $1,600,000. This charge comprised approximately 25% of the total present worth cost for the no-treatment/sewer discharge alternative in the FS (at 30 years and 10% interest).

The AOC system will replace the SAC system. The AOC will be calculated using a base service availability charge and a volume charge, both of which may change annually. The AOC is expressed as a percentage of the volume charge. It is added annually to the base sewer use charge, which is administered by the City of Fridley. For a ground water discharge flow to the sanitary sewer of 550 gpm, the calculated AOC, based on 1990 service availability charge and volume charge rates, would be $86,700 per year.

Preliminary calculations were made to determine the effect of the new AOC system on the cost comparison of the remedial alternatives as presented in the FS. Based on these calculations, it was determined that if the ground water pumpout system is required to operate only up to approximately 10 years, the estimated present worth cost (at an interest rate of 10%) of discharging the ground water directly to the sanitary sewer <u>without pretreatment</u> may be lower than the cost of treating the ground water (with discharge to the river and <u>no reuse</u>). However, if the ground water pumpout system must operate longer than approximately 10 years, or if pretreatment of ground water prior to discharge to the sanitary sewer would be

needed, the estimated present worth cost of treating ground water with discharge to the river and no reuse (as defined in the Record of Decision) may be lower than the cost of discharging the ground water to the sanitary sewer.

The additional costs associated with any ground water reuse option, especially Option 1B, would affect the cost comparison among the remedial alternatives defined in the FS. Further evaluation of these effects on the cost comparisons may be appropriate after the final decision is made by the Navy and the regulatory agencies regarding whether or not to incorporate ground water reuse into the design of the GWTS at the NIROP.

5. REFERENCES

USEPA. 1990. Record of decision for ground water remediation at the Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota.

RMT, Inc. 1988a. Feasibility study report for the remedial investigation/feasibility study at the Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota.

RMT, Inc. 1988b. Addendum to the remedial investigation/feasibility study at the Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota.

APPENDIX A

CORRESPONDENCE CONCERNING THE MDNR'S GROUND WATER REUSE POLICY

4210W

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

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DNR INFORMATION
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JUL 24 1991

January 4, 1991

Department of the Navy
Northern Division
Naval Facilities Engineering Command
Attn: James Shafer, Code 1421
Building 77L, U.S. Naval Base
Philadelphia, PA 19112-5094

Dear Mr. Shafer:

PHASE II WATER REUSE PLAN, NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT; FRIDLEY, MN

The Department of Natural Resources-Division of Waters understands that the Navy will prepare a treated water reuse feasibility report for Phase II ground-water remediation at the Naval Industrial Reserve Ordnance Plant (NIROP). This report will provide the Division of Waters with information regarding the technical feasibility of municipal and/or industrial reuse of treated water, and provide a summary of the capital cost and operation and maintenance costs for each water reuse prospect. The feasibility of municipal reuse should be determined for effluent treatment by air stripping, and for effluent treatment with granulated activated carbon.

This report must be submitted sufficiently in advance of Phase II implementation to permit an agency review of the study and incorporation of any feasible water reuse options into the final design plans for the system. The Division of Waters feels that the NIROP pumpout represents an opportunity to conserve a diminishing resource, and appreciates the Navy's investigation of water reuse possibilities at the site.

Sincerely,

DIVISION OF WATERS

Evan Drivas

Evan Drivas, Hydrologist
Ground Water Unit

ED:ed

cc: Mark Lahtinen, MPCA Site Response
Mark Winson, City of Fridley
Thomas Bloom, USEPA Region V

STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

DNR INFORMATION
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November 19, 1990

Department of the Navy
Northern Division
Naval Facilities Engineering Command
Attn: James Shafer, Code 1421
Building 77L, U. S. Naval Base
Philadelphia, PA 19112-5094

Dear Mr. Shafer:

PHASE II GROUND WATER TREATMENT SYSTEM; NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN

The Department of Natural Resources-Division of Waters (DNR-DOW) has taken the position that ground water appropriated for pollution containment and removal shall be treated to proper standards and reused for beneficial purposes (see enclosure). In accordance with this policy, an evaluation of the feasibility for water reuse must be submitted with an application to the DNR-DOW for ground-water appropriation at the site of a pollution cleanup project.

The DNR-DOW requests a review of the proposed plan for discharge of treatment system effluent to the Mississippi River during Phase II of the contamination pumpout at the Naval Industrial Reserve Ordnance Plant (NIROP). The Division of Waters regards domestic supply as the first priority for appropriation and use of water, and encourages the Navy to consider municipal supply as the primary option for treated water reuse. The Division of Waters understands that Fridley may be willing to accept treated water generated by the Phase II system for reuse as municipal supply. Industrial applications should also be considered a viable option for treated water reuse.

The DNR-DOW understands that Phase I of the NIROP project will start shortly and will continue for a period of two to three years, during which time the design and implementation of the Phase II system will be completed. The DNR-DOW will issue a conditional appropriation permit for the Phase I system, which will require submittal of a water reuse plan within six months of permit issuance and implementation of any feasible option for treated water reuse. Please keep this agency apprised of any progress toward water reuse at the NIROP site.

Sincerely,

DIVISION OF WATERS

Ronald D. Harnack, Administrator
Permits and Land Use Section

RDH/ED:tjb
Enclosure
cc: Mark Lahtinen, MPCA Site Response Section
Thomas Bloom, USEPA Region V
Evan Drivas, Ground Water Unit
Mark Winson, City of Fridley

DEPARTMENT OF NATURAL RESOURCES - DIVISION OF WATERS

DATE: JULY 2, 1990

SUBJECT: POSITION PAPER ON APPROPRIATIONS FOR POLLUTION CONTAINMENT AND REMOVAL

BACKGROUND: Remedial activities at a site of environmental contamination may include the installation of a system designed to pump ground water for the containment and removal of contaminants in an aquifer. Contamination pump-outs may require the long term treatment and disposal of large volumes of water from aquifers which are presently heavily pumped to supply water for municipal or other uses. Discharge of water to the sewer system or directly to a surface water body are the most common methods to dispose of water from pump-out systems. Water from containment wells and contaminated water that is treated may meet drinking water quality standards prior to disposal. Pump-out water can be used for municipal purposes, processing applications and other uses depending on water quality limitations. Options for the reuse of pump-out water should be utilized, when feasible, in order to conserve the resource and prevent the over use of aquifers.

FINDINGS: 1) In Minnesota, the number of applications for containment and removal of contamination are increasing. These pump-outs will be in operation for years, and in some cases, decades. Water conservation is needed to protect the resource from wasteful discharge of water that can be used for municipal purposes and other uses.

2) Minnesota Statutes 105.405, Subdivision 1, requires the commissioner of the Department of Natural Resources to develop and manage water resources to assure a supply adequate to meet long-range seasonal requirements for domestic, municipal, industrial, agricultural, fish and wildlife, recreational, power, navigation, and quality control purposes from surface and ground water sources.

3) Minnesota Statutes 105.39, Subdivision 1, requires the commissioner of the Department of Natural Resources to develop a general water resources conservation program for the state. The program must contemplate the conservation, allocation, and development of all the waters of

the state surface and underground, for the best interests of the people. The commissioner must be guided by the program in issuing permits for the use and appropriation of the waters of the state.

4) Laws of Minnesota 1989, Chapter 326, Article 4, Section 2, Subdivision 1a (e), encourages the treatment and reuse of water from non-consumptive uses.

CONCLUSION: It is the position of the Department of Natural Resources that ground water appropriated for pollution containment and removal shall be treated to proper standards and reused for beneficial purposes. Treated water that meets Minnesota Department of Health potable water standards should be incorporated into public water supply systems whenever feasible. Methods to reuse the water for processing or other purposes should be considered if pump-out water does not meet potable water standards.

In all cases where existing permittees or new applicants are seeking authorization or a water supply the Department shall require the applicant to evaluate the feasibility of using pump-out water before approving new sources or increases in water volumes.

Permit applications to appropriate water for containment and removal of contamination must include an evaluation of all options for reuse of the water. The applicant must select a feasible and practical option for reuse and also provide a reasonable time frame to implement reuse of pump-out water prior to Department approval for interim methods of disposal.

Approved By: Ron Nargang 6/29/90

Ron Nargang, Director
Division of Waters

Date

APPENDIX B

MAJOR INDUSTRIAL AND COMMERCIAL WATER USERS IN THE FRIDLEY, MINNESOTA, MUNICIPAL WATER SUPPLY SYSTEM

TABLE B-1

MAJOR INDUSTRIAL AND COMMERCIAL WATER USERS IN THE FRIDLEY, MINNESOTA, MUNICIPAL WATER SUPPLY SYSTEM*

Facility	Address	Average Annual Water Usage (million gal)
NIROP	4880 E. River Rd.	300.350
Quebecor Printing	5101 Industrial Blvd.	195.334
Dow Brands	5601 E. River Rd.	31.690
Longview Fiber	5851 E. River Rd.	15.544
Timmerman Finishing	5250 Main St.	4.788
H.B. Fuller	5220 Main St.	4.780
All Temp Dist.	5320 Main St.	4.020
River Road Investors	5155 E. River Rd.	3.904
Burlington Northern Railroad	4055 E. River Rd.	3.292

Note:

* Based on City of Fridley municipal records for the years 1989 - 1990.