United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-87/047
March 1987

EPA

Superfund Record of Decision:

New Brighton/Arden Hills/ St. Anthony, MN

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

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EPA/ROD/R05-87/047		

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12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. TYPE OF REPORT AND PERIOD COVERED Final ROD Report 14. SPONSORING AGENCY CODE 800/00
15. SUPPLEMENTARY NOTES	

16. ABSTRACT

The New Brighton/Arden Hills/St. Anthony site is located approximately two miles north of the Twin Cities of Minneapolis/St. Paul, Minnesota. The City of St. Anthony, located directly north of the Twin Cities, is one of several communities which obtain its municipal water supply from the Prairie due Chien-Jordan aquifer system. The City of St. Anthony obtains its water supply from well numbers 4 and 5 and an interconnectior to the City of Roseville's water distribution system. In June 1981, the Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Health (MDH) detected VOC contamination in the Praire du Chien-Jordan aquifer system used for municipal drinking water in New Brighton. Subsequently, the City of St. Anthony has also detected VOC contamination in their three Praire du Chien-Jordan aquifer wells; well number 3, 4 and 5. Well 4 is the city's major source of water. Well 5 and the Roseville interconnection are used for summer, peak, or emergency situations. Well 3 was shut down in early 1984 due to VOC contamination. As the number of contaminated wells within the Praire due Chien-Jordan began increasing, EPA initiated several Initial Remedial Measures. In 1983 granular activated carbon filters were installed on New Brighton wells 5 and 6 and several private well users were connected to New Brighton and Arden Hill's watermains. In 1984 the City of St. Anthony received a temporary water connection to the City of Roseville due to water shortages resulting from subsequent
(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision New Brighton/Arden Hills/St. Anthony, MN Fifth Remedial Action Contaminated Media: gw Key contaminants: VOCs, TCE, DCE		

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EPA/ROD/R05-87/047
New Brighton/Arden Hills/St. Anthony, MN
Fifth Remedial Action

16. ABSTRACT (continued)

closure of a contaminated well. The primary contaminants of concern affecting the ground water include: TCE, DCE, and other VOCs.

The selected remedial action for this site incudes: construction of granular activated carbon (GAC) water treatment facilities to remove VOCs from St. Anthony wells 3, 4, and 5 with discharge to the municipal water treatment plant and distribution system; and construction of a pipeline to connect St. Anthony well 5 with the GAC treatment facilities. Total capital costs for the selected remedial action is estimated to be $1,100,500 with annual O&M costs of $160,770. The MPCA plans to complete its evaluation of final remedial actions in 1988.

Record of Decision
Remedial Alternative Selection
Operable Unit for Provision of
Alternative Water Supply

Site: New Brighton/Arden Hills/St. Anthony
St. Anthony, Minnesota

DOCUMENTS REVIEWED

The following documents describing the analysis of the cost effectiveness of the remedial action alternatives for the New Brighton/Arden Hills/St. Anthony site have been reviewed:

- Phased Feasibility Study for St. Anthony, Minnesota, Camp Dresser and McKee, December, 1986
- Summary of Remedial Alternative Selection
- Responsiveness Summary

DESCRIPTION OF SELECTED REMEDY

- Construction of granular activated carbon (GAC) water treatment facilities to remove volatile organic compounds from the contaminated water from St. Anthony Wells 3, 4 and 5. The treated water will be discharged into the municipal water treatment plant and distribution system.
- Construction of a pipeline connecting St. Anthony Well 5 to the GAC treatment facilities.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Contingency Plan (40 CFR Part 300), I have determined that construction of GAC water treatment facilities to treat contaminated water for water system treatment and distribution, and construction of a pipeline connecting St. Anthony Well 5 to the GAC water treatment facilities is a cost-effective remedial action (operable unit), provides adequate protection of public health, welfare, and the environment,

can attain applicable or relevant and appropriate requirements, and is consistent with future remedial actions. The State of Minnesota has been consulted and concurs with the approved remedy. The action will require future operation and maintenance activities to assure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies for a period not to exceed 10 years.

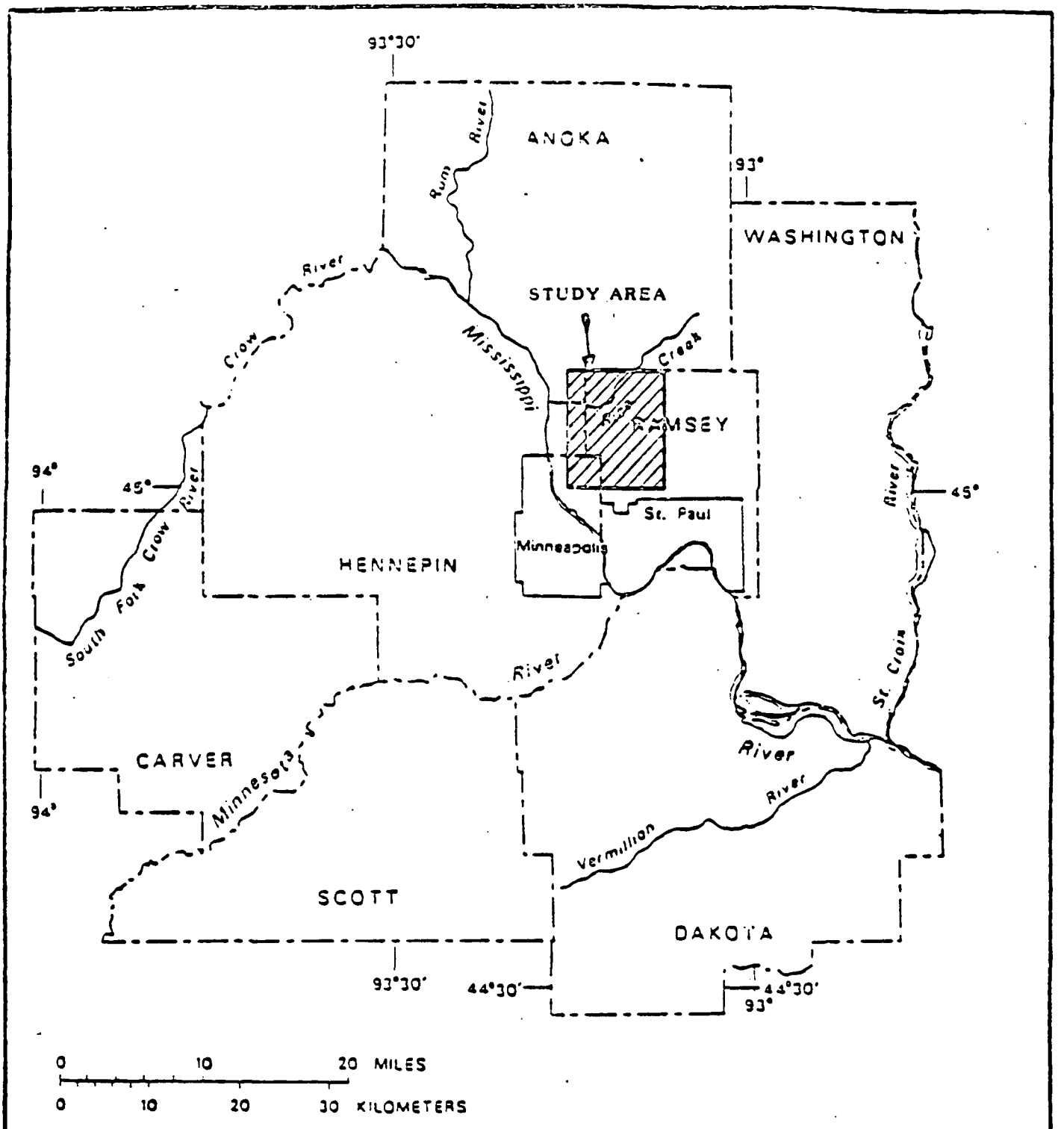
It has also been determined that the action being taken is appropriate when balanced against the availability of trust monies for use at other sites.

The State of Minnesota, through the Minnesota Pollution Control Agency (MPCA) is continuing its comprehensive Remedial Investigation/Feasibility Study (RI/FS) for the entire New Brighton/Arden Hills/St. Anthony study area through a cooperative agreement with the U.S. Environmental Protection Agency. The U.S. Army/Department of Defense is also conducting studies to define the contamination emanating from the Twin Cities Army Ammunition Plant (TCAAP). Other identified potentially responsible parties are performing studies both on and off the TCAAP within the study area. The MPCA has already completed a preliminary remedial investigation (RI) characterizing the site, major migration pathways, and preliminary identification of significant sources. The MPCA is planning to complete the remaining tasks of the comprehensive RI/FS in 1987-88 in order to evaluate potential final remedial actions. If additional remedial actions are determined to be necessary, a Record of Decision will be prepared for approval of the future remedial actions. The St. Anthony municipal wells operable unit will, to the extent practicable, contribute to the efficient performance of any long-term remedial action.

31 MAR 1987
Date

Peter Wise (Acting)
Valdas V. Adamkus
Regional Administrator
United States Environmental
Protection Agency, Region V

FIGURE 1



SOURCE:
CAMP DRESSER & McKEE
NEW BRIGHTON-ARDEN HILLS
PHASE I MULTI-POINT SOURCE
REMEDIAL INVESTIGATION
MAY, 1985

N

NEW BRIGHTON/ARDEN HILLS
ST. ANTHONY PFS

SITE VICINITY MAP

FIGURE 2

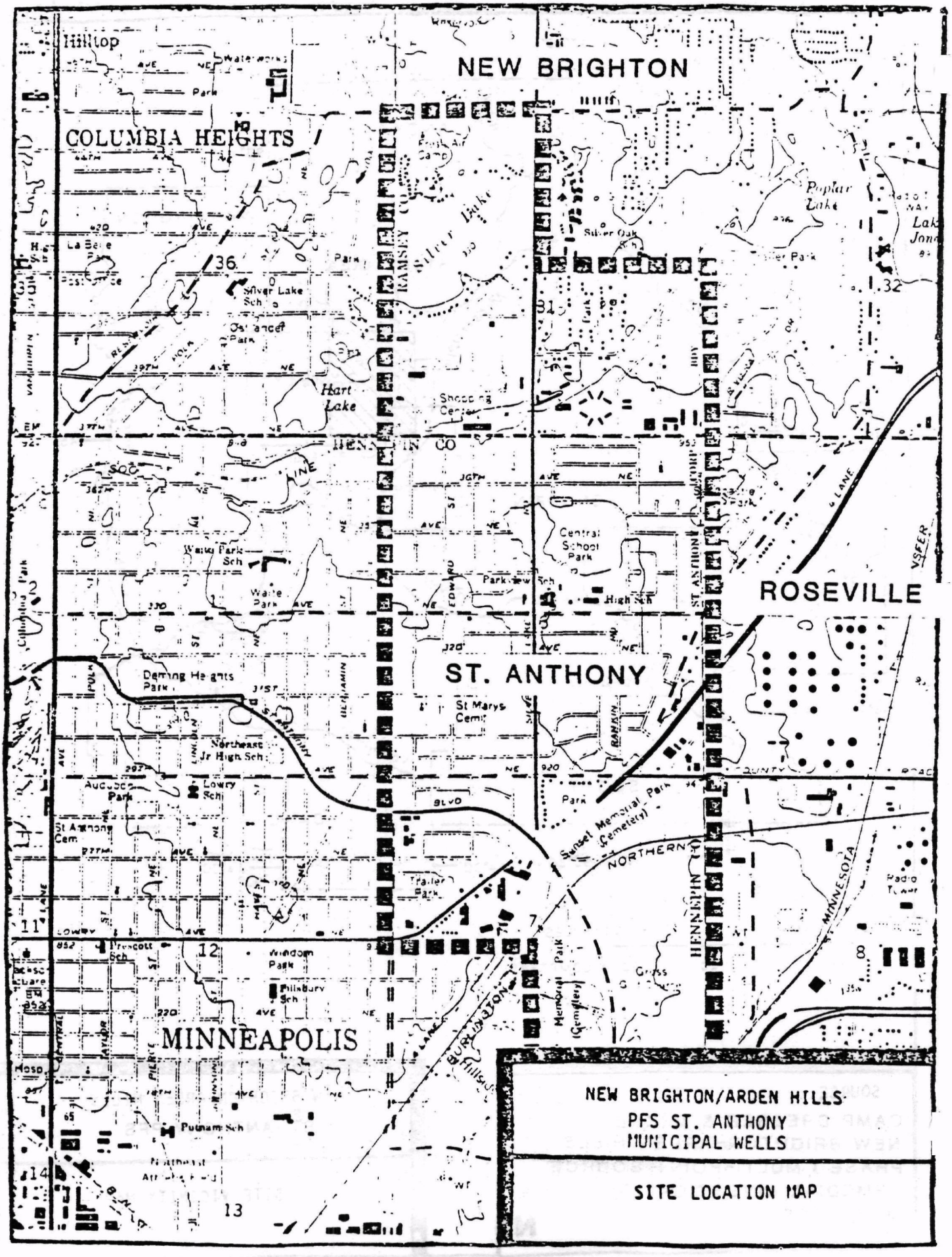
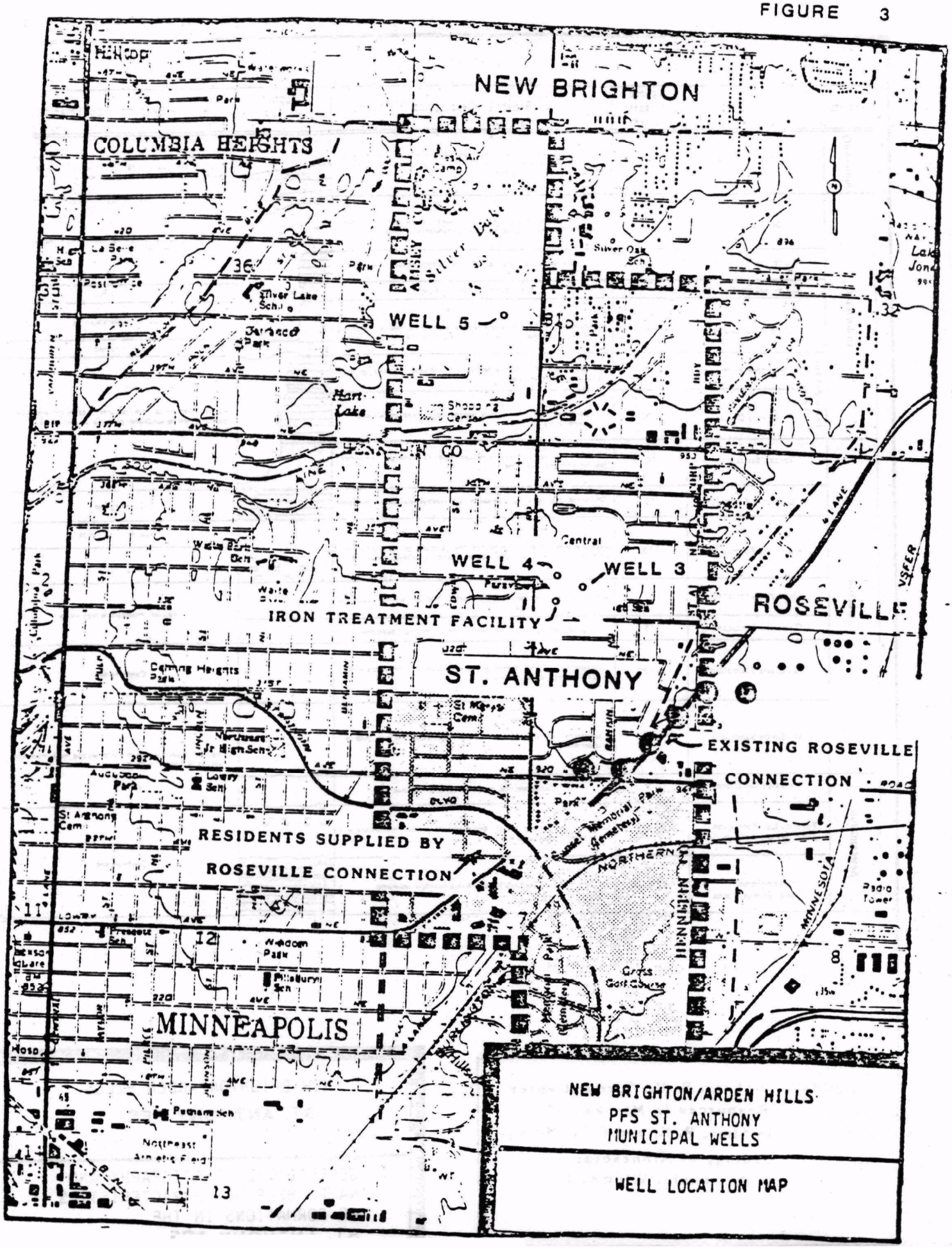
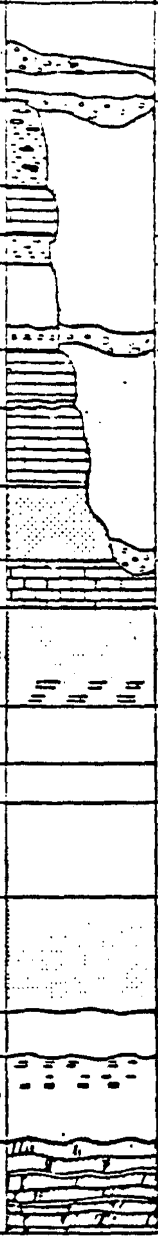

NEW BRIGHTON
COLUMBIA HEIGHTS
ROSEVILLE
ST. ANTHONY
MINNEAPOLIS
Hilltop
Silver Lake
Hart Lake
Poplar Lake
Central School Park
Silver Lake Sch
Northeast Jr High Sch
Lowry Sch
Prescott Sch
Pillsbury Sch
Putnam Sch
Windom Park
Audubon Park
Deming Heights Park
St Marys Cemet
St Anthony Cem
Sunset Memorial Park (Cemetery)
Memorial Park Cemetery
Trailer Park
Golf Course
Radio Tower
RAMSEY CO
HENNEPIN CO
NEW BRIGHTON/ARDEN HILLS
PFS ST. ANTHONY
MUNICIPAL WELLS
SITE LOCATION MAP

FIGURE 3


NEW BRIGHTON
COLUMBIA HEIGHTS
WELL 5
WELL 4
WELL 3
IRON TREATMENT FACILITY
ROSEVILLE
ST. ANTHONY
EXISTING ROSEVILLE CONNECTION
RESIDENTS SUPPLIED BY ROSEVILLE CONNECTION
MINNEAPOLIS
NEW BRIGHTON/ARDEN HILLS
PFS ST. ANTHONY
MUNICIPAL WELLS
WELL LOCATION MAP

System	Rock Unit	Approx thickness (in feet)	General Description	Graphic Column	Water - Bearing Characteristics
Quaternary	Undifferentiated glacial deposits	0-500	Glacial till, outwash, and valley train sand and gravel, lake deposits, and alluvium of several ages and several provenances; vertical and horizontal distribution of units is complex		Distribution of aquifers and confining beds complex; shallow sand and gravel aquifers ... large amounts of water are common in buried bedrock valleys
Ordovician	Decorah Shale	90	Shale, green and gray, fissile in blocks; includes ... and discontinuous lenses of fossiliferous limestone that increase in abundance upward		Aquifer: Low yields from fractures in shale and solution cavities in dolomite
	Platteville Formation	to 35	Dolostone, light-gray to buff, thin- to med.-bedded, shaly		
	Glenwood Formation	to 5	Shale, greenish-gray, fissile, sandy		Confining bed
	St Peter Sandstone	150	Sandstone, light-gray, massively bedded, well sorted, med.-gr., poorly cemented, quartzose; approx. 2-m thick silty to shaly bed near base		Aquifer: moderate yields Confining bed
	Prairie du Chien Group: Shakopee Formation	50	Dolostone, buff, thin- to thick-bedded, silty and sand-rich, med.-gr., thin sandstone beds near base		Aquifer: high yields from fractures in dolomite and from poorly cemented sandstone; principal aquifer of the Twin City basin
	Prairie du Chien Group: Oneota Dolomite	100	Dolostone, buff, thin- to thick-bedded, vuggy, med.-gr., silt-size dolomite matrix		
Cambrian	Jordan Sandstone	90	Sandstone, light-gray, massively bedded, med.- to coarse-gr., well sorted, poorly cemented, quartzose		
	St Lawrence Formation	50	Dolostone, gray to tan, silty or sandy, argillaceous, glauconitic in upper part		Confining bed
	Franconia Formation	155	Sandstone, greenish-gray, thin-bedded, fine- to coarse-gr., silty to dolomitic, commonly glauconitic; an upper aquifer (Reno) is a fine-gr. sandstone		Aquifer: low yields Confining bed
	Ironton Sandstone	30	Sandstone, light-gray, poorly to well sorted, med.-gr., silt-rich, quartzose		Aquifer: moderate to high yields
	Galesville Sandstone	35	Sandstone, light-gray, well sorted, fine- to med.-gr., quartzose		
	Eau Claire Formation	to 130	Sandstone, red, fine- to med.-gr., silty, glauconitic, interbedded with grayish-green to red fissile shale		Confining bed
	Mt Simon Sandstone	160	Sandstone, light-gray, fine- to coarse-gr., quartzose, thin shale beds in upper part		Aquifer: moderate to high yields; second most important aquifer of Twin City basin
Keweenawan	Hinckley Sandstone	75	Sandstone, tan, med.- to coarse-gr., arkosic		
	Fond du Lac Formation and older sedimentary rocks	to 4 000	Sandstone and siltstone, fine-gr., well cemented, arkosic, interbedded with red to green micaceous shale		Confining bed
	Metamorphic and Igneous Rocks	to 20 000	Mostly mafic lava flows with thin interflow sediments		

SOURCE: Hoberg, R. K., "Ground-Water Resources in Minnesota": In Sims, P. K. and G. B. Morey, Geology of Minnesota: A Centennial Volume, 1972

NEW BRIGHTON/ARDEN HILLS
ST. ANTHONY PFS

GENERALIZED STRATIGRAPHY AND WATER BEARING CHARACTERISTICS OF FORMATIONS IN THE ST. ANTHONY AREA

Summary of Remedial Alternative Selection
St. Anthony Municipal Water Supply

Site Location and Description

The New Brighton/Arden Hills/St. Anthony Superfund National Priorities List site is located immediately north of the Twin Cities of Minneapolis/St. Paul, Minnesota. This "site" includes the majority of the New Brighton Quadrangle, which includes parts of Anoka, Hennepin, and Ramsey counties (Fig. 1).

The City of St. Anthony is located directly north of the Twin Cities of Minneapolis/St. Paul, Minnesota, and is one of several communities in the area which obtains its municipal water supply largely from groundwater resources (Fig. 2).

At the present time, the City of St. Anthony obtains its water supply from two municipal wells (well numbers 4 and 5) (Fig. 3) and an interconnection to the City of Roseville's water distribution system. Of the three supplies, well 4 is the major source of water. Well 5 and the Roseville interconnection are used for summer, peak or emergency use. Well 3 has been shutdown since early 1984 because of contamination by volatile organic compounds (VOC's). Presently, the water treatment system at St. Anthony allows the groundwater from wells 3 and 4 to be treated for manganese and iron removal and chlorination while water from well 5 can only be chlorinated.

There are two major bedrock aquifers capable of large well yields within the study area. These aquifers are the Prairie du Chien-Jordan and the Mt. Simon-Hinckley systems (Fig. 4). In addition, at some locations the Platteville-St. Peter Sandstone and the Franconia-Ironton-Galesville formations are reported to provide low to moderate yields of groundwater.

However, in large areas of the New Brighton area, the Platteville and St. Peter Sandstone aquifers have been eroded away.

The most significant bedrock aquifer in the study area with regard to water supply is the Prairie du Chien-Jordan aquifer system. Approximately 75-80% of all Twin Cities metropolitan area communities that obtain their water from groundwater supplies, receive those supplies from the Prairie du Chien-Jordan aquifer system. The chief aquifer existing in the undifferentiated glacial deposits is the Hillside Sand. Within the study area, the Hillside Sand aquifer has historically served as a major aquifer for residential and light industrial use. Overlying the Hillside Sand (over most of the study area) is the Twin Cities Formation. This formation is a complex till unit consisting of, in order of abundance, sand, silt, and clay mixed with gravel and occasional boulders. The Twin Cities Formation is overlain by several types of surficial deposits including various aeolian, fluvial and lacustrine deposits.

The Twin Cities Formation, where present, generally serves as an aquitard that limits vertical migration of water from the surficial deposits to the underlying Hillside Sand. However, the Hillside Sand outcrops at several locations in the New Brighton area, allowing direct recharge from the ground surface. The most critical outcrop area is located at the Arsenal Kame located at the Twin Cities Army Ammunition Plant (TCAAP). As the Platteville and St. Peter Sandstone aquifers have been eroded away over much of the study area, the Hillside Sand is in direct contact with the underlying bedrock (Prairie du Chien and/or Jordan formations).

SITE HISTORY

In June 1981, the Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Health (MDH) detected VOC contamination in the Prairie du Chien-Jordan aquifer system used for municipal drinking water in New Brighton. Subsequently, the City of St. Anthony has also detected VOC contamination in their three Prairie du Chien-Jordan aquifer wells; well numbers 3, 4 and 5.

From 1982 to 1984, the City of New Brighton shut down six Prairie du Chien-Jordan aquifer wells, deepened two municipal wells to the Mt. Simon-Hinckley aquifer, and constructed three new wells into the Mt. Simon-Hinckley aquifer. During this same period, VOC contamination levels in all three St. Anthony's municipal wells were rising. Due to these increasing levels, well 3 was taken out of service in early 1984.

Because of the increasing municipal well contamination being experienced in the area, several Initial Remedial Measures (IRM's) were implemented at the site under the Superfund program in 1983 and 1984. In 1983, the U.S. EPA performed an IRM by installing granular activated carbon filters on two of New Brighton's wells (5 and 6) to meet peak summertime demands.

Also in 1983, pipeline connections to New Brighton's and Arden Hills' water mains were made for several private well users whose wells had excessive levels of VOC contamination. This IRM was a state-lead project.

Lastly in 1984, the City of St. Anthony, which is immediately south of New Brighton, received a temporary water connection to the City of Roseville. This state-lead IRM was necessary because the City of St. Anthony was experiencing water shortages due to the contamination and subsequent closure of one of their three Prairie du Chien-Jordan aquifer municipal wells.

In June 1985, the U.S. EPA completed a Phased Feasibility Study (PFS) which investigated alternative supply and treatment options for New Brighton well 7. The VOC contamination levels in this standby and emergency-use well has remained relatively low; however, no trend has been established as to whether the levels will increase or decrease. Because of the need of this supply, the lengthy implementation times of remedial alternatives and the uncertainty of future contaminant levels, U.S. EPA plans to install an alternative water supply prior to contamination levels rising above health criteria levels.

In 1983, the MPCA and U.S. EPA entered into a state-lead cooperative agreement to conduct a remedial investigation (RI) of this site to determine the extent of the contamination and to determine the source(s) of the contamination.

Preliminary results from this study indicate that the groundwater flow in the Prairie du Chien-Jordan aquifer is toward the southwest, while the Hillside Sand aquifer generally flows in a west-southwest direction. Study results also indicate that contamination in the New Brighton area is comprised of separate eastern and western plumes, originating in the vicinity of the

TCAAP, that are impacting New Brighton's eastern and western well fields. Currently, there is little firm evidence as to the extent of the plumes in the St. Anthony area.

Potential sites that may be contributing to the observed contamination were assessed and it has been concluded that four significant source areas of contamination may exist within the study area. These general source areas are located either on the TCAAP or in the vicinity of the TCAAP and are identified as follows:

1. An industrial area along Old Highway 8, north of Interstate 694.
2. A commercial/industrial area to the north of Rush Lake.
3. Sites located within the Twin Cities Army Ammunition Plant (TCAAP) that lie above the Twin Cities till.
4. Sites located on the TCAAP that are located within the Kame deposit (below which no till is present).

Major contaminants that have been identified in the groundwater system of the study area are: trichloroethylene (TCE); 1,1-dichloroethylene; cis 1,2-dichloroethylene; and 1,1,1-trichloroethane. Other contaminants include; 1,1-dichloroethane (1,1-DCA); trans 1,2-dichloroethylene; chloroform; 1,2-dichloroethane; 1,1,2-trichloroethane; 1,1,2,2-tetrachloroethylene; and benzene. Preliminary estimates of the extent of contamination in the Hillside Sand and Prairie du Chien-Jordan aquifers are shown in figures 5 and 6, respectively. Since TCE was the most prevalent VOC found and generally had the highest levels, it was used as the indicator chemical for these studies.

FIGURE 5

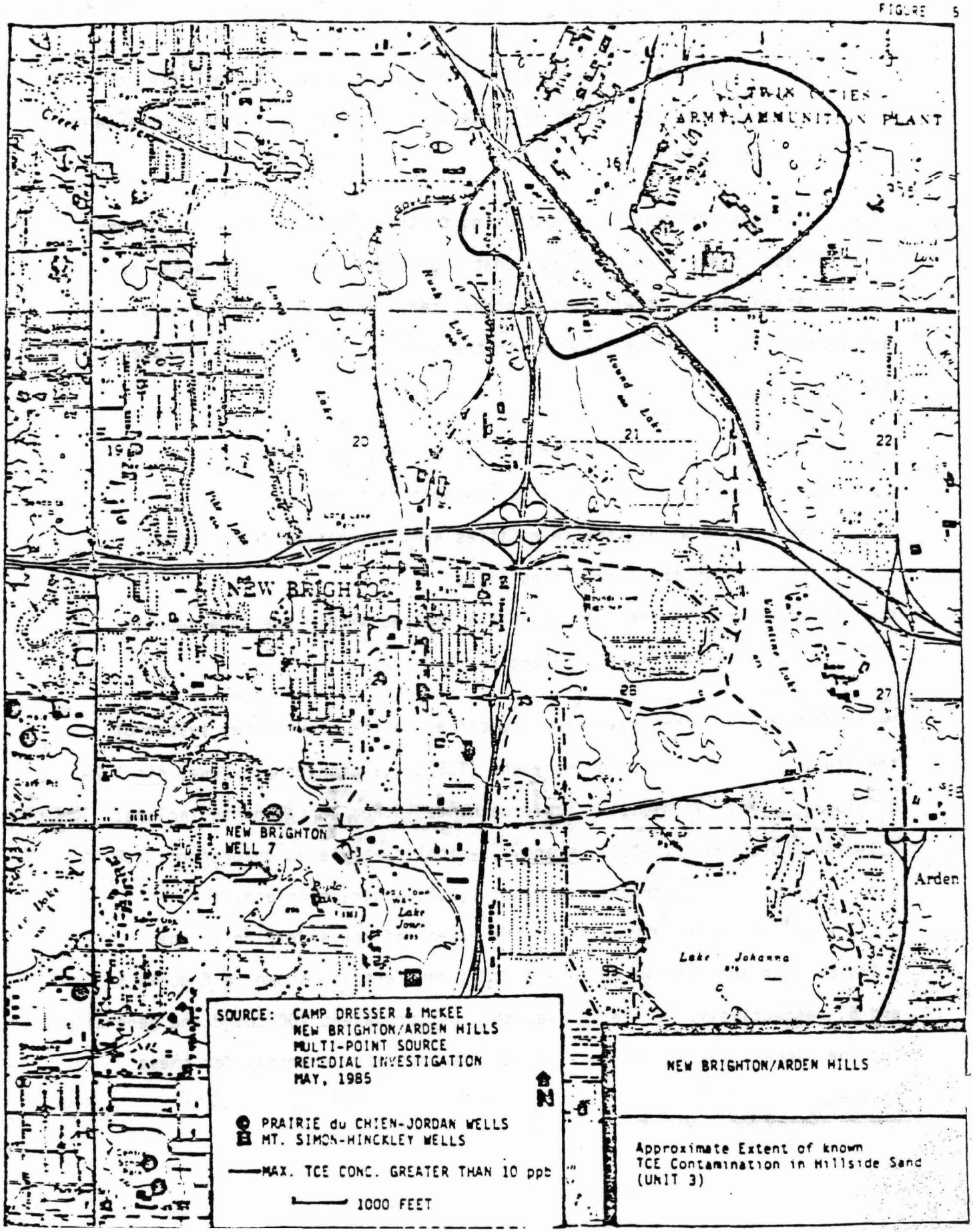
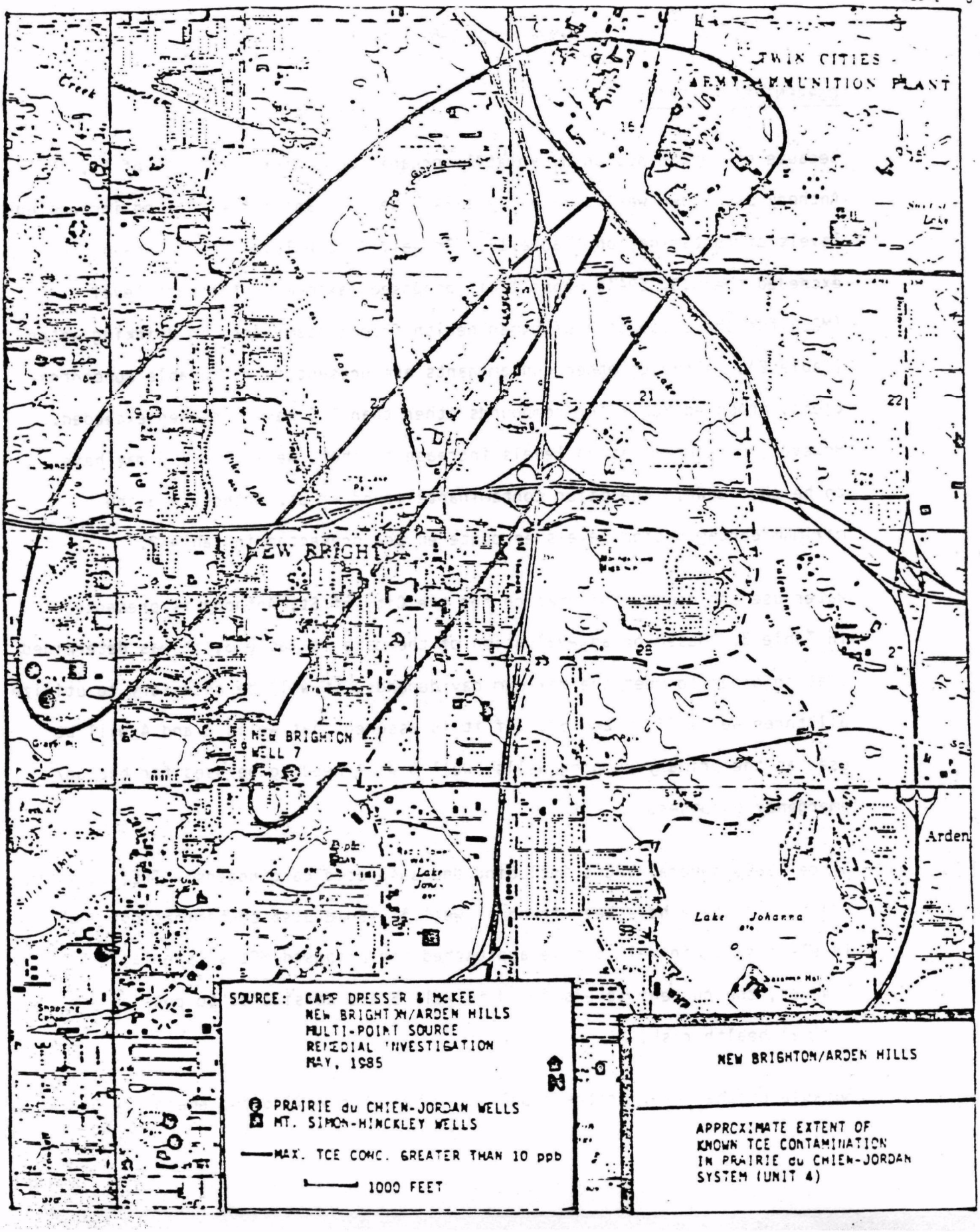

NEW BRIGHTON
NEW BRIGHTON WELL 7
Arden
Lake Johanna
SOURCE: CAMP DRESSER & McKEE
NEW BRIGHTON/ARDEN HILLS
MULTI-POINT SOURCE
REMEDIAL INVESTIGATION
MAY, 1985
PRAIRIE du CHIEN-JORDAN WELLS
MT. SIMON-HINCKLEY WELLS
MAX. TCE CONC. GREATER THAN 10 ppb
1000 FEET
NEW BRIGHTON/ARDEN HILLS
Approximate Extent of known
TCE Contamination in Hillside Sand
(UNIT 3)

FIGURE 6


TWIN CITIES
ARMY AMMUNITION PLANT
NEW BRIGHTON
NEW BRIGHTON
WELL 7
Arden
Lake Johanna
SOURCE: CAMP DRESSER & McKEE
NEW BRIGHTON/ARDEN HILLS
MULTI-POINT SOURCE
REMEDIAL INVESTIGATION
MAY, 1985
PRAIRIE du CHIEN-JORDAN WELLS
MT. SIMON-HINCKLEY WELLS
MAX. TCE CONC. GREATER THAN 10 ppb
1000 FEET
NEW BRIGHTON/ARDEN HILLS
APPROXIMATE EXTENT OF
KNOWN TCE CONTAMINATION
IN PRAIRIE du CHIEN-JORDAN
SYSTEM (UNIT 4)

CURRENT SITE STATUS

Because of contamination by volatile organic compounds, the City of St. Anthony shut down well 3 in early 1984. Wells 4 and 5 are showing increasing levels of contamination (Table 1). In well 4, the levels of TCE have exceeded the U.S. EPA's upper limit proposed maximum contaminant level (MCL) for the protection of human health from contaminants in drinking water (Table 2). Although other contaminants are present in measurable concentrations, proposed MCL's for compounds other than TCE have not been exceeded. However, if contamination levels increase further, wells 4 and 5 may have to be shut down. The major contaminants found at St. Anthony and the maximum contamination levels encountered are presented in Table 2.

Water use and demand information for the City of St. Anthony is presented in Table 3. Based on an evaluation of the data in Table 3, it was determined that in order to meet the maximum day demands, it will be necessary to utilize all three wells (3, 4 and 5). If it is assumed that wells 3 and 4 will be used as the primary pumping wells, well 5 will need to be used for backup/ emergency purposes.

Since 1982, several VOC's including the suspected carcinogens: TCE; 1,1-DCE; DCA; and benzene have been found in well 5. Some past contamination levels for TCE in well 5 have approached the proposed MCL's (see Table 2), however, the current levels found in well 5 are considered to pose only a minimal health risk.

Because of the need for the supply of water from well 5 for emergency and

TABLE 1 LEVELS OF CONTAMINATION IN WELL 4[a/b/]

Date	TCA[c/]	TCE[c/]	Total VOCs
01/06/82	--	0.5	0.5
02/09/83	--	0.2	0.2
02/23/83	--	0.2	0.2
03/07/83	--	0.2	0.2
03/22/83	--	0.3	0.3
04/05/83	--	0.4	0.4
05/11/83	--	0.2	0.2
05/25/83	--	--	18.1
06/10/83	--	0.4	0.4
08/17/83	--	1.5	1.5
02/24/84	--	1.1	1.1
05/09/84	--	1.2	1.2
12/10/84	0.4	3.2	3.9
08/07/85	0.4	3.7	4.1
08/23/85	0.5	4.0	4.5
09/09/85	0.8	5.3	6.8
09/30/85	0.6	5.9	6.8
10/07/85	0.6	3.4	4.6
10/16/85	0.7	5.5	6.8
10/30/85	1.6	7.8	10.7
11/14/85	0.85	4.3	6.0
11/27/85	1.2	4.6	11.5
12/20/85	--	4.0	5.0
01/15/86	0.8	4.4	6.4
02/19/86	1.4	5.2	12.6
04/21/86	1.1	9.5	15.0

[a/] Data Source: Minnesota Department of Health/Pollution Control Agency files

[b/] Concentrations in parts per billion

[c/] TCE-1,1,2-trichloroethylene

A-1,1,1-trichloroethane

TABLE 1 (cont.) LEVELS OF CONTAMINATION IN WELL 5[a/][b/]

Date	TCA[c/]	TCE[c/]	Total VOCs
01/06/82	--	0.1	0.1
06/04/82	--	--	.3
12/10/84	--	0.3	0.5
08/07/85	--	0.7	0.7
08/23/85	--	0.4	0.4
09/09/85	0.2	0.7	0.9
09/30/85	--	0.6	0.6
10/07/85	0.2	0.4	0.7
10/16/85	0.4	0.8	1.2
10/30/85	0.4	1.4	3.8
11/14/85	0.2	0.8	1.0
11/27/85	1.2	3.2	8.4
12/20/85	0.4	0.9	1.3
01/15/86	0.4	1.0	1.4
02/19/86	0.3	0.7	1.0
03/20/86	--	1.8	2.3
04/21/86	--	0.97	0.97

[a/] Data Source: Minnesota Department of Health/Pollution Control Agency files

[b/] Concentrations in parts per billion

[c/] TCE-1,1,2-trichloroethylene

TCA-1,1,1-trichloroethane

TABLE 3

ST. ANTHONY WATER USAGE[a/]

	MGD	MG/Month
Well 3	1.66	49.8
Well 4	1.66	49.8
Well 5	1.37	41.1
Average Demand	1.20	35.0
Maximum Demand	3.3 (June/76)	90.0 (July/76)

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a/ Data Compiled from:

- o CH_2M Hill, May 1983; Final Alternative Screening, Temporary Water Supply, St. Anthony, Minnesota (ref. 11).
- o Short, Elliot, Hendrickson, Inc., March 1984; Feasibility Report for Temporary and Permanent Water Supply from Roseville, St. Anthony, Minnesota (ref. 10).
- o Hamer, Larry; June 6, 1984; City of St. Anthony Request for City Council Action (ref. 17).

standby use, the long lead times needed for implementation of some of the alternatives being considered and the uncertainty of what the contamination levels will ultimately be in well 5. under continued use, it was decided by U.S. EPA and MPCA to investigate options for well 5 before the contamination levels rise above the proposed MCL's.

ENFORCEMENT - See Attachment 1

ALTERNATIVES EVALUATION

The major objective of the PFS conducted for St. Anthony's municipal wells was to evaluate remedial alternatives using a cost-effective approach consistent with the goals and objectives of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR 300.68, outlines the procedures and criteria to be used in selecting the cost-effective remedial alternative that effectively mitigates and minimizes threats to, and provides adequate protection of, public health and welfare and the environment. The remedial alternatives have subsequently been reevaluated to determine consistency with the goals and objectives of the Superfund Amendments and Reauthorization Act of 1986 (SARA).

Response actions may be conducted as an operable unit. An operable unit is a discrete response measure that may begin before selection of an appropriate final remedial action. This is consistent with the practice of phasing remedial actions at sites that present complex cleanup problems. The primary objective of the St. Anthony operable unit is to protect public health by providing a reliable supply of safe, potable water to consumers currently dependent on St. Anthony's municipal wells.

Numerous alternatives and options were identified and evaluated for potential as an operable unit for St. Anthony's municipal wells in accordance with the NCP and developmental EPA guidance for providing alternate drinking water supplies. The alternatives evaluation for the primary water supply is presented from page 8 to page 16. The emergency/standby supply options evaluation is then discussed in pages 16 to 19.

The primary supply alternatives were grouped into seven general categories:

- no-action
- provide bottled water for potable use and maintain wells 4 and/or 5 for non-potable use
- connect to nearby municipal water supply systems
- develop new sources
- treatment of contaminated water
- provide additional storage capacity
- dilution.

The alternatives were screened and evaluated based on their ability to protect public health, reliability, environmental impacts, speed of implementation, complexity, technical feasibility, and cost. A summary of the initial screening is presented in Table 4. The alternatives have been reevaluated to consider additional factors such as cleanup levels required under section 121 of SARA, and the ability to achieve permanent and significant reduction in mobility, volume, or toxicity of the contaminants of concern.

During the initial screening stage, the no-action alternative for all of St.

TABLE 4

SUMMARY OF INITIAL SCREENING OF ALTERNATIVES

	TECHNICAL ASPECTS			EFFECTS OF ALTERNATIVE		RELATIVE COST	RESULT OF INITIAL SCREENING
LTERNATIVE	FEASI-BILITY	TIME RE-QUIRED TO IMPLEMENT	RELIA-BILITY	ENVIRONMENTAL IMPACT[a/b/]	ABILITY TO PROTECT PUB-LIC HEALTH		
o Action	—	Immediate	Short term moderate Long term poor	None	Short term acceptable Long term poor	None (low)	Eliminated -- Strong indication contaminant levels will increase above acceptable levels with time
ɔttled Water for otable Use	Poor	1 Month	Poor	None	Poor	High	Eliminated -- Expensive and unreliable for long-term use, still allows exposure to contaminants through non-potable use.
tilize Adjacent ater Systems							
. Roseville/ St. Paul	Good	2-6 Months	Good	Temporary and Minor During Construction	Good	Moderate	Consider further
. Minneapolis	Good	2-6 Months	Poor	Temporary and Minor During Construction	Poor to Moderate based on Minneapolis' capacity to deliver adequate supply.	Moderate to High	Eliminated -- MDNR has serious reservations on use of Minneapolis water supplies as a sole source since adequate supplies may not be available.
. Columbia Heights	Good	2-6 Months	Poor	Temporary and Minor During Construction	Poor to Moderate based on Minneapolis' capacity to deliver adequate supply.	Moderate to High	Eliminated -- Columbia Heights obtains water from Minneapolis and MDNR has serious reservations on use of Minneapolis water supplies as a sole source since adequate supplies may not be available.
New Brighton	Moderate	1-6 Months	Poor	Temporary and Minor During Construction	Good	Moderate	Eliminated -- Insufficient supply to meet their own and St. Anthony's needs

1807/09

TABLE 4 (Continued)

SUMMARY OF INITIAL SCREENING OF ALTERNATIVES

	TECHNICAL ASPECTS			EFFECTS OF ALTERNATIVE		RELATIVE COST	RESULT OF INITIAL SCREENING
ALTERNATIVE	FEASIBILITY	TIME REQUIRED TO IMPLEMENT	RELIABILITY	ENVIRONMENTAL IMPACT[a/b/]	ABILITY TO PROTECT PUBLIC HEALTH		
Develop New Wells/ Deepen Existing Wells	Moderate to Good	12 to 18 Months to drill new well, 6 to 10 months to deepen existing wells 4-6 months for deep aquifer study	Moderate to Good	Temporary and Minor During Drilling	Good	High	Eliminated -- MDNR has strong concerns regarding potential of lower aquifer for long-term sole-source supplies; long implementation time; may require temporary action before wells come on-line; because of reduced well yields may require four new wells to replace current supply; deepening wells 4 and 5 infeasible because well diameters are too small; if new Mt. Simon-Hinckley wells are located within St. Anthony city limits, there is a potential for reduction of well yields due to well interference.
Treat Water from Wells 3, 4, and 5							
a. In Home Water Treatment	Poor	1 Month	Poor	None	Poor to Moderate (unproven over long term)	Moderate to High	Eliminated - Unreliable, expensive and impractical over long term
b. Air Stripping-Centralized Treatment Facility	Good	2-4 Months	Good	Temporary and Minor During Construction	Good	Moderate	Consider further
c. Carbon Adsorption - Centralized Treatment Facility	Good	2-4 Months	Good	Temporary and Minor During Construction	Good	High	Consider further
d. Combination Stripping and Carbon Adsorption--Centralized Treatment Facility	Good	2-4 Months	Good	Temporary and Minor During Construction	Good	Moderate to high	Eliminated - additional costs for carbon unit not justified since only volatile organics are present and combination doesn't provide significant cost savings over the carbon adsorption alternative described above

TABLE 4 (Continued)

SUMMARY OF INITIAL SCREENING OF ALTERNATIVES

	TECHNICAL ASPECTS			EFFECTS OF ALTERNATIVE		RELATIVE COST	RESULT OF INITIAL SCREENING
LTERNATIVE	FEASIBILITY	TIME REQUIRED TO IMPLEMENT	RELIABILITY	ENVIRONMENTAL IMPACT[a/b/]	ABILITY TO PROTECT PUBLIC HEALTH		
lending Contaminated ater with Non-ontaminated Supply	Poor to Moderate	1 Month	Poor	Temporary and Minor During Construction	Poor	Moderate	Eliminated -- Unreliable over long term since maximum concentrations unknown and availability of non-contaminated water for mixing is limited
rovide Additional torage	Poor to Moderate	12 to 24 Months	Good	Temporary and Minor During Construction	Good	High	Eliminated--highest cost alternative considered, implementation would require development of one of the other alternatives to supply an adequate amount of water

/ None of the alternatives considered are designed to permanently mitigate the region-wide contamination problem in the New Brighton/Arden Hills/St. Anthony area.

/ This column refers to the environmental impact of the alternative if it is implemented.

Anthony's municipal wells (3, 4 and 5) was eliminated from further consideration. The decision was based on a limited scope public health evaluation which stated that the lifetime consumption of water (from well 3 or well 4) containing contaminants at current levels may pose health risks to the residents of St. Anthony. Additionally, because of the need for the supply of water from well 5 for emergency and standby use, the uncertainty of what the contamination levels will ultimately be in well 5 under continued use, and the long lead times needed for implementation of some of the alternatives being considered, the no-action alternative for well 5 was considered to be not reliable over the long term.

Three of the original alternatives passed the initial screening and detailed studies were conducted. The alternatives for which detailed studies were conducted are:

- Connect to the Roseville/St. Paul System
- Treat wells 3, 4 and 5 at centralized location using an air stripper
- Treat wells 3, 4 and 5 at centralized location using carbon adsorption.

These three alternatives were evaluated on their ability to protect the public health, technical feasibility, environmental impacts, institutional requirements, and costs assuming a 30-year project life. All three of the alternatives considered in detail are comparable for most of these evaluation criteria. The main areas of divergence are in institutional issues and cost comparisons. A summary of this evaluation is presented in Table 5.

After the passage of SARA, these three alternatives were reevaluated for their ability to attain cleanup levels cited in section 121 of SARA; or to

TABLE 5. WATER SUPPLY ALTERNATIVES FOR ST. ANTHONY

Alternative	Cost ($1,000) Capital	Total Present Worth 5%	8 3/8%	10%	Public Health Concerns	Environmental Concerns	Technical Concerns	Community[a] Response Concerns	Others
1. Connection to Roseville/ St. Paul water system	442.0	8,947	6,460	5,665	Reduces/eliminates public health threat	Does not mitigate contamination problem	Two connections necessary Two pipelines required. Hydraulic engineering study of Roseville system required prior to implementation	Moderate resistance due to odor and taste problems	Current water rate structure does not allow all water charges to be passed on to residents. City must absorb additional costs.
2. Pump well 3 and 4 treat with air stripper	861.8	3,664	2,900	2,656	Reduces public health threat to less than proposed MCL risk level	Does not mitigate contamination problem. May cause the spread of contamination to the Jordan Aquifer. Possible air quality impacts.	Mixture of contaminants may change. Non-volatile contaminants may render stripper ineffective	Low to Moderate resistance	Noise reduction techniques may have to be used. Emission controls may be required if current regulations change.
3. Pump well 3 and 4 treat by carbon adsorption	725.8	3,246	2,553	2,331	Reduces public health threat to less than proposed MCL risk level	Does not mitigate contamination problem. Used carbon may be considered hazardous waste. May cause the spread of contamination to the Jordan Aquifer	If contaminant levels increase significantly carbon replacement costs may be high	Low to Moderate resistance	Both treatment options may be compatible with state implemented Remedial Actions.

a/ Community response as indicated in meeting with city officials (Mayor, City Manager, Director of Public Works).

achieve permanent and significant reduction in volume, toxicity, or mobility of the contaminants of concern. The two alternatives which use treatment of groundwater from wells 3, 4 and 5 should significantly and permanently reduce the volume of the contaminants of concern. Additionally, these alternatives can attain the applicable or relevant and appropriate requirements as cited in section 121 of SARA.

The most important factors to consider in determining which requirements are applicable or relevant and appropriate for remedial actions involving contaminated groundwater are the uses of the water and the purposes for which the potential requirements are intended.

For water that is intended to be used for drinking, Maximum Contaminant Levels (MCL's) set under the Safe Drinking Water Act are the applicable or relevant and appropriate standards. In situations where the groundwater being cleaned up will be supplied directly to 25 or more people, or 15 or more service connections, the MCL's are applicable. Therefore, for this site, MCL's are applicable.

At present, the MCL's for the contaminants of concern are only proposed, however, the final MCL's should be promulgated in June, 1987 (with the exception of the contaminant 1,2-dichloroethylene, which will be promulgated in June, 1988). Because the MCL's are applicable in this situation, the proposed MCL's set the target drinking water concentrations by which the alternatives were evaluated. The final target drinking water concentrations required by the remedial action will reflect the MCL's as promulgated.

ALTERNATIVE 1

CONNECT TO THE ROSEVILLE/ST. PAUL SYSTEM

This alternative utilizes an interconnection with the Roseville water supply system to meet the objectives of the operable unit. Previous studies and discussions with the water department directors of both Roseville and St. Paul have indicated that the feasibility of the Roseville/St. Paul connection alternative is good and that the Roseville/St. Paul system has an adequate supply of uncontaminated water to satisfy St. Anthony's water needs in addition to its own needs. Detailed hydraulic/engineering and computer studies of the Roseville distribution system will be necessary prior to implementation. Water supply agreements (St. Paul/Roseville/St. Anthony) will also be required.

Two interconnections would be required. The primary connection would be 2300 feet long. The second connection, which would serve as a backup to the primary connection, can be made by upgrading the existing Roseville/St. Anthony connection. This connection was constructed in 1984 and is currently used to provide water to residents in the southern part of the city during peak water demand periods.

Water from the Roseville distribution system would flow via connection into the St. Anthony ground storage reservoir. From this reservoir, water would flow into the St. Anthony water distribution system as before. Because the Roseville water system static level is higher than the St. Anthony ground storage reservoir, a pump would not be required for either of the two interconnections.

TABLE 2

U.S. EPA SUGGESTED CRITERIA FOR THE PROTECTION OF HUMAN HEALTH

Concentrations in ppb

Contaminant	Upper Limit Proposed MCLs	MCLG[c]	1 x 10-5 Lifetime Cancer Risks[b]	Office of Drinking Water Health Advisories[a]				Target Drinking Water Concentration for Protection of Human Health[g]	Maximum Contaminant Level Detected (1982-1986)		
				Longer Term (Child)	Longer Term (Adult)	Lifetime (Adult)	Lifetime (Adult)		Well 3	Well 4	Well 5
1,1,2-trichloroethylene	5[c]	0	28.0	--	--	260[f]	--	5	23.0	9.5	3.2
1,1,1-trichloroethane	200[c]	200	--	35,000	125,000	1,000[f]	200[e]	200	4.9	1.6	1.2
1,1-dichloroethylene	7[c]	7	2.3	1,000	3,500	350[f]	70[e]	7	1.7	0.8	1.2
1,2-dichloroethylene	70[d] (proposed RMCL)	70[d] (proposed MCLG)	--	1,000	3,500	350[f]	70[e]	70	--	0.7	0.8
Benzene	5[c]	0	6.7	--	--	--	--	5	7.5	3.9	--

MCL - Maximum Contaminant Level
RMCL - Recommended Maximum Contaminant Level
MCLG - Maximum Contaminant Level Goal

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a/ U.S. EPA, Health Advisories for Carbon Tetrachloride, 1,2-Dichloroethylene, Tetrachloroethylene, 1,1,1-Trichloroethane, and Trichloroethylene. Office of Drinking Water. September 30, 1985.

b/ Concentration in drinking water resulting in a projected upper 95 percent confidence limit excess lifetime cancer risk of 10-5. (Values are calculated by the U.S. EPA Carcinogen Assessment Group and published in 49 Federal Register 114:24340) (ref. 4)

c/ U.S. EPA. 1985b. National Primary Drinking Water Regulations; Volatile Synthetic Organic Chemicals. Federal Register 40:46880-46933, November 13.

d/ U.S. EPA, 1985b. National Primary Drinking Water Regulations; Synthetic Organic Chemicals, Inorganic Chemicals and Microorganisms; Proposed Rule. Federal Register 40: 46936-47022, November 13.

e/ Lifetime Health Advisories Assuming a Relative Source Contribution Factor (i.e., a certain percentage of exposure is from drinking water).

f/ Lifetime Health Advisories Assuming Total Exposure is from Drinking Water.

g/ Set based on the Proposed MCLs. Target concentrations also result in cancer risk levels within the suggested acceptable range for ground-water treatment of between 10^{-4} to 10^{-7}. The proposed MCLs, specifically result in cancer risk levels in the 10^{-5} to 10^{-6} range.

This alternative has two major drawbacks. The Roseville/St. Paul connection is the most expensive alternative out of the three alternatives which were considered for detailed study. Additionally, there may be some community resistance to this alternative. The main concern is due to taste and odor problems that are a result of using Roseville/St. Paul surface water supplies.

ALTERNATIVE 2

TREAT WELLS 3 AND 4 AT CENTRALIZED LOCATION USING AN AIR STRIPPER

This alternative utilizes a packed tower air stripper to meet the objectives of the operable unit. Due to the uncertainty of what the levels of contamination will ultimately be in wells 3 and 4 under continued use, the air stripper will be sized to achieve the high removal efficiencies required to remove VOC's found at the maximum concentrations observed in this area's municipal wells [approximately 300 parts per billion (ppb) of total VOC's were detected in New Brighton well 3 in mid-1982]. Because of the relatively low levels of contaminants in wells 3 and 4 water at the present time, and the high removal efficiencies achieved by air stripper systems (99 percent and higher if contamination reaches the 300 ppb level), there should be no problem in meeting the target drinking water concentrations.

The proposed location of the air stripping facility is in an area which is largely residential, with athletic fields, parks and a school nearby. For this reason, noise abatement equipment may be required. The proposed design parameters have not been run through an air contaminant dispersion model. Even if modelling results indicate that all Minnesota guidelines for air

discharges can be met, the air emissions from the stripping tower would probably require treatment before discharge to the atmosphere, as a result of expected adverse community concerns. Because of the close proximity of the air stripper towers to residences, parks, and especially the school, the community would perceive a significant health risk due to the air emissions regardless of what the model indicated. Without an air emissions treatment system for the air stripper, the community objections would probably be strong enough to make implementation of this alternative impossible. A vapor phase carbon adsorption system is a feasible method of treating the air emissions to ensure that ambient air quality would be maintained.

Adverse environmental impacts may occur if contaminated St. Anthony wells continue to be pumped, as pumping may influence the rate and direction of movement of the contaminant plume within the radius of influence of the well. Currently, there is little firm evidence as to the extent of the plume in the St. Anthony area; therefore, little quantification can be made regarding the effects of continued pumping of wells 3, 4 and 5.

The major problems regarding the air stripper alternative would be associated with the noise levels of the system and the air emissions from the unit. Noise abatement equipment and emission control equipment can mitigate these problems, however, the addition of this equipment to an air stripper system substantially increases the cost of the overall treatment system.

ALTERNATIVE 3

TREAT WELLS 3 AND 4 AT CENTRALIZED LOCATION USING CARBON ADSORPTION

This alternative utilizes granular activated carbon (GAC) media to meet the objectives of the operable unit. As with the previous alternative, because the future contamination levels of wells 3 and 4 are unknown, the GAC unit will be sized to achieved the high removal efficiencies required to remove VOC's at levels up to 300 ppb.

The effectiveness of carbon adsorption depends on the type and concentration of the contaminants present. In 1983, the neighboring City of New Brighton had two municipal wells in the Prairie du Chien/Jordan aquifer which had similar types of contamination as St. Anthony is presently experiencing. Granular activated carbon technology was successfully used to reduce the contamination levels at New Brighton to acceptable levels. Therefore, the GAC system proposed for St. Anthony should have the removal capabilities to sufficiently lower the contaminant concentrations in wells 3 and 4 so that the target drinking water concentrations can be met.

The proposed location of the carbon adsorption facilities would be adjacent to the present St. Anthony municipal water treatment facilities. These are located in St. Anthony Central Park near wells 3 and 4.

As with the previous alternative, there may be an environmental concern that if contaminated St. Anthony wells continue to be pumped, the rate and direction of the movement of the contaminant plume in the study area may be influenced. However, as in the previous alternative, because there is

little evidence as to the extent of the plume in the St. Anthony area, this concern cannot presently be substantiated.

All three of these alternatives are based on simple, proven technologies and can meet or exceed the target drinking water concentrations. As was previously stated, these alternatives ranked relatively equal in terms of technical feasibility and ability to protect public health. None of the alternatives are planned to mitigate the overall regional contamination problem, neither, however, are the alternatives inconsistent with the final remedial action. The two treatment alternatives will be consistent with the final remedial action if the final remedy involves treatment of the contaminated groundwater.

The two primary criteria regarding the alternatives which had the most impact in determining which alternative to recommend are community response and costs. For both Alternative 1 (Roseville/St. Paul connection) and Alternative 2 (air stripper), there may be adverse community response.

Residents may object to the taste and odor problems associated with Alternative 1. Additionally, because future water rates (costs) will be controlled by Roseville and St. Paul and not by St. Anthony, the community may be resistant to this alternative for economic reasons.

The proposed location of the air stripper tower for Alternative 2 is within 1,000 feet of a public school. Even if noise abatement equipment and air emission treatment systems were used, the community may still be opposed to this alternative.

The present worth cost of implementing each alternative was estimated assuming a 30-year project life with discount rates of 5, 8 3/8, and 10 percent. These costs are summarized in Table 6. At a discount rate of 10%, present worth costs for the three alternatives range from in excess of $5,600,000 for the Roseville/St. Paul connection alternative, to the lowest figure of about $2,331,000 for treating water from wells 3 and 4 by carbon adsorption.

For St. Anthony's standby and emergency water source, four options were considered. The standby/emergency requirements, assuming wells 3 and 4 would be the primary water supply, are to provide 1,000 gallons per minute (gpm) for a maximum of 30 days per year. The options considered were:

- Construct a transmission line between well 5 and the proposed central treatment facility;
- Treat water from well 5 at the wellhead (carbon adsorption);
- Treat water from well 5 at the wellhead (air stripper);
- Construct a new deep well to the Mt. Simon-Hinckley aquifer.

These four options were evaluated using the same criteria developed for the analysis of the wells 3 and 4 alternative. Similar environmental, institutional and health issues discussed during wells 3 and 4 alternative development are likewise applicable to the analysis of the emergency/standby options. The main areas of divergence are in institutional issues and cost comparisons. Table 7 summarizes the costs associated with the standby/emergency source options.

TABLE 6 . . COST SUMMARY TABLE

Alternative	Discount Rate (%)	Cost Estimates (Dollars) Capital	Annual O&M	Annualized Equip. Replacement	Present Worth at Discount Rate ($1,000) 5%[a]	8 3/8%[b]	10%[c/d]
Roseville	5	442,000	552,500	830	8,947		
	8 3/8	442,000	552,500	1,170		6,460	
	10	442,000	552,500	1,350			5,665
Air Stripper	5	861,800	169,720	12,590	3,664		
	8 3/8	861,800	169,720	17,810		2,900	
	10	861,800	169,720	20,520			2,656
Carbon Adsorption	5	725,800	154,070	9,880	3,246		
	8 3/8	725,800	154,070	13,980		2,553	
	10	725,800	154,070	16,110			2,331

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[a] Present Worth of Annuity Factor for 30 yr. = 15.37

[b] Present Worth of Annuity Factor for 30 yr. = 10.87

[c] Present Worth of Annuity Factor for 30 yr. = 9.43

[d] Use of 10% Discount Rate Recommended by U.S. EPA (ref. 26)

TABLE 7

COST COMPARISON FOR EMERGENCY/STANDBY OPTIONS

Option	Discount Rate	Capital	O&M	AERC	5%	8 3/8%	10%
Pipeline	5	374,700	6,700	1,950	508		
	8 3/8	374,700	6,700	2,760		478	
	10	374,700	6,700	3,180			463
Air Stripper	5	645,100	19,550	62,600	1,908		
	8 3/8	645,100	19,500	88,600		1,820	
	10	645,100	19,550	102,100			1,792
Carbon Adsorption	5	310,500	13,690	17,700	793		
	8 3/8	310,500	13,690	25,100		732	
	10	310,500	13,690	28,900			712
New Well	5	601,700	7,020	3,900	770		
	8 3/8	601,700	7,020	5,520		738	
	10	601,700	7,020	6,360			723

Option 1

CONSTRUCT TRANSMISSION LINE FROM WELL 5 TO PROPOSED CENTRAL TREATMENT FACILITY

This option would require construction of a 12-inch diameter transmission main from well 5 south to the existing iron treatment facility near wells 3 and 4. After manganese and iron removal, the water would be treated to remove VOC's and piped back into the existing distribution system. The existing pump at well 5 has sufficient capacity to convey the water to the treatment plant without the aid of booster pumps. This option would alleviate the need for disinfection at well 5.

Option 2

TREAT WATER FROM WELL 5 AT WELLHEAD BY CARBON ADSORPTION

If gravity flow carbon technology is employed, four carbon contactors, each with 250 gpm capacity, are required. Construction of a heated building or building addition at the existing well 5 wellhouse would be required to prevent freezing of the units in the winter.

Option 3

TREAT WATER FROM WELL 5 AT WELLHEAD BY AIR STRIPPING

Treatment by air stripping would require two stripping towers, each capable of treating 500 gpm. Construction of a heated building or building addition at the existing well 5 wellhouse would be required. There may be community resistance to this option because of noise levels and low levels of contamination in the air discharged from the air stripper. Due to community

concerns, an air emissions treatment system may be required. With an air emissions treatment system, the present worth cost of this option is approximately twice that of the next highest cost option (carbon adsorption treatment at well 5).

Option 4

CONSTRUCT NEW WELL INTO THE MT. SIMON-HINCKLEY AQUIFER

As the Mt. Simon-Hinckley aquifer is not currently contaminated, it can be utilized as a supply for standby or emergency purposes. As stated earlier, water from this aquifer requires treatment to remove iron. Thus, to utilize the existing iron treatment facility and minimize piping requirements, a new deep well should be located as close to the existing iron treatment facilities as practicable. A small pump house would be constructed which would be heated in the winter months.

The Minnesota Department of Natural Resources (MDNR) present policy discourages use of the Mt. Simon-Hinckley aquifer by cities for meeting peak water demands because of the aquifer's limited potential.

Each of these four options are based on simple, proven technologies and can meet all applicable Federal and State drinking water standards. The options ranked equally in terms of technical feasibility and ability to protect public health.

The present worth costs, assuming a 30-year project life and a 10% discount rate, for the options considered for the standby/emergency water source ranges from a low of $468,000 for the construction of a pipeline to connect

well 5 with the proposed central treatment facility to a high of $1,792,000 for treatment of well 5 water by air stripping.

COMMUNITY RELATIONS

The Superfund activities at the New Brighton/Arden Hills/St. Anthony site have been followed closely and consistently by the local press. Interest in Superfund activities has been high, and news accounts of the activities have been responsible. Residents and locally elected officials have maintained a constant and serious interest in the Superfund activities.

Copies of the PFS were made available to the community on June 11, 1986. The St. Anthony Branch of the Hennepin County Public Library served as the information repository. The U.S. EPA issued a press release on June 9, 1986, announcing the availability of the PFS, location of the repository, the June 12-July 2, 1986 public comment period, and the June 23, 1986 public meeting at St. Anthony City Hall in St. Anthony, Minnesota.

The public meeting was attended by approximately 60 people including representatives from MPCA, U.S. EPA, U.S. Army and local officials. At this meeting, the U.S. EPA presented results of the PFS, recommended construction of granular activated carbon (GAC) water treatment facilities to treat well 3 and 4 as the preferred alternative, answered questions regarding the New Brighton/Arden Hills/St. Anthony site, and accepted public comments.

The Responsiveness Summary to the public comments is attached to this summary (see Attachment 2). As a result of the public comments, the public comment

period was officially extended by two weeks and the recommended alternative was amended to include the construction of a pipeline connecting St. Anthony well 5 to the proposed GAC treatment facilities.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

The proposed alternatives and options to address St. Anthony municipal wells 3 and 4, and St. Anthony's standby/emergency water source are required to be consistent with other Federal and State environmental laws.

For remedial actions involving contaminated groundwater, the use of the water, and the manner in which it is used will determine what kinds of requirements or laws may be applicable or relevant and appropriate.

For water that is intended to be used for drinking, the applicable or relevant and appropriate standards are the MCL's established under the Safe Drinking Water Act. The MCL's are applicable in situations where the groundwater cleaned up will be directly supplied to 25 or more people, or to 15 or more service connections. Therefore, the MCL's are applicable for this site.

At present, the MCL's for the contaminants of concern (Table 2) are only proposed. These MCL's should be finalized and promulgated in June, 1987 (except for the contaminant 1,2-dichloroethylene which will be promulgated in June, 1988). The final target drinking water concentrations required by the remedial action will reflect the MCL's as promulgated.

The MCL's are the basis for the target drinking water concentration used to evaluate the alternatives, because the MCL's are the relevant and appropriate standards and are applicable. All of the proposed alternatives and options

will supply drinking water that will attain these target drinking water concentrations.

None of the proposed alternatives and options are inconsistent with the final remedial action. Additionally, all of the alternatives and options which incorporate treatment of water from wells 3, 4 and 5 should permanently and significantly reduce the volume of the contaminants of concern. These treatment alternatives and options may very likely be a part of the final remedial action at this site. The Roseville/St. Paul interconnection alternative for the primary water supply and the new deep well option for the standby/emergency water supply do not reduce the volume of contaminants.

The MPCA (Division of Air Quality) regulates the discharge of contaminants to the atmosphere from air strippers. The Division evaluates each case individually, but has not adopted a set of rules to date. The accepted criterion is 1% of the threshold limit value (TLV) of a contaminant over an 8-hour period. This is determined by running the physical parameters of the stripper--stack height, diameter, water pumping rate, influent contaminant levels, distance to property lines, etc., through a model to determine if the proposed alternative will meet all Minnesota regulations. The exhaust gases created from the air stripper alternative may have an impact on ambient air quality. While the proposed parameters for air strippers at wells 3, 4 and/or 5 were not run through a model, because of the relatively low levels of contaminants in the well water and therefore, in the exhaust air, and because the contaminant levels in the stripper exhaust would have been further reduced by an air emission treatment system, there should not be a problem with meeting all Minnesota guidelines for air discharges.

With regards to the spent activated carbon from the proposed GAC treatment systems, the U.S. EPA (Region V - Solid Waste Branch) has made the determination that this material is not a regulated Resource Conservation and Recovery Act (RCRA) material.

RECOMMENDED ALTERNATIVE

The National Oil and Hazardous Substances Contingency Plan (NCP)[40 CFR Part 300.68(i)] states that the appropriate extent of remedy shall be determined by the lead agency's selection of a cost-effective remedial alternative that effectively mitigates and minimizes threats to and provides adequate protection of public health and welfare and the environment. SARA provides a further requirement that the alternative selected should, to the maximum extent practicable, also utilize permanent solutions and alternative treatment technologies.

Based on the evaluation of cost, effectiveness and other concerns of each proposed alternative, the preference for permanent solutions, the comments received from the public and the Minnesota Pollution Control Agency, and the State and Federal environmental requirements, Alternative 3 in conjunction with Option 1 has been determined to be the most cost-effective alternative.

The recommended alternative is considered an operable unit remedial action. The objective of this action is to provide those consumers currently dependent on the St. Anthony municipal water supply for drinking water with a reliable supply of safe, potable water until the final remedial measure(s) may be implemented. The RI/FS currently underway will examine appropriate final response action(s). Implementation of the operable unit will return St. Anthony's water system to pre-contamination levels in terms of quality and quantity.

The recommended alternative provides for both granular activated carbon treatment of the contaminated groundwater from St. Anthony wells 3, 4 and 5, and a pipeline connecting St. Anthony well 5 to the GAC treatment facilities. The GAC treatment system would be sized to be capable of treating St. Anthony's peak water demand of 3.3 million gallons per day (mgd). The pipeline connecting St. Anthony well 5 to the GAC system would be sized to provide 1,000 gpm (1.4 mgd).

The GAC treatment system would be designed to treat water with influent VOC's of up to 300 ppb (300 ppb is the maximum concentration of VOC's observed in any of the study area's municipal wells). The GAC treatment system would be designed to achieve removal efficiencies sufficient to lower the contamination concentrations to acceptable levels. The pipeline from well 5 to supply St. Anthony with a reliable standby/ emergency water source would be designed to operate for 30 days per year and provide 1,000 gpm only when either well 3 or 4 was unable to be used.

A final remedy at this site can be approached by two means; minimization and mitigation of groundwater contamination, and use of an alternative water supply. Although the final remedy for this site has not been determined, it appears likely that some type of response to minimize and mitigate the current groundwater contamination will be the final remedy. Currently, there is little firm evidence as to the extent of the plume in the St. Anthony area; therefore, little quantification can be made regarding the effects of continued pumping of wells 3, 4 and 5.

In terms of the final site remedy, the recommended alternative may possibly be incorporated into a final remedy selected, as part of minimization and mitigation of the groundwater contamination, depending on results of the ongoing RI/FS. The agency may utilize the GAC system in a treatment-type final remedy to address contamination. If the ongoing RI/FS indicates that the groundwater contamination in the St. Anthony area is extensive and dilute, the only way to minimize and mitigate the groundwater contamination in this area would be through utilization of a treatment system, which would clean up the groundwater. This would possibly be in conjunction with the GAC treatment system.

Although the GAC treatment system may not eliminate the contamination of the Prairie du Chien-Jordan aquifer, the operable unit will minimize the threat posed by the contamination until the time a final remedy is selected by U.S. EPA. An RI/FS is currently underway to determine and evaluate the extent of groundwater contamination. Until the evaluation is completed, it is not technically feasible to develop a cost-effective, long term remedy for the site.

The capital cost of the recommended alternative is estimated to be $1,100,500. The total operation and maintenance (O&M) costs are estimated to be $160,770 per year of which $43,900 is for the operation of wells 3, 4 and 5 and the remaining $116,870 are costs associated with the GAC treatment system and the pipeline. The thirty-year present worth value for the recommended alternative is $2,799,000 at a discount rate of 10 percent. The capital and annual costs of the recommended alternative are summarized in tables 8 and 9.

The Superfund Amendments and Reauthorization Act of 1986 (SARA), specifically amendment (i)(6) to section 104 (c)(3) of CERCLA states that for groundwater

TABLE 8

CAPITAL COSTS - CARBON ADSORPTION

Item		Cost
1.	Purchase adsorption units @ $20,000, need 9 units, (includes wet wells, piping, circulating pumps, etc.)	$180,000
2.	Re-pressurizing Pump, Starter, Controls	16,000
3.	Construct New Building, Plumbing, Heating, Earthwork (26 x 100 feet)	208,000
4.	Pipe and Fittings	20,000
5.	Installation $2,000/unit	18,000
6.	Well Rehabilitation for One St. Anthony Well	35,000
	Pump Bowls 5,000	
	Pump Motor 20,000	
	Chemical Feed Equipment 10,000	
	SUBTOTAL	512,000
	Contingency (25%)	128,000
	Construction Engineering (5%)	32,000
	Engineering Design Costs (8%)	53,800
	TOTAL	725,800

TABLE 8 (cont.)

CAPITAL COSTS - PIPELINE CONSTRUCTION FROM
WELL 5 TO CENTRAL TREATMENT FACILITY

Item		Total
1.	Construct 12" Transmission Main from Well 5 to Proceed Treatment Facility (includes Watermains, Valves, Street/Turf Restoration)	251,300
2.	Electrical/Control Improvements	3,000
3.	Mobilization, Contractor Fees	10,000
	Subtotal	264,300
	Contingency (25%)	66,100
	Construction Engineering (5%)	16,500
	Engineering Design (8%)	27,800
	TOTAL	374,700

TABLE

ANNUAL COSTS - CARBON ADSORPTION

Item	Cost
1. Labor (3hrs/wk @ $17.50/hr)(12mos)(4wks/mo)	2,520
2. Service contract - maintenance, system check 5 days @ $500/day	2,500
3. Power - 1 booster pump - 50hp - 37kW 9 circulation pumps - 45hp - 33kW 70kW	
Demand: (70kW)($6.26/mo)(12mo)	5,260
Energy: (70kW)(24hrs/day)(30days/mo)(12mo)($0.039/kW) (75% system use on annual basis)	17,690
4. Operate Wells 3 and 4 - (438 MG) ($91.32/MG)[a/]	40,000
5. Laboratory analyses (160/yr @ $160)[b/]	25,600
6. Maintenance of building $500/year	500
7. Carbon - 10,000lb/unit, (60,000)($1.00/lb)[c/]	60,000
ANNUAL O&M	154,070
8. Annualized equipment replacement costs (AERC)[d/e/]	
At 5% Rate, $152,000 x 0.065 =	9,880
At 8 3/8% Rate, $152,000 x 0.092 =	13,980
At 10% Rate, $152,000 x 0.106 =	16,110

9. SUBTOTALS (O&M Plus AERC)

5%,	154,070
	9,880
	163,950
8 3/8%,	154,070
	13,980
	168,050

TABLE . (Continued)

ANNUAL COSTS - CARBON ADSORPTION

10%,	154,070	
	16,110	
	170,180	

10. Present Worth e/

Present Worth at 5% = 2,520,000

Present Worth at 8 3/8% = 1,827,000

Present Worth at 10% = 1,606,000

---

a/ Based on operating costs of St. Anthony Wells in 1985.

b/ Priority Pollutant Volatile Organics Scan. The proposed monitoring schedule is:

Influent: Once every 2 weeks (26 samples)
Composite Effluent: Once every 2 weeks (26 samples)
Contactor Effluent: One per month per unit (108)

c/ Carbon costs includes $0.80/lb for purchase and $0.20/lb for disposal, assumes carbon is delivered to the site and installed in the contactor, and used carbon is removed. Total costs are estimated assuming that on average, the carbon beds of only 6 contactors will be changed per year.

d/ Equipment Replacement Costs

I. Carbon Units

a. Re-pressurizing booster pumps every 10 years (2)(1500)	3,000
b. Circulation pumps every 10 years (9 @ 500)(2)	9,000
c. Electrical controls, starters, disconnects, etc., every 10 years (3500)(2)	7,000
d. Contingency (20%)	4,000
SUBTOTAL CARBON UNIT	23,000

TABLE

ANNUAL COSTS - CARBON ADSORPTION (Continued)

II. Wells 3 and 4	
a. Replacement of column pipe, some shaft, bearings, couplings, etc., every 5 years ($10,000/replacement) (2 wells) (5 replacements)	$100,000
b. Filtration plant: general annual equipment replacement costs	7,500
Contingency (20%)	21,500
SUBTOTAL	129,000
TOTAL (I plus II)	152,000

e/ See Table 3-6 for Present Worth and Annualized equipment replacement equations.

TABLE 9 (cont.)

ANNUAL COSTS - PIPELINE CONSTRUCTION FROM
WELL 5 TO CENTRAL TREATMENT FACILITY

Item		Total
1. Labor 2 hr. per week @ 17.50/hr.		1,800
2. Well 5 Operating Costs[a] (43 mg/yr) x ($91.32/mg)		3,900
3. Maintenance on Valves, Controllers		1,000
	Subtotal	6,700
4. Annualized Equipment Replacement Costs (AERC)[b/c]		
At 5% Rate, ($30,000)(.065)	1,950	
At 8 3/8 Rate, ($30,000)(.092)	2,760	
At 10% Rate,	3,180	
5. Subtotals (Annual O&M Plus AERC)		
At 5%, 6,700 + 1,950 =	8,650	
At 8 3/8, 6,700 + 2,760 =	9,460	
At 10%, 6,700 + 3,180 =	9,880	
6. Present Worth[c]		
At 5%,	133,000	
At 8 3/8%,	102,800	
At 10%,	93,200	

---

a/ Based on Operating Costs of St. Anthony Wells in 1985.

b/ Equipment Replacement Costs Throughout Project Life

a. Well 5 Rehabilitation (Approx. 15 yr.)		25,000
	Contingency (20%)	5,000
	TOTAL	30,000

c/ See Table 3-6 for Present Worth and Annualized Equipment Replacement Equations

contamination, a completed remedial action includes the completion of treatment or other measure(s) necessary to restore groundwater quality to a level that assures protection of human health and the environment. The operation of such measures for up to 10 years after the construction or installation and commencement of operation shall be considered remedial action. Also, under the amendment, operation and maintenance shall be considered to be any activities required to maintain the effectiveness of the treatment or measure following the initial 10 year period.

For this operable unit remedial action, only the construction or installation and operation of the GAC treatment system and the pipeline will be considered the remedial action. Therefore, operation of wells 3, 4 and 5 are not considered part of the remedial action.

It is recommended that the U.S. EPA fund 90% of the remedial action costs for a period not to exceed ten years after completion of construction. Based on an anticipated agreement with the State of Minnesota, the State will fund 10% of the capital costs of the remedial action and the City of St. Anthony will provide the 10% State share of the annual operation cost of the remedial action for up to ten years. The City will then assume all O&M costs for the life of the project. The City assumes all the costs associated with the operation of wells 3, 4 and 5.

STATE AGREEMENTS

Section 104(c)(3) of CERCLA sets forth the State financial responsibilities in remedial actions provided under CERCLA. The State financial responsibilities in the proposed remedial action would include payment or assurance of payment of 10% of the costs of remedial action, and assurance of all

future O&M costs after the initial 10 year period of the remedial action. The State anticipates receiving a commitment from the City of St. Anthony to assume all costs for the operation of wells 3, 4 and 5, all O&M costs of the operable-unit after the initial 10 year period, and to provide the 10% State share of the annual operation costs of the remedial action for the initial 10 year period.

The capital costs of the remedial action will be covered under a State Superfund Contract between the State and the U.S. EPA at the completion of design of the operable unit. The annual operation and future O&M costs will be covered under a Cooperative Agreement between the State and the U.S. EPA at the completion of design of the operable unit.

SCHEDULE*

Approval of Remedial Action (sign ROD)	March, 1987
Minnesota Pollution Control Agency Board Meeting-State Superfund Contract approval	April, 1987
Complete Design	October, 1987
Contract Award	November, 1987
Notice to Proceed	December, 1987
Construction Complete	June, 1988
Estimated Construction Period	5 - 9 months

* This schedule is contingent on the availability of funding by April 15, 1987.

FUTURE ACTIONS

The MPCA is continuing its comprehensive PI/FS for the site. MPCA has already completed a preliminary remedial investigation characterizing the site, major migration pathways, and preliminary identification of significant sources. MPCA is planning to complete the remaining tasks of the comprehensive RI/FS in 1988 in order to evaluate potential final remedial action(s). The feasibility study will recommend the most cost-effective remedial action(s) for the site. Consistent with section 120 of SARA, U.S. EPA and the Department of Army will enter into an interagency agreement concerning remedial action(s) for contamination arising as a result of the TCAAP activities.

[Attachment 1]

ENFORCEMENT

Past Federal and State enforcement activities have focused on up to twelve identified potentially responsible parties (PRP's). Each PRP had some involvement at either of the identified potential contamination source areas: the Twin Cities Army Ammunition Plant (TCAAP) or the Butcher Spur/Trio Solvents/Northwest Petroleum Refinery location.

In 1983 and 1984, the EPA issued notice letters to these PRP's requesting participation in the conduct of the three Initial Remedial Measures (IRM's) and the comprehensive regional remedial investigation/ feasibility study (RI/FS) for the New Brighton/Arden Hills/St. Anthony study area. None of the PRP's indicated willingness to undertake or participate in any of the IRM's or studies which EPA had requested. Therefore, EPA and MPCA proceeded with funding and undertaking of these remedial activities.

Preliminary results of the state-lead comprehensive regional RI/FS indicate that the TCAAP is a major source of groundwater contamination in the study area. Based on these results, in January, 1986, the EPA offered the U.S. Army/Department of Defense (DOD) the opportunity to participate in the regional RI/FS and in the TCAAP sewerline force main study being conducted by EPA off of the TCAAP. The Army/DOD steadfastly refused to undertake work outside of the base.

Notice letters, as required under section 122(a) of SARA, will be issued to all identified PRP's indicating the Agency's intent to proceed with the selected alternative for the operable unit remedial action without additional opportunity for the PRP's to negotiate a settlement.

[Attachment 2]

Community Relations Responsiveness Summary
St. Anthony Municipal Water Supply

INTRODUCTION

This "Community Relations Responsiveness Summary" documents citizens' reactions and concerns raised in reference to the Phased Feasibility Study (PFS) for an operable unit remedial action for the St. Anthony municipal water supply, St. Anthony, Minnesota. It also documents, for the public record, the United States Environmental Protection Agency's (U.S. EPA) responses to the comments presented during the public comment period for the PFS.

The U.S. EPA conducted the PFS to evaluate an operable unit for an alternative water supply for the City of St. Anthony. The PFS was completed on June 9, 1986, under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601 et seq., and in accordance with the National Contingency Plan (NCP), 40 CFR Part 300. The U.S. EPA recommended that construction of granular activated carbon (GAC) water treatment facilities and a pipeline connecting St. Anthony well 5 to the proposed GAC treatment facilities was the appropriate operable unit for St. Anthony.

BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Residents and locally elected officials have maintained a constant and serious interest in the Superfund activities at this site. Community relations has been a cooperative effort with the EPA funding the Minnesota

Pollution Control Agency (MPCA) to conduct the majority of the community relations work. EPA community relations staff participates in the Twin Cities Army Ammunition Plant (TCAAP) public affairs steering committee. Other participants in this committee are staff from the MPCA, the U.S. Army, Honeywell Inc., and Federal Cartridge Corporation.

The public has been kept informed of the activities at this site by various means. Four public meetings have been held in the area between the time contamination was first detected in New Brighton (June, 1981) and the June, 23, 1986 public meeting for the PFS. EPA and MPCA technical staff have kept St. Anthony's city manager apprised of any new developments regarding this site and specifically this operable unit. Both local newspapers, the weekly St. Anthony Bulletin and the biweekly Northeaster, regularly report on new information regarding the site.

The concerns expressed by the citizens are equally divided between health and financial issues, the latter manifested in a lawsuit filed by the City and local citizens to recover the City's costs associated with replacing its water supply system. Media interest regarding this site has remained very constant.

CONCERNS RAISED DURING THE COMMENT PERIOD

The public comment period to review the PFS and recommended alternative was opened on June 12, 1986. In compliance with CERCLA, a public meeting was held in St. Anthony on June 23, 1986. The results of the PFS were presented and questions about the findings answered. The meeting was attended by approximately 60 people, consisting of interested members of

the public, representatives from MPCA, U.S. EPA, U.S. Army and local officials. Comments about the recommended alternative were duly recorded.

During the public comment period, eleven comments -- four written and seven oral at the public meeting -- were received by the U.S. EPA. The public comment period was originally scheduled to close on July 2, 1986, however, one of the public comments requested a two-week extension of the comment period. The extension was granted and the community was notified that the public comment period would officially closed on July 16, 1986.

In general, the commentors were pleased the problem was being addressed and raised questions that requested additional information about alternatives that were not recommended. Concerns were also expressed about losing St. Anthony well 5 as a backup water source. EPA performed additional studies addressing this concern and has amended its recommendation to include construction of a pipeline connecting St. Anthony well 5 to the proposed GAC treatment facilities.

FORMAT FOR PRESENTATION OF PUBLIC COMMENTS AND RESPONSES

The public comments received during the comment period were complex and in many cases, duplicative. To facilitate presentation of the comments and the Agency's responses, the comments and responses are listed in appendices 1 and 2 respectively. Appendix 1 contains the public comments, listing the seven oral comments first, followed by the four written comments. Appendix 2, using a tabular format, contains the Agency's responses to the public comments.

The Agency's responses to the comments resulted in some changes to the draft PFS. The major revisions to the PFS incorporated more detailed discussion and additional information concerning topics that commentors felt were not fully addressed. An attempt was made to paraphrase the oral comments as accurately as possible, thereby, retaining the commentors original intent. The written comments are photocopies of the actual documents as received by the Agency.

Each comment is assigned a number (1 to 11) and each comment may be further divided by assigning a letter(s), found on the right hand margin, to separate paragraphs or ideas within each comment. This format should simplify presentation of the comments and responses and ease cross-referencing of similar comments and responses.

(APPENDIX 1)

PUBLIC COMMENTS
ST. ANTHONY MUNICIPAL WELLS
ST. ANTHONY, MINNESOTA

The EPA's responses to the public comments are presented in Appendix 2.

Comment No. 1

The city manager of St. Anthony, Mr. David Childs, expressed on behalf of the citizens of St. Anthony, the following comments. He commended EPA and MPCA for being helpful, thus allowing the City of St. Anthony adequate time to plan, with regards to the groundwater contamination problem affecting their municipal water supply. He wished the U.S. Army and the Department of Defense (DOD) were as responsive and felt that Army/DOD prefers litigation to negotiation. a

Regarding the PFS, he was concerned about the absence of some information and cost data pertaining to both the deep well alternative and the Roseville/St. Paul connection alternative. b

He stated that the Roseville/St. Paul connection alternative cost estimate could be reduced by 25% to $4,200,000. However, he had some reservations regarding this alternative because his office normally receives a large number of phone calls complaining about the taste, smell and odor of the water whenever the temporary Roseville connection is used. c

He is concerned that the fate of St. Anthony well 5 (the city's backup well) has not been properly addressed. Because well 5 is diesel-driven, it is a dependable backup well when St. Anthony experiences power outages (during electrical storms, tornadoes, etc.). d

With regard to the air stripper alternative, he expressed concerns about the noise and the air emissions generated from the unit(s). He stated that there would probably be a need for a rate increase with all of the alternatives and particularly with the Roseville/St. Paul connection alternative. The City and the staff of St. Anthony would probably recommend selecting the carbon filtration alternative. e

Comment No. 2

Mayor Robert Sundland thanked the U.S. EPA and MPCA for maintaining an open exchange of information regarding this project even though there may not be agreement among all parties with all aspects of the project. He has written to the congressional delegation with regards to the need for Superfund reauthorization. He stated that his concern and his goal is to have a clean, fresh water supply for the city. a

He is glad that St. Anthony has had the time to plan, with regard to the groundwater contamination problem, and not have to immediately react to the problem as New Brighton has had to do. He is aware of the proposed reduction for the maximum contaminant level for trichloroethylene (TCE). At this point, he agrees with the selection of the carbon filtration alternative. a (cont.)

Comment No. 3

Mr. DuWayne Mitkie, a resident of St. Anthony and an engineer, is pleased that the city can plan ahead with regard to the groundwater contamination problem. He believes carbon filtration is a good system. a

Comment No. 4

Ms. Cathy Daniels, a resident of St. Anthony, agrees that a carbon filtration system should be the recommended alternative. She states that even though water from the Roseville connection may get many complaints, she would rather drink rusty water than TCE-contaminated water. She is angry that the source of the groundwater contamination problem is not being attacked and she believes St. Anthony needs to take the risk and bring suit (against the Army) as the City of New Brighton has done. a

Comment No. 5

A resident of St. Anthony raised the concern that if an inter-city connection alternative was selected, there exists a strong possibility that the rates (costs) charged by the nearby a municipality could escalate in the future.

Comment No. 6

Mr. David McDonald, an attorney representing the City of St. Anthony, requested an extension (2 weeks) of the public comment a period. The City needed additional time to analyze and comment on the Phased Feasibility Study.

Comment No. 7

A resident of St. Anthony questioned whether there was sufficient notification to the public regarding the June 23, 1986 public a meeting.

8

JUL 14 1986

Minnesota Pollution Control Agency

July 11, 1986

Ms. Judy Beck
Office of Public Affairs
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Ms. Beck:

This letter provides the Minnesota Pollution Control Agency (MPCA) staff comments to the U.S. Environmental Protection Agency's (EPA) recently completed St. Anthony water supply system Phased Feasibility Study (PFS). As was stated by MPCA staff at the public meeting held at St. Anthony City Hall on June 23, 1986 regarding the PFS, we concur with the EPA recommended alternative of installing a carbon treatment system to the St. Anthony water supply system at municipal wells 3 and 4. a

MPCA staff believes that the air stripping treatment, Roseville interconnection and new deep well alternatives also given consideration by EPA were appropriately rejected. The public perception of the air stripping emissions, proximity of a public school to the operations, and additional costs of an air purification system, make the air stripping alternative less cost-effective than the carbon treatment option. The interconnection alternative to Roseville, while being the least expensive for initial capital costs, would have excessive annual operating costs due to purchase of the water from Roseville. The new well alternative involving Mt. Simon-Hinckley aquifer wells may not provide an adequate yield for St. Anthony's needs and the high construction costs of those wells along with the probable need for an iron treatment system and installation of a new distribution system would require excessive capital cost expenditures. b

While we support the carbon alternative, we would like to make several additional comments if the recommended carbon treatment alternative is finalized by the EPA.

1935 West County Road B2, Roseville, Minnesota 55113-2785
Duluth Brainerd Detroit Lakes Marshall Rochester

JUL 14 1988

1. The selection of carbon treatment is currently based on a gravity flow system. MPCA staff would encourage a detailed assessment (advantages, disadvantages, and costs) between the gravity and pressurized flow carbon treatment technologies. A selection of the appropriate carbon technology now could speed up the Remedial Design phase and response action implementation.

2. The carbon cost in the PFS is set at one dollar per pound for the disposal of spent carbon and the purchase of replacement carbon. Additional discussion of the purchase price of the appropriate carbon grade and of disposal of the carbon is necessary to provide information on the initial PFS cost estimates for carbon treatment operations and maintenance (O & M) costs. We would also recommend that thought be given to long term purchase and disposal contracts to potentially lower annual costs and provide the city with assurances of carbon availability and disposal at reasonable costs.

3. A determination of the future of St. Anthony's wells as well as the temporary Roseville-St. Anthony partial interconnection should be made. The City has expressed an interest to MPCA staff in maintaining St. Anthony well 5 within the city's distribution system for use during peaking periods and as an alternative when maintenance is being performed on the other wells. In addition, MPCA staff is using the well as part of regional monitoring network. MPCA staff would, therefore, recommend that the PFS assess the feasibility of continued use of well 5 with no treatment, treatment at the well head and treatment at the central plant to determine if the well can remain in the distribution system. In addition to well 5, MPCA staff would recommend the PFS assess the continued use of the Roseville-St. Anthony interconnection. We believe if long-term O & M costs are low, the interconnection should be maintained to provide the City with a partial water supply in case of emergency.

Thank you for your consideration of our comments. If you have any questions regarding this letter, please contact Mr. Douglas Day, Project Manager at 296-7388 or Mr. David Crisman, Hydrologist, at 296-7299.

Sincerely,

Gary A. Pulford, Chief
Site Response Section
Division of Solid and Hazardous Waste

GAP:mec

cc: David Childs, City of St. Anthony
David McDonald, Attorney at Law
Gene Wong, U.S. EPA, Chicago
Gary Englund, Minnesota Department of Health
Hedia Adelsman, Minnesota Department of Natural Resources

Saint Anthony Village

Administrative Offices

3301 Silver Lake Road, St Anthony, Minnesota 55418

(612) 789-8881

June 26, 1986

Judy Beck
U.S. Environmental Protection Agency,
Region V
230 South Dearborn Street
Chicago, IL 60604

Dear Judy,

Please accept this letter as the official request from the City of St. Anthony for an extension (2 weeks) in the official comment period on the "Phased Feasibility Study for St. Anthony, Minnesota June, 1986", as prepared by Camp, Dresser, and McKee, Inc. under the USEPA Contract No1 68-01-6939.

a

As we stated at the public hearing, we have found several areas in the report which we need additional time to analyze prior to forwarding detailed comments to your office. To assist in our analysis, we have engaged the engineering form of Rieke, Carroll, Muller Associates, Inc. of Hopkins, Minnesota to do the work. We expect to receive their report by July 8th and we will forward our comments immediately thereafter.

Thank you in advance for your consideration in this matter of vital importance to our community.

Sincerely,

DAVE CHILDS

David M. Childs
City Manager

DMC/cjk

cc: Doug Day, MPCA
David McDonald, Briggs and Morgan
Lawrence Anderson, Rieke, Carroll, Muller Associates
St. Anthony City Council
Gene Wong, EPA

10

Saint Anthony Village

Administrative Offices

3301 Silver Lake Road St. Anthony, Minnesota 55418

(612) 789-8881

July 15, 1986

Judy Dash
U.S. Environmental Protection Agency,
Region V
230 South Dearborn Street
Chicago, IL 60604

Dear Judy,

The City of St. Anthony appreciates the time extension which allows us to comment on the St. Anthony Phased Feasibility Study (PFS) and also the understanding on the part of U.S. EPA concerning the critical importance to our community and its citizens that the correct choice be made regarding our long range water supply alternatives.

Our comments on the Camp, Dresser and McKee (CDM) Report follow:

1. The Phased Feasibility Study (PFS) addresses replacement of capacity for only two-thirds of our water supply system. Our system was originally designed to handle most eventualities and remedial action relating to only two of our three wells will leave us without a back-up supply which has been so critical to us, especially during the last two years. In April of 1984, a tornado devastated our community, causing $15,000,000 to $20,000,000 in damage. Power was out for several days. The only source of water was Well #5 - a water supply source largely ignored by the CDM Report. In the summer of 1986, Well #5 also became the only source of supply for St. Anthony after lightning struck Well #4. The water rationing ban in our City lasted only one week, but could have been much longer if the damage had been more severe.

   It is absolutely essential to our community that the supply system available prior to contamination of our drinking water be maintained for our residents on into the future. a

2. The City of St. Anthony has commissioned Rieke, Carroll and Muller Associates (RCM) to evaluate the PFS submitted by CDM based on our comments and concerns, many of which were expressed at the June 23, 1986 public meeting. We have attached b

their report and ask that it be considered on behalf of the City of St. Anthony as official comment regarding the St. Anthony PFS.

3. The RCM Report raises a number of questions and concerns about the PFS which we would like to see addressed prior to final action, and I will not attempt to repeat all of them here. There are, however, some pertinent items which should be emphasized.

   a. The CDM Report anticipates that the existing "Roseville Connection" is available as back-up water supply. We strongly disagree and feel that the RCM Report addresses that concern. c

   b. We have also asked RCM to respond to statements in the PFS regarding deep wells as an alternative water source for the City. Although it may indeed prove to be unfeasible in the final analysis, we feel that the alternative was rejected too early in the process. d

4. We believe that the concept of carbon filtration of Wells #3 and #4 may have merit as a preferred alternative but are unable to give final concurrence until concerns raised at the public meeting, in the RCM Report, and in this letter are properly addressed. e

5. The RCM suggestion about drilling one new deep well (Mt. Simon/Hinckley) as a back-up well for carbon filtered Wells #3 and #4, appears to have true merit and deserves further study. The alternative would envision placement of this deep well near Wells #3 and #4, allowing all three wells to use the existing manganese and iron removal plant and the current pumping and storage system. The additional capital cost of a single new deep well would be comparable to a carbon filter on Well #5 and the Operation and Maintenance costs would be substantially lower for the deep well. f

These comments are certainly not exhaustive and with only a few weeks having elapsed since our receipt of the final CDM Report, we feel that we have taken swift action to study the report and to develop a preliminary position relating to the City's alternatives and EPA and MPCA's recommendations. g

We are extremely pleased with the cooperation of U.S. EPA and MPCA to date and send our thanks to both staffs for their responsiveness.

On the other hand, we have found the U.S. Army and others extremely uncooperative and resent the stonewalling presented in a situation involving two public agencies (the City and the Army), both of which are taxpayer supported. It is a tremendous waste of public h

monies and we call on the MPCA and U.S. EPA to "tighten the screws" on the Army and other alleged responsible parties to head off what will otherwise be a highly contested and bitterly fought lawsuit between the City and the responsible parties. Our resolve in prevailing in such a lawsuit will remain undimmed, while our willingness for sensible negotiation remains foremost in our minds.

Thank you again for the opportunity to comment on the PFS. With levels of contamination continuing to rise, we request early and speedy action so that our residents can enjoy safe drinking water without interim emergency (temporary) measures being required, which will inevitably cost more in the long run.

Please do not hesitate to call me if you have any questions.

Sincerely,

David M. Childs

David M. Childs
City Manager

DMC/cjk

cc: St. Anthony City Council
Gene Wong, U.S. EPA
Doug Day, MPCA
David McDonald, Briggs and Morgan
Attorney General Hubert H. Humphrey III
Representative John Rose
Congressman Martin Sabo
Congressman Gerry Sikorski
Congressman Bruce Vento
Congressman Arlan Stangeland
Senator David Durenberger
Senator Rudy Boschwitz

REVIEW OF THE PHASED FEASIBILITY STUDY REPORT FOR ST. ANTHONY VILLAGE WATER SUPPLY

Prepared for
St. Anthony Village, Minnesota

July 9, 1986

by

Rieke Carroll Muller Associates, Inc.

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Dale A. Watson

Dale A. Watson, P.E.
MN Reg. No. 12141

REVIEW OF THE PHASED FEASIBILITY STUDY REPORT FOR ST. ANTHONY VILLAGE WATER SUPPLY

by Rieke Carroll Muller Associates, Inc.
July 8, 1986

Introduction

a

The U.S. Environmental Protection Agency, through one of its hazardous waste sites remedial response consultant, Camp Dresser and McKee, Inc., has prepared a Phased Feasibility Study for the Saint Anthony Village water supply. The study was conducted to identify and evaluate alternatives to replace or treat the contaminated water from the City's existing wells.

Saint Anthony Village desires to have meaningful input into the Federal/State decision-making process because those decisions will directly affect the City. To assist them, the City retained Rieke Carroll Muller Associates (RCM) to provide engineering advice related to the review of the Phased Feasibility Study.

The scope of services consisted of the review of the Phased Feasibility Study (PFS) report for purposes of identifying engineering aspects of the report that appeared weak, flawed, insufficiently documented, or possibly counter to City interests.

As a part of the review, we obtained and reviewed the following documents:

a) "Phased Feasibility Study for St. Anthony;" June 1986; by Camp Dresser and McKee, Inc. for the U.S. EPA.

b) "Feasibility Report for Temporary and Permanent Water Service from Roseville"; March 27, 1984; by Short-Elliott-Hendrickson, Inc.

c) "Report on Water Supply System for St. Anthony, Minnesota" (with supplement); by Bonestroo, Rosene, Anderlik & Associates, Inc. and Barr Engineering Company.

d) "Alternative Screening Temporary Water Supply - St. Anthony, Minnesota"; June 27, 1983; by CH2M HILL.

e) Various project notes and worksheets provided by Camp Dresser and McKee, Inc.

Our review of the Phased Feasibility Study (PFS) report was conducted as a three part evaluation. The first part consisted of a review of the thirteen alternatives which the report considered. In that investigation we determined whether all potentially viable alternatives had been considered. The second part of the investigation consisted of a review of the treatment and/or supply alternatives which the PFS report eliminated as being not potentially feasible. Here, we judged whether or not adequate justification was developed and presented for excluding certain alternatives from further consideration. The third part consisted of a review of the three treatment/supply alternatives which the PFS report investigated in detail. A critique of the information presented follows.

Alternative Screening

We generally concur with the PFS report regarding the indentification of initial potentially feasible alternatives for supply and/or treatment. Other supply/treatment alternatives that could have been mentioned include:

A. New shallow wells (i.e. drift wells) with subsequent treatment: Glacial drift material can sometimes be found that provides good well yields. Such wells do tend to be susceptible to contamination.
B. Volatile organic compound (VOC) removal by different aeration or oxidation techniques. These techniques are generally considered experimental at this time.
C. Combinations of the various alternatives.

Although these are possible alternatives, we do not anticipate that any will provide a viable treatment or supply option and, therefore, we suggest no further consideration be given to these at this time. b

Dismissed Alternatives

Under the review of the treatment alternatives which were dismissed as being non-viable, we offer the following comments:

A. The Minneapolis connection is a potentially viable solution and should have been discussed in more detail. The treatment capability of the Minneapolis Water Treatment Plant is approximately 200 mgd. St. Anthony's average daily consumption is 1.2 mgd, or approximately 0.5% of the capability of the Minneapolis facility. The Minneapolis Water Department staff has indicated that they would have the capability of supplying water to St. Anthony. Minneapolis' distribution system near St. Anthony is quite good. A large diameter watermain along Stinson Blvd. could possibly be utilized for connection to the St. Anthony system. c

B. Connection to the Columbia Heights system should not have been categorically rejected for the same reasons that the Minneapolis connection should not have been rejected. It would appear to be more desirable to connect to Minneapolis than Columbia Heights because Columbia Heights purchases water from Minneapolis. If the distribution system in either Columbia Heights or St. Anthony would warrant such a connection, it may be feasible to connect to the Columbia Heights system; however Minneapolis typically restricts the resale of purchased water. d

C. The option of deepening the existing wells or constructing new wells into the Mt. Simon-Hinckley aquifer should not have been rejected without a detailed analysis. Cost estimates of constructing to this aquifer have not been presented in the PFS report. The O&M cost of wells in the Mt. Simon aquifer will most certainly be attractive from an annual cost standpoint compared to all other alternatives. It appears that, while from a regional standpoint it may be desirable to pump the contaminated water out of the Prairie Du Chien/Jordan aquifer as a method of reducing the spread of present contamination, this alternative may not be in St. Anthony's best interest, if operating costs must be borne locally. The cost to St. Anthony in the future will undoubtedly be greater than has been experienced in the past. The deep well alternative may be feasible and may provide some cost savings which the PFS report did not address. We e

asked B. A. Liesch Associates, Inc. to provide us with an assessment of the potential for Mt. Simon-Hinckley wells. Their comments are appended to this document.

D. The combined air stripping and liquid-phase-carbon-adsorption alternative should not have been dismissed without further evaluation. This alternative may also be attractive from an operation and maintenance standpoint. The report evaluation considers the cost of removing 300 parts per billion of VOC. If a combined air stripping carbon adsorption system is utilized, the cost of carbon replacement may be significantly reduced by first removing a major portion of the volatiles through air stripping. f

Review of Detailed Alternatives

Part three of our review consisted of evaluating the discussion of the three detailed alternatives.

Roseville Permanent Connection:

A. In the PFS report, much discussion is devoted to the standby connection to Roseville. We would recommend that, if a booster pump and/or automatic valve system were constructed, they should be built within a building and not a valve vault. Also, we do not understand the value of the valving arrangement as presented. It would appear to be more reasonable to have two manually operating valves feeding the system. Also, if a standby supply is needed, it may be more desirable to make that connection directly to the St. Anthony distribution system in the area of 29th Avenue and Silver Lake Road rather than locating it north along Rankin to 33rd Avenue. g

B. Since the existing iron removal filters would not be needed, would they be abandoned and what would be the removal cost. Also, proper abandonment or other disposition of the wells would be required. h

C. For consistent comparison of the alternatives, costs for operating the high service pumps (and building heating) should be included in the Roseville i

alternative, since these costs also appear in the treatment alternatives (combined in the estimate for operating wells 3 and 4).

D. The annualized equipment replacement cost is incorrectly calculated and is overstated. j

E. In the report, constructability of the Roseville connection is judged to be moderately difficult compared to moderately easy for the treatment alternatives. This seems to us to be an inaccurate qualification. k

F. A water rate change will be required for whatever alternative St. Anthony pursues. The cost of a rate study should be included in the total costs of each alternative. l

Air stripping with vapor phase carbon adsorber for air purification:

G. The air stripping system as proposed will just meet maximum day capacity with all equipment in service. For achieving good reliability, the design flow (maximum day rate) should be met with the largest individual unit of a given process out of service (called firm capacity). Preferably, an additional air stripper, or at least a standby blower, should be provided. m

H. The need for an emergency power supply has not been discussed. n

I. The design of the air purification system is not well documented. Since these systems are not commonly used on air strippers, the design, operation. costs. and need should be more fully considered and discussed. o

J. A 30 percent contingency allowance has been used for all alternatives. This seems overly generous and could tend to bias the cost estimates in favor of the less-capital-intensive alternatives. p

K. Computation of the annualized equipment replacement costs is not correct. q

L. Energy costs appear over-estimated because all three stripping tower blowers and both air purification system fans were assumed to run continuously. r

M. The air purification system carbon disposal cost appears to be miscalculated. s

Carbon Adsorption System (Liquid Phase):

N. Comments made previously regarding annual equivalent replacement costs, contingencies, rate study costs, emergency power, and firm capacity apply to this alternative as well. t

O. The square-foot cost of the new building is higher in this alternative than for the air stripping alternative. Why? Also the building maintenance cost is higher. u

P. The energy use seems to be overestimated. It appears that an extra stage of pumping has been assumed and that all pumps are assumed to run continuously. v

Q. The City should realize that carbon costs are a major operating expense and may vary greatly. The carbon replacement cost is estimated to be $60,000/yr. based on a carbon purchase price of $0.80/lb. and a disposal cost of $0.20/lb. Recent vendor information shows a purchase price of $0.95/lb and disposal costs could be as high as $1.10/lb. The carbon usage could also change greatly (perhaps by an order of magnitude) depending on the concentrations and types of organics in the water. With VOC levels in the wells apparently increasing with time, it is difficult to accurately predict carbon usage. w

R The cost estimate for liquid phase carbon adsorption is based on equipment normally used for temporary treatment situations. When considering a permanent facility, as will be required under this alternative, capital costs may be $150,000 greater than indicated. x

Reserve Water Supply Requirements

A. The entire treatment discussion in the report assumes that wells 3 and 4 will be utilized to supply the maximum daily demand and that the existing temporary connection would provide standby capabilities, if necessary. We think the City should have at least the same supply capabilities in the future as they had prior y

to the contamination. With wells 3, 4 and 5, there was the capability of providing the maximum daily demand with one well out of service. The system proposed by the PFS report would not provide that capability.

From the report by Short Elliott and Hendrickson Associates, it is obvious that the temporary connection was never intended to serve as a backup to the entire City. In fact, their report states that it would serve 15-20% of the City and wells 4 and 5 would serve the remainder of the City. If the entire St. Anthony system were directly operated off the Roseville system, 40% of St. Anthony's elevated storage and all of its ground storage would be rendered useless. When only a portion of St. Anthony's system is isolated and served by the temporary Roseville connection, the remainder of the City has no reserve supply at all. Relying on the Roseville temporary connection for standby capacity is not viable.

y

We suggest that if a backup supply connection is made to Roseville, it should be made similar to the so-called permanent connection which has been evaluated in one of the other alternatives of the report. Any cost of supply and/or treatment of the water from wells 3 and 4 would then have to include the cost of the so-called permanent Roseville connection. It should be noted that the system may have interface problems with two waters of different hardness, which is part of the reason the temporary connection serves only a section of the system that is valved off from the rest.

B. A better reserve supply alternative is to have a third well. The PFS report recommends elimination of well number 5 because it "operates with an older diesel engine". It is our feeling that since the City is investigating a long-term water supply problem, use of an existing well should not be eliminated just because of an inadequate existing well pump. The report also mentions high iron concentrations in well number 5 and no treatment available for removal of that iron. Treatment could be provided. Further analysis should be made to determine the cost-effectiveness of separate treatment at the well head versus piping of the well 5 raw water to a central treatment plant.

z

Also a combination of VOC treatment for wells 3 and 4 plus drilling a new Mt. Simon-Hinckley well should be given serious consideration. Placement of the

new well near wells 3 and 4 would permit utilization of the existing iron removal capability, would eliminate long-distance piping of raw water, and would not cause interference with wells 3 and 4 in the Prairie Du Chien/Jordan aquifer. Such an alternative would provide adequate standby capacity perhaps at less expense than other methods considered.

Conclusion

As a result of our review and critique of the PFS report, we have commented on numerous concepts and details which the City may wish to consider in preparing its response to EPA.

We have major reservations concerning the report's failure to adequately address the Mt. Simon-Hinkley wells alternative and the reserve supply issue for the treatment alternatives. Furthermore, there are some areas related to the preliminary design and cost-effectiveness analysis of the alternatives that could be improved if necessary. aa

Finally, we believe that consideration should be given to an alternative consisting of VOC treatment of water from wells 3 and 4, with construction of a new Mt. Simon-Hinckley well near the existing treatment plant. This alternative has a number of advantages and may be a cost-effective way of providing an adequate water supply.

bb

MT. SIMON - HINKLEY AQUIFER ASSESSMENT

ST. ANTHONY, MINNESOTA

JULY 9, 1986

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Mt. Simon-Hinkley Aquifer Assessment
St. Anthony, Minnesota

Introduction

As part of the review of the Camp Dresser & McKee, Inc. (CDM) phased feasibility study for St. Anthony (June, 1986), BAL conducted a preliminary assessment of the potential of the Mount Simon-Hinkley aquifer as a replacement Water Supply Source for the City of St. Anthony. As part of the review BAL collected and reviewed the following documents:

- CDM Phased Feasibility Study (June 1986)
- New Brighton Well Construction and Pumping Records
- DNR Water Appropriations Permits
- Discussion with DNR regarding permittability of Mt. Simon-Hinkley Wells
- Water well records from the Minnesota Geological Survey
- Pertinent publications on Mt. Simon-Hinkley Aquifer

The U.S. Geological Survey has conducted studies of the Mt. Simon-Hinkley Aquifer in the Twin Cities Area but that information was not available for review owing to the vacationing of the U.S.G.S. staff person responsible for the study.

CDM Findings

CDM concluded in their June, 1986 report that development of the Mt. Simon-Hinkley aquifer as an alternative water supply source was not feasible for the City of St. Anthony. CDM identified four limiting factors in the use of the Mt. Simon-Hinkley Aquifer as follows:

-The Mt. Simon-Hinkley is a tightly confined aquifer with little local recharge. It is for this reason that the DNR would like to see the Mt. Simon-Hinkley aquifer developed only as a last resort.

-It would be difficult to site wells in the St. Anthony area due to the spacing requirements needed to minimize well interference and maintain well yields.

-All water supplies would need to be treated with iron removal. The raw water would need to either be transmitted to a centralized treatment facility which would entail installation of transmission line to the treatment plant or treated at the water head through construction of individualized treatment plants.

-The Mt. Simon-Hinkley water supply alternative was calculated to be associated with the second highest capital costs of all alternatives evaluated.

CDM also concluded that only Well No. 3 has a sufficient well diameter to be reconstructed as a Mt. Simon-Hinkley well.

Mt. Simon-Hinkley Aquifer Availability and Feasibility.

New Brighton Water System

New Brighton experienced similar water supply contamination from volatile organics, with the contaminant levels observed in the New Brighton wells much higher than those observed in the St. Anthony wells. In 1982 New Brighton selected the deep well alternative as the most feasible approach to mitigating the contamination of the Prairie du Chien-Jordan aquifer. The deep well alternative was selected as the most feasible in large part because of the unknown reliability of both carbon treatment and air stripping in 1982. The City reports that the Minnesota Department of Health recommended that the deep well alternative be selected apparently because of this unknown reliability of other alternatives.

The City of New Brighton presently operates five Mt. Simon-Hinkley wells and one Prairie du Chien-Jordan well. New Brighton plans on installing one additional Mt. Simon-Hinkley well this summer. Of the five existing Mt. Simon-Hinkley wells, two are reconstructed Prairie du Chien-Jordan wells which were drilled and cased into the Mt. Simon formation.

The Mt. Simon-Hinkley wells presently pump from 700 to 1100 gallons per minute (gpm). During the initial testing of the wells, pumping rates of up to 1600 gpm were recorded. One of the limitations to higher pumping rates is that at the higher pumping rates increasing amounts of sand are pumped from the well. The City reports that a very fine grained sand was removed during development and observed during pumping. Over time with continued pumping the sand levels decrease. According to City staff, sand has not caused an abrasion problem with the well pumps and has not caused appreciable operational problems. The City estimates the sand content to be 2-4 ppm.

Testing and observation of the Mt. Simon-Hinkley wells has indicated that the wells are associated with a specific capacity of 10 gpm per foot of drawdown (gpm/ft). Because the well field cannot be shut down to test individual wells, this specific capacity takes into account the interference between wells. The distances from the centralized well to the other wells range from 7,000 to 10,000 feet. Static water levels observed at the City wells range from 280 feet below the surface in the southern parts of New Brighton to 220 feet below the surface in the northern parts of the City.

Water from the Mt. Simon-Hinkley aquifer is generally soft with a hardness reported to be 9-10 grains per gallon. Manganese is generally low with iron reported to be in the area of 0.7 ppm. The water is reported to be associated with hydrogen sulfide with an odor present at the well head. After treatment for iron, hydrogen sulfide is no longer a problem. The water is also reported to be slightly aggressive with piping but has not caused any operational problems.

Area Mt. Simon-Hinkley Water Use

In addition to the City of New Brighton, there are other Mt. Simon-Hinkley water users in the area. The City of Fridley is reported to have four Mt. Simon-Hinkley wells located over two miles northwest of St. Anthony. The Soo Line Railroad has a well one mile west of the City and was reported to have a 1984 water appropriation of 9.4 million gallons. The Burlington Northern Railroad has a Mt. Simon-Hinkley well approximately 1-1/2 miles southwest of the City. This well was reported to have no water appropriation in 1984 and may not be used at present. There are four other high capacity wells within two miles of the City which are not identified as to which aquifer they draw from. Those wells are; Midland Hills golf course and Paper Calmenson & Co. located southeast of the City, Indianhead Truck Lines east of the City, and Feinberg Distributing south of the City.

DNR Position

The DNR was contacted to discuss the potential for the use of the Mt. Simon-Hinkley Aquifer in the City of St. Anthony. The DNR indicated that the Mt. Simon-Hinkley Aquifer could be used as an alternative water supply source but that it must be shown to be the most feasible of all alternatives. The DNR policy is to attempt to stay away from use of the Mt. Simon-Hinkley Aquifer if possible.

If the Mt. Simon-Hinkley aquifer was proposed as the mitigation alternative, the selection would have to be justified before the DNR would issue appropriation permits. In reviewing this alternative, operations and maintenance costs will be considered as only one of many factors in the review of this alternative. The DNR would also require that a water conservation program be implemented to minimize water use.

Mt. Simon-Hinkley Potential

The Mt. Simon-Hinkley Aquifer appears to be a suitable alternative water supply source for the City of St. Anthony. The selection of this alternative also has some inherent short term and long term potential limitations.

Based on the experience of the City of New Brighton, a Mt. Simon-Hinkley well in St. Anthony could be expected to have a specific capacity of 10 gpm/ft. This means that a well pumped at 1000 gpm would experience 100 feet of drawdown. Recall that the specific capacity of 10 gpm/ft observed in New Brighton includes the drawdown interference caused by the other area wells pumping.

A static water level ranging from 250 to 300 feet below the surface could be anticipated at Mt. Simon-Hinkley wells. Static water levels would be highest in the northern areas if the City with static water levels declining in a southerly direction.

Well No. 3 is the only well in the St. Anthony well field that could be reconstructed as a deep well. At present Well No. 3 has a 24 inch diameter inner casing with a 30 inch diameter outer casing. A 23 inch borehole could be drilled to the Mt. Simon formation and an 18 inch diameter liner casing installed. The casing would be grouted in place to isolate the contaminated Prairie du Chien-Jordan Aquifer. Similar procedures were successfully used on wells no 8 and 9 in the City of New Brighton in 1982. Reconstruction of well no. 3 would provide a deep well centrally located in the City and near the existing iron treatment facility.

Wells no. 4 and 5 do not appear to be suited for reconstruction. Both wells are reported to be constructed with a 16 inch inner casing. To drill and install an inner liner casing a 10 inch diameter casing would need to be installed to meet the requirements of the Minnesota Department of Health. A 10 inch casing would limit the yield that the well could produce.

If the Mt. Simon-Hinkley Aquifer is developed, additional wells could be installed near Gross Golf Course in the southern end of the City and near well no. 5 near Silver Lake. General distances to other area wells from the proposed location are provided below.

Well No. 3 (St. Anthony)	(ft)
- Proposed deep well (Gross Golf Course)	7,000
- Proposed deep well (Silver Lake)	5,000
- Soo Line Railroad	10,000
- Well 10 (New Brighton)	6,500
- Well 9 (" ")	8,500
- Indian Head Trucking	9,000

Proposed Deep Well (Gross Golf Course)	
- Well 3 (St. Anthony)	7,000
- Burlington-Northern Railroad	10,000
- Soo Line Railroad	10,000
- Paper Calminson	2,500
- Feinstein Distributors	6,000
- Indian Head Trucking	9,000

Proposed Deep Well (Silver Lake)	
- Well 3	5,000
- Well 9 (New Brighton)	5,500
- Well 10 (New Brighton)	6,500

Under a well installation scenario as presented, Well No. 3 and the Proposed Deep Well (Gross Golf Course) could be the primary pumping wells with Proposed Deep Well (Silver Lake) as the backup well. This would help maximize the distance between area Mt. Simon-Hinkley wells. This scenario may also increase operational costs owing to the anticipated deeper static and pumping levels in the southern end of the City.

Well construction of the wells would be similar to the well construction of the New Brighton wells. A 30-inch surface casing would be driven to rock with a 29-inch borehole advanced to the top of the St Lawrence Formation. 24-inch casing would be installed and grouted in place with neat cement grout. A 23-inch borehole would be advanced into the top of the Mt. Simon Formation and an 18-inch casing would be installed and grouted into place with neat cement grout. A 17-inch borehole would be advanced into the Mt. Simon and Hinkley Formation and the well developed.

There are some limiting factors associated with the Mt. Simon alternative.

1) The DNR may not permit the use of the Mt. Simon-Hinkley Aquifer if other water supply sources are available. Capital and O & M cost will be only one of the factors in the review of the various alternatives.

2) Water levels in the Mt. Simon-Hinkley Aquifer have historically been declining since the use of the aquifer began. The Eau Claire formation overlying the Mt. Simon formation acts as an effective aquitard limiting the amount of vertical recharge reaching the aquifer. Recharge occurs predominantly in the areas north of the Twin Cities where the Mt. Simon and Hinkley formations subcrop and are in direct contact with glacial materials.

The City of New Brighton has not experienced a decline in static water levels over the almost 4 years of record which suggests that the City is not "mining" groundwater. This is an insufficient record to assess long term groundwater trends or the response of the aquifer to short term or prolonged drought. Intuitively, we would expect to see water levels slowly decline through the increased usage of the aquifer.

3) It is important that any new deep wells are adequately constructed so as not to provide a conduit for downward migration of contaminants into the Mt. Simon-Hinkley Aquifer.

4) The cost of well construction and operation will be higher for wells located in the southern end of the City when compared to northern areas. The formations and potentiometric surface slope in a southerly direction. This will require the installation of deeper wells and will required more lift at the southern wells.

5) High iron and hydrogen sulfide levels will require iron treatment prior to distribution. The water is also reported to be slighlty aggressive though New Brighton has not reported operational or equipment problems to date.

6) The fine grained nature of areas of the Mt. Simon -Hinkley Aquifer will require additional development time during well installation. Sand may also be a continuing problem through the operation of deep wells.

7) The existing Prairie du Chien-Jordan Wells may need to be abandoned if they are not deepened or used as part of an aquifer clean-up program.

If the wells are not to be used as either water supply sources or as clean-up wells, the Minnesota Department of Health may require that they be permanently abandoned. Abandonment of the wells may consist of grouting the wells from the base to the surface using neat cement grout.

The existing wells may be usable in what ever aquifer clean-up program is developed. The wells could be used as is, or reconstructed to draw water from a select horizon in the aquifer to act as either removal or monitoring wells.

Costs for Mt. Simon-Hinkley Alternative

Well Construction

Mt. Simon-Hinkley wells drilled and constructed as presented within this report (30 inch X 24 inch X 18 inch) should cost between $ 250,000.00 to $ 300,000.00 per well. This cost covers drilling, installation, and development of the well but does not cover pump costs, controls, well house, and any transmission line or treatment costs.

Well Abandonment

Well abandonment costs are difficult to estimate because of the unknown nature of the borehole characteristics. Both large cavities in the Jordan Sandstone as well as major fractures or solution cavities within the Prairie du Chien dolomites can require large quantities of grout and, as such, increase the well abandonment costs.

Wells No. 4 and 5 are Jordan Sandstone wells with the Prairie du Chien dolomites cased off. In developing costs for abandonment we assumed the open borehole was not much larger than the casing I.D.. We also assumed the well would need to be grouted using neat cement grout so as not to provide a conduit for deeper migration of contaminants.

The anticipated costs to abandon the wells is $ 6,000.00 each. If the borehole in the Jordan Sandstone is appreciably enlarged during development and operation, the cost could increase to $10,000 or more per well. This is based on an installed cost for neat cement grout of $200/c.y. which was provided by an area drilling contractor.

(APPENDIX 2)

AGENCY'S RESPONSE TO PUBLIC COMMENTS
ST. ANTHONY MUNICIPAL WELLS
ST. ANTHONY, MINNESOTA

The public comments are presented in Appendix 1.

PUBLIC COMMENT	EPA RESPONSE
1a	The U.S. EPA acknowledges the support of Mr. Childs.
1b	Additional information addressing the deep well alternative (see Sec. 2.2.4) has been incorporated into the Final Phased Feasibility Study (PFS). The primary reason the deep well alternative was not considered for detailed study was because of the Minnesota Department of Natural Resources' (MDNR's) concern about the long term adequacy of the Mt. Simon-Hinckley aquifer system as a sole-source supply. Other important reasons were the technical difficulty in locating the required number of deep wells, the long implementation times, and the high costs.
1c	With regards to the Roseville/St. Paul connection alternative, even with a 25% reduction in the cost estimate, this alternative would still be the least cost effective of the alternatives considered for detailed study. Additionally, there may be community resistance to the alternative due to taste and odor problems associated with the water.

1d The PFS has been amended to include detailed analysis of St. Anthony's need for a standby/ emergency water source (see Sec. 3.1.1.4). After the determination was made that the city required a new standby/emergency source, options were developed and evaluated to address this need. As a result of this evaluation, the recommended alternative was amended to include construction of a pipeline connecting St. Anthony well 5 to the proposed granular activated carbon (GAC) treatment facilities to provide the city with a dependable standby/emergency source of water.

1e At the time this comment was made, Section 104(c)(3) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) stated that the State had the financial responsibility to assure payment of 10% of the operation and maintenance (O&M) costs of the first year and all future O&M costs for the life of the project. The State would have most likely passed these costs on to the City of St. Anthony. Under the new Superfund Amendments and Reauthorization Act of 1986 (SARA), specifically amendment (i)(6) to Section 104(c)(3) of CERCLA, the U.S. EPA will assume 90% of the annual operation cost of

1e(cont)	the remedial action for a period of up to 10 years. The State will fund the remaining 10% of the annual operations costs and all future O&M costs after the initial 10 year period. The City of St. Anthony, through an anticipated agreement with the State may still have to assure the State share of the operational costs, however, under the new law, the State's share of O&M costs would be substantially reduced from previously anticipated levels.
2a	The U.S. EPA acknowledges the comments and the support of Mayor Sundland.
3a	The U.S. EPA acknowledges the comments and the support of Mr. Mitkie.
4a	The U.S. EPA acknowledges the comments and the support of Ms. Daniels. The City of St. Anthony has filed a complaint (suit) in March, 1986 against the U.S. Army for injunctive relief and damages resulting from the groundwater contamination problem.
5a	No response required.
6a	A two-week extension of the public comment period was granted, therefore, the public comment period officially closed on July 16, 1986.

7a U.S. EPA, through a press release issued on June 9, 1986 and a display ad, notified the public of the June 23, 1986 public meeting. Additionally, the local press provided notification through recent articles regarding the site.

8a The U.S. EPA acknowledges the support from the Minnesota Pollution Control Agency (MPCA) and look forward to working with the MPCA in a cooperative effort to conduct this operable unit.

8b No response required.

8c The PFS has been revised to include a more detailed discussion of the gravity and pressurized flow carbon treatment technologies (see Sec. 3.1.1.3). EPA believes detailed assessment between the gravity and pressure GAC treatment systems is more appropriately considered during the remedial design phase than the feasibility study phase. Additional information regarding both GAC systems will be obtained and applicability testing will be performed in the early stages of the remedial design.

8d Cost information on all remedial action technologies was obtained from vendors of these services as well as from the published

8d(cont)	literature. Cost estimates of the remedial action including O&M costs will be further refined in the design phase.
8e	Please refer to EPA's response to comment 1d. With regards to the existing Roseville-St. Anthony interconnection, water from this connection is not needed if the recommended alternative is implemented. However, abandonment of the connection is not warranted as the associated maintenance costs are far less than abandonment costs. As a consequence, it is recommended that the existing remain connection serviceable.
9a	Please refer to EPA's response to comment 6a.
10a	Please refer to EPA's response to comment 1d.
10b	No response required.
10c	Please refer to EPA's responses to comments 1d and 8e.
10d	Please refer to EPA's response to comment 1b.
10e	EPA believes that revisions incorporated into the PFS have addressed all of the City of St. Anthony's concerns.

10f Section 3.1.1.4, which addresses the standby/ emergency water source, has been added to the PFS. Based on the cost analysis of the standby/ emergency source options, the pipeline option was determined to be the most cost effective. The O&M costs between the pipeline option and the new well option are comparable, however, the capital cost of the new option is $227,000 greater than that of the pipeline option.

10g The U.S. EPA acknowledges the support and cooperation from the City of St. Anthony and look forward to working with the City in a cooperative effort to conduct this operable unit.

10h Please refer to attachment 1 which provides information regarding Federal enforcement activities at this site.

10i No response required.

11a No response required.

11b As was recommended, no additional potentially feasible alternatives were considered.

11c Section 2.2.3.2 of the PFS has been revised to include a detailed discussion regarding the reasons for dismissal of the Minneapolis connection alternative. The primary reason, for

11c (cont) dismissal is still because of MDNR's serious reservation about the adequacy of the Minneapolis system to supply water on a sole-source basis to additional users especially during an extended drought or under emergency situations.

11d Section 2.2.3.3 of the PFS has been revised to include further discussion regarding the reasons for dismissal of the Columbia Heights connection alternative. Since the community of Columbia Heights receives water from the City of Minneapolis, the same MDNR concerns exist.

11e Please refer to EPA's responses to comments 1b and 1e.

11f Preliminary cost estimates of a combination air stripper and carbon absorption system indicate that any reduction in carbon usage in the liquid adsorber would be offset by the added carbon use in the vapor phase adsorber. Capital and O&M costs would also be increased.

11g Technical justification in support of the comments is absent. Attention would have been given to these design considerations in the design phase if the Roseville/St. Paul connection alternative was recommended.

11h Currently, it cannot be determined whether abandonment of the iron filters and/or the wells is or is not consistent with the final remedy. Since the regional RI/FS has not been completed, no determination can be made at this time. Additionally, since this alternative was not the recommended alternative, a detailed cost analysis regarding iron filter/well abandonment was not performed.

11i Table 3-6 (Annual Costs - Roseville/St. Paul Alternative) has been revised to include the costs for building heating and for operating the high service pumps.

11j Upon reviewing our annualized equipment replacement cost (AERC) calculations, we find that they are correct. The vagueness of the term "overstated" is such that no changes in the AERC calculation are warranted.

11k It is unclear from reading the comment which alternative the commentor perceives is "inaccurate" in terms of constructability, therefore, no response could be given.

11l EPA believes the City of St. Anthony should assume the performance and the costs of any water rate studies deemed necessary as a

111 (cont) result of using any of the alternatives.

11m With the proposed air stripping system, essential demand would have been met. The additional cost of a backup tower is not warranted due to the ready availability of the air stripper system's moving components (motors, fans, etc.). In addition, for all alternatives which do not incorporate the existing Roseville-St. Anthony interconnection as part of the alternative, EPA recommends that this connection remain serviceable, thereby, maintaining a limited emergency water source.

11n The integration of an emergency power supply would have constituted an improvement to the St. Anthony water supply system beyond what existed prior to well contamination, therefore, an emergency water supply was not considered.

11o Since an air stripping system was not the recommended alternative, a detailed design, as requested in the comment, was not performed. Detailed discussion of design, operation, and costs are part of the design phase. EPA believes the need for the air purification system would have been dictated by community concern.

11p The typical contingency allowances specified in the U.S. EPA guidance document, "Remedial Action Costing Procedures Manual", fall in a range from 15 to 25 percent of total capital costs. Cost estimates in the PFS have been revised to reflect usage of a conservative contingency allowance of 25 percent.

11q AERC computations have been reviewed and no errors were found.

11r Table 3-8 (Annual Costs - Air Stripping) has been revised to reflect normal (assumed) operating conditions.

11s The air purification system carbon disposal cost was recalulated and the line item was corrected in Table 3-8.

11t Please refer to EPA's responses to comments 11l, 11m, 11n, 11p and 11q.

11u The higher square-foot cost for the carbon adsorption system building in comparison to the air stripping system building is warranted due to the requirement of large access doors to allow the carbon contactors to be removed/installed by truck. The minimally higher annual maintenance cost for the carbon adsorption system building is

11u (cont)	warranted because the air stripper system may generate greater amounts of dust/particulate matter during operation.
11v	Table 3-10 (Annual Costs - Carbon Absorption) has been revised to reflect normal (assumed) operating conditions.
11w	EPA agrees with this comment. Cost estimates in the PFS are based on vendor's quotes and published literature. Cost estimates will be refined during the remedial design phase.
11x	Supporting statements/technical justification for the $150,000 increase in capital costs is absent.
11y	Please refer to EPA's responses to comments 1d and 8e.
11z	Please refer to EPA's responses to comments 1d and 10f.
11aa	EPA believes that revisions incorporated into the PFS have addressed all of the City of St. Anthony's concerns.
11bb	The report prepared by Bruce A. Liesch Associates, Inc. titled "Mt. Simon-Hinckley Assessment" is a support document specifically for comment 11e.

11bb(cont) For discussions regarding Mt. Simon-Hinckley aquifer well(s), please refer to EPA's responses to comments 1b and 10f and to Sections 2.2.4 and 3.1.1.4 of the PFS.