

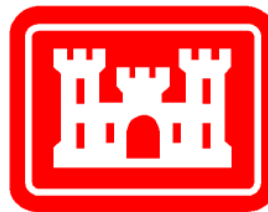
**LIMITED PRELIMINARY ASSESSMENT
REPORT**

FINAL

**STEAM PLANT & ASSOCIATED 26.7 ACRES
and
SEGMENTS B, C, AND D**

**FORMER GOPHER ORDNANCE WORKS,
ROSEMOUNT, MN**

PROJECT NUMBER E05MN0019



Prepared by U.S. Army Corps of Engineers-Omaha District

March 2009

LIMITED PRELIMINARY ASSESSMENT REPORT
FINAL
STEAM PLANT & ASSOCIATED 26.7 ACRES
and
SEGMENTS B, C, AND D
FORMER GOPHER ORDNANCE WORKS, MN

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**APPENDIX A – ATTACHMENTS
 APPENDIX B – REFERENCES**

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EXECUTIVE SUMMARY

The purpose of this Limited Preliminary Assessment (LPA)¹ investigation was to collect information to determine if further investigation at the Steam Plant and the associated 26.7 acres surrounding it (hereafter called the "Steam Plant property"), or at Segments B, C, or D of the Former Gopher Ordnance Works (FGOW) property, is warranted.

The Steam Plant property is the northeast corner of Segment A that was initially indemnified when transferred to the Regents of the University of Minnesota (UMN) in 1948. Due to the uncertainty over the effect of the various transfers of the Steam Plant property -- risk-shifting language was not included when the title to the property reverted from the UMN to the NIRD-GSA or when transferred from the GSA back to UMN -- in August 2006 the Office of the Assistant Secretary of the Army for Installations & Environment (ASA-I&E) recommended that Omaha District revise the FDE to reflect that all FGOW property, including the Steam Plant property, was FUDS eligible (Attachment 01). The revised FDE was signed in September 2006 (Attachment 02). A PRP investigation was approved in the same correspondence. As background for the PRP investigation, a PA was begun on the Steam Plant and associated 26.7 acres as request by Congressman John Kline in April 2006 (Attachment 03).

The FGOW property was divided into four segments, which are shown as Part II, Figure 1-1 of this LPA. Generally, Segment A contained the manufacturing operations and the northeast corner of Segment A specifically contained the gunpowder production lines as well as the Steam Plant property. The production of smokeless powder began in March 1945 and ended in September 1945. Following World War II, various parcels of FGOW were sold (or easements were released) to private individuals and to the Regents of the University of Minnesota (UMN). The UMN property is located on what was formerly Segment A. These sales and releases of easements occurred in 1947 and 1948.

FGOW was a government owned contractor operated (GOCO) facility. The facility was constructed and operated between August 1942 and July 1946. During 1945, E.I. DuPont de Nemours ("DuPont") produced nitric and sulfuric acids for approximately 10-months and smokeless cannon and rifle powder for about 6-months under Contract W-ORD-642, ending in September 1945.

To evaluate certain FGOW property through a PA the U.S. Army Corps of Engineers (USACE)-Omaha District used records from the National Archives and Records Administration (NARA), copies of historical maps and aerial photographs from the Dakota County Environmental Management (DCEM) office and information about current tenants in the remaining buildings from UMN. After reviewing preliminary information, the PA boundary was established around Segments B, C, and D, and around

¹ The reason that this investigation is regarded as a "Limited Preliminary Assessment" is that most of the history, property description and use, as well as the pathway and environmental hazard assessment were completed in the *Preliminary Assessment Report, Final, 1947 Quitclaim Property* which will be referred to as USACE, 2006 throughout this Preliminary Assessment.

the Steam Plant and the associated 26.7 acre property that reverted from the UMN to the National Industrial Reserve Division of the General Services Administration (GSA) on June 27, 1951 and then was transferred from the GSA back to UMN on March 3, 1961.

The USACE-Omaha District conducted a site reconnaissance in July 2005 and designated the Steam Plant as a DERP-FUDS eligible AOC in August 2006 (Attachment 01).

AOC 7: The Steam Plant and the associated 26.7 acres in the region

The Steam Plant property is shown in Figures ES-1a and ES-1b as part of the Segment A property transferred to the Regents of the UMN in 1948.

The following potential types of Hazardous, Toxic, and Radioactive Waste (HTRW)² were identified at the Steam Plant:

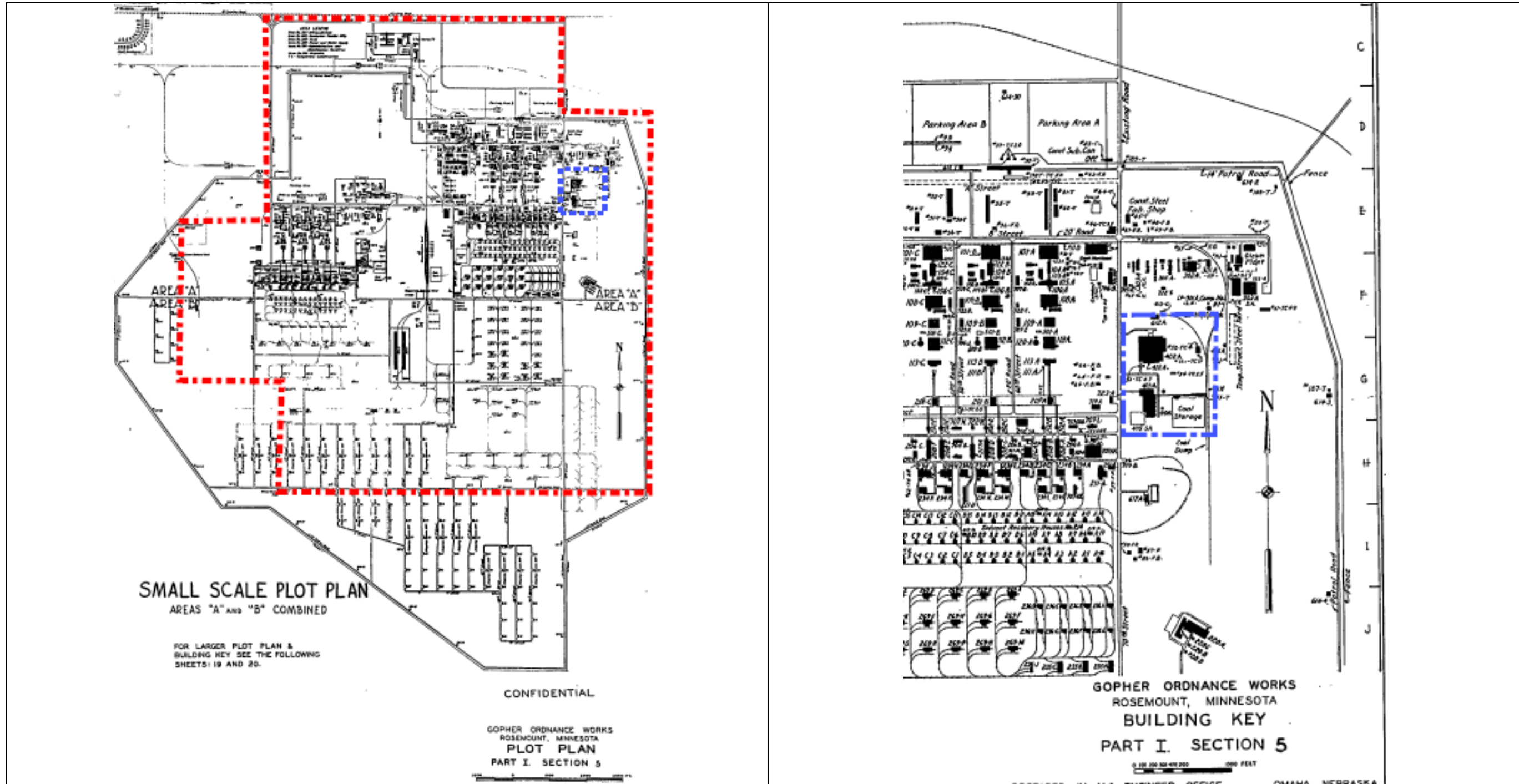
At AOC 7 the potential HTRW from past DuPont activities include nitrocellulose (NC), volatile organic compounds (VOCs) (petroleum-based or chlorinated industrial solvents/degreasers from vehicle maintenance activities), semi-volatile organic compounds (SVOCs), Resource Conservation and Recovery Act (RCRA) metals³, polychlorinated biphenyls (PCBs), and nitric and sulfuric acids. Nitrocellulose (NC), diphenylamine (DPA) and dinitrotoluene (DNT) are not considered as potential HTRW at AOC 7 because nitrocellulose and gunpowder were not manufactured in AOC 7 facilities, though there is a slight possibility of surface contamination due to windborne nitrocellulose. Other materials that are potentially present on AOC 7 due to demolition activities before and after property transfer to the Regents of UMN include asbestos.⁴

Because of Potentially Responsible Party (PRP) issues at AOC 7, a Site Inspection (SI) is recommended at AOC 7 to identify areas of possible contamination. There are no Potentially Responsible Party (PRP) issues involving HTRW on Segments B, C, and D so no SI is recommended for these Segments.

² HTRW is a standard acronym. There is no indication that radioactive waste was either used or generated during production at FGOW.

³ RCRA Metals are arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver

⁴ Asbestos is not considered HTRW. However, per Section 3-2.6.1 of ER 200-3-1, if a site is eligible for a FUDS project response action (such as remediation of HTRW), it may be possible to abate asbestos-containing materials (ACM) incidental to the completion of the eligible project response action - for instance, removal of soil containing both HTRW and ACM.



Former Gopher Ordnance Works
 Limited Preliminary Assessment
 Steam Plant & Associated 26.7 Acres

Figure ES-1a: Segment A Plot Plan, 20 July 1944.
 Property transferred to the UMN Regents in 1948,
 including Steam Plant & Associated 26.7 Acres
 (approximate location shown in blue in northeast corner).



Former Gopher Ordnance Works
 Limited Preliminary Assessment
 Steam Plant & Associated 26.7 Acres

Figure ES-1b: Close-up of approximate location of the
 Steam Plant & Associated 26.7 Acres

Neither Munitions and Explosives of Concern (MEC) or Munitions Constituents (MC) were present at FGOW. No MMRP projects are warranted at AOC 7 or Segments B, C, and D.

There is no indication of containerized HTRW on the sites. No CON/HTRW projects are warranted at AOC 7 or Segments B, C, and D.

Building or structural debris are present at AOC 7 but this site was determined as not eligible for Building Demolition / Debris Removal (BD/DR) projects since the buildings could not be determined to be inherently hazardous at the time of transfer to UMN in March 1961.⁵

Building or structural debris (in the form of water wells) may still be present on Segment B, but these sites were determined as not eligible for Building Demolition / Debris Removal (BD/DR) projects since the structures were not determined to be inherently unsafe at the time of transfer and since the property was transferred to private individuals, rather than State or Local government.

As noted in the *Preliminary Assessment Report Final 1947 Quitclaim Property* (USACE, 2006), Potentially Responsible Party (PRP) issues involving HTRW occur at all of the AOCs. DuPont is considered a PRP at AOC 7. The UMN is also considered a PRP at AOC 7.

This Preliminary Assessment recommends a SI project for AOC 7 with two (2) possible operators: E.I. DuPont and the Regents of the University of Minnesota. The purpose of the SI will be not only to characterize the contaminants of concern in the Steam Plant property but to accurately locate the precise boundaries of the 26.7 acre parcel of property transferred from the Government to the Regents of the UMN in March 1961.

Based on the evaluation for the potential of Hazardous, Toxic, and Radioactive Waste (HTRW), no HTRW projects are warranted for Segments B, C, and D.

This Preliminary Assessment recommends no further action for Segments B, C, and D.

⁵ The USACE, Omaha District Office of Counsel concluded that the "... lands comprising the campus and grounds of the University of Minnesota amount to 'lands of the state'." No evidence was located during the search of historical records for this limited PA to demonstrate that the conditions were hazardous as a result of prior DOD use or that structures were inherently hazardous when the property was transferred in March 1961.

**LIMITED
PRELIMINARY ASSESSMENT REPORT**

FINAL

PART I

STEAM PLANT & ASSOCIATED 26.7 ACRES

**FORMER GOPHER ORDNANCE WORKS,
ROSEMOUNT, MN**

PROJECT NUMBER E05MN0019



Prepared by U.S. Army Corps of Engineers-Omaha District

March 2009

SECTION 1.0 - INTRODUCTION

Under the authority of the Defense Environmental Restoration Program (DERP) (10 USC §§ 2701 et seq.), and its policies and procedures relating to Formerly Used Defense Sites (DERP-FUDS), including Department of Defense (DoD) Management Guidance for DERP dated September 28, 2001, and Engineering Regulation (ER) 200-3-1, *Environmental Quality, FUDS Program Policy* dated 10 May 2004, the USACE, Omaha District conducted a Limited Preliminary Assessment (LPA) at the Former Gopher Ordnance Work's (FGOW's) Steam Plant and associated 26.7 acres (hereafter called the "Steam Plant property") in Dakota County, Minnesota. This work effort was performed in accordance with the U. S. Environmental Protection Agency's (USEPA's) *Guidance for Performing Preliminary Assessments Under CERCLA* (EPA/540/G-91/013). The purpose of this investigation:

“[...] is to: (i) eliminate from further consideration those properties that pose little or no threat to public health or the environment; (ii) determine if there is any potential need for removal action; (iii) set priorities for site inspections; and (iv) gather existing data to facilitate later evaluation of the release pursuant to the Hazard Ranking System (HRS) conducted by EPA.” (USACE, 2006, p. 1-1)

The PA included the following tasks: review of existing information about FGOW including the collection of information on potential targets, collection of information on potential Areas of Concern (AOCs), and preparation of a PA report including a site characterization form.

1.1 PROCESS

FGOW was a government owned contractor operated (GOCO) facility. The facility was constructed and operated by the E.I. DuPont de Nemours under Contract W-ORD-642¹, between 1942 and August 1945 for the production of oleum and smokeless cannon and rifle powder. As shown in *Preliminary Assessment Report, Final, 1947 Quitclaim Property* (hereafter referred to as "USACE, 2006"), FGOW was divided into four segments (USACE, 2006, Appendix S, Plate 1): Segment A (USACE, 2006, Appendix S, Plate 3) contained the manufacturing operations, Segment B provided a path for transporting Mississippi River water to FGOW, Segment C connected the FGOW's waste disposal ditch with the Vermillion River and Segment D connected Segment C to the Mississippi River.

Following World War II, FGOW's Segment A was further informally subdivided into roughly four parts with the industrial area containing the Steam Plant in the northeast part transferred from the Federal Government to the Regents of the UMN by a QCD dated 17

¹ A search of USACE, Omaha District Real Estate files as well as National Archives and Records Administration (NARA) Great Plains facility (Kansas City, MO) did not locate a copy of this Contract.

March 1948 (USACE, 2006, Appendix G, Reference 2). The Steam Plant and the associated 26.7 acre property reverted from the UMN to the National Industrial Reserve Division (NIRD) of the General Services Administration (GSA) on June 27, 1951 and then were transferred from the GSA back to the UMN on March 3, 1961.

Due to the uncertainty over the effect of the various transfers of the Steam Plant property -- risk-shifting language was not included when the title to the property reverted from the UMN to the NIRD-GSA or when transferred from the GSA back to UMN -- in August 2006 the Office of the Assistant Secretary of the Army for Installations & Environment (ASA-I&E) recommended that Omaha District revise the FDE to reflect that all FGOW property, including the Steam Plant property, was FUDS eligible (Attachment 01). The revised FDE was signed in September 2006 (Attachment 02). A PRP investigation was approved in the same correspondence. As background for the PRP investigation, a PA was begun on the Steam Plant and associated 26.7 acres as request by Congressman John Kline in April 2006 (Attachment 03).

During the site information search phase, the team gathered maps, articles, documents, and electronic information. Much of the research effort had already been completed in earlier studies as well as during the preparation of the *Preliminary Assessment Report, Final, 1947 Quitclaim Property*, March 2006 (USACE, 2006).

After gathering historical information, one (1) AOC was identified. Any FGOW activity or post-FGOW activity that was conducted in AOC 7 and could pose a potential environmental concern was included in AOC 7.

Information regarding real estate, flood plains, wetlands, population, endangered species, sensitive environments, aerial photos, and other Geographical Information System (GIS) data were collected and reviewed for applicability.

Issues are addressed globally in this report wherever possible. This essentially includes regional and local geology, hydrogeology, hydrology, climate, flood-plain information, population, groundwater depth, endangered species, sensitive environments, and wetlands.

1.2 AREA OF CONCERN

The area of study for the PA has been identified as a single AOC to more accurately assess the radius of influence of potential hazards on human health and the environment. See Figure 1-1 for the LPA boundary. Figure 1-2 shows some of the facilities located on the Steam Plant property.

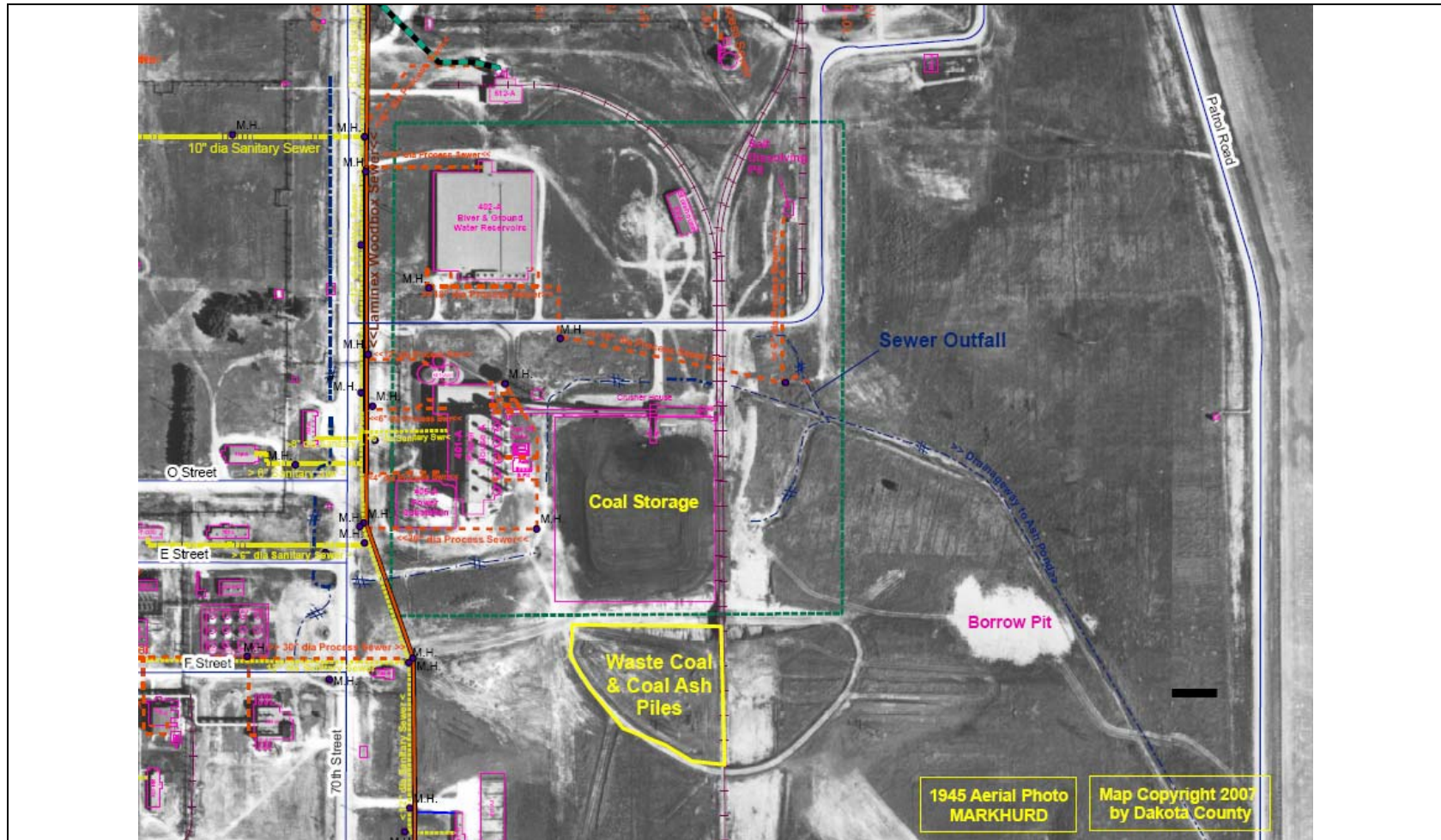
AOC 7: Steam Plant & Associated 26.7 Acres

1.3 GENERAL ORGANIZATION OF THIS PA REPORT

Section 1 presents the introduction to this report including the purpose and process description of the project. Section 2 contains a discussion of previous investigations. Section 3 includes a description of the property, acreages of the study area, and land use. Section 4 includes a historical property summary, including timeline, property ownership, DoD operations involving HTRW, and evaluation of aerial photographs. Section 5 evaluates the presence of military munitions. Section 6 evaluates the possible presence of HTRW and discusses the AOC. Section 7 evaluates the possibility of containerized HTRW and building demolition/ debris removal. Section 8 discusses contamination pathways and potential environmental hazards. Section 9 presents the summary and conclusions.²

² Five plates were included in USACE, 2006, as references to this PA Report. Plate 1 is a FGOW property vicinity map and boundaries abstracted from historical drawings/documents. Plate 2 presents features of interest - FGOW boundary layout. Plate 3 presents FGOW main facility (Segment A) layout. Plate 4 presents post World War II (WW II) land usage/ownership. Plate 5 presents current land usage/ownership.

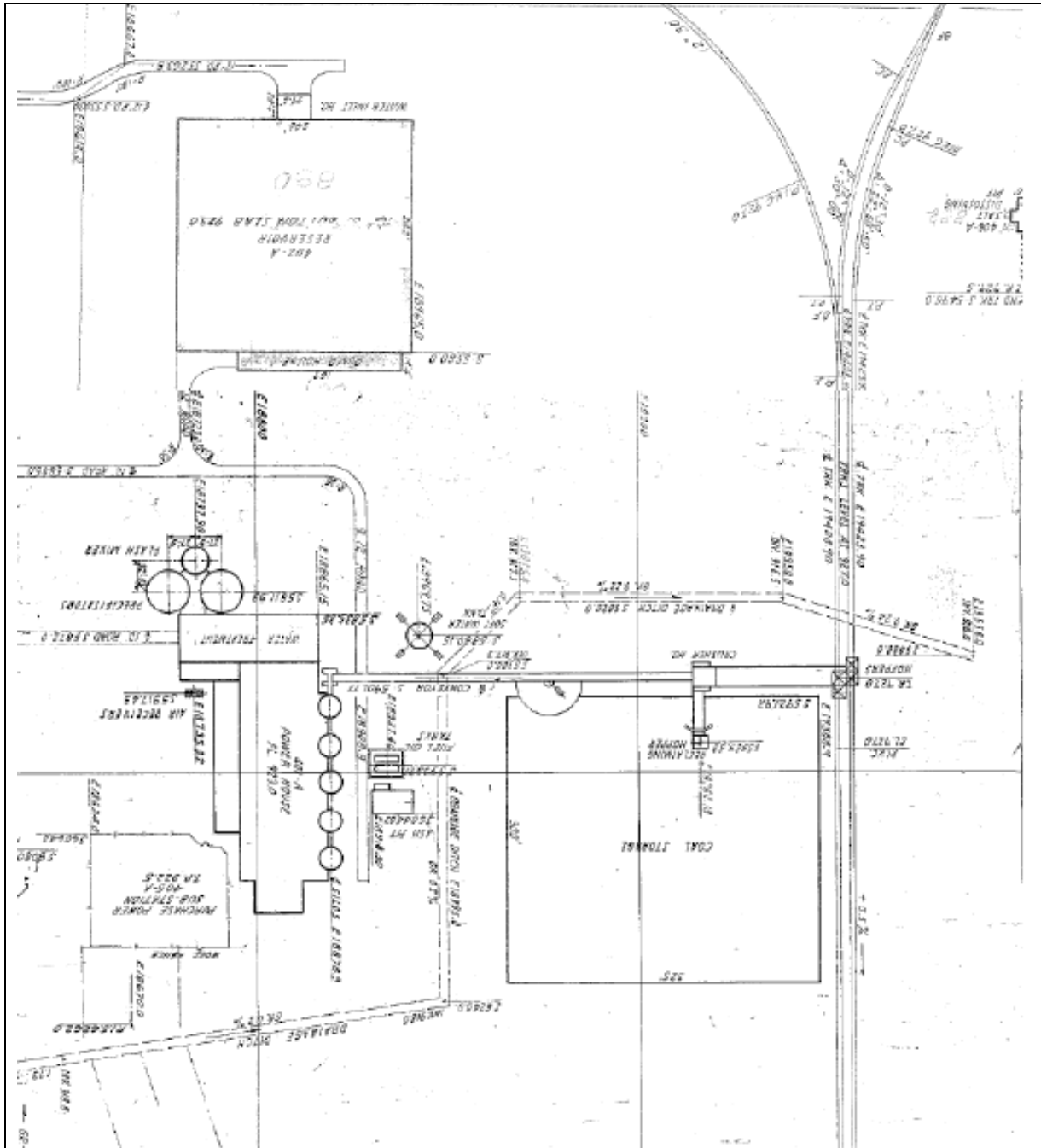
LIMITED PRELIMINARY ASSESSMENT - FINAL
PART I - STEAM PLANT & ASSOCIATED 26.7 ACRES
FORMER GOPHER ORDNANCE WORKS, ROSEMOUNT, MN




Former Gopher Ordnance Works
 Limited Preliminary Assessment
 Steam Plant & Associated 26.7 Acres

Figure 1-1: 1945 Aerial Photograph © Dakota County (2006) shows the approximate area of the Limited Preliminary Assessment

LIMITED PRELIMINARY ASSESSMENT - FINAL
PART I - STEAM PLANT & ASSOCIATED 26.7 ACRES
FORMER GOPHER ORDNANCE WORKS, ROSEMOUNT, MN



	<p>Former Gopher Ordnance Works Limited Preliminary Assessment Steam Plant & Associated 26.7 Acres</p>	<p>Figure 1-2: 1945 Structures within the Steam Plant property of the Limited Preliminary Assessment from the 1942 "2807" Layout Maps</p>
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SECTION 2.0 - INVESTIGATIONS

The following eight (8) documents were researched for the FGOW Steam Plant property.

- a. Gopher Ordnance Works, Decontamination - Completion Report, prepared by E.W. Hutchinson, August 16, 1946. (USACE, 2006, Appendix G, Reference 15)
- b. Request for Investigation and Production of Documents; correspondence between the UMN Department of Environmental Health and Safety and MPCA Division of Solid and Hazardous Waste, September 4, 1984.
- c. Draft Report for Confirmation Study at Former Gopher Ordnance Plant, Rosemount, Minnesota, prepared by Donohue & Associates, Inc for the USACE, Omaha District, October 1987.
- d. Preliminary Environmental Investigation, Former Gopher Ordnance Works, UMore Park, Rosemount, Minnesota, prepared by Peer Engineering for the UMN and the Minnesota Pollution Control Agency (MPCA) and dated August 19, 2003. (USACE, 2006, Appendix G, Reference 7).
- e. Site visit in November 2003 conducted by USACE, MPCA and UMN.
- f. Site Reconnaissance conducted during 18-22 July 2005 by USACE, DCEM, and UMN (USACE, 2006, Appendix L).
- g. Findings and Determination of Eligibility (FDE), Former Gopher Ordnance Works, FUDS Property # E05MN001900, Rosemount, Dakota County, Minnesota, prepared by the Omaha District, USACE, and signed by BG Gregg F. Martin on September 12, 2006. (Attachment 02)
- h. Concrete and Soil Assessment, UMore Park, Rosemount, Minnesota, prepared by Peer Engineering for the UMN Real Estate Office, October 13, 2006.

2.1. FGOW, DECONTAMINATION - COMPLETION REPORT

This 1946 document reported on the decontamination of various FGOW buildings, as well as those on the Steam Plant property. (USACE, 2006, Reference 15) Buildings located in the Power Department included the Process and Cooling Water Reservoir, Salt Dissolving Pit, Ash Disposal Basin, Power House (Steam Plant "A"), and Sub-Stations for Purchased Power. Power Department buildings were not burned as were many other FGOW buildings during the decontamination of other nitrocellulose and gunpowder production buildings. Steam Plant "A" (Bldg 401-A) boilers were drained and the interior of the boilers were cleaned and dried. The coal silos were emptied and handling equipment cleaned. The fuel oil storage tanks' system lines were dismantled and drained and auxiliary equipment cleaned/draind and greased (when applicable). When the steam lines to the Nitrocellulose Lines were broken and the last boiler was shutdown, three (3) temporary boilers were in ready condition for operation. In the Process and Cooling Water Reservoir (Bldg 402-A), the service water lines were drained, the reservoir was

drained and the valves on the lines from the river were left open. The Salt Dissolving Pit (Bldg 406-A) was emptied and ash was removed from the Ash Disposal Basin (Bldg 410-A). The Main Purchase Power Substation (Bldg 405-A) was left energized¹ as was the electrical distribution system in the Power House. The Water Pump House's (Bldg 412-A's) water lines were drained, including the two main lines from the river to the reservoir.

2.2. REQUEST FOR INVESTIGATION AND PRODUCTION OF DOCUMENTS

In September 1984, the UMN's Department of Environmental Health and Safety responded to a MPCA request for information concerning solid and hazardous waste disposal activities at the UMN Rosemount Research Center. While much of the document and attachments was concerned with the on-site disposal of toxic and hazardous waste, Attachment 12 to this response includes *Pertinent Data on Gopher Ordnance Works* (undated). In the Section titled "400 Area - Power and Water Supply", it states that the Ranney Well water is delivered through Bldg 412-A (Pump House) to Bldg 402-A, the 6,350,000 gallon reservoir² containing 3,075,000 gallons of the Ranney Well water and 3,275,000 gallons of river water.

Water for the boilers was removed from the well water main and delivered to the flash mixer tank (Bldg 413) where it was mixed with chemicals in a 20½ foot diameter by 22 foot high gunite concrete mixing chamber that was reinforced with wire mesh and steel bars. After 20 minute detention time, the water flowed into two (2) 42 foot diameter by 22 foot high gunite concrete precipitator tanks that was reinforced with wire mesh and steel bars for another 176 minutes of detention time. When the water was released, it then flowed into the clearwell where it was treated with acid to return the pH value to approximately 7.5 before it was soften and used in the boilers.

This attachment also suggests that the boilers will be fueled by the use of Illinois bituminous coal, ¾ inch size. The ashes from the boilers were removed using water and an Allen-Sherman-Hoff System.

According to a War Assets Administration (WAA) report of visual survey conducted on July 1 and 2, 1946, the power "... consisted of one line, 115,000 volts, 3 phase, 60 cycle transformer on line, 36,000 KVA, and 1 line 69,000 volts, 3 phase, 60 cycle transformer on line 6,000 KVA." (p. 2, Attachment 04)

¹ According to the *Completion Report*, "The Oil Level in Transformers was checked, the cooling system was cleaned and the nitrogen supply renewed." p. 8, USACE, 2006-03, Appendix G, Reference 15.

² "A" Reservoir was a 242' x 242' x 17' deep reinforced concrete structure with timber roof supported on timber posts. p. 20, *Request for Investigation and Production of Documents*

2.3. DRAFT REPORT FOR CONFIRMATION STUDY AT FORMER GOPHER ORDNANCE PLANT

In October 1987, Donohue & Associates, Inc, submitted a DRAFT Confirmation Study to the USACE, Omaha District. Soil sample D-4 was collected in the "Power & Water/Coal source area or contaminant location". This sample location is shown on Figure 2-1 to be in the approximate area to the east of the Steam Plant, though its exact location could not be determined accurately. In the Executive Summary it was stated that "[r]esults of the soil sampling and analyses program do not indicate that significant areas of contamination are present at the site." (Section 1.2, *Confirmation Study*)

Although MW-3 is located to the north of the boundary of this PA area, the groundwater sample from MW-3 did not "... indicate that any significant areas of contamination are present at the site." (Section 5.1.2, *Confirmation Study*) In addition, no limits for volatile organic compounds were exceeded and no significant levels of petroleum hydrocarbons³ were detected in any of the groundwater samples. A discussion of this sampling activity is included in Section 6.

2.4. PRELIMINARY ENVIRONMENTAL INVESTIGATION, FORMER GOPHER ORDNANCE WORKS, UMORE PARK, ROSEMOUNT, MINNESOTA

In August 2003, Peer Engineering completed a *Preliminary Environmental Investigation* of specific sections of the FGOW property for the UMN and the MPCA. During soil sampling for the Waste Water Treatment Plant, three (3) test pits were excavated within 70 feet west of the Steam Plant: two (2) test pits (WWTP-TP-1 and WW-TP-2) were located near two transformer pads near the southwest corner of the Steam Plant and one (1) test pit (WWTP-TP-12) was located directly west of the Steam Plant. Two (2) test pits (WWTP-TP-3 and TP-4) were located adjacent to the east walls of the Steam Plant. One (1) test pit (WWTP-TP-6) was located approximately 270 feet south of the Steam Plant in the earthen berm. Another test pit (WWTP-TP-9) was designated to be dug in the same earth berm and is mentioned in Section 5.4 as having been completed but there is no sampling data was found in the data tables for WWTP-TP-9. The five other test trenches (WWTP TP-5, TP-7, TP-8, TP-10 and TP-11) that were located further south than WWTP-TP-6 appear to be outside the south boundary surveyed by Bay West during the SI. Further study would have to be performed, including the conversion of GPS coordinates (rectified by Dakota County) that are provided in the *Preliminary Environmental Investigation*, to appropriate coordinates. See Figure 2-2. A discussion of this sampling activity is included in Section 6.

³ >1 milligram per liter

2.5. SITE VISIT

A site visit was conducted in November 2003 with representatives from CENWO (Engineering Division, Geotechnical Engineering and Service Branch and Project Management Division, Environmental Remediation Branch), MPCA and the UMN. During the site visit of the industrial part of Segment A, the steam plant smokestacks and suspected asbestos containing material (ACM) were observed and noted while the four large diameter water extraction wells (“Ranney Wells”) were discussed. Numerous unsafe structures or debris from “age/weather/trespassers” were noted during this site visit. However, there was no evidence that these structures were unsafe at the time that DuPont operations ceased or that the debris resulted from DuPont’s operations.

2.6. SITE RECONNAISSANCE

A site reconnaissance was conducted in July 2005 with representatives from CENWO (Engineering Division, Geotechnical Engineering and Service Branch), MPCA and the UMN and is reported in USACE, 2006.

2.7. FINDINGS AND DETERMINATION OF ELIGIBILITY

This document examined the status of FGOW as a FUDS property and its eligibility for project funding under the Defense Environmental Restoration Program - Formerly Used Defense Sites (DERP-FUDS) program.

2.7.1. Findings of Fact

FGOW was a government owned contractor operated (GOCO) facility. The facility was constructed and operated by the E.I. DuPont de Nemours under Contract W-ORD-642, between 1942 and September 1945. The Findings of Fact states that FGOW was built by the DuPont for the production of oleum and smokeless cannon and rifle powder on approximately 13,651 acres located near Rosemount, MN. The majority of the property was acquired through purchase, with a smaller portion acquired through easements and license to the War Department. FGOW was then divided into Segments A, B, C, and D, with each segment of land being used for different purposes by FGOW. The Findings of Fact goes on to discuss acreages in each segment, history of construction and operations at FGOW, and history of ownership of the various parcels of land. The information in the Findings of Fact is discussed in more detail in Section 3.2 of this PA.

2.7.2. Determinations

The FDE signed on May 24, 2005 determined that because of the “hold-harmless” (indemnification) language in the 1948 QCD that transferred the northeast property of Segment A from the federal government to the UMN, the Steam Plant property was ineligible as a FUDS Project. Due to the uncertainty over the effect of the various transfers of the Steam Plant property, in August 2006 the Office of the Assistant

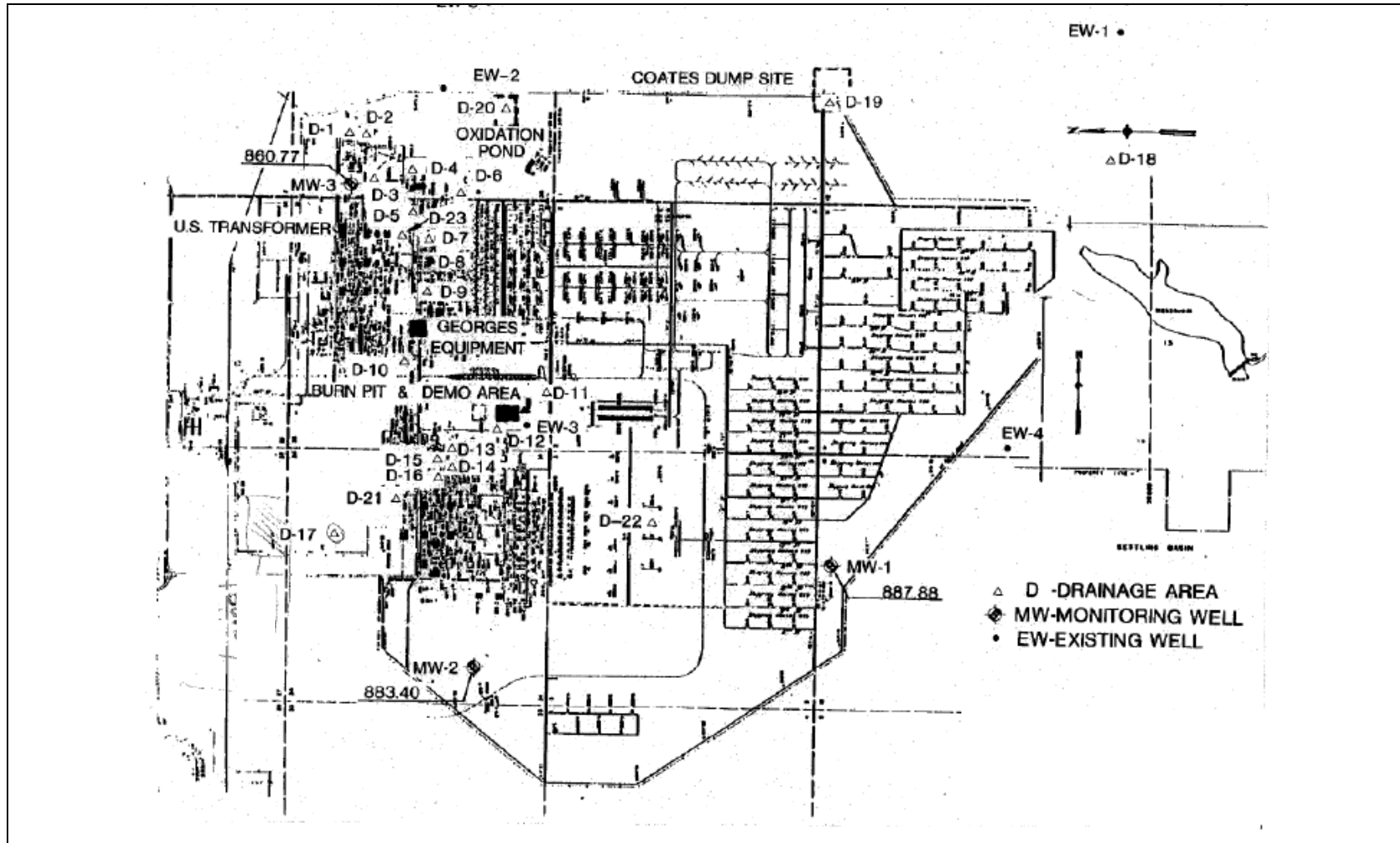
Secretary of the Army for Installations & Environment (ASA-I&E) recommended that Omaha District revise the FDE to reflect that all FGOW property, including the Steam Plant property, was FUDS eligible (Attachment 01). The revised FDE was signed in September 2006 (Attachment 02). A PRP investigation was approved in the same correspondence. As background for the PRP investigation, a PA was begun on the Steam Plant and associated 26.7 acres as request by Congressman John Kline in April 2006 (Attachment 03).

2.8. CONCRETE AND SOIL ASSESSMENT

In August 2006, Peer Engineering completed a *Concrete and Soil Assessment* of specific sections of the FGOW property for the UMN. Six (6) concrete samples (CS)⁴ were collected (CS-73-401A-3, CS-74-401A-3, CS-75-401A-3, CS-76-401A-3, CS-77-401A-3, CS-78-401A-3), two (2) test trenches (TT) were excavated (TT-48-401A and TT-49-401A) and five (5) soil samples were collected and analyzed [TT-48(0-1')-401A, TT-48(1-2')-401A, TT48(1-3')-401A, TT 49(0-1')-401A, and TT-49(4-5')-401A]. See Figure 2-3. A discussion of this sampling activity is included in Section 6.

⁴ According to *Concrete and Soil Assessment*, concrete samples were "... targeted for analysis of volatile organic compounds ... " (p. 7, PEI, 2006) and soil sampling was conducted "... to evaluate the environmental conditions of the soils adjacent to and/or in contact with the remnant concrete foundations." (p. 1, PEI, 2006)

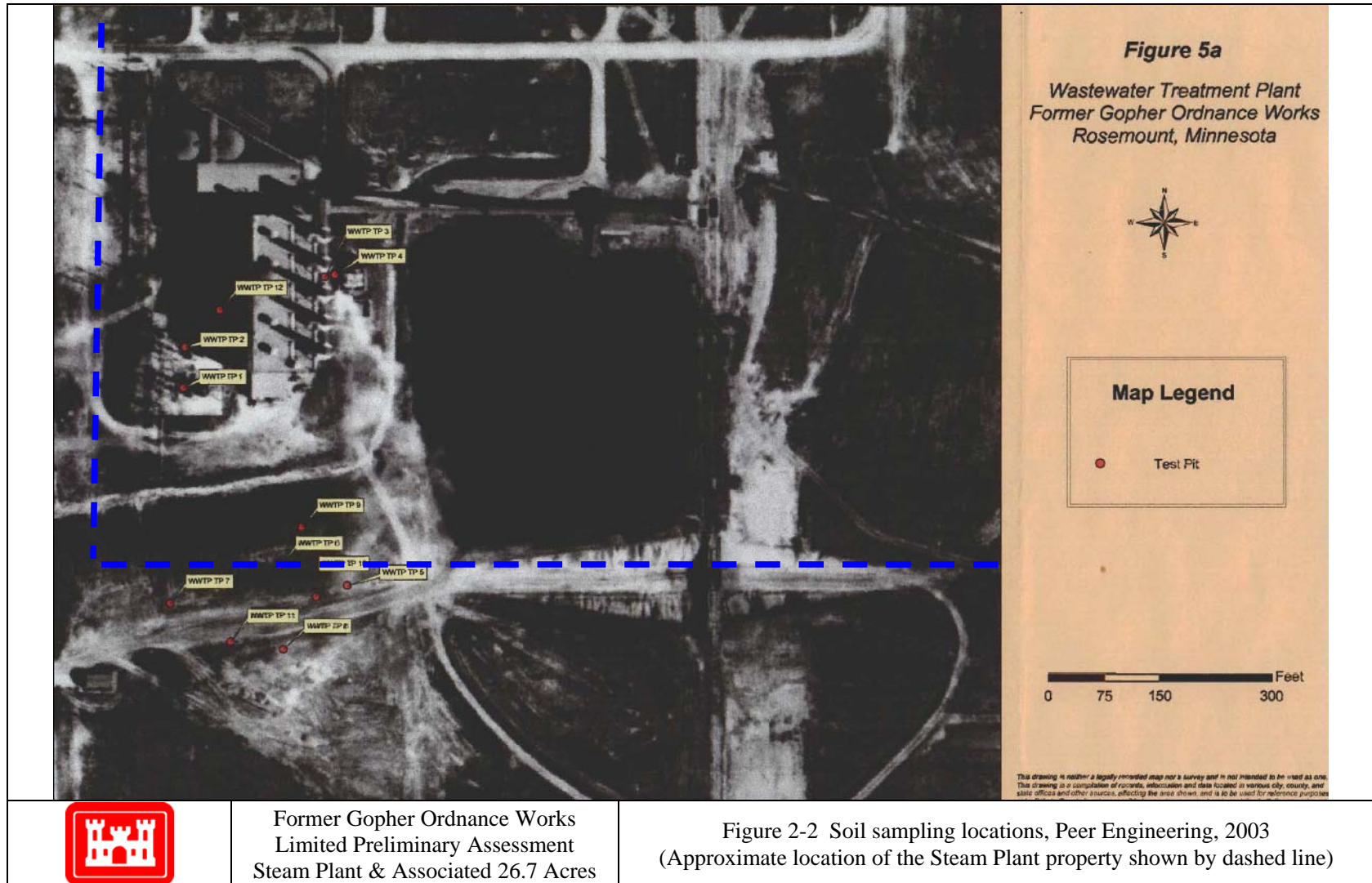
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Figure 2-1 Groundwater and soil sampling locations,
 Donohue & Associates, Inc., 1987

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Gopher Ordnance Works

Power Plant A Area 2006 Sampling



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Figure 2-3 Concrete and soil sampling locations and test trench locations, Peer Engineering, 2006

SECTION 3.0 – PROPERTY DESCRIPTION, ACREAGE AND LAND USE

3.1. LOCATION

The Steam Plant property is located approximately 1 mile northwest of Coates, MN (Figure 3-1). The Steam Plant property is primarily located in Township 115N in Range 19W, Sections 35 and 36. The State of Minnesota is located in U.S. Environmental Protection Agency (EPA) Region 5. The Steam Plant property is surrounded by agricultural land as well as some light manufacturing, training, and service companies under the auspices of the University of Minnesota Rosemount Research Center (UMRRC). The area addressed in this PA is immediately to the east of Blaine Avenue and about 0.2 miles south of 152nd Street. See Figure 3-2, for the approximate PA/FGOW/Steam Plant property boundary.

3.2. FUDS ELIGIBLE PROPERTY

FGOW was built by DuPont for the production of oleum and smokeless cannon and rifle powder on approximately 13,651 acres. Construction occurred between 1942 and 1945 and production of gunpowder occurred between March and September 1945. The May 2005 FDE listed the industrial property in Section A as non-eligible for FUDS because of the indemnification clause in the 1948 QCD. Due to the uncertainty over the effect of the various transfers of the Steam Plant property -- the property was transferred from the UMN to the Government in 1951 and back to the UMN in 1961 -- in August 2006 the Office of the Assistant Secretary of the Army for Installations & Environment (ASA-I&E) recommended that Omaha District revise the FDE to reflect that all FGOW property, including the Steam Plant property, was FUDS eligible (Attachment 01). The revised FDE was signed on September 12, 2006 (Attachment 02). A PRP investigation was approved in the same correspondence. As background for the PRP investigation, a PA was begun on the Steam Plant and associated 26.7 acres as request by Congressman John Kline in April 2006 (Attachment 03).

3.3. LAND USE AND OWNERSHIP HISTORY

3.3.1 Land Use and Ownership Prior to Construction of Steam Plant

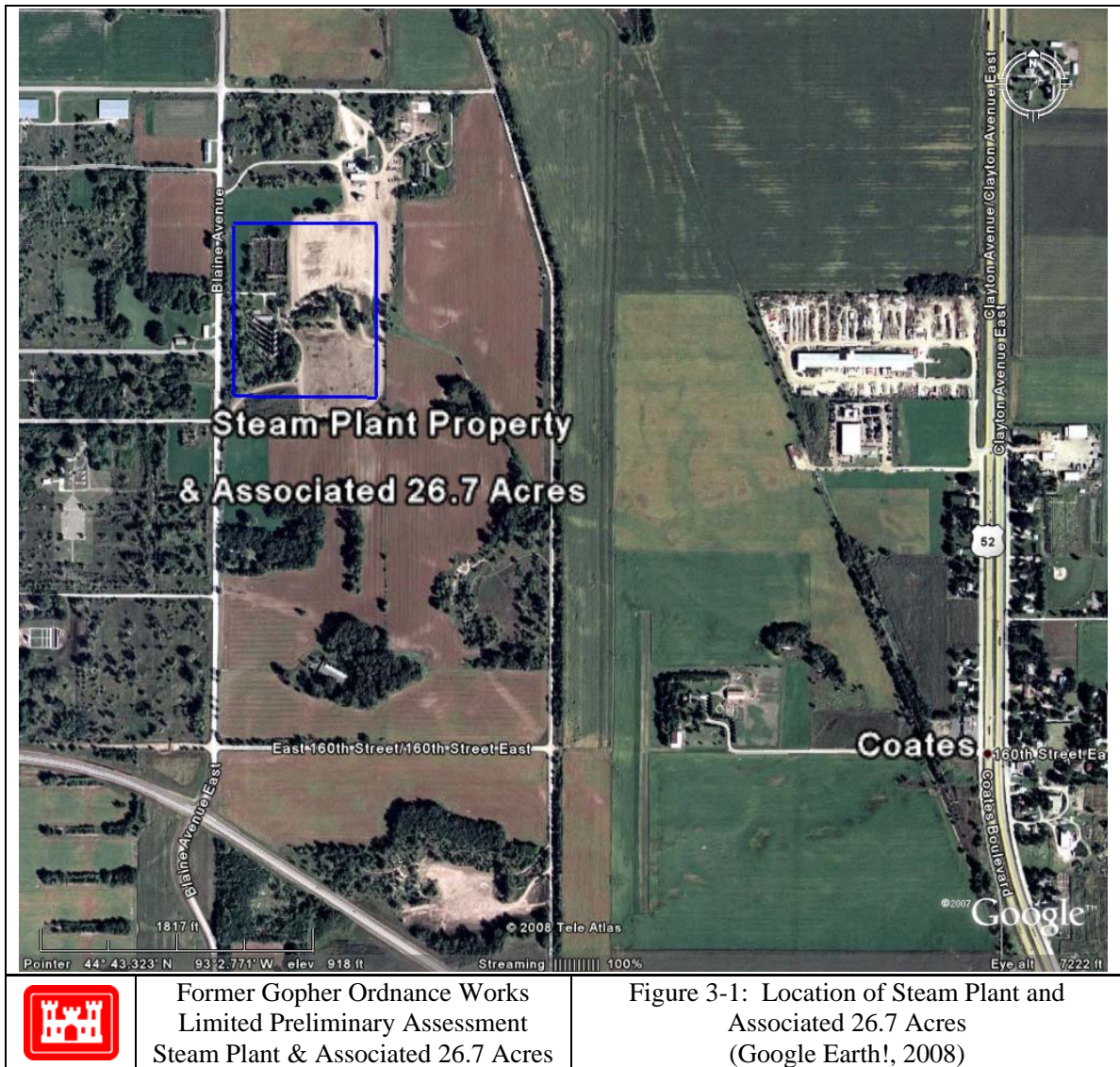
Prior to acquisition by the WD in 1942 and 1943, the majority of the land that became FGOW and the Steam Plant property was privately owned and used primarily for agriculture.

3.3.2 Acquisition and Use of Property for Construction of Steam Plant

The FGOW acreage (approximately 13,651 acres) was acquired through purchase (11,987.95 acres owned by WD), through easements (1,662.10 acres easement to WD) and through license (1.40 acres license to WD) in 1942. This includes Segment A (11,331 acres). The 26.7 acres of the Steam Plant property were obtained through purchase along with Segment A property.

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Some 885 buildings were constructed on Segment A between August 1942 and July 1943, of which six (6) main structures (with Bldg Numbers), five (5) temporary buildings and other associated structures are located on the Steam Plant property. (USACE, 2006) The Steam Plant was expected to become operational on 1 June 1943, but on March 22, 1943, DuPont was notified that the start up date for operations was postponed until January 1, 1944. (Attachment 05).



Nitrocellulose “C” line started in operation January 12, 1945, Smokeless Powder “C” line started in operation February 9, 1945, Nitrocellulose “B” line started in operation February 19, 1945 and Smokeless Powder “B” line started in operation March 2, 1945 (USACE, 2006, Appendix G, Reference 10). Production and packing of granulated cannon powder began in March 1945.



Figure 3-2: Approximate PA/FGOW/Steam Plant property boundary (Google Earth!, 2008)

On August 11, 1945, the Ordnance Department directed FGOW to cease production of smokeless cannon powder and the final production run of powder was packed for shipment in September 1945. Some 287 buildings and associated machinery had been partially or completely dismantled before production finally ceased.

3.3.3 Land Use and Ownership After Closure of FGOW

Decontamination of the buildings at FGOW was well underway in August 1945 as well as dismantling work incidental to the decontamination (USACE, 2006, Appendix G, Reference 13). Required decontamination was 99% completed by May 9, 1946 (USACE, 2006, Appendix G, Reference 14). The remaining decontamination became the responsibility of the Ordnance Department and dependent upon the Board to Recommend Destruction of

Buildings and Improvements. This Board recommended no further decontamination until advised by the Board. Most of the FGOW facility had been transferred to the War Assets Administration on May 16, 1946 (USACE, 2006, Appendix G, Reference 14).

As described in the *Gopher Ordnance Works – Decontamination Completion Report* (USACE, 2006, Appendix G, Reference 15), while a number of structures as well as flammable production equipment were burned during the decontamination process,¹ this was not the case for the Power Department. In Bldg 401-A (Steam Plant "A"), the boilers were drained and the interior of the boilers were cleaned and dried. The coal silos were emptied and handling equipment cleaned. The fuel oil system lines were dismantled and drained and auxiliary equipment cleaned/drained and greased (when applicable). The steam lines to the Nitrocellulose Lines were broken and when the last boiler was shutdown, three (3) temporary boilers were in ready condition for operation. In Bldg 402-A (Water Reservoir), the service water lines were drained, the reservoir was drained and the valves on the lines from the river were left open. In Bldg 406-A (Salt Dissolving Pit), the pit was emptied. In Bldg 410-A (Ash Disposal Pit), the ash was removed. In Bldg 412-A (Water Pump House), water lines were drained, including the two main lines from the river to the reservoir.

Following the closure of FGOW, 4,687 acres from Segment A were transferred to the Regents of the UMN in 1947. An additional 3,320 acres from Segment A were sold to the Regents of the UMN in 1948. The Steam Plant property is located in the 1948 parcel and included the buildings and facilities that remained intact. (USACE, 2006, Map 1, Appendix D).

3.3.3 Land Use After Transfer to the Regents of UMN

In July 1946, the WAA reported on a survey made of the FGOW on July 1 - 2, 1946. It reported that the "[...] 7,000,000 gal reservoir has been disconnected and conditioned as a standby ..." and the "[...] Power House has been completely shut down and being conditioned as standby." (p. 2, Attachment 04)

In February 1947, the WAA provided a list of "[...] buildings that are reserved for the University of Minnesota." (Attachment 06) Among the buildings listed is

401-A	Power House (including all inside electrical equipment, transformers, cubicles, switchboard, storage batteries, generators, etc.);
402-A	Reservoir and Settling Basin
405-A	Purchase Power Substation
410-A	Ash Disposal Basin
412-A	Reservoir Pump House and Control Room

¹ While wooden structures (such as tanks, wooden troughs, boiling tubs) were dismantled and burned, process equipment was either "flashed" at the burning ground to remove potential explosive particles and marked with five Xs or marked with three Xs to indicate that the equipment had not been decontaminated by washing and neutralization with hot caustic solution and had not been treated by flashing. (USACE, 2006, Appendix G, Reference 15)

412-A Transformer Bank - complete

Sometime in 1948 the UMN submitted an account to the WAA, reporting that an engineering study had been completed on potential use of the high pressure Steam Plant (Bldg 401-A) in conjunction with research being proposed with the Bureau of Ordnance, US Navy. "This study analyzed the feasibility of using the power plant as the source of steam for an ejector type, continuous flow, open wind tunnel." (p. 11, Attachment 07) A couple pages later, there is mention that the Purchase Power Substation (Bldg 405-SA) in the Power building was being used by UMN in its original purpose as of September 17, 1948.

In September 1950, a GSA Industrial Engineer inspected buildings at War Reserve Plants, including the Steam Plant property at the FGOW. He reported that the

"[...] power house at this site [FGOW] is the best the writer has seen in all his travels to War Reserve Plants. It has been turned over to the University of Minnesota and is the University's responsibility under the National Reserve Clause. It is the opinion of the writer [...] that this power plant is too valuable to permit its deterioration. It is evident that very little consideration has been given toward the preservation and maintenance of this plant by the University or that funds are available for such maintenance. Mr. Nelson, Assistant Superintendant for the University, indicated to me that they would be glad to get it off their hands. In view of the circumstances it may be in the best interests of the government to repossess this plant, plus the land and some of the adjoining acreage, with an easement to the pump house which supplied water for the plant, as well as tail easements for delivery of coal." (pp. 4-5, Attachment 08)

In October 1950, the National Industrial Reserve Division (NIRD) reported on an inspection conducted on September 27 - 28, 1950 that looked specifically at the condition of the Boiler House. This report stated that some:

"[...] stand-by processing had been done on certain portions of the Boiler House equipment prior to disposal, [...] In general, the equipment has not been adequately processed and deterioration has consequently set in. The general appearance is that, [...], deterioration will increase during the next few years to a serious degree." (pp. 2-3, Attachment 09)

The Government continued to emphasize that the UMN was responsible for the protection and maintenance of the property provided in the 1948 QCD. The NIRD wrote to the Federal Security Agency (forerunner to the GSA) in October 1950 that

"[...] the remaining buildings and facilities which are not being used were deteriorating rapidly and were in a poor state of repair. These unused and unmaintained facilities include a large steam boiler plant representing an original investment, by the Government, of over \$6,000,000.

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"The inspection [September 27, 1950] ... revealed that some portions of the purchased property, including the steam plant, is not being utilized or maintained by the University. The steam plant has deteriorated to such a degree that unless prompt action is taken for preservation, most of the equipment will be worthless for its designated purpose in two or three years."
(pp. 2-3, Attachment 10)

In a letter written at the same time to the Munitions Board (Attachment 11), NIRD stated that the UMN believed that it was not obligated to provide maintenance for the boiler plant and had no funds for such undertaking.

In response to the September 1950 inspection and the reports generated by it, the UMN responded to the GSA in January 1951 (last two (2) pages of Attachment 12) that the problem of maintenance was not a new one and that the burden of maintenance was beyond their need to carry out the uses of the property. The UMN stated that it was protecting the exterior of the heating plant because it "[...] is the site of our transformers." (p. 2, Attachment 12) According to a November 1951 Office Memorandum (Attachment 13), in February 1951 the "[...] Munitions Board requested that GSA regain title to the Boiler from the University of Minnesota." In June 1951, NIRD initiated an allotment of \$175,000 for a contract with Machine Products, Inc to begin layaway processing of the Boiler Plant equipment. At the end of June 1951, the Steam Plant property and associated 26.7 acres were deeded by the UMN to the Government.²

Between June 15, 1952 and October 1, 1952, both the roof and windows were repaired in the Power House (Bldg 401-A). (Attachment 14)

During the years following the transfer of the Steam Plant property and associated 26.7 acres, the Army, Navy and Air Force continuously screened the plant inventory and thousands of items were transferred to various Defense Plants during the Korean conflict. (Attachment 15) For example, in February 1953, Boiler Nos. 4 and 5 were released to the USACE for use at Picatinny Arsenal (Attachment 16) and in November of 1953, installed equipment was removed and transferred to the Department of the Air Force for use at the UMN. (Attachment 17)

The 26.7 acres were reported excess by USACE in July 1956 (Attachment 18)³ and in March 1957, the 26.7 acres were declared excess real property (Attachment 19) with the suggestion that it be disposed of to the UMN. This included Bldgs 401-A, 402-A, 405-A, 406-A, 410-A

² According to a letter written by the Commissioner of Public Buildings in response to an August 1955 Congressional Inquiry, it was claimed that "[...] approximately \$180,000 were expended to place it [the Steam Plant] in standby condition." (Attachment 15)

³ "The steam plant building was designed for five multi-story boilers and does not lend itself to remodeling for other uses. [...] The related buildings, such as pump house, reservoir, etc., are in poor condition or have been cannibalized, and are considered to be worthless.[...] The equipment remaining is obsolete." (Attachment 18) This explanatory statement covering the sale of a portion of FGOW to the UMN concluded that the sale of the 26.7 acres to the Regents of the UMN was "[...] consistent with the objectives and requirements for negotiated sale of surplus real property."

and 412-A. A note was provided on the Supplement to Report of Excess Real Property that wood plank constructed floors in the Water Reservoir (Bldg 402-A), and the Water Equipment Pump structure (Bldg 412A) would withstand only limited floor loads. On March 1, 1961, the 26.7 acres of land and improvements were sold to the UMN for \$20,000 and a QCD was filed on March 3, 1961 (Attachment 20). According to *A Historical Interpretation and Preservation Plan for UMore Park* (April 2006),⁴

"In May 1971, a crew from the Minnesota Lumber and Wrecking Company began to dismantle the four-story steam plant that had served the Ordnance Works' three active production lines, and had later provided power for the University's aeronautical laboratory." (p. 41)

AOC 7 is located adjacent to Blaine Avenue and about 0.2 miles south of 152nd Street. In a recent aerial photograph (Figure 3-3), the FGOW features remaining on this AOC are the deteriorated "permanent" structures (such as the Steam Plant stacks, the Water Reservoir foundation), scraped/graded area in the northeast quadrant where the Salt Dissolving Pit was located as well as unvegetated area in the southeast quadrant where the Coal Storage Area and Coal Crusher were located. Numerous ditches/drainage-ways are thought to cut across the property (carrying runoff in an easterly direction) but are not completely visible.

3.4. PHYSICAL PROPERTY CHARACTERISTICS

Dakota County is located on the west bank of the Mississippi River and typically receives precipitation from eastward moving storm systems. The average monthly precipitation varies from less than 1 inch in February to over 4 inches in July. The annual average precipitation at Rosemount is approximately 34.6 inches. The average temperature ranges from about 7 degrees Fahrenheit in December and February to 81 degrees Fahrenheit in July. The average snowfall each winter is 45 inches.

Detailed information regarding regional geology and hydrogeology is presented in Section 8.1 Groundwater Pathway.

There are no historically significant sites located on the property covered by this PA.

There are six Federally-listed threatened, endangered, or special concern plants and animals of Dakota County (USACE, 2006, Appendix G, Reference 18): the prairie bush clover (threatened), the bald eagle (threatened), the peregrine falcon (endangered), the blue sucker (threatened), the Higgins eye mussel (endangered) and the winged mapleleaf mussel (endangered). Bald eagle nests and roosts may be located within 15 miles of FGOW's Steam Plant property. There are also a large number of species considered by the State of Minnesota to be threatened or endangered. No study of the sites in this PA has been conducted to determine whether there is a potential for any of the threatened or endangered species to be present.

⁴ Report was prepared for the University of Minnesota, Center for Rural Design, by Historic Preservation and Community Planning

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Figure 3-3: Aerial Photograph shows: Water Reservoir (Bldg 402-A) (NW Quadrant) with Pump House (Bldg 412) on the south end, scraped area (NE Quadrant), Coal Storage Area with no vegetation (SE Quadrant), remains of the Steam Plant (Bldg 401-A) (SW Quadrant) (Google Earth!, 2008)

SECTION 4.0 – HISTORICAL PROPERTY SUMMARY

4.1 CHRONOLOGICAL PROPERTY SUMMARY

Prior to acquisition by the War Department (WD) in 1942 and 1943, most of the land that became FGOW was privately owned and used for agriculture.

A detailed history of the FGOW Segment A property (including the Steam Plant property and associated 26.7 acres) through March 1948 when it was transferred from the US Government to the Regents of the UMN can be found in the *Final Preliminary Assessment Report for the 1947 Quitclaim Property* (USACE, 2006).

4.2 MILITARY OPERATIONS

DuPont operations at FGOW included construction of facilities followed by dismantlement of many of those facilities between 1942 and 1946, production of acids and oleum from November 1944 to September 1945, and the packaging of cannon powder from March 1945 to September 1945. The production operation was GOCO, with E.I. Dupont de Nemours and Company as the contractor operator.

4.2.1 Operations Involving Military Munitions

There were no operations involving military munitions on any parcel of FGOW.

4.2.2 Operations Involving HTRW

FGOW was a GOCO facility. The facility was constructed and operated by the E.I. DuPont de Nemours under Contract W-ORD-642, between 1942 and September 1945 for the production of oleum and smokeless cannon and rifle powder.

Prior to the Federal Government's acquisition of the land in 1942 and 1943 of FGOW's Segment A (including the Steam Plant property), most (if not all of it) was farmland. After WWII, the land was either returned to private ownership or transferred to the Regents of the UMN. Under the auspices of the UMN Rosemount Research Center (RRC), the FGOW property housed an agricultural experiment station that conducted research into both agricultural and livestock projects while a research center focused on experimental aeronautical studies,¹ public health and cancer research programs, veterinary medicine and Army and Navy Reserve Officers' Training Corps (ROTC) activities. In December 1987, the entire UMN's RRC site (located in the east 2/3 of FGOW's Segment A) was placed on the National Priority List (NPL). Soil samples

¹ According to *A Historical Interpretation and Preservation Plan for UMore Park* (prepared for UMN Center for Rural Design by Historic Preservation and Community Planning), April 2006, "In May 1971, a crew from the Minnesota Lumber and Wrecking Company began to dismantle the four-story steam plant that had served the Ordnance Works' three active production lines, and had later provided power for the University's aeronautical laboratory." (p. 41)

contained elevated levels of polychlorinated biphenyls (PCBs) as well as heavy metals and groundwater samples contained chloroform. After completing soil remediation and providing drinking water to surrounding residences, the UMN RRC Center Superfund Site was deleted from the NPL in February 2001. Currently, all property remains for the most part agricultural² though some of the land is currently used for recreational activities or light industrial operations.

4.2.2.1 Nitrocellulose Production

A detailed description of the production of nitrocellulose can be found in USACE, 2006.

Large quantities of fresh water were used throughout the production process to wash the nitrocellulose (process water), cool the boiling vats as well as to provide steam to the manufacturing and support activities. Water was pumped from collectors in the Mississippi River as well as from the River itself to the water Reservoir (Bldg 402-A) where some of it was treated and used in steam production and the remainder used as water for the various processes to manufacture nitrocellulose. The process water from the acid production areas as well as the nitrocellulose production facilities collected in the sewers and flowed to a waste disposal ditch that ran from north to south along the east boundary of FGOW's Segment A.

4.2.3 Miscellaneous

According to "MAP 2807, Sheet 14" (Figure 2-2), two (2) fuel storage tanks were located east of the Steam Plant to provide fuel to start the furnace boilers prior to cutting in with pulverized coal. Fuel tanks also provided an emergency source of fuel.

No record could be found reporting known or confirmed spills.

4.3 MAP ANALYSIS

Numerous maps of FGOW dating from 1945 were acquired during archival research at NARA and from DCEM. A real estate map (Appendix I, Map 3, USACE, 2006) shows original property ownership prior to acquisition by the War Department, along with size of the parcels of land.

² According to a 2001 article in the *Journal of Environmental Quality*, UMN has been applying wastewater biosolids (sewage sludge) to a test plot at Rosemount Research Center since 1974. Sampling routinely was conducted to measure and evaluate the metal content remaining in the surface soil as well as plant uptake of metals at and around the site. The article points out that UMN's plowing of the test area where biosolids have been applied may inadvertently cause the metal particles to become airborne and spread over surrounding areas.

4.4 AERIAL PHOTOGRAPHIC INTERPRETATION

Aerial photographs dating from 1945 were obtained just prior to site reconnaissance from the UMN and the DCEM office. See Figure 4-1 for photograph. Aerial photos from other years were not reviewed. Aerial photographs from 2003 showing current land use can also be viewed on the Dakota County web site.

4.4.1 AOC 7, Steam Plant & Associated 26.7 Acres

The aerial photograph from 1945 shows buildings and associated roads present at this location.

LIMITED PRELIMINARY ASSESSMENT - FINAL
PART I - STEAM PLANT & ASSOCIATED 26.7 ACRES
FORMER GOPHER ORDNANCE WORKS, ROSEMOUNT, MN



Former Gopher Ordnance Works
Limited Preliminary Assessment
Steam Plant & Associated 26.7 Acres

Figure 4-1: 1945 Aerial Photograph
©Markhurd. Location of Steam Plant and
Associated 26.7 Acres

SECTION 5.0 **EVALUATION OF PRESENCE OF MILITARY MUNITIONS AND TECHNICAL DATA**

There is no evidence that ammunition was produced, stored, or used anywhere on the property transferred to the Regents of the UMN in the 1948 QCD, including the Steam Plant property.

The following three definitions are taken from USACE, 2006, Appendix G, Reference 20.

5.1 GENERAL EVALUATION OF CONVENTIONAL MEC PRESENCE:

Munitions and Explosives of Concern (MEC):

“[...] distinguishes specific categories of military munitions that may pose unique explosives safety risks means: (A) Unexploded ordnance (UXO), as defined in 10 USC 101(e)(5); (B) Discarded military munitions (DMM), as defined in 10 USC 2710(e)(2); or (C) Munitions constituents (e.g., TNT, RDX), as defined in 10 USC 2710(e)(3), present in high enough concentrations to pose an explosive hazard.” (p. 3)

No such MEC items were present at FGOW.

5.2 GENERAL EVALUATION OF MC PRESENCE:

Munitions Constituents (MC) are defined as:

“[a]ny material originating from unexploded ordnance (UXO), discarded military munitions (DMM), or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions.” (p. 3)

No such items containing MC were present at FGOW.

5.3 GENERAL EVALUATION OF RCWM PRESENCE:

Recovered Chemical Warfare Material (RCWM) is defined as:

“CWM used for its intended purpose or previously disposed of as waste, which has been discovered during a CWM response or by chance (e.g., accidental discovery by a member of the public), that DoD has either secured in place or placed under DoD control, normally in a DDESB [Department of Defense Explosives Safety Board]–approved storage location or interim holding facility, pending final disposition.” (p. 4)

No RCWM was ever present at the site.

5.4 PROPERTY-SPECIFIC LOCATIONS

Not Applicable

SECTION 6.0 EVALUATION OF HTRW PRESENCE AND AREAS

6.1 GENERAL EVALUATION OF HTRW PRESENCE

Sources of potential chemical releases on the sites included in this LPA include the following processes: the treatment of water (water reservoir) for use in the Steam Plant, the delivery (storage), transfer (conveyor/crusher) and burning of coal (including ash disposal) in the Steam Plant, the delivery and distribution of electrical power (transformer electrical substation) and the use of oil (underground tanks) for starting the boilers. There is a possibility that the manufacture of smokeless cannon powder (nitrocellulose) may also have released chemicals onto the surface.

Historical aerial photographs and facility plans, along with site reconnaissance, provide evidence of the activities and structures that were associated with this AOC. Some analytical data is available from the two Peer Engineering, Inc, reports relative to this site to indicate presence of contamination. Sampling and analysis of media located in this area is necessary to determine if the potential chemicals are indeed present. The Regents of UMN and private landowners use the surrounding land for farming. There is potential for movement of contamination from the surrounding land to the land addressed by this LPA through runoff, airborne dust, and migration of any contaminated groundwater.

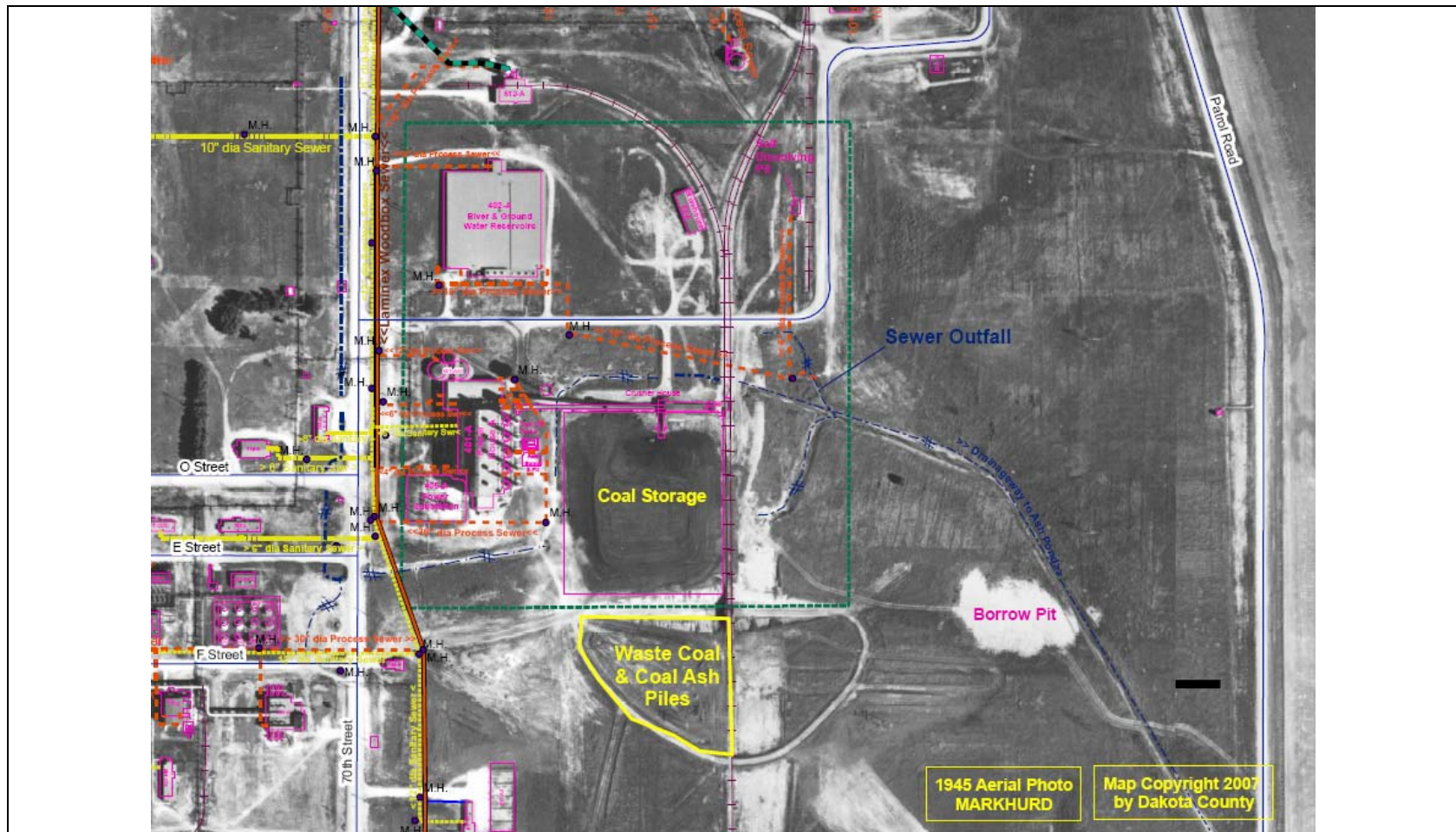
6.2 PROPERTY-SPECIFIC LOCATION

AOC 7 is located adjacent to Blaine Avenue and about 0.2 miles south of 152nd Street. The FGOW features remaining on this AOC are the deteriorated "permanent" structures (such as the Steam Plant stacks, the Water Reservoir foundation), scraped/graded area in the northeast quadrant where the Salt Dissolving Pit was located as well as unvegetated area in the southeast quadrant where the Coal Storage Area and Coal Crusher were located. Numerous ditches/drainage-ways are thought to cut across the property (carrying runoff in an easterly direction) but are not completely visible. See Figure 6-1.

The property was privately farmed prior to acquisition by the WD and the areas are farmed now or are used for education.

During operation of FGOW, electrical power was brought to the transformers near the Steam Plant where it was then distributed to the facility. Water was carried in two (2) 42-inch water mains from the Mississippi River to the reservoir and either treated for use in the boilers or used to break down cotton fibers, neutralize acid and remove impurities from the nitrated cotton. Coal was delivered by rail and stockpiled in an open area southeast of the Steam Plant where it waited to be burned to generate steam to heat the various buildings as well as to provide steam to heat process water used to manufacture nitrocellulose. Coal ashes were removed from the Steam Plant by water and deposited in the waste coal/ash piles south of the boundary of the 26.7 acre parcel covered in the LPA.

**LIMITED PRELIMINARY ASSESSMENT – DRAFT FINAL – PART I - STEAM PLANT & ASSOCIATED 26.7 ACRES
FORMER GOPHER ORDNANCE WORKS, ROSEMOUNT, MN**



Former Gopher Ordnance Works
Limited Preliminary Assessment
Steam Plant & Associated 26.7 Acres

Figure 6-1: 1945 Aerial Photograph © Dakota County (2006) shows: Water Reservoir with Pump House located on the south end of the reservoir, Steam Plant and Coal Storage Area

DuPont production operations in the northeast (industrial) part of FGOW's Segment A may have contributed the following potential HTRW to the Steam Plant property as well as the 26.7 acres surrounding it:

- Nitrocellulose from production operations.
- DNT from the production of rifle powder¹.
- Diphenylamine (DPA) that was added as a stabilizer to nitrocellulose (between 0.9 and 1.1% in the finished product).
- Industrial solvents and degreasers used to remove grease and oil during the maintenance of the Steam Plant and associated machines.
- Petroleum, Oils and Lubricants from underground storage tanks (located east of the Steam Plant) that containing fuel used to start the boilers
- Mercury (impurity) from the coal stored and burned at steam plant producing both smoke and ash waste streams.
- PAHs from the coal stored at the steam plant yard.
- Polychlorinated Biphenyls (PCBs) from transformers
- Metals (scrap metal, demolition debris, etc).

Records show that the Steam Plant was not used for the production of steam after the FGOW Segment A was transferred to the Regents of the UMN in 1948 and was cannibalized for parts sometime after it was transferred back to the Government in 1951. However, the UMN continued to use the transformers in the Steam Plant area. Documentation also exists showing that from 1974 to the present, UMN has applied wastewater biosolids² to areas within the boundaries of FGOW. Building and demolition debris (bricks, electrical components, slag, etc) have been dumped into an underground concrete pit (Secondary Containment Reservoir) west of the Steam Plant. Therefore, this is a possible Potentially Responsible Party (PRP) area.

¹ Reference Flow Diagram for rifle powder (USACE, 2006, Appendix G, Reference 21) shows that DNT would be added in the "Sweetie Barrel House" where it would blend with the rifle powder. According to the QHR for April – June 1945 (USACE, 2006, Appendix G, Reference 11) line A started production of smokeless rifle powder on 16 April 1945. However there are no production records for the following reporting periods (USACE, 2006, Appendix G, References 10-13).

² According to a 2001 article in the *Journal of Environmental Quality*, UMN has been applying wastewater biosolids (sewage sludge) to a test plot at Rosemount Research Center since 1974. Sampling routinely was conducted to measure and evaluate the metal content remaining in the surface soil as well as plant uptake of metals at and around the site. The article points out that UMN's plowing of the test area where biosolids have been applied may inadvertently cause the metal particles to become airborne and spread over surrounding areas.

6.3 MEDIA OF POTENTIAL CONCERN

Media of potential concern include surface and subsurface soil, groundwater, and surface water.

6.3.1 Sampling in October 1987

In October 1987, Donohue & Associates, Inc, submitted a DRAFT Confirmation Study to the USACE, Omaha District. One soil sample (D-4) had been collected at the "Power & Water/Coal" source area (in an approximate area to the east of the Steam Plant (Figure 2-1)) and analyzed for metals, petroleum hydrocarbon, extractable organics, and explosives. According to the *Confirmation Study*, "[The] results of the soil sampling and analyses program do not indicate that significant areas of contamination are present at the site." (Section 5.1.3, *Confirmation Study*)

6.3.2 Sampling in August 2003

Peer Engineering, Inc. (PEI) conducted sampling around the Steam Plant - excavated trenches and collected soil samples - for the UMN in August 2003 and noted traces of mercury and PCBs in the soil as well as PCBs, arsenic, diesel range organics, asbestos and VOCs/SVOCs where demolition debris had been dumped west of the Steam Plant. The sample results as well as reference values are from Table 4 of the *Preliminary Environmental Investigation*, Former Gopher Ordnance Works, U/More Park, Rosemount, MN, August 2003.

6.3.2.1 WWTP-TP-1 and WWTP-TP-2

No evidence of soil staining or electrical components was present in any of the surficial areas immediately adjacent to the pads. Arochlor 1260 (a PCB) was detected in both soil surface samples at concentrations of 0.3 and 0.11 mg/kg, respectively. In 2003, the Minnesota Residential Soil Reference Value (SRV)³ for Arochlor 1260 had not been established; the SRV for Total PCBs was reported as 1.2 mg/kg. In 2003, the Tier 1 Minnesota Soil Leaching Value (SLV) for Arochlor 1260 had not been established; the SLV for Total PCBs was reported as 2.1 mg/kg. In 2003, the Industrial SRV for Total PCBs was 8 mg/kg.

6.3.2.2 WWTP-TP-3 and WWTP-TP-4

Test pits did not encounter a concrete slab at the base of the Secondary Containment Reservoir. No visual or olfactory evidence was observed in the underlying soil. Sampling detected arsenic, barium, cadmium, chromium, and lead concentrations below their respective SRV or SLV. Total mercury was detected in the surface soil sample for

³ All references in this document to Soil Reference Values (SRV) and to Soil Leaching Values (SLVs) are specific to those determined by the State of Minnesota as of 2003.

WWTP-TP-3 at a concentration of 0.014 mg/kg. In 2003, the Residential SRV for mercury was 0.7 mg/kg, the Industrial SRV was 2.0 mg/kg, and Tier 1 SLV for mercury was 1.6 mg/kg.

6.3.2.3 WWTP-TP-6 and WWTP-TP-9

Soil samples from both of these test pits detected no VOCs, no metals in excess of their respective Residential SRV or SLV and no SVOCs, nitro-aromatic compounds, PCBs, or DROs above their respective reporting limits

6.3.2.4 WWTP-TP-12

This test pit was completed inside of an underground water holding tank located to the west of the steam plant. According to the Reference 4, the test pit uncovered a large amount of miscellaneous demolition debris consisting of electrical components, brick, slag, and tar.⁴

a. Naphthalene was shown as "ND(360)" in the 4-5 foot (bgs) depth on Table 4. In 2003, the Residential SRV for naphthalene was 10 mg/kg, the Industrial SRV was 28 mg/kg, and the Tier 1 SLV was 7.5 mg/kg.

b. Eight (8) SVOCs - acenaphthene, carbozole, dibenzofuran, fluoranthene, fluorine, naphthalene, pyrene, and benzo(a)pyrene (BaP) equivalent⁵ - were shown as exceeding their residential and industrial BaP equivalent. In 2003, the Residential SRV for BaP was 2 mg/kg, the Industrial SRV for BaP was 4 mg/kg and the Tier 1 SLV was 2 mg/kg.

c. Concentrations of Arochlor 1254 (a PCB) and 1260 ranged from 0.08 mg/kg to 2.7 mg/kg. In 2003, the Residential and Industrial SRVs for Arochlor 1254 and 1260 had not been established; the Residential SRV for Total PCBs was reported as 1.2 mg/kg and the Industrial SRV for Total PCBs was reported as 8 mg/kg. In 2003, the Tier 1 SLV for Arochlor 1254 and 260 had not been established; the SLV for Total PCBs was reported as 2.1 mg/kg. The sample of the electrical insulation in the underground tank exceeded its residential SRV for total PCBs.

d. Arsenic was detected at 84 mg/kg in one of the two samples analyzed for RCRA metals. In 2003, the Residential SRV for arsenic was 10 mg/kg, the Industrial SRV was 20 mg/kg, and the Tier 1 SLV for arsenic is 15.1 mg/kg.

e. Asbestos was identified ranging from trace to 30% in two of the three samples

⁴ No written records were located to show when or by whom the demolition debris was placed into this pit.

⁵ According to the PEER, 2003, 4 Benzo(a)pyrene (BaP) equivalent is a calculated value based on the weighted concentration and toxicity of the following compounds: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, debenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene

analyzed for asbestos.

f. Diesel Range Organics (DROs) were detected at 56,000 mg/kg in a sample of tar-like material collected from the debris in the holding tank. In 2003, no State of Minnesota Residential or Industrial SRV or Tier 1 SLV had been established.

6.3.3 Sampling in August 2006

Peer Engineering, Inc. (PEI) conducted soil sampling for the UMN east of the Steam Plant in August 2006 and noted the presence of lead. The sample results as well as reference values are from pages 21 through 25 of the *Concrete and Soil Assessment*, UMore Park, Rosemount, MN, October 2006.

6.3.3.1 Soil Samples

According to Section 4 of the *Concrete and Soil Assessment*, no VOCs were detected. Di-n-butyl phthalate was detected in soil samples but at concentrations below the residential SRV and the SLV. No PCBs, aniline or diphenylamine were detected in the samples. Metal concentrations detected were below the established Residential SRV and SLVs. No asbestos was detected in the concrete samples analyzed.

6.3.3.2 Test Trenching and Soil Sampling

According to Section 4, *Concrete and Soil Assessment*, no VOCs were detected. Polycyclic aromatic hydrocarbons (PAHs) were detected but at concentrations below the established Residential SRV and SLVs. No PCBs, aniline or diphenylamine were detected in the samples. Metal concentrations detected were below the Residential SRV and SLVs, with the exception of lead (TT-49(0-1 foot)-401A, apparently located between the fuel oil tank and the east side of the Steam Plant) which was detected at 335 mg/kg. (PEI, 2006, p. 25) In 2006, the Residential SRV for lead was 300 mg/kg, the Industrial SRV was 700 mg/kg and the SLV was 525 mg/kg. (PEI, 2006, p. 21)

No asbestos was detected in the concrete samples analyzed.

SECTION 7.0 – EVALUATION OF CON/HTRW AND BD/DR PRESENCE

According to ER 200-3-1, *Formerly Used Defense Sites (FUDS) Program Policy*, Building Demolition and Debris Removal (BD/DR) and Containerized Hazardous, Toxic and Radioactive Waste (CON/HTRW) are not generally regulated under CERCLA.

7.1 EVALUATION OF CON/HTRW PRESENCE AND AREAS

According to paragraph 3-2.4.2 of ER 200-3-1 “CON/HTRW projects include response actions in an area of FUDS property to address [U]nderground storage tanks (USTs), aboveground storage tanks (ASTs), transformers, hydraulic systems, investigation derived wastes (IDW), abandoned inactive monitoring wells, etc. [...]” (USACE, 2004) None of these items were observed during the site reconnaissance.

7.2 EVALUATION OF BD/DR

Debris may pose safety hazards at the Steam Plant area. No visible debris at AOC 7 presents a “clear danger” according to the definitions in Table 3-1 of ER 200-3-1.

7.2.1 BD/DR Projects

According to the definition of BD/DR projects in ER 200-3-1, AOC 7 does not satisfy the first of the two primary conditions listed in the following:

“BD/DR projects are response actions at an area of an eligible FUDS property to address the demolition and removal of unsafe buildings and structures and the removal of unsafe debris. ... BD/DR projects are eligible if the title, deed, or other transfer document conveying the property from DOD specifically requires DOD to undertake BD/DR activities; or, all the following conditions are met:

- Subsequent to DOD ownership, the property must have always been on lands owned by State, Local Government or Alaskan Native Corporation.
- The conditions must have been hazardous as a result of prior DoD use and must have been inherently hazardous when the property was transferred or disposed of by GSA before 17 October 1986.
- Inherently hazardous BD/DR must present a clear danger, likely to cause, or having already caused, death or serious injury to a person exercising ordinary and reasonable care.” (USACE, 2004)

As for the first of the two primary conditions, the QCD that transferred the property to the Regents of the UMN in March 1948 did not specifically require DOD to undertake BD/DR activities, nor did the subsequent one in March 1961.

As for the second of the two primary conditions, if the lands comprising the grounds of the UMN amount to lands of the state, then the first of the three (3) sub-conditions is met. However, no evidence was located to prove that the conditions at AOC 7 were inherently hazardous on March 3, 1961 when the 26.7 acres were deeded to the Regents of the UMN. Visual observation at AOC 7 during site reconnaissance failed to find inherently hazardous BD/DR.

7.2.2 Asbestos

The Regents of the UMN are concerned about the presence of asbestos in the underground water holding tank to the west of the Steam Plant. While the CERCLA PA may identify potential projects at eligible FUDS properties, abatement of asbestos containing material (ACM) is an ineligible project unless:

“The ACM [...] is incidental to the completion of response actions at an approved project, or

“In situations where the ACM were not incorporated as an integral component of a facility but were released into the environment by DOD disposal actions resulting in an on-site CERCLA hazardous release for which DOD is responsible.” (USACE, 2004)

If “[...] the hazard is a result of neglect by the owner/grantee subsequent to DOD use, regardless of whether the deed or disposal document required the owner/grantee to maintain the property improvements.” (USACE, 2004) then the activity is ineligible for FUDS.

As the records for the disposal of debris at AOC 7 have not been located, there is presently no evidence to suggest that any asbestos present at AOC 7 was the result of “DOD disposal action”.

SECTION 8.0 PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENT

Pathway Characteristics:

The objective of the Limited Preliminary Assessment is to identify the exposure routes and pathways which are a means for hazardous substances to pose a potential threat to human health and the environment. The four migration pathways are groundwater, surface water, soil, and air. The pathways and exposure routes are outlined in the Table below.

Migration Pathways and Exposure Routes

Pathway	Exposure Route
Groundwater	Hazardous substance migration to and within aquifers; potential threats to drinking water supplies.
Surface Water	Hazardous substance migration to surface water bodies; potential threats to drinking water supplies, the human food chain and sensitive environments.
Soil	Potential threat to people on or near the site who may come into contact with exposed wastes or areas of suspected contamination. This includes both soil ingestion and dermal exposure.
Air	Hazardous substance migration, in gaseous form or particulate form, through the air; potential threats to people and sensitive environments.

Target Populations:

Based on land use, there are several routes through which a receptor may encounter contamination in the environmental media. See the table below. Current land use is light industrial, agricultural, and residential with many open areas. Future land use is similar to current land use. Potential receptors under both current and future land uses include the on-site worker, the resident (adult and child), and the food-chain consumer.

Target Populations

Pathway	Target Population*
Groundwater and air	4-mile radius around the site.
Surface water	15 miles downstream from the probable point of entry.
Soil exposure	200 feet for the resident population threat.
	1 mile from the nearest population threat.

* Reference: EPA 540/G-91/013 *Guidance for Performing Preliminary Assessments under CERCLA*.

8.1 GROUNDWATER PATHWAY

The groundwater pathway is evaluated by determining if a release of a hazardous substance occurred and by identifying the depth to the aquifer.

8.1.1 Hydrogeologic Setting of Preliminary Assessment Area

8.1.1.1 Regional Physiography, Relief and Drainage

FGOW's Steam Plant property is located within Dakota County. Dakota County lies within the Central Lowland Physiographic Province. FGOW is located in the northeastern portion of Dakota County.

Dakota County is a geologically complex area. It includes several distinct geomorphic regions.

The northwestern and western parts of the county consist of complex moraines, most notably the St. Croix moraine to the north of FGOW. The topography is hilly and irregular. There are many deep depressions that are poorly drained. Most of the natural lakes in Dakota County are in this area.

A large area in the central and eastern parts of the county and parts of the extreme south are level to gently rolling outwash plains. A few short steep escarpments separate terraces along the Mississippi River. Most of these areas are well drained; however some areas in the central part of the county are poorly drained and several have large peat bogs.

Much of the southern part of the county has gently sloping topography controlled by bedrock. In some places, bedrock buttes stand 100 feet above the surrounding areas. Thin layers of silty or loamy sediments cover most of the bedrock. Short, steep slopes of bedrock are common across much of the area; but long very steep slopes are common in the extreme southeast.

Along the Mississippi and Minnesota Rivers are extensive flood plains. Most are nearly level and poorly drained. Oxbow lakes and bogs are common.

The Mississippi and Minnesota Rivers drain the northern part of the county. The Vermillion River drains the central part. The Cannon River drains the extreme southern part of the county.

The highest elevations in the county are in the moraines in the northern and western areas. Buck Hill, the highest point in the county, has an elevation of 1,195 feet above Mean Sea Level (MSL). Most of the county slopes toward the east. It drops from an average elevation of about 1000 feet above MSL in the west and south to about 800 feet above MSL at the top of the Mississippi River Valley. The lowest elevation, about 675 feet, occurs where the Mississippi River leaves the county. (USACE, 2006)

8.1.1.2 Regional Geology

The geology of Dakota County is complex and varied. The materials that make up the geology of Dakota County can be placed in descending order into three broad groups: Quaternary deposits on the surface, with Early Paleozoic sedimentary rocks forming the upper bedrock layers, on a basement of Middle Proterozoic rocks. Quaternary deposits are further divided into Recent sediments and Pleistocene glacial deposits.

The Recent sediments consist of deposits of flood plain alluvium, along the principal stream channels, and organic deposits (peat bogs), in poorly drained isolated depressions and on flood plains, resting mostly on Pleistocene glacial deposits.

The Pleistocene deposits form much of the shallow subsurface, and consist mostly of interlayered glacial till and outwash deposits from several glacial episodes including the Wisconsinan, the Illinoian, and the Kansan. Older tills and outwash are found mostly in the southern and western portions of the county, and occasionally underlying the more recent Late Wisconsinan. The Late Wisconsinan glacial deposits occur mostly along and north of the Vermillion River. Three levels of terraces occur along the Minnesota and Mississippi Rivers, along the northern border of the county. A large buried valley is cut into the bedrock across the northeastern portion of the county, north of Pine Bend and south of Hastings.

Paleozoic rocks of the Cambrian and Ordovician periods form the upper bedrock throughout the county and crop out in a few small areas, mostly along the Minnesota and Mississippi Rivers and south of the Vermillion River. Paleozoic bedrock can occur in the shallow subsurface, mostly along and south of the Vermillion River, east of Farmington, below a residual soil cover. Elsewhere, it may be deeply buried under a hundred feet or more of glacial sediments. The formations or groups present by increasing age (and depth) are: Decorah Shale (in the northern tip of the county), Platteville and Glenwood Formations (mostly dolomite and limestone), St. Peter Sandstone, Prairie Du Chien Group (principally dolomite) Jordan Sandstone, St Lawrence Formation (dolomitic shale and siltstone), Franconia Formation (thinly bedded fine grained glauconitic sandstone and minor shale), Ironston and Galesville Sandstones, Eau Claire Formation (siltstone, very fine sandstone, and shale), and Mt. Simon Sandstone, resting on the Precambrian basement rocks.

Beneath the Paleozoic rocks are Middle Proterozoic rocks of the Precambrian, which make up the basement rocks. Proterozoic rocks consisting of the Solor Church Formation west of the Empire Fault and the Fond du Lac Formation east of that fault. Along the Empire Fault and the adjacent Vermillion Anticline, Proterozoic basaltic and rhyolitic volcanic rocks are present beneath thin layers of Solor Church Formation. The Hinckley Sandstone, which is the uppermost Proterozoic sedimentary formation in the region, is absent in most of Dakota County.

Structural features in Dakota County include the above-mentioned Empire Fault and the adjacent Vermillion Anticline that run northeast to southwest, paralleling the Vermillion River, from Farmington east. A number of other minor folds and faults also occur in this immediate area, mostly to the southeast. Dakota County is on the southeastern margin of the Twin Cities Basin, which accounts for the regional dip of the Paleozoic strata toward the west and north. The twin cities Basin developed in Middle Ordovician time over an older basin formed along a part of the Midcontinent rift. The rift is now a large geologic feature composed of thick lava flows and red clastic sedimentary rocks. Large scale block faulting in these Proterozoic rocks caused the formation of an elongated northeast-trending basin, as a down faulted block or graben, beneath what was to become the Twin Cities Metropolitan Area. The Paleozoic Twin Cities Basin, rather than a single down faulted structure, is the result of many small folds and faults in step fashion, including the folds and faults discussed above. Individually they have small displacements of about 100 feet for folds and 50 to 150 feet for faults. None are exposed in outcrop, but they are inferred from subsurface data.

8.1.1.3 Regional Hydrogeology

The Quaternary Aquifers may include Recent sediments, but are principally Pleistocene glacial deposits.

Glacial deposits of sand and gravel are a source of water for domestic and irrigation wells in Dakota County. Because of their susceptibility to pollution, they are not used for municipal or public water supply wells. Their moderate yield capacity in the northern suburbs is adequate for some non-potable industrial uses.

In addition to the Rosemount outwash plain, outwash sand and gravel occurs in the valleys of the Vermillion and Cannon Rivers and their tributaries, and is buried by till of the St. Croix moraine north of Rich Valley.

The St. Croix moraine forms a leaky confining layer. Buried sand layers may or may not be hydraulically connected as well as connected to the underlying Prairie Du Chien-Jordan, except in places where the St. Peter overlies the Prairie Du Chien.

Bedrock Aquifers include the Platteville, St. Peter, Prairie Du Chien-Jordan, Franconia-Ironton-Galesville, and Mt. Simon-Hinckley. The Glenwood Formation forms an aquitard separating the Platteville from the underlying St. Peter. A shale layer at the base of the St. Peter Sandstone forms a discontinuous aquitard between the St. Peter and the underlying Prairie Du Chien-Jordan. The St. Lawrence Formation consists of dolomitic shale that has been used as a low yield aquifer in the northeastern part of Dakota County, but also acts as a leaky aquitard between the overlying Prairie Du Chien-Jordan and the St. Lawrence-Franconia in other parts of the county. The Eau Claire Formation underlies the Galesville and forms a confining bed 200 feet thick between the Ironton-Galesville and the Mt. Simon-Hinckley aquifers.

The Platteville Aquifer is used for domestic wells in Mendota Heights, South St. Paul and Inver Grove Heights in the north part of the county. The Platteville occurs discontinuously in the Rosemount area, where several drillers' logs report the Platteville as dry. The St. Peter is widely used for domestic wells in the north part of the county. It is also used in combination with the Prairie Du Chien in high-capacity wells of less than 150 gpm, including some older public supply wells. The Prairie Du Chien-Jordan is the major high-capacity aquifer for Dakota County, and is absent only in the buried bedrock valleys north of Pine Bend, south of Hastings, and in the Mississippi River valley. In general, groundwater flows in the Prairie Du Chien-Jordan aquifer from the west-southwest to the north and east, toward the Minnesota and Mississippi River valleys, and the buried valley in the northeastern portion of the county.

The Prairie Du Chien-Jordan is particularly sensitive to contamination as the Prairie Du Chien consists of a thin to thickly bedded sandy dolomite in which groundwater flows along joints, fractures, and bedding planes. The Franconia, Ironston, and Galesville (sometimes including the St Lawrence) are low yield aquifers usually used in high-capacity multi-aquifer wells. The Mt. Simon-Hinckley aquifer is the deepest high-yield aquifer available in Dakota County. It underlies the entire county, and under natural conditions, it is isolated from the Prairie Du Chien-Jordan aquifer. In Dakota County, the potentiometric surface of the Mt. Simon slopes toward high capacity wells in Minneapolis and the suburbs of Hennepin County. Near some multi-aquifer wells in Burnsville, Pine Bend, and South St. Paul, the static water level in the Mt. Simon has been raised to the level of the Franconia. Such artificial recharge and discharge can change flow direction locally, and modify natural water chemistry. (Balaban, 1990)

8.1.1.4 General Site Geology

FGOW is located on the southeastern portion of the Twin Cities Basin within the Central Lowland Physiographic Province in northeastern Dakota County, Minnesota, on the south edge of the Minneapolis-St. Paul metropolitan area.

FGOW sits on the Rosemount outwash plain, southeast of the St. Croix moraine. As such, the soils can be expected to be very permeable, mostly sands and gravels. A review of the Soil Survey of Dakota County indicates that the Waukegan-Wadena-Hawick soil group underlies most of FGOW. The Waukegan-Wadena-Hawick is described as level to very steep, well drained and excessively drained soils formed in silty and loamy sediments over sandy outwash: on outwash plains and terraces. Recent alluvium has been deposited along the Mississippi River in the area of the water supply wells, along the upper reach of Spring Lake, and along the Vermillion River and its tributaries, which received runoff from a disposal ditch at FGOW.

On the main FGOW Segment A property, the St. Peter Sandstone (0 to 160 feet thick) underlies about half of FGOW, elsewhere, the underlying Prairie Du Chien (dolomite, up to 308 feet thick) is the first bedrock unit encountered. The easement toward the water supply wells by Spring Lake, and the Vermillion River, cross deep bedrock valleys which

cut through the Prairie Du Chien into the underlying Jordan Sandstone (up to 125 feet thick), and the St Lawrence (dolomitic shale and siltstone) and Franconia Formations (thinly bedded fine grained glauconitic sandstone and minor shale). The St. Lawrence and Franconia Formations have a combined thickness of up to 240 feet.

8.1.1.5 Hydrogeology

The overburden, as discussed above, consists principally of glacial outwash deposits on the main FGOW facility, with some alluvium along the peripheral portions that include major river valleys. At FGOW, the overburden is generally not considered a developable aquifer, except along the Vermillion River and by Spring Lake. There may be some potential for limited water development (domestic, agricultural or livestock wells) in the outwash deposits along the northern portion of the main FGOW facility, and to the west toward Rosemount. At the main FGOW facility, groundwater elevation in the overburden is from about elevation 890 feet above MSL on the southwest corner to about 840 feet above MSL on the northeast corner. Yield in the overburden can be expected to be below 5 gpm and transmissivity usually below 500 gpd, except in the northern most portion of the main FGOW. Elsewhere, in the peripheral areas of the facility along the Mississippi and Vermillion River valleys and over the major buried bedrock valley to the east, groundwater elevation in the overburden will be lower with yield and transmissivity usually much higher.

The typical depth to water measurements between 50 and 100 feet bgs in the FGOW area

Groundwater in the Quaternary drift is of the calcium-magnesium bicarbonate type. It is hard water and high in iron content, but suitable for most purposes. In water samples from the early 1960s, most samples had nitrates greater than drinking water standards of 10 ppm (NO_3^- as N), though all chloride concentrations were less than 9 ppm. Sulfate concentrations were about 20 ppm in most wells. Studies in the 1980s documented feedlots, fertilizer and storm-sewer runoff as reasons for increased concentrations of nutrients, particularly nitrogen and phosphorous in surface water bodies. Elevated chloride concentration was attributed to use of road salt for deicing. The results are pertinent to groundwater due to the high susceptibility of the aquifers in the area to the downward migration of contaminants.

The bedrock aquifers are the principal source for groundwater in the immediate area of FGOW. Of those, the principal shallow bedrock aquifer would be the Prairie Du Chien-Jordan. The elevation of the potentiometric surface in the Prairie Du Chien-Jordan aquifer is about 890 ft Above Mean Sea Level (AMSL) in the southwest corner of the main facility to about 830 ft (AMSL) in the northeast corner, with the levels declining to the northeast. The Prairie Du Chien-Jordan aquifer has a potential yield of 1,000 to 2000 gpm and a transmissivity of 50,000 to 200,000 gpd, in the area around the main FGOW facility, declining along the peripheral areas toward Spring Lake and along the Vermillion River east of the main FGOW facility, where the Prairie Du Chien-Jordan has been removed by erosion and replaced by alluvium or glacial outwash deposits. The

Prairie Du Chien-Jordan aquifer is of concern not only because of its value as a groundwater resource, but also because of its high susceptibility to contamination. The aquifer's susceptibility relates both to the permeability of the overlying materials and the nature of the voids in the Prairie Du Chien portion of the aquifer, the reason for the high yield and transmissibility but without much ability to filter out or retard contamination. The regional aquifers above the Prairie Du Chien-Jordan are either absent or likely have inadequate saturation to be useful by them. The aquifers below the Prairie Du Chien-Jordan are usually not developed, unless needed for high capacity wells. The St. Lawrence Formation could be expected to provide some protection from downward migration of contamination that reached the Prairie Du Chien-Jordan aquifer. However, high capacity wells screened across multiple aquifers can provide pathways for downward movement of such contamination, since the piezometric levels in the lower aquifers are generally lower than in the Prairie Du Chien-Jordan.

Groundwater in all the sedimentary bedrock aquifers is of the calcium-magnesium bicarbonate type - hard to very hard - but is suitable for most uses. The groundwater chemistry is quite stable and the pH is about 7.5. Dissolved Fe and Mn content is variable, with some samples having concentration above the drinking water standards of 0.3 ppm for Fe and 0.05 ppm for Mn. Sulfate varies across the county but is around 80 ppm in immediate area of Coates/FGOW. Total dissolved solids were reported to be increasing into the 1980s, and nitrate values were reported to exceed drinking water standards of 10 ppm (NO_3^- as N) of observation wells sampled in the 1980s. Chloride concentration, which is naturally quite low (<5ppm), increased throughout the aquifer in most observation wells from 1960 to the present, were up to 120 ppm, though still below the drinking-water standard of 250 ppm. Tritium tests of the groundwater indicate that groundwater in the Prairie Du Chien-Jordan in the area of Burnsville and Apple Valley, to the west, had been recharged from precipitation within the last 35 years.

8.1.2 Groundwater Targets

The most likely groundwater pathway encountered is the Prairie Du Chien-Jordan bedrock aquifer with typical depth to water measurements between 50 and 100 feet bgs in the FGOW Steam Plant area. The majority of the population within a 4-mile radius of FGOW's Steam Plant property (primarily in the city of Rosemount located upgradient of the Steam Plant property) relies on drinking water supplied from municipal water provided by the city of Rosemount or from groundwater pumped from private wells. According to the 2004 City of Rosemount Drinking Water Quality Report

“[t]he City of Rosemount provides drinking water to its residents [population estimated in 2002 to be 16,262] and businesses from a groundwater source via six wells (ranging from 400 to 498 feet in depth) that draw from the Jordan aquifer.” (USACE, 2006, Appendix G, Reference 24)

The DCEM office provided a map that shows approximately 165 private domestic wells within a 4-mile radius of FGOW that could be used for drinking water (Appendix I, Map 8, USACE, 2006). Individuals relying on these private wells for drinking water represent the secondary target population. Census data for 2000 averages 2.7 persons per household for Dakota County. Assuming each well represents one household, at 2.7 persons per household, this equates to a secondary target population of 446 residents. The nearest resident relying on a private drinking water well is within 1-mile of the center of FGOW. Primary target drinking water wells are located upgradient of FGOW and would not be affected by any suspected release to groundwater caused by FGOW activities.

8.1.3 Groundwater Conclusions

During its operation, facilities on the Steam Plant and associated property collected and treated raw Mississippi River water through chemical processes and burned coal to create steam. These activities may have generated HTRW; there was no MEC or MC associated with the operations conducted at FGOW Steam Plant property.

A release of hazardous substances to the groundwater caused by FGOW's activities in the Steam Plant property area is not suspected based upon information about FGOW activities. A release of HTRW to the alluvial aquifer and the target population is possible within the AOC due to activities conducted at the AOC, the depth-to-aquifer (50 to 100 feet bgs), and the potential for high conductivity within the alluvial and bedrock aquifers. For example:

- there was the potential for release of mercury from the coal delivered, stored and then burned at the Steam Plant;
- there was the potential for release of mercury from instruments, gauges, and/or switches used throughout the Steam Plant;
- there was the potential for release of POL (from the oil storage tanks located east of the Steam Plant); and
- there was the potential for release of PCBs from the transformers

After the transfer of FGOW property, UMN industrial and agricultural activities may also have released HTRW into the aquifer. For example:

- there was the potential for release of arsenic and other chemicals from the application of agricultural pesticides and herbicides on nearby fields;
- there was the potential for release of mercury from instruments, gauges, and/or switches that remained in the Steam Plant;
- there was the potential for release of mercury and other heavy metals from the application of biosolids on nearby fields;

- there was the potential for release of solvents from industrial activities in the Steam Plant and nearby buildings; and
- there was the potential for release of PCBs from the transformers that were beneficially used by the UMN.

If HTRW contamination exists, there is a groundwater pathway.

8.2 SURFACE WATER PATHWAY

The surface water pathway is evaluated by determining if a release of a hazardous substance occurred, by identifying the distance to surface water, and by determining the flooding frequency.

8.2.1 Hydrologic Setting

Dakota County, located on the west bank of the Mississippi River, typically receives precipitation from eastward moving storm systems. The average annual precipitation varies from less than 1 inch in February to over 4 inches in July. The annual average precipitation at Rosemount is approximately 34.6 inches. The average temperature ranges from about 10 degrees Fahrenheit in January to 71 degrees Fahrenheit in July (Appendix G, Reference 18, USACE, 2006). The average snowfall each winter is 45 inches. Overland drainage from the Steam Plant property generally flows to the southeast into the Vermillion River, about 1-mile south of the perimeter of Segment A. At this point the Vermillion River meanders approximately 12 miles to the east-northeast before merging with the Mississippi River that flows generally south. The final drainage is about 13-miles from the probable point of entry (PPE). No other significant surface waterways exist within 15 miles downstream of FGOW.

The other source of drainage in the Steam Plant property is the Waste Disposal Ditch that connects to the Primary and Secondary Settling Ponds and then into the Vermillion River. (USACE, 2006)

8.2.2 Surface Water Targets

Surface water pathway targets include a naturally reproducing population of trout and sensitive environments. Surface water pathway targets do not include intakes that supply drinking water. Targets have been identified and evaluated over a 15-mile target distance limit, which defines the “in-water segment” of the surface water migration route. For measurement purposes, the PPE for the in-water segment is defined as the point where the Waste Disposal Ditch crosses the southeastern boundary of FGOW (Appendix S, Plate 1). The Vermillion River, located within the 15-mile in-water segment, is not a drinking water source for the Cities of Vermillion and Hastings municipal supply. No drinking water intakes are located within 15 miles downstream of FGOW. Fisheries located within 15 miles downstream of FGOW include the Vermillion River. A few wetlands may be located along the riverbanks of the Vermillion River. These wetlands

are not labeled and can only be assumed from mapped vegetation along the banks of the river.

8.2.3 Surface Water Conclusions

During its operation, facilities on the Steam Plant and associated property treated water through chemical processes and burned coal to create steam. These activities may have generated HTRW; there was no MEC or MC associated with the operations conducted at FGOW Steam Plant property.

There is one surface waterway near the FGOW Steam Plant: the Waste Disposal Ditch. Ultimately, drainage from FGOW's Segment A flows to the Vermillion River. The Vermillion River does not include drinking water intakes but may contain several adjacent wetlands. As noted, the average annual precipitation is about 34.6 inches.

A release of hazardous substances to the surface waterway caused by FGOW's Segment A activities is not suspected based upon information about FGOW activities. A release of HTRW to the surface waterway and the target population is possible within the AOCs due to activities conducted at the AOC and the presence of the surface waterway. For example:

- there was the potential for release of mercury from the large quantities of coal delivered, stored and burned at the Steam Plant into the Waste Disposal Ditch;
- there was the potential for release of mercury from instruments, gauges, and/or switches used throughout the Steam Plant;
- there was the potential for release of POL (from the oil storage tanks located east of the Steam Plant) into the Waste Disposal Ditch; and
- there was the potential for release of PCBs from the transformers into the Waste Disposal Ditch.

After the transfer of FGOW property, UMN industrial and agricultural activities may also have released HTRW to the surface waterway. For example:

- there was the potential for release of arsenic and other chemicals from the application of agricultural pesticides and herbicides on nearby fields;
- there was the potential for release of mercury and other heavy metals from the application of biosolids on nearby fields;
- there was the potential for release of mercury from instruments, gauges, and/or switches that remained in the Steam Plant;
- there was the potential for release of solvents from industrial activities in the Steam Plant and nearby buildings; and

- there was the potential for release of PCBs from the transformers that were beneficially used by the UMN.

If HTRW contamination exists, there is a surface waterway pathway.

8.3 SOIL EXPOSURE AND AIR PATHWAYS

The soil and air pathway is evaluated by identifying a suspected release of a hazardous substance and the quantity of waste that may have been released.

8.3.1 Physical Conditions

The 1947 Quitclaim Property of FGOW's Segment A is generally surrounded by vacant land used primarily for agricultural purposes (rangeland). DuPont ceased ordnance activities in this area in late 1945. The city of Rosemount is located adjacent to the northwest corner of FGOW's Segment A. The nearest residential area includes homes located in this corner. The vacant lands are covered by native vegetation. Some FGOW buildings still exist and are either vacant or being leased to occupants for light industrial and commercial activities. In addition, some of original streets of FGOW remain intact. In many places where FGOW buildings have been removed, concrete foundations remain.

There are five soil associations within Segment A of FGOW, as identified in the Soil Survey of Dakota County Minnesota (USDA, 1983; Appendix I, Map 5). The Waukegan-Wadena-Hawick association (Unit 2 on Map 5) underlies approximately 75 percent of Segment A of FGOW, mostly the northern portion. These soils are level to very steep, well drained to excessively drained, silty, loamy, and sandy soils on the glacial outwash plains and terraces. County-wide, about 36 percent are Waukegan soils, 22 percent are Wadena soils, and 8 percent are Hawick soils, the remaining 34 percent are minor soils. These soils have moderate to rapid vertical permeability (0.6 – 20 inches/hour) and are in general easily erodible. Soil thickness varies from about 21 to 42 inches thick, grading into the underlying parent material of sand and gravel (outwash).

About 15 percent of Segment A of FGOW, in the south-central to southeastern portion, is underlain by the Tallula-Port Byron-Bold soil association. These soils are nearly level to steep, well drained loamy and silty soils formed in loess on uplands. County-wide, about 38 percent are Tallula soils, 18 percent are Port Byron soils, 18 percent are Bold soils and the remaining 26 percent are minor soils. These soils have moderate vertical permeability (0.6-2.0 inches/hour) and are in general easily erodible. Soil thickness varies from about 8-inches to more than 52-inches, grading into the underlying parent material of yellowish-brown calcareous silt loam (loess).

About 5 percent of Segment A of FGOW, in the south-central portion, is underlain by the Marshan-Cylinder soil association. These soils are nearly level, poorly drained and somewhat poorly drained silty and loamy sediments over sandy outwash, on outwash

plains and terraces. County-wide, about 30 percent are Marshan soils, 28 percent are Cylinder soils and the remaining 42 percent are minor soils. These soils have moderate vertical permeability (0.6-2.0 inches/hour, 20 or greater in the parent material, below) and would be easily erodible, except for their occurrence in nearly level and mostly saturated environments. Soil thickness varies from about 28 to 32-inches, grading into the underlying parent material of yellowish or grayish-brown sand (outwash).

The remaining 5 percent of Segment A of FGOW is underlain by the Etter-Rockton-Copaston soil association on a small southeast portion, the Kingsley-Mahtomedi soil association on a small northeast portion, and the Ostrander-Klinger-Maxfield soil association along the south portion of the western boundary. The Etter-Rockton-Copaston association soils are generally shallow permeable soils formed mostly on limestone bedrock. The Kingsley-Mahtomedi association soils are generally about three-foot thick moderately slow to moderately rapid permeable soils formed on sandy loam glacial till (Kingsley soils) and sandy and gravelly outwash (Mahtomedi soils). The Ostrander-Klinger-Maxfield association soils are generally four feet thick or greater and moderately permeable, formed on silty and loamy sediments and loamy-calcareous till.

8.3.2 Soil and Air Targets

Dakota County is 539 square miles. The overall population of Dakota County is 375,642 (2003 estimate). According to the Real Estate office at the University of Minnesota Rosemount Research Center (UMRRC) there are approximately 70 workers in the area west of Akron Avenue (in the vicinity of AOC 6) and about 40 seasonal agricultural workers in the area south of 170th Street (near AOCs 1, 2 and 3). The population within 200-feet of the property lines surrounding the 1947 Quitclaim Property is approximately 70 people. Resident population residing between 200-feet and 1-mile is estimated from census data to be about 4,406 people. The population within a 4-mile radius of FGOW is approximately 17,614. This number maybe high because census tracts falling on both sides of the 4-mile radius boundary were included in the population count. No terrestrial sensitive environments existing within 200-feet of the 1947 QCD property lines. There are no schools or daycare facilities located within 200-feet of the specified property lines. The nearest daycare facility is located in the city of Rosemount and is less than 4-miles from the center of FGOW. The nearest school is located in Rosemount, approximately 4-miles from the center of FGOW. Transient population includes visitors involved in recreational activities – individuals who use the horseback, walking, jogging, bicycle and cross-country skiing trails or the outdoor shooting range – as well as trespassers who visit the property to explore the surface and subterranean structures of FGOW¹.

Workers on the site, transient population as well as all animals could come in direct contact with potentially contaminated soil or windblown soil.

¹ Numerous web sites as well as University and County personnel report the presence of trespassers in the Laminex Woodbox and sanitary sewer systems.

8.3.3 Soil Exposure and Air Pathway Conclusions

During its operation, facilities on the Steam Plant and associated property treated water through chemical processes and burned coal to create steam. These activities may have generated HTRW; there was no MEC or MC associated with the operations conducted at FGOV Steam Plant property.

DuPont production activities on the land transferred to the Regents of the UMN in 1948 lasted for approximately seven months in 1945 (Appendix G, References 10-13, USACE, 2006). The soil exposure pathway is possible but the potential is limited because much of the Steam Plant area was covered with asphalt, crushed gravel, paving or coal storage that impede or prevent a soil exposure pathway. This includes the building foundations and roads in the area.

A release of HTRW to the surface soil and the target population is possible within the AOC due to activities conducted at the AOC. For example:

- there was the potential for release of mercury from the large quantities of coal delivered, stored and burned at the Steam Plant;
- there was the potential for release of mercury from instruments, gauges, and/or switches used throughout the Steam Plant;
- there was the potential for release of POL (from the oil storage tanks located east of the Steam Plant); and
- there was the potential for release of PCBs from the transformers.

After the transfer of FGOV property, UMN industrial and agricultural activities may also have released HTRW to the surface soil. For example:

- there was the potential for release of arsenic and other chemicals from the application of agricultural pesticides and herbicides on nearby fields;
- there was the potential for release of mercury and other heavy metals from the application of biosolids on nearby fields;
- there was the potential for release of mercury from instruments, gauges, and/or switches that remained in the Steam Plant;
- there was the potential for release of solvents from industrial activities in the Steam Plant and nearby buildings; and
- there was the potential for release of PCBs from the transformers that were beneficially used by the UMN.

The air pathway is evaluated by identifying a suspected release of a hazardous substance and the quantity of waste that may have been released. Because of rapid dispersion of

released substances in the atmosphere, air releases usually can only be detected while the release is occurring. DuPont ordnance activities ceased in 1945; therefore, it is believed that airborne exposure to contaminated dust particles from DuPont activities is a negligible concern. If sufficient quantities of HTRW were present in the surface or subsurface soil their releases to the air could be a concern. However, due to the short time that the Steam Plant was completely operational it is unlikely that sufficient quantities of HTRW were generated. There was no evidence of stressed vegetation or reports of airborne "fallout" that could be traced to past DuPont operations. In conclusion, complete air receptor pathway to receptors is unlikely.

8.4 SUMMARY TABLE

Area of Concern	Use	Potential Contaminant ²	Pathway			
			SW	GW	Air	Soil
1. AOC 7 Steam Plant & Associated 26.7 Acres	FGOW Activities: Water treatment, coal storage, steam generated by burning the coal, power distribution through transformers	volatile and semi volatile organic compounds, PCBs, and metals	x	x		x
	Post-FGOW Activities: power distribution through transformers, support of aeronautical laboratory, demolition of buildings	volatile and semi volatile organic compounds, PCBs, and metals	x	x		x

² Exact chemicals are not known since comprehensive investigation of HTRW producing activities in the industrial area (transferred to UMN in the 1948 QCD) was not conducted.

SECTION 9.0 – SUMMARY AND CONCLUSIONS

The Steam Plant property requires further DOD action. Due to the uncertainty over the effect of the various transfers of the Steam Plant property -- risk-shifting language was not included when the title to the property reverted from the UMN to the NIRD-GSA or when transferred from the GSA back to UMN -- in August 2006 the Office of the Assistant Secretary of the Army for Installations & Environment (ASA-I&E) recommended that Omaha District revise the FDE to reflect that all FGOW property, including the Steam Plant property, was FUDS eligible (Attachment 01). The revised FDE was signed in September 2006 (Attachment 02). A PRP investigation was approved in the same correspondence. As background for the PRP investigation, a PA was begun on the Steam Plant and associated 26.7 acres as request by Congressman John Kline in April 2006 (Attachment 03).

9.1 AREAS THAT MAY WARRANT NO FURTHER ACTION BY DOD

No area of the Steam Plant & Associated 26.7 acre property warrants further action by DOD.

9.2 POTENTIAL HAZARDS THAT MAY WARRANT FUDS PROJECTS

9.2.1 HTRW

Potential hazards from past DuPont activities include:

- Chemicals used in the treatment of water from the Mississippi.
- Mercury (in both the smoke and ash waste stream) from the coal burned at steam plant as well as from the coal stored at the steam plant.
- Heavy metals (such as chromates and lead) from structural maintenance processes.
- Industrial solvents and degreasers from where solvents may have been used to remove grease and oil during maintenance and cleaning.
- POLs from fuel storage tank located east of the Steam Plant.
- PCBs from the transformers.
- Demolition debris dumped into underground water holding tank (west of the Steam Plant) during demolition and prior to UMN taking possession of the property.

Potential hazards from post-DuPont activities include:

- Arsenic and other chemicals from the application of agricultural pesticides and herbicides on nearby fields.

- Mercury from the application of biosolids on nearby agricultural fields.
- Heavy metals (such as chromates and lead) from structural maintenance processes.
- Industrial solvents and degreasers from where solvents may have been used to remove grease and oil during maintenance and cleaning.
- Demolition debris dumped into underground water holding tank (west of the Steam Plant) during demolition after UMN took possession of the property.
- PCBs from the transformers that were beneficially used by the UMN.

Media of potential concern include surface and subsurface soil, groundwater, and surface water.

AOC 7 may warrant a FUDS project to further investigate potential HTRW hazards.

9.2.2 Military Munition Response Program (MMRP)

There is no evidence that ammunition was produced, stored, or used anywhere on the Steam Plant property that is eligible for DERP-FUDS. There is no evidence that MEC, MC, or RCWM are present at FGOW. See Section 5 Evaluation of Presence of Military Munitions Technical Data for additional information. No FUDS projects based on MMRP are warranted.

9.2.3 PRP/HTRW Considerations

The Steam Plant and the underground water holding tank do not appear to have been operated after it was transferred to the Regents of the UMN in 1948¹ but the electrical transformers were used to provide power distribution to buildings and facilities owned and operated by the UMN.² Demolition debris was reported to have been found in the underground water holding tank west of the Steam Plant but the timeframe and source of the demolition debris is not known. Potential hazards from past activities include mercury and other heavy metals resulting from the application of wastewater biosolids on property within the FGOW boundaries by the UMN, as well as POL, PCBs and asbestos. Media of potential concern are surface and subsurface soil, groundwater, and surface water. This area has a potential for PRP considerations for DuPont and the UMN.

9.2.4 PRP/MMRP Considerations

There are no MMRP concerns identified at the site.

¹ According to *A Historical Interpretation and Preservation Plan for UMore Park* (April 2006), the Steam Plant "[...] provided power for the University's aeronautical laboratory." (p. 41)

² According to correspondence from the UMN to the GSA in January 1951, the UMN states that they are "... protecting its [heating plant] exterior. It is the site of **our** [emphasis added] transformers." (Attachment 12)

9.2.5 CON/HTRW

There is no indication of containerized HTRW on the site. See Section 7 of this PA for additional information. No CON/HTRW projects are warranted.

9.2.6 BD/DR

BD/DR projects can be used at eligible FUDS property to address the removal of unsafe debris. Debris may pose safety hazards at the Steam Plant property. Although it is possible that building debris is present on the site, AOC 7 does not appear to qualify for a BD/DR project per Section 3-2.4.5 of ER 200-3-1 because it does not meet the following:

“BD/DR projects are response actions at an area of an eligible FUDS property to address the demolition and removal of unsafe buildings and structures and the removal of unsafe debris. ... BD/DR projects are eligible if the title, deed, or other transfer document conveying the property from DOD specifically requires DOD to undertake BD/DR activities; or, all the following conditions are met:

- Subsequent to DOD ownership, the property must have always been on lands owned by State, Local Government or Alaskan Native Corporation.
- The conditions must have been hazardous as a result of prior DOD use and must have been inherently hazardous when the property was transferred or disposed of by GSA before 17 October 1986.
- Inherently hazardous BD/DR must present a clear danger, likely to cause, or having already caused, death or serious injury to a person exercising ordinary and reasonable care.” (USACE, 2004)

The QCD that transferred the property to the Regents of the UMN in March 1948 did not specifically require DOD to undertake BD/DR activities. Following the DOD’s ownership, the property was deeded to the Regents of the UMN. No evidence was found to prove that the conditions at AOC 7 were “inherently hazardous” on March 1961 when the land was again deeded to the Regents of the UMN. Visual observation at AOC 7 during site reconnaissance failed to find inherently hazardous BD/DR.

A BD/DR project at AOC 7 does not appear to be warranted.

This Limited Preliminary Assessment recommends further environmental research be conducted on the Steam Plant property and proposes a Site Investigation (SI) be conducted on the Steam Plant & Associated 26.7 acres. The purpose of this SI will be not only to characterize the contaminants of concern in the Steam Plant property but to accurately locate the precise boundaries of the 26.7 acre parcel of property transferred from the Government to the Regents of the UMN in March 1961.

SECTION 12.0 – PROPERTY DESCRIPTION, ACREAGE AND LAND USE

12.1. LOCATION

The major part (95%) of the land comprising Segment A of FGOW is located within the city limits of Rosemount in Dakota County (Minnesota) approximately 20 miles southeast of the Minneapolis/St. Paul metropolitan area (see Figure 12-1 at the end of this section). Segments B, C, and D are also located within Dakota County, MN (Figures 12-2, 12-3, and 12-4). The inset maps on Figures 3-2, 3-3, and 3-4 show the relative locations of the segments to each other. The State of Minnesota is located in U.S. Environmental Protection Agency (EPA) Region 5.

The southernmost point of Segment B begins approximately 2 miles north and ½ mile west of the small town of Coates, MN and extends northeast to the Mississippi River. It is mostly in Township 115N, Range 18W. Segment B consisted of 656.32 acres owned by the War Department, easements on 129.56 acres, and a license on 1.4 acres.

The portion of Segment C that adjoins Segment A of FGOW begins approximately 2 ½ miles south of the town of Coates, extends southeast and enters the Vermillion River, and continues to the northeast on the Vermillion River for approximately 7 miles. It is mostly in Township 114N, Range 18W. Segment C consisted of easements on 1,004.40 acres.

Segment D begins in the Vermillion River where Segment C ends, and continues northeast on the Vermillion River, through the town of Hastings, and ends at the Mississippi River. It is mostly in Townships 114N, Ranges 17W and 18W, and Township 115N, Range 17W. Segment D consisted of easements on 524.77 acres

12.2. FUDS ELIGIBLE PROPERTY

FGOW was built by DuPont for the production of oleum and smokeless cannon and rifle powder on approximately 13,651 acres. Construction occurred between August 1942 and July 1943, while powder production activities occurred between January and September 1945. The FDE signed on September 12, 2006 (Attachment 02) determined that FGOW is eligible for the DERP-FUDS program. The property covered by this PA was all returned to private ownership after the end of WWII.

12.3. LAND USE AND OWNERSHIP HISTORY

12.3.1 Land Use and Ownership Prior to Construction of FGOW

Prior to acquisition by the WD in 1942 and 1943, the majority of the land that became FGOW was privately owned and used primarily for agriculture. The land included in Segments B, C, and D was owned by multiple property owners. Figures 12-2, 12-3, and 12-4 each show the original property owners and acreages of the original parcels. Figure 12-2 also

FORMER GOPHER ORDNANCE WORKS, ROSEMOUNT, MN

indicates whether the parcels were to be obtained by purchase or easement. One parcel of 1.4 acres was obtained by license from the Chicago Great Western Railroad.

12.3.2 Acquisition and Use of Property for Construction of FGOW

The FGOW acreage (approximately 13,651 acres) was acquired through purchase (11,987.95 acres owned by WD), through easements (1,662.10 acres easement to WD) and through license (1.40 acres license to WD) in 1942.

12..3.2.1 Segment A

A discussion providing background on the construction and operation of the production facilities on Segment A is available in Section 3 of *Preliminary Assessment Report, Final, 1947 Quitclaim Property* (USACE, 2006). FGOW facilities were constructed between August 1942 and July 1943. Production of powder occurred between January and September of 1945. Although the Segment A information does not apply directly to Segments B, C, or D, it gives some indication of the period when the Ranney wells and water lines would have been in use and when waste may have been discharged to the waste disposal ditch and subsequently to Segment C.

12.3.2.2 Segment B

Land and/or easements for construction on Segment B were obtained in the 1942-43 timeframe by the War Department and the wells were constructed in this approximate time period. The real estate transfer documents indicate that land obtained for the Ranney Wells and waterlines was also to be used for a patrol road and power lines. Segment B included the facilities needed to obtain water for FGOW manufacturing processes, production of steam at the steam plant, and for fire protection. Work on Segment B included installation of four Ranney Wells, pump houses for the Ranney wells, a booster station for the water from the Ranney wells, a pump house for the river water, and two pipelines to transport water back to the production facilities. Water drawn directly from the Mississippi River was used for fire protection.

River Water Facilities: *Pertinent Data on Gopher Ordnance Works* (Attachment 22) is an undated document describing the site and plans for FGOW that appears to have been written either prior to the construction of the ordnance works or as construction work was beginning. Much of the document is written in the future tense. It describes the facility features, including the planned work to be done for obtaining the FGOW water supply. This document indicates that water obtained directly from the Mississippi River was intended to be used for condenser cooling purposes, although other historical documents only indicate the river water was used for fire protection. Water from the river and water from the four Ranney wells was to be transported separately through a pair of 42-inch concrete and steel pipes to the production facilities. The planning document states that river water was to be obtained through a channel dredged from the bank of the river across Spring Lake (which is adjacent to the Mississippi River), to the bank of the bluff bordering the Mississippi valley.

FORMER GOPHER ORDNANCE WORKS, ROSEMOUNT, MN

This channel was described as being 2,700-ft long, with a minimum depth of 12-ft below normal water elevation and a bottom width of 50-ft, and leading to a pump house. The planning document states “[...] it is anticipated that approximately 40,000 lineal feet of chain link fencing on steel posts will be erected around the River Pump House and the four Ranney Wells.”(p. 38, Attachment 22) According to a War Assets Administration report dated December 7, 1946 (Attachment 23), raw river water was pumped by a large pumping station (Building 414A) located at the river. This pumping station was located adjacent to a booster pumping station (Building 412C) used to pump water from the Ranney wells to storage reservoirs on the FGOW production facilities. Pump houses are described as being constructed of brick and tile. Dimensions of Building 412C are recorded as 61-ft, 10-in by 32-ft, while the dimensions of Building 414A are recorded as 73-ft by 63-ft. The river water was pumped to the production facilities, to a separate reservoir compartment from the Ranney well water. According to the December 1946 document, river water was pumped from the reservoirs into an underground distribution system to the fire mains.

Ranney Well Facilities: A Ranney well, or radial collector well, consists of multiple lateral well screens projecting from the bottom of a caisson installed below the water table. This design can provide natural filtration of water as it travels through sand and gravel. A partial record drawing dated May 10, 1944 (Figure 12-5) indicates that the inside diameter of at least one of the wells was approximately 13 feet.

Water from the Ranney wells was intended to be used for production facility processes and for the steam plant. According to Attachment 21, prepared by the United States Public Health Service (USPHS) in August 1946, four Ranney wells were constructed, but Wells A and B were not equipped for operation. The PHS report indicates that all water supplied by Ranney wells came from wells C and D.¹ The report goes on to state that wells A and B were 64-ft deep; well C was 107-ft, 6-in deep; and well D was 104-ft, 3-in deep. Pump houses associated with wells C and D were indicated to be 22-ft x 31-ft, 6-in x 13-ft and to be constructed of concrete, tile and brick. The USPHS document indicates that the Booster Pump House (Building 412C) was added to the plant design because of the extreme distance of wells C and D from the manufacturing area. An undated partial drawing (Figure 12-6) indicates that locations of Collectors 3 and 4 were moved northwest of their original planned locations. The pump houses/wells for the Ranney wells were designated 404 A, B, C, and D.

As mentioned in the discussion for the river water facilities, water from the Ranney wells was transferred to the ordnance works through an underground 42-in concrete and steel pipe.

¹ In various historical reports and drawings, the Ranney wells are sometimes referred to as “wells” and sometimes as “collectors”. They are sometimes designated A, B, C, and D and sometimes designated 1, 2, 3, and 4.

12.3.2.3 Segments C and D

Segments C and D were used to provide discharge for process plant wastes to the Vermillion River and from there to the Mississippi River. FGOW designers anticipated large amounts of flow from the plant plus additional runoff from the plant's surface areas. The waste disposal ditch facilities on the plant (Segment A) included a detention pond for settling solids as well as acid neutralization facilities prior to discharge to the access channel leading to the Vermillion River. The access channel was the first section of Segment C.

A drawing from a Field Progress Report dated June 30, 1943 (Figure 12-7) indicates that the structures and improvements of Segments C and D were completed or in progress by that date. This included an access channel from the Secondary Settling Pond on Segment A to the Vermillion River (a distance of approximately 9,000 feet), reconstruction of existing bridges, construction of new bridges, construction of drop structures in the river to reduce the velocity of the stream's flow, addition of rip-rap, and construction of two dams: a closing dam on the Vermillion River near the Mississippi River, and a Lake Isabel Outlet Dam (Attachment 22). The two new dams would have been located on Segment D. A detention reservoir dam was also constructed at the discharge point of the plant (on Segment A) in order to detain process runoff for a period of 18 hours and to aid in neutralization of the process discharge. Some of the details about the location and function of these structures are provided in Attachment 22, a document which was written prior to construction. Because the document was written to describe "the functions of the physical features which must be created...", it is not known if all of these features were constructed exactly as described. This document also indicates a need for dredging of the Vermillion River in order to accommodate the predicted flow from the plant, potential construction of some farm crossing bridges, addition of riprap along the river and fencing of the entire right of way boundary. Again, because this document describes planned features, it is not known if everything described was actually constructed.

12.3.3 Land Use and Ownership After Closure of FGOW

12.3.3.1 Segment B

Following the closure of FGOW, manufacturing processes were closed down and unneeded facilities were dismantled. Water supply facilities on Segment B were demolished since the residual water supply needs could be met by the two deep wells that were located on FGOW Segment A.

According to the December 1946 WAA report (Attachment 23), the pumping stations at the Mississippi River had been dismantled beginning in September 1946 by a Contractor (Standard-Anderson-Commonwealth) under Corps of Engineers supervision. In addition, all the manholes on the concrete pipelines associated with the raw river water are described as permanently out of commission and the report recommends filling them with earth. A WAA memorandum dated October 24, 1947 (Attachment 24) indicates that the manholes and valve pits on the lines between the river and the plant have been filled. An attachment to the

FORMER GOPHER ORDNANCE WORKS, ROSEMOUNT, MN

October 1947 memorandum indicates that Booster Station 412C and River Pump House 414A had been demolished. The October 1947 memorandum also states that the four collecting wells near the Mississippi River had been filled. The December 1946 WAA report (Attachment 23) only discusses two wells (presumably wells C and D since these were the only operational wells), and states that the wells had been filled with earth. The WAA memorandum dated January 7, 1947 (Attachment 25) lists the following structures as “Buildings and Structures which have been demolished by the Corps of Engineers”:

Building No. 404 A, B, C, D	Process Wells and Pumps
Building No. 412 C	Reservoir Pump House (Booster Station)
Building No. 414 A	River Pump House

The August 16, 1946 *Decontamination – Completion Report* (USACE, 2006, Appendix G, Reference 15) indicates that pumps were pulled from the pump houses and that the waterlines and wells were drained.

The *Decontamination – Completion Report* also indicates that a sub-station for purchased power (Building 405-C) was located at the river area but was not left energized. The report includes the following: “The main power lines feeding the river area were disconnected at the breakers located at the northeast corner of the fenced area. The oil level in the transformers was checked, the cooling system cleaned and the nitrogen supply renewed.” (USACE, 2006, Appendix G, Reference 15, p. 8) The January 7, 1947 WAA memorandum (Attachment 25) indicates that Building 405 SC Purchase Power Station was demolished. Following review of various demolition reports and lists, it appears that 405-C and 405 SC are designations for the same facility.

Review of Dakota County property records indicates that property owned by the Government on Segment B was sold to various private entities and easements were released in 1947 from the United States of America through the Federal Farm Mortgage Corporation. These sales and releases did not retain any Government access to or use of the abandoned underground facilities on the Segment B property. For some of the properties the United States of America reserved rights in connection with the construction, maintenance and operation of the Lock and Dam in the Mississippi River near Hastings, MN; however, there was no mention of retaining an interest in the facilities associated with FGOW. Although there was some discussion of potential salvage of the underground pipeline system (Attachment 23), it appears that all underground structures including the Ranney wells and pipelines were ultimately abandoned after filling in the wells, valve pits, and manholes and that all aboveground buildings and facilities were demolished or dismantled and stripped. Since 1947, parcels of land formerly associated with Segment B have been transferred amongst various private and public entities.

12.3.3.2 Segments C and D

Production at the FGOW plant ceased in September 1945, so discharges to the industrial waste disposal system would have ended at that time also. The December 1946 WAA report (Attachment 23) indicates that the industrial sewer system was entirely out of use at that time and that effluent was not being discharged into the river. Easements for Segments C and D were released in 1947.

The War Department never owned any of the property in Segments C or D, but only had easements. No records were found to indicate that any facilities associated with Segments C or D such as bridges, dams, or drop structures were removed or dismantled after the production facilities were closed down. No records were found to indicate that the Government retained an interest in the property or facilities that had been included in Segments C and D.

12.4. PHYSICAL PROPERTY CHARACTERISTICS

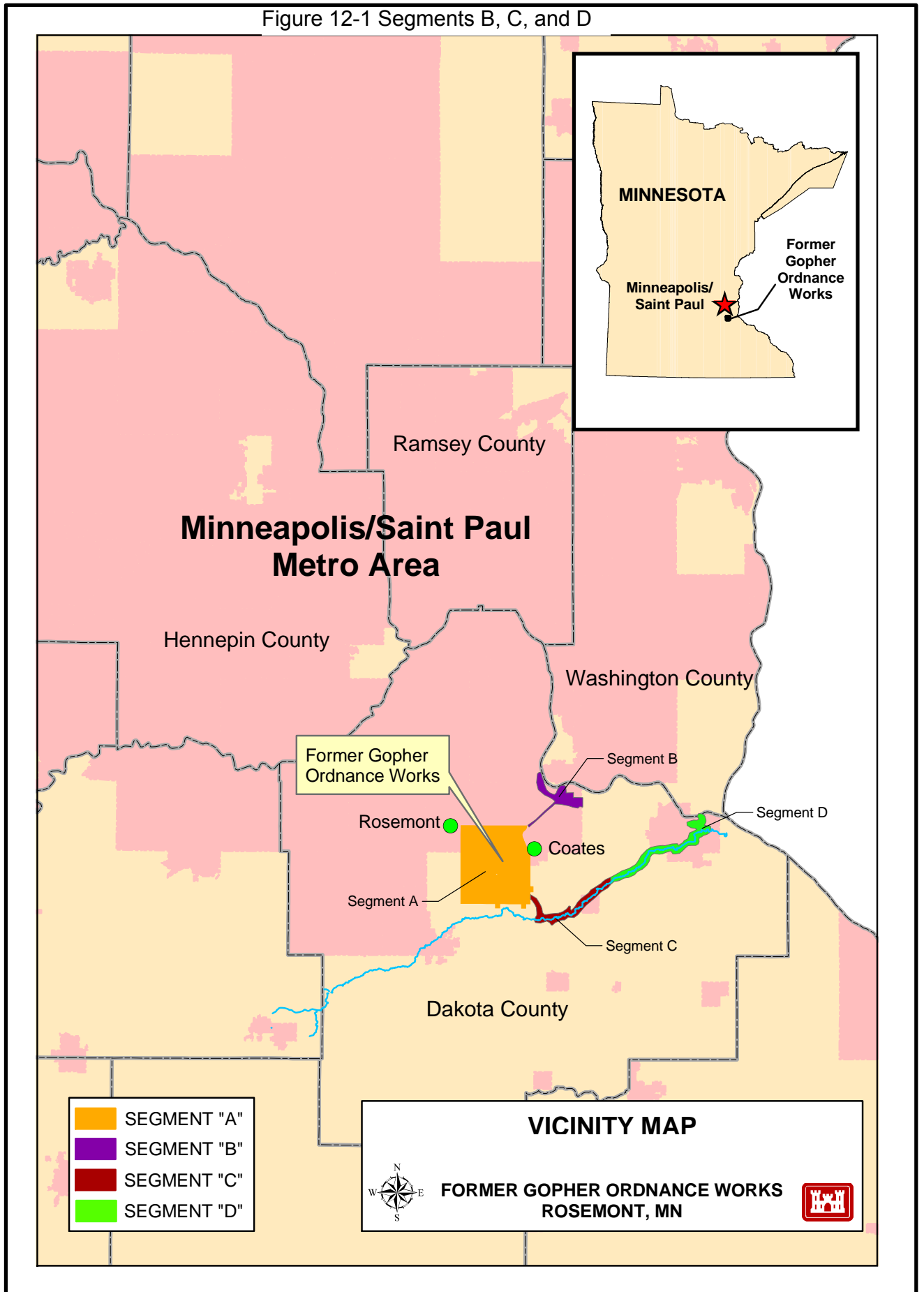
Dakota County is located on the west bank of the Mississippi River and typically receives precipitation from eastward moving storm systems. The average monthly precipitation varies from less than 1 inch in February to over 4 inches in July. The annual average precipitation at Rosemount is approximately 34.6 inches. The average temperature ranges from about 7 degrees Fahrenheit in December and February to 81 degrees Fahrenheit in July. The average snowfall each winter is 45 inches.

Detailed information regarding regional geology and hydrogeology is presented in Section 17.1 Groundwater Pathway.

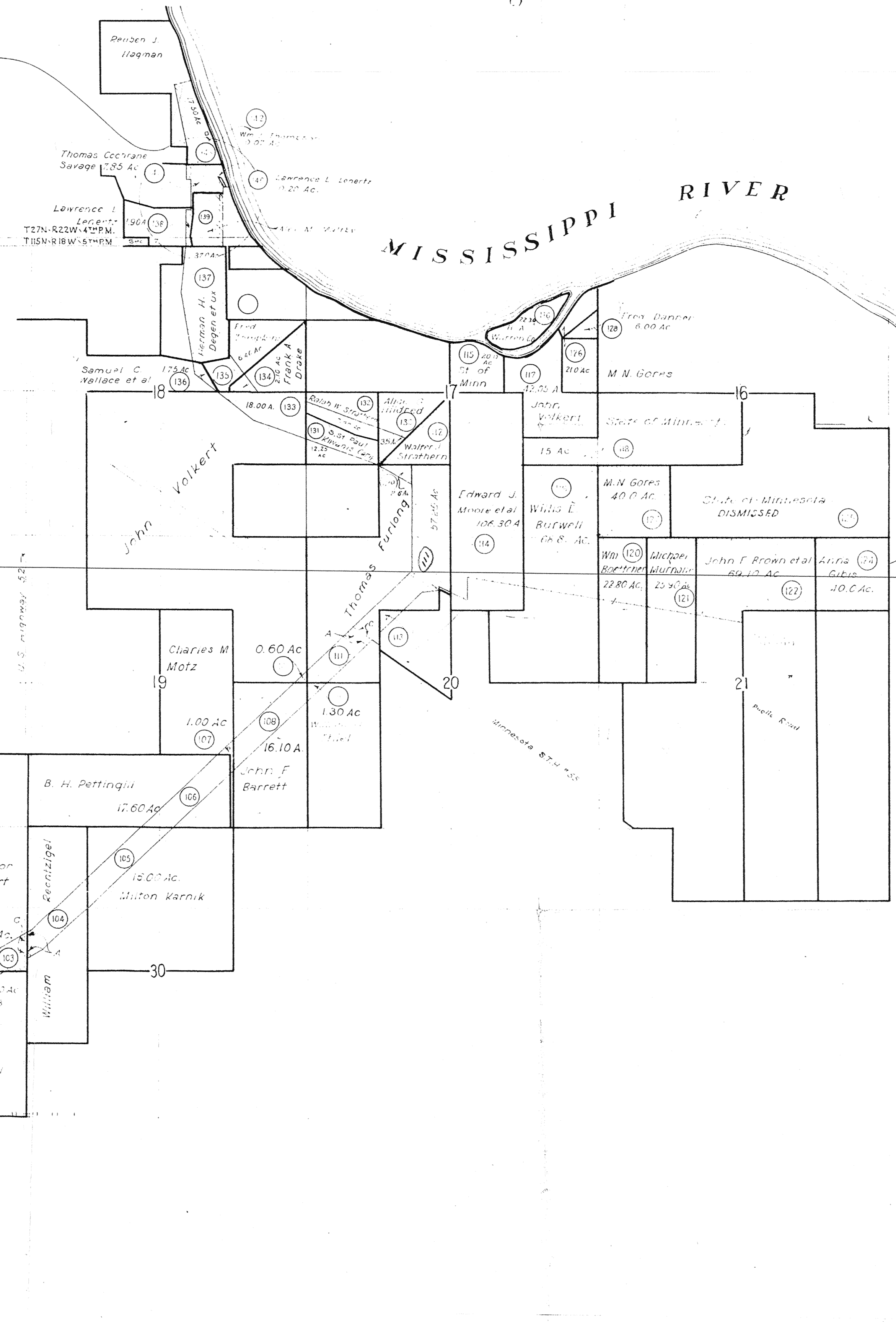
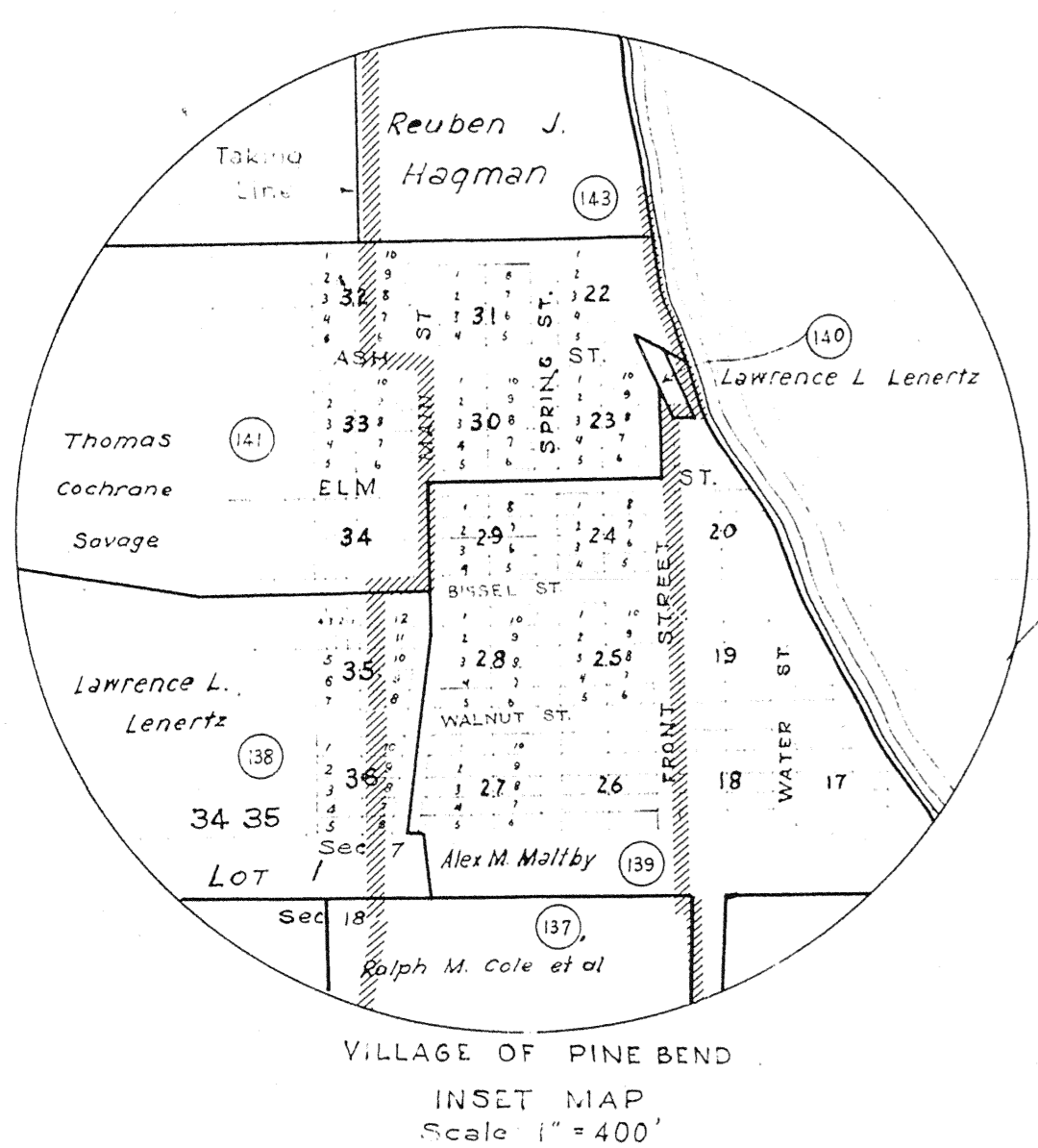
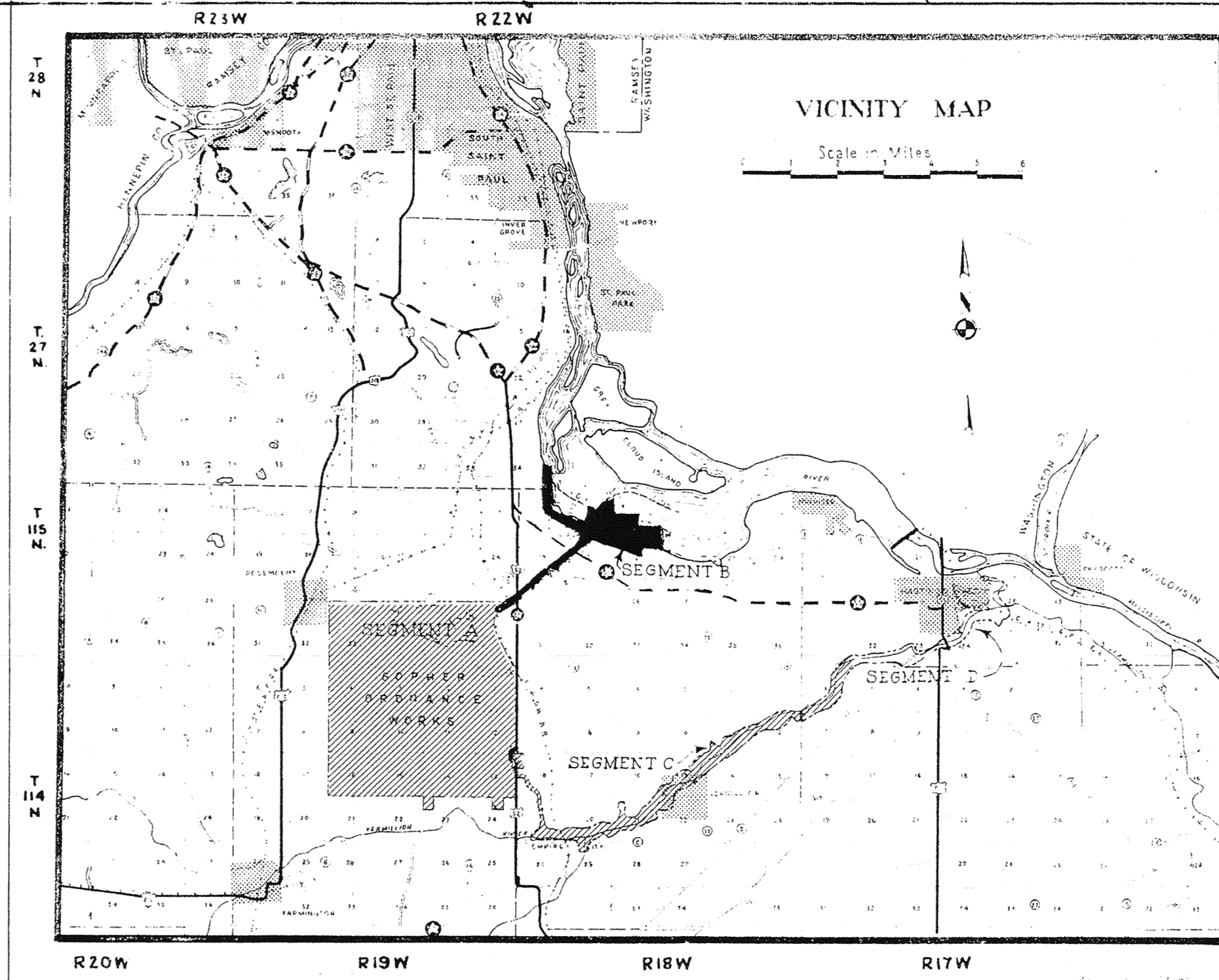
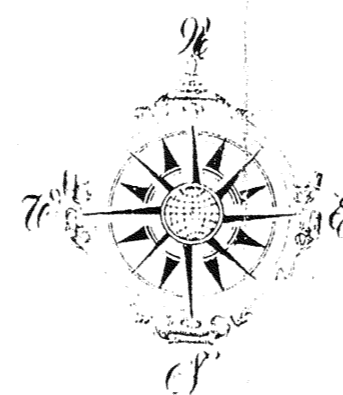
There are no historically significant sites located on the property covered by this PA.

There are six Federally-listed threatened, endangered, or special concern plants and animals of Dakota County (*Preliminary Assessment Report, Final, 1947 Quitclaim Property, Appendix G, Reference 18*): the prairie bush clover (threatened), the bald eagle (threatened), the peregrine falcon (endangered), the blue sucker (threatened), the Higgins eye mussel (endangered) and the winged mapleleaf mussel (endangered). Bald eagle nests and roosts may be located within 15 miles of FGOW. There are also a large number of species considered by the State of Minnesota to be threatened or endangered. No study of the sites in this PA has been conducted to determine whether there is a potential for any of the threatened or endangered species to be present.

Figure 12-1 Segments B, C, and D



SEGMENT B



TRACT NO.	VENDOR	ACRES FEE	ACRES EASEMENT	ACRES LICENSE
B-101	Chicago Great Western R.R.			1.10
B-102	Mary Husten et al	4.00		
B-103	Eleanor Volkert	9.10		
B-104	William Rehtzigel	13.00		
B-105	Milton Karnik	16.00		
B-106	B. H. Pettingill	17.60		
B-107	Chas. M. Motz	1.60		
B-108	John F. Barrett	16.10		
B-109	John Volkert	0.60		
B-110	William H. Tuel	1.30		
B-111	Thomas Furlong	57.25		
B-112	Walter J. Strathern	10.00		
B-113	Willis E. Burwell & WF	2.12		
B-114	Edward J. Moore et al	106.30		
B-115	State of Minnesota	20.00		
B-116	H. A. Warren Co	22.30		
B-117	John Volkert	42.05		
B-118	State of Minnesota	15.00		
B-119	Willis E. Burwell	68.80		
B-120	William Boettcher	22.80		
B-121	Michael Murnane	25.90		
B-122	John F. Brown et al	69.10		
B-123	Deleted			
B-124	Anna Gibis	40.00		
B-125	State of Minnesota DISMISSED			
B-126	M. N. Gores	21.00		
B-127	M. N. Gores	40.00		
B-128	Fred Cannon	5.00		
B-129	Thomas Furlong		2.60	
B-130	Alice G. Hildred		3.50	
B-131	South St. Paul Kiwanis Camp		12.20	
B-132	Ralph W. Strathern		7.00	
B-133	John Volkert		17.40	
B-134	Frank A. Drake		2.10	
B-135	Fred Tompkins		6.65	
B-136	Samuel C. Wallace et al		1.75	
B-137	Ralph M. Cole et al		37.00	
B-138	Lawrence L. Lenertz		1.90	
B-139	Alex Mally		11.84	
B-140	Lawrence L. Lenertz		0.20	
B-141	Thomas Cochrane Savage		7.85	
B-142	William J. Thompson		0.07	
B-143	Reuben J. Hagman		17.50	
* A	State of Minnesota		0.00	
* B	Chicago & Great Western R.R.		0.00	
† C	Miss. St. Hwy. Dept.			
† D	Dakota County Hwy. Comm.			

* Permit to build transmission line across right of way
 † Permit to build water pipe line across right of way

FINAL
PROJECT OWNERSHIP
 (TYPE OF MAP)
 STATE MINNESOTA
 COUNTY DAKOTA
 DIVISION MISSOURI RIVER
 DISTRICT OMAHA
 SERVICE COMMAND SEVENTH
 USING AGENCY US ARMY ORDNANCE DEPT.
 5 MILES NE OF ROSEMOUNT
 6 MILES S OF S. ST. PAUL

TRANSPORTATION FACILITIES
 C. R. I. & P. - C & G. W. RAILROAD
 55 56 STATE ROAD
 52 FEDERAL ROAD
 AIRLINE

LAND AREA

ACRES OWNED BY W. D.	THIS JOB	PREVIOUS PROJECTS
656.32		11987.95
ACRES LEASED BY W. D.		
ACRES LEASED FROM W. D.		
ACRES EASEMENT TO W. D.	129.56	1662.10
ACRES LICENSE TO W. D.	1.40	1.40

DISPOSALS
 ACRES SOLD
 ACRES TRANSFERRED
 ACRES EXCHANGED
 ACRES OTHERWISE

LEGEND

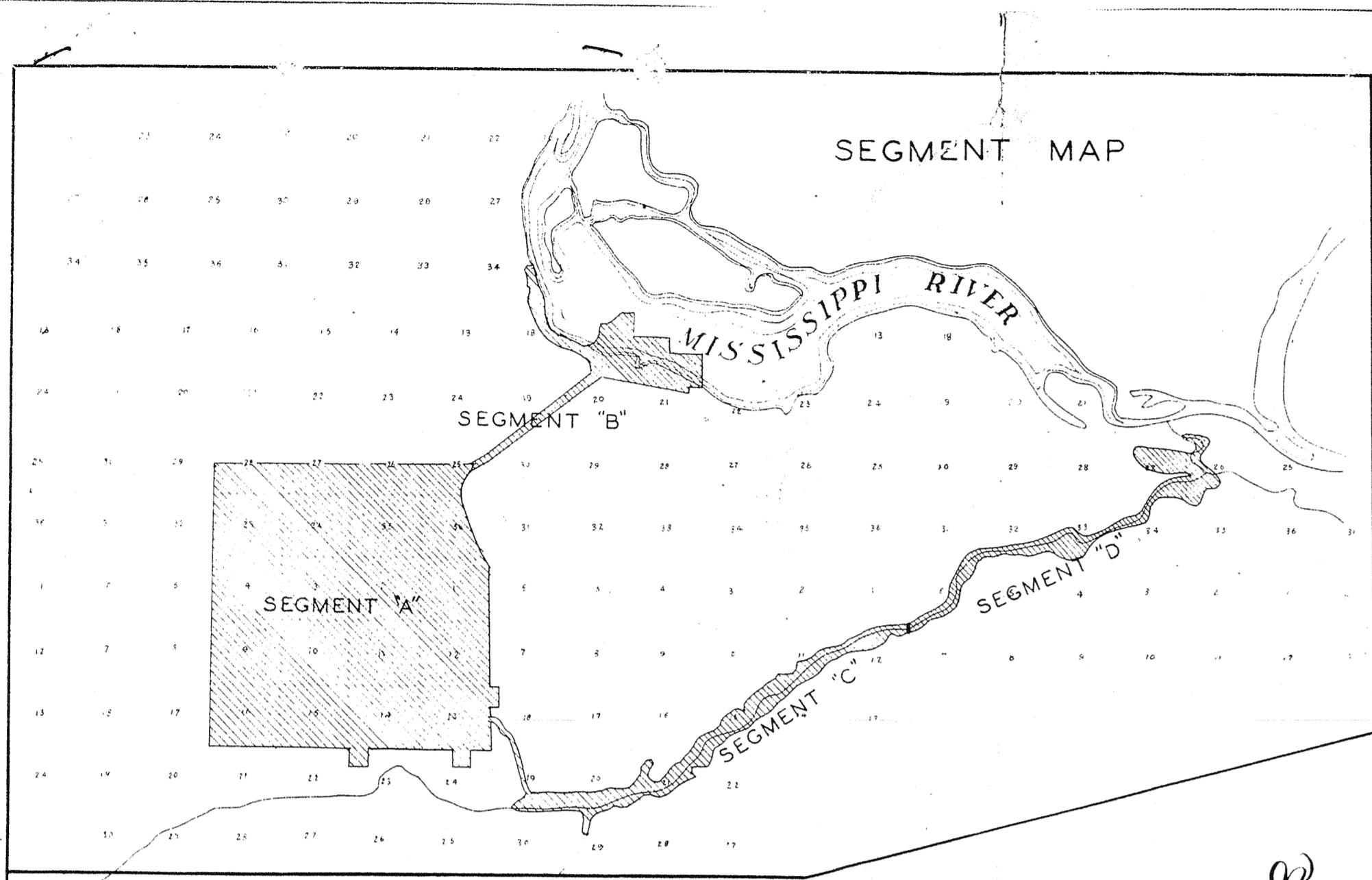
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Tract Boundary	-----
County Line	-----
Civil District Precinct	-----
Land-Grant Line	-----
City, Village or Borough	-----
Cemetery, Small Park, etc.	-----
Township Line	-----
Section Line	-----

WAR DEPARTMENT, C. O. E.
 CONSTRUCTION DIVISION
REAL ESTATE
GOPHER ORDNANCE WORKS
SEGMENT "B"
 MILITARY RESERVATION

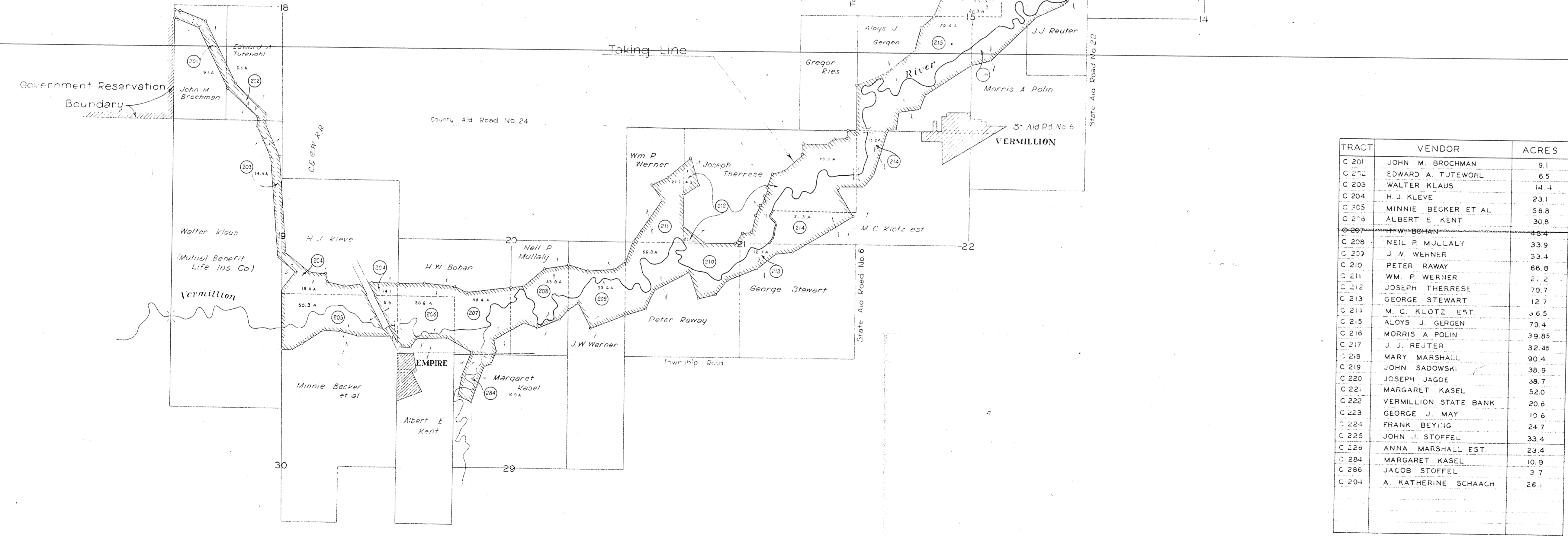
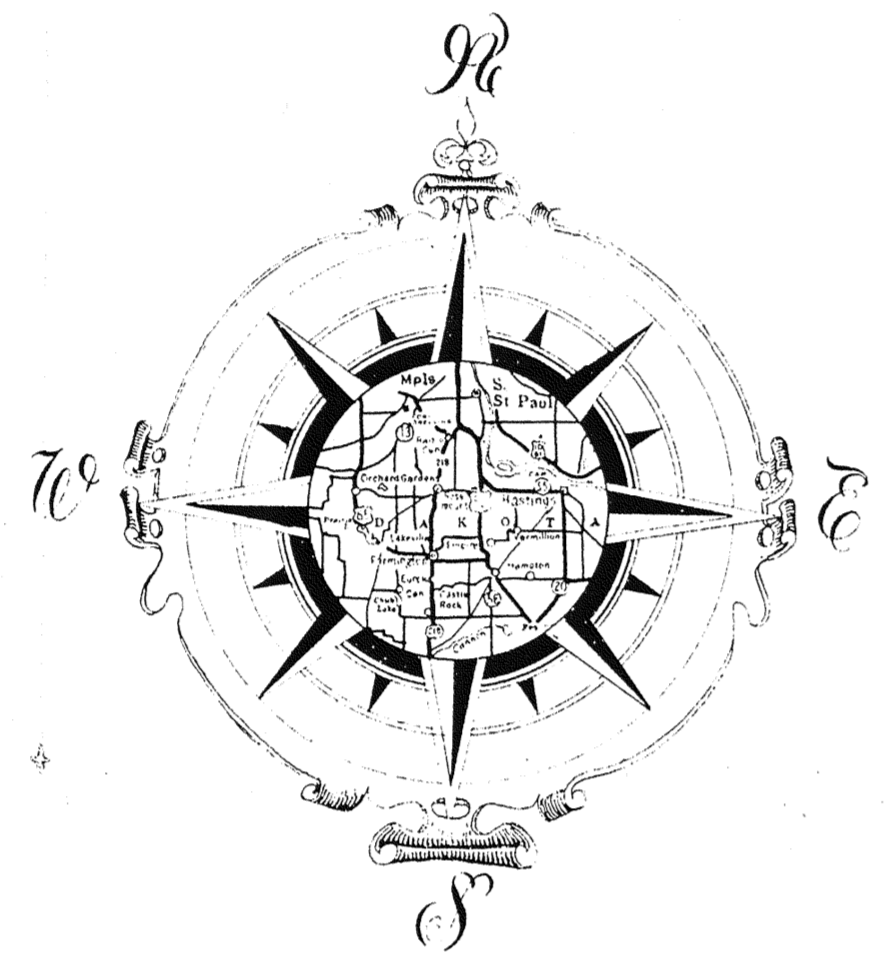
RECOMMENDED: _____ DATE: _____
 APPROVED: _____ DATE: _____

DATE	BY	REVISIONS	APPROVED
11-17-44	AWJ	TRACT REGISTER REVISED	awj

Figure 12-2
 Limited Preliminary Assessment
 Segments B, C, and D



SEGMENT C



TRACT	VENDOR	ACRES
C 201	JOHN M. BROCHMAN	9.1
C 202	EDWARD A. TUTEWÖHL	6.5
C 203	WALTER KLAUS	14.4
C 204	H. J. KIEVE	23.1
C 205	MINNIE BECKER ET AL.	56.8
C 206	ALBERT E. KENT	30.8
C 207	W. BOHANN	45.2
C 208	NEIL P. MULLALLY	33.9
C 209	J. W. WERNER	33.4
C 210	PETER RAWAY	66.8
C 211	WM. P. WERNER	2.2
C 212	JOSEPH THERRESE	79.7
C 213	GEORGE STEWART	12.7
C 214	M. C. KLOTZ EST.	6.5
C 215	ALOYS J. GERGEN	79.4
C 216	MORRIS A. POLIN	39.85
C 217	J. J. REUTER	32.45
C 218	MARY MARSHALL	90.4
C 219	JOHN SADOWSKI	38.9
C 220	JOSEPH JAGOE	38.7
C 221	MARGARET KASEL	52.0
C 222	VERMILLION STATE BANK	20.6
C 223	GEORGE J. MAY	10.6
C 224	FRANK BEYING	24.7
C 225	JOHN J. STOFFEL	33.4
C 226	ANNA MARSHALL EST.	23.4
C 284	MARGARET KASEL	10.9
C 286	JACOB STOFFEL	3.7
C 204	A. KATHERINE SCHAACH	26.1

Segment C

FINAL

PROJECT OWNERSHIP MAP
(TYPE OF MAP)

STATE MINNESOTA
 COUNTY DAKOTA
 DIVISION MISSOURI RIVER
 DISTRICT OMAHA
 SERVICE COMMAND SEVENTH
 USING AGENCY ARMY ORDNANCE DEPT.
 10 MILES SE OF ROSEMOUNT
 8 MILES SW OF HASTINGS

TRANSPORTATION FACILITIES

C. & G.W. C. M. ST. P. & P. RAILROAD
 MINN. 55 & 56 STATE ROAD
 U. S. 52 FEDERAL ROAD
 AIRLINE

LAND AREA

ACRES OWNED BY W. D.	THIS SEGMENT	SEGMENT B & C	ENTIRE PROJECT
ACRES LEASED BY W. D.			11987.95
ACRES LEASED FROM W. D.			
ACRES EASEMENT TO W. D.	1004.40	1529.17	1662.10
ACRES LICENSE TO W. D.			1.40

DISPOSALS

ACRES SOLD _____
 ACRES TRANSFERRED _____
 ACRES EXCHANGED _____
 ACRES OTHERWISE _____

LEGEND

Reservation Line

State or Province Line

County Line

Civil District Precinct

Land-Grant Line

City, Village or Borough

Cemetery, Small Park, etc.

Township Line

Section Line

Scale

WAR DEPARTMENT, O C E
 CONSTRUCTION DIVISION

REAL ESTATE
 GOPHER ORDNANCE WORKS
 VERMILLION RIVER WASTE DISPOSAL
 MILITARY RESERVATION
 SEGMENT "C"

RECOMMENDED: _____ DATE: _____
 APPROVED: _____ DATE: _____

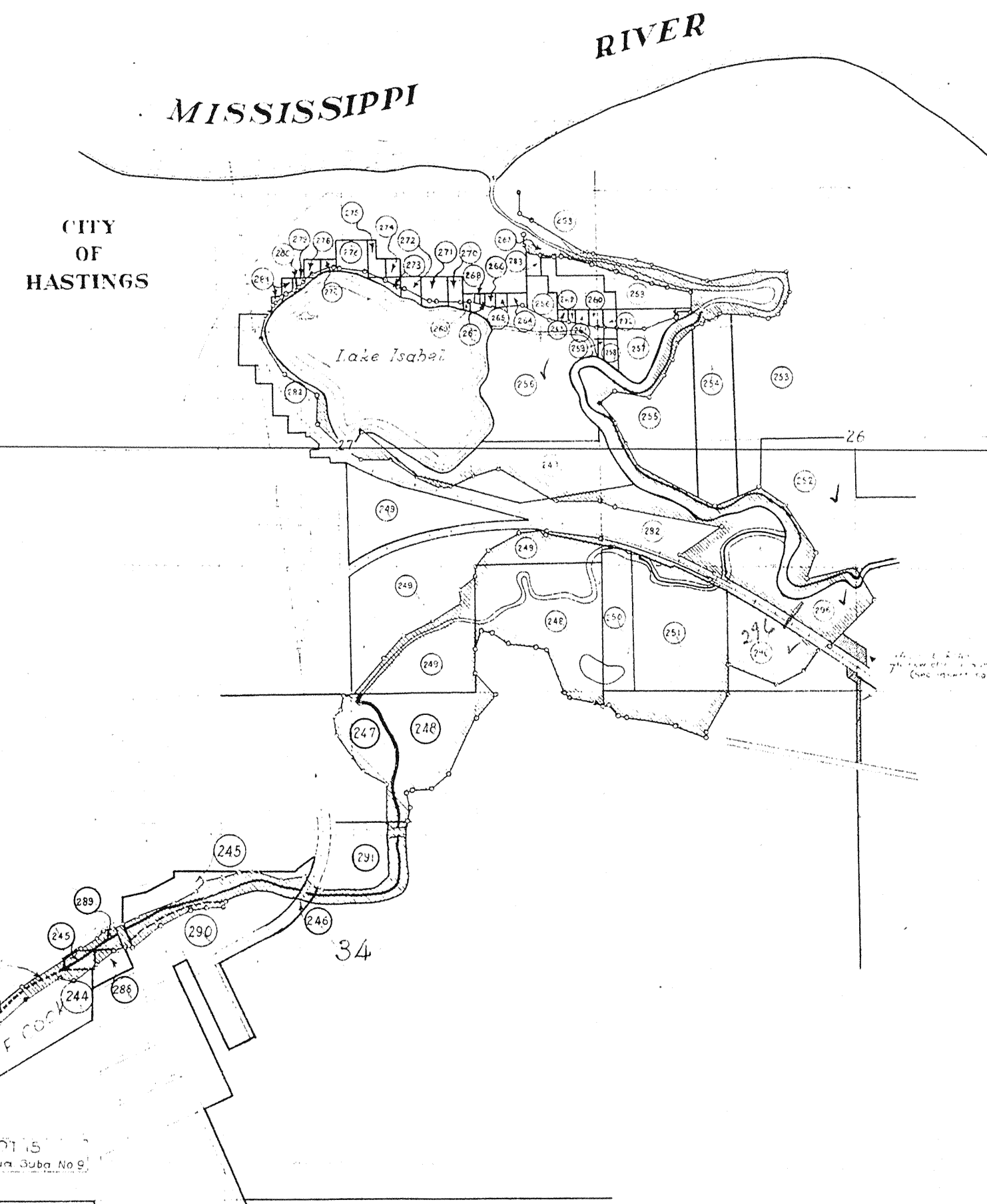
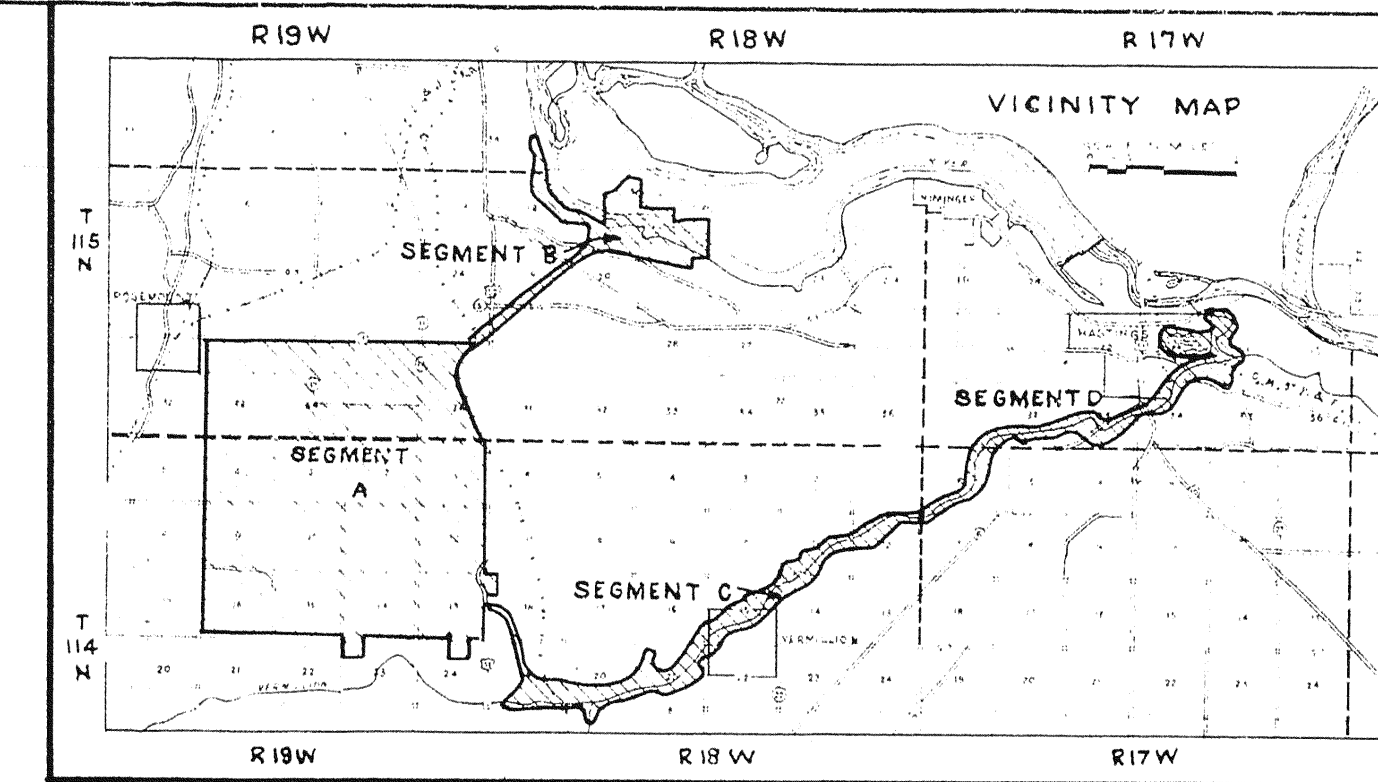
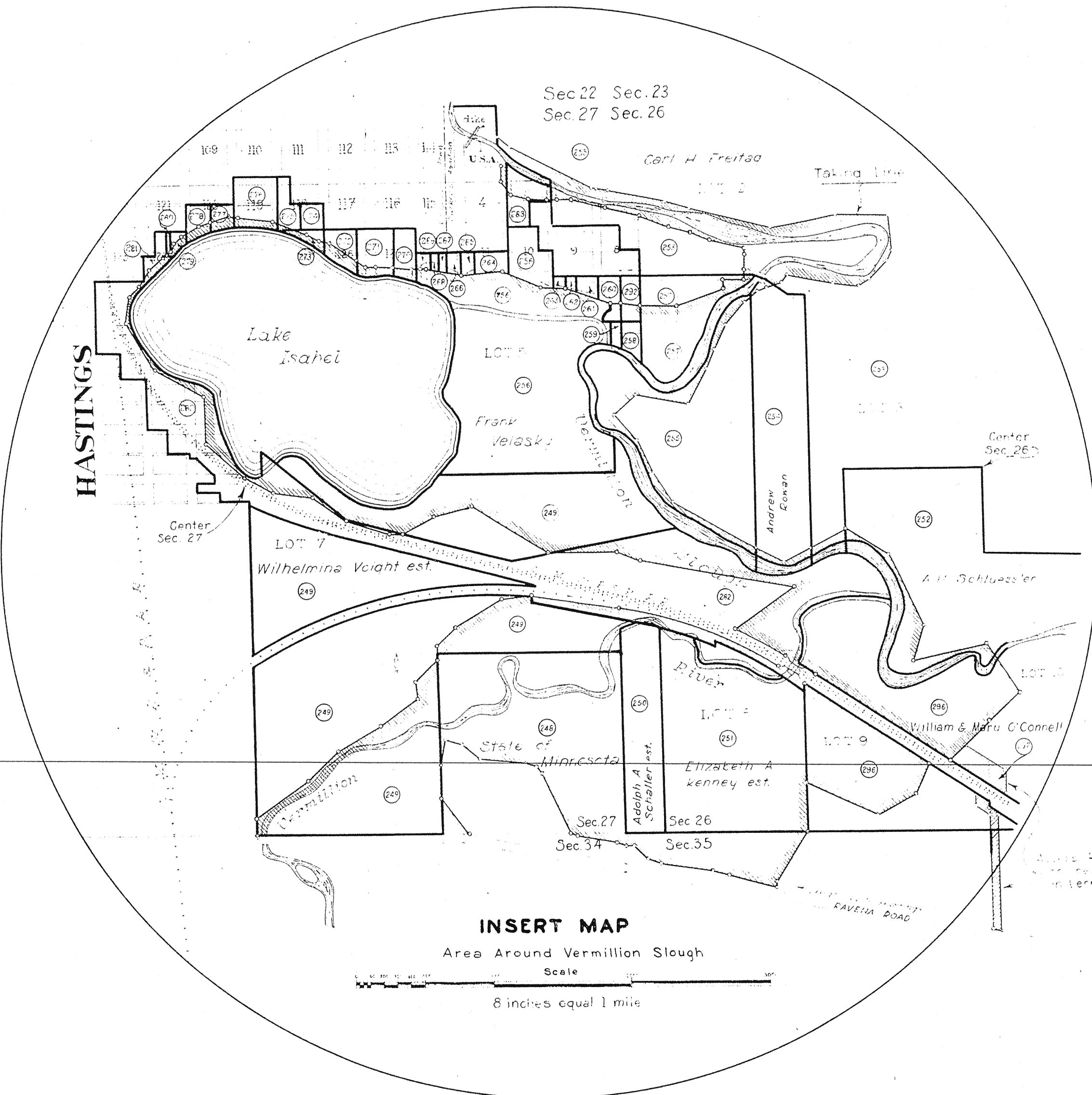
COMPILED: A. W. J. TRACED: A. W. J. CHECKED: A. W. J.

DATE	BY	REVISIONS	APPROVED
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11/17/43	W. J.	Handwritten A. W. J. Traced	

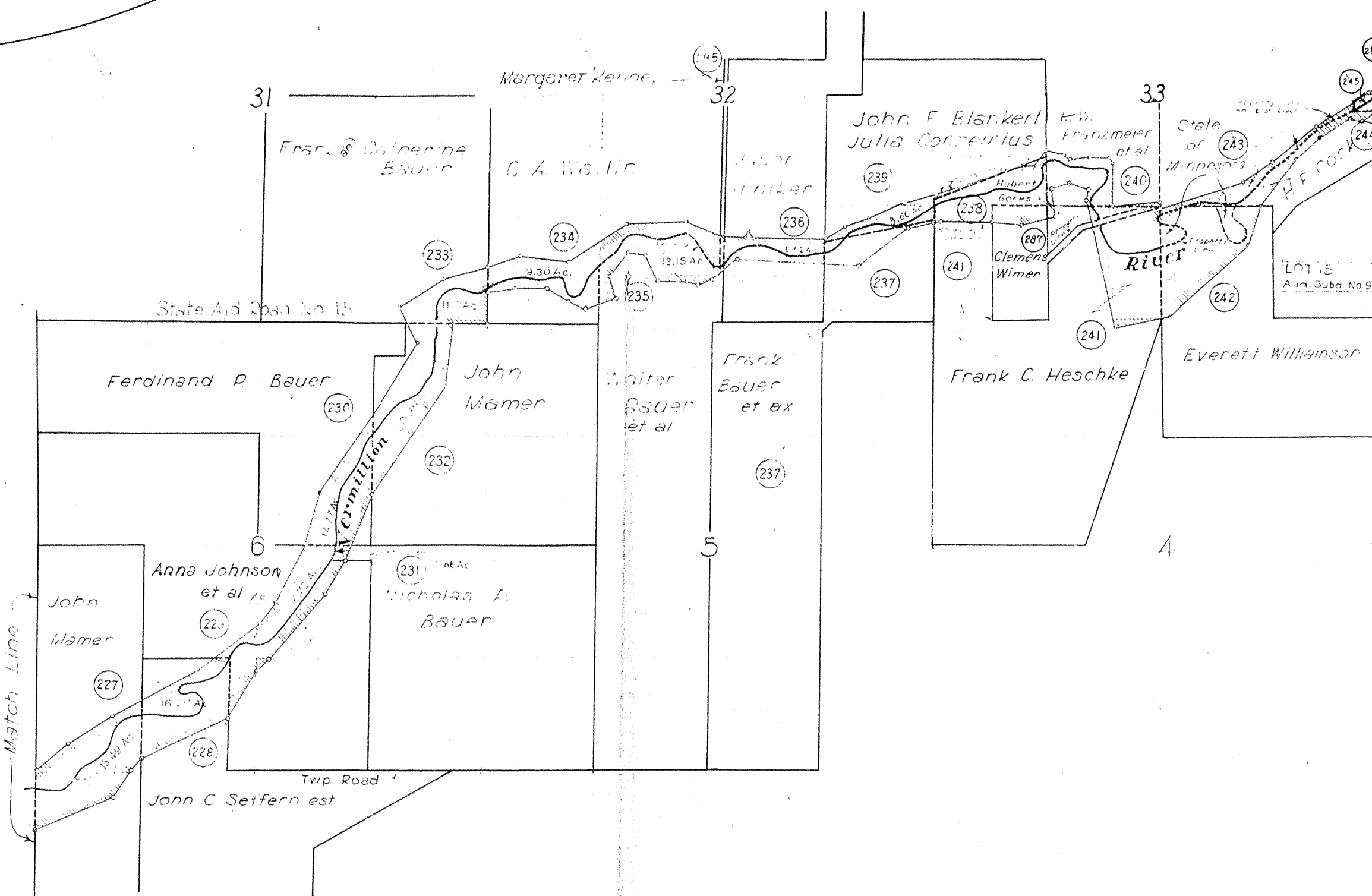
SHEETS 3 OF 4 DRAWING NO. MINN. 10
 CR-FORM-177A

Figure 12-3
 Limited Preliminary Assessment
 Segments B, C, and D

SEGMENT D



TRACT NUMBER	VENDOR	ACRES	TRACT NO	VENDOR	ACRES
D-227	John Mamer	23.9	D-262	Wm & F.A. Drager	0.00
D-228	John C. Jeffern	16.2	D-263	State of Minnesota	0.04
D-229	Anna Johnson et al	19.0	D-264	Theresa Seleske	0.00
D-230	Ferdinand P. Bauer	14.77	D-265	Kayler Kaiser et al	0.07
D-231	Nicholas P. Bauer	0.69	D-266	Frank Majeska	0.04
D-232	John Mamer	20.36	D-267	Anton Every	0.00
D-233	Frank Bauer et al	11.0	D-268	Cornelia Grosvenor	0.07
D-234	Herman Hegge & C.A. Wallin	19.3	D-269	State of Minnesota	0.22
D-235	Walner Bauer et al	12.15	D-270	John Majeska	0.26
D-236	Jacob Hinkler	6.62	D-271	Richard Lohman	0.33
D-237	Frank Bauer & wife	5.25	D-272	Daniel Duffy	0.46
D-238	Hubert Gores	14.23	D-273	Ferdinand Hudley	0.26
D-239	John F. Blankert	6.36	D-274	George O'Halloran	0.00
D-240	Arthur G. Franzmeier et al	8.72	D-275	Stephan Knoll	0.22
D-241	Frank G. Hesckke	19.28	D-276	City of Hastings	0.37
D-242	Everette Williamson	18.35	D-277	State of Minnesota	0.11
D-243	State of Minnesota	16.0	D-278	Agnes Snyder	0.29
D-244	W. F. Cook	1.40	D-279	State of Minnesota	0.18
D-245	King Midas Mining Co.	16.20	D-280	Wm. H. O'Connell	0.06
D-246	C. M. S. P. & P.	0.66	D-281	John C. Murray et ux	0.11
D-247	George J. Hetherington	0.90	D-282	C. M. S. P. & P. R. R.	18.96
D-248	State of Minnesota	64.40	D-283	Theresa Seleske	0.22
D-249	Wilhelmina Voigt est.	58.35	D-284	See Segment C	
D-250	Joseph L. Schottler est.	10.0	D-285	Gregor-Ries deleted	
D-251	Elizabeth A. Kenney est.	28.50	D-286	See Segment C	
D-252	A. H. Schuessler et al	3.60	D-287	Clemens Wimer	2.70
D-253	Carl Freitag	1.40	D-288	Catherine Kimmes	0.34
D-254	Fred Bessel & Andrew Bowen	0.68	D-289	State of Minnesota	0.90
D-255	Victoria McIntosh	5.40	D-290	Francis Boynton	1.52
D-256	Frank Velosky	34.35	D-291	City of Hastings deleted	
D-257	John Majeska	0.00	D-292	Catherine Tasbender	0.40
D-258	State of Minnesota	0.80	D-293	Deleted	
D-259	John Mamer	1.32	D-294	See Segment C	
D-260	Frank Majeska	1.14	D-295	Margaret Kenney et al	0.33
D-261	J. W. Weschek	0.00	D-296	Willert O'Connell	28.90
			D-297	William & Macey O'Connell	2.97



FINAL
PROJECT OWNERSHIP MAP
(TYPE OF MAP)
STATE MINNESOTA
COUNTY DAKOTA
DIVISION MISSOURI RIVER
DISTRICT OMAHA
SERVICE COMMAND SEVENTH
USING AGENCY ARMY ORDNANCE DEPT.
12 MILES E OF ROSEMOUNT
MILES OF

TRANSPORTATION FACILITIES
C. M. S. P. & P. RAILROAD
MINN. 55 STATE ROAD
U. S. 52 FEDERAL ROAD
AIRLINE

LAND AREA

ACRES OWNED BY W. D.	TOTAL ACRES	TOTAL ACRES	TOTAL ACRES
ACRES LEASED BY W. D.			
ACRES LEASED FROM W. D.			
ACRES EASEMENT TO W. D.	524.77	1529.17	1662.10
ACRES LICENSE TO W. D.			1.40

DISPOSALS
ACRES SOLD
ACRES TRANSFERRED
ACRES EXCHANGED
ACRES OTHERWISE

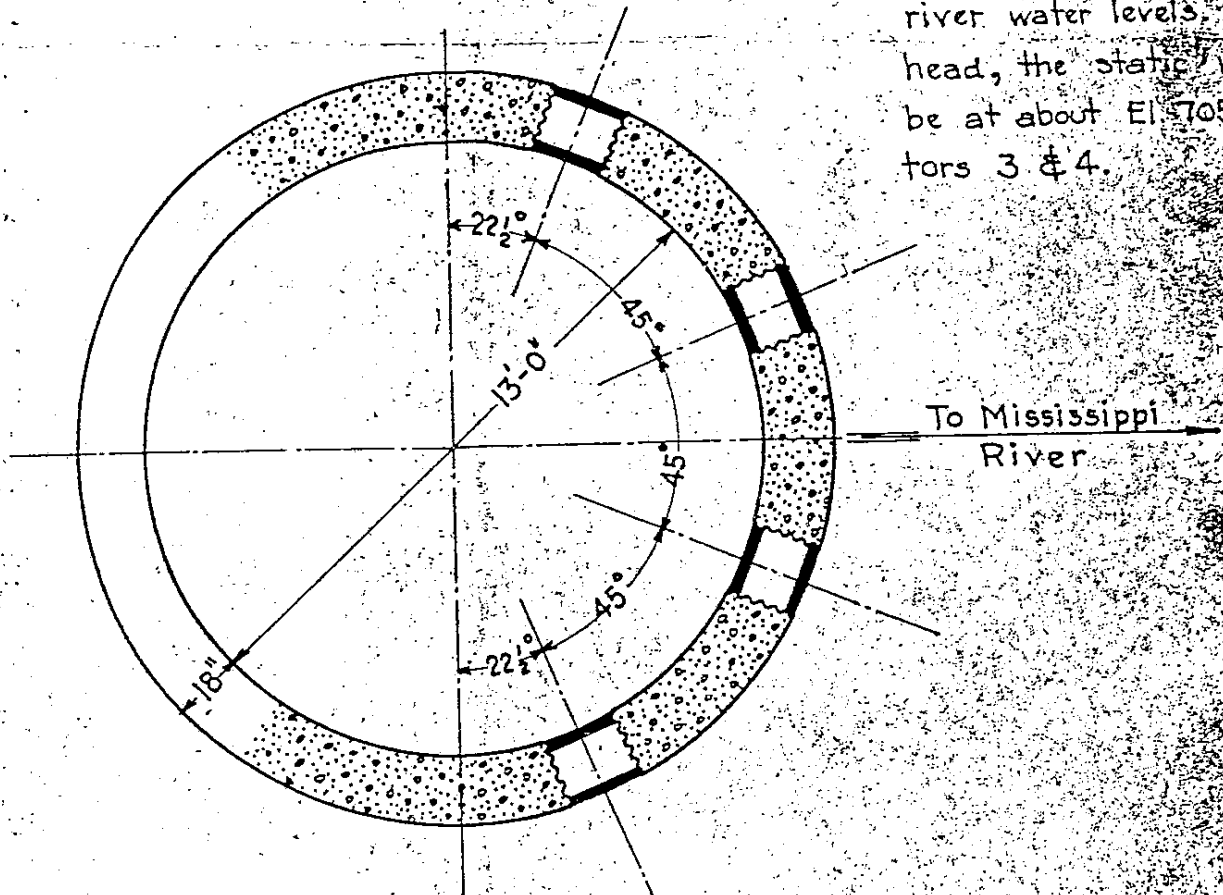
LEGEND

Reservation Line	---
State or Province Line	---
County Line	---
Civil District Precinct	---
Land-Grant Line	---
City, Village or Borough	---
Cemetery, Small Park, etc.	---
Township Line	---
Section Line	---

WAR DEPARTMENT, O. C. E.
CONSTRUCTION DIVISION
REAL ESTATE
GOPHER ORDNANCE WORKS
VERMILLION RIVER WASTE DISPOSAL
MILITARY RESERVATION
SEGMENT "D"
RECOMMENDED: DATE:
APPROVED: DATE: 7/19/74
COMPILED: A. W. J. TRACED: A. W. J. CHECKED:
DATE: 1-9-74 BY: Tract Nos. & Owners: Tracts 267, 295
11-17-44 A.W.J. TRACT REGISTER REVISED AND CORRECTED
SHEETS 4 OF 4 DRAWING NO. M111.1.C
CR-FORM-1774

Figure 12-4
Limited Preliminary Assessment
Segments B, C, and D

Note: Water levels should be the same as river water levels. Due to head, the static water level should be at about El. 705 for towers 3 & 4.



Section A-A
1/4" = 1'-0"

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Notes

1. For layout of screen lines, etc., see R-143.
2. For caisson and plug reinforcement, see R-105, R-127 and R-128.
3. For location of test holes, see R-110; for geological sections, see R-117.
4. All valves operated from grating platform, through extension stems.
5. Wall brackets are provided to keep ext. stems in place.
6. Concrete developing a strength of 2500#/sq after 28 days.

Revised May 10, 1944.
Revised Nov. 16, 1943.

RANNEY WATER CO
CORPORATION OF NE
HEYBURN BLDG. LOUIS

GOPHER ORDINANCE
ST. PAUL, MINN
PROJECT 8953, ORDER #
RANNEY COLLECTOR
E. I. duPONT deNEMOURS

RECORD DRAWING,

DRAWN BY: J. S. A. APPROVE

SCALE: Different
DATE: August 25, 1943.

Figure 12-5
Limited Preliminary Assessment
Segments B, C, and D

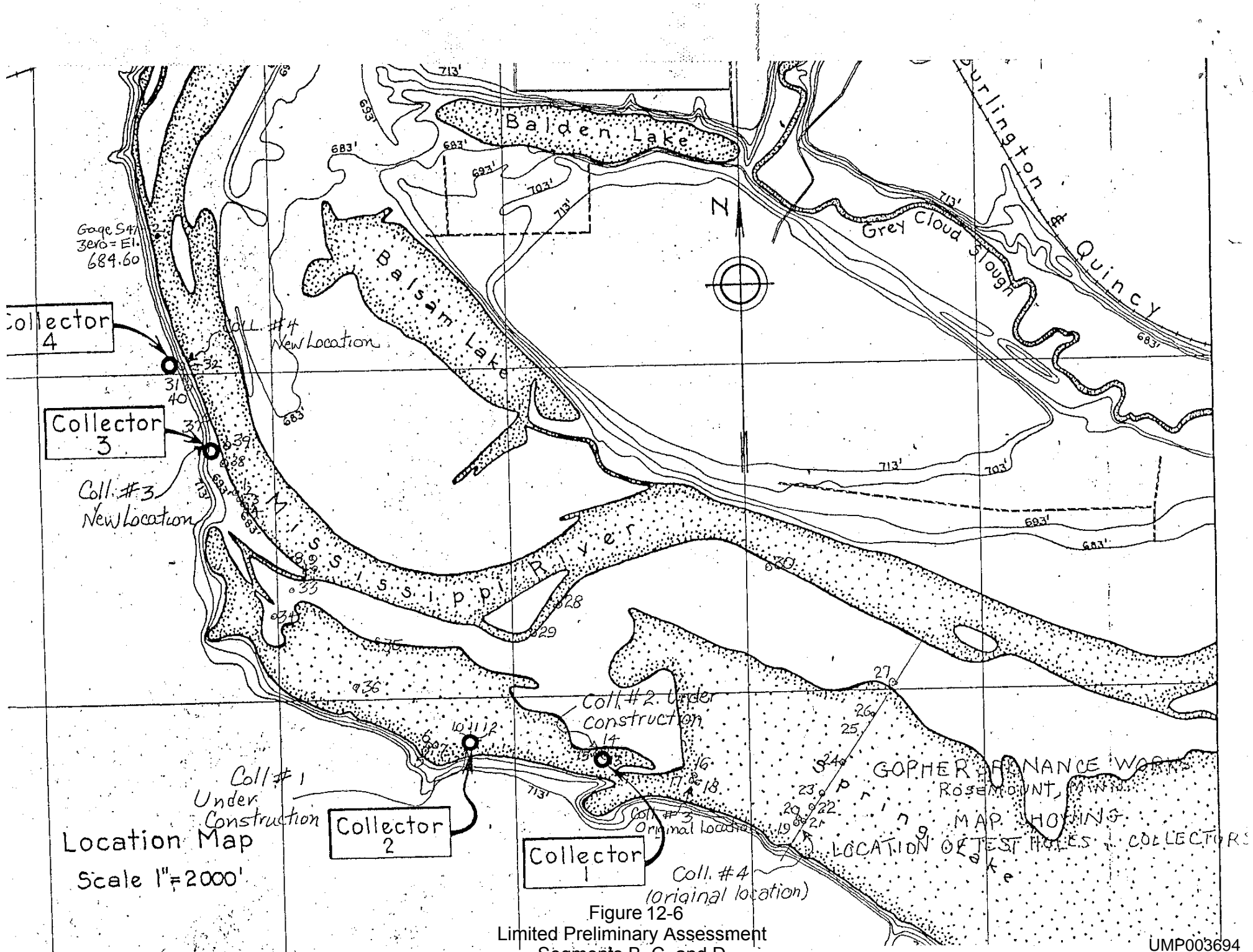
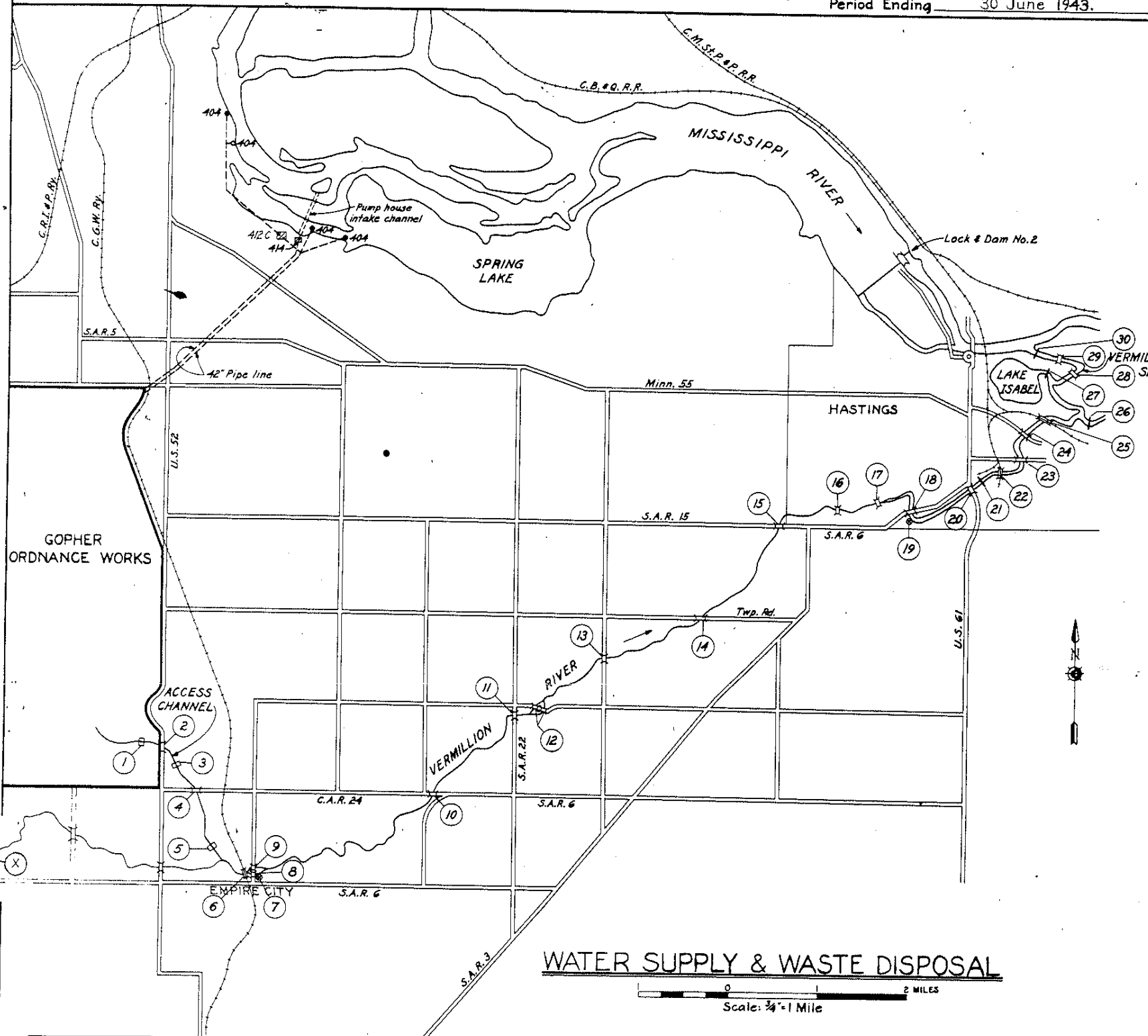


Figure 12-6
 Limited Preliminary Assessment
 Segments B, C, and D



WATER SUPPLY & WASTE DISPOSAL

VERMILLION RIVER WASTE DISPOSAL PROJECT

NO	STATION	DESCRIPTION	REMARKS	NO	STATION	DESCRIPTION	REMARKS
X		Existing U.S. Geological Survey Stream Gage Station		16	661+90	Existing Single-span Bridge	
1	9+75 A	New Detention Reservoir Dam	90% Complete	17	695+00	Existing Concrete Culverts	
2	0+00	New 2-span Concrete Deck Bridge & Riprap Highway U.S. 52	100% Complete	18	717+20	Existing 2-span Concrete Girder & Deck Bridge on Concrete Pier & Abutments, M.H.D. #3851, S.A.R. #6	
3	14+00	New Drop Structure & Riprap	100% Complete	19	720+00	Existing U.S. Geological Survey Stream Gage Station	
4	33+40	Rebuild Single-span Concrete Deck Bridge & Riprap. C.A.R. #24	100% Complete	20	768+70	Existing 3-span Reinforced Concrete Bridge on Concrete Piers & Abutments, M.H.D. #4653	
5	69+50	New Drop Structure & Riprap	10% Complete	21	774+70	Existing King Midas Milling Co. Mill Foundations & Dam	
6	97+50	Existing Chicago & Great Western Ry. Bridge		22	789+50	Existing C.M. St.P. & P.R.R. High Deck Bridge	
7	99+65	Existing U.S. Geological Survey Stream Gage Station		23	804+90	Existing High Deck Type Bridge	
8	99+65	Existing Single-span Bridge		24		Existing Single-span Pony Truss Bridge on Steel Cylinder Piers	
9	99+77	New 2-span Timber Bridge with Approaches & Riprap	100% Complete	25		Existing C.M. St.P. & P.R.R. 3-span Plate Girder Bridge on Concrete Piers & Abutments	
10	281+60	Existing Single-span Pony Truss Bridge on Concrete Abutments, C.A.R. #24 - Riprap	100% Complete	26		New Closing Dam #1	75% Complete
11	370+60	Existing Single-span Pony Truss Bridge on Concrete Abutments, S.A.R. #22 - Riprap	100% Complete	27		New Lake Isabel Outlet Dam	15% Complete
12	388+90	Two existing Single-span Steel beam & Concrete Deck Bridges - Riprap	100% Complete	28		Existing Single-span Timber Deck & Stringer Bridge - Riprap Channel bed & Abutment wings	
13	446+30	Existing Single-span Steel beam & Concrete Deck Bridge, M.H.D. #1022		29		Existing 2-span Timber Deck & Stringer Bridge Farm Road - Riprap Channel bed & Abut. wings	
14	523+50	Existing Single-span Pony Truss Bridge on Masonry Abutments, C.A.R. #2 - Riprap	100% Complete	30		Existing Closing Dam - To be removed	
15	609+10	Existing 2-span Concrete Girder & Deck Bridge on Concrete Pier & Abutments, M.H.D. #4406, S.A.R. #15 - Riprap	100% Complete			Project Boundary Fencing	100% Complete

Note:-
 Continuous dredging, including access channel and Vermillion River to bridge at (13), is completed.
 Spot dredging from bridge at (13) to Vermillion Slough is completed.