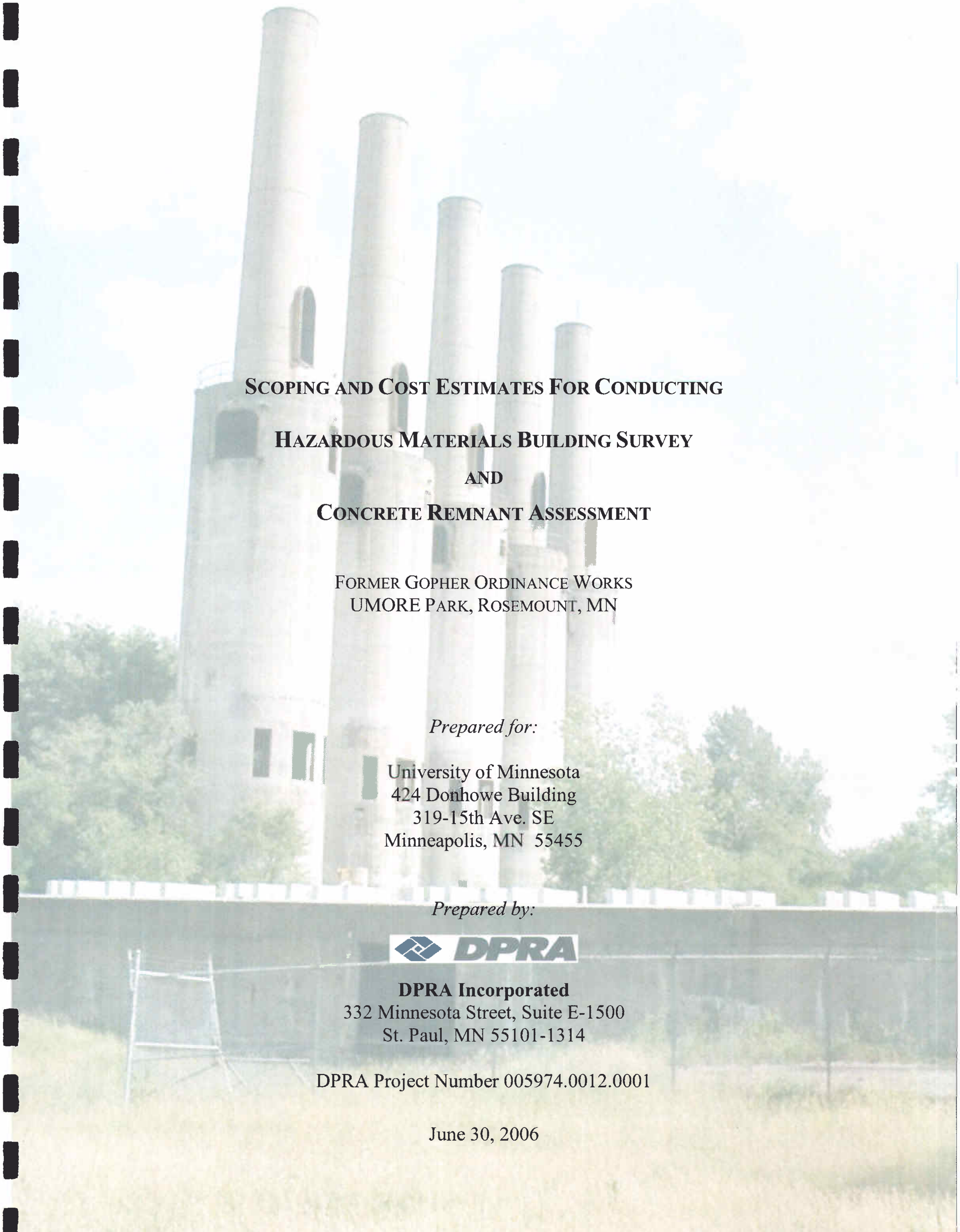
U of M Real Estate Office
Copy 2 of 6
Gopher Ordnance Works
UMore Park, Rosemount, MN
June 30, 2006



Scoping and Cost Estimates For Conducting

Hazardous Materials Building Survey

and

Concrete Remnant Assessment

Former Gopher Ordinance Works
UMORE Park, Rosemount, MN

Prepared for:

University of Minnesota
424 Donhowe Building
319-15th Ave. SE
Minneapolis, MN 55455

Prepared by:

DPRA Incorporated
332 Minnesota Street, Suite E-1500
St. Paul, MN 55101-1314

DPRA Project Number 005974.0012.0001

June 30, 2006

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Project Tasks and Objectives 1
1.1.1 Hazardous Materials Building Survey 1
1.1.2 Concrete Remnant Assessment 2
2.0 BACKGROUND 3
2.1 FGOW Production Areas and Facilities 3
2.2 Operational History 7
3.0 EXISTING DATA AND ANALYSIS 8
3.1 Field Verification Assessment 8
3.2 Findings 10
3.3 Building Material Volume Estimates 11
4.0 SCOPE OF WORK 13
4.1 Hazardous Materials Building Survey Scope of Work 13
4.2 Concrete Remnant Assessment Scope of Work 14
4.3 Cost Estimate 15

TABLES

Table 1 GPS Building Coordinates
Table 2 Selected Representative Sampling Locations

FIGURES

Figure 1 Property Boundary
Figure 2 Former Gopher Ordinance Works Production Areas
Figure 3 East Acid Area and Oleum Plant
Figure 4 West Acid Area
Figure 5 Smokeless Gun Powder Production Lines
Figure 6 East Powder Manufacturing
Figure 7 West Powder Manufacturing
Figure 8 Powder Storage & Shipping
Figure 9 Powder Testing – 3 Areas North, South, and West
Figure 10 Main Shop Area
Figure 11 Power Plants
Figure 12 Wastewater Treatment Area
Figure 13A – 13D FGOW Structure Locations Prior to 1945
Figure 14 Debris Disposal Area

APPENDICES

Appendix A Photograph Log
Appendix B Dakota County Information

1.0 INTRODUCTION

The University of Minnesota (University) owns approximately 8,000 acres of land in Dakota County, near Rosemount, Minnesota, called UMORE Park (formerly called the Rosemount Research and Outreach Center and Rosemount Research Center). The University acquired this property from the U.S. government after World War II. Prior to the University's acquisition, the property was part a 12,000-acre gunpowder manufacturing facility known as the Gopher Ordnance Works. The U.S. government acquired the property in 1942 and 1943 and contracted with E. I. du Pont de Nemours (Du Pont) to construct and operate the facility.

Since acquiring portions of the former Gopher Ordnance Works (FGOW) in the late 1940s, the University has used the property for agricultural and other educational and research programs. The University has also leased portions of FGOW to the U.S. government (Navy and Air Force) and to private commercial enterprises.

The University has recently initiated a long-term planning process regarding potential future uses of UMORE Park. As part of that process, the University is performing an environmental assessment and investigation, identifying potential impacts present in abandoned, unoccupied structures associated with FGOW, quantifying and assessing remnant concrete foundations and walls, and considering alternatives for reuse, reconditioning and/or disposal of the concrete. These activities are targeted in the northern portion of the FGOW as defined in the Request for Proposal, entitled "Phase I ESA and Scoping for the Phase II Investigation, Hazardous Materials Building Survey and Concrete Assessment, UMORE Park, Rosemount, MN," and referred to in this report as the Property. The Property boundaries are shown in Figure 1.

1.1 Project Tasks and Objectives

DPRA Incorporated (DPRA) was retained by the University to

1. Prepare a proposed scope of work and cost estimate to conduct a pre-demolition hazardous materials building survey of FGOW-related remnant structures.

2. Prepare a proposed scope of work and cost estimate for quantifying the amount of FGOW concrete building remnants located above and below grade at the Property.

1.1.1 Hazardous Materials Building Survey

The scope of work for the hazardous materials building survey included the following activities:

- Met with and obtained from Dakota County Environmental Management (DCEM) background materials, including maps and databases of the historic and current Property status.

- Reviewed the databases, maps, and aerial photography from DCEM to understand the data sources and their assumptions used in generating their maps.

- Reviewed the operational history and layout of the site to understand the potential for contaminants associated with the building functions/operations and/or from construction methods.

- Performed a limited site reconnaissance to observe the potential for hazardous materials.

- Prepared this document which summarizes the data collected, findings from the site reconnaissance, an opinion regarding the need to complete a hazardous materials building survey of each such remnant structure present, and presents the scope of work and cost estimate for the hazardous building materials survey.

1.1.2 Concrete Remnant Assessment

The scope of work for the concrete remnant assessment included the following activities:

- Met with and obtained from DCEM background materials, including maps and databases of the historic and current Property status regarding the presence of concrete structures, floors, remnants, and footings.

- Reviewed the databases, maps, and aerial photography from DCEM to understand the data sources and their assumptions used in generating their volume estimates and maps.

- Performed a limited site reconnaissance to verify dimensional estimates of concrete structures at various locations across the Property and to obtain GPS coordinates of selected concrete structures and remnants to field verify the maps generated by DCEM.

- Reviewed the operational history and layout of the site to understand the potential for contaminants associated with the building functions/operations and/or from construction methods.

- Quantified the amount of FGOW concrete building remnants located above and below grade at the Property and categorized the remnants by construction type.

- Prepared a table of the GPS coordinates as well as a figure indicating the coordinates of the historic concrete structures located on the Property.

- Prepared this document which summarizes the data collected, findings from the site reconnaissance, and presents initial estimates of the volume of concrete located on Property, as well as the scope of work and cost estimate for additional concrete assessment that is cost-effective and includes collection of samples to characterize the concrete for future disposal, remediation, recycling and reuse.

2.0 BACKGROUND

The former Gopher Ordinance Works (FGOW) was one of 77 munitions facilities built during World War II. It produced gunpowder, chemicals, explosives and incendiaries for 42 assembly plants. In May 1942, the U.S. government seized 12,120 acres (80 farms). Immediately, Du Pont began construction activities for six nitrocellulose production lines; nitrocellulose is also known as smokeless gunpowder. Chemical production also included sulfuric acid from the oleum plant and nitric acid from the ammonia oxidation plant.

2.1 FGOW Production Areas and Facilities

The Property on FGOW encompasses approximately 12,000 acres and, based on historic construction plans, included at least 858 buildings, many of which were constructed of concrete and concrete block with concrete footings.

Based on the size of the Property and the nature of the operations, the Property is separated into ten primary areas. Within these ten areas, there were, based on the historic construction plans, 550 buildings. These areas are shown across the Property in Figure 2 and shown individually in Figures 3 through 12.

1. East Acid Area and Oleum Plant

In the area of the East Acid Area and Oleum Plant, nitric acid and sulfuric acid were manufactured, mixed, and stored for use in the nitrocellulose area of the smokeless gun powder lines. This area included 23 buildings with 6 or 7 tanks. The primary chemicals used in this area included oleum, nitric acid, sulfuric acid, anhydrous ammonia, and sulfur. The East Acid Area and Oleum Plant are shown on Figure 3.

2. West Acid Area

In the West Acid Area, nitric and sulfuric acids were manufactured, mixed, and stored for use in the nitrocellulose area of the smokeless gun powder lines. This area included 16 buildings with one tank. Some of the buildings in this area included anhydrous ammonia storage, boiler houses, and warehouses. The West Acid Area is shown on Figure 4

3. Smokeless Gun Powder Production Lines

In the Smokeless Gun Powder Production Lines, gun and cannon powders were manufactured. FGOW had six smokeless gun powder production lines referred to as the A, B, C, D, E, and F lines. While production occurred on lines A, B, and C, lines D, E, and F were never operational.

Production of smokeless gunpowder was complex and used numerous chemicals in a process performed throughout many buildings. Specifically, each line consisted of 53 buildings and two tanks. The buildings on these lines included the cotton dry house, poacher tub house, boiling tub house, solvent recovery houses, and mixer houses. Detail of the B Line is shown on Figure 5.

A simplified summary of the buildings, chemicals, and process is outlined below in order of production:

- Purified Cotton Storehouse (Building 101) - The purified cotton storehouse was used to store the purified cotton as it was delivered to the FGOW.

- Cotton Dry House (Building 104) – The dry house contained large ovens to remove moisture from the purified cotton.

- Nitrating House (Building 105) - The nitrating houses were four-story brick buildings where the dried cellulose was mixed with a blend of acids, consisting of primarily nitric acid. Water was immediately added to the dry nitrocellulose to make a slurry; nitrocellulose was explosive when dry, but relatively safe when wet.

- Boiling Tub House (Building 108) - The nitrocellulose slurry was piped to the boiling tub house to remove impurities that made the nitrocellulose unstable. The process consisted of several acid boils and freshwater rinses. This process usually took between 60 to 90 hours.

- Pulping House (Building 109) - The slurry passed through a series of shredders, of the same type used in paper mills, to cut the material to the desired size for processing in the powder line.

- Nitrocellulose Slurry Tank (Building 111) and Poacher Tub House (Building 112) - The nitrocellulose slurry was boiled in a series of alkaline (sodium hydroxide) and neutral solutions and then rinsed to purify the nitrocellulose. This process allowed the powder to have a longer shelf life and removed 40% of the liquid from the slurry.

- Blending Tub and Final Wringer (Building 113) – In the blending tub, different batches of nitrocellulose were blended together to obtain specific nitrogen and solubility characteristics. In the final wringer, the blended materials were spun in centrifuges to remove most of the water; at this stage, the nitrocellulose contained approximately 25% to 33% moisture. This was the end of the nitrating process.

Note: the building numbers assigned to different building types is consistent across production lines with extensions to make them unique per the facility, such as Building 113-A. These building numbers are also consistent across production facilities throughout the U.S. Therefore, a Blending Tub and Final Wringer building was assigned as Building 113 in Minnesota, as well as in Wisconsin.

4. East Powder Manufacturing

Once the nitrating process was complete, the nitrocellulose was shipped to the powder manufacturing area. In the area of the East Powder Manufacturing, powder was prepared, blended, and packed into steel- or copper-lined boxes for shipping. This area included 74 buildings, including vertical press houses, tray dryers, shaker sieve houses, glaze barrel house, sweetie barrel houses, and blend towers. The primary chemicals used in this area included strong alcohols, ethyl ether, and diphenylamine. The East Powder Manufacturing is shown on Figure 6 and consisted of the following production steps:

- Nitrocellulose Lag House (Building 201) – The nitrocellulose lag house was used to store nitrocellulose until it was ready to be used in the powder process.

- Dehydrating Press House (Building 202) – In the dehydrating press house, a strong alcohol was added to the nitrocellulose and then pressed to remove the remaining water moisture.

- Mixer House (Building 208) – In the mixer house, nitrocellulose was mixed with ethyl ether to create a gelatin like mixture, which was pressed into a cylindrical block. Diphenylamine was also added as a stabilizer to neutralize any acid products which might be formed as a result of the gradual decomposition of the powder.

- Vertical Press House (Building 234) - The cylindrical blocks of nitrocellulose gelatin were transferred to the Vertical Press House, where it was pushed through dyes that formed the blocks into long strands of powder. The strands of powder fell into waiting tubs on the first floor.

- Solvent Recovery House (Building 214) - In the Solvent Recovery House, inert gases were passed through the powder at high temperatures to remove the residual volume from the powder.

- Water Dry House (Building 269) – In the water dry house, water was used to remove trace amounts of solvent from the powder.

- Sweety Barrel House (Building 236) – In the sweety barrel house, the powder was mixed with dinitrotoluene (DNT). The DNT affected the burning rate of the gun powder and dictated the caliber of the ammunition.

- Powder Dry House (Building 235 and Tray Dryer Building 237) – In the powder dry house, any remaining moisture was removed from the powder via hot air.

- Glaze Barrel House (Building 238) – In the glaze barrel house, graphite was added to the powder to reduce static and to improve its settling properties. This allow the powder to be packed tighter than if the graphite was not added.

- Shaker Sieve House (Building 239) – In the shaker sieve house excess graphite and odd sized powder particles were removed. The powder was then stored temporarily while the batch was analyzed by the ballistics laboratory.

- Blending Tower and Packing House (Building 240) – In the blending tower powders from different batches that had been approved by the laboratory were mixed to get consistent chemical and physical properties. In the packing house, the powder was packaged into air-tight containers.

- Shipping House (Building 229) – In the shipping houses, the packed powder was stored until it could be shipped via rail or truck to the Twin Cities Ordnance Plant.

5. West Powder Manufacturing

In the West Powder Manufacturing area, gun powder was blended and packed into steel- or copper-lined boxes for shipping. This area included 31 buildings, including water dry houses, controlled circulation dry houses, air test houses, and blend towers. The West Powder Manufacturing is shown on Figure 7.

6. Powder Storage and Shipping

In the Powder Storage and Shipping area, the packed gunpowder was stored and prepared for shipping. This area included 30 shipping houses and one comfort station. The Powder Storage and Shipping area is shown on Figure 8.

7. Powder Testing – North, South, and West

The Powder Testing area was used to determine the ballistic value of each batch of gunpowder by actual firing tests and through laboratory methods. There were three temporary powder magazines and a ballistic lab and range in the north area. The south area had three air test houses, two comfort stations, a supply office, and an old farmhouse. The west area contained two air test houses and a supply office. The Powder Testing area is shown on Figure 9.

8. Main Shop Area

The Main Shop Area was used for administrative and maintenance activities. This area included 38 buildings, including auto repair shops, machinery storage, the foreman's shack, acetylene storage, and the water pump house. A large water tank was also located in this area. The Main Shop Area is shown on Figure 10.

9. Power Plants

There were two power plants associated with the FGOW. Power Plant A was the only plant that operated and had five smokestacks. Power Plant B had four stacks and was never operational. These plants provided the FGOW with electricity. The Power Plants are shown on Figure 11.

10. Wastewater Treatment Area.

The wastewater treatment was used for treatment of wastewater that was generated at GOW. This area included three buildings and two wastewater lagoons. The Wastewater Treatment Area is shown on Figure 12.

2.2 Operational History

The original construction plans included six smokeless powder manufacturing lines: Lines A, B, C, D, E, and F. Lines B and C operated from February through August 1945, producing 15,000 tons of powder. Although Line A was completed, it did not appear go into complete production, although portions of the line may have been used for blending. Lines D, E, and F were partially completed, but did not operate.

The Oleum Plant operated from November 1944 through July 1945, producing 40,350 tons of sulfuric acid, and the Ammonia Plant operated from November 1944 through August 1945, producing 25,500 tons of nitric acid.

On August 14, 1945, the FGOW stopped production and the remaining gunpowder was shipped out by October 1945. In the fall of 1945 through 1947, buildings were dismantled, burned, salvaged, and disposed. On site disposal occurred in a number of areas based historical documentation and exposed building remnant materials.

The present day condition at the FGOW includes numerous buildings, assorted remnants, foundations, footings, and rubble associated with the former facilities.

3.0 EXISTING DATA AND ANALYSIS

Dakota County Environmental Management (DCEM) has developed an extensive geographical information system (GIS) database of the historical documentation for the FGOW. The database was developed from the following sources of information:

- Historical aerial photography coverage from 1937 through 1985;
- Orthophotography collection from 1991 through 2003;
- Current and historical site photographs;
- Building plans, plat maps, historical documents, and reports from 1942;
- Light distancing and ranging (LiDAR) aerial-based laser pulse survey performed in 2004;
- Photogrammetry;
- ArcScene and three-dimensional maps;
- Global Positioning Satellites (GPS) surveying and ArcPad software;
- Pictometry; and
- Dakota County GIS base map.

DCEM used these data sources to generate a repository of digital information of the FGOW using the ArcGIS software package which allows the generation of maps and associated databases. The maps include two-dimensional shapes of the FGOW building footings and floors that were digitized from the historical aerial photographs and orthophotographs. From these digitized shapes, an area is calculated in ArcGIS. Other remnant building features were also digitized from the historical plans and specifications including

- Footings – An above or below ground concrete base designed to support the structure.
- Floor (1st) – The first level of the building constructed of concrete or other material and supported by the footing.
- Floor (2nd) – The second level of the building constructed of concrete or other material and supported by concrete walls or columns.
- Remnants – The remnant building structures, such as walls, columns, and support structures, that still exist above the floor level.

The footing depth/height, floor thickness, building height, wall thickness, and other building features were determined from historic plans and specifications, or estimated, when unknown. Based on the remnant areas and depths, DCEM also calculated the volume of concrete present on the Property. The concrete remnants are shown on Figure 2.

3.1 Field Verification Assessment

On June 22 and 23, 2006, DPRA representatives, Rob Heimbach and Peder Sandhei, performed field activities at UMORE Park to verify the locations of remnants of the FGOW and provide field measurements of remnants to assess the accuracy of DCEM's remnant building locations and concrete volume estimates.

DPRA used a Trimble GeoXH handheld GPS (GeoXH) for field verification of selected concrete structures and remnants; the GeoXH has an accuracy ranging from 2 to 6 feet, based on satellite positioning. It also has the capability of downloading shape files, representing current or historic structures and/or features, from previously generated digital maps, so that the GeoXH operator can navigate to those shapes in the field. The building and remnant shape files for FGOW were obtained from DCEM and uploaded to the GeoXH to provide reference points as well as to help identify the specific remnants and verify their location in the field.

During the site visit, DPRA identified and located the major features of the F Line and a composite of the B and C Lines. In addition, features from Power Plants A and B, the west acid area, and the east powder manufacturing areas were also identified.

DPRA walked north to south along the F Line and verified the corners of the following remnants:

- Pre-Treated Purified Cotton Storehouse (101-F),
- Boiling Tub House (108-F),
- Pulping House (109-F),
- Poacher Tub House (112-F), and
- Blending Tub (113-F).
-

Numerous open pipes, pits, and unstable rubble were encountered within and adjacent to the remnants.

DPRA continued south to verify the locations of two Mixer Houses (208-L and 208-M) and three Solvent Recovery Houses (214F-13, 214F-12, and 214F-11). The Vertical Press Houses on the F Line were visible as raised areas in a grassy area; however, the there was no visible concrete remnants, only concrete pieces mixed within the soil and ground vegetation. DPRA collected the locations of one Mixer House (208-J) and one Vertical Press House (211-C) from the E Line to the east.

DPRA repeated this process for the B Line and verified the corners of the following remnants and existing building (101-B):

- Pre-Treated Purified Cotton Storehouse (101-B),
- Acid Tanks (102-B1 and 102-B4),
- Cotton Dry House (104-B),
- Boiling Tub House (108-B),
- Pulping House (109-B),
- Poacher Tub House (112-B),
- Blending Tub (113-B),
- Nitrocellulose Slurry Tank (111-B),
- Nitrocellulose Lag Storehouse (201-B),
- Dehydrating Press House (202-P), and
- Mixer House (208-D).

The southern portion of the B Line is within the Minneapolis-St. Paul Gun Range and Bomb Squad Detonation Area and could not be accessed; therefore, the C Line was used to verify the location of the southern buildings. DPRA verified the locations of two vertical press houses (234-J and 234-H) and three solvent recovery houses (214C-12, 214C-11, and 214C-7) from the C Line.

On June 23, 2006, DPRA verified the locations of the five stacks and the corners of Building A (401-A) near Power Plant A. DPRA verified the locations of the four stacks at Power Plant B, Building G (401-B), the large water reservoir north of Power Plant B (402-B), and a silo (612-B1). The West Acid Area was also field verified, including the Acid Area Tank Farm (305-B) and the Nitric Acid and Sulfuric Acid Concentration Building (303-B). DPRA also verified the location Boiling Tub House (108-D) and the Poacher Tub House (112-D) on D Line, which is to the west of the West Acid Area.

DPRA identified the locations of four of the Sweetie Barrel Houses (236-A, 236-B, 236-E, and 236-F) and two of the Rifle Powder Water Dry Houses (235-A and 235-B) in the East Powder Manufacturing Area. Finally, DPRA field verified the corners of the Garage and Repair Shop (716-A), the burning pit south east of the four stack power plant, and the edge of the debris disposal area east of the four stack power plant.

The GPS coordinates of the FGOW remnants are summarized on Table 1 and the remnant location detail is provided on Figures 13A through 13D. These tables and figures indicate the locations of FGOW structures that were present prior to 1945. Most of these structures are no longer present; however, footings and/or floors may still exist on the Property. A subset of the FGOW concrete remnants, organized by process area, is included in Table 2. This table identifies the process areas and associated concrete remnants, by building name and number, that DPRA recommends investigation for potential contamination and verification of the concrete remnant volume.

3.2 Findings

In general, based on the field verification, the locations of the building shape files appear to be more consistent with the field locations than the remnant shape files; however, the accuracy of the building and remnant locations is adequate to identify and locate specific structures in the field. In general, the building and remnant locations varied between 5 to 20 feet, which is within the cumulative accuracy of the aerial photographs, pictometry, and plans and specifications. The building shape files are based on the 1945 aerial photos and the building plans for FGOW. The remnants are based on the 2002 aerial photographs and 2004 pictometry.

A FGOW building disposal area was identified east of the Power Plant B. This disposal area outcrops along a ravine that ranges in depth from approximately 15 to 25 feet and encompasses an area of approximately 1¼ acres. DPRA identified the location of the east edge of the disposal area and marked the location using the GeoXH as shown in Figure 14.

During the site visit, DPRA observed concrete block, concrete footings, concrete pieces, metal, steel support structures, tires, and wood sticking out of the eastern edge of this disposal area.

Photographs of the disposal area are also included in Appendix A. Approximately 50,000 cubic yards of debris may be present in this area. Field verification, such as test pits, borings, and/or geophysical techniques, would be required to quantify the volume associated with this area and was outside of the scope of work for this task.

DPRA collected field measurements from the remnants of three T-wall structures (214F-13, 214F-12, and 214F-11) and measured building floor areas from the hydraulic refrigeration house (226-A), poacher tub house (112-F), mixer house (208-L), boiling tub house (108-F), and the vertical press house (211-C).

Specifically, DPRA measured the thickness of the T-wall remnants remaining from the solvent recovery houses to verify the concrete volume calculations. Based on field measurements, the T-walls are one-foot thick; the DCEM shape files utilize a T-wall thickness of approximate 6 to 7 feet. Calculations based on the field measurements show that the volume of each T-wall remnant is 1,425 cubic feet (ft^3) versus the 10,283 ft^3 presented in the DCEM database; there are 90 T-walls on the Property.

3.3 Building Material Volume Estimates

Based on DPRA's calculations, approximately 171,000 cubic yards of concrete remain on the Property as building remnants. A breakdown of the concrete volumes is summarized in the table on the following page. This volume does not account for any buried concrete debris located on the Property, the concrete associated with 64 building footings and floors[1], concrete roads, or the miscellaneous structures that are present on the Property but not identified in the original plans and specifications for FGOW.

In addition, a footing depth of six feet was used to determine the footing volume; however, anecdotal information suggests that the as-built conditions of the footings may vary. Specifically, it was reported that one building footing was reported to extend to a depth of greater than 12 feet. Based on the "Industrial Facilities Inventory, Gopher Ordinance Works," prepared by the Corp of Engineers, dated January 1944, approximately 162,000 cubic yards of concrete was needed for the facility, excluding concrete block.

[1] There are at least 64 buildings identified in the original FGOW plans and specifications which do not have footings and floors indicated in the plans and specifications.

Concrete Volume Estimates Remaining on FGOW

FGOW Feature	DCEM Concrete Volume (cubic yards)	Adjusted Concrete Volume (cubic yards)
Footings	39,667	39,667
First Floors	51,748	51,748
Second Floors	10,109	10,109
Remnants	98,730	69,203(1)
TOTAL:	**200,254**	**170,727**(2) (3)

(1) The remnant volume was recalculated with the adjusted T-wall volumes; see Section 3.2.
(2) The total volume does not account for the presence of concrete and other debris in the area located east of the Power Plant B stacks (see Figure 14); the volume of any concrete and debris in this area is estimated to be at least 50,000 cubic yards.
(3) In addition, the total volume does not account for any other concrete and buried debris on the Property; these volumes, if present, have not been estimated at this time.

3.4 Limitations

Variability in the data is inherent to the various sources of historical information; this variability may include, but is not limited to, gaps in the data, lack of post GOW demolition detail, and the inherent error that possibly exists within the data. The following are identified as specific limitations:

- No footing or floor information is available for at least 64 building footings and floors identified in the original FGOW plans and specifications;
- Volume of footings could be underestimated based on limited information on the actual depth of footing being greater than the plans and specifications; the footings represent approximately 23% of the total volume of concrete at FGOW; and
- The discrepancy discovered with the volumes of the T-walls may necessitate field verification to confirm estimated concrete volumes of all remnant structures.

4.0 SCOPE OF WORK

Based on a review of the information available from Dakota County Environmental Management (DCEM), field observations, and historic documents regarding FGOW, DPRA presents the following scopes of work and cost estimates for conducting hazardous materials building surveys and concrete assessments.

4.1 Hazardous Materials Building Survey Scope of Work

In general, there are two categories of buildings on the Property: buildings that are or have been used in at least the past 20 years and abandoned remnant structures. The surveys needed for these categories are different. The functional FGOW buildings will require the standard hazardous materials building survey as suggested by the Minnesota Pollution Control Agency (MPCA) prior to demolition. The abandoned remnant structures will require a more specialized approach that accounts for its original construction, former uses, and current condition; this survey will be more naturally performed with the concrete assessment than as a specific hazardous materials building survey, and is include in the scope of work for the concrete assessment.

At least 30 former FGOW buildings are currently leased, and are occupied and/or used for storage as part of the UMORE business operations. Based on the diverse nature of the activities performed within these existing buildings, individual surveys will be required. The scope of work for the hazardous materials building survey of each functional FGOW building is presented below.

1. Obtain and review the available documentation regarding the former and current use of the building and prepare a summary of all known chemicals and hazardous substances.

2. Perform a visual inspection and identify suspect asbestos-containing materials and collect samples of suspect asbestos-containing materials in accordance with applicable regulations. Submit up to 30 samples for laboratory analysis to determine asbestos content. Representative samples will be collected from buildings that are known to be of similar construction or if field indication shows similar characteristics.

3. Identify mercury-containing lights, switches, thermostats, and equipment, PCBs, lead, refrigerants, and other regulated wastes in accordance with the MPCA's Pre-Demolition Environmental Checklist and Guide from existing buildings.

4. Perform a lead-based paint survey using an XRF of painted surfaces including the walls, window casings, and other areas. This survey will be for verification only and will not include collecting physical paint chip samples.

5. Collect waste characterization samples of observed materials, such as liquid samples of wastewater and/or wipe samples of stains, for analysis appropriate to the suspected material. The analysis may include gasoline range organics (GRO), diesel range organics

(DRO), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and/or other contaminants as appropriate.

6. Prepare a written report identifying the locations of asbestos-containing materials, percent asbestos by weight, quantity and condition of asbestos-containing material; and the location of mercury-containing lights, switches, thermostats, and other equipment, PCBs, lead, refrigerants, and other regulated wastes.

4.2 Concrete Remnant Assessment Scope of Work

Based on DPRA's evaluation of the concrete remnants, at least 171,000 cubic yards of concrete are present on the Property. The concrete covers an area of over 29 acres. Depending on the presence of contamination, this concrete may require disposal and/or remediation, or may be recycled and reused on or off the Property as road base or for other beneficial uses.

The additional concrete assessment will consist of three primary activities: 1) estimating the concrete volumes for which an accounting has not been performed, 2) determining whether the concrete is contaminated, and 3) assessing alternatives for future disposal, remediation, recycling and/or reuse. The scope of work for the remnant concrete assessment is presented below.

1. Assess the footing depths of representative selected remnants by excavation or non-invasive geophysical techniques.

2. Develop a sampling plan including field activities to verify and assess the selected remnants for various hazards and physical properties.

3. Perform a visual inspection of selected remnants of the FGOW structures on the north ends of Lines A, B, and C, the acid plants, and power plants, to visually assess the accessibility and sampling requirements prior to conducting the field sampling program to determine the feasibility. Document the selected sampling locations using a hand-held GPS unit to facilitate returning to the same location for sampling. A list of potential representative sampling locations is provided on Table 2.

4. Collect, including but not limited to, soil, liquid, sludge, and/or sediment samples from sumps, basins, pits, or other areas from within the selected remnants and sample, as appropriate, for PCBs, DRO, GRO, SVOCS, and/or RCRA metals in addition to various smokeless powder production chemicals such as nitroaromatic compounds (2,4-DNT, 2,6-DNT and other nitrotoluenes), diphenylamine (DPA), dibutylphthalate (DPB) and DPA breakdown products, such as diphenylnitrosamine (DPNA). A list of potential representative sampling locations is provided on Table 2.

5. Collect representative samples of/from the concrete and test, as appropriate, for PCBs, DRO, GRO, VOCs, SVOCS, and RCRA metals metals in addition to various smokeless powder production chemicals such as nitroaromatic compounds (2,4-DNT, 2,6-DNT and other nitrotoluenes), DPA, DPB, and DPA breakdown products. A list of potential representative sampling locations is provided on Table 2.

6. Prepare summary reports which address the presence of contaminants associated with the concrete; the concrete volumes which may be contaminated; decontamination and/or disposal options; remediation, recycling, and reuse options for non-contaminated materials; and recommendations for additional assessment, if necessary.

Potential asbestos-containing materials (ACM) were observed at various locations across the Property. DPRA observed potential ACM as loose pieces lying on or adjacent to the concrete remnants; potential ACM is also adhered directly to the concrete in some locations. It is anticipated that selected asbestos sampling will be initially performed to establish the presence or absence of asbestos in typical materials observed across the Property. Regulations require that all ACM which are friable or will become friable during demolition must be removed from a building prior to demolition by a licensed asbestos abatement contractor.

Contamination from releases in the concrete is expected to be at accumulation points on the concrete surfaces, such as in pits, sumps, depressions, corners, and pipe openings. In addition, the likelihood of contamination from former activities warrant initially evaluating the Property based on the areas as defined by the production activities and facilities as well as considering where production was performed. Based on these factors, sampling for other contaminants, such as SVOCs, PCBs, and metals would be limited to the north ends of the Lines A, B, and C, the east and west acid plants, and possibly the power plants.

4.3 Cost Estimate

The cost estimates to perform the scopes of work outlined above are summarized in the following tables.

Hazardous Materials Building Survey Cost Estimate

Task Description	Cost Estimate
Review historical and current information	$500
Survey for hazardous materials and collect samples	$1,000
Collect asbestos analysis (30 samples)	$500
Perform chemical and/or wipe analysis	$500
Prepare report and project management	$1,000
TOTAL PER SURVEY:	**$3,500***
TOTAL (30 surveys):	**$105,000**

* This cost is based on completing no less than 30 building surveys.

Concrete Remnant Assessment Cost Estimate

Task Description	Cost Estimate
Perform concrete condition assessment and contaminant analysis	$25,000
Perform concrete volume assessment	$15,000
Perform assessment of debris area located east of the Power Plant B stacks	$25,000
Report preparation and project management	$25,000
Assess the alternatives for reuse, reconditioning, and/or recycling the remnant concrete	$10,000
TOTAL:	**$100,000**