Phase II Investigation Work Plan

Sites of Concern 1-3 and 6-8
UMore Mining Area
Dakota County, Minnesota

Prepared for
University of Minnesota

May 1, 2009

BARR

Phase II Investigation Work Plan

Sites of Concern 1-3 and 6-8
UMore Mining Area
Dakota County, Minnesota

Prepared for the
University of Minnesota

May 1, 2009

BARR

4700 West 77th Street
Minneapolis, MN 55435-4803
Phone: (952) 832-2600
Fax: (952) 832-2601

Phase II Investigation Work Plan
SOCs 1-3 and 6-8
UMore Mining Area

Dakota County, Minnesota

May 1, 2009

Table of Contents

List of Tables

List of Figures

List of Appendices

List of Acronyms

AES	Agricultural Experiment Station
AOC	Area of Concern
bgs	Below ground surface
COC	Constituent of Concern
DNT	Dinitrotoluene
DPA	Diphenylamine
DRO	Diesel Range Organics
EIS	Environmental Impact Statement
FSI	Focused Site Inspection
GOW	Gopher OrdnanceWorks
GRO	Gasoline Range Organics
MDA	Minnesota Department of Agriculture
MPCA	Minnesota Pollution Control Agency
msl	Mean sea level
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
REC	Recognized Environmental Condition
SAP	Sampling and Analysis Plan
SOC	Site of Concern
UMA	UMore Mining Area
UMore Park	University of Minnesota Outreach, Research and Experimentation Park
USACE	U.S. Army Corps of Engineers
VOC	Volatile Organic Compound

Executive Summary

This work plan (Plan) identifies and describes the investigation tasks that will be used to characterize soil and groundwater at the UMore Mining Area (UMA) located in the City of Rosemount and Empire Township, Dakota County, Minnesota (Figure 1). The UMA consists of the westernmost one-third of the University of Minnesota's UMore Park (Figure 2). The goal of the investigation is to provide information necessary to determine if past releases have occurred. If a release is confirmed, the investigation data will be used to help prepare the affected areas so that they may be addressed prior to or in conjunction with anticipated aggregate mining over a majority of the UMA. The mining activities and general hydrogeologic characterization are described in an Environmental Impact Statement (EIS) that is in preparation.

The UMA occupies approximately 1,711 acres within UMore Park including most of the University's Agricultural Experiment Station. Land use is predominantly rural within the UMA, located between Biscayne and Akron Avenues to the east and west, County Road 42 to the north, and 170th Street to the south. The vast majority of the UMA is open agricultural land with no known history of industrial activities and little or no evidence of past environmental releases.

This Plan addresses six "Sites of Concern" (SOCs) within the UMA. .The SOCs are areas in which there is either a historical recognized environmental condition (e.g., closed petroleum or agricultural spill site) or an area of potential environmental concern based on circumstantial historical data. Therefore, the scope of work presented in this Plan is intended primarily to determine if a release of hazardous substances or petroleum has occurred. The information collected in this investigation will be used to guide any subsequent investigations and to remediate areas consistent with future anticipated land use within the UMA.

Two additional SOCs, referred to as the Former DNT Loading Platform and Drainage Ditch (SOC 4) and Former DNT Bunkers (SOC 5), have also been identified within the UMA. However, after consulting with the MPCA, the University has decided to investigate these two SOCs separately from the Phase II Investigation described herein. SOCs 4 and 5 will be addressed with a separate work plan because they were utilized during World War II as part of the Gopher Ordnance Works (GOW), a smokeless gunpowder production facility and are the subject of an ongoing investigation by the U.S. Army Corps of Engineers (USACE). Additionally, a separate work plan is deemed more appropriate for SOCs 4 and 5 (a.k.a. USACE AOC 3-DA1 and AOC 5, respectively) because they

have already been identified by the USACE in a Preliminary Assessment and Focused Site Inspection as “areas of concern” or “AOCs” potentially associated with release of hazardous substances to soil through historical military munitions manufacturing activities.

Although mining for sand and gravel is currently being contemplated for much of the UMA, this Plan is focused on evaluating potential release source areas and is intended to be independent of future mining plans. If environmental impacts are encountered within the UMA, it is anticipated that the planned level of cleanup will be consistent with the Minnesota Pollution Control Agency (MPCA) requirements for providing a “No Further Action” level assurance.

The Phase II scope of work within the UMA will consist of the following:

- Collect soil samples from direct push soil borings, surface soils, and test trenches within the SOCs and background sample locations.
- Collect groundwater samples from direct-push boring borings.
- Collect groundwater samples from one water supply well located within the Ag Engineering Complex (SOC 3) and from three additional monitoring wells that were installed as part of the on-going Groundwater Assessment study being conducted for the UMA as part of the EIS.
- Inventory the location of water supply wells for which sealing will eventually be required prior to mining operations.
- Summarize the results of the investigation in a report that will include results of the above scope and will identify any SOCs that should be carried forward for supplemental investigation and/or potential response actions.

1.0 Introduction

This document presents the Phase II Investigation (Phase II) Work Plan (Plan) for a six sites of concern (SOCs) that have been identified in the UMore Mining Area (UMA) in Dakota County, Minnesota (Figure 1). The UMA consists of the approximate western third of the UMore Park property owned by the University of Minnesota (University). The UMA is being proposed for future sand and gravel mining and is the subject of an Environmental Impact Statement currently in preparation by the University.

The Plan has been prepared on behalf of University by Barr Engineering Company to address possible subsurface environmental impacts resulting from previous activities in the UMA. The Plan has been developed to be consistent with National Contingency Plan (NCP) requirements and will be administered under the authority of the MPCA Superfund Program. Although the vast majority of the UMA's 1,711 acres have historically been used as agricultural cropland, some portions of the UMA were part of the former Gopher Ordnance Works (GOW). There were also past releases within the UMA of petroleum and pesticides arising from post-GOW activities.

The Plan includes the following sections:

- **Section 1: Introduction**—including the purpose of the investigation and background information. This section describes the nature of past releases and identifies the sites of concern (SOCs) that have been carried forward for the investigation described in this work plan.
- **Section 2: SOCs and Constituents of Concern—**including potential constituents at each SOC and the anticipated affected media.
- **Section 3: Phase II Investigation Tasks—**including sampling protocols, the rationale for the sampling locations and a description of quality assurance/quality control measures.
- **Section 4: Reporting and Schedule—**including a summary of Phase II report contents, a preliminary discussion of potential actions, and the schedule for field work and reporting.
- **Section 5—**References used in this document.
- **Site maps**—showing relevant site features, previous sampling locations, and proposed sampling locations.
- **Tables—**presenting previous and proposed sampling locations and parameters.

- **Appendices**—providing supporting information as well as detailed description of methods that will be used in the investigation.

1.1 Purpose of Phase II Investigation

The UMA was the subject of a CERCLA Preliminary Assessment (PA) and Site Investigation (SI) completed in 2008 by the USACE. The scope of the PA/SI included the entire UMore Park area and focused in operations at the former GOW. The results of the USACE's PA/SI identified two areas of concern (AOCs) in the UMA (AOC 3DA-1 and AOC 5). These correspond to SOCs 4 and 5 in the University's updated Phase I (Section 1.5.3). The remaining portion of the UMA was screened out of the USACE's Superfund process.

The purpose of this Phase II is to be sure that past activities outside of AOCs 3DA-1 and 5 have not caused a release of hazardous substances or petroleum products to the environment within the UMA. As such, this investigation goes beyond the USACE's RI process to ensure that areas screened out of the process by the USACE indeed do not show evidence of releases. If evidence of a release is identified in this investigation, supplemental investigations may be necessary to further define the ultimate magnitude and extent of any releases and to evaluate appropriate response actions. The Phase II and subsequent investigation data will be used to determine the potential risk of any releases to human health and the environment in accordance with MPCA risk-based guidance. The Phase II and subsequent investigations will also define the volumes of contaminated media that require treatment, removal, or containment to mitigate any unacceptable risks associated with mining.

The work will be performed under the oversight of the MPCA's Superfund Program staff. The information presented in this Plan is consistent with EPA CERCLA investigation guidance for a Preliminary Assessment (PA) and the proposed scope is consistent with a Focused Site Inspection (FSI) and the NCP. If evidence of a previously undocumented release is encountered, subsequent investigations will follow CERCLA guidance for an expanded SI or Remedial Investigation (RI) and be consistent with the NCP.

The Phase II of the UMA SOCs will consist of the following scope:

- Incorporate data collected from other investigations (e.g., from the EIS) to assess subsurface materials and estimate depths to bedrock and the saturated zone to develop a hydrogeologic conceptual model that will be used to guide future investigations and/or remediation.
- Use pre-existing data where available to define areas of past releases.

- Describe visual and olfactory soil characteristics and collect field headspace measurements from soils collected from soil boring and test pits.
- Collect soil samples from soil boring, surface sampling and test trench locations and analyze the samples for a suite of parameters consistent with past land uses. Laboratory analyses will be performed for one or more of the following parameters: asbestos-containing material (ACM), semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), metals, nitrocellulose, herbicides, organochlorine and organophosphate pesticides (MDA List 1 and List 2).
- Collect groundwater samples from temporary wells and existing water supply and monitoring wells.
- Identify and inventory available information on existing wells that may need to be sealed prior to mining activities. Several wells may be retained for continued service as monitoring wells for the UMA.
- Summarize the results of the Phase II investigation in a report, including results of the above scope, and providing, where appropriate, recommendations for future investigation and response actions.

1.2 Site Location and Current Land Use

The UMA is located approximately 15 miles southeast of the Twin Cities, just west of US Highway 52 and south of Dakota County Road 42, between the Mississippi and Vermillion Rivers. The UMA consists of 1,711 acres within a predominantly rural area located generally between Biscayne and Akron Avenues. The address for the UMore Park Administrative Office is 1605 160th Street West, Rosemount, MN 55068. The UMA occupies all of Section 4 and parts of Section 3 in T 114N, R 19W as well as all of Section 33, and portions of Sections 27, 28, and 34 of Township 115 N, and Range 19 W in Dakota County (Figure 1).

The majority of the UMA is currently used for agriculture purposes with a small percentage of the area used for administration and support of the University's research at UMore Park. The principal land use activities at the UMA since 1947 have related to agricultural research on crops and livestock associated with the University Agricultural Experiment Station (AES). The University also leases a portion of the cropland within the UMA to the U.S. Department of Agriculture (USDA). The operations related to the agricultural research with potential for releases to the environment include past and current storage of fuels, fertilizers, herbicides, and pesticides.

Figure 2 shows current land use and significant surrounding property features. The surrounding area consists of residential land use to the north, the University's UMore Park to the east, gravel mines

and agricultural lands to the south, and a mixture of commercial and industrial uses with a few farmsteads to the west.

1.3 Historical Land Use Overview

UMore Park, including the UMA, was once owned by the U.S. Government and was conveyed to the University in 1947 and 1948. UMore Park includes portions of the former GOW, which was constructed and operated from 1942 to 1945 by E.I DuPont de Nemours for the U.S. Government. The plant was established to manufacture smokeless gunpowder, oleum (an intermediate used in the manufacture of sulfuric acid), and nitric acid. Dinitrotoluene (DNT), aniline, dibutyl phthalate (DBP), and diphenylamine (DPA) were imported for use in the smokeless gunpowder manufacturing process. Other potential constituents related to the former GOW that were potentially released to the environment include metals, herbicides, asbestos, and volatile and semivolatile organic compounds. By 1946, the GOW had been decommissioned and most of the buildings had been decontaminated and demolished by the federal government.

The majority of GOW operations were located east of the UMA as shown on Figure 3. However, a railroad corridor and an excess supply yard were located in the northern and eastern portions of the UMA. Some of the materials used for construction and operation of the GOW likely arrived via the railroad system. No known releases are associated with the railroad and excess material storage areas and these areas were screened out of the CERCLA site cleanup process by the USACE. A DNT-loading platform and DNT storage bunkers were located in the south-central portion of the UMA. The USACE identified GOW-related releases in the DNT storage bunker area during a 2007 Focused Site Inspection (see Section 1.5.2 below). The Remedial Investigation of the DNT-loading platform and DNT storage bunkers will be described in a work plan submitted under separate cover.

1.4 Physical Setting

The physical setting of the UMA is described in terms of climate and hydrology, soils, geology, hydrogeology, and water supply wells and receptors in the following subsections.

1.4.1 Climate and Hydrology

The average daily maximum temperatures range is 23 to 83 degrees Fahrenheit and the average annual precipitation is approximately 32.5 inches (NOAA, 2008). The UMA is located on a localized topographically high area, with surface topography sloping gently towards the northeast in the northern two-thirds of the UMA and to the southeast in the southern one-third of the UMA. The

ground surface elevation at the UMA varies from approximately 950 to 945 feet above mean sea level (MSL). Existing conditions and surface topography are shown on Figure 4.

1.4.2 Soils

Waukegan series soils cover approximately ninety percent of the UMA (Figure 5; USDA, 2008). The Waukegan series consists of deep, well drained soils that form on outwash plains and stream terraces. These soils are described as moderately to rapidly permeable and have the ability to readily absorb water.

1.4.3 Geology

The geology of the UMA consists of 25 to over 150 feet of unconsolidated glacial deposits overlying an erosional Paleozoic bedrock surface.

1.4.3.1 Unconsolidated Deposits

The surficial soils are relatively thin across the UMA (less than 10-feet thick) and are derived from loess (wind blown silt) or consist of localized fill associated with various land use activities on the property. The underlying glacial deposits consist primarily of outwash comprised of sand and gravel of varying grain sizes. Glacial till and fluvial/lacustrine deposits are present within and above the outwash (Figure 7). The till consists of a massive (unlayered) diamicton with a homogenously mixed texture consisting of gravel, sand, and silt within a clay matrix. The till is typically yellowish brown to gray in color. The lacustrine units are typically fine-grained with lower sand and gravel content than the till. The till and lacustrine deposits range in thickness from a few feet to tens of feet and appear to exhibit lateral continuity on the order of a half-mile in the UMA (Barr, 2008).

1.4.3.2 Bedrock Deposits

The uppermost bedrock units in the UMA are the St. Peter Sandstone and the Prairie Du Chien Group (dolomites). The Prairie Du Chien Group and the underlying Jordan Formation Sandstone together comprise the primary aquifer and are used locally for domestic water supply and crop irrigation. The St. Lawrence Formation, considered an aquitard (or confining layer), is present below the Jordan Sandstone.

1.4.4 Hydrogeology

Groundwater within the UMA is approximately 60 feet below ground surface (bgs). The water table surface is within the outwash deposits across much of the UMA and groundwater flow is anticipated

to occur under generally unconfined conditions. Confined groundwater flow in outwash is likely where overlying till or lacustrine deposits are present at or beneath the water table.

Based on monitoring data collected during the Groundwater Assessment for the EIS (in preparation), groundwater flow within the outwash and underlying aquifers is to the northeast towards the Mississippi River (Figure 8). Monitoring data indicate that a groundwater flow divide exists south of the UMA. Therefore, groundwater flow to the Vermillion River from the UMA does not appear likely.

1.4.5 Supply Wells and Potential Receptors

The existing and sealed wells located within the UMA are shown in Table 1. Based on a search of the Minnesota County Well Index (CWI) and Dakota County databases, approximately 12 existing and 7 sealed wells are present at the UMA. Locations of the wells are shown on Figure 9. Potable water is supplied by private wells located within or near each of the research complex areas at the AES. Typically these wells are open to the PDC Group or Jordan Formation aquifers.

Limited field verification of the well search results conducted during the Groundwater Assessment (in preparation) indicated that several of the active wells listed in the database (e.g., H48777, 208400) likely correspond to either sealed wells or mapping inaccuracies as there were no observed above ground well features observed at several mapped locations. Likewise, several potential wells (including standpipe wells shown in Appendix C) were identified within the Ag Engineering Complex and one at the South Research Complex that are not listed in the databases surveyed. A well inventory, as described in Section 3, will be completed as part of the Phase II investigation to address the data gaps indicated above.

High capacity private and public supply wells located within approximately 4 miles of the UMA boundary have been incorporated into the groundwater flow model prepared for the Groundwater Assessment of the site (in preparation). Details of the modeling results will be provided in the Phase II investigation report.

1.5 Previous Investigations

Many of the previous investigations regarding UMore Park have focused on areas east of the UMA. This section describes the previous investigations as they apply specifically to the UMA.

1.5.1 Phase I Environmental Site Assessment ("Peer Phase I"; Peer, 2006)

The Peer Phase I was conducted in accordance with ASTM E 1527-05 and provided numerous findings regarding of the UMA and information on several Recognized Environmental Conditions (RECs). A Recognized Environmental Condition means that an existing release, a past release, or a material threat of a release of hazardous substances or petroleum products into the ground, groundwater, or surface water of the property has been identified and would be of concern from a regulatory perspective.

Peer identified RECs on former GOW operational and functional areas within the entire UMore Park. The majority of the UMA has no former GOW-related operations or functions; therefore less information is presented for the area within the UMA than in the rest of UMore Park. Although the presence of the former GOW was identified as a REC in the Phase I, no specific areas within the UMA were identified as RECs in the report. The Peer Phase I also included a well search for all public and private wells within the ASTM standard search radius. A complete copy of the Peer Phase I is available at: http://www.umorepark.umn.edu/Reference_Documents.html.

The Peer Phase I did indicate that several historical RECs related to closed petroleum or agricultural releases are present within the UMA. Peer recommended additional review of these release sites to assess the need for further investigation or cleanup.

The findings of the Peer Phase I were used in compiling the UMA SOCs summarized in Table 2. These SOCs include possible impacted areas within the UMA identified by Dakota County in 2005. The Peer Phase I also provided information on former tenants, environmental databases, and site reconnaissance relevant to the UMA. Appendix A contains a summary of historical information and data from the Peer Phase I related to the UMA.

1.5.2 USACE Investigations Related to the Former GOW

USACE has conducted a PA (USACE, 2006) and FSI (Bay West, 2008) of a portion of the former GOW. The only GOW-related areas within the UMA identified in the PA and carried forward to the FSI were the former DNT storage bunkers and related drainage area which the USACE referred to as AOC 5 and AOC 3-DA1, respectively. These areas will be investigated by the University and will be addressed in a work plan submitted under separate cover.

The PA also included field reconnaissance of the Railroad "Y" (referred to as the "Wye" in the PA), a Y-shaped rail junction, located in the northern portion of the UMA. A map showing the PA

investigation areas and excerpts from the associated findings are included in Appendix B. No rail hardware or ties were observed during the PA site visit. USACE did not carry the Railroad Y forward to the FSI.

1.5.3 Additional Historical Data Review and Site Reconnaissance (Barr, 2008)

Barr Engineering conducted additional historical land use and information review to supplement the Peer Phase I and other previous studies and to help focus efforts to investigate areas of the UMA that have the potential for release or threatened release of petroleum products or hazardous substances. The scope included review of the following historical information for the UMA:

- An updated GIS database of possible environmentally impacted areas from Dakota County (Dakota Co. 2008).
- Updated database search of government records (EDR, 2008) consistent with ASTM E 1527-05 and EPA's All Appropriate Inquiry Rule.
- Review of historical city directories, Sanborn insurance maps, and historical aerial photographs.
- Review of University records and reports regarding general setting information and past releases. This information included a 1949 topographic survey, limited facility diagrams, a directory of University buildings compiled in the early 1990s with oblique aerial photographs, reports on past leaking underground storage tank investigations and agricultural chemical spills that were cleaned up and administratively closed.
- Review of the Peer Phase I (described above) and evaluation of the historical RECs that were identified in that report.
- Site reconnaissance of buildings and areas identified in the above resources that have or may potentially be associated with releases of hazardous substances or petroleum products. The site reconnaissance included discussions with University staff familiar with past operations within the UMA.
- An evaluation of the identified sites of potential concern from available sources of information to determine which of these sites should be carried forward as a "Site of Concern" or SOC.

A summary of this information is in Appendix C, Table C-1. Of the 37 sites of potential concern identified from historical reviews and site visits, Barr selected eight SOCs that either meet the ASTM definition of a REC as described in Section 2.0 or are potentially associated with past activities that make them a possible source of a release. In the latter case, if it was determined that there was insufficient information to exclude a site as an SOC, that site was carried forward for additional

investigation. The sites carried forward for investigation as SOCs are summarized in Table 2. As described above, SOCs 4 and 5 being addressed under a separate work plan and investigation.

As discussed in Section 2.0, SOCs 1 through 3 and 8 are related to GOW-era features. SOCs 6 and 7 are related to post-GOW activities associated with the Agricultural Experiment Station. The approach used to identify the SOCs is described in detail below.

1.5.3.1 Evaluation of Sites of Concern

Barr collected information from multiple data sources to identify RECs within the UMA that were then evaluated as SOCs. Each identified SOC (except SOC 4 and 5) will be assessed during the Phase II investigation. Observations and the data collected are summarized in Appendix C. Based on the above information, Barr considered whether an identified site met the ASTM (2005) definition of a REC and would therefore require additional investigation. As indicated above, a REC means that the site exhibits:

> "The presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, ground water, or surface water at the property." (ASTM, 2005)

The areas that did not meet the definition of a REC included eight former farmsteads or residences. Many of these areas were former (pre-GOW) farmsteads that were not used for any GOW or post-GOW activities that would indicate a REC. Potential sources of impacts from these farmsteads would include fuel oil tanks, ash pits, and small farm dumps. Site reconnaissance indicated no evidence of impacts in these areas. Some of the farmsteads were demolished before or shortly after GOW development, although a few remained in use during the post-GOW era as residences or administration buildings. Although it is possible that some of these homes may have used fuel oil before 1940, it is more likely that coal, coke or wood was used for heating (US Census Bureau, 2008). The small quantities of released fuel or ash that might remain at these farmsteads more than 60 years later were judged to be deminimus and not a REC. Mining at the site will be conducted under an Environmental Contingency Plan (ECP) that will include procedures for addressing potential environmental concerns (old wells, tanks, buried farm dumps, etc.) if they are discovered during soil stripping in preparation for mining.

1.5.3.2 Historical RECs Listed as Closed with No Evidence of Remaining Impacts

Post-GOW releases at the UMA appear to be related to petroleum and pesticide storage and management. All underground storage tanks (USTs) were removed from the Agricultural Experiment Station research areas in the UMA in the 1990s. Fueling for vehicles and equipment is now centralized within the Central Services area near the administration building using above ground storage tanks (ASTs). Investigation of the Central Services area (SOC 5) will be described in a separate work plan.

Most of the documented past releases indicated in the EDR (Appendix C) are listed as having been investigated, cleaned up, and closed by the MPCA or MDA. Based on the closure of the petroleum and pesticides sites, it appears that the historical petroleum and pesticide RECs have been adequately addressed with no known residual impacts and do not require additional investigation.

1.5.3.3 Historical RECs with Evidence of Remaining Impacts

Several pesticide releases, including a release near Building 709 in the Southern Complex Storage Buildings and Wash Pads (SOC 6), were investigated, remediated via impacted soil excavation, and closed by the University (Peer 2001) using the MDA remedial action program in the 1990s and through 2002.

Based on discussions with University staff (Girtz, pers. comm., 2008); it is possible that pesticide residues remain in groundwater at SOC 6 and ongoing pesticide storage and pesticide tank loading operations were observed in this area (Appendix C). Based on these circumstances, the historical REC related to pesticide release at the Southern Complex Storage Buildings and Wash Pads is incorporated into SOC 6 (as shown in Table 2) and will be addressed during this investigation.

1.5.3.4 Suspected Dump Areas

Several potential dump areas associated with the former GOW are discussed in Section 2 and are carried forward for investigation. Another suspected dump area with less apparent origins was identified in the Peer Phase I (Appendix A) near the former dairy complex (demolished in 1999). This area is currently a corn field. The source date for this area was an entry in a 2005 Dakota County listing of potential environmental sites. This site was not included when the list was updated based on a lack of definitive site data (Dakota County, 2008; pers. comm.) and a lack of current evidence of releases of hazardous substances or petroleum. There was no evidence of past land alteration apparent from the historical air photographs. However, this area was carried forward as SOC 7 based on scattered fragments of concrete, vinyl and fabric observed in surface soils during site

reconnaissance (Appendix C) and the location of the area near a topographic depression that appears in historical aerial photographs to have been more extensive than is currently apparent.

1.5.4 Groundwater Assessment Work Plan for EIS (Barr, 2008)

The University is preparing an Environmental Impact Statement (EIS) for gravel mining in the UMA. As part of the EIS, various investigations have been initiated including a Groundwater Assessment. The purpose of the Groundwater Assessment is to broadly characterize groundwater conditions and provide information needed to construct a groundwater flow model for the UMA. The flow model will be used to evaluate potential environmental impacts and develop mitigative strategies if necessary related to the mining operations and reclamation. A copy of the Groundwater Assessment Report will be submitted in conjunction with the Phase II Investigation report.

The Groundwater Assessment will include the use of new and existing wells to collect water level and general groundwater chemistry data that will help define and calibrate the flow model. The flow model will include pumping data from all wells that have existing appropriations permits. This includes wells that pump more than 10,000 gallons per day. A summary of the new and existing wells that are proposed for the EIS monitoring network within the UMA is in Appendix D.

Although the well locations for the Groundwater Assessment were not selected to address specific SOCs, groundwater samples from a number of monitoring wells and one existing water supply well (in SOC 3) will be collected during this investigation. Additional monitoring wells may be added to the scope of subsequent Phase II investigations to help define impacts from one or more SOCs and to monitor potential areas of groundwater impact.

2.0 Investigation Areas and Constituents of Concern

This section describes the location of each of the SOCs to be addressed during this Phase II investigation as well as the likely affected media and constituents of concern. The location of each SOC is shown on Figure 10 and the information available on each SOC is summarized in Table 2. The selection of each SOC was based on the presence of one or more RECs identified through the evaluation of historical information and field observations as described in Section 1 and Appendices A through D of this plan. This information provides the basis for the number and location of samples that are in the Phase II Investigation as described in Section 3.

The SOC naming convention is based on the name currently used for the area at UMore Park, rather than historical name. This is intended to simplify communication in clearing utilities and arranging site work with University staff and tenants. In some cases, the past use is included for clarification or when the site has no current purpose specific to University operations. Subsites have been identified where they are either located within a distinct portion of the SOC, have unique constituents of concern, and/or require a different investigation approach from the rest of the SOC.

The majority of the identified SOCs are being investigated for the first time, so the purpose of the investigation of these areas is to determine whether or not a release has occurred. For areas where a past release has already been documented, such as the Southern Complex Storage Buildings and Wash Pads (SOC 6), the purpose of the investigation is to characterize the magnitude and extent of any remaining impacts.

Each SOC is described below along with a summary of the affected media (e.g., soil or groundwater) and anticipated constituents of concern.

2.1 SOC 1—The Former Railroad "Y"

The construction of the GOW began rapidly in 1942, starting with heavy gauge rail service to supply the construction materials for the many buildings and equipment needed for the munitions plant (Peer, 2006). The Railroad Y (Grid Location A2 on Figure 10) was the main railroad junction for material arriving at the GOW. Although there is no information on derailments or any spills or releases in this area, there have been no investigations conducted in this area and railroad junctions are likely areas of rail car accidents and spills.

The Y-shaped area still exhibits a raised rail grade that is relatively less vegetated and higher in elevation than the topographic low areas on either side of the track and in the center of the Y. No tracks or ties are present. The 1949 topographic map (Appendix C) indicates that the lowest portion of the area was in the center of the Y. Other topographic low areas are located on the east and west sides of the rail grade.

Hazardous substances released in this area could have included DNT, DPA, DBP and nitrocellulose. Arsenic-based herbicides may have been used along the rail lines to suppress vegetation and reduce the risk of a grass fire resulting from rail sparking. The depressions around the rail lines would have been areas where released substances would be likely to accumulate either from spills or runoff along the rail corridor. Because a spill on the scale of a rail car would likely accumulate in these low areas and seep through the granular soils to the water table, groundwater impacts will be evaluated.

The specific constituents of concern in this area include:

- **Metals—**metals, particularly arsenic, were likely present in herbicides used at the GOW.
- **Herbicides—**herbicides may have been used for weed suppression along the tracks to prevent rail-sparked fires.
- **Explosives—**DNT, DPA, aniline, and dibutyl phthalate were likely shipped by rail into the GOW through this junction. It is also possible that nitrocellulose may have been shipped through this junction.
- **SVOCs—**lubricants, grease, and polycyclic aromatic hydrocarbons (PAHs) may have been present from the rail cars and rail ties.
- **VOCs—**solvents may have been shipped to the site for various processes.

2.2 SOC 2—Forestry Research/Former GOW Storage

SOC 2 is located along the rail line south of the "Y" described above. This area has not been previously investigated. Records from the GOW-era (Peer, 2006) indicate that a dock platform and several "Excess Material" storage buildings were located just south of Patrol Road (Grid Location C2 on Figure 10). This area is also located south of the former lumber yard that was used for the GOW. The 1945 and 1951 air photos (Appendix C) show several disturbed areas located just west of the buildings along the rail line. A railroad tie, fragments of concrete and vitrified clay pipe were observed in this area by Barr during a field reconnaissance.

The former building locations are currently a corn field with concrete fragments visible in the topsoil. Because the timing of the appearance of the disturbed area on the aerial photos coincided with the commencement of government demolition activities at the GOW, it is a suspected dumping area. The nature of impacts in this area is likely to be related to surface releases or disposal of demolition materials; therefore groundwater sampling is not contemplated at this time. If evidence of a release is found, future groundwater sampling may be necessary.

Constituents of concern for this area are:

- **Asbestos—**present in building demolition materials associated with GOW-era buildings that may have been buried.
- **Metals—**present in ash from burned material including building materials, and from herbicides.
- **SVOCs—**by-products of flashed buildings or burning of materials that were not deemed salvageable or excess tar coatings, and/or railroad ties.
- **VOCs—**parts, motors and other similar items were stored in this SOC during the GOW era.

2.3 SOC 3—Ag Engineering Complex/Former "K" Street Dump Area

The former "K" street dump (Grid Location D3 on Figure 10) was a borrow pit that was apparently excavated for aggregate used for GOW construction and was later used to dispose of GOW demolition debris. The area exhibits uneven topography with visible concrete rubble at the ground surface. A description of the "K" Street dump (Site #5225) prepared by Dakota County (Appendix C) reports that the north end of the dump was encountered during the construction of CR 46.

The adjacent Agricultural Engineering complex is located just west of the suspected dump. The complex is located at the former Kane farmstead. The Agricultural Engineering complex was used for petroleum and pesticide storage; however, no releases were identified based on available records. This area has not been previously investigated. Barr identified a former manure lagoon located west of the dump area as described in Appendix C.

Historical maps (Figure 3) show that the eastern half of the area was serviced by a GOW-era sewer. It is not known whether the sewer was ever operational or which of the buildings, if any, were connected to the sewer.

Based on the materials observed at other GOW-era dumps (Bay West, 2008), likely wastes at this location included demolition debris, rubble, and concrete rebar. Due to the hummocky ground surface, dump materials at this location may have been susceptible to leaching, therefore both soil and groundwater impacts are possible. Constituents of concern are:

- **Asbestos—**commonly found in GOW-era construction materials.
- **Metals—**present in used oil (lead) and switches (mercury); also present in ash or building materials and herbicides.
- **Pesticides/Herbicides—**potentially used during both the GOW and post-GOW eras.
- **SVOCs—i**ndicative of tars used for coating buildings and from the flashing of materials prior to demolition.

2.4 SOC 6—Southern Complex Storage Buildings and Wash Pads

The southern complex houses the plant pathology research area and was also a former farmstead that was demolished shortly after the GOW was decommissioned. There were two documented agricultural spills associated with two buildings in the Southern Complex as described below. Photographs from the area are included in Appendix C.

2.4.1 SOC 6A —Building 706 Pesticide Storage/Wash Pad

Building 706 has been the subject of a previous agricultural chemical spill (Peer, 2001; AgSpill #14388) which was closed in 2002. The interior of the building was not accessible during Barr's site reconnaissance but it is listed by the University as "pesticide storage" (Appendix C). This building also has a wash pad used to clean equipment. Potentially affected media in this area include soil and groundwater. Constituents of concern are:

- **Pesticides/Herbicides—**past storage and spills may have resulted in residual soil or groundwater impacts.

2.4.2 SOC 6B—Building 709 Pesticide Storage/Wash Pad

The southern half of Building 709 is currently used to store pesticides and fertilizers. The northern half of the building is used for a pump and equipment storage. There is a wash basin inside the pesticide storage portion of the building with a disconnected drain. A sewer-pipe riser is capped next to the basin, suggesting that the basin may previously have been connected to a septic system located south of the office building, east of Building 709. A wash pad is located outside of the building

where pesticide tanks are temporarily stored and cleaned. The pad slopes into the grass on the south side of the building.

This area was previously the subject of a spill investigation (Peer, 2001; AgSpill #14389)and the spill file was closed in 2002. However, based on discussions with University staff, it is possible that there are remaining impacts associated with pesticide use. Potentially affected media in this area include soil and groundwater. Constituents of concern include:

- **Pesticides/Herbicides—**past storage and spills may have resulted in residual soil or groundwater impacts.

2.5 SOC 7—Suspected Dump Area Near Former Dairy Complex

SOC 7 is a suspected dump area located near a topographic depression on the west side of the UMA, just east of the former Dairy Complex. Traces of concrete rubble and small pieces of vinyl and fabric were noted in the surface soils during a Barr site reconnaissance. Because the area is a cultivated corn field and there are no obvious indications of former structures, it is possible that observed materials indicate that demolition-type disposal occurred in this area. Media of concern include soil and groundwater. However, because the presence of a dump has not been verified, no groundwater sampling is proposed unless dump material is encountered during trenching that is suggestive of potential leaching to the groundwater.

Potential constituents of concern are similar to other areas of the UMA and include:

- **Asbestos—**may be included in building demolition materials.
- **Metals—**from ash, burned debris, or building materials.
- **SVOCs—**burned wastes may have resulted in releases of oily hydrocarbons and/or PAHs

2.6 SOC 8—Undetermined Use Area West of Patrol Road and South of CR 46

SOC 8 is located adjacent to and west of the patrol road that is visible in the 1945 air photo. Several rounded shapes are scattered in this area and were interpreted by Barr to be hay bales and were initially not included in this investigation. However, based on concerns expressed by Dakota County, these areas were added to the investigation for visual examination. The area is farmland before the 1945 air photograph and in subsequent air photos. There are no records indicating storage or disposal of hazardous substances and past land use appears to be agricultural cropland. The field

reconnaissance conducted by Barr in September 2008 did not specifically visit this area. However driving along the Patrol Road did not reveal any evidence of activity other than the area was planted as a soybean field at that time.

- There are no known constituents of concern for this area. This information will be updated based upon surface and subsurface reconnaissance of the area during the investigation.

3.0 Phase II Investigation Tasks

This section provides an overview of the Phase II Investigation and describes the tasks that will be completed. All work will be performed in accordance with the PHASP for the UMA (Appendix E). Sampling methods and Quality Assurance/Quality Control (QA/QC) procedures are described in the Sampling and Analysis Plan (SAP) which has been submitted under separate cover. An Asbestos Emission Control Plan for work in and around suspected dump sites is presented in Appendix F.

3.1 Overview

The Phase II Investigation is being conducted to determine if past operations within the identified SOCs in the UMA have resulted in releases of hazardous substances or petroleum products to soil and groundwater. The scope of the Phase II Investigation will include sample screening and soil and groundwater sampling and analysis. However, in this early stage of investigation, emphasis will be on observing soil conditions for evidence of a release rather than detailed sampling. Where a release of hazardous substances or petroleum products is identified, the results of this investigation will be used to guide additional investigation necessary to determine the extent and magnitude of the release so that appropriate response actions can be developed consistent with gravel mining and future property use.

3.1.1 Conceptual Model of Pollutant Sources and Distribution

Based on a review of background information, the majority of reported (or potential) releases within the SOCs were the result of leaks or spills onto the ground surface or into the shallow subsurface, less than 10 feet below the ground surface. Because the planned development includes soil stripping to allow mining, the soils will need to be managed on site in an unrestricted manner. In order to have maximum flexibility in managing these soils, a goal of the investigation is to identify areas where there may be concentrations in soil that are above MPCA Tier 1 Soil Reference Values (SRVs). These areas are most likely to occur where there has been a surface spill, fill placement, or dumping. Evidence of these activities is often visible in the subsurface where non-native soil is present. In some cases there may also be obvious visual or incidental odor. In areas where the release may not have obvious visual indication in the subsurface (e.g., metals), analytical sampling will be performed. In order to isolate areas most likely to exhibit contamination, sampling is biased toward topographically low areas that would be most likely to accumulate a release.

Although leaching to groundwater is possible, the depth to groundwater is typically over 50 feet across the UMA. Therefore, the areas most likely to impact groundwater are those where a significant release occurred or those areas where smaller releases may have occurred repeatedly over a long period of time.

As a result of the permeable nature of surface and subsurface soils at the UMA, a hypothetical release would be expected to migrate primarily downward from the source and exhibit limited lateral spreading above the water table. Upon reaching the water table, soluble pollutants would be anticipated to migrate laterally with groundwater flow within the outwash aquifer. Because groundwater flow is anticipated to be to the northeast, groundwater samples will generally be collected within topographic low areas or on the northeastern side of a suspected release area.

3.1.2 Technical Approach

The soil sampling strategy is designed to identify areas of hazardous substance or petroleum releases by the collection of discrete (grab) soil samples from direct push borings and test trenches. In areas of a known or suspected release, surface and near surface soil sampling will be conducted in conjunction with soil headspace screening,.

In areas with no evidence of a surface release, deep soil chemical profiling is unlikely to identify impacts that can not be identified by near surface soil sampling. As such, the sampling strategy used in the Phase II Investigation will focus on shallow subsurface soils and the water table for groundwater. Where there are two separate soil horizons such that the lower surface may represent a former ground surface filled over by subsequent activity, additional samples will be collected so that both the upper and lower surface are characterized for metals, at a minimum. Additional parameters may be added depending on the past land use for a particular SOC and on obvious evidence of contamination. In areas where there is documented evidence or an obvious indication of a release (e.g., odor, headspace, staining), samples will be collected from apparent source material.

Where buried debris or subsurface structures may be present, test trenching will be used to determine the nature and approximate extent of the buried debris. The sampling target for test-trenching will be the soils directly under the debris rather than the waste material itself. Waste characterization will consist of photographs and a detailed description of the types and nature of the materials encountered. Samples will not be collected in the dump debris unless potential asbestos containing material (PACM) or unknown wastes are encountered. Management of PACM and samples of asbestos will be conducted in accordance with the Asbestos Emission Control Plan in Appendix F.

Groundwater samples will be collected during this investigation to broaden investigation coverage and identify release areas that may be missed by surface sampling. If release areas are identified by soil or groundwater sampling, additional investigation may be necessary to identify the source and define the extent and magnitude of the release. Recommendations for additional sampling will be addressed in the Phase II Investigation Report.

3.1.3 Field Methods

This section provides an overview of the field methods that will be used during the Phase II Investigation. A more detailed discussion of field methods and the Standard Operating Procedures is included in the SAP.

3.1.3.1 Surface Soil Samples

The purpose of the surface soil sampling is to characterize soils at the surface or within a buried soil surface in order to identify releases on the current or past land surface (if filling has occurred). Surface soil samples will be collected with hand tools and decontaminated between samples. No VOC or SVOC samples will be collected from surface soils unless there is obvious evidence of contamination or indicated in Table 3.

3.1.3.2 Soil Borings

The purpose of the direct-push soil borings is twofold:

- Allow the collection of soil samples to provide information on geology and hydrogeology including soil type, depth to water (at selected locations), and the presence of soil contamination.
- Allow collection of groundwater samples at the water table.

Soil borings will be advanced using direct-push methods to the target depths in Table 3. Soil samples will be collected continuously in 4 foot cores at each direct-push boring location. Continuous samples will be collected for geologic description and organic vapor screening with a PID. The soil type and textural classification will be recorded on boring logs in accordance with ASTM D2488.

Due to significant target depths and the nature of the native soils at the site, soil borings that extend greater than 20 feet below the ground surface may need to be advanced with a borehole casing.

3.1.3.3 Groundwater Sampling in Soil Borings

Groundwater samples will be collected from selected direct push borings as indicated in Table 3. The groundwater samples will be collected by driving a groundwater sampling probe approximately five feet below the water table, retracting the drill stem to expose a stainless steel screen, and collecting a groundwater sample with a narrow-diameter, tubing/check-valve (Waterra) assembly as described in the SAP. In the event this groundwater sampling technique is not effective, a temporary PVC well screen and casing will be set to collect the sample. The groundwater probe or temporary well will be developed with the tubing/check-valve assembly for up to ten minutes to establish hydraulic communication with the aquifer and minimize sediment in the samples.

The direct-push borings will not be able to collect groundwater samples if the water table is below the bedrock surface. If this is the case, an alternate means of sampling will be proposed to the MPCA and upon approval and contracting, an appropriate drill rig will be mobilized to the site. The nature and type of drill rig and sample device will depend on the depth and type of bedrock encountered.

3.1.3.4 Test Trenching

Test trenches will be excavated by a qualified contractor using a track mounted excavator. Test trenches will be approximately 20 to 50 feet in length; however, actual trench lengths will be determined in the field with the objective of determining the approximate extent of buried debris if possible. The test trenches may also be comprised of sequential and linearly spaced test pits labeled with letters (A, B, C, etc.).

The test trenches will extend vertically through any buried debris and approximately two feet into the underlying native soil if the excavator reach is sufficient and the trench sidewalls can be safely maintained. Each trench will be documented with a description of depth, length, soils encountered and samples collected, as appropriate.

Test trenching near buildings will be used to identify the location of dry wells and assess soil quality. The trenches will be placed immediately adjacent to the building structure but will not extend more than 15 feet along the length of the foundations to maintain the structural integrity of the foundation. Test trench locations will be finalized in the field with consideration to subsurface utilities.

Sampling methods for test trenching will be similar to that described above for soil borings except that samples will be collected from the backhoe bucket. In general, one sample will be collected from selected test trenches as indicated in Table 3.

3.1.4 Sampling Collection Methods

3.1.4.1 Locations

The planned surface sampling, soil boring and test trenching locations target specific locations within the SOCs that have been identified through background data review and site visits. Groundwater sampling locations have been selected to provide groundwater samples in the likely release areas when such areas are known or immediately downgradient from the SOCs based on the anticipated groundwater flow direction (northeast) when the location of the release area is unknown. Sample locations for each SOC are illustrated on Figures 11 through 16. Background locations are shown on Figure 17. The soil and groundwater sampling plan, including sampling locations, targeted sampling intervals and analytical parameters is summarized in Table 3.

3.1.4.2 Depth of Sample Collection

As discussed in the constituent source and distribution conceptual model, soil sampling efforts will focus on surface and near surface soils. Surface soils will be sampled at a target interval of 0 to 6 inches depth at each sampling location. At least one sample from the 0 to 6 inch interval will be collected from each boring and trench for metals analysis and evaluation of impacts from GOW-era herbicide use. Where turf is present the top 2 inches of soil will be stripped away prior to sampling to minimize incorporation of organic matter. If a buried soil horizon is evident in soil borings or test trenches, the lower soil horizon will also be sampled so that approximately one-third of the sample is from above the buried soil and two thirds is below buried surface. Deeper near surface soil sampling depths will entail collecting samples for chemical analysis from the upper four feet of soil at each sampling locations unless otherwise noted in Table 3. Upon retrieval of the initial (0-4 foot) direct push sample core, the upper 6 inches of soil will be discarded (assuming that a surface sample has already been collected at each location). The remainder of the core will be inspected and screened for organic vapors with a photoionization detector. If, based on the initial inspection of the core, impacts from a specific constituent of concern (COC) is suspected, that sample will be containerized first (e.g., if a sample interval exhibits pesticide odors, the pesticide sample containers will be filled from that sample interval). If there is no indication of COCs impacts, soil samples for volatile COCs will be containerized first.

At locations where there is no indication of COC impacts in deeper soils (below the 4 foot depth), no additional samples will be collected for chemical analysis. If evidence of COC impacts is observed in deeper soils, a sample of the impacted soils and, if possible underlying un-impacted soils, will be collected for analysis.

3.1.4.3 Analytical Parameters

Table 3 provides a summary of the analytical parameters planned for each soil and groundwater sample. The analytical parameters for each sample are based on past operations within the SOCs as described in Section 2.0 of this Plan. If additional soil samples are collected based on field observations, the analytical parameters for the additional samples will at a minimum include the COCs defined for the SOC from where the sample is collected.

3.2 Non-Sampling Investigation Tasks

The following preliminary investigation tasks will be implemented in the Phase II Investigation.

3.2.1 Surveying and Sample Locations

All soil boring and test trench locations will be surveyed in the field using Global Positioning System (GPS) methods prior to the investigation. Sampling location information will be provided to the MPCA in accordance with spatial reporting guidance (MPCA, 2006).

3.2.2 Contractor Coordination and Utility Location

Barr staff will prepare plans and specifications and select qualified contractors to perform the drilling and test trench tasks. The subcontractors will arrange a utility location meeting in accordance with State regulations. Barr will attend all onsite coordination meetings including the utility meeting prior to drilling or test trenching.

3.2.3 Well Inventory and Location

The locations of existing water supply wells within the UMA will be surveyed by use of a handheld GPS. The survey will include the collection of information regarding the diameter of the well, its location (e.g., inside pump house), and whether it corresponds to a mapped MDH Unique ID number.

3.3 SOC Investigations

The following section describes the tasks in each SOC investigation and collection of background soil quality data.

3.3.1 SOC 1 – Former Railroad "Y"

SOC 1 will be investigated to determine if past rail operations associated with the GOW resulted in a release of hazardous substances or petroleum products to the soil or groundwater. As described in Section 2.1, likely sources of hazardous substances or petroleum products at this SOC include spills from railcars and incidental chemical use to control vegetation. The sampling locations target topographically low areas where spilled materials would have accumulated at the time of operation. Sampling locations are shown on Figure 11. In addition, a series of surface soil samples will be collected from three transects located at each vertex of the "Y."

Sampling methods at SOC 1 will include surface samples and direct-push soil borings. Surface samples will be analyzed for metals and SVOCs (including PAHs and explosives parameters DNT, DPA, DBP, and aniline. If the SVOC analysis indicates the presence of explosives, subsequent sampling will be conducted for nitrocellulose. Near surface soil samples will be collected from the borings and analyzed for chemical analysis of the COCs listed in Table 3. One soil boring will be continuously sampled to the water table to evaluate subsurface soils, identify the depth to groundwater, and collect a groundwater sample.

3.3.2 SOC 2 – Forestry Research/Former GOW Storage

SOC 2 will be investigated to determine if buried debris exists within the SOC and, if so, whether COCs have leached from the buried debris into the underlying soil. The subsurface debris investigation will be conducted using test trenches. The test trench locations were selected based on a review of historical photographs (showing areas of soil disturbance) and on observed debris during a Barr site reconnaissance (Appendix C). Surface samples will be collected from approximately one-third of the test trench locations. Test trenches locations are shown on Figure 12.

In the event buried debris is not encountered, one sample will be collected from the near surface soils for COC analysis as indicated in Table 3. If buried debris is encountered, samples of native soil underlying the debris will be collected at a rate of one per twenty-five linear feet of test trench. Test pits may be used to identify the extent of buried debris if encountered. Based on field observations, a sample of the debris may be collected for chemical analysis if appropriate.

3.3.3 SOC 3 – Ag Engineering Complex/Former "K" Street Dump Area

SOC 3 will be investigated to determine if buried debris exists within the SOC and, if so, whether COCs have leached from the buried debris or lagoon residue into the underlying native soil. The investigation for the dump and lagoon areas will be conducted via test trenching. The test trench

locations were selected based on observations made during a Barr site reconnaissance and the report of buried debris encountered during the construction of County Road 46 to the north. Test trench locations are shown on Figure 13.

In the event buried debris or lagoon residue is not encountered, one sample will be collected from the near surface soils for COC analysis as indicated in Table 3. If buried debris is encountered, samples of native soil underlying the debris will be collected at a rate of one per twenty-five linear feet of test trench. Test pits may be used to identify the extent of buried debris if encountered. Based on field observations, a sample of the debris may be collected for chemical analysis if appropriate.

Groundwater samples will also be collected in this SOC as the groundwater may have been affected by pesticide releases. A sample will be collected from the existing water supply well (Unique Well Number 207605) located in the central portion of the SOC. Prior to sampling, the field staff will inspect the well for a unique well ID tag and will measure well diameter and depth (if accessible). Groundwater sampling methods are described in the SAP. Additional groundwater samples will be collected from direct push borings as indicated in Table 3

3.3.4 SOC 6 – Southern Complex Storage Buildings and Wash Pad

SOC 6 will be investigated to determine if residual pesticide impacts are present in soil or groundwater. The sampling locations target areas at the outside storage of miscellaneous equipment and equipment wash areas. Sampling locations are shown on Figure 16.

Sampling at SOC 6 will involve direct-push soil borings. Near-surface soil and groundwater samples will be collected for analysis of the COCs as listed in Table 3.

3.3.5 SOC 7 – Suspected Dump Area Near Former Dairy Complex

SOC 7 will be investigated to determine if buried debris is present within the SOC and, if so, whether COCs have leached from the buried debris into the underlying soil. The investigation for debris will be conducted using test trenches. The test trench locations were selected based on observations made during a Barr site reconnaissance. Test trench locations are shown on Figure 17.

A minimum of one sample will be collected from selected test trenches for the COCs listed in Table 3. In the event no buried debris is encountered, the samples will be collected from the near surface soils. If buried debris is encountered, samples of the native soil underlying the debris will be collected at a rate of one per twenty-five linear feet of test trench. Test pits may be used to identify

the extent of buried debris if encountered. Based on field observations, a sample of the debris will be collected for chemical analysis if appropriate.

3.3.6 SOC 8 - Undetermined Use Area West of Patrol Road and South of CR 46

SOC 8 will be investigated with to determine if there is evidence of contamination, filling, disturbed soil or other features that may indicate a potential release or buried debris within this area.

The investigation will be conducted using test trenches. The test trench locations were selected based on locations of the bale-like features observed on the 1945 aerial photograph. Test trench locations are shown on Figure 17.

3.3.7 Background Sampling

3.3.7.1 Soil Metals

A series of surface samples will be collected outside of the UMA SOCs for the purpose of assessing background metals, SVOCs, and pesticide concentrations. The background sampling locations are shown on Figure 18. These data may be combined with samples collected during previous investigations (Bay West, 2008) to develop a statistical prediction limit based on the soil data.

Soil samples will be collected for chemical analysis as shown in Table 3. The soil samples will be collected from the surface soils (0 to 6 inches).

3.3.7.2 Groundwater

Groundwater flow within the UMA is to the northeast. Several groundwater monitoring wells have been installed within the UMA as part of the Groundwater Assessment for the EIS (Barr, 2008). Three of the UMA monitoring wells (MW-B1-001, MW-E2-009 and MW-E2-209) will be sampled for the parameters indicated on Table 3. The groundwater data will be used to monitor ambient water quality data and identify potential off-site sources (e.g., VOCs). Sampling methods are described in SAP.

4.0 Reporting and Schedule

4.1 Phase II Investigation Report

Data collected during the Phase II Investigation will be tabulated and mapped for presentation in the Phase II Report. The Report will summarize the findings of the investigation and recommendations for follow-up investigation activities as necessary. It is anticipated that the location of potential environmental impacts within each SOC will be illustrated with a sample location map and a tabular summary of sampling results.

Soils data will be compared to the MPCA's Tier I and Tier II SRVs, considering the human-soil pathway for residential and industrial chronic risk scenarios (MPCA, 2005). Exposure concentrations will be based on the highest measured concentrations at each sample location. Groundwater samples will be compared to the MDH Health Risk Limits (HRLs) or applicable groundwater criteria. Summary tables will include comparisons to SRVs and HRLs. Exceedences will be indicated in bold typeface.

4.2 Schedule and Timeline

The approximate timeline for the Phase II Investigation is as follows:

- May 1, 2009—Revised Plan submitted for MPCA review.
- May 8, 2009—Plan approved by MPCA Superfund Program.
- May 5, 2009—Preparation of bid documents and contracting.
- May 15, 2009—Phase II field work begins.
- June 1, 2009—Phase II field work completed.
- June 15, 2009—Final laboratory results received.
- July 20, 2009—Phase II Report and recommendations for additional investigation submitted to MPCA.

It is anticipated that MPCA review of this Plan will require about one week. If review requires additional time, the above schedule will be adjusted accordingly.

After the Phase II Investigation described in the Plan is complete, the scope of any additional investigation and/or remediation (if necessary) will be evaluated and discussed with the MPCA. Additional investigation activities will be addressed in a future Plan submittal along with a corresponding schedule.

5.0 References

ASTM, 2005. Standard Practice for Environmental Site Assessments. Phase I Environmental Site Assessment Process. November 2005 ASTM International, 200 Bar Harbor Drive West, Conshohocken, PA.

Barr Engineering Company, 2008. *Groundwater Assessment Work Plan, Resource Document for Environmental Impact Statement, UMore Mining Area, Dakota County, Minnesota*.

Bay West, 2008. *Draft – Final Focused Site Inspection Report, Former Gopher Ordnance Works, Rosemount, Minnesota.*

Bolton & Menk, Inc., 2005. *Empire Township, Dakota County, Environmental Impact Statement (EIS) for Sand and Gravel Mining and Accessory Use.*

Dakota County (MN), 2006. Dakota County GIS Data (GOW_Areas_Operational_Area_AOC_UTM).

Dakota County, 2008. GIS Coverage Showing Well Locations, UMore Park, Dakota County, Minnesota

Dakota County, 2008. Pers. Communication. Telephone call with Steve Scott of Dakota County Department of Environmental Management, regarding GIS database entries. Mr. Scott indicated that some entries were removed from the 2005 database when it was updated. September 2008.

EDR, 2008. The EDR Radius Map Report with GeoCheck and Certified Sanborn Map Report, UMore Park, Rosemount, Minnesota 55068

Girtz Pers. Communication, 2008. Meeting with Gordon Girtz of the University of Minnesota regarding past spill response and remediation locations within the UMA. October 24, 2008.

Jefferds, 1947. Memorandum to War Assets Administration regarding Inspection of Decontaminated Areas, Gopher Ordnance Works, April 28, 1947.

Minnesota Geologic Survey, 1990. *Geologic Atlas, Dakota County, Minnesota (Atlas C-6).*

Minnesota Pollution Control Agency (MPCA), 1998. Risk Based Site Characterization and Sampling Guidance, Draft Guidelines, September 1998.

MPCA, 2005. Risk-Based Guidance for the Soil-Human Health Pathway User's Guide, Tier 2 SRV table, November 2005.

MPCA, 2006. Superfund and Emergency Response Guidance for Collection of Spatial Data, Publication C-S4-02, MPCA 2006.

NOAA Satellite and Information Service, 2008. Monthly Station Climate Summary for St. Paul, Minnesota, http://cdo.ncdc.noaa.gov/cgi-bin/climatenormals/climatenormals.pl.

Peer, 1994. Letter to Mr. Don Milles of MPCA from Thomas McMullen of Peer summarizing previous reports and providing soil and groundwater and SVE system data in support of closure for LEAK #2529, August 30, 1994.

Peer, 2001. *Comprehensive Summary Report and Site Investigation and Corrective Actions* for AgSpill File# 14388, 14389, and 4783, UMore Park, Rosemount, MN. Prepared for the University of Minnesota by Peer Environmental and Engineering Resources, Inc., April 2001.

Peer, 2006. *Phase I Environmental Site Assessment, UMore Park, Rosemount, Minnesota,* Prepared for the University of Minnesota by Peer Environmental and Engineering Resources, Inc.

USACE, 2006. *Preliminary Assessment Report Final 1947 Quitclaim Property, Former Gopher Ordnance Works, Rosemount, Minnesota.*

United States Census Bureau, 2008. Historical Census of Housing Tables -House Heating Fuel, .U.S. Census Bureau, Housing and Household Economic Statistics Division; available at: http://www.census.gov/hhes/www/housing/census/historic/fuels.html

United States Department of Agriculture, 2008. Dakota County Soil Survey, Minnesota, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx