Environmental Construction Contingency Plan
Vacant Property, Highway 280 and Kasota Avenue
St. Paul, Minnesota

Prepared for:
Venture Pass Partners, LLC
Mason Holdings III, LLC

July 2019

Landmark Environmental, LLC
2042 West 98th Street | Bloomington, MN 55431 | Phone: 952-666-2444 | www.landmarkenv.com

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280 Trailer Storage

Property Specific Summary

Prepared for: Venture Pass Partners, LLC & Mason Holdings III, LCC Dated: July 2019

SITE DESCRIPTION AND KEY PERSONNEL

The Property, located northwest of Kasota Avenue and MN-280 in St. Paul, Minnesota, is a vacant lot. The Property location is shown on **Figure 1**.

The Property is currently owned by Stan Koch and Sons Trucking, Inc. The Property consists of 1.668 acres of land that is currently zoned for light industrial use. The Property has never been developed. Historical aerial photographs from 1947 show surface water on the northern half and far-south sections of the Property. Surface water was no longer present by 1953, but visible again in 1966. This fluctuation may be the result of seasonal changes, precipitation or snowmelt. By 1974, the majority of the Property was occupied by surface water. By 1980, fill material appears to have been brought onto the Property because surface water is present on adjacent sites but is no longer present on the Property. The southwestern corner of the Property appears to support a stormwater pond/low-lying area between 1988 and present. The current Property owner, Stan Koch and Sons Trucking Inc., acquired the Property on February 25, 1992 and the Property has been vacant and unused since then.

Previous environmental investigations indicated that the Property supported a portion of the Elm Street Ash dump, which was used for disposal of incinerator ash containing heavy metals and other wastes. Therefore, historic uses on the Property have likely involved the use, storage, and/or disposal of hazardous substances and petroleum products, and the documented presence of impacted fill soils at the Property, likely caused by historic dumping (Elm Street Ash Dump), was identified as a Recognized Environmental Conditions (REC) in the Phase I Environmental Site Assessment (ESA) Report.

Based on the identified REC, a Limited Phase II Environmental Investigation (Investigation) was recommended to further understand the potential for sub-surface impacts related to the planned redevelopment. These investigation locations are shown on **Figure 2**.

The following previous environmental assessments and investigations were conducted at the Property and were summarized in Section 4.8 of the Phase I ESA.

- *Exploratory Soil Borings for Phillips Klein, 280 & Kasota,* prepared by Advance Surveying & Engineering, Co. and dated March 14, 1986;
- *MPCA Property File Evaluation Letter*, prepared by the MPCA and dated August 10, 1995;
- *Phase I Environmental Site Assessment, Kasota Avenue and Highway 280, St. Paul, Minnesota*, prepared by GME and dated August 17, 1995;

- *A Geotechnical Evaluation Report for Stan Koch & Sons Trucking, Proposed Manufacturing/Warehouse Building Northwest of the Intersection of Kasota Avenue and the Southbound Minnesota Highway 280 Entrance Ramp in St. Paul, Minnesota*, prepared by Braun Intertec Corporation (Braun) and dated January 15, 1996;

- *Environmental Profile, Kasota and Highway 280 Saint Paul, Ramsey County, MN*, prepared by EnPro Assessment Corp (EnPro) and dated May 21, 1996; and

- *Log of Boring Sheets and Monitoring Well Details for the Site Located in the Northwest Quadrant of Kasota Avenue and Highway 280 in St. Paul, Minnesota*, prepared by Braun and dated March 27, 1996.

Following the Investigation, Landmark conducted an Additional Investigation to delineate the lead impacts found during the Investigation. As a result, the lead hot spot, as shown on **Figure 3**, was determined to be approximately 15 feet (east-west) by 20 feet (north-south).

If visible or olfactory evidence of contaminated soil, other than previously identified, are observed during earthwork activities related to the project, the following actions will be taken:

1. STOP WORK IMMEDIATELY, SECURE WORKER SAFETY, AND SECURE THE AREA.
2. Contact Landmark—or in their absence— MPCA for further instruction.

Project Role	Organization	Title	Contact Name	Contact Number
Environmental Consultant	Landmark Environmental, LLC 2042 West 98th St. Bloomington, MN 55431	Field Manager	Jerry Mullin	612-810-7979 (cell) 952-666-2415 (office)
		Field Backup	Shannon Russell	763-710-0486 (cell) 952-666-2419 (office)
		Safety Officer	Mark Meier	952-666-2422 (office)
Regulatory Agency	Minnesota Pollution Control Agency 520 Lafayette Road North St. Paul, MN 55155	Duty Officer MPCA	Various Various	651-649-5451 651-296-6300
Future Property Owner	Venture Pass Partners, LLC	Project Manager	Randy Rauwerdink	612-801-4313

ECCP PURPOSE

This ECCP will be implemented in the event that indications of contamination, regulated waste, or other items of environmental concern that require special handling are **unexpectedly** encountered during construction. This Site Specific Summary provides project-specific information and context applicable to the ECCP. Proposed cleanup actions for known cleanup actions are identified in the Voluntary Response Action Plan (VRAP) produced under separate cover.

REDEVELOPMENT PLANS

Redevelopment plans for the Property include constructing a paved surface parking lot for parking semi-trailers. The improvements will include a paved parking lot and driveway, perimeter chain link fencing, site lighting and the construction of a stormwater pond and associated stormwater manhole structures. The stormwater pond is located in the southwest corner of the Property, at Phase II Investigation location LTT-4.

PREVIOUS ENVIRONMENTAL INVESTIGATIONS AND DOCUMENTS

The following previous investigations have been conducted on the Property or portions thereof:

- Phase I Environmental Site Assessment, Northwest of Kasota Avenue and MN-280, St. Paul, Minnesota, prepared by Landmark and dated April 2019;
- Limited Phase II Environmental Investigation, Vacant Property, Highway 280 and Kasota Avenue, St. Paul, Minnesota, prepared by Landmark and dated June 2019; and
- Voluntary Response Action Plan, Vacant Property, Highway 280 and Kasota Avenue, St. Paul, Minnesota, prepared by Landmark and dated June 2019.

CHEMICALS OF CONCERN

The following table summarizes the identified locations of chemicals of concern (COC) that were detected above MPCA unrestricted use criteria.

Area of Concern Location Description	Sample IDs	COCs	Detected Concentration Ranges	Response Action in VRAP
Throughout Property – Soil	LTT-1 through LTT-8	DRO PCBs Debris	89.2 – 1,660 mg/kg 0.37 – 5.5 mg/kg concrete, brick, clay tile, glass, plastic, wood, rubber, slag/coke, ash, metal and styrofoam	Yes
Western portion of the Property – Soil	LTT-5	Lead	1,430 mg/kg	Yes
Western portion of the Property – Soil	LTT-4, LTT-6 & LTT-7	TCE	0.09 – 0.10 mg/kg	Yes
Northwestern portion of the Property – Soil	LTT-5 & LTT-6	Arsenic	5.9 & 10.3 mg/kg	Yes
North-northwestern portion of the Property – Soil	LTT-7	Benzene Ethylbenzene	0.14 mg/kg 2.6 mg/kg	Yes
Southeastern portion of the Property – Soil	LTT-1	Lead	579 mg/kg	Yes

In addition, previous investigations at the Property also documented the presence of other petroleum volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs), which were detected below MPCA unrestricted use criteria.

Unexpected environmental conditions potentially consist of encountering one or more of the following during excavation activities: underground storage tanks (USTs), buried debris containing brick, concrete, wood and materials with potential ACM and other hazardous materials or contaminated soils. Refer to Section 2.0 of the ECCP for procedures for addressing each potential condition. **Appendix A** provides the Action Summary for encountered contaminated soil.

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Appendices

1.0 Introduction

Landmark Environmental, LLC (Landmark) prepared this Environmental Construction Contingency Plan (ECCP) as described in the ECCP Property Specific Summary. Refer to the Property Specific Summary for project details.

This ECCP will be implemented in the event that indications of contamination, regulated waste, or other items of environmental concern that require special handling are unexpectedly encountered during implementation of response actions (RAs) and/or during redevelopment. Proposed RAs for the known cleanup actions are identified in the Voluntary Response Action Plan (VRAP) produced under separate cover. **Appendix A** includes the Action Summary for contaminated soil or other environmental issues encountered.

Considering the planned redevelopment activities described in the Property Specific Summary, this ECCP has been prepared in general accordance with Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup (VIC) Program Guidance Document #10, Site Safety and Contingency Plans and applicable MPCA Petroleum Remediation Guidance Documents included in **Appendix B**.

2.0 Contingency Procedures

Unexpected environmental conditions potentially consist of encountering one or more of the following during excavation activities: underground storage tanks (USTs), buried debris containing brick, concrete, wood and materials with potential asbestos containing materials (ACM) and other hazardous materials or contaminated soil. Procedures for addressing each potential condition are discussed below.

2.1 General Procedures

The MPCA requires the following notification and environmental oversight requirements with regard to the activities covered by this ECCP.

2.1.1 Notification Requirements

In the event that any suspected hazardous substances or unexpected environmental issues are encountered during the excavation activities, work in the area will cease and the work area will be secured. The excavation contractor shall contact Landmark immediately. A representative of Landmark and/or the contractor will then contact the MPCA. Identified releases may need to be reported to the Minnesota Duty Officer within 24 hours.

2.1.2 Pre-Excavation Preparation

The excavation contractor shall coordinate a utility meet and will confirm that all existing utilities have been adequately located and marked.

2.1.3 Underground Storage Tanks

In the event an UST is encountered during earthwork, removal of the UST and excavation of petroleum-contaminated soil, including field screening, soil sampling, and storage/disposal of contaminated soil, will be conducted in accordance with MPCA Petroleum Remediation Program Guidance Documents in **Appendix B**.

The excavation contractor will confirm that the UST (if identified) is isolated from all supply and/or drain piping and that all utilities have been adequately located and marked. To the maximum extent practicable, the excavation contractor will be responsible for removing and containerizing residual contents of the UST prior to removal. All residual UST contents shall be handled in accordance with MPCA and Occupational Safety and Health Administration (OSHA) requirements. This includes, but is not limited to, use of appropriate Department of Transportation (DOT), OSHA, and U.S. Environmental Protection Agency (EPA) drums and containers, use of appropriate fluid transfer devices, use of suitable absorbent materials, use of appropriate blast shields, and use of

non-sparking material handling equipment and hand tools. All laborers handling residual petroleum or hazardous waste products shall be properly trained and in compliance with contractor's Site Safety Plan.

Any UST will be excavated and removed in a manner that minimizes the potential for incidental spillage of residual tank contents during tank removal. Pending cleaning, scrapping, and/or loading of tank for transportation off-site, all tank components will be placed on impermeable sheeting to prevent incidental soil contamination at the Property. In the event that field screening discloses evidence of a petroleum or hazardous waste release from the UST, contaminated soil will be placed onto a minimum 10-mil-thick reinforced polyethylene liner. Contaminated soil will be excavated following the guidance in the MPCA Petroleum Remediation Program Guidance Documents in **Appendix B**. Contaminated soil shall be covered with minimum 10-mil-thick reinforced polyethylene liner to prevent water from coming in contact with the soil.

2.1.4 Transportation and Disposal

In the event impacted soils are disposed off-site for disposal at a permitted landfill, the soils will be transported in strict compliance with all applicable local, state, and federal guidelines and regulations. All soil that exceeds the applicable cleanup criteria will be transported off-site and disposed of at appropriately licensed facilities. The end disposition of all impacted soil transported off-site will be documented in the RA Implementation Report and/or the ECCP Implementation Report.

2.1.5 Buried Demolition Debris

In the event buried demolition debris with potential ACM is encountered during RA implementation and/or redevelopment activities, a representative of Landmark that is an Asbestos Hazard Emergency Response Act-certified and Minnesota Department of Health (MDH)-licensed inspector will be present to guide further excavation and sampling efforts. Subsequent excavation and abatement work will be conducted in accordance with the July 1999 MPCA Asbestos Guidance on Excavation Projects and the Emissions Control Plan in **Appendix C**.

2.1.6 Hazardous Materials or Contaminated Soils

Hazardous materials and/or additional soil containing hazardous substances may be encountered during excavation activities associated with RA implementation and redevelopment. If, based upon visual or olfactory evidence, such materials and/or hazardous substances are encountered; excavation of the impacted area will temporarily cease until Landmark and the MPCA are notified. Specific requirements for the excavation contractor as they relate to contaminated soil excavation may include one or

all of the following: temporary erosion controls; run-on and runoff controls; air emission controls; decontamination facilities; notification procedures; temporary contaminated soil stockpile areas; excavation and staging; and contaminated soil disposal. General requirements are described below.

Soil to be reused offsite will meet the definition of unregulated excess fill as defined in the MPCA's Best Management Practices guidance documents (**Appendix D**). The guidance documents in **Appendix D** provide guidance for cleanup actions and action levels approved by the MPCA including, but not limited to, photoionization detector headspace criteria and sampling frequency requirements.

A contaminated materials staging area (CMSA) will be constructed by placing a minimum 8-mil-thick plastic sheet on the ground and constructing a 6-inch-high soil berm around the perimeter. The plastic will extend beyond the perimeter berm to prevent runoff from and run-on to the CMSA. A minimum 8-mil-thick plastic cover will be placed over the CMSA stockpile. The cover will extend beyond the perimeter soil berm and will be secured and maintained.

If chemical containers or other hazardous items are encountered, they will be individually removed and their condition assessed. If the excavated chemical containers are not in good condition (e.g., severe rusting, structural defects, leaking, etc.) or if uncontainerized hazardous substances are encountered, the materials will be transferred to a new drum or overpack that is in satisfactory condition. These containers will meet the appropriate requirements of DOT, OSHA, and EPA regulations for the associated materials.

Intact chemical containers and repacked materials will be transported to the storage area and placed in roll-off boxes. If appropriate, liquid wastes may be bulk-stored in tanks. The roll-off box will be lined to contain leaks, spills, or accumulated precipitation. The roll-off box will be of sufficient capacity to contain 10 percent of the volume of the drums or the volume of the largest container, whichever is greater. The roll-off box will be covered to prevent collection of precipitation.

After contaminated soil (as determined by field screening tests), chemical containers, and hazardous substances have been excavated from the impacted area; the excavation will be extended in shallow lifts for an additional 1-foot (unless groundwater is encountered). Additional soil from this "over-excavation" will be transported to the storage area and stockpiled separately from the contaminated soil.

Soil samples will be analyzed for the appropriate parameters designated by the Landmark field personnel in consultation with the MPCA staff if necessary, based upon the likely

source of contamination and field observations, according to the MPCA Risk Based Site Characterization and Sampling Guidance, Section 7, which is included in **Appendix E**. The sampling plan of the stockpiled contaminated soil, the stockpiled clean soil, and any containerized materials will be conducted in accordance with the MPCA requirements, after the material and/or contaminated soil has been excavated and the results of the samples collected during the excavation are available.

Following completion of the "over excavation," the excavation contractor will continue RA implementation and/or redevelopment activities. A plan for managing the stockpiled soil (contaminated or clean) and any containerized materials will be prepared and implemented after the results from all of the sampling are available and following MPCA approval. Stockpiles will be inspected daily while project personnel are onsite, and/or after a significant weather event, by a person knowledgeable with the project.

2.1.7 Dewatering

During construction and earthwork activities, if dewatering is needed to manage contaminated groundwater encountered during redevelopment activities, a water discharge permit may be necessary. The water could be discharged to the sanitary sewer with a permit from the wastewater treatment facility or if in the Minneapolis-St. Paul metropolitan area then the Metropolitan Council Environmental Services (MCES) or to the storm sewer with a National Pollutant Discharge Elimination System (NPDES) permit, depending on the concentrations of any potential contaminants in the groundwater. A Minnesota Department of Natural Resource (DNR) Permit for groundwater dewatering may also be necessary depending on the quantity of water. The quantity of contaminated groundwater potentially requiring discharge will also be directly related to the location and depth of the excavations. If dewatering is necessary, action taken will be documented in the RA Implementation Report and/or the ECCP Implementation Report.

2.1.8 Water Wells

In the event water wells are encountered at the Property during RA implementation or during redevelopment activities, a licensed water well driller will be hired to seal the well in accordance with Minnesota Rules Section 4725.3850 Sealing Well and Boring of the Minnesota Rules Chapter 4725 Department of Health, including measuring the length of the well to be sealed, making reasonable efforts (with MDH guidance, if necessary) to remove any obstructions from the well, making proper notifications to the MDH, requesting MDH recommendations on proceeding, ripping or perforating casing if required, and providing responsibility for well abandonment in accordance with Section 4725.3875 Responsibility for Sealing, of the Minnesota Rules Chapter 4725 Department of Health. Any well casing will be removed to a depth of six feet below ground surface

to eliminate any obstacles to future development. In addition, well protection (i.e., protective posts or surface mount) will be removed.

3.0 Reporting

Landmark will inform personnel as appropriate of project status and oversight observations by telephone or via e-mail on an as-needed basis during the project. Documentation and records related to the project will be reported to personnel as appropriate if any ECCP activities are implemented. Following completion of the RA implementation and/or redevelopment activities, a RA Implementation Report and/or ECCP Implementation Report will be prepared.

Figures

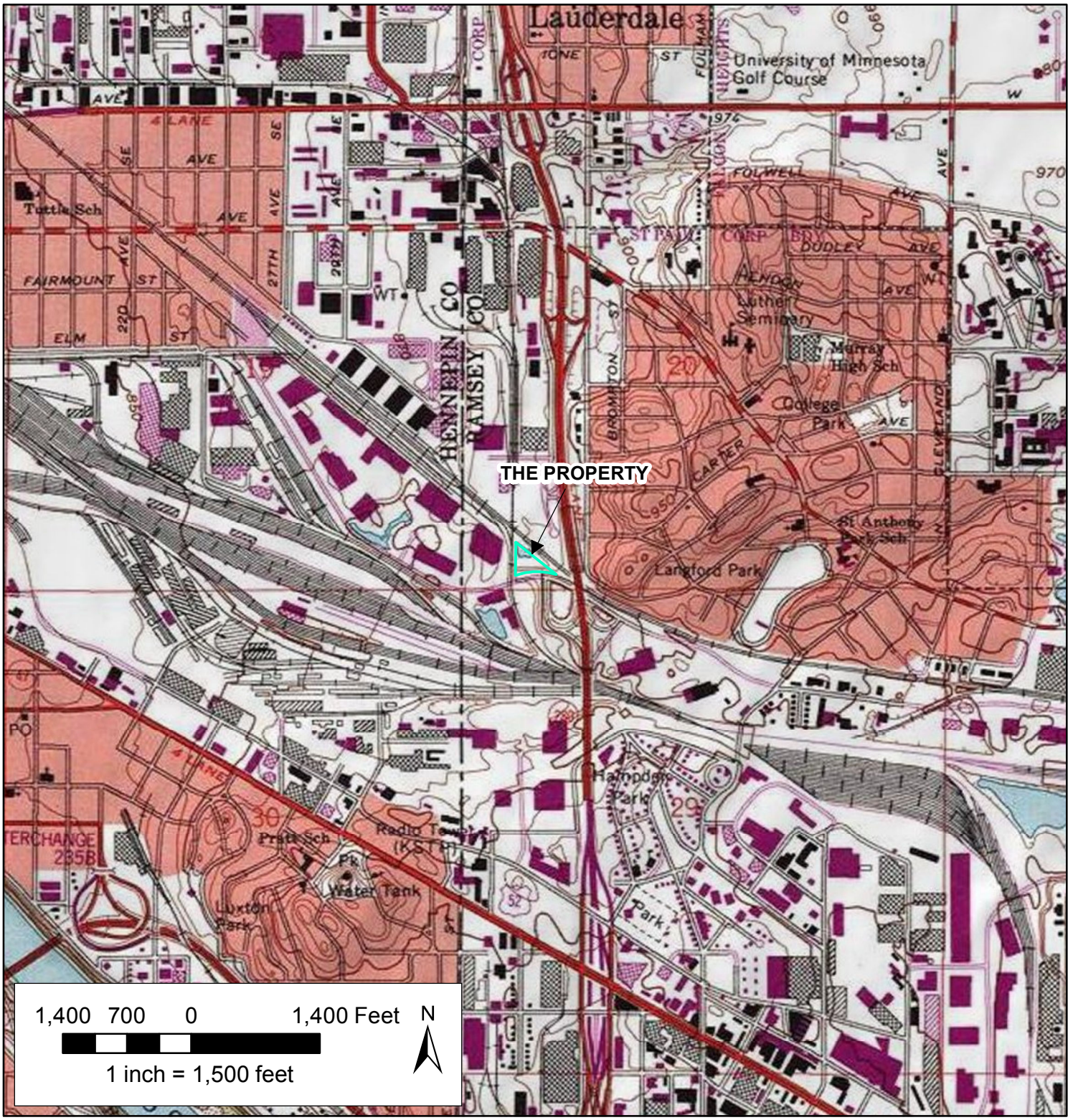

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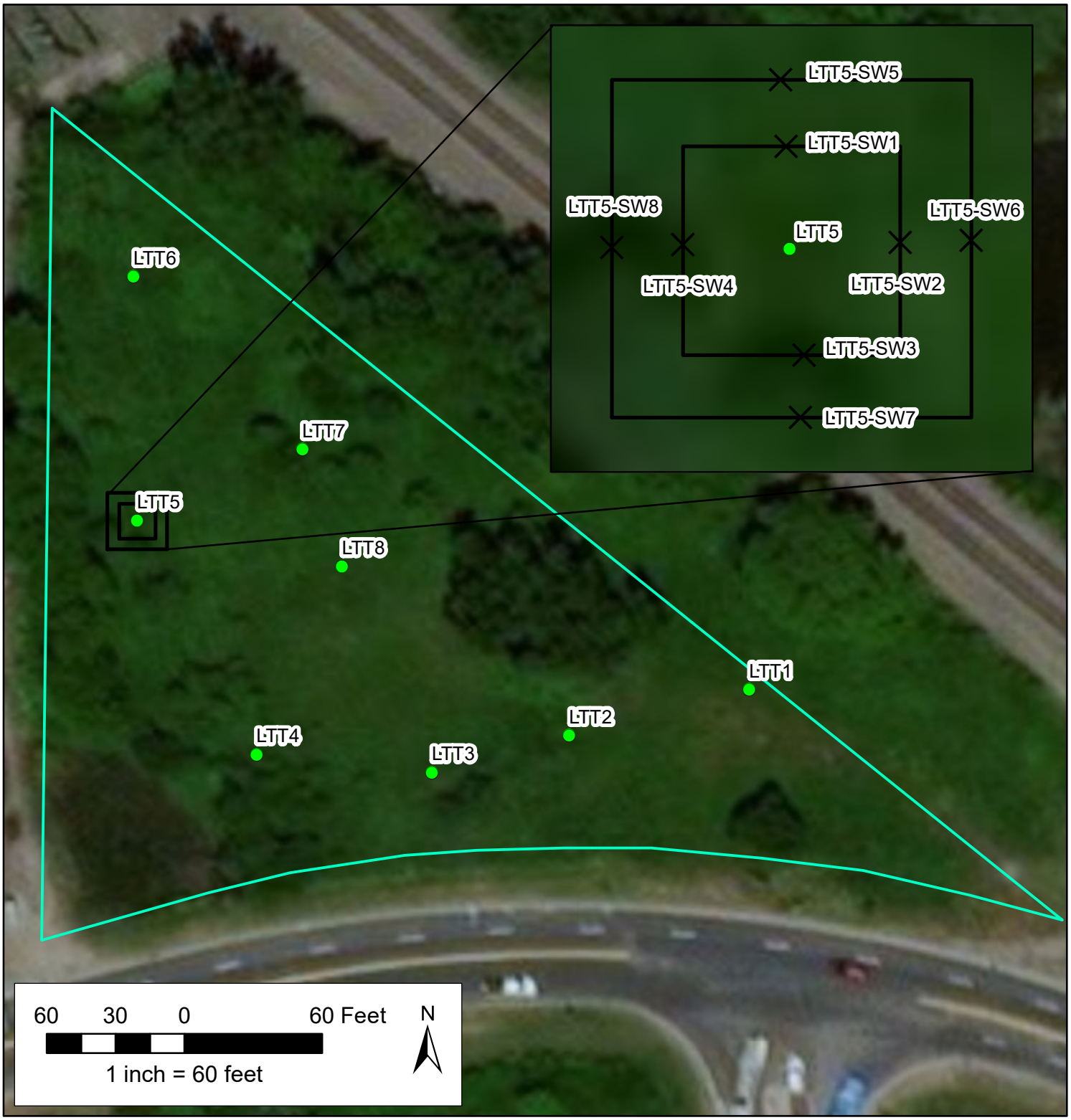
Figure 1

PROPERTY LOCATION MAP
NW of Kasota Ave and MN-280
St. Paul, Minnesota

LANDMARK ENVIRONMENTAL, LLC



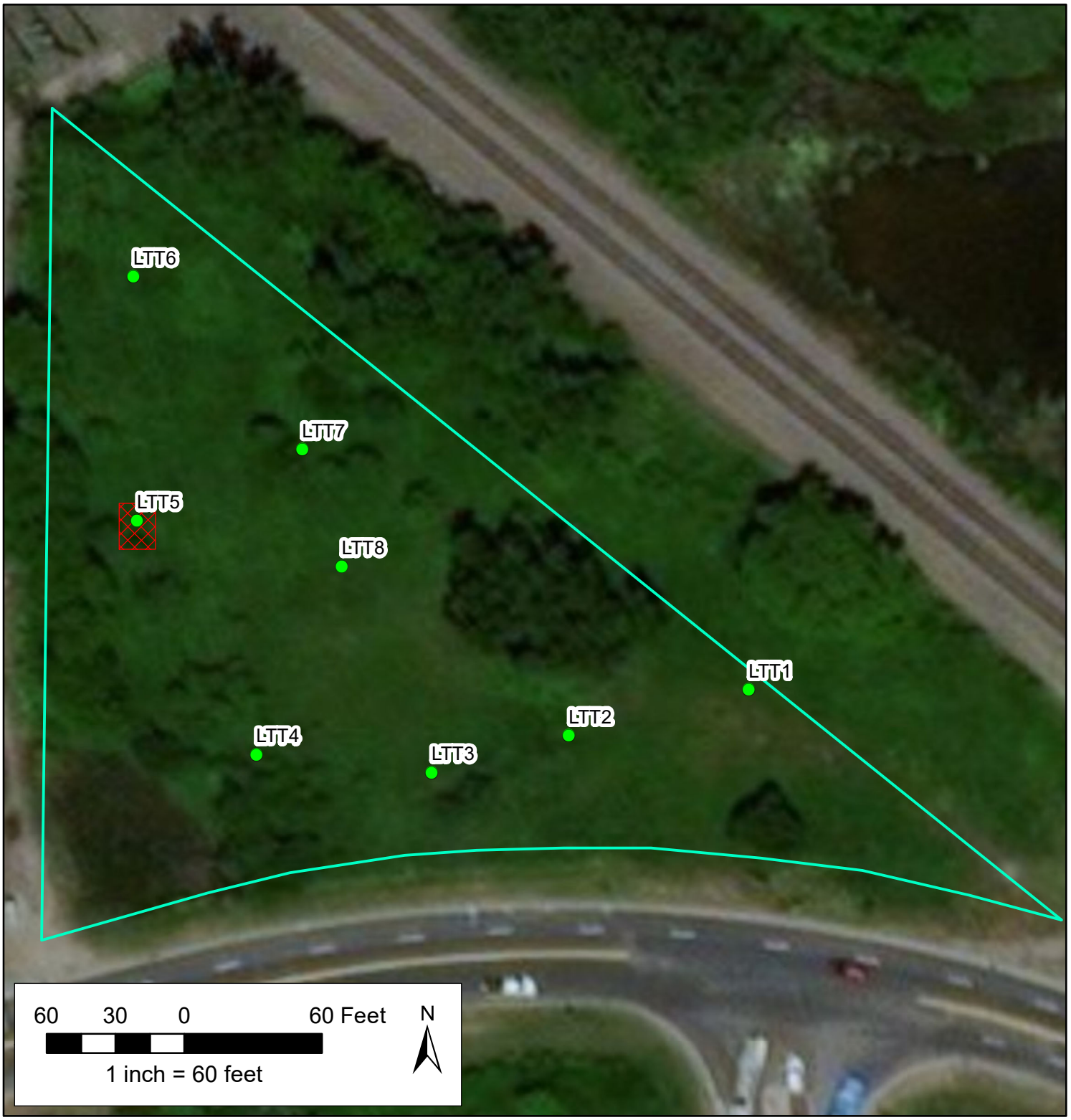
Legend

- Property Boundary
- Tax Parcels
- Test Trench Locations
- Delineation Sampling Locations

Figure 2

PROPERTY LAYOUT MAP WITH INVESTIGATION LOCATIONS
NW of Kasota Ave and MN-280
St. Paul, Minnesota

LANDMARK ENVIRONMENTAL, LLC



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Legend

- Property Boundary
- Tax Parcels
- Test Trench Locations
- Hot Spot 1

Figure 3

PROPERTY LAYOUT MAP WITH HOT SPOT
NW of Kasota Ave and MN-280
St. Paul, Minnesota

LANDMARK ENVIRONMENTAL, LLC

Appendices

Appendix A
Action Summary

Action Summary

If visible or olfactory evidence of contaminated soil (such as discoloration, presence of oils or tars, chemical odors, vapors, chemical containers, potential asbestos-containing material [ACM], or discernable concentrations of debris or non-native fill material such as ash, glass, or slag), other than previously identified and sampled locations, are observed during drilling, grading, excavation or other earthwork activities related to the project, the following actions will be taken:

1. STOP WORK IMMEDIATELY, SECURE WORKER SAFETY, AND SECURE THE AREA.
2. Contact Landmark Environmental, LLC (Landmark) and project manager —or in their absence— Minnesota Pollution Control Agency (MPCA) for further instruction. See the Site Specific Summary for contact details.

Action Summary for Screening, Sampling, and Excavation of Contaminated Soil

Unless otherwise directed by the MPCA, complete the following:

3. Follow field-screening procedures described in the standard operation procedures (SOPs) described in this Environmental Construction Contingency Plan (ECCP) for Excavation Activities and record observations.
4. If evidence of **petroleum-related contamination** is observed, refer to **Appendix B** of this ECCP for sampling and excavation action levels and sampling instructions.
5. If evidence of ACM is observed, refer to **Appendix C** for more details
6. If **non-petroleum-related contamination** is observed, refer to **Appendix D** for the number of samples to collect and the **recommended action levels in the following table** for determining when to collect laboratory samples:

Field Screening Action Level	**Required Sample Analysis**
10 parts per million (ppm) non-methane headspace or greater	Volatile Organic Compounds (VOCs) Method 8260 (preserved with methanol)

Field Screening Action Level	Required Sample Analysis
Discoloration or staining	Polynuclear Aromatic Hydrocarbons (PAHs) Method 8270, Diesel Range Organics (DRO) and Resource Conservation and Recovery Act (RCRA) metals
Potential asbestos-containing material	Refer to Appendix C—**licensed asbestos inspector to perform sampling**
Concentration of debris or chemical containers	PAHs and RCRA metals. Additional parameters will be determined in consultation with MPCA, depending on type of debris or characteristics of the chemicals in the containers.
Oily material	Polychlorinated biphenyls (PCBs); DRO.

At a minimum, ***one soil sample will be collected from each excavation area or type of material*** exhibiting potential contamination based on field screening results (showing the greatest impacts). Follow the pertinent SOPs for soil sample collection.

If analytical results indicate presence of contamination above MPCA appropriate risk-based screening concentrations or cleanup goals discussed in Section 4, the excavated contaminated **soil will be stockpiled, covered, and managed** in accordance with procedures described in this ECCP and in accordance with the excavation and stockpiling procedures and sampling guidelines published by the MPCA.

SOP For Field Screening Soil Samples

Field screening techniques for soils are as follows: (1) Visual Examination; (2) Odor; and (3) Headspace Measurement. The results of these three screening procedures will be used to screen soil samples for possible contamination.

Visual Examination

Visual examination of the soil sample will include noting any discoloration of the soil or visible oiliness, tar, ash or other non-native soil material.

Odor

The chemical odor will be noted while handling the soil sample. Chemical odor will be described as light, moderate, or strong, and will be appropriately described by type, if evident.

Headspace Measurement

MPCA staff recommends the polyethylene bag headspace method described below as the field procedure for characterization of soil contamination. This procedure is consistent with the MPCA's Risk Based Site Characterization and Sampling Guidance, Working Draft, September 16, 1998, Soil Sample Collection and Analysis Fact Sheet #3.22, July 1996.

1. Use a photoionization detector (PID) with a 11.7 eV (+/-) or greater lamp source. Perform PID instrument calibration off site and at least daily to yield "total organic vapors" in volume ppm of a benzene equivalent. Follow the manufacturer's instructions for operation, maintenance, and calibration of the instrument. Keep calibration records. MPCA staff reserve the right to request these records.
2. Use a self-sealing quart-size polyethylene freezer bag. Half-fill the bag with the sample to be screened so the volume ratio of soil to air is equal then immediately seal it. Manually break up the soil clumps within the bag. Note: Soil collected from a split spoon should be transferred to the bag immediately after opening the split spoon; soil collected from an excavation or soil pile should be collected from freshly exposed surfaces.
3. Allow headspace development for at least 10 minutes. Vigorously shake bags for 15 seconds both at the beginning and end of the headspace development period. Headspace development decreases with temperature. When temperatures are below the operating range of the instrument perform headspace development and analysis in a heated vehicle or building. Record the ambient temperature during headspace screening. Complete headspace analysis within approximately 20 minutes of sample collection.
4. Following headspace development introduce the instrument sampling probe through a small opening in the bag to a point about one-half of the headspace depth. Keep the probe free of water droplets and soil particles. (Syringe withdrawal of a headspace sample and injection to an instrument probe or septum-fitting inlet is acceptable; provided the method accuracy is proven by means of test gas standard.)
5. Record the highest meter response. Maximum response usually occurs within about two seconds. Erratic meter response may occur at high organic vapor concentrations or if moisture is present. Note any erratic headspace data.

SOPs For Soil Sample Collection

A variety of samplers (split-barrel, split-barrel with brass liners, piston sampler, backhoe, or shovel) may be used to retrieve soil from sampling locations. Depending on the analysis to be conducted on the soil sample, the soil sample will either be sealed within the sampler (e.g., collecting volatile samples) or the soil sample will be transferred to laboratory-supplied containers. The equipment required to transfer the soil from the sampler to the laboratory-supplied sample containers includes:

stainless steel spoons or scoops and the appropriate personal protective equipment necessary for collection and handling of soil samples as described in the SSP.

All soil sampling equipment will be carefully cleaned before and during soil sampling. All sampling tools including split-barrels, stainless steel spoons and scoops will be cleaned before use and between samples in the following manner: (1) clean with tap water and TSP, using a brush if necessary to remove particulate matter and films; (2) rinse three times with tap water; and (3) rinse three times with deionized water. To prevent sample cross-contamination, the sampler will discard the outer pair of sample gloves and put on a new pair between each sample event.

Collecting Semivolatile Organic Samples

The following procedure applies to the collection of hand-excavated soil samples:

1. Dig to the desired sampling interval, exposing fresh soil surface to sample.
2. Collect a large sample on a shovel or in a bucket auger and bring it to the surface or collect the sample directly from the fresh soil surface.
3. Using a stainless-steel spoon, pack the soil into 4-ounce sample jars.
4. Wipe the jar lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.
5. Cool the sample to approximately 4°C immediately after collection.

Collecting Volatile Organic Samples

The following procedure applies to the collection of hand-excavated soil samples:

1. Dig to the desired sampling interval, exposing fresh soil surface to sample.
2. Collect a large sample on a shovel or in a bucket auger and bring it to the surface or collect the sample directly from the fresh soil surface.
3. Using a stainless-steel spoon, place 10 grams of soil in a laboratory-provided sample container containing methanol (avoid splashing the methanol).
4. Wipe the jar lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.
5. Cool the sample to approximately 4°C immediately after collection

Collecting Metals Samples

1. The metals and cyanide soil samples will be collected from hand samples or core barrel samples and placed into a laboratory-supplied, 8-ounce, wide-mouth glass jar.
2. The sample containers will be filled to at least three-quarters full using a stainless steel spoon or scoop.
3. Cool the sample to approximately 4° C immediately after collection.

Sample Storage

Immediately after samples are collected, they will be placed in a cooler containing ice or ice packs. Samples will be kept cold (approximately 4° C) until receipt at the laboratory, where they are to be stored in a refrigerated area. All samples will be kept secured to prevent tampering.

Appendix B

MPCA Petroleum Remediation Guidance Documents

Excavation of petroleum-contaminated soil and tank removal sampling

Petroleum Remediation Program

This document describes the requirements for excavating petroleum-contaminated soil and for sampling during regulated petroleum tank removal when a release has occurred. General soil excavation requirements are provided as well as requirements for specific circumstances such as tank removal and installation. Sampling is required following tank removal to quantify residual contaminant levels and to determine whether further investigation is needed.

Release Reporting

Detection of any amount of contamination in soil or groundwater must be reported to the Minnesota Duty Officer, even if contaminant levels are lower than the action levels stated below.

Emergency Conditions

If there was a recent release, or there are vapor impacts, drinking water impacts, surface water impacts, free product, or a potentially unstable condition, immediately contact the Minnesota Duty Officer.

Additional Information

Additional guidance on release reporting, release response, and emergency conditions is found in *Reporting of Petroleum Releases*, *Light Non-Aqueous Phase Liquid Management Strategy*, *Recent Releases at Petroleum Tank Sites*, and the *Petroleum Remediation Program General Policy*.

I. General excavation requirements

A. Excavation prior to a limited site investigation

Contaminated soil may be excavated prior to completing a limited site investigation (LSI) in the situations listed below. Otherwise, contaminated soil should remain in place until an LSI has been completed. Identifying receptors, defining the extent and magnitude of contamination, and evaluating risk during the LSI will determine if excavation is appropriate.

1. All contaminated soil meeting any of the field screening criteria listed in Table 1 can be excavated within a maximum of 200 cubic yards, providing that groundwater is not impacted or likely to become impacted. See subsection B below for more details. Prior Minnesota Pollution Control Agency (MPCA) approval is required to excavate more than 200 cubic yards of soil.

Table 1. Field screening criteria

Petroleum product	Soil headspace screening level (ppmv*)	Visual evidence	Petroleum sheen test
Gasoline, ethanol-blended fuel, and aviation gasoline	40 or above	Visual evidence of petroleum staining	Positive sheen test result
Diesel fuel, fuel oil, used or waste oils, jet fuel, kerosene	10 or above		

*ppmv (parts per million by volume)

2. Petroleum-saturated or grossly contaminated soil is accessible such as during tank removal or installation. Excavate up to 200 cubic yards of contaminated soil that is petroleum saturated or grossly contaminated. Use the petroleum sheen test to determine if soil is petroleum saturated. Use soil headspace screening with a photoionization detector (PID) to determine if soil is grossly contaminated. Soil with PID readings of 200 parts per million by volume (ppmv) or above is considered grossly contaminated. Soil headspace screening and petroleum sheen test procedures are described in *Soil Sample Collection and Analysis Procedures*. In certain situations, the site-specific risk scenario may justify excavating more than 200 cubic yards. Please contact the MPCA for approval to exceed the 200–cubic yard limit.

Excavation Limits
The total excavation volume allowed under subsections 1 and 2, applied separately or in combination, cannot exceed 200 cubic yards without prior MPCA approval. This limit is not applicable to subsections 3, 4, or 5, where site-specific circumstances dictate excavation volume.

3. A recent release has occurred. Quick removal of contamination can prevent the expansion of a contaminant plume. See *Recent Releases at Petroleum Tank Sites* for more information.
4. An obvious emergency condition exists where soil excavation is an appropriate interim corrective action. Refer to the *Petroleum Remediation Program General Policy* for more information on emergency conditions, and contact the MPCA for site-specific guidance.
5. Excavation is necessary to facilitate tank system installations (see Section II).

B. Situations requiring a limited site investigation

An LSI is necessary if any of the following situations exist:

1. Contamination cannot be addressed by excavation of 200 cubic yards or less of soil.
2. Groundwater is present in the excavation and has been in contact with either petroleum product or petroleum-contaminated soil, or groundwater contamination is suspected.
3. Contamination intercepts a seasonally high water table (indicated by mottling on the excavation sidewalls) or bedrock.
4. Other impacts are known or suspected (e.g., discharge of contaminated water to surface waters or sewers, vapor impacts to buildings or utilities, etc.).
5. Residual soil contamination meets any of the field screening criteria in Table 1 or has a soil analytical result greater than 100 mg/kg gasoline range organics (GRO) or diesel range organics (DRO).
6. Contaminated groundwater is encountered in post-excavation soil borings (see subsection C below).

C. Post-excavation soil borings

A soil boring(s) is necessary at sites with sandy or silty sand soil (Unified Soil Classification System/American Society for Testing Materials) and where the water table is within 25 feet of the ground surface. The purpose of this boring(s) is to determine whether or not an LSI is necessary. Advance a soil boring directly through each suspected source area (e.g., former tank locations, dispensers, and piping runs) in the following situations:

a. Soil contamination from a suspected source area excavation is between 1 and 100 mg/kg GRO/DRO; or
b. Visual or other evidence of contamination remains in a suspected source area.

Collect and analyze soil samples following the procedures and analytical requirements described in *Soil Sample Collection and Analysis Procedures*. Collect and analyze groundwater samples following the procedures and analytical requirements described in *Groundwater Sample Collection and Analysis Procedures*.

If the boring(s) encounters contaminated groundwater, an LSI is necessary.

If the boring(s) encounters historical contamination that does not intersect the water table and the groundwater sample is not contaminated, an LSI may not be necessary depending on the likelihood of groundwater becoming contaminated.

D. Returning contaminated soil to the excavation basin

When an LSI is necessary, return contaminated soil to the excavation basin **except** petroleum-saturated or grossly contaminated soil as described in subsection A.2 above.

E. Field screening during excavations

All soil samples collected for field screening must be labeled so as to designate the sample type, sample location, and sample depth (see below). All excavation soil sample locations must be shown on a map of the excavation.

Field screening includes completing soil headspace screening with a PID and the petroleum sheen test as described in *Soil Sample Collection and Analysis Procedures*. As excavation proceeds, collect and field screen soil samples frequently, enough to verify the need for soil removal (at least one sample for each 10 cubic yards of soil removed). Label removed samples with the prefix "R", the sample ID, and the sample depth. Accurately show the sample locations on a scaled map. The field technician should carefully document successive PID readings vertically below the source of release, indicating the location and depth of each sample on a map of the excavation. *Example*: R-1(2'), R-1(4'), R-1(6'), R-2(4'), etc. Note: R-1 samples are from the same location but successively deeper.

Following excavation, screen soil samples from the bottom and sidewalls of the excavation, along removed piping runs, and beneath removed dispensers. Collect and label field screening sidewall and bottom samples as discussed in subsection F below.

F. Sampling requirements following soil removal

After the excavation is complete but before returning any soil to the excavation basin, collect soil samples for laboratory analysis to document the contamination remaining in place. Also, in order to document the contamination removed, stockpile soil samples must be collected (see subsection G.2 below). Label soil samples collected for laboratory analysis according to the sample type, location, and depth (see below). All soil sample locations must be shown on a map of the excavation. The map must show site features and the two-dimensional extent of the final excavation footprint at the ground surface, along with final excavation depth contours using a contour interval of 1 to 2 feet. Collect and analyze soil samples following the procedures and analytical requirements described in *Soil Sample Collection and Analysis Procedures* according to the following schedule:

1. **Sidewall samples**. Remove at least one foot of exposed soil prior to collection to ensure collecting a representative sample. Collect sidewall samples at a rate of one sample per 25 linear feet of sidewall; however, a minimum of four sidewall samples (i.e., one from each side) must be collected to document

the contaminant levels remaining in place. Collect samples at the depth interval where the highest contaminant level was detected in the removed soil (i.e., "R" samples), typically near the bottom of the excavation basin. Label sidewall samples with the prefix "S", the sample ID, and the sample depth. Accurately show the sample locations on a scaled map. *Example*: S-1(6'), S-2(8'), S-3(5'), etc.

2. **Bottom samples**. Remove at least one foot of exposed soil prior to collection to ensure collecting a representative sample. Collect bottom samples from the bottom of the excavation basin at a rate of one bottom sample per 100 square feet of bottom area and beneath removed dispensers. Label bottom samples with the prefix "B", the sample ID, and the sample depth. Accurately show the sample locations on a scaled map. *Example*: B-1(7'), B-2(14'), B-3(10'), etc.

   Note: Laboratory analysis to document remaining contamination is not generally required after removing contaminated surface soil as a corrective action (see Section IV).

3. **Groundwater samples**. When groundwater is encountered in an excavation basin, collect one sample per basin to assess groundwater contamination. If obvious evidence of contaminated groundwater exists such as visible or measureable petroleum product on the water, including petroleum sheen, a sample is not required. Collect and analyze groundwater samples following the procedures and analytical requirements described in *Groundwater Sample Collection and Analysis Procedures*.

G. Management of petroleum-contaminated soil after excavation

1. Storage

Stockpile contaminated soil on an impervious surface or on minimum 40-mil plastic. Cover the stockpile at the end of each day with minimum 6-mil reinforced plastic or 10-mil unreinforced plastic. Securely anchor the stockpile cover with clean soil or other suitable material. Remember to obtain local government and MPCA approval prior to moving contaminated soil for off-site storage. Storage at land treatment sites must be in accordance with Minn. R. 7037.0810. Improper storage of contaminated soil may cause an additional release to the environment and result in a reduction in Petrofund reimbursement.

2. Stockpile sampling

Collect and analyze soil samples from representative portions of the stockpile following the procedures and analytical requirements described in *Soil Sample Collection and Analysis Procedures*. Label stockpile samples with the prefix "SP" and the sample ID. *Example*: SP-1, SP-2, etc.

Note: If less than 10 cubic yards of contaminated soil is removed for treatment, soil samples will not normally be necessary if the soil will be land treated, unless the soil is a potential hazardous waste as described in *Soil Sample Collection and Analysis Procedures*.

3. Soil treatment and disposal

Petroleum-contaminated soil may be land treated, composted, thermally treated, or disposed of at a sanitary landfill. There are specific documents detailing the requirements for land treatment and composting. Contact the MPCA is you wish to thermally treat contaminated soil. Soil disposal at a landfill is regulated by the MPCA's Solid Waste Program. Contact the landfill to obtain soil disposal requirements.

See *Thin Spreading Small Quantities of Petroleum-Contaminated Soil* as a treatment option for soil volumes less than 10 cubic yards.

H. Excavation report

Complete a *General Excavation Report* in all cases where petroleum contamination is encountered during an excavation completed prior to an LSI, even if no soil is removed for off-site treatment. If an LSI is not being completed, promptly submit the *General Excavation Report* for MPCA review. If an LSI is being completed, include the *General Excavation Report* as an appendix in the *Investigation Report*. The reporting deadline is

10 months from the date the MPCA issues a *Petroleum Storage Tank Release Investigation and Corrective Action* letter. The MPCA will establish a shorter deadline for high-priority sites.

I. Endangering structures

Do not allow excavations to endanger structures, including buildings, roads, utility lines, etc. Excavations must comply with Occupational Safety and Health Administration (OSHA) standards.

II. Excavation during tank system removals or installations

A. Planning ahead

It is in your best interest to obtain at least two bids on the work before you hire a contractor. By doing this, you will have met the Petrofund bidding requirement should contaminated soil be encountered. Bid forms are available from the Department of Commerce, or call 651-539-1515 (800-638-0418).

Note: Regulated underground storage tanks (USTs) must be removed by an MPCA-certified contractor.

Prior to any tank work, plan ahead for storage and treatment of contaminated soil (see Section I.G). Remember to obtain local government and MPCA approval prior to moving contaminated soil for off-site storage.

Arrange for an environmental consultant with appropriate equipment to field screen soil and collect soil samples for laboratory analysis during and after excavation as described in Sections I and III.

B. Installation or removal of underground storage tanks

Refer to Appendix A for a flowchart on managing petroleum-contaminated soil during UST removals or installations.

1. **Excavation when new UST systems are being installed and:**

   a. **The site is a closed petroleum release site.** If the site is a closed release site, refer to *Assessment of Petroleum Contamination at Closed Sites*.

   b. **The site is an open petroleum release site or contamination is discovered during installation**. Remove and separate contaminated soil meeting any of the field screening criteria in Table 1, up to the volume allowed by Table 2. Screen soil from around any removed tanks, piping, or dispensers. If excavation removed all contaminated soil meeting the criteria in Table 1 and groundwater is not likely to be impacted, collect sidewall and bottom samples from the tank basin, piping, and dispenser areas. Analyze soil samples following the procedures and analytical requirements described in *Soil Sample Collection and Analysis Procedures*.

      If groundwater is likely to be impacted or test pits indicate the volume of contaminated soil remaining after removing the allowable volume based on Table 2 exceeds 200 cubic yards, an LSI is necessary. Do not remove additional soil beyond the volume allowed for the tank installation at this phase of work, unless it is petroleum saturated or grossly contaminated as described in Section I.A.2.

Table 2. Allowable contaminated soil removal during new UST installation

Table 2A		Table 2B	
New tank size (gallons)	For each tank to be installed add: (cubic yards)	Old tank size (gallons)	For each tank to be removed subtract: (cubic yards)
550	30	550	3
1,000	40	1,000	5
2,000	70	2,000	10
3,000	90	3,000	15
4,000	110	4,000	20
5,000	130	5,000	25
6,000	140	6,000	30
8,000	170	8,000	40
10,000	210	10,000	50
12,000	240	12,000	60
15,000	260	15,000	75
20,000	320	20,000	100
25,000	400	25,000	125

Note: For new pipe trenching allow one-third (0.33) cubic yard for every one (1) linear foot of contaminated trench.

Example 1: Two 10,000-gallon tanks are to be installed in the old tank basin, where one 4,000-gallon tank and one 6,000-gallon tank will be removed.

(210 + 210) - (20 + 30) = 370

Up to 370 cubic yards of contaminated soil may be removed.

Example 2: Two 10,000-gallon tanks are to be installed in the old tank basin, where one 4,000-gallon tank and one 6,000-gallon tank will be removed. Test pits indicate the removal of an additional 130 cubic yards of petroleum-contaminated soil would remove all the soil contamination meeting the field screening criteria in Table 1 and groundwater impacts are not likely.

(210 + 210) - (20 + 30) + 130 = 500

Up to 500 cubic yards of contaminated soil may be removed.

2. Excavation when USTs are removed but new tank installation will not occur

If the site is a closed petroleum release site, refer to *Assessment of Petroleum Contamination at Closed Sites*. If the site is an open release site or a newly discovered release, refer to Section I of this document.

C. Excavation when upgrading, installing, or removing aboveground storage tanks

Excavation requirements at AST sites are similar to those for UST sites. The main difference is that contaminated surface soil at AST sites often occurs at loading and transfer areas, valve locations, piping runs, and from tank releases. Contaminated surface soil can pose a risk to surface water, groundwater, and direct human contact and requires corrective action. Except for the site-specific situations listed in Section I.A and subsection 1 below, contaminated soil should remain in place until an LSI has been completed.

For additional guidance, refer to *Frequently Asked Questions (FAQs) about Investigation and Remediation of Above-Ground Storage Tank Facilities*.

1. Excavation when upgrading or installing AST systems

If contaminated surface soil (meeting field-screening criteria in Table 1) is encountered during an AST upgrade or new system installation, you may remove up to two (2) feet of contaminated soil in the following areas:

a. below the footprint of the new AST containment berm
b. below piping, dispenser areas, and loading and transfer areas

If the contaminated soil encountered appears to pose a human or environmental risk and the upgrade or installation will make the soil inaccessible, additional removal beyond the limits stated above may be appropriate prior to an LSI. Obtain prior MPCA approval before excavating beyond the stated limits.

If contaminated surface soil exists in areas of the site other than those listed above, removal or other corrective actions will probably be necessary but should wait until an LSI has been conducted. Soil removal prior to an LSI may be conducted if excavating up to 200 cubic yards completely addresses the release and eliminates the need for an investigation at the site, as described in Section I.A.1.

Contaminated Surface Soil

Excavating contaminated surface soil when upgrading or installing AST systems should not be confused with excavating contaminated surface soil when completed as a corrective action (Section IV). Excavation during an upgrade or installation occurs before an LSI, with removal criteria based solely on field evidence (Table 1). When addressing a release by excavation alone during an AST upgrade or install (Section I.A.1), field screening and soil sampling are required as described in Section I.

Contaminated soil must be managed in accordance with Section I.G.

2. **Excavation at the time of AST decommissioning**

   Refer to Section I to determine if excavation alone will adequately address the release or if an LSI will be required.

III. Soil sampling requirements during tank or tank system component removal

The following requirements apply when there is evidence of a release from a regulated tank system. For sampling requirements when there is no evidence of a release, refer to *Site Assessment for Underground Storage Tanks With No Apparent Contamination* and *Out-of-Service Above-Ground Storage Tank Systems*. The requirements below are in addition to the sampling requirements described in Section I.F, which include excavation sidewall and bottom sampling.

Unregulated Tanks

The MPCA strongly encourages owners of unregulated petroleum tanks to follow the sampling requirements described in this section when there is evidence of a release at the time of removal. Soil sample results may be used to justify not requiring a costlier site investigation when a release has occurred. Petroleum release reporting requirements apply to all tanks regardless of their regulation status.

A. Sample collection requirements

Collect soil samples for soil analysis according to the requirements in Tables 3 and 4. Collect samples following the methods and procedures described in *Soil Sample Collection and Analysis Procedures*. Note: AST sampling is required in any circumstance when a release has occurred or visible contamination is present, including tank facility upgrades and tank decommissioning.

Table 3. Underground storage tank sampling requirements

Sample location	Sampling specifics
Tanks	
One tank, any size, in an individual tank basin	two samples; one sample directly below each end of the tank
More than one tank, less than 10,000 gallons, in a single tank basin	one sample directly below the center of each tank
More than one tank, 10,000 gallons or larger, in a single tank basin	two samples; one sample directly below each end of each tank
Tank system components	
Dispensers	one sample below each removed dispenser
Leaking pipes	one sample below each suspected point of release, or every 20 feet if the release point is unknown

Collect any additional samples needed to adequately characterize the excavation(s) as described in Section I.E.

Table 4. Aboveground storage tank sampling requirements

Sample location	Number of samples	Sampling specifics
Tanks (type and size)		
Vertical tank up to 15-foot diameter	one sample	2 feet below the center of the tank
Vertical tank greater than 15-foot diameter	divide tank bottom surface area in square feet by 113 square feet and round to the nearest whole number (see example below*)	2 feet below the tank, evenly spaced
Horizontal tank up to 10,000 gallons	one sample	2 feet below the center of tank
Horizontal tank greater than 10,000 gallons	two samples	2 feet below each end of the tank
***Example:** 27-foot diameter tank: 573/113 = 5.07. Round to the nearest whole number, 5. Five soil samples are required.*		
Tank system components		
Transfer area(s)	one sample in each area if there is more than one transfer area	2 feet below the loading rack
Leaking pipes[1]	one sample below each suspected point of release, or every 20 feet if the release point is unknown	2 feet below the sampling location
Visible contamination	one sample from each distinct stained area	submit sample from the most heavily stained soil

Collect any additional samples needed to adequately characterize the release(s).

[1] Field screen soil two feet below the following areas: pipefittings, joints, and any other area where there is evidence of a suspected release from the piping.

B. Analytical requirements

Analyze soil samples following the procedures and analytical requirements described in *Soil Sample Collection and Analysis Procedures*. All analytical requirements must be met, including volatile organic compounds (VOCs), as well as metals and polychlorinated biphenyls (PCBs) when applicable to the product type.

IV. Excavation as corrective action after a limited site investigation

Soil excavation can be an appropriate corrective action to address actual or potential impacts where risks are high (e.g., drinking water or surface water impact, vapor intrusion, or direct human contact). Design, implementation, and reporting of soil excavation as a corrective action are described in *Corrective Action Design and Implementation*. When soil is excavated as a corrective action after a limited site investigation, the results are reported in a *Corrective Action Excavation Report*.

Two scenarios for excavation as corrective action following a limited site investigation include: excavation of a light non-aqueous phase liquid (LNAPL) body and excavation of contaminated surface soil. The general excavation requirements for field screening, soil sampling, and management of petroleum-contaminated soil described in Section I are typically applied to these two scenarios with exceptions noted below.

A. Excavation of an LNAPL body

Excavation of an LNAPL body can be a cost-effective method for reducing or eliminating long-term risks if the LNAPL body is accessible given depth, soil types, groundwater occurrence, and the absence of obstructions such as buildings or utilities. Excavation of the LNAPL body can result in nearly complete removal of the contaminant source mass and, depending on the site-specific risk scenario, subsequent site closure. Source removal by excavation should be considered as an option when remediation is necessary.

Field screen overburden soil as it is removed to assure that no portion of it is contaminated with LNAPL. In addition, screen soil near the lateral and vertical extents of the LNAPL body to confirm the final excavation extent. Screening can be accomplished using direct evidence of LNAPL, including visual observation for staining and sheen and/or use of the petroleum sheen test. Soil headspace screening may be used to pre-screen soil, but positive detections should not be considered sufficient evidence of LNAPL impacts. If soil headspace is used to pre-screen soil, LNAPL impacts should be confirmed using the other, more direct methods. The MPCA will consider the use of other screening methods (e.g., ultraviolet black box, mobile laboratory) on a case-by-case basis. Contact the MPCA for approval to excavate beyond the approved extent or to exceed the approved volume.

Remove and segregate all LNAPL-impacted soil for treatment or disposal. Collect final excavation sidewall and bottom samples for laboratory analysis as described in Section I unless the excavation is being completed solely to address LNAPL migration risk. Re-use clean overburden soil to backfill the interval from which it was originally removed and import clean fill to backfill the interval from which the targeted LNAPL-impacted soil was removed. If the LNAPL body is present in fine-grained soil, imported fill should consist of fine-grained soil.

See *Corrective Action Design and Implementation* for additional considerations regarding LNAPL body excavation design and implementation.

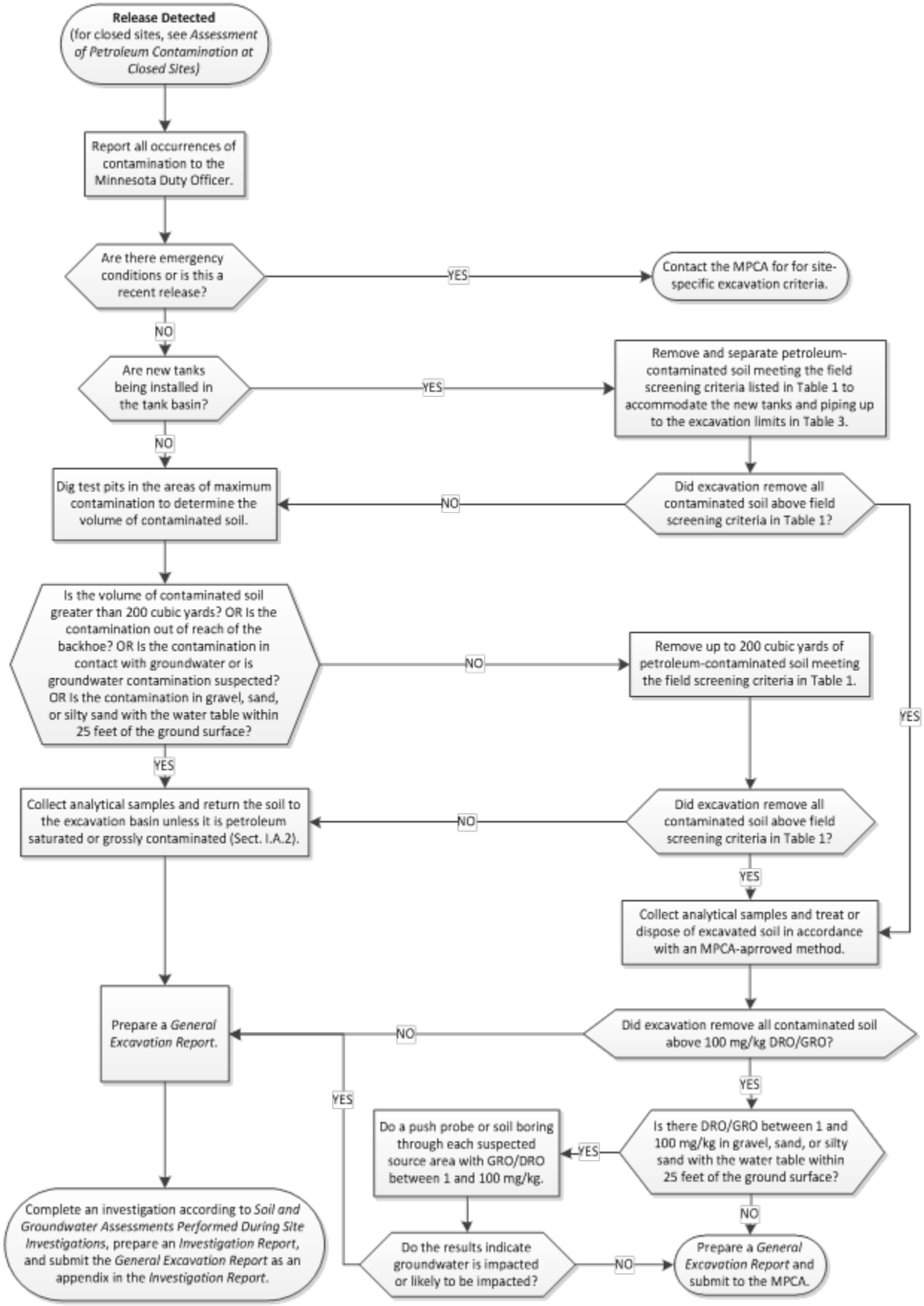
B. Excavation of contaminated surface soil

Contaminated surface soil is excavated following an approved corrective action design based on petroleum sheen test and soil analytical results. Field screening during surface soil excavation is generally limited to the petroleum sheen test. Screen soil at the edges of the approved excavation extent using the sheen test to determine if additional excavation is necessary. Contact the MPCA for approval to excavate beyond the approved extent or to exceed the approved volume.

Post-excavation soil sampling is not required to document contamination remaining in place after a surface soil excavation. Sampling of the removed soil, however, may be required prior to soil treatment or disposal approval. Backfill excavated areas with clean fill to restore the site to its original surface grade.

See *Risk Evaluation and Site Management Decision at Petroleum Release Sites* for additional information regarding the contaminated surface soil pathway. Refer to *Soil and Groundwater Assessments Performed During Site Investigations* for information on completing a surface soil assessment.

Appendix A. UST removal/installation flowchart



Appendix C

MPCA Asbestos Guidance on Excavation Projects
Emissions Control Plan

Minnesota Pollution Control Agency

Metro District, North and South Districts, Regular Facilities Section

Asbestos Guidance on Excavation Projects

Air Quality/Asbestos Program/#4.03/July 1999

This excavation guidance document is for excavation/construction projects that involve demolition debris, solid waste or other materials contaminated with asbestos-containing materials (ACM) and/or asbestos-containing waste materials (ACWM) that are excavated or otherwise disturbed during the project. This document does not address those activities that are related to a demolition project. If you want information related to building or structure demolition please contact the Minnesota Pollution Control Agency (MPCA) asbestos team at the number below.

The excavation of any materials that are contaminated with ACM is governed by 40 Code of Federal Regulations (CFR) pt. 61, subp. M, also known as the asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP).

The regulatory framework of the asbestos NESHAP for excavations is as follows:

1. The definition of a "Facility" includes Inactive Waste Disposal Sites.
2. An Inactive Waste Disposal Site is defined as a site where ACWM has not been added for one year.
3. Renovation means the altering of a "Facility" in any way, which includes the excavation of an inactive waste disposal site.
4. Projects that involve excavation or disturbance of demolition debris, solid waste or other materials contaminated with ACM and/or ACWM in an inactive waste disposal site are renovations and are subject to the asbestos NESHAP. For these projects, the owner(s) and operator(s) of the property and the project should determine the extent of the contamination in relation to the material to be excavated or disturbed in order to assure that the project is conducted in compliance with the asbestos NESHAP.

a. Thoroughly inspect the area to be excavated or disturbed for the presence of asbestos. In an excavation, this means test pits almost exclusively as soil borings are too limited. Determine what quantity of demolition debris with ACM mixed in is present or expected to be present. This determination can be made from the test pits or other information in connection with physical observations. The sampling and testing of suspect building materials for asbestos must be performed by an Asbestos Hazard Emergency Response Act (AHERA) certified and Minnesota Department of Health (MDH) licensed inspector. The testing of materials for asbestos must be of discrete layers or products.

Minnesota Pollution Control Agency, 520 Lafayette Road North, St. Paul, Minnesota 55155-4194
(651) 296-6300, toll-free (800) 657-3864, TTY (651) 282-5332 or (800) 657-3864

Soil testing for asbestos may need to be performed if friable ACM materials are identified in an area.

b. Determine the extent of contamination - all demolition debris and ACM is considered Regulated Asbestos-Containing Material (RACM) at this point. The contamination may be limited to specific areas of the excavation or of the demolition debris. This will have a significant impact on the controls needed throughout the project and is critical. Non-contaminated areas could potentially be handled much differently than contaminated areas.

c. All types and if possible sources of RACM must be identified. This will impact the types of controls and remediation considered and the level of risk associated with the RACM.

d. Phase I, As-builts, Sanborn Insurance Maps, Aerial Photographs, City Utility or Inspection Records, etc. may all be very helpful in determining the type of structure disposed of, the timeline of the filling operation, the location of foundations, and other information.

5. If the project is subject to 40 CFR 61.145, you must now hire a licensed asbestos contractor and follow the asbestos NESHAP renovation regulations as follows:

   a. Submit a Notification of Intent to Perform an Asbestos Abatement Project (Notice) to the MPCA. The Notice must include Facility information, owner/operator information, emission control procedures, disposal location, and other information. The Notice includes a ten-working day notification period for MPCA review and processing.

   b. Emission Control requirements of 40 CFR 61.145 must be met. Including the adequate wetting of the excavated material and no visible emissions from the RACM. The area where RACM abatement is being performed must be cordoned off and asbestos warning signs must be clearly visible at all entrances or exits.

   c. Waste handling provisions of 40 CFR 61.150 must be met. It includes the following:

      i. adequately wet

      ii. polyethylene lined and covered trucks or containers.

      iii. proper manifesting, waste generator label, and warning signs used.

   d. Disposal at a site operated in accordance with 40 CFR 61.154. An “approved” Landfill that is permitted by the MPCA to accept RACM.

6. The RACM removal project is completed after all the RACM is removed and a visual inspection is performed by the licensed asbestos contractor or an AHERA/MDH certified inspector. In an excavation, this would be for the affected area where RACM was removed. Any RACM not disturbed will not need to be inspected.

If RACM is identified and is not scheduled for excavation, then other portions of the asbestos NESHAP may apply regarding deed recording or cover requirements depending on the information supplied regarding the project and the potential for future RACM exposure. The ability to rework the excavation project to disturb as little RACM as possible will help with disposal and handling costs, avoid the potential for airborne asbestos fibers, and avoid any further liability from the RACM due to handling or off-site disposal. In some instances, institutional controls for the RACM being left in place will be sufficient to ensure that the RACM is safe. These controls may include deed notification or restrictions.

The owner/operator definition of the asbestos NESHAP includes anyone who “... owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition operation or both.” This means that any party or person that meets the above definition is potentially liable (responsible) for compliance with the asbestos NESHAP throughout the renovation. On an excavation project an operator could include the general contractor, environmental specialists, or excavation contractor and the property owner.

The experience of the MPCA in asbestos-contaminated demolition debris is that buildings that were demolished years ago did not routinely have the asbestos-containing materials abated and therefore the ACM is mixed in with the demolition debris. The efforts that you make in examining

and delineating the extent of the contamination will facilitate your development of a mutually acceptable work plan for proper handling of the contamination in your excavation or development project. The ability of all parties to be creative, flexible, and consistent, will ensure that the contamination is properly addressed and that any potential release of asbestos fibers into the air will be eliminated.

As part of the MPCA's and the asbestos NESHAP's risk-based, environmental impact approach to site cleanup and remediation, eliminating the potential for asbestos fibers to become airborne during the project should be the guiding factor in deciding which remediation method is used. The project should utilize the least intrusive means to handle the RACM and the best control methods available. These principles should guide you in determining the best remediation approach to your project.

Some examples of creative ideas used to remediate RACM contamination on excavation projects include:

1. Use of a staging area to place suspect contaminated materials for later sorting or disposal which allows the excavation to proceed without constant mobilization for off-site disposal and other asbestos NESHAP requirements.
2. Reworking the project to avoid to the greatest extent possible the disturbance of materials thought to potentially contain RACM.
3. Screening of RACM depending on the use of the screened material, types of RACM, screening test results, condition of the material, etc.
4. Dynamic compaction to get desired engineering of the area for building footings. This would require a deed restriction but avoids any handling and off-site disposal costs.

As a policy, the MPCA wants to avoid wherever possible the creation of inactive asbestos waste disposal sites. The disposal sites would require deed notation and restrictions and are not always a final solution. Alternatives to standard off-site disposal of the RACM must be approved by the MPCA on a case-by-case basis.

This guidance document is not intended as a substitute for reading the rules or regulations and making your own independent determination of its applicability to your excavation project. Examples in this guidance document do not represent an exhaustive listing of types of materials or projects to which the rules or regulations might apply.

MPCA Website: http://www.pca.state.mn.us

Appendix D

MPCA Best Management Practices for the Off-Site Reuse of Unregulated Fill

MPCA Program Management Decision on Regulated Fill

Best Management Practices for the Off-Site Reuse of Unregulated Fill

Remediation Division

This document defines **unregulated fill** and provides guidance from the Minnesota Pollution Control Agency (MPCA) Remediation Division regarding Best Management Practices for its off-site reuse.

Off-site reuse of excess soil as fill or aggregate is a common practice at many development and road construction projects. If no known or potential sources of contamination are identified during environmental due diligence and subsequent field observations, then sampling of excess soil for laboratory analysis is not necessary. However, when excess soil originates from a site with known or potential sources of contamination, characterization of the soil is warranted prior to off-site reuse in order to ensure the protection of public health and the environment.

If contamination is detected in the soil, the unregulated fill criteria and best management practices described herein provide a framework for making good decisions about the off-site reuse of the soil. If the soil does not meet the criteria for unregulated fill, the soil should be managed or disposed of in accordance with applicable regulations.

Definition of unregulated fill

Unregulated fill, for the purpose of this guidance, is defined as excess soil in which a release of contaminants has been identified at concentrations less than the MPCA's most conservative risk-based values (see complete criteria on the next page). Thus, the identified contaminants in the fill are present at concentrations that are not of regulatory concern to the MPCA. Unregulated fill is not a solid waste.*

Exclusions

1. Some excess soil and other material generated at a redevelopment site is regulated as either solid or hazardous waste and must be managed according to applicable solid or hazardous waste laws, including:
   - Soil that is characteristically hazardous or contaminated due to a release of a listed hazardous waste, as defined in Minn. R. ch. 7045. Such soil must be managed in accordance with the requirements of the MPCA's Resource Conservation and Recovery Act (RCRA) program.
   - Waste material such as salvaged bituminous, crushed concrete, bricks, fly ash, etc. proposed to be reused as fill. The beneficial reuse of solid wastes is governed by Minn. R. 7035.2860. Information regarding the beneficial reuse of solid wastes can be found on the MPCA's website at http://www.pca.state.mn.us/waste/sw-utilization.html.
2. The management and reuse of dredged material may be regulated by permit or subject to other regulations. Information about the management of dredged materials can be found on the MPCA's website at http://www.pca.state.mn.us/water/dredgedmaterials.html.

**If sent to a permitted landfill for disposal, unregulated fill may be subject to a solid waste tax.*

Criteria for unregulated fill

Unregulated fill is excess soil that meets all of the following field screening and contaminant concentration criteria:

- free from solid waste, debris, asbestos-containing material, visual staining, and chemical odor
- organic vapors less than 10 parts per million, as measured by a photoionization detector (PID)
- for petroleum-impacted soil, less than 100 mg/kg diesel range organics (DRO)/gasoline range organics (GRO)
- for contaminants detected in soil, less than the MPCA's Residential Soil Reference Values (SRVs) and Tier 1 Soil Leaching Values (SLVs)*

**Naturally-occurring concentrations of some metals, such as arsenic, selenium, or copper, sometimes exceed the SRV or SLV. Such soils are not considered impacted in the absence of a contaminant source or other field or laboratory indications of contamination.*

A list of current SRVs can be found in the MPCA's Risk-Based Guidance for the Soil-Human Health Pathway. A list of current SLVs can be found in the Risk-Based Guidance for Evaluating the Soil Leaching Pathway. Both documents can be found at http://www.pca.state.mn.us/cleanup/riskbasedoc.html. For contaminants detected in soil that do not have established SRVs or SLVs, additional evaluation may be needed to determine whether the soil can be considered unregulated fill.

Some detections of DRO in soil may stem from the presence of natural organic material or non-petroleum contaminants in the soil, such as coal tars or other material containing polynuclear aromatic hydrocarbons (PAHs). Evaluation of DRO data should take into consideration the history of the property, including the known or likely presence of a petroleum source, the presence (or lack thereof) of other contaminants in the soil sample, and the type of soil. If positive DRO results are related to non-petroleum contaminants, risk-based criteria for the non-petroleum contaminants should be applied. If necessary, laboratory analytical methods are available to help determine if the DRO is from natural organic material in the soil.

Placement of unregulated fill

To avoid potential problems or public concern stemming from the placement of unregulated fill in sensitive settings, the MPCA recommends the following Best Management Practices:

- Avoid placing unregulated fill at schools, playgrounds, daycares, and residential properties. Unregulated fill is most suitable for use at industrial or commercial properties.
- Avoid placing unregulated fill in gardens where food for human/animal ingestion will be grown.
- Observe a minimum ten-foot separation distance between unregulated fill and the water table.
- Avoid placing unregulated fill where contaminants may be transported by run-off to lakes, rivers, wetlands, or streams.

Sampling decisions

Decisions of whether to sample soil for contamination prior to off-site reuse should be based on the history of the source area, the nature of the source material, the extent to which the soil has been previously characterized, and other factors that are part of a due diligence assessment of the environmental condition of the source property.

If the soil originates from a site where known or potential sources of contamination are present, samples of the soil should be collected for field screening and laboratory analyses. Examples of sites where environmental due diligence may reveal known or potential sources of contamination include sites where contamination was previously identified as a result of regulatory action or voluntary

investigation, previously developed sites (commercial, industrial, recreational, or residential), agricultural properties, or land that may have been subject to dumping, spills, or historic filling activities.

If no known or potential sources of contamination are identified during environmental due diligence and subsequent field observations, then sampling of excess soil for laboratory analyses is not necessary.

Sample type and frequency

When soil sampling is appropriate, the frequency and type of samples should be based on the potential sources of contamination, the depth, volume, and heterogeneity of the source material, and the availability of existing data. At a minimum, analytical parameters should include volatile organic compounds, PAHs, RCRA metals, DRO, and GRO. Other contaminants of concern should be included as appropriate, based on the history of the source location. Analytical data should be age-appropriate and representative of the source material.

Some soils even lightly impacted by heavy metals have the potential to leach at concentrations at or above the Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit. As a rule-of-thumb, a TCLP analysis for RCRA metals should be conducted if the soil concentration of a metal is 20 times or greater the TCLP regulatory criteria.

A typical frequency for the field screening of potentially contaminated soil using a PID is one measurement for every ten cubic yards of soil. For analytical samples, the stockpile sampling guidance presented in Section 7.3 of the MPCA's Site Characterization and Sampling Document can be used as a frame of reference for the appropriate sampling frequency based on soil volume: http://www.pca.state.mn.us/cleanup/pubs/sitechar.pdf. Soil sampling guidelines for the Petroleum Remediation Program are presented in guidance Document 4-04: http://www.pca.state.mn.us/publications/c-prp4-04.pdf. Flexibility in the number of samples may be warranted, depending on the site-specific circumstances. Sound professional judgment, taking into account all of the factors discussed above, should be used when developing a sampling plan to determine whether excess soil meets the criteria for unregulated fill.

Implementation

All parties are encouraged to use the best management practices described herein in order to make good decisions about the off-site reuse of unregulated fill. It is the responsibility of the property owners and other parties engaged in development and construction activities to make sure that their activities include appropriate environmental due diligence and that excess soil and other materials generated by these activities are managed in an environmentally responsible manner.

Note that some local units of government, including Dakota County, may have local ordinances which restrict the off-site reuse of unregulated fill within their boundaries. Parties seeking to import unregulated fill should check with local regulators to determine if such ordinances are in effect in their project area.

Nothing in this guidance excuses anyone from compliance with any law, rule, or other legal obligation (including any environmental covenant) that applies to any development or construction activity, including the generation, management, transport, and reuse of excess soil.

For more information

Questions about the information presented above can be directed to the MPCA at 651-296-6300 or 1-800-657-3864.

Off-Site Use of Regulated Fill Policy

Voluntary Investigation and Cleanup Program
Petroleum Brownfields Program

Policy Statement

Brownfield redevelopment sites that are enrolled in the Minnesota Pollution Control Agency's (MPCA) Voluntary Investigation and Cleanup (VIC) and/or Petroleum Brownfields (PB) programs may move Regulated Fill, as defined below, from one VIC/PB site to another VIC/PB site, subject to the terms and conditions outlined below.

Background

A developer may need to excavate large quantities of soil for geotechnical soil correction, changes in grade, or for the construction of basements, underground parking, or utility corridors. Often, this soil may consist of historical urban fill that has concentrations of contaminants greater than the MPCA's Residential Soil Reference Values (SRVs) but less than or equal to Industrial SRVs. In the past, the MPCA has required such soil, if excess, to be hauled to a permitted landfill for disposal or use as daily cover. Other Brownfield sites being redeveloped for industrial or restricted commercial use may require the import of large quantities of soil to backfill an excavation or to achieve the necessary design grade. Typically, these sites import clean fill to meet site redevelopment needs. In cases where low-impact soil can be reused in a way that is protective of human health and the environment, the controlled off-site reuse of such soil is consistent with a green remediation philosophy and can be a significant cost-saving measure for developers of Brownfield sites and for state and local units of government which provide contamination cleanup grants.

Definitions

The MPCA's framework for the off-site use of excess soil generated during site redevelopment is based upon three categories of potential fill soils, as defined below:

- **Clean Fill** – soil that is unaffected by a spill or release.
- **Unregulated Fill** – soil with no field signs of contamination, but which nevertheless has been affected by a release of contaminants at concentrations less than the MPCA's most conservative screening values. The MPCA has recommended best management practices for persons seeking to reuse Unregulated Fill. For additional information, see "Best Management Practices for the Off-Site Reuse of Unregulated Fill". http://tinyurl.com/Unregulated-Fill-BMP
- **Regulated Fill** – soil which has any of the contaminant characteristics described below:
  - diesel range organics (DRO)/gasoline range organics (GRO) 100 milligrams per kilogram (mg/kg) or greater from a known or likely petroleum source
  - metals or semi-volatile organic compounds (SVOCs) between the MPCA's residential and industrial SRVs
  - volatile organic compounds (VOCs) between the MPCA's default Tier 1 Soil Leaching Values (SLVs) and the site-specific Tier 2 SLVs for the importing site

Characterization of Regulated Fill

A sampling plan to characterize excess soil for potential off-site use as regulated fill should be reviewed and approved by VIC/PB staff. The approved sampling approach can be implemented during Phase II field work or as a separate effort during implementation of the Response Action Plan/Soil Management Plan. The following bullet points address some frequently asked questions regarding characterization of fill for potential off-site use:

- Naturally-occurring concentrations of some metals, such as arsenic, selenium, or copper, sometimes exceed the SRV or SLV. Such soils are not considered impacted in the absence of a contaminant source or other field or laboratory indications of contamination.
- Some detections of DRO in soil may stem from the presence of natural organic material or non-petroleum contaminants in the soil, such as coal tars or other material containing polynuclear aromatic hydrocarbons (PAHs). Evaluation of DRO data should take into consideration the history of the property, including the known or likely presence of a petroleum source, the presence (or lack thereof) of other contaminants in the soil sample, and the type of soil. If positive DRO results are related to non-petroleum contaminants, risk-based criteria for the non-petroleum contaminants should be applied. If desired, laboratory analytical methods are available to help determine if the DRO is from natural organic material in the soil.
- Provided that enough samples of the fill material have been collected to allow a meaningful statistical evaluation of the data, averaging of the data is acceptable. For example, some exporting sites that have successfully applied an averaging approach (excluding hot spots) have implemented a three-dimensional grid-based sampling strategy during the site investigation phase to characterize the fill material for potential reuse.
- While the goal is for Regulated Fill to be as free of debris as practicable, Regulated Fill may contain a de minimis amount of inert debris such as fragments of brick, concrete, glass, metal, etc. Because Regulated Fill will typically be comprised of historical urban fill, Regulated Fill may be discolored relative to native soil. If VOCs or elevated organic vapors (10 ppm or greater) as measured by a photo ionization detector (PID) are present in the Regulated Fill, special placement criteria at the receiving site may apply. The presence of VOCs in the Regulated Fill may also trigger the need for MPCA-approved site-specific Tier 2 SLVs for the receiving site.

Exclusions

Reuse of the following soil and other materials are not covered by the MPCA's fill reuse framework and will not be approved under this policy:

- Soil contaminated with agricultural chemicals. Such soil is under the regulatory oversight of the Minnesota Department of Agriculture Incident Response Program.
- Soil containing asbestos-containing material.
- Soil containing more than a de minimis amount of demolition debris, industrial waste, or other solid waste. Such soil continues to be regulated by the MPCA as a solid waste.
- Soil that is characteristically hazardous or contaminated due to a release of a listed hazardous waste. Such soil must be managed in accordance with the requirements of the MPCA's Resource Conservation and Recovery Act (RCRA) program.
- Soil exhibiting chemical odors, due to the potential for nuisance conditions at the receiving site.

- Non-soil materials such as crushed concrete, bricks, etc., that are proposed to be beneficially used as fill. Such material must be managed in accordance with the requirements of the MPCA's Solid Waste Program. http://tinyurl.com/Beneficial-Use
- Dredge materials. Such material may be regulated by permit or be subject to other MPCA regulations. http://tinyurl.com/Dredged-Materials

Requirements for Off Site Use of Regulated Fill

1. Both the exporting and importing sites must be enrolled in the VIC and/or PB program(s), as appropriate for the type of contaminants present at the site.
2. Both the exporting and importing sites must have completed a Phase I and Phase II environmental site assessment that is acceptable to MPCA.
3. Both the exporting and importing sites must have an MPCA-approved plan for the management and reuse of the Regulated Fill. This can be in the form of a *Response Action Plan* (RAP), if response actions are needed at the site or a *Soil Management Plan*, if response actions are not necessary or if the soil reuse plans were not known at the time the RAP was written.
4. Regulated Fill can only be used at restricted commercial or industrial sites which have existing contamination similar in type and concentration to that of the Regulated Fill to be imported. For definitions of restricted commercial and industrial property use, see the MPCA's Risk-Based Site Evaluation Manual at the link below. Placement of Regulated Fill at uncontaminated sites, or where only minor contamination is present (e.g. < Residential SRVs), or where the land use is not restricted commercial or industrial will not be approved. http://tinyurl.com/RBSE-definitions
5. The off-site use of Regulated Fill must be protective of human health and the environment, and there must be no increase in risk posed by the contamination as a result of its placement at the importing site. The evaluation of risk at the importing site must include (a) the potential human health risk through direct exposure to the soil contaminants, (b) the potential for groundwater impacts due to leaching, (c) the potential for soil vapor migration and vapor intrusion, and (d) the potential for surface water impacts.
6. The importing site must be a locally permitted and approved construction/redevelopment project with a legitimate need for backfill or grading material, as indicated in site documents submitted to the MPCA.
7. A ***Regulated Fill application*** which describes the proposal for the export/import of Regulated Fill must be submitted to the MPCA for review and approval. The Regulated Fill application identifies the exporting and importing sites and provides the necessary supporting information by which to evaluate the proposal. The application must be signed by the property owners of the exporting and importing sites.
8. The property owner of the importing site shall furnish a copy of the Regulated Fill application to the local unit(s) of government (LUG) listed below, as appropriate for the site. The LUG must sign a ***Local Government Notification*** form to confirm receipt of the information. A copy of the signed local government notification form must be attached to the Regulated Fill application when submitted to MPCA. Compliance with this policy does not release either party (exporter or importer) from any obligation to comply with local government ordinances, including ordinances that may require a solid waste permit prior to placement of the Regulated Fill material.
    - county auditor or other person designated by the county board to receive notifications
    - city clerk or other person designated by the city council to receive notifications

- town clerk or town chair as determined by resolution of the town board
- for land within a reservation, the appropriate official of the tribal authority

9. Final placement of Regulated Fill at the importing site must be in accordance with the timeframe described in the Regulated Fill application, as approved by the MPCA. Temporary staging of Regulated Fill at a site other than the originating or importing sites will not be approved.

10. The origin, final disposition, and placement of the Regulated Fill must be described in the Implementation Reports for the exporting and importing sites, with appropriate documentation. The Implementation Reports must be submitted to the MPCA for review and approval.

11. An institutional control may be required for the receiving site based on activity restrictions or affirmative obligations related to the site's final conditions, as per standard Remediation Division policy. In the vast majority of cases, the need for an institutional control at the importing site will be driven by the site's own residual contamination, as opposed to the import of Regulated Fill. In rare cases where the placement of Regulated Fill was contingent upon the presence of a paved surface or building to reduce infiltration, the import of Regulated Fill may trigger the need for an institutional control.

Approvals/Assurances

Regulated Fill is considered by the MPCA to be solid waste. However, the MPCA has adopted a Program Management Decision on Regulated Fill which allows the VIC and PB programs to provide oversight for the off-site reuse of Regulated Fill, as defined above, rather than have such sites subject to permitting under the solid waste management program. The MPCA will not require permits or approvals to be obtained from the solid waste program for the off-site use of Regulated Fill, when managed in accordance with the terms and conditions of this policy. The MPCA will take no action against persons who move Regulated Fill, as defined above, from one VIC/PB site to another VIC/PB site so long as the persons comply with the terms and conditions of this policy.

The VIC/PB programs will use the following approvals and assurances to provide regulatory oversight and environmental closure for Brownfield redevelopment sites exporting or importing Regulated Fill. As with any approval or assurance, standard disclaimers will apply.

- Approval of Response Action Plan and/or Soil Management Plan.
- Approval of Regulated Fill application.
- For a site which exports or imports Regulated Fill impacted by petroleum, the PB program may issue an Implementation Report approval letter for the site.
- For a site which exports or imports Regulated Fill impacted by hazardous substances, the VIC program may issue an Implementation Report approval letter and a No Action/No Further Action Letter for the site, provided that the site meets all appropriate VIC requirements for these assurances.

Kathryn J. Sather
Division Director
Remediation Division
Minnesota Pollution Control Agency

3/23/12
Date

Appendix E

MPCA Risk Based Site Characterization and Sampling Guidance, Section 7

If compositing of samples is conducted and grid sampling is used, each grid square should be divided into four sub-areas for composite sampling. The composite concentration can then be applied to the grid square. If composite sampling is conducted without a grid, assign the composite concentration to the centroid of the polygon formed by the individual sample locations (no more than four). Averaging of composite sample data is not acceptable, since the composite samples are already representative of a physical average of the sub-samples. For more information on this topic, please refer to Section 5 (Data Collection and Evaluation) of the MPCA *Risk-Based Evaluation for Soil - Human Health Pathway Guidance*.

Certain site-specific soil data are required for the assessment of human health risks. Parameters such as soil moisture and total organic carbon should be analyzed. See the MPCA *Risk-Based Evaluation for Soil - Human Health Pathway Guidance* for additional information.. All laboratory method detection limits should be low enough so data can be used for risk evaluation purposes. In order to be used to evaluate risk, the data should also be representative of potential exposure scenarios.

6.0 SURFACE WATER SAMPLING

(To be added at a later date)

7.0 SAMPLING FOR REMEDIATION VERIFICATION

7.1 Introduction

Information presented in this section is intended to guide the environmental professional in the recommended methods for verifying that soil contamination has been adequately remediated. Primarily, the minimum number and the location of required samples are addressed.

Verification sampling strategies for soil remediation depend on the type of remediation -- excavation or in-situ treatment. The minimum number of samples and sampling locations are different for each remediation type. While the minimum number of samples required is easily determined for both situations, determining the sampling locations is more complex and requires some professional judgment. The sampling strategies are outlined below.

Ex-situ remedies may be amenable to statistical sampling strategies or batch sampling. Any proposed sampling for ex-situ remedies should be developed on a site by site basis with the oversight of the MPCA project staff.

7.2 Excavations

Verifying that contaminated soil has been remediated by means of excavation requires samples from the excavation floors and sidewalls. The tables below provide the minimum number of samples necessary to verify cleanup for various sizes of excavations. Remediation verification is demonstrated by comparing the analytical results from each sampling point with the cleanup goals. If the cleanup goals are exceeded at any point, this verification methodology may require additional excavation at that point until the goals are met. Specifically, if less than ten samples are collected from either excavation floors or sidewalls, the calculated average concentrations will have very little meaning from a risk standpoint. In these situations, the appropriate risk/cleanup standards should be considered as numbers that are not to be exceeded in any sample.

A sampling strategy that uses bias to choose sample locations is recommended. This guidance document cannot dictate the exact locations for sample collection using this strategy. The location of the sample collection points relies on site specific information from the remedial investigation, analysis of the release or contaminant distribution and the soil types encountered in the excavation. Sampling and analyzing the soil samples from the locations most likely to have contaminants can minimize the number of samples needed to verify that remediation is complete. Since professional judgment and site specific knowledge are required for selecting sampling locations, the rationale used to select these locations must be well documented in the implementation report.

Analysis of data generated by prior investigations at the site should yield information for the verification analysis. The field personnel present during the remediation should be sufficiently familiar with the conditions on site to implement an appropriate verification sampling plan. Soil verification sampling should incorporate all pertinent biases of a site which may include, but are not limited to, the following:

- preferential pathways of contaminant migration
- source areas, stained soils, other site specific "clues" (e.g., fractures in clays)
- changes in soil characteristics (e.g., sand/clay interfaces)
- soil types and characteristics.

Compositing soil samples for verifying soil remediation may be acceptable for non-volatile parameters. Generally, when sampling for non-volatile parameters, each composite sample to be analyzed may be comprised of a maximum of four subsamples. However, please be aware that if contamination is indicated in a composited sample at levels above the cleanup goal, the entire area of the excavation comprising the composite sample may require additional excavation until the cleanup goals are met. Suspected contaminated areas discovered during verification sampling should not be sampled as part of a composite but should be sampled discretely.

The minimum required number of verification samples is determined by the subsequent tables. Confirmation sampling should generally be conducted on a grid.

7.2.1 Excavation Floor

The minimum acceptable number of floor samples to be analyzed is based on the area of the excavation floor as designated in Table 7A shown below.

Table 7A Excavation Floor Samples

Area of Floor (sq ft)	Number of Samples
<500	2
500-<1,000	3
1,000-<1,500	4
1,500-<2,500	5
2,500-<4,000	6
4,000-<6,000	7
6,000-<8,500	8
8,500-<10,890 (0.25 acres)	9
>10,890	Use Guidance Below

The following guidance is to be used when excavation floor areas exceed 10,890 square feet:

Floor Acreage	Square Feet	Grid Interval
0.25 - 3.0	10,890-130,680	15 - 30 Feet
3.0 and over	130,680 +	30 Feet plus

7.2.2 Excavation Sidewalls

Sidewall samples are required to verify that the horizontal extent of the soil contamination has been remediated. The number of sidewall samples shall be determined by Table 7B shown below. In no case is less than one sample on each sidewall acceptable. Known hot spots should be sampled separately. Once again, when sampling for non-volatile parameters, each sample to be analyzed may be comprised of four subsamples.

Table 7B Excavation Sidewall Samples

Area of Sidewall (sq ft)	Number of Samples
<500	4
500-1,000	5
1,000-1,500	6
1,500-2,000	7
2,000-3,000	8
3,000-4,000	9
>4,000	1 sample per 45 lineal feet of sidewall

When sampling the sidewalls of excavations that exceed five feet in depth, the sidewall sampling locations must be staggered in the vertical plane. This will ensure that lateral remediation has been adequate at all depths within the excavation.

7.3 Soil Stockpiles

Often times an excavation results in a contaminated soil stockpile that then needs to be treated (on- or off-site) or sent off-site for appropriate disposal. Sampling of the stockpile is necessary in order to characterize the contaminated or treated soil and to determine the appropriate final disposition. Landfills and the various types of treatment facilities (such as thermal treatment facilities or land farm sites) have permitted limits on the levels of contaminants they can accept. Sampling is necessary to ensure receiving facilities are operating within their permit limits. Additional samples beyond what is recommended here may be necessary based on each facility's specific permit requirements. TCLP and/or total analyses should be conducted for each type of contaminant suspected to be present. The detection limits for the total analyses should be determined based on the requirements of the receiving facilities permit, or on the cleanup level established for the site. The following table shall be used to determine the appropriate number of stockpile samples to be collected for analyses.

Table 7C Stockpile Samples

Cubic Yards of Soil in Pile	Number of Samples
0-500	1 per 100 cubic yards
501- 1000	1 per 250 cubic yards
1001 or more	1 per 500 cubic yards

If less than ten samples are collected from a stockpile, a calculated average concentration will have very little meaning from a risk standpoint. Therefore, in this type of situation, the appropriate risk/cleanup standards should be considered as numbers that are not to be exceeded in any sample. Compositing of stockpile samples is acceptable for the non-volatile parameters. Each sample may be comprised of four subsamples collected randomly from within the stockpile.

7.4 In-Situ Soil Remediation

When in-situ remedies are used, the effectiveness of the remedy must be verified by soil sampling. In these cases, three-dimensional sampling must be undertaken to verify that the soils have been adequately treated.

In instances of in-situ stabilization, the sampling should be conducted using a grid pattern with a vertical component added at each node. The number of samples collected for analyses should be determined using Tables 7A and 7B. The vertical extent of the remedy should be determined by compositing samples within each grid over 10 foot depth intervals extending to the bottom of the stabilization zone.

For in-situ treatment such as soil vapor extraction (SVE), the number of samples collected for analyses should be determined using Tables 7A and 7B, but should be biased toward the sampling points located remote from the SVE points. The vertical component must also be addressed and, therefore, the soil borings should be screened continuously using a PID, and any soils showing elevated organic vapors should be sampled. If no elevated PID readings are detected, discrete samples should be collected at 5 foot intervals over the depth of the treatment zone.

Compositing of remediation verification samples is acceptable for in-situ remediations for the non-volatile parameters. Each sample may be comprised of no more than 4 subsamples.

MINNESOTA POLLUTION CONTROL AGENCY
SITE REMEDIATION SECTION

DRAFT GUIDELINES
RISK BASED SITE CHARACTERIZATION AND SAMPLING GUIDANCE

WORKING DRAFT, September 16, 1998
Comment Period Ends December 31, 1998
Send Written Comments to:
Guidance Coordination Team
Minnesota Pollution Control Agency
Site Remediation Section
520 Lafayette Road
St. Paul, Minnesota 55155-4194
Fax (651) 296-9707

NOTICE

THIS DOCUMENT IS A WORKING DRAFT. The Site Remediation Section of MPCA is developing guidelines for evaluating risks to human health and the environment at sites that may require investigation or response actions pursuant to the Minnesota Environmental Response and Liability Act, Minn. Stat. § 115B.01 to 115B.24 (MERLA).

DEVELOPMENT OF A SITE REMEDIATION SECTION SITE EVALUATION MANUAL. The attached document and other documents will be incorporated into a Site Remediation Risk-Based Site Evaluation Manual which will contain guidelines for conducting MERLA-related evaluations, including risk evaluations under the State Superfund program and the MPCA Voluntary Investigation and Cleanup (VIC) Program.

MPCA staff intend to use the policies and procedures in the manual as guidelines to evaluate the need for investigation or remedial actions to address releases and threatened releases of hazardous substances or pollutants or contaminants under MERLA, and the scope and nature of such actions. These policies and procedures are not exclusive and do not have the force and effect of law. MPCA staff may use other policies or procedures to evaluate the need for or adequacy of response actions under MERLA, including procedures set forth in outstanding MPCA Requests for Response Action and Consent Orders. The final standard for all such evaluations is the MERLA statutory requirement that such actions must be reasonable and necessary to protect the public health and welfare and the environment.

The Minnesota state Superfund program, governed by the Minnesota Environmental Response and Liability Act (MERLA) and the supplementary rules, and the federal Superfund program, governed by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the federal regulations in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), work together to clean up various types of sites.

~ Continued ~