Landmark Environmental LLC

Contract Documents for Dual Phase Extraction System Installation

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

Prepared for
The City of Rochester

November 2007

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Agreement

CONTRACT DOCUMENTS
FOR DUAL PHASE EXTRACTION SYSTEM INSTALLATION
The City of Rochester
MN Bio Business Center
Rochester, MN

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AGREEMENT BETWEEN
ADOLFSON & PETERSON CONSTRUCTION AND ENVIRONMENTAL CONTRACTOR
FOR DUAL PHASE EXTRACTION SYSTEM INSTALLATION

THIS IS AN AGREEMENT made as of November 12, 2007, between Adolfson & Peterson Construction and ENVIRONMENTAL CONTRACTOR.

Adolfson & Peterson Construction and ENVIRONMENTAL CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK

ENVIRONMENTAL CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents of which this Agreement is a part. The Work is generally described as follows:

Project Title MN Bio Business Center
Project Description Construct a dual phase extraction (DPE) system to treat subsurface soil, fractured bedrock, and ground water contaminated with perchloroethene (PCE) at the proposed MN Bio Business Center located in Rochester, MN (the Property).

ARTICLE 2. DEFINITIONS

Wherever used in these Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

GENERAL CONTRACTOR - Adolfson and Peterson Construction will retain the services of the ENVIRONMENTAL CONTRACTOR for dual phase extraction system installation services.

ENGINEER - Landmark Environmental, LLC, is ENGINEER for the project. ENGINEER prepared the Contract Documents for the dual phase extraction system installation and will oversee the ENVIRONMENTAL CONTRACTOR during system installation.

GENERAL CONTRACTOR's Client - The City of Rochester (CITY) on behalf of whom GENERAL CONTRACTOR has retained services of ENVIRONMENTAL CONTRACTOR and from whom GENERAL CONTRACTOR will obtain compensation for services of ENVIRONMENTAL CONTRACTOR performed under the Contract Documents.

Change Order - A written instrument signed by GENERAL CONTRACTOR and ENVIRONMENTAL CONTRACTOR that authorizes a revision in the Work, an adjustment in the Contract Price or Contract Time, or otherwise amends the Contract Documents issued on or after the Effective Date of the Agreement.

Contract Drawings - The drawings that show the extent, character and scope of the Work to be performed for construction of the Project and that have been prepared or approved by LANDMARK and the CITY's architect and are included as part of the Contract Documents (Exhibit B).

Field Memorandum - A written statement issued by ENGINEER that clarifies or interprets the Contract Documents, but does not change the Contract Time or Contract Price.

Laws and Regulations; Laws or Regulations - Laws, rules, regulations, ordinances, codes, and/or administrative orders of any Federal, State, or local authority.

Project - The construction of a dual phase extraction system of which the Work to be provided under the Contract Documents is a part as indicated elsewhere in the Contract Documents.

Project Manager - The authorized representative of GENERAL CONTRACTOR and ENGINEER to whom ENVIRONMENTAL CONTRACTOR shall address all correspondence, inquiries, notifications, Applications for Payment, and other official matters pertaining to the Work. The Project Manager is named in the Supplementary Conditions.

Property Owner - The CITY having a legal ownership interest in the Property on which the Work will be conducted along with all other person(s), firm(s), and corporation(s) named in the Supplementary Conditions that may have a secondary interest (i.e., option holders, estates, leaseholders, etc.). Property Owner is the same as GENERAL CONTRACTOR's Client(s).

Resident Project Representative - The representative of GENERAL CONTRACTOR and ENGINEER who is assigned to the project or any part thereof. The Resident Project Representative does not have authority to issue Change Orders.

Subcontractor - An individual, firm, or corporation having a direct contract (written or verbal) with ENVIRONMENTAL CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Property.

Supplementary Conditions - The part of the Contract Documents (Exhibit A) that amends or supplements the standard language of the Agreement.

Supplier - A manufacturer, fabricator, supplier, distributor, material man, or vendor to the ENVIRONMENTAL CONTRACTOR.

Underground Utilities and Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, foundations, basements, or other such structures and facilities along with all ancillary attachments and supports, and any encasements containing such facilities which have been installed underground.

Work - The entire completed DPE system including mobilization and demobilization from the property; constructing the DPE system wells, piping, equipment, system emissions effluent piping, system groundwater discharge effluent piping; providing operation, maintenance, and troubleshooting of the system, if necessary, during start-up activities; and supporting activities and construction required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

ARTICLE 3. CONTRACT DOCUMENTS

3.1 Definitions

The Contract Documents, that comprise the entire agreement between GENERAL CONTRACTOR and ENVIRONMENTAL CONTRACTOR concerning the Work, consist of the following:

3.1.1 Change Orders issued pursuant to the terms of the Contract Documents.
3.1.2 Agreement.
3.1.3 Exhibit A - Supplementary Conditions.
3.1.4 Exhibit B - Contract Drawings.
3.1.5 Exhibit C - Technical Specifications.
3.1.6 Exhibit D - Schedule of Unit Prices.
3.1.7 Exhibit E - Application for Payment Form.
3.1.8 Exhibit F - Site Safety Plan.
3.1.9 Exhibit G - Previous Groundwater Analytical Data
3.1.10 Performance and Other Bonds

3.2 Discrepancies in Contract Documents

The Contract Documents described herein form the contract, and all Contract Documents are as fully a part of the contract as if attached hereto or herein repeated. In the case of a discrepancy in the Contract Documents, the order listed above shall be the order of precedence.

ARTICLE 4. GENERAL CONTRACTOR AND ENGINEER'S RESPONSIBILITIES

4.1 Existing Project Information

GENERAL CONTRACTOR and ENGINEER will make available for review by ENVIRONMENTAL CONTRACTOR information that ENGINEER has available that may affect the cost, progress, performance, or furnishing of the Work. Specific information such as reports, results of explorations and tests of subsurface conditions, chemical analyses of soil and groundwater, topographic maps, and maps relating the location of surface and subsurface features may be identified in Exhibit A (Supplementary Conditions). Copies of this information can be reviewed by ENVIRONMENTAL CONTRACTOR in GENERAL CONTRACTOR OR ENGINEER's office by appointment.

GENERAL CONTRACTOR and ENGINEER do not imply that this information is necessarily representative, exhaustive, or comprehensive and expressly disclaims any warranty as to its accuracy. In performing the Work, ENVIRONMENTAL CONTRACTOR shall be solely responsible for reviewing and determining the adequacy of existing project information for ENVIRONMENTAL CONTRACTOR's purposes, and shall make written request to GENERAL CONTRACTOR and ENGINEER for any additional information required prior to beginning the Work.

GENERAL CONTRACTOR and ENGINEER will assist ENVIRONMENTAL CONTRACTOR in obtaining from the CITY such additional information as ENVIRONMENTAL CONTRACTOR deems necessary.

4.2 New Project Information

GENERAL CONTRACTOR and ENGINEER will, in a timely manner, notify ENVIRONMENTAL CONTRACTOR of any new information that GENERAL CONTRACTOR and ENGINEER becomes aware of, either by GENERAL CONTRACTOR's or ENGINEER's own actions or that others have brought to GENERAL CONTRACTOR's or ENGINEER's attention, that differs materially from the information made available previously and to the extent that such new information may affect the cost, progress, performance, or furnishing of the Work. Such new information can be reviewed by ENVIRONMENTAL CONTRACTOR in GENERAL CONTRACTOR's or ENGINEER's office by appointment.

4.3 Site Access

GENERAL CONTRACTOR will arrange for access required for ENVIRONMENTAL CONTRACTOR to perform the Work.

4.4 Locations of Work and Surveys

ENGINEER will locate and label the proposed locations for the DPE system or other features that ENVIRONMENTAL CONTRACTOR is to construct or install under the Contract Documents. After the proposed locations have been established by ENGINEER, ENVIRONMENTAL CONTRACTOR shall satisfy itself as to the location of all Underground Utilities and Facilities and site features as set forth in Article 5 of this Agreement. If any of the proposed locations are in conflict with the location of Underground Utilities and Facilities or other site features, ENVIRONMENTAL CONTRACTOR shall notify GENERAL CONTRACTOR's and ENGINEER's Project Manager or Resident Project Representative. ENGINEER will work to relocate portions of the Project in conflict in order to meet ENGINEER's requirements for the Project. Work on portions of the Project shall not begin until ENGINEER has accepted the revised location as adequate for the purposes of the Project.

GENERAL CONTRACTOR will be responsible for performing any horizontal and vertical surveys required to determine the location and elevation of the portions of the Project constructed or installed by ENVIRONMENTAL CONTRACTOR.

4.5 Underground Utilities and Facilities

GENERAL CONTRACTOR will assist ENVIRONMENTAL CONTRACTOR in the location of Underground Utilities and Facilities owned by the CITY by furnishing ENVIRONMENTAL CONTRACTOR with the names and telephone numbers of appropriate representatives of the CITY that will be responsible for locating. The names and phone numbers will be set forth in Exhibit A (Supplementary Conditions) of the Contract Documents. ENVIRONMENTAL CONTRACTOR shall satisfy itself as to the location of all Underground Utilities and Facilities as set forth in Article 5 of this Agreement.

4.6 Permits and Approvals

GENERAL CONTRACTOR and ENGINEER will furnish to ENVIRONMENTAL CONTRACTOR all information regarding the CITY that is required by applications for permits that ENVIRONMENTAL CONTRACTOR is required to obtain in accordance with paragraph 5.6 of this Agreement. In addition, GENERAL CONTRACTOR and ENGINEER will assist the CITY to obtain all permits specifically identified as their responsibility in Exhibit A (Supplementary Conditions).

4.7 Limitations on GENERAL CONTRACTOR's and ENGINEER's Responsibilities

GENERAL CONTRACTOR and ENGINEER is not responsible for ENVIRONMENTAL CONTRACTOR's means, methods, techniques, sequences, or procedures of construction (except as explicitly stated in the Contract Documents). Except as specifically stated in the Contract Documents, ENVIRONMENTAL CONTRACTOR is solely responsible for these items and for complying with all applicable laws and regulations. Not withstanding the foregoing, GENERAL CONTRACTOR and ENGINEER shall have sole direction for method of disposal chosen for any particular portion of the Work and over the ENVIRONMENTAL CONTRACTOR'S disposal choice for soil and\or groundwater.

4.8 Safety

GENERAL CONTRACTOR's and ENGINEER's responsibilities with regard to safety precautions for the Work are set forth in Article 6 of this Agreement.

ARTICLE 5. ENVIRONMENTAL CONTRACTOR'S RESPONSIBILITIES

5.1 Work

ENVIRONMENTAL CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents within the Contract Time, for the Contract Price, and pursuant to all other terms and conditions set forth in this Agreement.

ENVIRONMENTAL CONTRACTOR shall be licensed and otherwise fully qualified to perform the Work in accordance with Laws and Regulations and the Contract Documents.

ENVIRONMENTAL CONTRACTOR shall at all times, except as specifically stated in Article 6 of this Agreement relating to safety, permit access to the Work by LANDMARK, the CITY, employees of regulatory agencies, and other persons deemed appropriate by any of the above parties. Such access shall include the collection of samples.

5.2 Site Conditions

By execution of this Agreement, ENVIRONMENTAL CONTRACTOR represents that it has familiarized itself with the nature and extent of the Contract Documents, Work, site and site features, locality, information and reports available publicly and from GENERAL CONTRACTOR and ENGINEER, locations of Underground Utilities and Facilities, and all local

conditions and Laws and Regulations that in any manner may affect the cost, progress, performance, or furnishing of the Work.

5.3 Underground Utilities and Facilities

ENVIRONMENTAL CONTRACTOR shall be responsible for locating all Underground Utilities and Facilities not owned by the CITY. ENVIRONMENTAL CONTRACTOR shall be responsible for contacting the representatives of the CITY and for coordinating the location of privately owned Underground Utilities and Facilities owned by the CITY.

ENVIRONMENTAL CONTRACTOR shall be responsible for all damages to persons or property, including but not limited to repair, replacement, clean-up, and loss of service of any Underground Utility or Facility damaged as a result of ENVIRONMENTAL CONTRACTOR's operations if said Utility or Underground Facility is damaged as a result of ENVIRONMENTAL CONTRACTOR's negligence, omission, willful misconduct, or failure to comply with the terms of these Contract Documents or applicable Laws and Regulations.

5.4 Conflicts in Locations of Work

Before beginning any work on any portion of the Project that is located in conflict with Underground Utility and Facility or any site feature, ENVIRONMENTAL CONTRACTOR shall notify GENERAL CONTRACTOR's and ENGINEER's Project Manager or Resident Project Representative. Conflict may include, but is not necessarily limited to, locations that are too close to an Underground Utility and Facility, that are inaccessible, or that are dangerous to workers or the general public.

5.5 Communications

All communication by ENVIRONMENTAL CONTRACTOR with regulatory agencies, CITY regarding the Project shall be through or with the knowledge of the Project Manager, except as specifically provided elsewhere in the Contract Documents.

5.6 Permits and Approvals

ENVIRONMENTAL CONTRACTOR shall apply for and obtain all permits normally required in the name of ENVIRONMENTAL CONTRACTOR for completion of the Work in accordance with Laws and Regulations, except as specifically identified in paragraph 4.6 of this Agreement. In addition, ENVIRONMENTAL CONTRACTOR shall apply for and obtain all permits specifically identified as ENVIRONMENTAL CONTRACTOR's responsibility in Exhibit A (Supplementary Conditions) to the Contract Documents. ENVIRONMENTAL CONTRACTOR shall include the cost of applying for and obtaining all such permits in the Contract Price. ENVIRONMENTAL CONTRACTOR shall submit to GENERAL CONTRACTOR and ENGINEER copies of all permits and approvals before beginning the Work unless explicitly informed otherwise by GENERAL CONTRACTOR's and ENGINEER's Project Manager.

ENVIRONMENTAL CONTRACTOR shall not be responsible for any permits required in the name of the CITY, except as specifically identified in Exhibit A (Supplementary Conditions) to the Contract Documents.

5.7 Restoration

ENVIRONMENTAL CONTRACTOR shall take all reasonable precautions to prevent damage to the Property, including but not limited, exacerbating or worsening of any condition as regulated by any law, regulation or public agency relating to health, safety or protection of the environment. If any such damages should occur, ENVIRONMENTAL CONTRACTOR shall repair said damage to a condition equal to or better than the original condition. The cost of repairing all damage is included in the Contract Price and no additional compensation will be made.

5.8 Safety

ENVIRONMENTAL CONTRACTOR's responsibilities with regard to safety precautions for the Work are set forth in Article 6 of this Agreement.

5.9 Subcontractors

ENVIRONMENTAL CONTRACTOR shall not employ any subcontractor for performance of any portion of the Work without the prior written approval of GENERAL CONTRACTOR AND ENGINEER. Subcontractors shall purchase and maintain insurance meeting the requirements of Article 12 of this Agreement.

5.10 Emergencies

In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, ENVIRONMENTAL CONTRACTOR, without special instruction from GENERAL CONTRACTOR, ENGINEER, or CITY, is obligated to, and shall, act immediately to prevent any threatened damages, injury, or loss in accordance with all applicable laws and regulations. The ENVIRONMENTAL CONTRACTOR shall have a spill containment program to cover any potential spills resulting from the work covered in this contract.

ENVIRONMENTAL CONTRACTOR shall give GENERAL CONTRACTOR AND ENGINEER prompt written notice if ENVIRONMENTAL CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused by the ENVIRONMENTAL CONTRACTOR's response to such an emergency. If GENERAL CONTRACTOR and ENGINEER determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Change Order will be issued to document the consequences of the changes or variations.

ARTICLE 6. SAFETY

Safety is discussed in the Technical Specifications, Division 1 General Requirements, Section 011400 Work Restrictions - Safety.

ARTICLE 7. CONTRACT TIME

ENVIRONMENTAL CONTRACTOR agrees to complete all Work described in these Contract Documents within the Contract Time set forth in Exhibit A (Supplementary Conditions). The Contract Time shall commence on the Start Date set forth in GENERAL CONTRACTOR's written Notice to Proceed. This Agreement will automatically terminate if GENERAL CONTRACTOR does not issue a Start Date that is within the time set forth in Exhibit A (Supplementary Conditions).

ARTICLE 8. CONTRACT PRICE

8.1 GENERAL CONTRACTOR's AND ENGINEER's Determination

The Contract Price constitutes the full compensation (subject to Change Orders) payable to ENVIRONMENTAL CONTRACTOR for performing the Work. The total price for an item will be determined by GENERAL CONTRACTOR AND ENGINEER as the Unit Price for that item times the quantity of the item actually furnished in accordance with the Contract Documents. The Unit Prices shall be as set forth in Exhibit D (Schedule of Unit Prices). The Contract Price will be determined as the sum of the total prices for all items.

8.2 Quantities

GENERAL CONTRACTOR and ENGINEER reserve the right to increase or decrease the quantities of the Work without limit without changes in the Unit Prices.

GENERAL CONTRACTOR and ENGINEER will issue Change Order(s) to modify Contract Time commensurate with changes in quantities. GENERAL CONTRACTOR will pay actual documented shipping, handling, and restocking charges for materials ordered specifically for this Work and not required as a result of a decrease in quantities.

ARTICLE 9. PAYMENT PROCEDURES

9.1 Field Procedures

At the end of each working day, or at another interval determined to be appropriate by GENERAL CONTRACTOR's Resident Project Representative and the ENVIRONMENTAL CONTRACTOR's representative, GENERAL CONTRACTOR's Resident Project Representative will meet with ENVIRONMENTAL CONTRACTOR's representative at the Property to concur on the quantities of Work completed for payment during the interval since their last meeting. Their concurrence shall be evidenced in writing, and such written statements shall form the basis for periodic Applications for Payment.

9.2 Applications for Payment

ENVIRONMENTAL CONTRACTOR shall bill GENERAL CONTRACTOR for services performed in accordance with the billing schedule set forth in Exhibit A (Supplementary Conditions) to the Contract Documents. Application for Payment shall be submitted on the form included as Exhibit E (Application for Payment Form) to the Contract Documents. Each Application for Payment shall be accompanied by an invoice on the ENVIRONMENTAL CONTRACTOR's standard form. The invoice form shall reference GENERAL CONTRACTOR's Project Title, GENERAL CONTRACTOR's Project Manager, and the Application for Payment Number. Applications for Payment shall be accompanied by supporting information required by the Contract Documents. Application for Payment shall only be made for completed and useable portions of the Work.

GENERAL CONTRACTOR will notify ENVIRONMENTAL CONTRACTOR in writing within fifteen (15) calendar days of receipt of ENVIRONMENTAL CONTRACTOR's application for payment if GENERAL CONTRACTOR disagrees with any items in the Application for Payment. GENERAL CONTRACTOR will bill the CITY for ENVIRONMENTAL CONTRACTOR's work, with acceptable Applications for Payment billed with GENERAL CNTRACTOR's next regular billing following receipt of Application for Payment. Should payment for certain items be disputed, said dispute will not delay payment for undisputed items.

GENERAL CONTRACTOR will pay ENVIRONMENTAL CONTRACTOR within 30 calendar days following receipt of payment from CITY attributable to the Work of the ENVIRONMENTAL CONTRACTOR, or not to exceed 60 days from the day GENERAL CONTRACTOR receives an invoice from ENVIRONMENTAL CONTRACTOR. GENERAL CONTRACTOR will exert reasonable efforts to collect prompt payment from the CITY.

ARTICLE 10. CHANGES

This Agreement may be amended or modified only by a written instrument (Change Order) signed by both GENERAL CONTRACTOR and ENVIRONMENTAL CONTRACTOR.

ARTICLE 11. BONDS

If required, ENVIRONMENTAL CONTRACTOR shall furnish performance and/or payment Bond(s) in the amounts and for the benefit of the parties specified in Exhibit A (Supplementary Conditions) to the Contract Documents. The cost of all Bonds shall be included in the Contract Price and no additional compensation will be made.

ARTICLE 12. INSURANCE

12.1 Types of Coverage

ENVIRONMENTAL CONTRACTOR shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, such commercial general liability and other insurance as is appropriate for the Work being performed and furnished and as will provide protection from claims set forth below which may arise out of or result from ENVIRONMENTAL CONTRACTOR's performance and furnishing of the Work and

other obligations under the Contract Documents, whether it is to be performed or furnished by ENVIRONMENTAL CONTRACTOR, by any Subcontractor, by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

12.1.1 Claims under workers' or workmen's compensation, disability benefits and other similar employee benefit Laws or Regulations;

12.1.2 Claims based on pollution arising out of ENVIRONMENTAL CONTRACTOR's Work.

The Commercial General Liability shall provide at a minimum the following coverages:

- Operations of the Contractor
- Operations of Subcontractors (contingent liability)
- Products/Completed Operations (to be carried one year after completion of contract)
- Personal Injury including employee-related claims
- Employees as Additional Insured
- Property Damage Hazards of Explosion, Collapse and Underground
- Contractual Liability (to insure the provisions of Article 13 of this Agreement)
- Sudden and Accidental Pollution Liability Coverage (if claims made, include 1-year discovery clause)

The Comprehensive Automobile Liability shall provide coverage for the following automobiles:

- All owned automobiles
- All non-owned automobiles
- All hired automobiles

Workers Compensation and Employees Liability.

Policy shall include Pollution Liability Endorsement (ISO Form CA9948) or comparable MCS-90. The Pollution Liability Policy shall contain no asbestos, PCB (polychlorinated biphenyl) or lead exclusions. If written on a claims made basis, coverage shall remain in effect for at least two years after final payment.

The ENVIRONMENTAL CONTRACTOR's commercial general liability policy shall include the interests of GENERAL CONTRACTOR, ENGINEER, the CITY, all of whom shall be listed as additional insured parties. The names of all parties to be so included shall be as listed in Exhibit A (Supplementary Conditions) to the Contract Documents. Such insurance shall be primary to any and all other insurance of GENERAL CONTRACTOR, ENGINEER, the CITY and shall specifically provide that it applies separately to each insured against which claim is made or suit is brought, except with respect to the limits of the insurer's liability, and that all rights of subrogation against GENERAL CONTRACTOR and ENGINEER are waived.

12.2 Limits of Coverage

The limits of coverage for insurance required by these Contract Documents shall be not less than the limits set forth in Exhibit A (Supplementary Conditions) to the Contract Documents or greater if required by Laws or Regulations. These insurance requirements are not to be construed as maximum or recommended amounts. ENVIRONMENTAL CONTRACTOR is solely responsible for determining the appropriate maximum limits of insurance coverage for injuries or damages resulting from the performance of the Work under the Contract Documents.

All responsibility for payment of any sums resulting from any deductible provision, corridor, or self-insured retention condition of the policy or policies shall remain with the ENVIRONMENTAL CONTRACTOR.

12.3 Certificates

Before any Work at the Property is started, ENVIRONMENTAL CONTRACTOR shall deliver to GENERAL CONTRACTOR and ENGINEER certificates (and other evidence of insurance requested by GENERAL CONTRACTOR and ENGINEER) evidencing insurance that ENVIRONMENTAL CONTRACTOR is required to purchase and maintain under these Contract Documents. It shall be the ENVIRONMENTAL CONTRACTOR's sole responsibility to purchase and maintain insurance meeting the requirements of the Contract Documents and failure of GENERAL CONTRACTOR or ENGINEER to respond to any evidence of insurance provided by ENVIRONMENTAL CONTRACTOR shall not be construed as acceptance or approval of ENVIRONMENTAL CONTRACTOR's insurance.

The cost of all insurance shall be included in the Contract Price and no additional compensation will be made.

ARTICLE 13. INDEMNIFICATION

13.1 GENERAL CONTRACTOR

GENERAL CONTRACTOR agrees to indemnify and hold harmless ENVIRONMENTAL CONTRACTOR from and against all claims, losses, damages, liability, costs, and reasonable costs of defense to the comparative extent that such claims, etc. are proximately caused by the negligent acts, omissions, or willful misconduct of GENERAL CONTRACTOR and GENERAL CONTRACTOR's employees.

13.2 ENVIRONMENTAL CONTRACTOR

ENVIRONMENTAL CONTRACTOR agrees to indemnify and hold harmless GENERAL CONTRACTOR AND ENGINEER from and against all claims, losses, damages, liability, costs, penalties, and reasonable costs of defense to the comparative extent that such claims, etc. are proximately caused by the negligent acts, omissions, or willful misconduct of ENVIRONMENTAL CONTRACTOR, ENVIRONMENTAL CONTRACTOR's employees, and/or Subcontractors.

ARTICLE 14. RECORDS AND SAMPLES

14.1 Records

ENVIRONMENTAL CONTRACTOR shall prepare and furnish reports and documents to GENERAL CONTRACTOR and ENGINEER in the form and quantity specified elsewhere in these Contract Documents. All reports, notes, calculations and other documents, as instruments of service, shall remain the property of ENVIRONMENTAL CONTRACTOR. ENVIRONMENTAL CONTRACTOR shall retain all pertinent records and documents for five (5) years following submission of reports. During that time the records shall be made available to GENERAL CONTRACTOR and ENGINEER and legible copies shall be provided to GENERAL CONTRACTOR and ENGINEER for a reasonable charge. ENVIRONMENTAL CONTRACTOR shall not make available to any person or entity other than GENERAL CONTRACTOR and ENGINEER, except as required by Laws or Regulations, any information, reports, or documents associated with the Work without the written consent of GENERAL CONTRACTOR and ENGINEER.

GENERAL CONTRACTOR and ENGINEER may use, reproduce, and retain in GENERAL CONTRACTOR's and ENGINEER 's files ENVIRONMENTAL CONTRACTOR's reports and documents furnished under the Contract Documents, and furnish said reports and documents to others.

14.2 Samples

All samples remaining after completion of the Work and any tests that may be subsequently requested shall remain the property of CITY unless otherwise directed. Within ten (10) days following submission of required reports or final Application for Payment, whichever comes first,

GENERAL CONTRACTOR and ENGINEER shall deliver or ship remaining samples to CITY. All samples shall be labeled with Project Number, Project Title, and the name of GENERAL CONTRACTOR's and ENGINEER's Project Manager. The cost of all sample handling shall be included in the Contract Price and no additional compensation will be made.

ARTICLE 15. MISCELLANEOUS

15.1 Controlling Law

This Agreement is to be governed by and construed in accordance with the laws of the State of Minnesota.

15.2 Suspension

GENERAL CONTRACTOR may immediately suspend the Work by written notice at any time for a period of up to sixty (60) calendar days. If GENERAL CONTRACTOR orders the Work to resume within the above-specified time, ENVIRONMENTAL CONTRACTOR shall complete the Work in accordance with the Contract Documents. If GENERAL CONTRACTOR does not provide written notice to resume the Work within the above-specified time, this Agreement will automatically terminate unless otherwise mutually agreed to by both parties in writing prior to termination. GENERAL CONTRACTOR will pay for all acceptable Work completed prior to suspension and for reasonable remobilization or other direct Project-related costs resulting from the suspension. In the event of suspension, ENVIRONMENTAL CONTRACTOR shall contact GENERAL CONTRACTOR's Project Manager or Resident Project Representative prior to taking any action to remove personnel, equipment, or materials from the site. GENERAL CONTRACTOR and ENGINEER will determine whether it is in the best interests of the Project to fully or partially demobilize or to remain at the site until the Work resumes.

15.3 Termination

GENERAL CONTRACTOR may terminate this Agreement at any time, with or without cause, by written notice to ENVIRONMENTAL CONTRACTOR. GENERAL CONTRACTOR will pay for all acceptable Work completed prior to termination and all additional services authorized by GENERAL CONTRACTOR to complete or close the Project.

15.4 Successors and Assigns

GENERAL CONTRACTOR and ENVIRONMENTAL CONTRACTOR and the partners, successors, executors, administrators and legal representatives of GENERAL CONTRACTOR and ENVIRONMENTAL CONTRACTOR, are hereby bound to this Agreement.

ENVIRONMENTAL CONTRACTOR shall not assign or transfer any rights or obligations under this Agreement without the written consent of GENERAL CONTRACTOR.

Nothing under this Agreement shall be construed to give any rights, benefits, or obligations in this Agreement to anyone other than GENERAL CONTRACTOR and ENVIRONMENTAL CONTRACTOR.

15.5 Entire Agreement

This Agreement, together with the exhibits and schedules identified in Article 3 herein, comprise the entire agreement between GENERAL CONTRACTOR and ENVIRONMENTAL CONTRACTOR and supersedes all prior written or oral agreements. In no event shall the preprinted terms or conditions stated on any invoice, work order, or other standard form of either party be considered an amendment or modification of this Agreement.

15.6 Independent Status

ENVIRONMENTAL CONTRACTOR shall perform all of its obligations under this Agreement as an independent contractor, and shall not be deemed an employee or agent of GENERAL CONTRACTOR for any purpose.

15.7 Confidentiality

ENVIRONMENTAL CONTRACTOR shall not disclose any information relative to the Work to anyone other than GENERAL CONTRACTOR and ENGINEER without GENERAL CONTRACTOR's and ENGINEER's prior written consent, except to the extent that ENVIRONMENTAL CONTRACTOR is obligated to provide emergency disclosure by Laws or Regulations.

15.8 Severability

Should a court of law determine that any clause or section of this Agreement is invalid or illegal, all other clauses or sections shall remain in effect.

IN WITNESS WHEREOF, the parties hereto have made and executed this Agreement as of the day and year written above.

GENERAL CONTRACTOR:	ENVIRONMENTAL CONTRACTOR:
(Signature)	(Authorized Signature)
(Title)	(Title)
(Name of Company, Partnership, or Corporation)	(Name of Company, Partnership, or Corporation)
ADDRESS FOR GIVING NOTICES:	ADDRESS FOR GIVING NOTICES:

Exhibit A
Supplementary Conditions

EXHIBIT A
SUPPLEMENTARY CONDITIONS

Project Title: MN Bio Business Center

GENERAL CONTRACTOR's Project Manager: Mike McGowan

ENGINEER's Project Manager: Jason Skramstad

These Supplementary Conditions amend, modify, or supplement the corresponding Article or paragraph of the Agreement between GENERAL CONTRACTOR and ENVIRONMENTAL CONTRACTOR for the dual phase extraction (DPE) system installation. Any Article or paragraph that is not so amended, modified, or supplemented shall remain in full force and effect.

ARTICLE 4. GENERAL CONTRACTOR's and ENGINEER's RESPONSIBILITIES

SC-4.1 Existing Project Information

The following generally describes the location of the Property, background information, and site conditions:

The Property consists of two parcels of land, the 219 Parcel and the 223 Parcel. The 219 Parcel is currently owned by the City. The City acquired the Property from Rochester DC LLC, a Delaware limited liability company on May 31, 2007. The 223 Parcel was previously owned by the Mayo Clinic Rochester, a Minnesota non-profit corporation. Both parcels comprise the Property and are currently used as surface parking lots. The 219 Parcel consists of 14,300 square feet of land that historically supported two dry cleaning facilities; historical structures were demolished prior to the construction of the current parking lot. The historical activities likely involved the use of hazardous substances, including the common dry cleaning solvent tetrachoroethylene ("PCE"). The 219 Parcel is enrolled in the MPCA VIC Program as VP#12560. Based on previous environmental investigations, RAs have been conducted to address reported releases of PCE at the Property on this parcel since 2000. Until recently, the RAs included operation of a dual phase extraction ("DPE") system. The 223 Parcel consists of approximately 4,300 square feet of land that historically was used as a stable and later as a hotel and then as the Lawler Movie Theatre; historical structures were demolished prior to the construction of the current surface parking lot. The general Property vicinity has been developed since prior to 1884 for residential/commercial use. Historical activities at the 223 Parcel likely did not involve the use of significant quantities of hazardous substances or petroleum products.

Limited soil and groundwater investigations completed to date at the Property have identified the presence of Volatile Organic Compound (VOC) constituents in groundwater and soil samples.

Polynuclear aromatic hydrocarbons (PAHs) and Resource Conservation and Recovery Act (RCRA) metals have additionally been detected in the Property soils.

ENGINEER has available the following maps, drawings, reports, tests and data that ENVIRONMENTAL CONTRACTOR can review in accordance with the terms of the Agreement:

Geotechnical Report, Proposed MN Bio Business Center, 1st Avenue and 3rd Street SW, Rochester, MN, Prepared for Landmark Environmental, LLC, McGhie & Betts, Inc., January 2007

Voluntary Investigation and Cleanup - Voluntary Response Action Plan and Preliminary Response Action Design (VRAP), 219 and 223 First Avenue S.W., Rochester, MN, Prepared for The City of Rochester, Landmark Environmental, LLC, June 2007

Environmental Contingency Plan (ECP), 219 and 223 First Avenue S.W., Rochester, MN, Prepared for The City of Rochester, Landmark Environmental, LLC, June 2007

Voluntary Response Action Plan - Response Action Design, 219 and 223 First Avenue S.W., Rochester, MN, Landmark Environmental, LLC, July 17, 2007

VRAP, ECP, & Design Modifications Submittal, 219 and 223 First Avenue S.W., Rochester, MN, Landmark Environmental, LLC, September 18, 2007

Emission Control Plan, 219 and 223 First Avenue S.W., Rochester, MN, Prepared for The City of Rochester, Landmark Environmental, LLC, July 2007

The following chemicals, compounds, or products are known or suspected to be present in the soil and/or groundwater at the Property. This list is not necessarily exhaustive or comprehensive:

Polycyclic Aromatic Hydrocarbons	
Resource Conservation and Recovery Act Metals	
Volatile Organic Compounds	

SC-4.5 Underground Utilities and Facilities

ENVIRONMENTAL CONTRACTOR shall contact the following persons for location of Underground Utilities and Facilities owned by GENERAL CONTRACTOR's and ENGINEER's Client(s) and Property Owners(s) prior to beginning the Work:

Name	Represents	Telephone Number
Gopher State One Call	State of Minnesota	651-454-8388
Terry Spaeth	The City of Rochester	507 328-2008

SC-4.6 Permits and Approvals

In addition to the responsibilities for permits and approvals set forth in the Agreement, ENGINEER has or will assist The City of Rochester [GENERAL CONTRACTOR's and ENGINEER's Client(s) and Property Owner(s)] to obtain the following:

1. Industrial Discharge Permit from the City of Rochester – Rochester Water Reclamation Plant Environmental Coordinator.

The above itemization shall not be construed as a limitation on either party's obligations to obtain permits or approvals required by the Agreement.

ARTICLE 5. ENVIRONMENTAL CONTRACTOR'S RESPONSIBILITIES

SC-5.6 Permits and Approvals

In addition to the responsibilities for permits and approvals set forth in the Agreement, ENVIRONMENTAL CONTRACTOR shall apply for and obtain the following:

1. No additional permits required. ENVIRONMENTAL CONTRACTOR shall be responsible for complying with the Industrial Discharge Permit which will be issued by the City of Rochester's Rochester Water Reclamation Plant prior to construction of the DPE system. ENGINEER shall collect all samples and perform reporting required by permit.
2. The construction of DPE system and monitoring wells shall be completed according to the rules and regulations required by the Minnesota Department of Health for wells installed in fractured bedrock.

The above itemization shall not be construed as a limitation on either party's obligations to obtain permits or approvals required by the Agreement.

ARTICLE 6. SAFETY

Safety is discussed in the Technical Specifications, Division 1 General Requirements, Section 011400 Work Restrictions - Safety.

ARTICLE 7. CONTRACT TIME

SC-7.0 The Contract Time shall be 180 calendar days. As stated in Article 7, the Agreement shall automatically terminate if GENERAL CONTRACTOR does not issue a Start Date within 45 calendar days of the effective date of the Agreement.

ARTICLE 9. PAYMENT PROCEDURES

SC-9.1 ENVIRONMENTAL CONTRACTOR shall bill GENERAL CONTRACTOR in accordance with the schedule and procedure indicated (checked) below:

X Within 15 calendar days following completion of the Work.

___With submission of ENVIRONMENTAL CONTRACTOR's written report.

___No more than once per month and upon completion of the Work.

ARTICLE 11. BONDS

SC-11.0 Performance Bond (is/is not) required.

Amount: None Required

Beneficiary: _____

_____

_____

Payment Bond (is/is not) required.

Amount: None Required

Beneficiary: _____

_____

_____

If Bonds are required, they shall be delivered to GENERAL CONTRACTOR prior to beginning any Work on the site. GENERAL CONTRACTOR will not issue Notice to Proceed until required Bonds have been delivered.

All Bonds shall remain in effect for a period of at least sixty (60) calendar days after the date of the final Application for Payment. All Bonds shall be in forms prescribed by Laws and Regulations and be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act.

ARTICLE 12. INSURANCE

SC-12.1 Types of Coverage

The insurance policy or policies required by these Contract Documents shall include the interests of the following persons or entities, all of whom shall be listed as additional insured:

GENERAL CONTRACTOR: Adolfson & Peterson Construction

ENGINEER: Landmark Environmental, LLC

GENERAL CONTRACTOR's Client(s): The City of Rochester

Property Owner(s): The City of Rochester

SC-12.2 Limits of Coverage

The limits of liability insurance required by the Agreement shall provide coverage for not less than the following amounts (or greater when required by Laws and Regulations):

Worker's Compensation and Employers' Liability:

Each Occurrence	$ 100,000
Aggregate	$ 500,000

Comprehensive General Liability:

Each Occurrence	$1,000,000
General Aggregate	$2,000,000

Automobile Public Liability and Property Damage:

Bodily Injury and Property Damage Liability Combined

Each Occurrence	$ 500,000

Umbrella Liability:

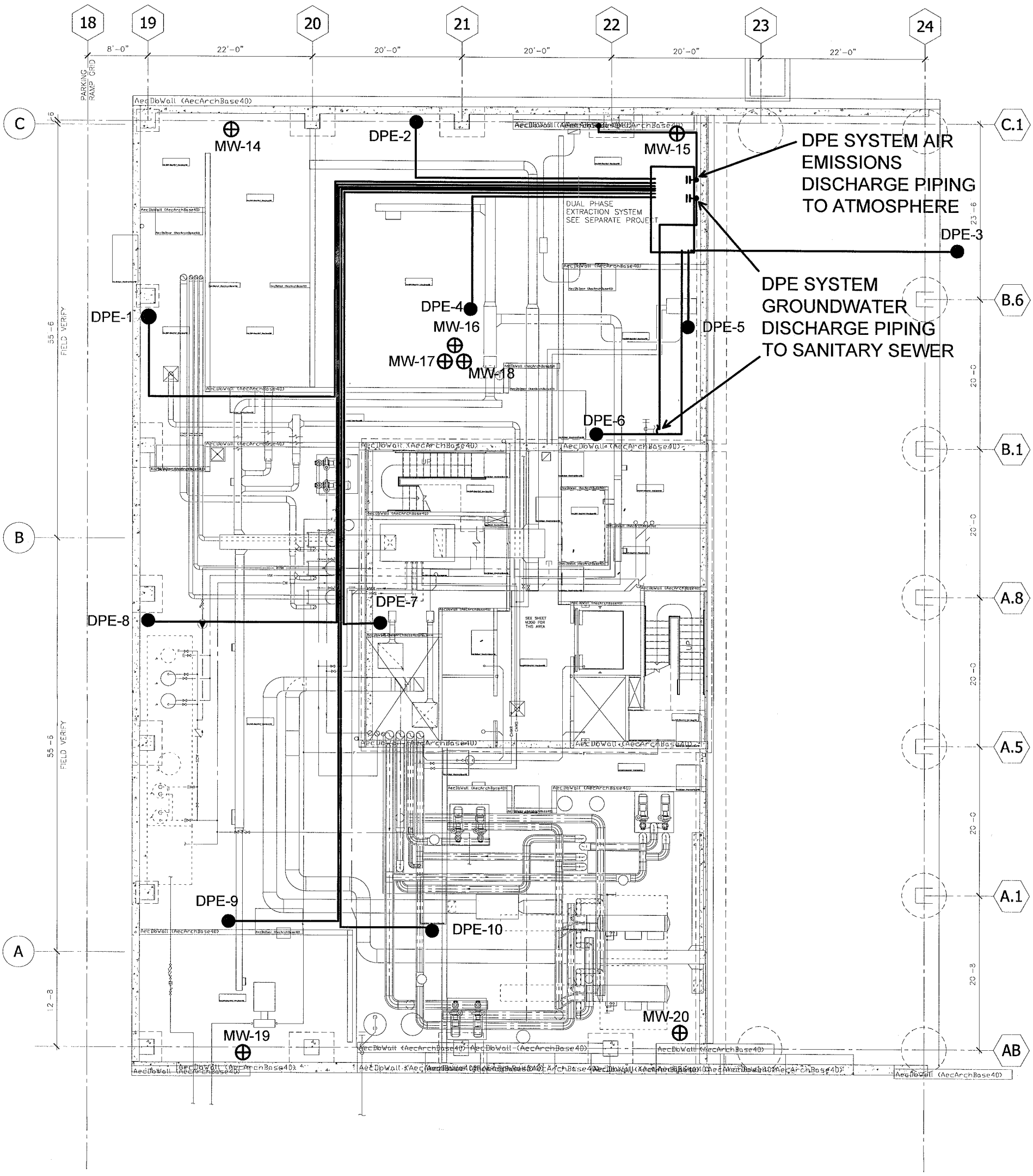
Aggregate	$2,000,000

The Umbrella Liability shall provide excess limits over and above the Comprehensive General Liability, Employers Liability, and Automobile Public Liability limits set forth herein.

Pollution Liability	
Each Claim	$2,000,000
Aggregate	$2,000,000

Exhibit B

Contract Drawings



1 BASEMENT FLOOR PLAN
1/8"=1'-0"

BASEDRAWINGS PROVIDED BY HGA
F:/Projects/CRC/CAD\basement planview/20070829 DPE System/20071106 DPE sys-final.dwg

NOTES:

1. DPE system piping shall be installed above the basement slab from the DPE wellheads to the basement ceiling. At the basement ceiling the horizontal DPE system piping from each of the wells shall slope downward towards the DPE system location.
2. The DPE system piping from the DPE wellheads shall consist of 2-inch SCH 80 PVC pipe.
3. The DPE piping shall be installed and pressure tested as described in the technical specifications and proposed drawings.
4. The DPE wells and horizontal piping shall be installed as shown on the proposed drawings.
5. The DPE system equipment and manifold shall be installed as shown on the proposed drawings.
6. Groundwater generated from the DPE system shall be discharged to the sanitary sewer. A groundwater treatment system may be required based on system start-up sampling analytical results.
7. DPE exhaust emissions shall be discharged to the atmosphere through riser piping that exits the building through the proposed building's west wall of the second level ceiling. Air emissions treatment may be required based on system start-up analytical results.

LEGEND

N

NOT TO SCALE

● DPE-1	Proposed DPE Well Location
⊕ MW-14	Proposed Monitoring Well Location
———	Proposed DPE Piping Location

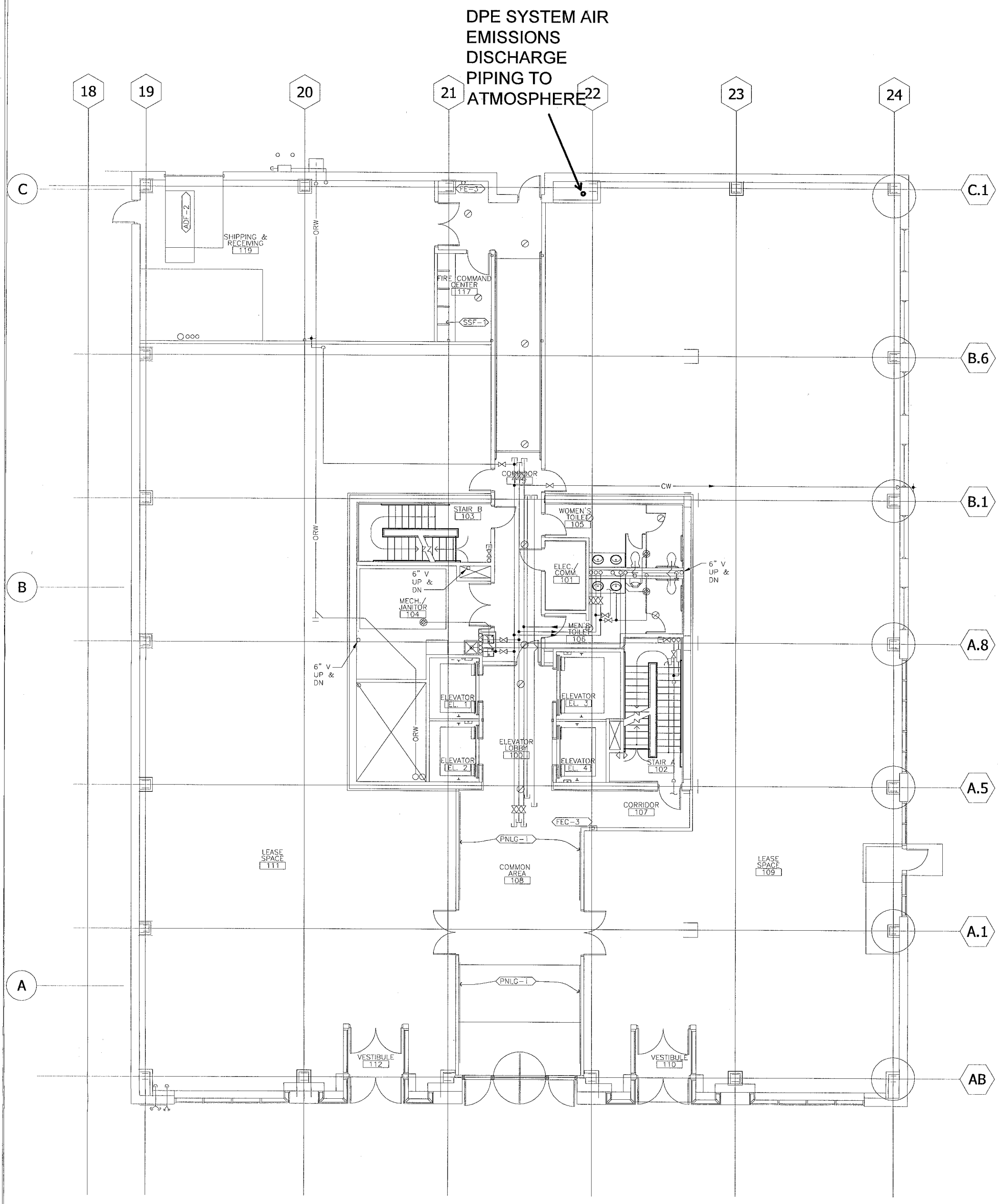
Rev	Date	By	Description
1	7/26/07	JS	design mods.
2	8/06/07	JS	design mods.
3	8/30/07	JS	design mods.
4	9/25/07	JS	CP2 ADD2.
5	11/6/07	JS	Bid Docs

LANDMARK ENVIRONMENTAL, LLC
2042 West 98th Street
Bloomington, MN 55431

BASEMENT FLOOR - DUAL PHASE EXTRACTION SYSTEM LAYOUT

219 AND 223 FIRST AVENUE S.W.
ROCHESTER, MINNESOTA

Landmark Project Number: CRC		
Drawn: JDS	Checked:	Designed: JDS
Scale: NONE	Date: 9/25/2007	Revision: 4
Drawing Number:	Sheet 1 Of	Sheets 7



1 FIRST FLOOR PLAN
1/8"=1'-0"

NOTE: Drawing provided by HGA; however, the venting and DPE systems were designed by Landmark Environmental, LLC.

LEGEND

O DPE Air Emissions Discharge Piping

N NOT TO SCALE

F\projects\crc\CAD\P200 1st floor - LM final.dwg

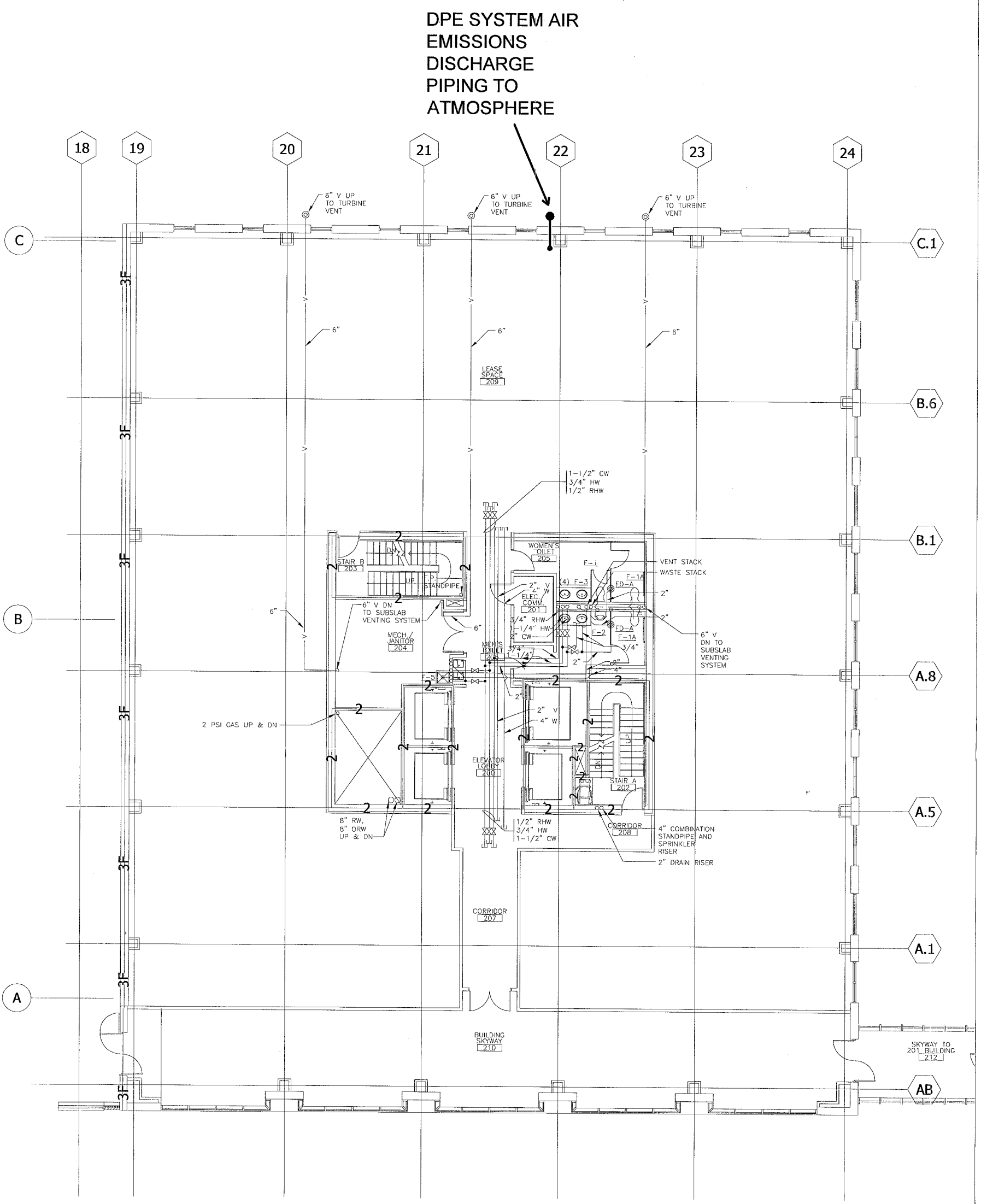
Rev	Date	By	Description

LANDMARK ENVIRONMENTAL, LLC
2042 W. 98th Street
Bloomington, MN 55431

FIRST FLOOR - DPE SYSTEM AIR EMISSIONS DISCHARGE PIPING

219 AND 223 FIRST AVENUE S.W.
ROCHESTER, MINNESOTA

Landmark Project Number: CRC			
Drawn: JDS	Checked: JDS	Designed: JDS	
Scale: NONE	Date: 9-18-07	Revision:	
Drawing Number:	Sheet 2	Of	Sheets 7



1 SECOND FLOOR PLAN
1/8"=1'-0"

NOTE: Drawing provided by HGA; however, the venting and DPE systems were designed by Landmark Environmental, LLC.

LEGEND

O DPE Air Emissions Discharge Piping

N NOT TO SCALE

F\projects\crc\CAD\P201 2nd floor - LM final.dwg

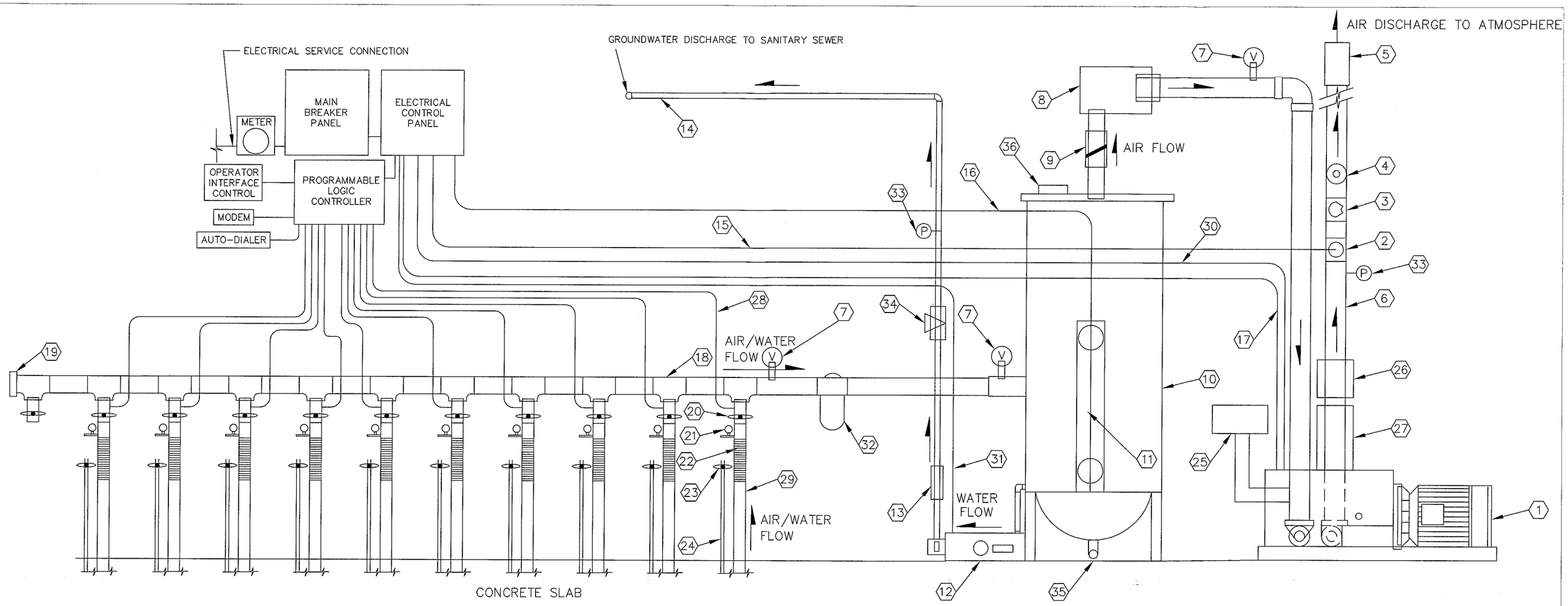
Rev	Date	By	Description
			.

LANDMARK ENVIRONMENTAL, LLC
2042 W. 98th Street
Bloomington, MN 55431

SECOND FLOOR - DPE SYSTEM AIR EMISSIONS DISCHARGE PIPING

219 AND 223 FIRST AVENUE S.W.
ROCHESTER, MINNESOTA

Landmark Project Number: CRC
Drawn: JDS | Checked: | Designed:
Scale: . | Date: 11-06-2007 | Revision: 00
Drawing Number: | Sheet 3 Of Sheets 7



1. REITSCHLE 7.5 HP VLR300 ROTARY CLAW VACUUM PUMP
2. TEMPERATURE GAUGE (20° – 350°F)
3. ERDCO AIR–FLOW METER (MAX 220 SCFM)
4. SAMPLING PORT
5. RAIN CAP & SILENCER EXHAUST STACK
6. EXHAUST PIPING – 3" GALV PIPE TO EXHAUST STACK
7. VACUUM GAUGE – 0 TO 30" Hg LIQUID FILLED STAINLESS STEEL
8. FILTER (SOLBERG INLET FILTER/ SILENCER WITH 10 MICRON) DILUTION VALVE WITH SOLBERG FILTER/ SILENCER VACUUM RELIEF VALVE – SET AT 22" Hg 3" CHECK VALVE PIPING 3"
9. BRONZE VERTICAL MOUNT SWING CHECK VALVE
10. 100 GALLON – VAPOR/LIQUID SEPARATOR
11. MOISTURE SEPARATOR LEVEL CONTROLS
12. PROGRESSIVE CAVITY TRANSFER PUMP (MOYNO MODEL 344 1 HP EXP PROOF)
13. INLINE SPRING CHECK VALVE
14. DPE DISCHARGE 1 1/4" GALV PIPE TO SANITARY SEWER
15. HIGH TEMPERATURE SENSOR CONTROL LEAD
16. WATER LEVEL CONTROL LEAD (LOW, HIGH, HIGH/HIGH)
17. DPE BLOWER CONTROL LEAD
18. 3" DIA MANIFOLD PIPE (SCH 80 PVC)
19. PVC END CAP
20. 3" AUTOMATED BALL VALVE OR SOLENOID VALVE, TYP
21. VACUUM GAUGE 0 TO 30" Hg, TYP LIQUID FILLED STAINLESS STEEL WITH RELIEF VALVE
22. 2" WIRE BRAIDED HIGH PRESSURE TRANSPARENT TUBING, TYP
23. 3/4" SNAP LOCK BALL VALVE, TYP
24. 3/4" PVC VACUUM RELIEF PIPE
25. INLET PARTICULATE FILTER
26. PULSATION DAMPENER
27. SILENCER
28. AUTOMATED BALL VALVE CONTROL LEAD
29. 2" SCH 80 PVC DPE PIPING
30. DPE BLOWER OVERLOAD SENSOR CONTROL LEAD
31. DISCHARGE PUMP CONTROL LEAD
32. SEDIMENT BAG FILTER
33. PRESSURE GUAGE (MAX 50 PSI)
34. WATER FLOW METER (MAX 50 GPM)
35. DRAIN PIPE
36. 3" CLEANOUT

DUAL PHASE EXTRACTION SYSTEM CENTERLINE SCHEMATIC

NO SCALE

NOTES:

1. ALL PVC PIPING SCHEDULE 80 CEMENTED SLIP JOINT UNLESS OTHERWISE NOTED.
2. ALL COMPONENTS TO BE INSTALLED TO MANUFACTURERS SPECIFICATIONS AND ACCORDING TO THE CONTRACT DOCUMENTS.

Rev	Date	By	Description

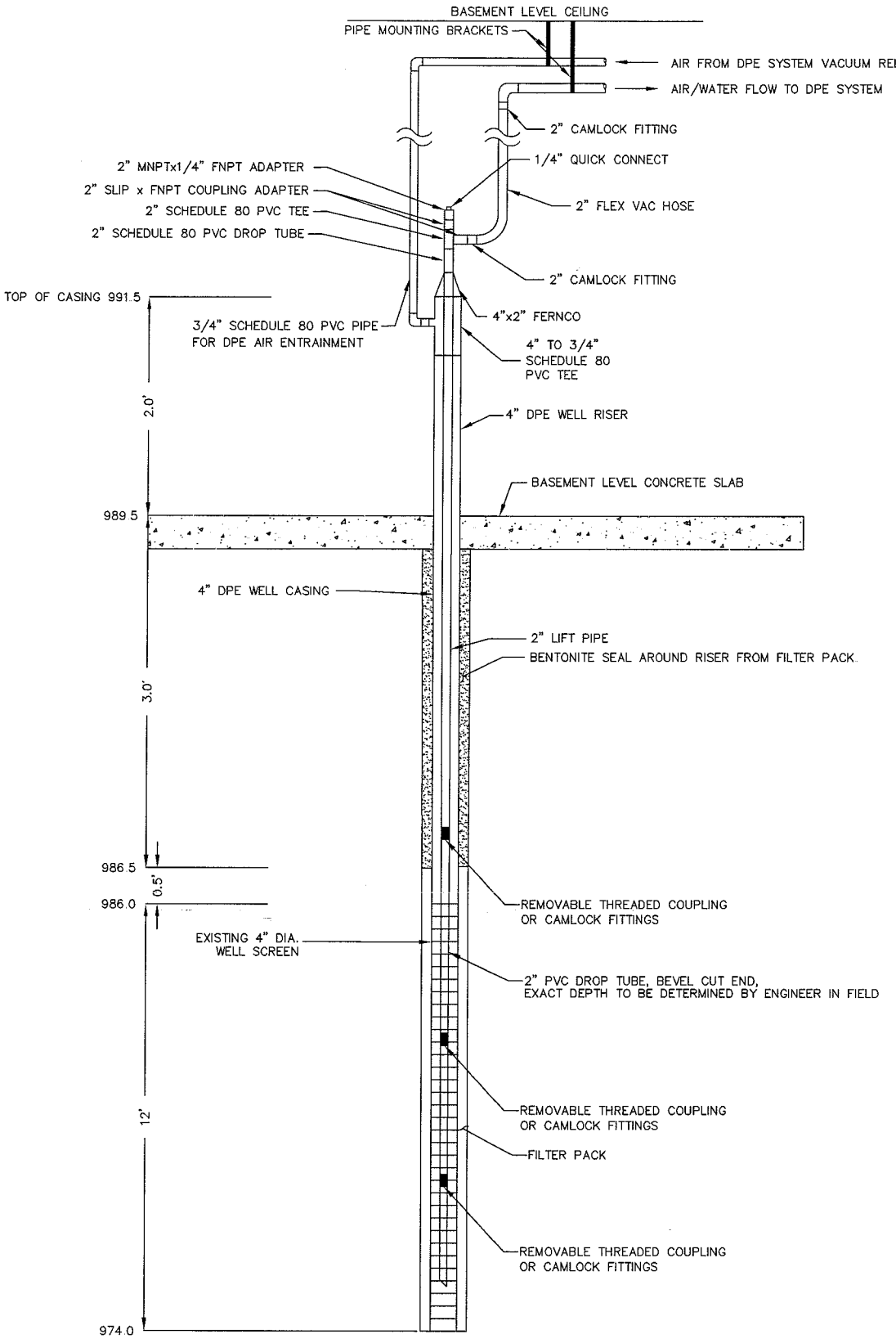
LANDMARK ENVIRONMENTAL, LLC
2042 W 98th Street
Bloomington, MN 55431

DUAL-PHASE EXTRACTION SYSTEM SCHEMATIC

219 AND 223 FIRST AVENUE S.W.
ROCHESTER, MINNESOTA

Landmark Project Number: 06062 03			
Drawn: AMF	Checked: JDS	Designed: JDS	
Scale: NONE	Date: 11/07/07	Revision:	
Drawing Number:		Sheet 4 Of	Sheets 7

F:\PROJECTS\Cre--City of Rochester\CAD\DPE System Schematic 010107.dwg



NOTES:
1. ALL CONNECTIONS TO THE VERTICAL DPE PORTS SHALL BE IN ACCORDANCE WITH MINNESOTA DEPARTMENT OF HEALTH WELL CODE.
2. SEE SECTION 026200 10 TABLE 1 – PROPOSED REMEDIATION AND MONITORING WELL CONSTRUCTION SUMMARY.
3. 2" PVC DROP TUBE SHALL BE CONNECTED AT 5' INTERVALS WITH REMOVABLE THREADED COUPLINGS OR CAMLOCK FITTINGS.

CONNECTION TO DUAL PHASE EXTRACTION (DPE) PORT
NOT TO SCALE

F:\PROJECTS\Crc-City of Rochester\CAD\20071101 DPE Details.dwg

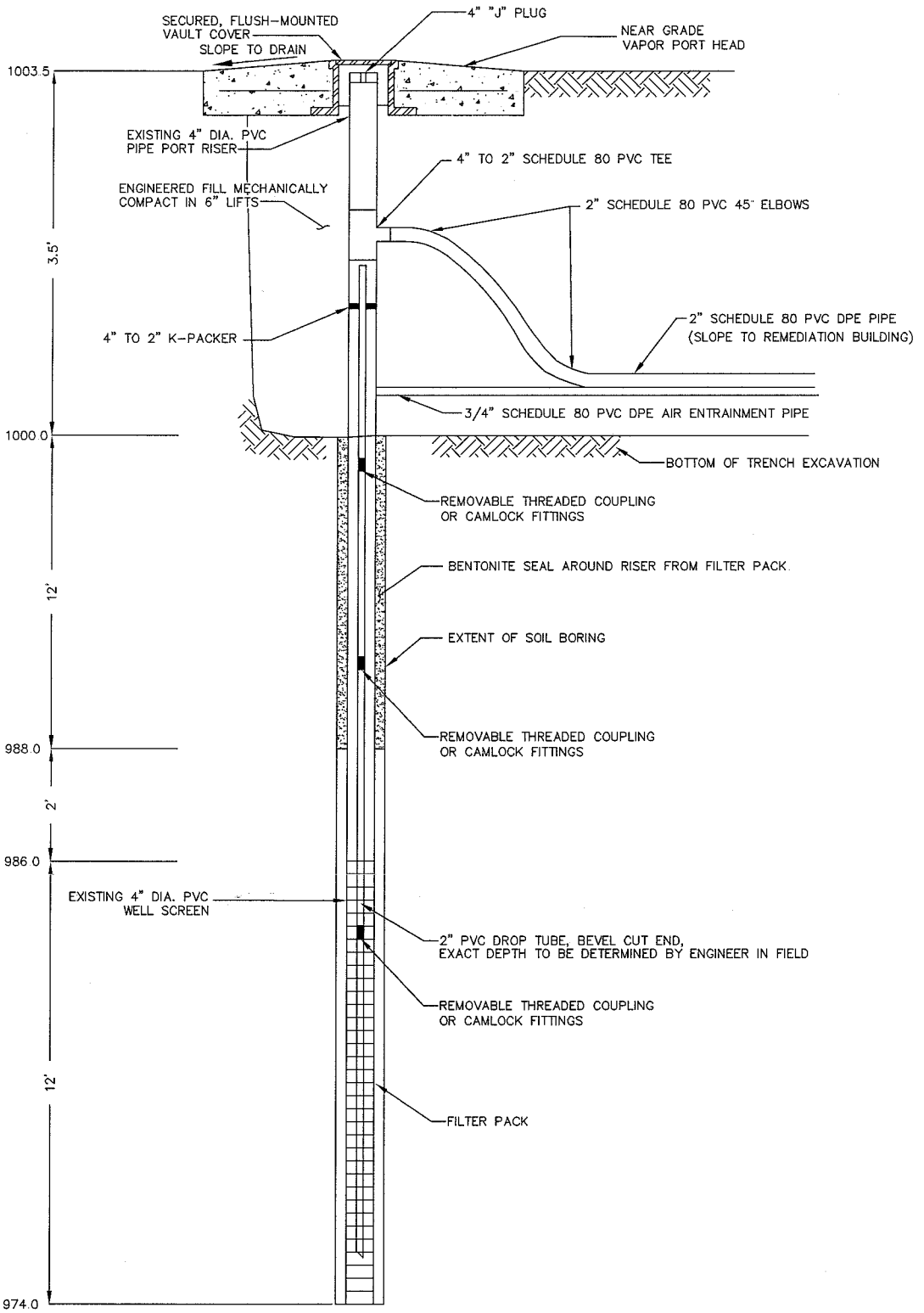
Rev	Date	By	Description

LANDMARK ENVIRONMENTAL, LLC
2042 West 98th Street
Bloomington MN 55431

DPE WELL DETAIL
(BASEMENT LEVEL)

219 AND 223 FIRST AVENUE SW
ROCHESTER, MINNESOTA

Landmark Project Number: 06062 03		
Drawn: AMF	Checked: JDS	Designed: JDS
Scale:	Date: 11/07/07	Revision:
Drawing Number:	Sheet 5 Of	Sheets 7



NOTES:
1. ALL CONNECTIONS TO THE VERTICAL DPE PORTS SHALL BE IN ACCORDANCE WITH MINNESOTA DEPARTMENT OF HEALTH WELL CODE.
2. SEE SECTION 026200.10 TABLE 1 – PROPOSED REMEDIATION AND MONITORING WELL CONSTRUCTION SUMMARY.
3. 2" PVC DROP TUBE SHALL BE CONNECTED AT 10' INTERVALS WITH REMOVABLE THREADED COUPLINGS OR CAMLOCK FITTINGS.

CONNECTION TO DUAL PHASE EXTRACTION (DPE) PORT

NOT TO SCALE

F:\PROJECTS\Crc-City of Rochester\CAD\20071101 DPE Details.dwg

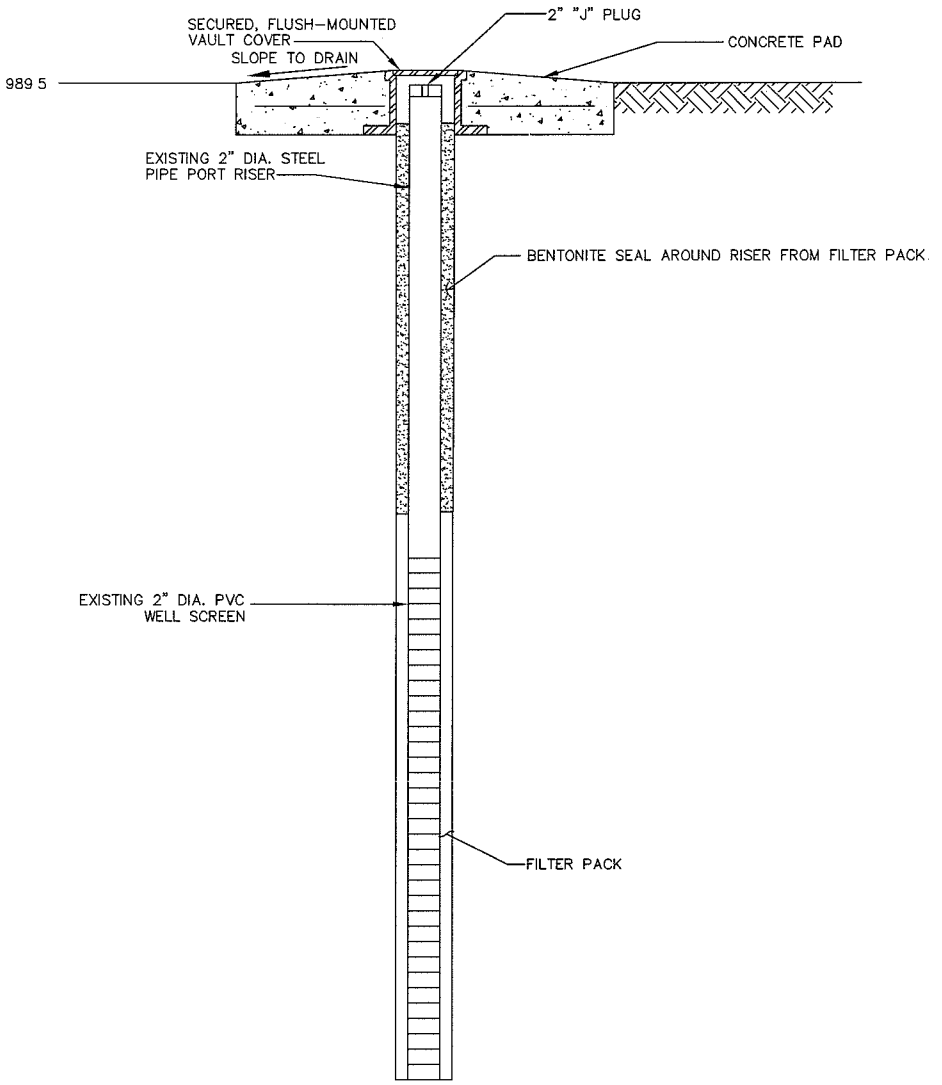
Rev	Date	By	Description

LANDMARK ENVIRONMENTAL, LLC
2042 West 98th Street
Bloomington MN 55431

DPE-3 WELL DETAIL (STREET LEVEL)

219 AND 223 FIRST AVENUE SW
ROCHESTER, MINNESOTA

Landmark Project Number: 06062 03		
Drawn: AMF	Checked: JDS	Designed: JDS
Scale:	Date: 11/07/07	Revision:
Drawing Number:	Sheet 6 Of	Sheets 7



NOTES:
1. ALL CONNECTIONS SHALL BE IN ACCORDANCE WITH MINNESOTA DEPARTMENT OF HEALTH WELL CODE.
2. SEE SECTION 026200 10 TABLE 1 – PROPOSED REMEDIATION AND MONITORING WELL CONSTRUCTION SUMMARY.

F:\PROJECTS\Crc-City of Rochester\CAD\20071101 DPE Details.dwg

Rev	Date	By	Description

LANDMARK ENVIRONMENTAL, LLC
2042 West 98th Street
Bloomington, MN 55431

MONITORING WELL DETAIL

219 AND 223 FIRST AVENUE SW
ROCHESTER, MINNESOTA

Landmark Project Number: 06062 03			
Drawn: AMF	Checked: JDS	Designed: JDS	
Scale: NONE	Date: 11/07/07	Revision:	
Drawing Number:	Sheet 7 Of 7	Sheets 7	

Exhibit C

Technical Specifications

TECHNICAL SPECIFICATIONS

Minnesota Bio Business Center
Rochester, Minnesota

TABLE OF CONTENTS

SECTION 011100

SUMMARY OF REMEDIATION WORK

1.01 INTRODUCTION

These Specifications were prepared to summarize the tasks related to the construction of the proposed dual phase extraction (DPE). The OWNER will contract with the ENGINEER to oversee and manage the Work performed by the ENVIRONMENTAL CONTRACTOR. The work includes the following tasks:

- Prepare and implement a site safety plan.
- Subcontract DPE and monitoring well installation.
- Subcontract the DPE system groundwater discharge plumbing to the sanitary sewer.
- Install a groundwater treatment system, if necessary.
- Subcontract the DPE system air emissions effluent plumbing to the atmosphere.
- Install an air treatment system, if necessary.
- Install a dual phase system consisting of a Reitschle 7.5 HP 3-phase explosion proof VLR300 R blower, a Moyno 1 HP transfer pump, a vapor liquid separator, control panel, and additional miscellaneous electrical and mechanical equipment.
- Installation of a telemetry system.
- System Start-up/debugging.

PART 2: PRODUCTS [NOT USED]
PART 3: EXECUTION [NOT USED]

END OF SECTION 011100

SECTION 011400

WORK RESTRICTIONS - SAFETY

1.01 GENERAL

A. In accordance with generally accepted construction practices, ENVIRONMENTAL CONTRACTOR shall be solely and completely responsible for job-site conditions and safety procedures and programs, including safety and health of all persons and property, on those portions of the property affected by or used by ENVIRONMENTAL CONTRACTOR, ENVIRONMENTAL CONTRACTOR's employees, subcontractors, agents, and others during performance of the Work. This requirement will apply continuously and not be limited to normal working hours. Observation of the Work and ENVIRONMENTAL CONTRACTOR's performance by OWNER and ENGINEER is not intended to include review of the adequacy of ENVIRONMENTAL CONTRACTOR's safety and health procedures and programs on or near the construction site. ENVIRONMENTAL CONTRACTOR is solely responsible for the protection of property and the safety and health of its employees, subcontractors, suppliers, agents and others on or near the property. OWNER and ENGINEER shall have access to all areas of the Property at all times. ENVIRONMENTAL CONTRACTOR shall make all areas of the Property available at all times to OWNER and ENGINEER.

1.02 SITE SAFETY PLAN

A. ENVIRONMENTAL CONTRACTOR shall be solely responsible for the health and safety of all persons at the property, specifically including but not limited to, health and safety matters related to the remedial nature of the Work and the potential for encountering hazardous substances in groundwater and soil during the Work. ENVIRONMENTAL CONTRACTOR shall prepare its own Site Safety Plan (SSP) specifically for performance of the Work, or the ENVIRONMENTAL CONTRACTOR shall adopt the ENGINEER'S SSP. ENVIRONMENTAL CONTRACTOR's SSP shall, at a minimum, meet the requirements established in ENGINEER's SSP and shall meet the regulatory requirements set forth by the Occupational Safety and Health Administration (OSHA), specifically those set forth in the Code of Federal Regulations (CFR) at 29 CFR Parts 1910 and 1926, in particular 1910.120 (Hazardous Waste Operations and Emergency Response). Specific topics that shall be addressed in ENVIRONMENTAL CONTRACTOR's SSP are those that are required to be addressed by Laws and Regulations, those that are addressed in ENGINEER's SSP, and the following (if not addressed in ENGINEER's SSP):

1. worker medical surveillance;

2. worker training;

3. a detailed description of the planned movement of labor, equipment and materials from and between work areas as work progresses, including measures to be employed to prevent recontamination of previously cleaned areas and contamination of areas that do not now contain hazardous materials;

4. a detailed description of the personnel decontamination facilities to be employed including the planned phasing of decontamination facilities between work areas as the work progresses and the methods to be used to collect, store, treat, and ultimately dispose of personnel decontamination waters and wastes;

5. a detailed description of the area for decontamination of vehicles and equipment and the methods to be used to collect above, treat and ultimately dispose of washdown decontamination waters and sediments;

6. personal protective equipment types to be used and conditions for use;

7. personal hygiene and personnel decontamination procedures;

8. respirator protection program and procedures;

9. personnel and ambient air monitoring;

10. emergency and first aid equipment and supply;

11. dust and particulate emission control;

12. monitoring and mitigation of worker heat and cold stress;

13. the types of materials and substances likely to be encountered in the course of the work; and

14. property security, property access, and property control.

In addition, ENVIRONMENTAL CONTRACTOR's SSP shall detail safety procedures appropriate for the Work.

ENVIRONMENTAL CONTRACTOR shall submit the SSP or a completed copy of the ENGINEER'S SSP adoption form to ENGINEER before beginning the Work and will not commence construction activities until its receipt is noted by ENGINEER and distributed as herein below provided. ENGINEER's review will be only to see that ENVIRONMENTAL CONTRACTOR's SSP meets the minimum requirements set

forth in these Specifications. ENVIRONMENTAL CONTRACTOR shall make reasonable changes required by ENGINEER to make ENVIRONMENTAL CONTRACTOR's SSP conform to the minimum requirements. ENVIRONMENTAL CONTRACTOR shall distribute four copies to ENGINEER and one copy to subcontractors, suppliers, and all other parties that will be required to enter the property for any purpose. Such distribution shall not impose on any party any obligation to approve ENVIRONMENTAL CONTRACTOR's SSP, but is intended only for informational purposes to make parties aware of ENVIRONMENTAL CONTRACTOR's requirements for entry to the Property. It is not intended that ENVIRONMENTAL CONTRACTOR's SSP cover routine construction activities that would not otherwise require a project specific health and safety plan under Laws and Regulations were it not for the potential for contact with contaminated soil and water.

ENVIRONMENTAL CONTRACTOR's SSP shall designate a qualified individual to act as ENVIRONMENTAL CONTRACTOR's Site Safety Officer for purposes of assuring compliance by all persons with ENVIRONMENTAL CONTRACTOR's SSP. ENVIRONMENTAL CONTRACTOR's Site Safety Officer shall be present on the property during all activities that could potentially result in exposure to contaminated soil or groundwater, specifically including but not limited to, excavation, transportation and backfilling. At other times of routine construction, ENVIRONMENTAL CONTRACTOR shall determine the need for the presence of the designated Site Safety Officer. However, the Site Safety Officer (or a designated alternate(s)) shall be available by telephone continuously during the Contract Time, and shall be available to respond to the property within two hours at any time following request by ENVIRONMENTAL CONTRACTOR, OWNER or ENGINEER at no additional cost to OWNER.

ENVIRONMENTAL CONTRACTOR shall hold regularly scheduled safety meetings (at least weekly) that shall be given by ENVIRONMENTAL CONTRACTOR's Site Safety Officer. That meeting shall also be attended by ENVIRONMENTAL CONTRACTOR's resident supervisors and subcontractors involved in the Work during the upcoming period. OWNER and ENGINEER will attend when appropriate. The topic of the meeting shall specifically be limited to safety and attendees shall at a minimum discuss safety problems and requirements related to upcoming work.

ENVIRONMENTAL CONTRACTOR will not be required to supply personnel protective equipment or monitoring equipment for any persons other than ENVIRONMENTAL CONTRACTOR's employees. However, ENVIRONMENTAL CONTRACTOR shall make available ENVIRONMENTAL CONTRACTOR's decontamination facilities to those persons who reasonably require access to the Work, including OWNER, ENGINEER, and regulatory authorities. ENVIRONMENTAL CONTRACTOR shall be solely responsible for assuring compliance by all persons with ENVIRONMENTAL CONTRACTOR's SSP in

accordance with paragraph 6.20 of the General Conditions and Supplementary Conditions. ENVIRONMENTAL CONTRACTOR shall not unreasonably restrict access to the property and shall not proceed with Work that OWNER or ENGINEER request to observe during such time as OWNER or ENGINEER are being denied access to the property because of non-compliance with ENVIRONMENTAL CONTRACTOR's SSP.

B. The costs of safety and health as specified in this Section 011400 of the Specifications shall be included in the Contract Price and no additional compensation will be provided. Health and safety shall be of paramount importance and shall take precedence over cost and schedule considerations.

C. ENGINEER has prepared a SSP for ENGINEER's employees. A copy of ENGINEER's SSP is included as Exhibit F of the Specifications.

1.03 HAZARD COMMUNICATION PROGRAMS

A. ENVIRONMENTAL CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between employers at the Property in accordance with Laws and Regulations. All workers shall have access to all material safety data sheets and other hazard communication information.

1.04 EMERGENCIES

A. In emergencies affecting the safety or protection of persons, the Work, or any property adjacent to the Work, ENVIRONMENTAL CONTRACTOR, without special instruction from OWNER or ENGINEER, is obligated to act to prevent threatened damage, injury, or loss. ENVIRONMENTAL CONTRACTOR shall give ENGINEER prompt written notice if ENVIRONMENTAL CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been created by such emergency. If ENGINEER or OWNER determines that a change in the Contract Documents is required because of the action taken by ENVIRONMENTAL CONTRACTOR in response to such an emergency, a Change Order will be issued to document the consequences of such action.

1.05 PROPERTY CHARACTERIZATION

A. A list of contaminants identified to be on-site is presented in ENGINEER's SSP. More detailed information is contained in documents located at ENGINEER's offices and may be reviewed at ENGINEER's office upon request by ENVIRONMENTAL CONTRACTOR or ENVIRONMENTAL CONTRACTOR's designee. A summary of previous investigation results is included in the VRAP.

1.06 SUBMITTALS

A. ENVIRONMENTAL CONTRACTOR shall submit to ENGINEER proof of worker training and proof of medical surveillance.
B. ENVIRONMENTAL CONTRACTOR shall submit 4 copies of the ENVIRONMENTAL CONTRACTOR's SSP or completed ENGINEER'S SSP adoption form to the ENGINEER 5 days prior to Work is scheduled to begin.

PART 2: PRODUCTS [NOT USED]
PART 3: EXECUTION [NOT USED]

END OF SECTION 011400

SECTION 013300

SUBMITTAL PROCEDURES

1.01 GENERAL SUBMITTAL PROCEDURES

A. Submittals shall be delivered to GENERAL CONTRACTOR's and ENGINEER's Project Managers.

1.02 LIST OF SUBMITTALS

ENVIRONMENTAL CONTRACTOR shall submit the following list of submittals, but ENVIRONMENTAL CONTRACTOR shall submit all other submittals not specifically specified below but called out elsewhere in these Contract Documents.

A. SITE SAFETY PLAN

Four copies of the ENVIRONMENTAL CONTRACTOR's Health and Safety Plan and one copy of training documentation shall be submitted five days before work starts as discussed in Section 011400. See Section 011400 for more information.

B. SUBCONTRACTOR AND LANDFILL DOCUMENTATION

Documentation of the subcontractors that will be used on the project shall be submitted to ENGINEER upon receipt.

C. CERTIFICATE OF INSURANCE

One copy of the Certificate of Insurance with the liability limit requirements discussed in the Contract Documents shall be submitted five days before work starts..

PART 2: PRODUCTS [NOT USED]
PART 3: EXECUTION [NOT USED]

END OF SECTION 013300

SECTION 015050

MOBILIZATION/DEMOBILIZATION

PART 1: GENERAL

1.01 DESCRIPTION

A. All Work included in this Section shall be performed in accordance with the following paragraphs, as well as the General Requirements as set forth in Division 1 and the requirements of all of these Contract Documents.

B. The Work covered by this section of the Specifications consists of, but is not limited to furnishing all supervision, labor, equipment, and materials and performing all operations necessary to:

1. Move (mobilize) personnel, equipment, supplies, and incidentals to the Property.

2. Prepare a SSP and train personnel to meet the requirements of Section 015010.

1. Identify and obtain approval from the ENGINEER or OWNER for the ENVIRONMENTAL CONTRACTOR's storage, equipment, parking, and soil loading areas;

2. Perform all work that must be performed before beginning work on the various items for which payment is provided elsewhere in these Specifications;

3. Furnish all submittals described in these Specifications;

4. Furnish all insurance required specifically for this Project;

5. Obtain all permits required specifically for the Work.

6. Coordinate Work with utility companies.

C. The Work covered by this section also includes decontaminating and removing (demobilizing) all equipment from the Property after it is no longer necessary and cleaning up the area within the construction limits at the completion of the Work.

1.02 SUBMITTALS

A. All submittals described in this section shall be transmitted in accordance with Section 013300 of these Specifications.

B. The following submittals are required as part of ENVIRONMENTAL CONTRACTOR's mobilization, and shall be submitted within five (5) days of being given Notice to Proceed.

1. Project Contacts

a. ENVIRONMENTAL CONTRACTOR shall submit to ENGINEER a list of technical personnel available for ongoing technical support and who are familiar with the Project and are responsible for its completion.

b. The list should include at least two persons and should include names, functional titles, mailing addresses, delivery addresses, and phone numbers.

c. At least two phone numbers shall be furnished which will provide 24-hour answering by a competent technical representative of ENVIRONMENTAL CONTRACTOR in the event of an unanticipated condition requiring immediate attention. At least one person should be available at all times for immediate response to the site within 2 hours of being called. This person shall have authority to make field decisions for ENVIRONMENTAL CONTRACTOR.

2. Permits

a. ENVIRONMENTAL CONTRACTOR shall submit copies of all permits to ENGINEER a minimum of five days prior to any work activities at the Property.

C. Site Safety Plan

1. ENVIRONMENTAL CONTRACTOR shall submit to ENGINEER four copies of ENVIRONMENTAL CONTRACTOR's SSP or completed ENGINEER'S SSP adoption form specific for this project. The SSP shall be submitted in accordance with submittal procedures in Section 013300, five days before Work is scheduled to begin.

PART 2: PRODUCTS [NOT USED]

PART 3: EXECUTION [NOT USED]

PART 4: MEASUREMENT AND PAYMENT

4.01 MOBILIZATION/DEMOBILIZATION

A. Mobilization and demobilization of the ENVIRONMENTAL CONTRACTOR will include furnishing supervision, labor, equipment, and materials as are necessary for all mobilization and demobilization activities related to the work, including: mobilization and demobilization of equipment; delivery of supplies, materials, and all incidentals; preparing and obtaining all permits, approvals, and record documents; preparing any submittals required specifically for disposal of contaminated soil cuttings from well drilling activities; arranging for marking of underground utility locations and coordination with underground utility companies; establishing and maintaining decontamination and loading areas; and all other items not specifically listed but necessary to mobilize the operators and equipment in good working order and to remove from the Property all materials used by the ENVIRONMENTAL CONTRACTOR.

All tasks and costs associated with mobilization/demobilization activities will be incidental to the excavation costs.

4.02 SITE SAFETY PLAN

A. The ENVIRONMENTAL CONTRACTOR will be paid on the basis of lump-sum price for preparing and maintaining a SSP as specified in the Contract Documents. Payment will include all labor and materials required to complete and maintain the SSP.

END OF SECTION 015050

SECTION 026200

DUAL PHASE EXTRACTION ABOVEGROUND PIPING

PART I -GENERAL

1.1 INTRODUCTION

A. These Specifications were prepared following completion of the (1) Phase I Environmental Assessments for 219 and 223 First Avenue S.W., Rochester, Minnesota, dated March 2007; (2) Phase II Environmental Investigation, dated January, 2007; (3) Voluntary Response Action Plan (VRAP), dated June 2007; (4) Environmental Contingency Plan (ECP), dated June 2007; (5) VRAP Addendum – Response Action Design, July 17, 2007; and, (6) VRAP, ECP, & Design Modifications Submittal.

1.2 RELATED SECTIONS

A. Section 026200.10 – Remediation Wells.

1.3 SUBMITTALS

A. Pipe line pressure test data shall be submitted to Owner's Representative.

1.4 EXISTING CONDITIONS

A. DPE piping from the wells will be routed along the ceiling of the basement level to the proposed remediation room as shown on the proposed Drawings.

1.5 REGULATORY REQUIREMENTS

A. Contractor shall conform to applicable codes of state, local and federal regulatory authorities. If any information contained within these specifications is contrary to applicable regulations, the Bidder shall notify the Owner's Representative immediately upon discovery.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary end caps and closures on piping and fittings. Maintain in place until connections to pipe are made.

B. Protect piping systems from entry of foreign materials by providing temporary covers, completing sections of Work and isolating parts of completed system.

PART 2 - PRODUCTS

2.1 ABOVEGROUND PIPING FROM REMEDIATION WELLS

A. PVC Pipe: ASTM D1785, Schedule 80, flush threaded.

1. Fittings

2. Joints

B. Refer to Drawings.

2.2 MULTI-PHASE EXTRACTION DROP TUBE, WELLHEAD COMPLETION

A. PVC Pipe: ASTM D1785, Schedule 80, flush threaded.

B. Refer to drawings.

2.3 ACCESSORIES

A. None.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Contractor shall verify to Owner's Representative that all piping is installed according to specification and Drawings.

3.2 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends, as required, and remove burrs.

B. Remove debris, scale and dirt, on inside and outside, before assembly.

3.3 CONNECTIONS

A. All connections shall be fused.

3.4 INSTALLATION – REMEDIATION PIPING

A. All piping must be clearly labeled during installation so that piping labels correspond to correct well.

B. Install pipe and fittings in accordance with manufacturer's instructions.

C. Cover pipe ends during installation with cap, tape, or other, to prevent debris and soil from entering the pipe.

D. At the basement ceiling, the horizontal DPE system piping runs from each of the wells shall slope down towards the system location so that condensation drains towards the DPE system location, and NOT towards the wells. Confirm elevation and slope at every pipe joint with laser or level and stadia rod.

E. Route pipe over or under obstructions (utilities, etc.), provided that there is adequate cover, such that there are no low points in piping runs.

F. Clearances between remediation piping and utilities must meet minimum requirements specified by each individual utility owner.

3.6 AIR PRESSURE TESTING - PREPARATION

A. Upon completed placement of DPE piping, conduct a line pressure test on each new pipeline to determine degree of tightness.

B. Testing shall be performed after piping has been installed but prior to piping connection to DPE wells. Piping shall be terminated at the treatment building location but shall remain unconnected to equipment until testing is completed.

C. Contractor shall seal each piping run. One end of each piping run shall be fitted with a connector to pressurize line for testing purposes and connecting a pressure gauge.

D. Compressed gas source shall be equipped with an adjustable pressure relief regulator and pressure gauge. Connection for piping run will include a ball or other leak-proof valve for isolating pipe line after pressurization for duration of test.

E. Provide all labor, blowers, compressors, other compressed gas sources, piping, connections, gauges, measuring devices and all other appurtenances necessary to conduct testing.

F. Conduct pressure testing at a time acceptable to and in the presence of the Owner's Representative, and in accordance with the requirements of this section.

B. Any detected leaks or reductions in line pressure shall result in failure of the test and require location and elimination of the leak by the Contractor, at no additional cost to Owner's Representative.

3.7 AIR PRESSURE TESTING

A. Pressure testing shall be successfully completed prior to connection to the system manifold and DPE wells.

B. DPE pipelines shall be tested at 15 psig (pounds per square inch gauge).

C. Pressure test all other pipe prior to backfilling by pressurizing the pipe with air to 15 psig and soaping the joints to check for leaks.

D. Contractor shall test each piping run individually, however, individual tests may be performed concurrently.

E. Contractor shall pressurize the pipeline to be tested to the required pressure and then isolate the line from the pressure source by closing the isolation valve.

F. Pipe must maintain 90 percent of the initial pressure for 5 minutes to pass the test.

G. Contractor must complete line-testing form for each pipe run to be tested. Forms must be provided to the Owner's Representative.

H. Contractor shall submit completed forms to Owner's Representative after completion of testing. Any failures in pipe tests shall be specifically and clearly noted and brought to Owner's Representative's attention.

3.8 FIELD QUALITY CONTROL

A. If Work does not meet the requirements specified in the Contract Documents, remove Work and replace until accepted by the Owner's Representative, at no additional cost to the Owner's Representative.

A. Repair and retest all pipe, joints and fittings failing the pressure test at no additional cost to the Owner's Representative.

END OF SECTION

SECTION 026200.10

REMEDIATION AND MONITORING WELLS

PART 1 - GENERAL

1.1 INTRODUCTION

A. These Specifications were prepared following completion of the (1) Phase I Environmental Assessments for 219 and 223 First Avenue S.W., Rochester, Minnesota, dated March 2007; (2) Phase II Environmental Investigation, dated January, 2007; (3) Voluntary Response Action Plan (VRAP), dated June 2007; (4) Environmental Contingency Plan (ECP), dated June 2007; (5) VRAP Addendum – Response Action Design, July 17, 2007; and, (6) VRAP, ECP, & Design Modifications Submittal.

1.2 RELATED SECTIONS

A. Section 026200 – Dual Phase Extraction Aboveground Piping

1.3 REFERENCES

B. Minnesota Department of Health Well Code.

C. City specifications, standards, and requirements, City of Rochester, Minnesota.

1.4 EXISTING CONDITIONS

A. The soil and fill material at the property generally exists at depths ranging from 10 to 15 feet below ground surface (street level). Bedrock exists at depths ranging 13 to 17 feet bgs. A one to two-foot thick layer of weathered bedrock exists between the soil/fill material and the bedrock. The depth to ground water is expected to be approximately 20 to 25 feet bgs. It is important to note that all of the wells, except DPE-3, shall be installed at the base of the basement level excavation, and not from the street level.

B. Coring through concrete is not expected for most boring locations.

C. Drilling will occur as shown on Drawings.

1.5 SUBMITTALS

A. Submit to Owner's Representative, signed copies of well records and other documents which may be required by state, local or federal agencies, including permits.

1.6 REGULATORY REQUIREMENTS

A. CONTRACTOR shall conform to applicable codes of state, local and federal regulatory authorities. If anything contained within these specifications is contrary to Minnesota well code or other applicable regulations, the Bidder shall notify the Owner's Representative immediately upon discovery.

B. The CONTRACTOR shall obtain any and all permits including Minnesota Department of Health permits and City of Rochester Street-Use Permits.

1.7 UTILITIES

A. CONTRACTOR shall be responsible for calling Minnesota Gopher State One-Call to locate public utilities a minimum of 72 hours and a maximum of 10 days prior to initiating drilling activities. All areas must be remarked if snowfall, ice cover, or faded paint hinders positive identification of located utilities.

B. CONTRACTOR shall verify with Owner's Representative, location of non-public utilities located in work areas.

PART 2 - PRODUCTS

2.1 WELL PRODUCTS

A. All products shall be new materials and shall be as specified on the Drawings.

B. Well materials required by the Minnesota Department of Health for fractured bedrock installation shall be used. The well piping shall be flush threaded and shall use Buna O-rings for each connection.

C. For DPE-3 and all of the monitoring wells, watertight vaults shall be Morrison, 418XAW, New Welded Manhole, available from Morrison Brothers Company, P.O. Box 238, Dubuque, IA 52001, (800) 553-4840, FAX (319) 583-5028, or equivalent.

2.2 SAMPLING PRODUCTS

A. One groundwater sample will be collected at each of the monitoring and remediation wells.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. The CONTRACTOR shall provide adequate safety cones, barriers, signs, and/or other equipment as necessary for automobile and pedestrian traffic control for drilling locations.

B. CONTRACTOR shall protect all structures and utilities near the wells from damage.

3.2 DRILLING

A. Drill borehole to diameters sufficient for proper well installation.

3.3 WELL INSTALLATION

A. Well installation shall be in accordance with Drawings and the Proposed Monitoring Well Construction Table attached to the end of this specification section, and subject to minor changes as directed in the field by on-site Owner's representative.

B. Well installations shall be completed as required by MDH well code for fractured bedrock.

C. Prior to use, the casings and couplings shall be inspected for cuts, deformations, deep scratches, damaged ends, and other imperfections. Any casing or coupling having such defect(s) may not be used. Trim and smooth ends and remove burrs from well casings. Remove any debris or dirt, on inside and outside of casings, before assembly.

D. The well casing and screen assembly shall be constructed during the drilling of the borehole. Place well casing(s) and screen assembly(s) immediately after drilling, with well screen centered in the borehole. Set firmly in place. Allow inspection of casing(s) prior to placement of well construction materials.

E. CONTRACTOR shall ensure that the filter pack and filter pack seal are installed evenly surrounding the well screen and casing over the proper interval by using a tape measure, measuring rod or similar device. The filter pack sand shall not be allowed to bridge. If bridging occurs, the filter pack sand shall be tamped into place to surround the well screen and/or casing.

F. Maintain well openings(s) and casing(s) free of contaminated materials. Do not permit cuttings to enter casing(s) when the top is being cut to final elevation.

G. The CONTRACTOR shall not allow bentonite or other well construction materials to bridge in the augers while constructing wells.

H. Accurately record actual locations of wells, depths, subsoil strata and drilling difficulties encountered.

I. Settling of neat cement must be replaced as necessary to form a proper seal and to bring to grade.

3.4 SOIL BORING ABANDONMENT

A. All soil borings that are not completed as wells shall be abandoned according to state guidelines.

3.5 DRILL CUTTINGS

A. Owner's Representative will provide on-site personnel to segregate soil cuttings.

B. Drill cuttings shall be collected and containerized in CONTRACTOR-provided standard, 55-gallon drums. CONTRACTOR shall transport all drums containing drill cuttings to a storage area as directed by the on-site Owner's Representative.

C. All drums shall be labeled as directed by Owner's Representative.

D. Owner's Representative will coordinate disposal of soil cuttings.

3.6 SITE CLEANING

A. Driller shall collect and dispose of all cement, sand pack and bentonite bags, as well as other refuse and materials, and cleaning up and restoring the areas where drilling has taken place.

END OF SECTION

SECTION 026200.10 - TABLE 1

PROPOSED REMEDIATION AND MONITORING WELL CONSTRUCTION SUMMARY
(elevations are in feet above mean sea level)

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

Monitoring Well	Actual Top of Casing Elevation[1]	Actual Surface Elevation[1,2]	Actual Top of Seal Elevation[1]	Actual Top of Filter Pack Elevation[1]	Actual Top of Well Screen Elevation[1]	Actual Bottom of Well Screen Elevation[1]	Screen Interval (feet)	Actual Bottom of Well Elevation[1]	Actual Well Depth (feet)
MW-14	989.75	989.5	989	984	983	973	10	971	18.5
MW-15	989.75	989.5	989	984	983	973	10	971	18.5
MW-16	989.75	989.5	989	984	983	973	10	971	18.5
MW-17	989.75	989.5	989	971	969	964	5	962	27.5
MW-18	989.75	989.5	989	936	934	929	5	929	60.5
MW-19	989.75	989.5	989	984	983	973	10	971	18.5
MW-20	989.75	989.5	989	984	983	973	10	971	18.5
DPE-1	991.5	989.5	989.25	986.5	986	974	12	974	15.5
DPE-2	991.5	989.5	989.25	986.5	986	974	12	974	15.5
DPE-3	1003.2	1003.5	989.5	986.5	986	974	12	974	29.5
DPE-4	991.5	989.5	989.25	986.5	986	974	12	974	15.5
DPE-5	991.5	989.5	989.25	986.5	986	974	12	974	15.5
DPE-6	991.5	989.5	989.25	986.5	986	974	12	974	15.5
DPE-7	991.5	989.5	989.25	986.5	986	974	12	974	15.5
DPE-8	991.5	989.5	989.25	986.5	986	974	12	974	15.5
DPE-9	991.5	989.5	989.25	986.5	986	974	12	974	15.5
DPE-10	991.5	989.5	989.25	986.5	986	974	12	974	15.5

(1) = Actual benchmark elevation of 1003.18 feet at the top nut of the fire hydrant located on the east side of First Ave SW as surveyed by McGhie and Betts on 7/30/07. This benchmark elevation was verified by the City of Rochester's Public Works Department in 1992.

(2) = The Actual Ground Surface elevation represents the elevation of the basement level floor slab for all the prposed wells except DPE-3, which is installed outside the building on the street level.

NA: Not applicable

F:\PROJECTS\Crc-City of Rochester\data tables\Proposed Well Construction.xls

SECTION 113300

DUAL PHASE EXTRACTION AND AIR TREATMENT SYSTEMS

PART 1 - GENERAL

1.1 INTRODUCTION

A. These Specifications were prepared following completion of the (1) Phase I Environmental Assessments for 219 and 223 First Avenue S.W., Rochester, Minnesota, dated March 2007; (2) Phase II Environmental Investigation, dated January, 2007; (3) Voluntary Response Action Plan (VRAP), dated June 2007; (4) Environmental Contingency Plan (ECP), dated June 2007; (5) VRAP Addendum – Response Action Design, July 17, 2007; and, (6) VRAP, ECP, & Design Modifications Submittal.

1.2 WORK INCLUDED

A. This section covers the work necessary to install one vapor / liquid separator, one rotary claw vacuum pump, one groundwater discharge pump, groundwater discharge piping from the pump to the sanitary sewer, air emissions discharge piping to the exhaust stack, an air emissions treatment system (if required based on start up emissions concentrations), and to furnish and install associated equipment described herein and as shown in the Drawings.

1.3 RELATED SECTIONS

A. Section 026200 – DPE Aboveground Piping

B. Section 026200.10 – Remediation and Monitoring Wells

1.4 MATERIAL COMPATIBILITY

A. Materials of construction not specified herein are to be specified by manufacturer consistent with the intended service. Free phase chlorinated compounds will be extracted. All equipment and parts must be compatible for use with chlorinated compounds and shall be able to withstand design vacuum conditions.

PART 2 - PRODUCTS

2.1 GENERAL

A. All components of the dual phase extraction and air treatment systems on the Drawings shall be furnished and supplied by the CONTRACTOR

1. Major components supplied by the CONTRACTOR include the vapor liquid separator with transfer pumps, the rotary claw vacuum pump, air emissions effluent

piping to the exhaust stack, groundwater discharge piping to sanitary sewer, and the air emissions treatment system.

2. All DPE equipment to be supplied by the CONTRACTOR including flow meters, filters, valves, etc., are specified in the Drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all equipment in accordance with manufacturer's instructions, Drawings, and specifications. Notify the Owner's Representative immediately if conflicts between the manufacturer's instructions, Drawings and/or specifications are discovered.

3.2 SHIPPING

A. CONTRACTOR will be responsible for shipping the equipment to the job site. CONTRACTOR will be responsible for unloading, safely storing, setting the equipment in place, and complete installation.

END OF SECTION 113300

CERTIFICATIONS

I hereby certify that Divisions 01, 02, and 11 of these specifications were prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Date Jason D. Skramstad, P.E. Reg. No. 43899

Exhibit E

Application for Payment Form

Exhibit E
Application for Payment Form
Application for Payment Number _____

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

	Item Description	Estimated Quantity	Unit	Unit Cost	Extension
011400	WORK RESTRICTIONS - SAFETY				
1	SSP	1	L.S.	_____	_____
015050	MOBILIZATION/DEMOBILIZATION				
2	Mob/demob	1	L.S.	_____	_____
026200	DPE ABOVE GROUND PIPING				
3	Above Ground Piping Installation	1	L.S.	_____	_____
26200.10	REMEDIATION AND MONITORING WELLS				
4	4" DPE recovery wells	10	L.S.	_____	_____
5	2" Monitoring Wells	7	L.S.	_____	_____
113100	EQUIPMENT				
6	Reitschle 7.5 HP 3 PH Explosion Proof VLR300 Blower	1	L.S.	_____	_____
7	Pulsation Dampener and Silencer for VLR300 Blower	1	L.S.	_____	_____
8	100 gal DPE Vapor/Liquid Separator	1	L.S.	_____	_____
9	Moyno 1 HP Explosion Proof Groundwater Pump	1	L.S.	_____	_____
10	90 LB Liquid Phase Carbon Adsorber with Carbon, or Explosion Proof Air Stripper	2	L.S.	_____	_____
11	180 LB Vapor Phase Carbon Adsorber with Carbon	2	L.S.	_____	_____

Exhibit E
Application for Payment Form
Application for Payment Number _____

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

	Item Description	Estimated Quantity	Unit	Unit Cost	Extension
12	Plumbing Materials	1	L.S.		
13	Rain Cap and Silencer for Air effluent Stack	1	L.S.		
14	Control Panel, Programmable Logic Controller, Operator Interface/Control, Auto-Dialer	1	L.S.		
15	Floats, Filters, Flow Meters, etc.	1	L.S.		
16	Electrical Installation	1	L.S.		
17	System Installation (including air emissions effluent and groundwater discharge piping)	1	L.S.		
18	System Startup/Debugging	1	L.S.		

GROSS AMOUNT DUE TO DATE	$ _____
LESS PREVIOUS PAYMENTS	$ _____
AMOUNT DUE THIS APPLICATION	$ _____

Exhibit E
Application for Payment Form
Application for Payment Number _____

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

EVIRONMENTAL CONTRACTOR's Certification:

The undersigned EVIRONMENTAL CONTRACTOR certifies that: 1) all previous progress payments received from LANDMARK on account of Work done under the Contract Documents referred to above have been applied to discharge in full all obligations of EVIRONMENTAL CONTRACTOR incurred in connection with Work covered by prior Application for Payment (Numbers ___ through___); and 2) title to all materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to Landmark, Landmark's Client(s), or Property Owner(s) at the time of payment free and clear of all liens, claims, security interests, and encumbrances.

Dated: _____

_____
(Signature)

_____
(Type or Print)

_____
(Title)

_____
(Name if Firm, Parternships, or Corporation)

Exhibit D

Schedule of Unit Prices

EXHIBIT D
UNIT PRICE SCHEDULE
DPE SYSTEM INSTALLATION

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

	Item Description	Estimated Quantity	Unit	Unit Cost	Extension
011400	WORK RESTRICTIONS - SAFETY				
1	SSP	1	L.S.		
015050	MOBILIZATION/DEMOBILIZATION				
2	Mob/demob	1	L.S.		
026200	DPE ABOVE GROUND PIPING				
3	Above Ground Piping Installation	1	L.S.		
26200.10	REMEDIATION AND MONITORING WELLS				
4	4" DPE recovery wells	10	L.S.		
5	2" Monitoring Wells	7	L.S.		
113100	EQUIPMENT				
6	Reitschle 7.5 HP 3 PH Explosion Proof VLR300 Blower	1	L.S.		
7	Pulsation Dampener and Silencer for VLR300 Blower	1	L.S.		
8	100 gal DPE Vapor/Liquid Separator	1	L.S.		
9	Moyno 1 HP Explosion Proof Groundwater Pump	1	L.S.		

UNIT PRICE SCHEDULE
DPE SYSTEM INSTALLATION

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

	Item Description	Estimated Quantity	Unit	Unit Cost	Extension
10	90 LB Liquid Phase Carbon Adsorber with Carbon, or Explosion Proof Air Stripper	2	L.S.		
11	180 LB Vapor Phase Carbon Adsorber with Carbon	2	L.S.		
12	Plumbing Materials	1	L.S.		
13	Rain Cap and Silencer for Air Effluent Stack	1	L.S.		
14	Control Panel, Programmable Logic Controller, Operator Interface/Control, Auto-Dialer	1	L.S.		
15	Floats, Filters, Flow Meters, etc.	1	L.S.		
16	Electrical Installation	1	L.S.		
17	System Installation (including air emissions effluent and groundwater discharge piping)	1	L.S.		
18	System Startup/Debugging	1	L.S.		

GRAND TOTAL OF EXTENSIONS _____

Number of Addenda _____

Exhibit E

Application for Payment Form

Exhibit E
Application for Payment Form
Application for Payment Number _____

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

	Item Description	Estimated Quantity	Unit	Unit Cost	Extension
011400	WORK RESTRICTIONS - SAFETY				
1	SSP	1	L.S.	_____	_____
015050	MOBILIZATION/DEMOBILIZATION				
2	Mob/demob	1	L.S.	_____	_____
026200	DPE ABOVE GROUND PIPING				
3	Above Ground Piping Installation	1	L.S.	_____	_____
26200.10	REMEDIATION AND MONITORING WELLS				
4	4" DPE recovery wells	10	L.S.	_____	_____
5	2" Monitoring Wells	7	L.S.	_____	_____
113100	EQUIPMENT				
6	Reitschle 7.5 HP 3 PH Explosion Proof VLR300 Blower	1	L.S.	_____	_____
7	Pulsation Dampener and Silencer for VLR300 Blower	1	L.S.	_____	_____
8	100 gal DPE Vapor/Liquid Separator	1	L.S.	_____	_____
9	Moyno 1 HP Explosion Proof Groundwater Pump	1	L.S.	_____	_____
10	90 LB Liquid Phase Carbon Adsorber with Carbon, or Explosion Proof Air Stripper	2	L.S.	_____	_____
11	180 LB Vapor Phase Carbon Adsorber with Carbon	2	L.S.	_____	_____

Exhibit E
Application for Payment Form
Application for Payment Number _____

MN Bio Business Center
219 and 223 First Avenue SW
Rochester, Minnesota

	Item Description	Estimated Quantity	Unit	Unit Cost	Extension
12	Plumbing Materials	1	L.S.		
13	Rain Cap and Silencer for Air effluent Stack	1	L.S.		
14	Control Panel, Programmable Logic Controller, Operator Interface/Control, Auto-Dialer	1	L.S.		
15	Floats, Filters, Flow Meters, etc.	1	L.S.		
16	Electrical Installation	1	L.S.		
17	System Installation (including air emissions effluent and groundwater discharge piping)	1	L.S.		
18	System Startup/Debugging	1	L.S.		

GROSS AMOUNT DUE TO DATE	$
LESS PREVIOUS PAYMENTS	$
AMOUNT DUE THIS APPLICATION	$

Exhibit F

Project Site Safety Plan

Landmark Environmental LLC

Site Safety Plan

219 and 223 First Avenue S.W.
Rochester, Minnesota 55902

October 2007

2042 W. 98th Street Bloomington, Minnesota 55431 Phone: (952) 887-9601 Fax: (952) 887-9605 www.landmarkenv.com

Landmark Environmental, LLC

Site Safety Plan

219 and 223 First Avenue S.W.
Rochester, Minnesota 55902

Preparation Date:	**October 8, 2007**
Review Date:	**October 8, 2007**
Prepared By:	**Jason Skramstad**
Project Number:	**06062.03**

Jason Skramstad
Project Manager

J. Eric Gabrielson
Field Team Leader

Sherry Van Duyn
Health & Safety Manager

List of Figures

List of Tables

List of Forms

Appendix

Section 1: Project Health and Safety Information

1.1 Purpose

This Site Safety Plan (SSP) provides guidelines, requirements, and procedures intended to help protect the health and safety of all on-site Landmark staff, and contract employees and subcontractors to Landmark in accordance with the provisions of 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response. A field copy of this SSP will be present at the Property during all on-site activities conducted by Landmark staff, and contract employees and by subcontractors to Landmark. The SSP applies to all on-site Landmark staff, and contract employees and subcontractors to Landmark, who participate in investigation, response actions construction activities, or other field activities.

This SSP also applies to those persons who choose to adopt this SSP for use by their personnel and have signed the SSP Adoption form (Form 3-4). Unless otherwise indicated, the term ″Landmark staff, and contract employees and subcontractors to Landmark″ is also intended to apply to those persons (e.g., Landmark's clients). This document consists of three discrete sections: the site safety plan; the emergency response plan; and safety record keeping and recording.

1.2 Control, Organization and Coordination

The following Landmark staff, and contract employees and subcontractors to Landmark are designated to carry out stated job responsibilities related to this project. These responsibilities are described further in Landmark Health and Safety Program Manual (Program).

Field Team Leader:	Jerry Mullin and Eric Gabrielson
Health and Safety Contact:	Sherry Van Duyn
Health & Safety Manager:	Sherry Van Duyn

The Field Team Leader is responsible for implementing safety procedures on the Property and, as such, the Field Team Leader is empowered to use their judgement to make safety field decisions and to consult with other project representatives when appropriate. Any changes to this SSP should be documented.

Prior to and during field activities the Field Team Leader will facilitate and document all site safety meetings (pre-entry, pre-construction, and daily safety meetings) as described in Section 3.0 of this document.

1.3 Property Description

A northern portion of the Property is located at 219 First Avenue Southwest, Rochester, Olmsted County, Minnesota in the Northeast Quarter of Section 2, in Township 106 North, Range 14 West. The legal description of this portion of the Property is as follows:

The North on-half of Lot 3 and all of Lot 4, Block 18, Original Plat of the City of Rochester.

The southern portion of the Property is located at 223 First Avenue Southwest, Rochester, Olmsted County, Minnesota in the Northeast Quarter of Section 2, in Township 106 North, Range 14 West. The legal description of the Property is as follows:

> The North one-half of Lot 2, less the South 6 inches thereof, and the South one-half of Lot 3, all of Block 18, original Plat of the City of Rochester, Olmsted County, Minnesota.

The northern portion of the Property consists of 14,300 square feet of land and is currently owned by Rochester DC LLC, a limited liability company and used as an asphalt-paved parking lot. Current use of the Property does not likely to involve the use, treatment, storage, disposal or generation of significant quantities of hazardous substances or petroleum products. However, the Property was previously the site of two drycleaners. As a result, a dual phase remediation system is currently in operation at the Property. This system does involve the use, treatment and disposal (discharge of wastewater to a sanitary sewer) of hazardous substances in accordance with an MPCA-approved Response Action Plan (RAP).

A number of previous environmental investigations and remediation activities have been conducted at the Property or portions thereof. A summary of these investigations is as follows:

> Soil samples were collected in 1999 from six hollow stem auger borings, one each from the following locations: the former loading dock area on the northwestern side of the former building, the former door area on the north side of the former building, the former sewer connection at the northeast corner of the former building, the southeast corner of the Property, the southwest corner of the Property and the center of the Property (See Figure 2 of the report). The soil borings were advanced to bedrock (14.5 to 16.5 feet bgs). The former concrete basement floor was encountered between nine and 11.4 feet bgs. All the samples that were sent to the lab for analysis of volatile organic compounds (VOCs) were collected at a depth below the basement floor. The report indicated that no staining or odors were encountered in the borings, however one soil sample collected in boring B-6 at five to seven feet bgs (above the basement floor) had a photoionization detector (PID) reading of 7 parts per million. No VOCs were detected in borings B-1, B-2, B-3 and B-5. Napthalene was detected in boring B-4 at 10 to 12 feet bgs and boring B-6 at 14.5 to 16 feet bgs (0.041 and 0.29 ppm, respectively) and PCE was detected at boring B-6 at 14.5 to 16 feet bgs at 0.42 ppm. Groundwater was not encountered in any of the borings. The soil samples were only analyzed for VOCs.
>
> An Additional Investigation was conducted in 2000. The reports states that "according to information obtained from nearby petroleum release sites, the groundwater is located approximately 20 feet bgs and flows towards the northeast, towards the Zumbro River. Two municipal wells are located approximately 3,000 feet downgradient from the project site; these wells utilize the uppermost groundwater." Soil samples were collected from six borings. Low concentrations of PCE were detected in borings B-7 and B-9 (160 and 41 micrograms per kilograms, respectively). Napthalene was detected at low concentrations in borings B-6B, B-9 and B-10. One groundwater sample was collected from a monitoring well (MW-1). PCE and cis-1, 2-dichloroethene ("DCE") were detected at concentrations of 7,500 micrograms per liter ("µg/L") and 350 µg/L, respectively. The Minnesota Department of Health ("MDH") Health Risk Limit ("HRL") for PCE is 7.0 µg/L and the MDH HRL for DCE is 70 µg/L. Soil and groundwater samples were analyzed for VOCs only.
>
> An Interim Response Action Plan was prepared in 2001. The IRAP provides a summary of the Property's background information, discusses activities conducted since September 2000, provides additional conclusions and recommendations and presents an IRAP to address the PCE release at the Property. The IRAP states that since September 2000, a 75 foot deep well (MW-6) was installed next to MW-1 to attempt to define the plume's vertical extent; additional groundwater samples were collected; three vapor ports were installed in the southwest corner of the Property; a vapor extraction pilot test was conducted; and water samples were collected from nearby wells. The newest sampling results showed that PCE concentrations ranged from 410 to 14,000 µg/L with the newest monitoring well (MW-6) having a concentration of PCE at 230 µg/L. DCE was

also reported to be detected in five of the six wells located on the Property at concentrations ranging from 2.4 to 240 µg/L.

From April 24th through June 26th, 2006 approximately 30,000 gallons of groundwater were removed from the bedrock fractures at the site. During that time, the system operated for approximately 45 days with a approximate removal rate of 0.5 gallons per minute (GPM). Over 90% of the PCE in the groundwater is being stripped into the air. Approximately 0.16 kilograms (kg) of PCE has been discharged into the sanitary sewer and approximately 7.56 kg of PCE has been discharged into the air, for a total of 7.72 kg removed by the DPE system. The previous VES removed approximately 0.66 kg of PCE from the site. Based on these results, the following recommendations were made:

1. Continue operation of the DPE system to remove PCE from the subsurface and lower the water table at the site.
2. Collect quarterly groundwater sampled from all existing monitoring wells for VOCs, dissolved organic carbon, methane and sulfate. Record natural attenuation parameters including dissolved oxygen, redox potential, pH, nitrate, soluble iron and sulfide.
3. Install permanent soil gas points adjacent to the surrounding buildings to monitor soil gas concentrations in these areas.
4. Collect a soil gas sample from each point and submit them for analysis of VOCs. If the PCE concentrations in the soil gas still exceed the industrial ISVs, a building specific vapor investigation will be completed.

To date, the MPCA has not approved the recommendations. As a result the soil gas points and any subsequent indoor air quality sampling have not been conducted.

The southern portion of the Property is currently owned by the Mayo Clinic Rochester, a Minnesota non-profit corporation, and used for parking. The Property consists of approximately 4,300 square feet of land.

In November 2005, one soil gas sample was collected in connection with the adjacent property located at 219. The results of the soil gas sampling are described in a March 9, 2006 letter report entitled, *Status Update Report, Former Dry Cleaners, 219 First Avenue SW*, prepared by DPRA on behalf of Sunstone Properties, Inc. and submitted to the MPCA. As described in the March 2006 report, DPRA collected four soil gas samples with one of the samples collected on the Property. PCE was detected in three of the four samples at concentrations ranging from 480 to 520 micrograms per cubic meter (ug/m3). The highest concentration was found in the soil gas sample collected on the Property. According to the report, "the surrounding buildings are commercial with basements so the PCE concentrations were compared to the MDH acute health risk value (HRV) of 20,000 ug/m3. None of the soil gas samples exceeded the acute MDH HRV for any VOCs detected in the sample gas."

However, the MPCA published new risk-based intrusion screening values (ISVs) in June 2006. As a result, when DPRA prepared a subsequent report entitled *Implementation Report* in July 2006, on behalf of Sunstone Properties, Inc., the report stated "the PCE concentrations in the soil gas samples were compared to the industrial-commercial ISV fro PCE, which is 14 ug/m3." Based on this comparison, the PCE concentration in the soil gas sample collected on the Property (520 ug/m3) exceeded the industrial-commercial for PCE. No other VOCs were detected in the soil gas sample collected on the Property.

Based on the results of the Investigation, the City requests that the MPCA Petroleum Brownfields Program issue a General Liability letter for the documented petroleum releases to soil and groundwater at the Property. The City should also request that the MPCA VIC Program issue a No Association Determination for the reported arsenic- and PAH- contaminated soil that exceeds the RSRVs and/or the C/ISRV on the 223 parcel, which were identified in this Phase II Investigation Report. Likewise, the City should request that the MPCA VIC Program issue a No Association Determination for documented historical VOC-contaminated soil on the 219 parcel. Finally, the City should request that the MPCA issue a No Association Determination for VOC-impacted groundwater beneath both parcels.

FIGURES for this SSP include a Property location map (Figure 1), a Property map (Figure 2), a hospital location map (Figure 3).

1.4 Scope of Work

The proposed scope of work for the Investigation includes the following Response Actions:

- Decommission the current remediation system and seal any wells prior to redevelopment.
- The excavation area of the soil/fill material on 223 Parcel is shown on Figure 3. The soil/fill material will be generally excavated to a depth of 12 to 14 feet below the final grade, based on the redevelopment plans. All of the soil/fill material excavated from the 223 Parcel will be transported off-site to a permitted Subtitle D landfill. Final sidewall and floor verification samples for the 223 Parcel excavation area will be collected following excavation in accordance with applicable MPCA guidelines.
- Design and install a new DPE system to address the chlorinated VOCs detected in groundwater samples to acceptable levels.
- Design and install a vapor barrier and a venting system under the entire proposed building to address any potential vapor intrusion into the proposed building. A vapor barrier will also be installed around the tunnel located on the adjacent property which will connect to the partial basement located on the property.

1.5 Property Facilities/Features

- Security: None
- Sanitation Facilities: None
- Potable Water: None
- First Aid Kit/Eye Wash: In Landmark first aid kit
- Communication Facilities: Cell phones
- Utilities: Located prior to work.
- Decontamination Procedures: Sample equipment will be decontaminated between each sample location.
- Material Safety Data Sheets: NA

The general site control procedures (e.g. site work zones, buddy system, communications) are included in the Program. Diagrams showing typical work zones (Figures 3 and 4) that are frequently used to conduct site investigations on sites are included as appropriate as attachments to this SSP.

1.6 Hazard Analysis

1.6.1 Potential Chemical Hazards On The Property

Field activities may potentially expose personnel to hazardous substances in the soil, in airborne dust-containing contaminants, or in groundwater; harmful or potentially explosive vapors may be present in confined spaces; and/or hazardous substances containers (drums, pails, etc). Table 1-1 lists selected hazardous substances that are known or suspected to be present on the Property based on site reconnaissance information, information regarding the classes of compounds associated with typical types of inductions and or laboratory analyses of samples obtained during previous investigations.

Health effects, exposure limits, and guidelines for selected hazardous substances of concern as well as their physical and chemical properties are described in Appendix A: TOXICITY PROFILE FOR HAZARDOUS SUBSTANCES included in the Landmark Health and Safety Program. Material Safety Data Sheets (MSDSs) for hazardous substances are routinely brought on the Property by Landmark staff, and contract employees and subcontractors to Landmark, are included in the Program.

Table 1-1
Selected Hazardous Substances

Hazardous Substance	Maximum Reported Concentration in Groundwater (mg/L)	Maximum Reported Concentration in Soil (mg/kg)
PCE	989	520
Petroleum	No previous data	No previous data
Arsenic	No previous data	10.2
PAHs	No previous data	12.7
Asbestos	No previous data	No previous data

NA = Not collecting groundwater samples
* = ACGIH or OSHA confirmed or suspected human carcinogen (see toxicity profile for details)
PAHs = Polycyclic aromatic hydrocarbons
1 = Some PAHs are included in the category of coal tar pitch volatiles (CTPV). The ACGIH TLV and OSHA PEL for CTPVs is 0.2 mg/m^3. See SECTION 6 - TOXICITY PROFILE FOR HAZARDOUS SUBSTANCES ON SITE.

NOTE: Concentrations provided in table were derived from published summary tables. The units provided in these summary tables may have been in error, and the maximum concentrations may be 1,000 times greater for one or more of the compounds identified.

1.6.2 Potential Physical Hazards On The Property

The following potential physical hazardous have been identified be present on the Property:

Physical Hazard		Physical Hazard	
Disorderly Physical Environment	X	Compressed Gas Cylinders	
Slip, Trip, and Fall Hazards	X	Fire and Explosion	
Lighting		Noise Extremes	X
Lifting	X	Ionizing Radiation	

Utilities		Confined Space	
Heavy Equipment Operation	X	Temperature Extremes	
Excavation Entry		Water	X
Deteriorated/Abandoned Buildings	X	Biological hazards	X
Electrical hazards		Other:	

See Attachment D-3 of the Program for a description of the physical hazards and method for preventing or minimizing exposure to these physical hazards.

1.6.3 Hazard Group Description/ Hazard Group Analysis For Project Tasks- Actions to Mitigate Hazards

The project tasks have been evaluated for hazards associated with those activities and have been assigned a particular Hazard Group. Table 1-2 describes these Hazard Groups. Each Hazard Group represents a different potential for exposure and consequently has a corresponding level of personal protective equipment level assigned to it.

Work activities assigned to the same Hazard Group have similar exposure potentials, even if the work activities are different. In this way, the work activity and its exposure potential prescribes the personal protective level, rather than the type or portion of the Property where a work activity is performed.

Table 1-2
Hazard Group Descriptions

Hazard Group	Description
Group 0	No contact with hazardous substances is expected during this work activity. No construction hazards are immediately adjacent to the work area while this work activity is being performed. No specific level of protection is required except for normal work/street clothes.
Group 1 (Level D1)	No contact with hazardous substances is expected during this work activity. Construction hazards are immediately adjacent to the work area while this work activity is being performed. Level D1 protection would be appropriate.
Group 2 (Level D2)	Contact with ″low″ levels of hazardous substances is expected during this work activity. Construction hazards are immediately adjacent to the work area while this work activity is being performed. Level D2 protection would be appropriate.
Group 3 (Level C3/D3)	Contact with ″moderate″ levels of hazardous substances is expected during this work activity. Construction hazards are immediately adjacent to the work area while this work activity is being performed. Level D3 protection would be appropriate. Possible upgrade to a corresponding Level C protection.
Group 4 (Level C4/D4)	Contact with ″high″ levels of hazardous substances are expected during this work activity or contact with contaminated liquids is possible. Construction hazards are immediately adjacent to the work area while this work activity is being performed. Level D4 protection would be appropriate. Possible upgrade to a corresponding Level C protection.

Table 1-3 lists the project tasks in the appropriate Hazard Groups as anticipated at the time of this SSP′s preparation.

Table 1-3
Hazard Groups For Project Tasks

Task	Hazard Group				
	0	1	2	3	4
Nonintrusive Activities					
Site Preparation ● Reconnaissance ● Perform topographical survey	✓				
Intrusive Activities					
Drilling (if required) ● Observe soil boring operations ● Observe monitoring well installation ● Observe monitoring well development		D1	D2		
Trenching/Excavation ● Observe test trenching ● Collect soil samples from trenches		D1	D2		
Soil Sampling ● Collect soil samples from soil borings ● Perform headspace screening		D1	D2		
Other Work Site Activities ● Perform soil gas survey		D1	D2		
Decontamination Activities					
Equipment DECON Operations ● cleaning of equipment		D1	D2		

✓ - Normal Work/Street Clothes

Copies of applicable SOPs for conducting work at this Property are included in Appendix B.

1.7 Overview of Project Task Hazards

Table 1-4 lists project tasks and identifies potential safety and health hazards that have been evaluated for the preparation of this SSP. Recommended work practices, levels of protection, and monitoring equipment usage have been incorporated into this SSP based on these potential hazards. A complete hazard analysis for tasks routinely performed by on-site Landmark staff, contract employees or subcontractors to Landmark is found in SECTION D of the Program.

Table 1-4
Overview of Project Task Hazards

Task	Potential for Inhalation Exposure	Potential for Ingestion Exposure	Potential for Skin Contact/Eye Irritation	Potential for Flammable Vapors*	Potential for Physical Hazards
Nonintrusive Activities					
Site Preparation ● Reconnaissance ● Perform geophysical survey ● Perform topographical survey	Low	Low	Low	Low	Low

Intrusive Activities					
Drilling (if required) ● Observe soil boring operations ● Observe monitoring well installation ● Observe monitoring well development	Low	Low	Low - Moderate	Low	Low - Moderate
Trenching/Excavation ● Observe test trenching ● Observe excavation operations ● Collect soil samples from trenches	Low	Low	Low - Moderate	Low	Low - Moderate
Soil Sampling ● Collect soil samples from soil borings ● Perform headspace screening ● Collect waste samples	Low	Low	Low - Moderate	Low	Low
Other Work Site Activities ● Perform soil gas survey	Low	Low	Low - Moderate	Low	Low
Decontamination Activities					
Equipment DECON Operations ● cleaning of equipment	Low	Low	Low - Moderate	Low	Low

*Flammability ranges for selected hazardous substances on the Property are found in Appendix A: TOXICITY PROFILE FOR HAZARDOUS SUBSTANCES.

1.8 Guidelines For Personal Protection Levels

Table 1-5 describes personal protective equipment (PPE) selected to protect against potential hazards suspected on the Property. These protection levels may be modified (upgraded or downgraded) by the Health and Safety Manager or Field Team Leader, depending on specific conditions at the Property, equipment configuration, status or phase of field activities, air monitoring results, and previous experience. Any field deviations of this SSP should be documented. The level of PPE used should be reevaluated for appropriateness upon the first indication of hazardous substances through the detection of odors from exposed soils/fluids, appearance of oiliness in soils, or unnatural soil discoloration. Landmark's PPE program is described in Section F of the Program.

Table 1-5
Guidelines For Personal Protection Levels[1]

	D1	D2	D3	D4	C3	C4
General Safety Equipment Hard Hat[2]	R	R	R	R	R	R
Safety Glasses	O	R	R	R	R	R
Chemical Goggles	O	O	O	O	O	O
Face Shield	O	O	O	O	O	O
Hearing Protection[3]	R	R	R	R	R	R
Safety Vest[4]	O	O	O	O	O	O
Boots Steel-Toed Boots/Insulated Steel-Toed Boots	O	R	R	-	R	-
Chemical Resistant Steel-Toed Boots[5]	-	O	O	R	O	R
Boot Covers[6]	-	R	R	R	R	R
Clothing Cotton Coveralls	-	O	-	-	-	-
Kleengard	-	O	-	-	-	-
Tyvek[4]	-	-	O	-	R	-
Poly-Coated Tyvek	-	-	O	R	O	R
Respirators[8] ½ Mask Respirator with OV/AG/P100 filter	-	-	-	-	R	R
Full Face Respirator with OV/AG/P100 filter	-	-	-	-	O	O
Emergency Life Support Apparatus (ELSA) 5-Minute Escape Bottle	-	O	O	O	O	O
Gloves Inner Glove (Surgical)	-	O	O	R	R	R
Outer Glove (Nitrile, neoprene, monkey grip)[7]	-	R	R	R	R	R

R = Required O = Optional - = Not Required

Special Considerations

1 **Work activities** conducted during colder months may require modification of these PPE levels.

2 **Hard hat** not required in the absence of construction activities or overhead hazards, unless required by client. Hardhat liners should be used during colder months.

3 **Hearing protection** is required during soil boring, monitoring well installation, and excavation activities involving heavy equipment, when personnel may be exposed to high noise levels (for example, cannot hear normal conversation or have to raise voice to be understood).

4 **Brightly colored safety vests** should be used when working on and adjacent to roadways, working in remote areas during hunting season, or when working on active construction sites during winter months while wearing non-contrasting protective clothing (i.e., white Tyvek).

5 **Chemical resistant steel-toed boots** may be used instead of steel-toed leather boots and boot covers if water is available for DECON.

6 **Boot covers** or chemical resistant boots required if walking in contaminated soil or liquids.

7 **A second pair of surgical gloves** may be used where outer gloves are required.

8 **If air monitoring indicates a respirator is required,** Landmark staff will first remove themselves from the exclusion zone and reassess.

9 **Tyvek is not required if potential exposure to hazardous substances is low (see Table 1-4) due to low concentrations of hazardsous substances or if engineering controls and work practices reduce the potential of exposure.** The ambient temperature needs to be considered when assessing the need to wear Tyvek at a site. If wearing Tyvek in hot temperatures, extreme caution is needed to prevent heat stress.

1.9 Air Monitoring and Action Levels

Table 1-6 indicates which air monitoring instruments should be used on the Property for each activity in a particular Hazard Group. Air monitoring should be conducted periodically in the breathing zone (a 2-foot radius around a person′s head). Air monitoring equipment used on the Property should be calibrated daily, or before each use if used less than daily. Landmark staff, contract employees and subcontractors of Landmark should document real-time air monitoring information and keep calibration logs in either the Project Field Book or the Daily Safety Record Form. Landmark's Air Monitoring Program is described in Section E of the Program.

Table 1-6
Guidelines For Air Monitoring Instrumentation

Task Group	Instrument[1]	Hazard Group				
		0	1	2	3	4
Nonintrusive Activities						
Site Preparation ● Reconnaissance ● Perform geophysical survey ● Perform topographical survey	Organic vapor indicator		O	O		
	Combustible gas indicator		O	O		
Intrusive Activities						
Drilling (if required) ● Observe soil boring operations ● Observe monitoring well installation ● Observe monitoring well development	Organic vapor indicator		O	R		
	Combustible gas indicator		O	R		
Trenching/Excavation ● Observe test trenching ● Observe excavation operations ● Collect soil samples from trenches	Organic vapor indicator		O	R		
	Combustible gas indicator		O	R		
	Aerosol monitor		O	O		
	Chemical specific detector tubes		O	O		
Soil Sampling ● Collect soil samples from soil borings ● Perform headspace screening ● Collect waste samples	Organic vapor indicator		O	R		
	Combustible gas indicator		O	R		
Other Work Site Activities ● Perform soil gas survey	Organic vapor indicator		O	R		
	Combustible gas indicator		O	R		
	Aerosol monitor		O	O		
	Chemical specific detector tubes		O	O		
Decontamination Activities						
Equipment DECON Operations ● Observe steam cleaning of equipment	Organic vapor indicator		O	O		
	Combustible gas indicator		O	O		
	Aerosol monitor		O	O		

O = Optional
R = Required for Periodic Monitoring

[1] See Table 1-7 for air monitoring frequency

Table 1-7 describes guidelines for the monitoring durations during field activities.

Table 1-7
Guidelines For Air Monitoring Frequency

Instrument	Periodic Monitoring Frequency	Notes
Organic Vapor Indicator	• Unusual or unidentified new odors are encountered • Discolored soils are encountered.	For more information, see AIR MONITORING PROGRAM
Combustible Gas Indicator	• The organic vapor monitor registers sustained readings above action level • Intrusive activity when combustible gases may potentially have accumulated • The potential exists for a combustible atmosphere to develop.	
Aerosol Monitor	• Large area(s) of material (soil) known or suspected to contain hazardous substances may become airborne from excavating/ trenching activities • The potential exists for coal tar pitch volatiles (CTPVs) to become airborne.	
Detector Tubes for _____	• Total organic vapor read-out exceeds the action limit for a 10-minute duration, and organic vapors have not been characterized • Upgrade to Level C is made and organic vapors have not been characterized.	

Table 1-8 indicates action levels for air monitoring instruments. If action levels are exceeded in the breathing zone, the Health and Safety Manager or Health and Safety Contact should be notified immediately to determine what action should be taken. Background air monitoring for organic vapors and airborne dust particles should be conducted prior to commencement of activities.

Table 1-8
Action Levels

Monitoring Instrument[1]	Hazard	Action Levels	Action
Organic Vapor Analyzer/Organic Vapor Monitor/Hnu	Organic vapors/gases	≤2.5 ppm above bckgrd ---------- >2.5 ppm above bckgrd (for 10 min.) ---------- >25 ppm	Level D (see Table 1-5 for sublevels) ---------- Level C (see Table 1-5 for sublevels) and use detector tubes ---------- Leave area and reassess
MSA 260/360 or Microgard	Explosive atmosphere	≤10% LEL ---------- >10% LEL	Level D ---------- Leave area and reassess
MINIRAM Aerosol Monitor	Dust particles containing hazardous substances	≤5 mg/m^3 dust ---------- >5 mg/m^3 dust	Level D ---------- Move to upwind location if possible, implement engineering controls, or Level C
Detector Tubes for _____	_____ vapors	---------- ----------	Level D (see Table 1-5 for sublevels) ---------- Level C (see Table 1-5 for sublevels) ---------- Leave area and reassess

[1] SECTION E: AIR MONITORING PROGRAM describes equipment, operating, and calibration procedures, and action level determination.

1.10 Additional Health and Safety Concerns For Contract Employees and Subcontractors Personnel

A hazard analysis for Landmark's contract employee and subcontractor employee activities is described in Table 1-9. Levels of protection (Level D) have been selected according to the information obtained from prior site characterizations and are also assigned in Table 1-9. If respiratory protection is determined to be necessary, based on air monitoring results or good judgement, Level C protection will be used, with appropriate body protection for that Hazard Group as long as the contract employee or subcontractor employee is working under an approved respirator protection program. Either full facepiece or half mask respirator usage is acceptable. Eye protection should be used appropriately, according to the type of respirator selected. If the contract employee or subcontractor employee does not have a respirator program, the employee will exit the exclusion zone.

Table 1-9
Contract Employee and Subcontractors Task/Hazard Groups

Task	Chemical Hazard Analysis	Physical Hazard Analysis	Hazard Group		
			2	3	4
Drilling/Geoprobe/ Sampling ● Operate drill/ Geoprobe rig. ● Collect soil samples. ● Collect soil gas samples. ● Collect groundwater samples.	Potential for inhalation exposure to soil vapors, skin exposure to contaminated soil/fluids, and inhalation exposure to vapors in contaminated fluids.	Potential for injury from falling parts or equipment, and from moving and turning parts or equipment. Slip, trip, or fall hazards. Increase noise levels while hammering probe.	D2	D3	D4
Test Trenching ● Operate backhoe to excavate test trench.	Potential for inhalation exposure to soil vapors, skin exposure to contaminated soil/fluids, and inhalation exposure to vapors in contaminated fluids.	Potential for injury from falling parts or equipment, and from moving and turning parts or equipment. Slip, trip, or fall hazards.	D2	D3/C3	D4/C4
Install Monitoring Well ● Install well casing in borehole and install filterpack.	Potential for inhalation exposure to soil vapors, skin exposure to contaminated soil/fluids, and inhalation exposure to vapors in contaminated fluids.	Potential for injury from falling parts or equipment, and from moving and turning parts or equipment. Slip, trip, fall or lifting hazards.	D2	D3	D4
Well Development ● Surge well with air or water or by other mechanical means. ● Pump wellwater and sediment.	Potential for skin exposure to contaminated fluids, potential for inhalation exposure to vapors in contaminated fluids.	Slip, trip, or fall hazards.	D2	D3	D4
Equipment Decontamination ● Steam clean equipment. ● Pump decon fluids into storage containers or to the POTW.	Potential for skin exposure to contaminated fluids, potential for inhalation exposure to vapors in contaminated fluids.	Potential for burns from hot water or equipment used. Potential for injury from high-pressure spray equipment.	D2 with face-shield	C3 with face-shield	C4 with face-shield
Grout Borehole or well[1] ● Mix grout and pump into borehole or annular space.	Potential for skin exposure to grout, inhalation exposure to portland cement dust, and skin exposure to grout which has contacted contaminated fluids/soil.	Slip, trip or fall hazards, lifting hazards.	D2	D3	D4

[1]Nuisance dust respirator should be worn when mixing cement grout.
Refer to TABLE 1-5 — GUIDELINES FOR PERSONAL PROTECTION LEVELS for an explanation of D2, D3, D4, C3, and C4.

Section 2: Emergency Action Plan/ Emergency Phone Numbers

2.1 Purpose

This Emergency Action Plan (EA Plan) is designed to facilitate prompt and safe evacuation of Landmark staff, and contract employees and subcontractors to Landmark. The EA Plan will be implemented immediately in the event of a fire, explosion, accident, hazardous substance release, or other emergency that could threaten human health or the environment. This EA Plan is intended to be compatible with and to integrate the emergency response plan of local emergency service providers, and to satisfy the requirements of 29 CFR 1910.120(l)(1) Emergency Response Plan.

2.2 Pre-emergency Planning

All Landmark staff, contract employees and subcontractors to Landmark should review and become familiar with this EA and with the hospital location map prior to the commencement of operations at the Property to be used in the event of minor injuries. A map of the route to the hospital has been provided as FIGURE 3 – HOSPITAL LOCATION MAP of this SSP.

2.3 Emergency Telephone Numbers

Always call 911 in emergencies. Other emergency telephone numbers are listed on Table 2-1.

Table 2-1
Emergency Telephone Numbers

Agency/Facility	Telephone Numbers
Police	911
Fire	911
Ambulance	911
Hospital Emergency Room : Mayo Clinic	507-284-2511
Spill/Release Reporting (answered 24-hours) (MN Only)	911 (even if non-emergency) followed by: (651) 649-5451 (MPCA Duty Officer) or (800) 422-0798 (outside Metro)
National Response Center	(800) 424-8802
CHEMTREC (Chemical Transportation Emergency Center)	(800) 424-9300
Landmark Environmental, LLC	(952) 887-9601
Park Nicollet Clinic – Airport (Landmark's Occupational Clinic)	(952) 993-9700 (main phone) (952) 993-9770 (appointments)
Client Contact – Gary Neumann	(507) 285-8082
Health and Safety Contact/IH – Sherry Van Duyn	(952) 887-9601 ext. 209

NOTE: A copy of these emergency telephone numbers should be placed near phones designated for use by Landmark staff, and contract employees and subcontractors to Landmark. The Field Team Leader may supplement this list of telephone numbers with the names and telephone numbers of key personnel for Landmark contract employees and subcontractors.

2.4 Medical Services and First Aid

Landmark has contracted with Park Nicollet Clinic-Airport Medical Clinic, located in Minneapolis, to provide occupational health services. The clinic is available to provide medical evaluations, advice, and consultation on matters of occupational health. All non-emergency medical treatment should be administered by Park Nicollet-Airport Medical Clinic.

For medical emergencies and for projects outside the geographic area of the Airport Medical Clinic, local hospitals and/or medical clinics are located and identified in the SSP. The hospital/clinic is contacted prior to site work to determine capability to render medical services and first aid. A map to this facility, along with a phone number and driving directions are included in the SSP (Figure 3).

In the absence of an infirmary, clinic, hospital, or physician that is reasonably accessible in terms of time and distance to the worksite, for the treatment of injured employees, a person who has a valid certification in first-aid training will be available at the Property to render first aid for Landmark staff.

Additionally, first aid kits are available for use. The first aid kits should be checked before being sent to the field. The Field Team Leader is responsible for regularly checking the first aid kit to ensure all expendable items are replaced. First aid kits will be stored in either the vehicle or construction trailer. Sterilized contents in the first aid kit are individually sealed. First aid kits should contain the following supplies:

1–Bloodstopping Bandage	1–Bandage Scissors 5½"
1–Gauze Pads 3" x 3" (4)	1–Antiseptic Towelettes (10)
1–Splinter Forcepts 4½"	1–Sting Relief Swabs (10)
1–Instant Cold Pack	1–Bandaids (60)
1–Latex Gloves (2)	1–Extra Large Bandage 2"
1–Bee Sting Kit	1–Portable Eyewash Kit or Fluids

Medical transport will be made by anyone at the site, whoever is able to respond in a most timely manner, or through contacting the local ambulance service. Cellular phones will be on-site for daily and emergency contact purposes.

2.5 Emergency Response to Potential Exposures

General emergency procedures for responding to potential exposures to hazardous substances are described below. Follow directions of emergency service providers, if available, in lieu of the following instructions. Provide emergency service providers with background information regarding chemical/physical exposure. In case of where serious medical attention is warranted and medical transport is available, always call for medical transport.

Table 2-2
General Emergency Procedures to Potential Exposures

Hazardous Substance Exposure Route	Emergency Procedure
Eye Contact:	Flush eyes with eyewash and saline solution and follow with a eye flush for at least 15 minutes with clean water, if available while awaiting emergency medical services. Seek emergency medical attention.
Skin Contact:	Flush skin with clean water, for at least 15 minutes, if possible. Remove contaminated clothing while flushing skin. Seek emergency medical attention as needed.
Inhalation:	Remove person to fresh air, away from active work area. Seek emergency medical attention. If breathing has stopped, a qualified individual should provide artificial respiration, while awaiting emergency medical services.
Ingestion:	Do not induce vomiting. Immediately seek emergency medical attention.

2.6 Evacuation Escape Procedures

In the event of an emergency necessitating evacuation (such as fire, explosion, or significant release of a hazardous substance), Landmark staff, contract employees and subcontractors to Landmark will evacuate the immediate area or the Property and rely on emergency service providers such as the local fire department, police department and/or hospital to assist in the handling of the emergency. Landmark staff, contract employees and subcontractors to Landmark should not attempt any emergency service procedures, except those necessary to render first aid and for the safe evacuation of others. The Field Team Leader will account for all Landmark staff, contract employees and subcontractors to Landmark after emergency evacuation has been completed.

2.7 Emergency Alarm System

If evacuation is necessary, three long blasts are to be sounded with an air horn or vehicle horn. This signal indicates that immediate evacuation of all persons on the Property is necessary as a result of some immediate or impending danger. Equipment operators should be advised to shut down and all personnel should evacuate to a safe area, as determined by the Field Team Leader or the Site Safety Officer, if present at the project location at the time. This safe area should be in the predominantly upwind direction of the exclusion zone. See discussion on emergency evacuation routes below. The signal method and possible safe area location(s) may vary depending on the type of emergency, size of the Property, and number of employees. This signal and location(s) to be used as a safe area should be discussed at the pre-construction safety meeting, and any changes should be noted at daily "tool-box" meetings.

2.8 Emergency Evacuation Routes

Emergency evacuation routes should be identified prior to the beginning of activities on the Property for each area in which work is performed. This evacuation route should be communicated to all Landmark staff, contract employees and subcontractors to Landmark at the pre-construction safety meeting, and any changes should be noted at daily "tool-box"″ safety meetings. The evacuation route should also be posted at the Property.

Evacuation routes should be established to prevent isolation of personnel from other portions of the Property. Landmark staff, contract employees and subcontractors to Landmark should not risk personal safety to save or salvage equipment in use at the time of evacuation. Emergency service providers should be contacted immediately, and the Health and Safety Manager should be notified as soon as it is feasible.

In the event that an evacuation route has not yet been established for a work area and an emergency occurs, all Landmark staff, contract employees and subcontractors to Landmark should attempt to evacuate to an area of at

least 100 feet upwind; 200 feet perpendicular to wind direction; or other area designated as safe by the Field Team Leader or Health and Safety Contact/IH.

2.9 Reporting Fires and Other Emergencies

If Landmark is primarily responsible for field activities, the Field Team Leader or other available personnel is responsible for contacting emergency service providers in the event of a fire or other emergency.

2.10 Emergency Notification Procedures

The following course of action should be taken if an emergency situation develops:

1) Evacuate as necessary. Maintain security and control as described in Section 1.5 of this SSP.

2) Notify proper emergency services (fire, ambulance, police, etc.) for assistance. See TABLE 2-1, EMERGENCY TELEPHONE NUMBERS. Inform emergency services personnel of the type of work being performed so that the need for equipment and decontamination can be assessed.

3) Notify any other affected personnel at the Property.

4) Contact the Field Team Leader to inform them of the incident as soon as possible. The Field Team Leader should notify the appropriate parties including the owner′s representative.

5) Prepare a summary report of the incident for the Health and Safety Manager as soon as possible after the incident. The summary should be filed in the project file that is kept at the Lanmark office.

2.11 Accountability of Persons

A clear chain of authority has been established to mobilize the resources necessary to respond to a fire or other emergency. When Landmark is primarily responsible for field activities, the Field Team Leader should take the initiative for project emergency notification procedures. This person should be informed of any on-site emergencies, and is responsible that appropriate evacuation procedures are followed and conducted in a safe and orderly manner. The Field Team Leader should determine that all Landmark staff, contract employees, subcontractors to Landmark, and clients' representatives who were working in the evacuation area have been evacuated to safe locations.

The Field Team Leader has overall responsibility for this EA Plan and should be notified whenever the EA Plan is utilized or whenever there is a question on proper implementation to allow for critique of the emergency response and subsequent follow-up.

2.12 Spill Containment Plan

This SSP does not include a specific spill containment plan, since the potential for hazardous waste spills are not anticipated. However, if a spill occurs Landmark will hire a subcontractor, with authorization by the Client to respond to emergencies that affect the safety and protection of persons or field activities or Property to prevent any threatened damage, injury or loss in accordance with all laws and regulations.

2.13 Decontamination Procedures

In the event of emergencies involving serious or potentially serious injuries, contact emergency service providers immediately. Decontaminate injured person(s) as much as possible prior to transport to a medical facility. Where hazardous substances cannot be removed at the Property, consider use of clean Tyvek to line the stretcher under

the injured. Standard operating procedures for decontamination procedures described in the health and safety manual and shown on Figure 5, should be followed whenever possible.

2.14 PPE and Emergency Equipment

In the event of an emergency requiring emergency service providers, those providers should be providing their own personal protective equipment and emergency equipment. Protective equipment used for this evacuation should be consistent with levels of protection and action levels as determined in this SSP.

Section 3: Recordkeeping/Forms

3.1 Purpose

This section provides guidance for documenting field safety operations.

3.2 Safety Meetings

- Pre-entry Safety Meeting: Prior to initiating field activities, the Field Team Leader should attend a pre-entry safety briefing with the Health and Safety Manager or Health and Safety Contact/IH. The Hospital Location Map (Figure 3) should be reviewed prior to the start of construction to make any necessary changes.

- Pre-construction Safety Meeting: The Health and Safety Manager, Health & Safety Contact/IH, or Field Team Leader should hold a pre-construction safety meeting with Landmark staff, contract employees and subcontractors to Landmark and other appropriate personnel on the first day of field activities, reviewing appropriate elements of this SSP. The topics covered during the initial meeting should be documented on the Pre-Construction Safety Meeting Checklist (Form 3-2).

- Daily ″Tool-Box″ Safety Meeting: Each morning a short ″tool-box″ safety meeting should be held, which can be combined with other specific meeting topics.

  Any Landmark staff, contract employees or subcontractor to Landmark joining the project at a later time will be required to go through a brief pre-construction safety meeting before participating in any field activities at the Property.

3.3 Field Safety Deviations/Amendments, Project Field Book/Daily Safety Record Form

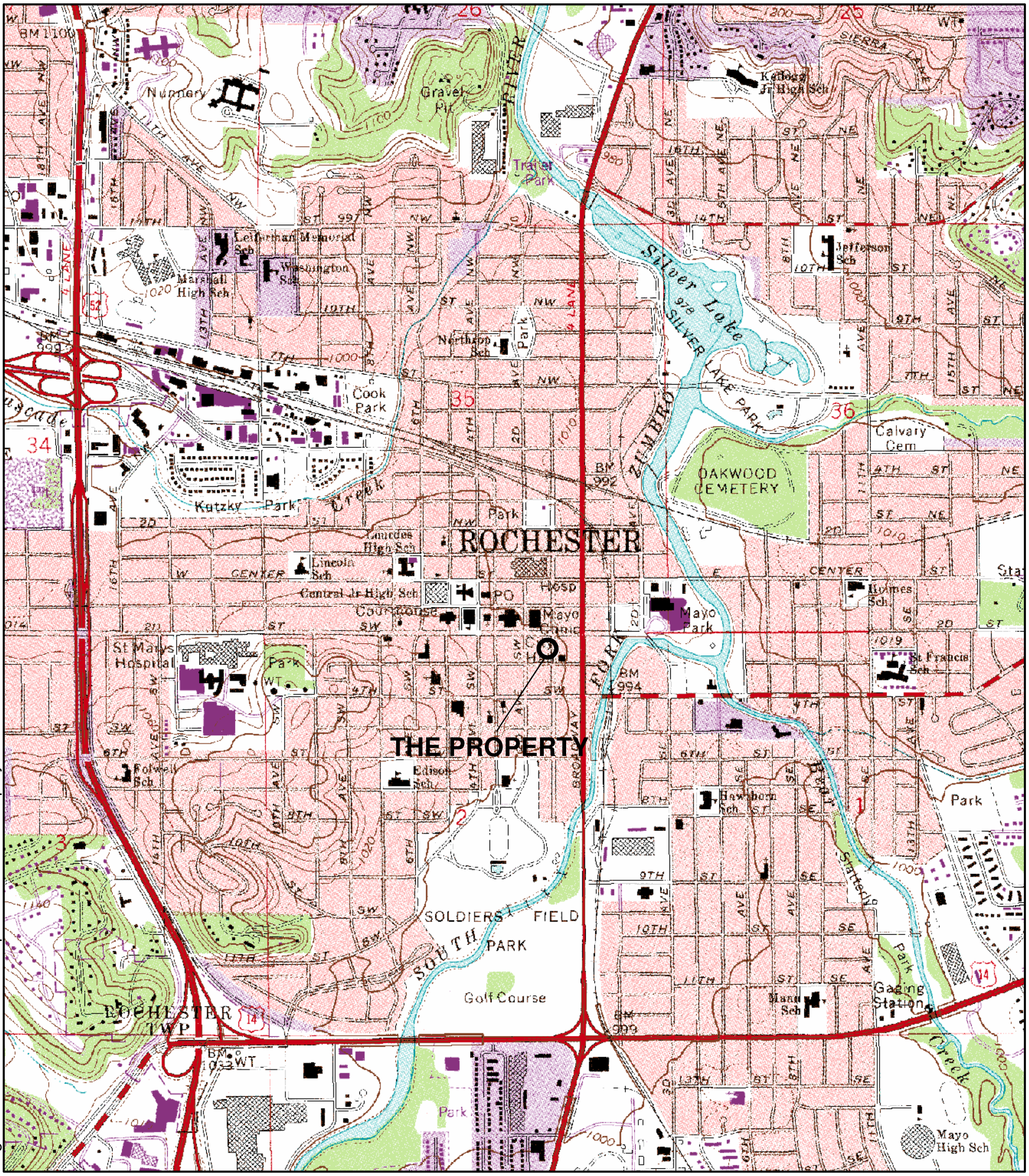
Any field deviations in the implementation of this SSP should be documented in either the Project Field Book or on the Project Daily Safety Record Form (Form 3-1). Any change in site tasks not considered in this SSP should be addressed with the Amendment Form (Form 3-3).

Field documentation should be entered in either the Project Field Book or the Daily Safety Record form. The Project Daily Safety Record form is shown as Form 3-1. Either the Project Field Book or the Project Daily Safety Record form should be maintained at the Property by Landmark staff, contract employee or subcontractor to Landmark at all times, and should be returned to the Field Team Leader at completion of the project.

3.4 Work Location Safety Audit Form

Safety audits preformed on larger projects, or during Health and Safety Manager visits should be entered in either the Project Field Book or the Work Site Safety Audit form. The Work Site Safety Audit form is shown as Form 3-5.

Figures



Source: Rochester, Minnesota Topographic Quadrangle, 7.5-Minute Series

f:\gis\client\crc\06-two vacant parcels-1st ave sw\projects\location-both.mxd

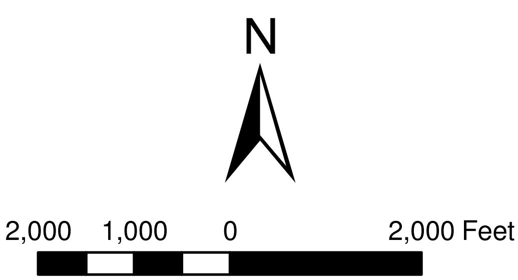
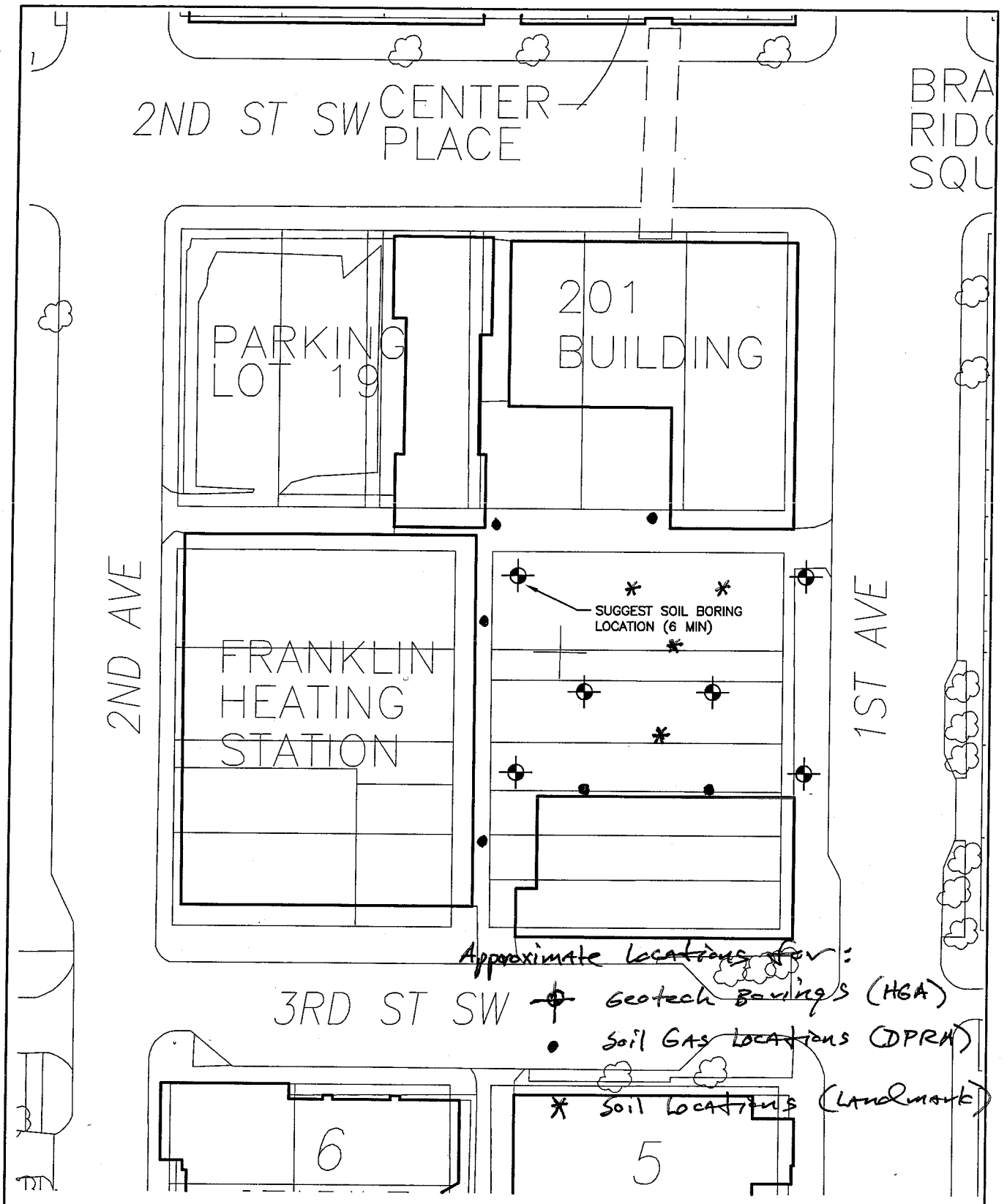


FIGURE 1

PROPERTY LOCATION MAP
219 1ST Avenue Southwest
Rochester, Minnesota



SUGGESTED SOIL BORING LOCATIONS

HGA
Architecture | Engineering | Planning
Hammel, Green and Abrahamson, Inc
202 1st Avenue SW - Suite 200
Rochester, Minnesota USA 55902 - 3129
Telephone 507.281.8600 Facsimile 507.281.8688

COMM. NO.	1009-018-00
SCALE	1/64"=1'-0"
DATE	NOV 13 2006
DRAWN	TS

MN BIO BUSINESS CENTER

ROCHESTER MN

SK1

Google Maps

Start **Rochester, MN**
End **223 1st Ave SW**
Rochester, MN 55902
Travel **0.4 mi – about 1 min**

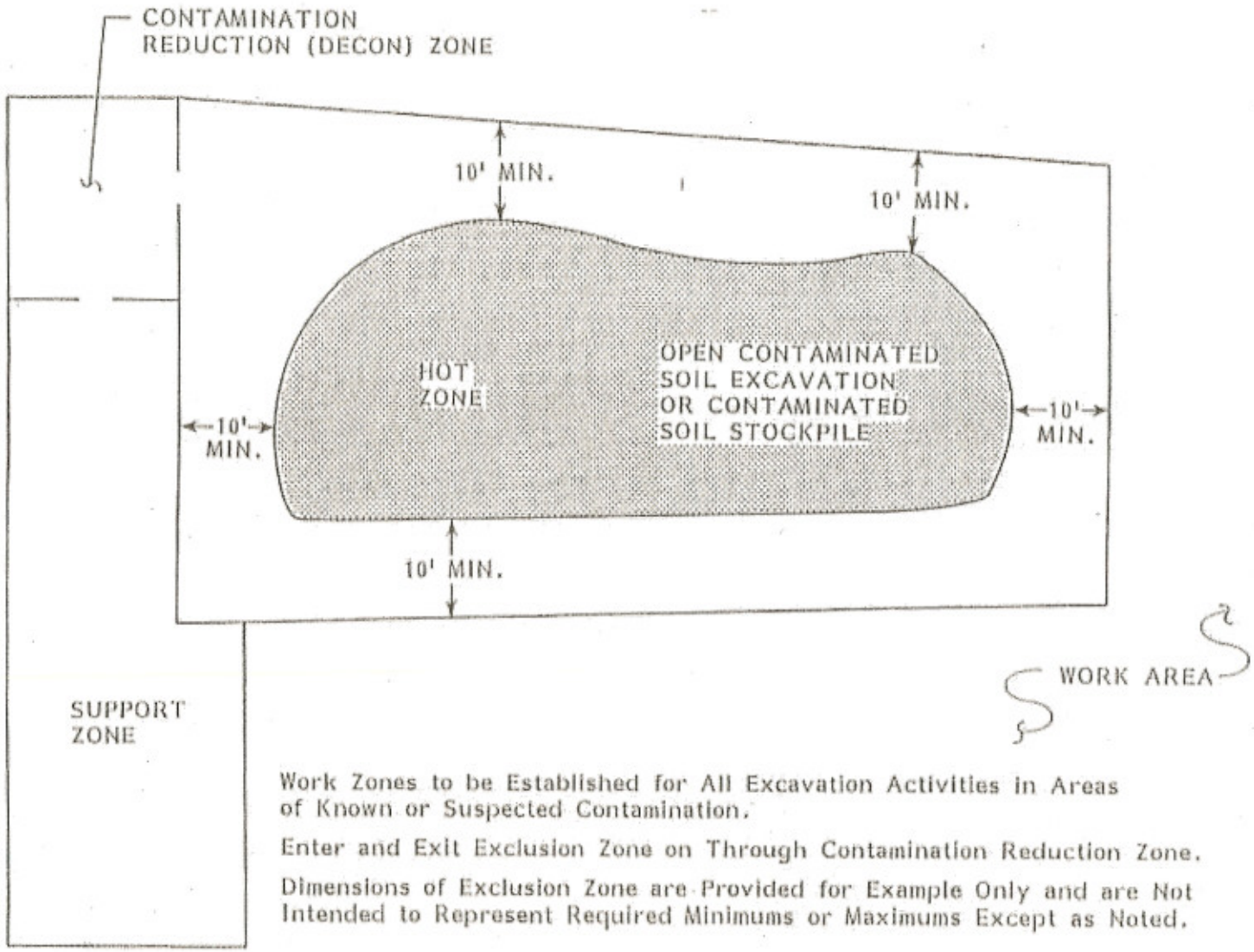
Rochester, MN

Drive: 0.4 mi – about 1 min

1. Head **west** on **4th St SE** toward **1st Ave SE** — 0.2 mi, 1 min
2. ➜ Turn **right** at **1st Ave SW** — 0.1 mi

223 1st Ave SW
Rochester, MN 55902

These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.



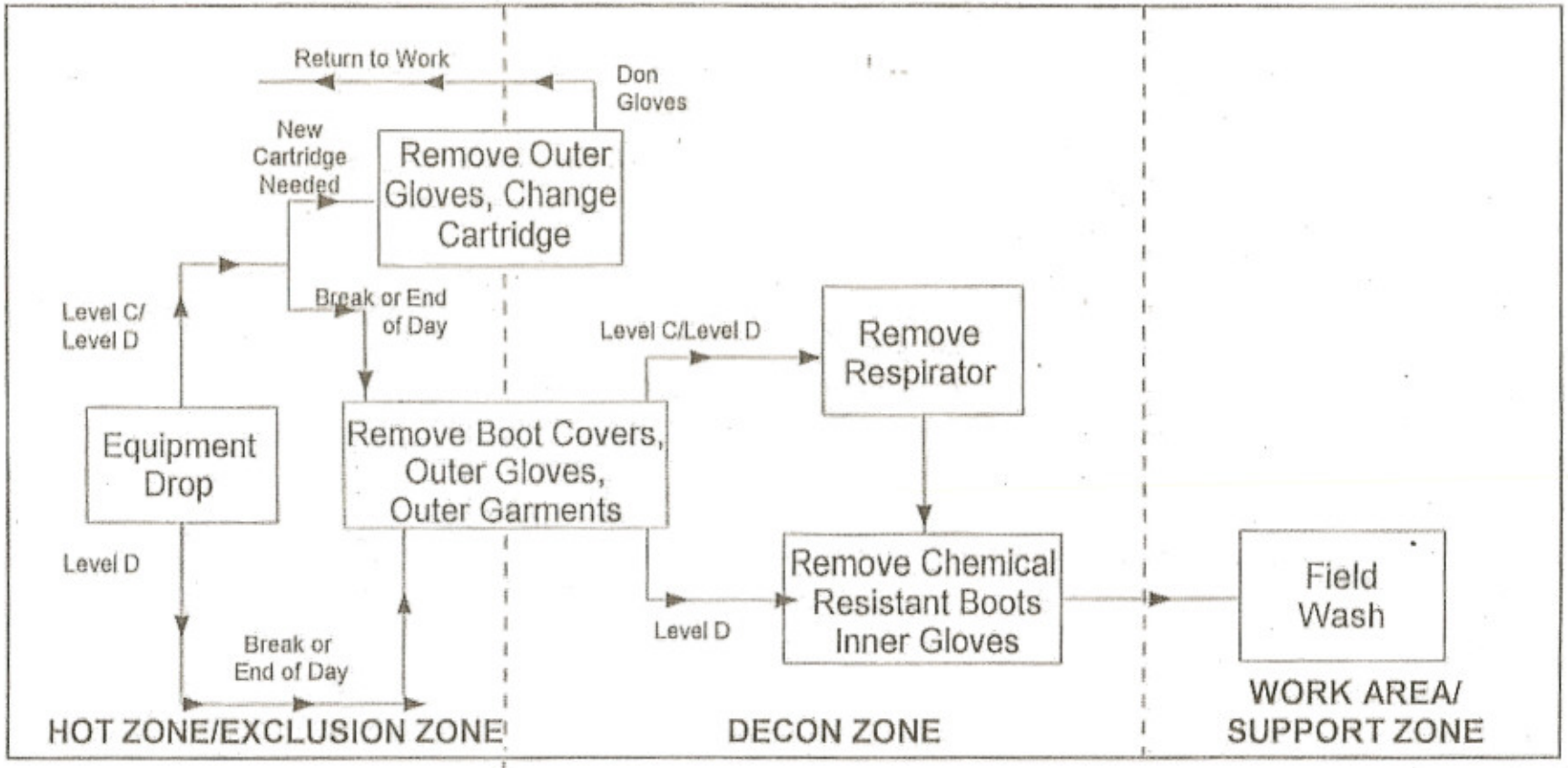
Work Zones to be Established for All Excavation Activities in Areas of Known or Suspected Contamination.

Enter and Exit Exclusion Zone on Through Contamination Reduction Zone.

Dimensions of Exclusion Zone are Provided for Example Only and are Not Intended to Represent Required Minimums or Maximums Except as Noted.

Figure 4 d

WORK ZONES
FOR EXCAVATION ACTIVITIES



1. Decontamination Equipment
2. Remove boot covers
3. Remove outer gloves and tyvek
4. Remove respirator
5. Place all disposed PPE in garbage bags or drum
6. Remove inner gloves and place in garbage bags or drum
7. Wash hands and face with water, alcohol wipes, other cleaning wipes
8. Shower as soon as possible offsite

Figure 5
Decontamination Procedures

F:\admin\H&S\decon_procedures.apr

Forms

Form 3-1
Project Daily Safety Record

PROJ. NAME: _____ DATE: _____

PROJ. NUMBER: _____ COMPLETED BY: _____

	WORK LOCATION			
Location Identifier				
Time Interval at Location				
Maximum PID/FID Readout in Airspace (ppm)*				
Typical PID/FID Readout Range (circle)*	ND 1-2.5 2.5-25	ND 1-2.5 2.5-25	ND 1-2.5 2.5-25	ND 1-2.5 2.5-25
Hazard Group Assessment (circle all that apply)	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
Level of PPE worn (circle all that apply)	D1 D2 C3 D3 C4 D4	D1 D2 C3 D3 C4 D4	D1 D2 C3 D3 C4 D4	D1 D2 C3 D3 C4 D4

* = PID/FID readouts in ppm above background
ND = No detection

CHECK (X) THE FOLLOWING AFTER COMPLETION

□ Daily "Tool-Box" Safety Meeting Time _____

Comments: _____

□ Instrument Calibration

Instrument	Instrument	Instrument
Time _____	Time _____	Time _____
□ Calibration Check	□ Calibration Check	□ Calibration Check
□ Battery Check	□ Battery Check	□ Battery Check

Comments (Field Deviations, Incidents, Visitors On the Property, Etc.):

_____
_____
_____
_____
_____

Form 3-2
Pre-Construction Safety Meeting Checklist

Project Name: _____ Project Number: _____

Meeting Conducted by: _____ Date: _____

Attendees: _____

_____

CHECK (X) TOPICS COVERED DURING SAFETY MEETING

ADMINISTRATIVE

__ Location of telephone and emergency numbers
__ Smoking and eating areas
__ Fire extinguisher, eyewash, and First Aid kit on the Property
__ Potable water, restrooms on site, or location of nearest facilities
__ Emergency alarm signals
__ Emergency evacuation routes and location of posting
__ Hospital and route to hospital
__ Accidents/illnesses/injuries/near misses
__ Work/Break schedule
__ Location of PHASP (including Appendix)
__ Work zones
__ Buddy system
__ Site control and/or site security
__ First Aid/CPR qualified persons on the Property
__ Contractor's MSDS collection labeling system and precautionary measures
__ Subcontractor's MSDS collection labeling system and precautionary measures
__ High visibility PPE

PERSONAL PROTECTIVE EQUIPMENT

__ Hazard groups chosen for the tasks being performed (0,1,2,3,4)
__ Levels of Personal Protective Equipment (PPE) (D1, D2, D3, D4, C1, etc.)
__ Respirator protection
__ PPE limitations

AIR MONITORING

__ Actions taken when action levels exceeded
__ Air monitoring to be conducted

DECONTAMINATION (DECON)

__ DECON area and procedures
__ Containers for contaminated materials

PHYSICAL HAZARDS ON SITE

__ Underground/overhead utilities
__ Confined space entry (permit required)
__ Excavation entry (permit required)
__ Water hazards
__ Winter hazards (e.g., ice hazards)
__ Earth moving equipment
__ Traffic near or on the Property
__ Noise
__ Slip/trip hazards
__ Overhead hazards
__ Radiation (from radioactive wastes like hospital wastes, etc.)

CHEMICAL HAZARDS

__ Hazardous substances on the Property
__ Symptoms of overexposure
__ Fire and explosion
__ Reactive/unstable
__ Oxygen deficient atmosphere

BIOLOGICAL HAZARDS

__ Poisonous vegetation (poison ivy, poison oak)
__ Pests (snakes, rodents, bees, wasps)
__ Animals (dogs, bears)
__ Biological wastes (hospital wastes, animal wastes)

__ **OTHER** _____
__ Cold stress
__ Hypothermia
__ Frostbite
__ Heat stress
__ Availability of warm fluids
__ Availability of shade

NA = Not Applicable

Form 3-3
Site Safety Plan Amendment

Amendment #: _____

Project Name: _____

Project #: _____

Date: _____

Amendment Section: _____

Amendment: _____

_____

_____

Reason For Amendment: _____

_____

_____

_____

_____ _____

Project Field Team Leader Date

Form 3-4
SSP Adoption Form

_____

Site Safety Plan Adoption

CONTRACTOR has read and understands the Site Safety Plan (SSP) entitled, _____prepared by Landmark Environmental, LLC; and has evaluated its appropriateness for CONTRACTOR's personnel for the Work as described in the Contract Documents entitled _____prepared by Landmark Environmental, LLC for the _____("Contract Documents").

CONTRACTOR does hereby adopt the SSP for use by CONTRACTOR and CONTRACTOR's personnel involved in the Work as described in the Contract Documents for the _____(Property). CONTRACTOR agrees to use the SSP as a minimum standard of health and safety practice for the Work. CONTRACTOR agrees to provide a Safety Officer as defined in Article 6, Safety in Supplementary Conditions of the Contract Documents (Exhibit A). CONTRACTOR's adoption of the SSP is accomplished by attachment of this executed agreement to the SSP.

CONTRACTOR agrees that by adopting this SSP, CONTRACTOR acknowledges that there may be elements of the SSP that may not be representative of the types of safety programs CONTRACTOR currently implements. Some applicable SSP elements that CONTRACTOR agrees to evaluate for appropriateness and/or adopt include (but are not limited to): Project Organization and Coordination, Standard Operating Procedures, Emergency Action Plan, Hazard Evaluation, Site Control Measures, Personal Protective Equipment Program, Decontamination Program, Air Monitoring Program, General Safety, Confined Space Entry Program, Hazardous Waste Operations, Training Program, Medical Surveillance Program, and Employee Right-to-Know Program. CONTRACTOR agrees that by adopting this SSP, CONTRACTOR has developed and is currently implementing these procedures and programs for CONTRACTOR AND CONTRACTOR'S personnel. CONTRACTOR agrees that by adopting this SSP, CONTRACTOR has adopted the procedures and programs of the PHASP to properly protect CONTRACTOR and CONTRACTOR'S personnel. CONTRACTOR also agrees to conform to the provisions of 29 CFR Parts 1910 and 1926.

By entering into this agreement and by adopting the SSP, CONTRACTOR acknowledges and agrees that it remains solely responsible for complying with all applicable federal, state, and local laws, rules, and regulations as they may apply to the Work to be performed by CONTRACTOR, as this Work is described in the Contract Documents. Further, CONTRACTOR agrees that its adoption of the SSP in no way obligates Landmark to supervise CONTRACTOR, CONTRACTOR's personnel, or the work conditions, except as may be expressly stated in the Contract Documents.

CONTRACTOR acknowledges that the responsibility to supervise CONTRACTOR's personnel remains solely with it, except as may be expressly stated in the Contract Documents.

CONTRACTOR: _____

_____

_____

BY: _____

TITLE: _____

DATE: _____

Form 3-5
Work Site Safety Audit Form

Project Name: _____ Evaluated By: _____

Project No. _____ No. People Observed _____

Location of Audit _____ Date/Time _____

(If corrective action is required, note action in Comment section of Safety Audit Form)

		YES	NO	NA	COMMENT
A.	**ADMINISTRATIVE**				
1.	Pre-construction/pre-site entry safety meeting	☐	☐	☐	
2.	SSP on the Property	☐	☐	☐	
3.	Weekly "tool-box" safety meeting conducted and documentation on the Property	☐	☐	☐	
4.	Site work zones delineated on Property map	☐	☐	☐	
5.	Current training/medical surveillance cards on the Property	☐	☐	☐	
6.	Respirator fit-test within last two years	☐	☐	☐	
7.	SSP followed by on-site team member	☐	☐	☐	
B.	**SITE CONTROL**				
1.	Work zones physically defined	☐	☐	☐	
2.	Buddy system implemented	☐	☐	☐	
3.	Emergency communication system	☐	☐	☐	
4.	Emergency eyewash/first aid kit	☐	☐	☐	
C.	**PERSONAL PROTECTIVE EQUIPMENT**				
1.	Properly used/stored	☐	☐	☐	
2.	Daily inspection	☐	☐	☐	
3.	PPE appropriate for on-site hazards	☐	☐	☐	
4.	PPE used as written in SSP	☐	☐	☐	
5.	PPE limitations known	☐	☐	☐	
6.	Eye protection	☐	☐	☐	
7.	Head protection	☐	☐	☐	
8.	Hand/torso protection	☐	☐	☐	
9.	Foot protection	☐	☐	☐	
10.	Hearing protection	☐	☐	☐	
11.	Respiratory protection	☐	☐	☐	
12.	Fall protection	☐	☐	☐	
13.	Heat stress procedures	☐	☐	☐	
14.	Cold stress procedures	☐	☐	☐	
D.	**DECONTAMINATION**				
1.	Good work practices to minimize contamination	☐	☐	☐	
2.	Decon areas situated to minimize contamination	☐	☐	☐	
3.	Decon procedures properly conducted	☐	☐	☐	
4.	Decon area delineated	☐	☐	☐	

Form 3-5
Work Site Safety Audit Form

		YES	NO	NA	COMMENT
E.	**MONITORING**				
1.	Instruments calibrated on-site/calibration logs	☐	☐	☐	
2.	Noise level monitoring	☐	☐	☐	
3.	Particulate monitoring	☐	☐	☐	
4.	Organic vapor monitoring	☐	☐	☐	
5.	Combustible gas monitoring	☐	☐	☐	
6.	Documentation of air monitoring results	☐	☐	☐	
F.	**TOOLS/EQUIPMENT**				
1.	Tools and equipment right for job	☐	☐	☐	
2.	Tools and equipment used correctly	☐	☐	☐	
G.	**UNSAFE CONDITIONS (Do any of the following conditions exist)**				
1.	Falling	☐	☐	☐	
2.	Being struck by object	☐	☐	☐	
3.	Being caught between objects	☐	☐	☐	
4.	Contact electric current	☐	☐	☐	
5.	Overhead hazards	☐	☐	☐	
6.	Overexposure to chemicals/hazardous substances	☐	☐	☐	
7.	Heat/cold stress	☐	☐	☐	
8.	Other	☐	☐	☐	
H.	**PROCEDURES/OTHER**				
1.	Applicable permits following	☐	☐	☐	
2.	Completed copies of permits on the Property	☐	☐	☐	
3.	Procedures in place and being followed	☐	☐	☐	
4.	Firewatch. Appropriate and effective	☐	☐	☐	
5.	Holewatch. Appropriate and effective	☐	☐	☐	
6.	Are unnecessary materials lying around creating hazard (e.g., slip/trip/fall)	☐	☐	☐	

ORIGINAL TO PROJECT FILE; SEND COPY TO SAFETY

Form 3-6
Work Site Safety Inspection Checklist

Project Name:	Project Number:	
Project Location:	Evaluated By:	Date/Time:
Health & Safety Officer:	Field representative(s) (If different than Health & Safety Officer):	

ADMINISTRATIVE	YES	NO	N/A		YES	NO	N/A
Pre-Construction/Pre-Site Entry Safety Meeting:	☐	☐	☐	Material Safety Data Sheets Present?	☐	☐	☐
Weekly "Tool-Box" Safety Meeting Conducted?	☐	☐	☐	First Aid Procedures	☐	☐	☐
Safety Meeting Documentation On Site?	☐	☐	☐	Emergency Numbers Present?	☐	☐	☐
SSP and Program On Site?	☐	☐	☐	Evacuation Procedures Developed	☐	☐	☐
Worksite Audit/Inspection Forms On-site	☐	☐	☐	Accident Reporting Procedure	☐	☐	☐
SSP Followed by On Site Team Members?	☐	☐	☐	Confined Space Entry Permit Present?	☐	☐	☐
Site Work Zones Delineated On Site Map?	☐	☐	☐	Excavation Safety Procedures Followed?	☐	☐	☐
Overhead and Underground Lines Identified?	☐	☐	☐	Excavation Competent Person On Site?	☐	☐	☐
				Scaffold Competent Person On Site	☐	☐	☐
Comments:							

EMPLOYEE TRAINING	YES	NO	N/A		YES	NO	N/A
Applicable Safety Training (e.g., water safety, CSE, fall protection, excavation safety, HAZWOPER, HAZCOM, etc.)?	☐	☐	☐	Heat Stress Breaks Followed and Documented?	☐	☐	☐
Respirator Fit Test Current?	☐	☐	☐	First Aid Certified?	☐	☐	☐
Employees Instructed on Safe Equipment Use?	☐	☐	☐	CPR Certified?	☐	☐	☐
Knowledgeable of Chemicals on Site?	☐	☐	☐	Other:	☐	☐	☐
Comments:							

SITE SET-UP & SITE CONTROL	YES	NO	N/A		YES	NO	N/A
Site Clean and Organized?	☐	☐	☐	Emergency Communication System?	☐	☐	☐
Correct Air Monitoring Equipment Present?	☐	☐	☐	Weekly Check of First Aid Kit	☐	☐	☐
Designated chemical Storage Area?	☐	☐	☐	First Aid Kit On Site	☐	☐	☐
Work Zones Physically Defined?	☐	☐	☐	Emergency First Aid Kit Present?	☐	☐	☐
Buddy System Implemented?	☐	☐	☐	Emergency Eyewash or Water Available for Flushing Chemicals?	☐	☐	☐
Warning Signs (e.g., Caution, Do Not Enter, etc.) Posted?	☐	☐	☐	Other:	☐	☐	☐
Comments:							

AIR MONITORING	YES	NO	N/A		YES	NO	N/A
Instruments Calibrated?	☐	☐	☐	Organic Vapor Monitoring Conducted?	☐	☐	☐
On Site Calibration Logs?	☐	☐	☐	Combustible Gas Monitoring Conducted?	☐	☐	☐
Noise Level Monitoring Conducted?	☐	☐	☐	Personal Exposure Monitoring Conducted?	☐	☐	☐
Particulate Monitoring Conducted?	☐	☐	☐	Daily Documentation of Air Monitoring Results?	☐	☐	☐
Comments:							

PERSONAL PROTECTIVE EQUIPMENT	YES	NO	N/A		YES	NO	N/A
Properly Used/Stored?	☐	☐	☐	Proper Foot Protection?	☐	☐	☐
PPE Appropriate for On Site Hazards?	☐	☐	☐	Proper Clothing?	☐	☐	☐
PPE Used as Written in SSP?	☐	☐	☐	Proper Hearing Protection?	☐	☐	☐
Proper Eye Protection?	☐	☐	☐	Dust Masks/Level C Respirators Used?	☐	☐	☐
Proper Head Protection?	☐	☐	☐	Fall Protection Used when at heights > 6 feet?	☐	☐	☐
Proper Hand Protection	☐	☐	☐	Proper PPE Disposal?	☐	☐	☐
				Respirator Changeout Schedule?	☐	☐	☐
Comments:							

TOOLS AND EQUIPMENT SAFETY	YES	NO	N/A		YES	NO	N/A
Tools and Equipment in Good Condition?	☐	☐	☐	Generators and Other Equipment Grounded?	☐	☐	☐
Tools and Equipment used Correctly?	☐	☐	☐	GFI used and Electrical Cords in Good Condition?	☐	☐	☐
Compressed Gas Cylinders Secure and Upgright?	☐	☐	☐	Lockout/Tagout Procedures Followed?	☐	☐	☐
Safety Cans used for Gasoline Storage?	☐	☐	☐	Fall Prevention Procedures Implemented?	☐	☐	☐
Fire Extinguishers On Site?	☐	☐	☐	Daily Ladder Inspection?	☐	☐	☐
Comments:							

UNSAFE CONDITIONS	YES	NO	N/A		YES	NO	N/A
Falling Hazards?	☐	☐	☐	Overhead Hazards?	☐	☐	☐
Being Struck by Object?	☐	☐	☐	Potential Overexposure to Chemicals/ Hazardous Substances?	☐	☐	☐
Being Caught Between Objects?	☐	☐	☐	Heat/Cold Stress?	☐	☐	☐
Electrical Hazards?	☐	☐	☐	Other:	☐	☐	☐
Comments:							

DECONTAMINATION	YES	NO	N/A		YES	NO	N/A
Good Work Practices to Minimize Contamination?	☐	☐	☐	Decon Area Delineated?	☐	☐	☐
Decon Areas Situated to Minimize Contamination?	☐	☐	☐	Spill Control Materials Present?	☐	☐	☐
Decon Procedures Properly Conducted?	☐	☐	☐	Other:	☐	☐	☐
Comments:							

ADDITIONAL COMMENTS/CORRECTIVE ACTION

Form 3-7
Visitor Sign-In Sheet
Project_____

No.	Date	Name	Signature	Affiliation	Purpose of Visit	Time In	Time Out
1)							
2)							
3)							
4)							
5)							
6)							
7)							
8)							
9)							
10)							
11)							
12)							
13)							
14)							
15)							
16)							
17)							
18)							
19)							
20)							
21)							
22)							
23)							
24)							
25)							

Appendix A

Toxicity Profile

Appendix A: Toxicity Profile for Hazardous Substances on the Property

Table A-2 provides chemical and physical information, exposure guidelines and standards, and toxicity information on those hazardous substances present, or suspected to be present, on the Property that have a work place exposure limit. Substances covered in this table include the following:

Diesel Range Organics
RCRA Metals
Potential Volatile Organic Compounds (VOCs)

Terminology (and its abbreviations) used in this table are defined below.

TLV (Threshold Limit Value): The ACGIH time-weighted average airborne concentration, to be used as a guideline for a normal 8-hour workday and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

PEL (Permissible Exposure Limit): OSHA-regulated time-weighted average airborne concentration for a normal 8-hour workday and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

(): IDLHs that were originally in the Standards Completion Program that did not take into consideration carcinogenic effects.
BP: Boiling point
C (Ceiling): The concentration that should not be exceeded during any part of the working exposure.
Ca: Potential occupational carcinogen (NIOSH – National Institute for Occupational Safety and Health)
CNS: Central nervous system
Fl P: Flash point
Flamm. Range: Flammability Range
GI: Gastrointestinal
I.P.: Ionization potential
IDLH: Immediately dangerous to life and health
LEL: Lower explosive limit in air, % by volume
MN RAL: Minnesota Recommended Allowable Limit for drinking water contaminants
NA: Not available
NOC: Not otherwise classified
OT: Odor threshold
PAHs: Polynuclear aromatic hydrocarbons
PCBs: Polychlorinated biphenyls
ppm: Parts per million
Skin: Indicates skin absorption as an additional exposure route
Sol: Solubility in water
Sp.Gr.: Specific gravity

STEL (Short-term exposure limits): 15-minute TWA Concentration, which should not be exceeded at any time during a workday. The duration of a STEL exposure should not be repeated more than four times per day.
TWA: Time weighted average
UEL: Upper explosive limit in air, % by volume
VP: Vapor pressure in mm of Mercury

Table A-1 defines the carcinogenicity classes referred to in TABLE A-2 — TOXICITY PROFILE FOR SELECTED HAZARDOUS SUBSTANCES.

Table A-1
Carcinogen Categories

Group	Category
U.S. EPA Classification of Overall Weight-of-Evidence for Human Carcinogenicity	
A	Human carcinogen—sufficient evidence from epidemiological studies.
B1	Probable human carcinogen—limited human evidence.
B2	Probable human carcinogen—inadequate human data but sufficient evidence in animals.
C	Possible human carcinogen—limited animal evidence and no human data.
D	Not classifiable as to human carcinogenicity—inadequate animal evidence.
ACGIH Carcinogen Categories	
A1	Confirmed human carcinogens—recognized to have carcinogenic potential.
A2	Suspected human carcinogens—suspected of inducing cancer, based on limited epidemiological evidence or animal studies.

Table A-2: Toxicity Profile for Selected Hazardous Substances on the Property

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Acetone (67-64-1)	2,500 (10% LEL)	500 250 (NIOSH)	750	9.69	Respiratory, eye, skin irritant; inhalation to high concentrations may result in central nervous system (CNS) depression (nausea, dizziness, headache, fatigue); vomiting; abdominal pain.	Skin contact may cause dermatitis; inhalation exposure may cause bronchitis. May cause kidney damage by the oral route of exposure.	2.5	13	OSHA: No US EPA: No ACGIH: No	OT: 100 ppm VP: 180 mm Hg BP: 133ºF Sol: Miscible Fl P: 0ºF Odor: Fragrant, mint-like odor
Antimony (7440-36-0)	50 mg/m^3 (as Sb)	0.5 mg/m^3 Antimony and compounds, as Sb	NA	NA	Inhalation of antimony compounds may cause upper respiratory tract irritation. Acute overexposure may also produce symptoms such as nausea, dizziness, and dry throat. eye contact may cause irritation.	Prolonged contact may cause dermatitis. May cause heart, kidney, and liver disorders from chronic antimony exposure.	NA	NA	OSHA: No US EPA: No ACGIH: No	VP: 0 mm (approx.) BP: 2975ºF Fl P: NA Sol: Insoluble Odor: Odorless
Arsenic (7440-38-2)	Inorganic compounds Ca 5 mg/m^3 (as As)	10 µg/m^3 0.5 mg/m^3 (PEL for organic compounds) 0.01 mg/m^3 (PEL for inorganic compounds)	NA	NA	Inhalation can cause severe respiratory irritation; oral exposure may cause cramps, gastrointestinal (G.I.) damage, swelling and death.	Skin changes may be produced (including pigmentation changes) upon oral or inhalation exposure; vascular, nervous system and liver injury may result if inhaled or ingested.	NA	NA	OSHA: Yes US EPA: A ACGIH: A1[4]	Properties vary depending on specific compound; essential element Odor: inorganic-odorless; organic-odor may vary

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Asbestos, all forms (1332-21-4)	Ca	0.1 fiber/cc	NA	NA	Acute effects are not expected.	Chronic inhalation exposure to asbestos may cause asbestosis, lung cancer, and mesothelioma (a cancer of the lining of the lung cavity). Asbestosis, characterized by the formation of scar tissue in the lungs, develops several (from 7 to 30) years after the period of exposure. Symptoms include cough, shortness of breath, and chest pain. Asbestos is also a human carcinogen.	NA	NA	OSHA: Yes US EPA: A ACGIH: A1	VP: 0 mm Hg (approx.) BP: Decomposes Sol: Insoluble Fl P: NA Appearance: White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous Odor: Odorless
Barium (7440-39-3)	50 mg/m^3	0.5 mg/m^3	NA	NA	Inhalation may cause coughing, bronchial irritation, and pneumoconiosis. Contact with soluble salts may cause irritation of eyes, and mucous membranes; and possibly burns.	Dermatitis may result from repeated or prolonged skin contact.	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties vary depending on specific compound Odor: odorless
Benzene (skin) (71-43-2)	Ca 500	0.5 1 (PEL) (0.1 NIOSH)	2.5 1 (NIOSH)	9.24	Eye, skin, respiratory irritant. Inhalation can cause central nervous system (CNS) depression (headache, fatigue, dizziness, nausea).	Toxic to bone marrow cells, leading to anemia (fatigue, headache, nausea, anorexia) upon repeated inhalation exposure; continued exposure may result in leukemia.	1.3	7.9	OSHA: Yes US EPA: A ACGIH: A1	OT: 4.68 ppm VP: 75 mm Hg BP: 176ºF Sol: Slightly sol. in water; very sol. in organic solvents and oils Fl P: 12ºF Odor: aromatic
Bis(2-ethylhexyl)phthalate (Di-sec octyl phthalate) (117-81-7)	Ca 5,000 mg/m^3	5 mg/m^3	10 mg/m^3 (NIOSH)	NA	Low order of acute toxicity.	Liver and testicular toxic effects were produced in animals following ingestion.	NA	NA	OSHA: No US EPA: B2 ACGIH: No[4]	BP: 248ºF Fl P: 410ºF Sol: 400 µg/L

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Cadmium (7440-43-9)	Ca 9 mg/m^3 (as Cd)	10 $\mu g/m^3$ 2 $\mu g/m^3$ (respirable fraction) 5 $\mu g/m^3$ (PEL)	NA	NA	Ingestion may lead to nausea, diarrhea, muscle cramps; high doses may lead to unconsciousness.	Chronic oral exposure may produce bone and kidney damage.	NA	NA	OSHA: Yes US EPA: B1 ACGIH: A2[4]	Cadmium dust properties vary depending on specific compound Odor: odorless
Carbon Disulfide (skin) (75-15-0)	500	10 1 (NIOSH)	10 (NIOSH)	10.08	Readily absorbed through unbroken skin. Causes eye, skin, and respiratory irritation. Inhalation causes CNS effects (excitability, confusion, irritability). Ingestion of small quantities may cause vomiting, diarrhea and headache.	Dry scaly skin may develop. Chronic exposure produces central and peripheral nervous system, cardiovascular, gastrointestinal, kidney, endocrine, and eye disorders.	1.3	50.0	OSHA: No US EPA: No ACGIH: No	VP: 297 mm Fl P: -22ºF BP: 116ºF Sol: 0.3% OT: 0.02-0.42 ppm (Sweet ether-like odor. Reagent grades are foul smelling. Olfactory fatigue may occur.)
Carbon Monoxide (CO) (630-08-0)	1,200	25	C200 (NIOSH)	14.01	Exposure to CO can cause headache, dizziness, lightheadedness, nausea, vomiting, unconsciousness, and suffocation. Lower levels can effect concentration, memory, and vision, and loss of muscle coordination. Extremely high exposure levels can decrease the ability of the blood to carry oxygen. Skin contact with liquid CO can cause frostbite.	Chronic exposure may cause central nervous system (CNS) damage.	12.5	74	OSHA: No US EPA: No ACGIH: No NTP: No IARC: No	OT: 100,000 ppm VP: >35 atm BP: -313°F Fl P: NA (Gas) Sol: Slight (2%) Color/Odor: colorless, odorless gas

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Carbon Tetrachloride (skin) (56-23-5)	Ca 200	5	10	11.47	Inhalation or dermal exposure to high concentrations may result in CNS depression (dizziness, nausea, confusion, headache); kidney and liver damage may occur upon acute inhalation or oral exposure to high concentrations.	Repeated inhalation or oral exposure to low concentrations may produce liver and kidney damage; CNS depression may occur upon repeated exposure; systemic effects are increased when used in conjunction with alcohol; liver tumors have been produced in animals following inhalation and ingestion.	NA	NA	OSHA: No US EPA: B2 ACGIH: A2	OT: >10 ppm VP: 91 mm Hg Fl P: NA BP: 170ºF Sol: 0.05% Odor: characteristic ether-like odor
Chloroethane (skin) (ethyl chloride) (75-00-3)	3.800 (10% LEL)	100	NA	10.97	Inhalation of high concentrations of chloroethane causes CNS depression (dizziness, eye irritation, incoordination, analgesia, and symptoms of inebriation). Sudden deaths from inhalation overexposure have been reported. Skin absorption is possible and chloroethane can cause frostbite. Guinea pigs exhibited lung, liver and kidney histopathological changes from the oral route of exposure.	No chronic effects found in the literature.	3.8	15.4	OSHA: No US EPA: No ACGIH: No	VP: 1000 mm Fl P: NA(gas) BP: 54ºF Sol: 0.6% Odor: Pungent, ether-like odor
Chloroform (67-66-3)	Ca 500	10	2 (NIOSH)	11.42	Eye and skin irritant; acute inhalation exposure to moderately high concentrations results in CNS depression (nausea, inebriation and excitation may occur); exposure to high concentrations may result in cardiac sensi-tization to epinephrine and liver and kidney injury.	Liver and kidney injury may result from repeated inhalation exposure; embryo-toxic in rats by the inhalation route of exposure.	NA	NA	OSHA: No US EPA: B2 ACGIH: No[4]	OT: 205-307 ppm VP: 160 mm Hg BP: 143ºF Fl P: NA Sol: 0.5% Odor: Pleasant

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Chromium (hexavalent) (18540-29-9)	Ca	0.05 mg/m^3 (Water soluble Cr VI compounds) 0.01 mg/m^3 (insoluble Cr VI compounds)	NA	NA	Hexavalent forms are more toxic than trivalent; Inhalation of salts may produce severe nasal irrita-tion/damage; skin ulcers and dermatitis result from contact with salts or chromic acid.	Hexavalent forms are more toxic than trivalent; liver, kidney and lung damage may result from inhalation exposure; dermatitis may result from skin contact.	NA	NA	OSHA: No US EPA: A ACGIH: A1	Properties vary depending on specific compound; essential element Odor: Odorless
Coal Tar Pitch Volatiles (benzene solubles: anthracene, benzo(a)pyrene, phenanthrene, acridine, chrysene, pyrene) (65996-93-2)	Ca 80 mg/m^3	0.2 mg/m^3 (0.1 mg/m^3 NIOSH)	NA	NA	Acute toxicity appears low in lab animals, although occupational exposure has caused skin reactions and eye irritation.	Dermatitis may result from skin exposure; animal studies show oral adminis-tration may lead to blood disorders and liver, kidney, and ocular effects. Carcinogenic CTPVs may produce immunosuppressive effects in humans by the inhalation route of exposure.	NA	NA	OSHA: Yes US EPA: B2 (benzo(a) pyrene) ACGIH: A1	Properties vary; Low VP Odor: Naphthalene-like odor
Cobalt (7440-48-4)	20 mg/m^3	0.02 mg/m^3 0.1 (PEL)	NA	NA	Inhalation can cause irritation of the nose and throat, and may cause respiratory disease. Dermal exposure to cobalt may cause an allergic skin rash.	Chronic inhalation may cause inflammation of the lungs (pneumonitis).	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties vary depending on specific compound Odor: Odorless
Cumene (skin) (98-82-8)	900 (10% LEL)	50	NA	8.75	Inhalation of large vapor concentrations may cause dizziness, incoordination and unconsciousness. High doses to animals led to spleen damage and liver changes. High air concentrations can cause eye and skin irritations; may be absorbed through the skin.	Prolonged skin contact may result in rashes; limited information is available on systemic chronic effects.	0.9	6.5	OSHA: No US EPA: No ACGIH: No	VP: 5 mm Fl P: 96ºF BP: 306ºF Sol: Insoluble Odor: Sharp, penetrating aromatic odor

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Cyanazine (triazine pesticide) (21725-46-2)	NA	NA	NA	NA	Low oral acute toxicity	Structurally related compounds may produce thyroid tumors; decreased weight gain and increased platelet count seen in dogs	NA	NA	OSHA: No US EPA: C ACGIH: No	NA
Cyanide (skin) (57-12-5)	50 mg/m^3	See STEL	C4.7 (5 mg/m^3)	NA	Exposure by all routes to hydrogen cyanide can result in constriction of the throat, nausea, vomiting, staggering, headache; inhalation of high levels may lead to unconsciousness, convulsions, and death.	Chronic cyanide poisoning in a serious or incapacitating form is rare; fatigue, nausea, and headaches may occur if inhaled.	NA	NA	OSHA: No US EPA: No ACGIH: No	OT: 1 mg/m^3 VP: 0 mm Hg Fl P: NA
Dicamba (substituted benzoic acid pesticide) (1918-00-9)	NA	NA	NA	NA	No acute effects found in literature.	Mode of action unknown.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
Dichlorodifluoromethane (Freon 12) (75-71-8)	15,000	1,000	NA	11.75	Dichlorodifluoromethane is a CNS depressant (decrease in consciousness, amnesia, cardiac arrhythmias, paresthesia, tinnitus and slurred speech) when inhaled. 10,000 ppm can cause psychomotor impairment.	Chronic inhalation exposures of human volunteers to 1,000 ppm did not cause subjective symptoms, cardiac abnormalities nor abnormalities in pulmonary function. Chronic exposure of rats to 10,000 ppm and of dogs to 5,000 ppm did not cause any adverse effects.	NA	NA	OSHA: No US EPA: No ACGIH: No	VP: >1 atm BP: -22ºF Sol: 0.03% Odor: Ether-like odor at extremely high conc.
1,1-Dichloroethane (75-34-3)	3,000	100	NA	11.06	Inhalation exposure to high concentrations may result in CNS depression (headache, dizziness, fatigue, nausea); irritating to skin.	Data is limited.	5.6%	NA	OSHA: No US EPA: C ACGIH: No	VP: 230 mm Hg @ 77ºF Fl P: 22ºF BP: 135ºF Sol: 0.6% Odor: Chloroform-like odor

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
1,2-Dichloroethane (ethylene dichloride) (107-06-2)	Ca 50	10 1 (NIOSH)	2 (NIOSH)	11.05	At high concentrations, irritating to eyes, nose, throat; at lower concentrations, inhalation and oral exposures may result in CNS depression and gastrointestinal upset (confusion, headache, dizziness, nausea, vomiting); liver, kidney, and adrenal injury may also result from inhalation exposure.	Chronic inhalation exposure may cause CNS depression, nausea, vomiting, liver, kidney and adrenal injury.	6.2	16	OSHA: No US EPA: B2 ACGIH: No[4]	OT: 100 ppm VP: 64 mm Hg Fl P: 56ºF BP: 182ºF Sol: 0.9% Odor: Chloroform-like odor
1,1-Dichloroethylene (vinylidene chloride) (75-35-4)	Ca	5 1 (PEL)	NA	10.00	Inhalation exposure to high concentrations may result in CNS depression (headache, fatigue, dizziness, nausea); intoxication; eye, respiratory, skin irritant.	Chronic inhalation exposure to low concentrations causes liver and kidney injury; CNS depression.	5.6	11.4	OSHA: No US EPA: C ACGIH: No[4]	MW: 96.9 VP: 591 mm Hg BP: 89ºF Fl P: 14ºF Odor: Mild, sweet, chloroform-like odor
1,2-Dichloroethylene, cis & trans (540-59-0)	1,000	200	NA	9.65	Eye irritant; inhalation exposure to high levels of the trans isomer may cause narcosis (severe CNS depression); cis isomer appears to be less potent, but is anesthetic at high concentrations.	Chronic inhalation exposure may cause adverse effects to the liver and lungs.	5.6	12.8	OSHA: No US EPA: No ACGIH: No	OT: 0.085 ppm VP: 180-264 mm Hg Fl P: 36ºF BP: 118-140ºF Sol: Insoluble Odor: Slightly chloroform-like odor

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Dichlorofluoromethane (Freon 21) (75-43-4)	5,000	10	NA	12.39	Inhalation of high concentrations of dichlorofluoro-methane causes asphyxia in animals. Guinea pigs exposed to 400,000 ppm dichlorofluoro-methane exhibited dyspnea, tremor, convulsive movements and death. 102,000 ppm resulted in congested lungs, kidneys, liver, and death. 52,000 ppm caused tremors, incoordination and irregular breathing in animals. Rats exposed to 1,000 ppm dichlorofluoromethane developed arrhythmias and hearts sensitized to epinephrine.	Chronic effects in humans have not been reported. 90 day inhalation exposures of 100 and 5,000-ppm dichlorofluoro-methane caused bilateral hair loss, extensive liver damage and excessive mortality in rats. The chronic toxicity of dichlorofluoromethane appears to be more hepatotoxic than closely related fluorinated compounds, and more similar to chloroform.	NA	NA	OSHA: No US EPA: No ACGIH: No	VP: 1200 mm BP: 48ºF Sol: Insoluble Fl.P: NA (non-flammable gas) Odor: Slight, ether-like odor
1,2-Dichloropropane (propylene dichloride) (78-87-5)	Ca 400	75	110	10.87	At very high air concentrations, 1,2-Dichloropropane is a CNS depressant and an eye irritant. Ingestion or inhalation of high levels causes severe liver damage, acute renal failure and hemolytic anemia. Inhalation can also result in anorexia, abdominal pain, vomiting, purplish patches on the skin, and blood in the urine. The chemical is moderately irritating to the eye. Skin absorption is possible.	Guinea pigs repeatedly exposed to 1,2-Di-chloropropane exhibited severe conjunctival swelling, respiratory irritation and incoordination. Some of the animals died and had severe liver and some kidney injury from repeated inhalation exposure. No reports of injury to humans from occupational exposure found.	3.4	14.5	OSHA: No US EPA: B2 ACGIH: No	VP: 40 mm Fl P: 60ºF BP: 206ºF Sol: 0.3% Odor: Chloroform-like odor

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Diesel Fuel (68334-30-5)	NA	NA	NA	NA	Skin and respiratory irritant. Inhalation of high concentrations may cause CNS depression (headache, confusion, drowsiness, nausea). Ingestion may cause gastrointestinal irritation, nausea, and vomiting.	Repeated skin contact may cause dermatitis.	0.6 (Diesel Fuel Oil No.2-D)	7.5 (Diesel Fuel Oil No. 2-D)	OSHA: No US EPA: No ACGIH: No	VP: 2.12-26.4 mm Hg @ 70ºF BP: 304->1090ºF FP: 100ºF min. will vary depending on type
Dimethoate (organophosphate pesticide) (60-51-5)	NA	Biological Exposure Index available (organo-phosphorus choline-sterase inhibitors).	NA	NA	Ingestion may lead to nausea, sweating, headache, dizziness, fatigue; oral human lethal dose probably between 50-500 mg/kg.	Decreased cholinesterase activity seen in the brain and blood upon chronic ingestion by rats.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
Ethyl Benzene (100-41-4)	800 (10% LEL)	100	125	8.76	Respiratory, eye, skin irritant; inhalation or ingestion overexposure may result in CNS depression (nausea, dizziness, headache, fatigue); vomiting; abdominal pain.	Repeated skin contact may cause dermatitis; inhalation exposure may cause bronchitis.	0.8	6.7	OSHA: No US EPA: No ACGIH: No	OT: 0.092-0.6 ppm VP: 7 mm Hg BP: 277ºF Sol: 0.01% Fl P: 55ºF Odor: Aromatic odor
Ethyl Ether (diethyl ether) (60-29-7)	1,900 (10% LEL)	400	500	9.53	Eye and respiratory irritant; inhalation of high concentrations produces CNS depression and narcosis; symptoms may include drowsiness, vomiting, headaches, muscular relaxation.	Chronic inhalation exposure may cause anesthetic effects.	1.9	36.0	OSHA: No US EPA: No ACGIH: No	OT: 0.83 ppm VP: 440 mm Hg BP: 94ºF Sol. 8.0% Fl P: -49ºF Odor: Pungent, sweetish odor

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Ferric Ferrocyanide (Prussian Blue) (14038-43-8) worker exposure levels based on hydrogen cyanide	50	See STEL	C4.7 (5 mg/m^3)	NA	Practically nontoxic if swallowed (oral rat LD50:>8gm/kg). Low order of toxicity due to strong chemical bonding between cyanide groups and iron. Although cyanide is considered to be a skin absorbant; ferric ferrocyanide is not readily absorbed through the skin.	No long-term effects found.	NA	NA	OSHA: No US EPA: No ACGIH: No	Chemically stable and insoluble at pH <4, with solubility increasing at higher pH. Soluble iron cyanide complexes have been observed to undergo rather rapid photolysis in the presence of sunlight, yielding free hydrogen cyanide.
Fuel Oil	NA	NA	NA	NA	Inhalation or ingestion exposure may cause headache, nausea, confusion, drowsiness, convulsions, and coma. No. 2 Fuel Oil: Mild eye and moderate skin irritation, practically nontoxic.	May produce kidney damage.	0.6	7.5	Some fuel oils may be carcino-genic	VP: 2-26 mm Hg at 21ºC BP: 304-1090ºF Fl P: 100-336ºF Sol: ~5 mg/L
Gasoline (8006-61-9)	Ca	300	500	NA	Inhalation overexposure to vapors can cause broncho-pneumonia, pulmonary edema, inebriation, and vomiting.	Dermatitis and blistering of the skin may occur from repeated dermal contact.	1.4	7.6	OSHA: No US EPA: No ACGIH: No[4]	OT: 0.25 ppm VP: 263 mm Hg BP: 102ºF Sol: Insoluble Fl.P: -45ºF
Hexane (skin) (110-54-3)	1,100 (10% LEL)	50	NA	10.18	Moderate skin irritant. Vapors an irritant to eyes, nose, and upper respiratory tract. High concentration results in CNS depression (headache, dizziness, nausea, and hallucination).	Chronic inhalation exposure causes peripheral neuropathy (tingling of extremities, incoordination, sensory losses, weakness, tremors).	1.1	7.5	OSHA: No US EPA: No ACGIH: No	OT: 65-248 ppm VP: 150 mm (77ºF) BP: 156ºF Fl P: -7.6ºF (CC) Sol: 0.002% Odor: Gasoline-like odor
Hydraulic Fluid	NA	NA	NA	NA	Skin or eye contact may produce slight irritation. Ingestion may result in gastrointestinal irritation.	No chronic effects found in the literature.	NA	NA	OSHA: No US EPA: No ACGIH: No	BP: 375-550ºF FP: Varies w/ particular blend and product

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Hydrogen Cyanide (skin) (74-90-8)	50	See STEL	C4.7	13.60	Exposure to hydrogen cyanide by all routes can result in constriction of the throat, nausea, vomiting, staggering, headache; inhalation of high levels may lead to unconsciousness, convulsions, and death.	Chronic cyanide poisoning in a serious or incapacitating form is rare; fatigue, nausea, and headaches may occur if inhaled.	5.6%	40%	OSHA: No US EPA: No ACGIH: No	OT: 1 mg/m^3 VP: 630 mm Hg Fl P: 0ºF BP: 78ºF Sol: Miscible Odor: Bitter almond-like odor
Hydrogen Sulfide (H_2S) (7783-06-4)	100	10	15	10.46	H_2S is an irritant of the eyes and respiratory system at low concentrations (50 ppm); inhalation exposure to higher concentrations may cause respiratory paralysis; symptoms of short-term overexposure to low levels are nervousness, headaches, fatigue, weakness, spasms, convul-sions, and delirium.	Inhalation exposure to 250 ppm over a period of time has led to lung problems, nausea, cramps, and diarrhea.	4.0	44	OSHA: No US EPA: No ACGIH: No	OT: 0.005 ppm (rotten eggs; olfactory fatigue occurs at 150 ppm) VP: >760 mm Hg BP: -77ºF Sol: Insoluble Fl P: NA
Jet Fuel	NA	NA	NA	NA	Moderate skin, eye, and respiratory irritant. May cause CNS depression (headache, nausea, and mental confusion) by the inhalation and oral routes of exposure. In extreme cases, loss of consciousness may occur.	Prolonged or repeated contact may cause dermatitis. Long-term vapor exposure to shale-derived JP-4 jet fuel has produced liver effects, kidney effects, and neurological damage.	1.3 (JP-4)	8.0 (JP-4)	OSHA: No US EPA: No ACGIH: No	OT: 1 ppm VP: 91 mmHg @ 68ºF BP: 140-518ºF FP: -9.4-30.2ºF (CC) Sol: Physical data vary with fuel type

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Kerosene (Fuel Oil No. 1) (8008-20-6)	NA	100 mg/m^3 (NIOSH)	NA	NA	Inhalation exposure to the vapor is not expected since kerosene has a low vapor pressure. Potential respiratory irritant and CNS depressant (headache, nausea, dizziness, lightheadedness, and vomiting if heated or misted. Skin irritant and possible eye irritant. Aspiration hazard. Kerosene can enter lungs during swallowing or vomiting and cause lung inflammation, lung damage, and, in some cases, death.	Long-term dermal exposure to kerosene may produce dermatitis. Limited data regarding other chronic effects.	0.7	5	OSHA: No US EPA: No ACGIH: No	BP: 347-617ºF Sol: Insoluble Fl.P: 100-162ºF VP: 5mm (100ºF) OT: 0.55 Predominantly C_9 - C_{16} Odor: Characteristic, mild petroleum
Lead (inorganic) (7439-92-1)	100 mg/m^3	0.05 mg/m^3	NA	NA	Early signs of acute inhalation exposure are fatigue, metallic taste in mouth, and sleep disturb-ance.	Inhalation and ingestion may produce abdominal pain, weakness, muscle cramps. Effects of chronic exposure to low lead levels are subtle (blood lead of 40-60 µg/L); chronic intoxication is thought to produce anemia and have an adverse effect on nervous system development.	NA	NA	OSHA: No US EPA: B2 ACGIH: No[4]	Properties vary depending on compound. Pregnant women and children are especially sensi-tive to low-level effects.
Liquefied Petroleum (LP) Gas (propane, butane, and mercaptans) (68476-85-7)	2,000 (10% LEL)	1,000	NA	10.95	Practically nontoxic below explosive limits; narcotic at high concentrations if inhaled; simple asphyxiant. Generally, flammability and explosive hazards outweigh biologic effects.	No adverse health effects are reported.	2.1 (propane) 1.9 (butane)	9.5 (propane) 8.5 (butane)	OSHA: No US EPA: No ACGIH: No	OT: 5,000-20,000 ppm VP: >760 mm Hg BP: >-44ºF Fl P: NA(gas) Sol: Insoluble Odor: Odorless, however, a foul smelling odorant is usually added

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Mercury (all forms except alkyl) (skin) (7439-97-6)	10 mg/m^3 as Hg	0.025 mg/m^3 inorganic forms including metallic mercury 0.10 mg/m^3, as Hg-aryl	NA	NA	Inhalation of high concentrations of mercury vapor can cause bronchitis and chest pains; ingestion may result in abdominal pain, diarrhea, shock, and liver and kidney damage.	Chronic inhalation or ingestion exposure to both inorganic and organic mercury compounds may result in nervous system disorders; psychic and emotional disturbances, kidney damage and digestive disturbances. Exposure to organic mercury may cause visual disturbances and tunnel vision.	NA	NA	OSHA: No US EPA: D ACGIH: No	VP: 0.0012 mm Hg BP: 674ºF Sol: Insoluble Fl P: NA Odor: Odorless
Methane (74-82-8)	NA	NA	NA	12.98	No physiological effects below the flammability limits; simple asphyxiant at high concentrations if inhaled. Generally, flammability and explosive hazards outweigh biologic effects.	No adverse health effects are reported.	5.3	15.0	OSHA: No US EPA: No ACGIH: No	OT: 200 ppm Fl P: -386.6ºF Odor: Odorless
Methyl Alcohol (skin) (Methanol) (67-56-1)	6,000	200	250	10.84	Eye, skin and respiratory irritant. Inhalation of high concentrations may cause CNS depression, visual impairment (optic nerve neuropathy or visual field changes) or complete and possibly permanent blindness. Can absorb through skin and may cause headache, fatigue and visual disturbances.	Repeated inhalation exposure or skin absorption may produce temporary or permanent visual disturbances and possibly blindness.	6	36.5	OSHA: No US EPA: No ACGIH: No	OT: 4.2-5,960 ppm VP: 99 mm BP: 148ºF Fl P: 54ºF Sol: Miscible Odor: Characteristic pungent odor

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Methylene Chloride (Dichloromethane) (75-09-2)	Ca 2,300	50 25 (PEL)	NA	11.32	Symptoms of excessive exposure include dizziness, nausea, tingling or numbness of the extremities, sense of drunkenness from inhalation exposure. Exposure to very high concentrations may lead to rapid unconsciousness and death.	Inhalation may cause CNS effects; may produce liver and kidney damage in animals if inhaled.	13	23	OSHA: No US EPA: B2 ACGIH: No[4]	OT: 205-307 ppm VP: 350 mm Hg BP: 104ºF Fl P: Not flammable by standard tests; will burn under extreme conditions. Sol: 2% Odor: Chloroform-like odor
Methyl Ethyl Ketone (MEK) (2-Butanone) (78-93-3)	3,000	200	300	9.54	Respiratory, eye, skin irritant; inhalation of high concentrations may cause CNS depressant (nausea, dizziness, headache, fatigue); vomiting; abdominal pain.	Prolonged skin contact and inhalation exposure may cause dermatitis; inhalation may cause bronchitis.	1.4	11.4	OSHA: No US EPA: No ACGIH: No	OT: 10 ppm VP: 78 mm Hg BP: 175ºF Fl P: 16ºF Sol: 28% Odor: Moderately sharp, fragrant mint or acetone-like odor
Methyl Isobutyl Ketone (Hexone; MIBK) (108-10-1)	500	50	75	9.30	Irritation of eyes, mucous membranes, and skin; inhalation exposure of 80 to 500 parts per million (ppm) may also cause weakness, loss of appetite, headache, sore throat, and nausea.	Prolonged or repeated inhalation exposure may result in kidney and liver changes.	1.2	8.0	OSHA: No US EPA: No ACGIH: No	OT: 0.47 ppm VP: 16 mm Hg Fl P: 64ºF BP: 242ºF Sol: 2% Odor: Pleasant odor
Naphthalene (skin) (91-20-3)	250	10	15	8.12	Oral exposure may produce abdominal pain, nausea, vomiting. Skin/eye contact can lead to systemic effects, conjunctivitis (pink eye), and dermatitis.	Inhalation of vapors and ingestion of dusts may lead to cataracts and retinal degeneration. Dermatitis may result from skin contact.	0.9	5.9	OSHA: No US EPA: No ACGIH: No	OT: 0.08 ppm VP: 0.08 mm Hg Fl P: 174ºF BP: 424ºF Sol: 0.003% Odor: Mothballs or coal tar odor

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Nickel (7440-02-0)	Ca 10 mg/m^3 as Ni	1.5 mg/m^3 Elemental/ Metal 0.1 mg/m^3 Soluble compounds as Ni 0.2 mg/m^3 insoluble compounds as Ni (inhalable fraction)	NA	NA	Inhalation exposure to nickel-containing dust may result in chemical pneumonitis and nasal irritation.	Metallic nickel and certain nickel compounds upon repeated skin contact cause "nickel-itch". Sensitization dermatitis; damage to the nasal mucosa and loss of smell have been reported among workers exposed to nickel aerosols. Nickel refining has been associated with an increased risk of nasal and lung cancer by the inhalation route of exposure.	NA	NA	OSHA: No US EPA: A (nickel refinery dust) ACGIH: No[4] A1 for insoluble compounds	Properties vary depending on specific compound Odor: Odorless
Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)	Ca	NA	NA	NA	Acute toxicity appears low in lab animals, although occupational exposure has caused skin reactions and eye irritation. Acute and chronic effects of cPAHs and nPAHS are similar.	Dermatitis may result from skin exposure; animal studies show oral administration may lead to blood disorders and liver, kidney, and ocular effects. cPAHs may produce immuno-suppressive effects in humans.	NA	NA	OSHA: Yes US EPA: B2 (benzo(a) pyrene) ACGIH: A1 (coal tar pitch volatiles) A2 (benzo(a) pyrene)	Properties vary; Low VP
Noncarcinogenic (nPAHs)	NA	NA	NA	NA	Acute toxicity appears low in lab animals, although occupational exposure has caused skin reactions and eye irritation. Acute and chronic effects of cPAHs and nPAHS are similar.	Dermatitis may result from skin exposure; animal studies show oral administration may lead to blood disorders, and liver, kidney, and ocular effects.	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties vary; Low VP
Polychlorinated Biphenyls, 54% chlorine (PCBs) (skin) (11097-69-1)	Ca 5 mg/m^3	0.5 mg/m^3 0.001 (NIOSH)	NA	NA	Oral ingestion of PCBs has produced liver damage, general fatigue, and weight loss in rats; nausea, swelling of the hands and face may occur upon acute exposure.	Chronic human exposure to PCBs has led to headaches, fever, vomiting, diarrhea and chloracne (a skin disease).	NA	NA	OSHA: No US EPA: B2 ACGIH: No[4]	VP: 0.0004 mm Hg BP: 617-734ºF Fl P: Relatively nonflammable Sol: Insoluble Odor: Mild hydrocarbon odor

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Pentachlorophenol (skin) (87-86-5)	2.5 mg/m^3	0.5 mg/m^3	NA	NA	Short dermal exposure causes skin irritation and first degree burns; secondary burns may occur on long exposure; absorbed through the skin.	Dermal exposure may lead to contact dermatitis. Lung, liver and kidney damage may result from long-term inhalation, ingestion and skin absorption exposure.	NA	NA	OSHA: No US EPA: B2 ACGIH: No	OT: NA VP: 0.0001 mm Hg @ 77ºF BP: 588ºF Decomposes Fl P: NA Sol: Insoluble Odor: Benzene-like odor
Phenol (skin) (108-95-2)	250	5	C15.6	8.50	Corrosive to tissue; may cause severe eye damage and blindness; systemic effects from any route of exposure may include weak-ness, sweating, headache, ringing in ears, excitement or shock.	Skin discoloration; possible liver and kidney damage by the inhalation and skin absorption exposure.	1.8	8.6	OSHA: No US EPA: No ACGIH: No	OT: 0.05 ppm VP: 0.4 mm Hg BP: 359ºF Fl P: 175ºF Sol: 9% Odor: Sweet, acrid odor
Prometon (triazine pesticide) (161-01-8)	NA	NA	NA	NA	Low oral acute toxicity.	Reduced body weight seen in animals upon ingestion.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
Selenium	1 mg/m^3 as Se	0.2 mg/m^3	NA	NA	Inhalation exposure may cause headache, fever, chill, sore throat, and bronchitis. Garlic odor of breath and sweat a sign of acute poisoning.	Loss of hair, teeth, nails, depression, nervousness, giddiness, gastrointestinal disturbance, dermatitis, and blurred vision.	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties may vary depending on specific compound
Silica, crystalline - Quartz (as respirable particulate) (14808-60-7)	Ca 50 mg/m^3	0.05 mg/m^3	NA	NA	Inhalation exposure may cause coughing; wheezing, and nonspecific chest illness.	Inhalation exposure may cause scarring of the lung tissue leading to silicosis; possibly lung cancer.	NA	NA	OSHA: No US EPA: No ACGIH: No	VP: 0 mm Hg (approx.) BP: 4046ºF Fl P: NA Sol: Insoluble Odor: Odorless
Silvex (chlorophenoxy compound pesticide) (93-72-1)	NA	NA	NA	NA	Most chlorophenoxy compounds are relatively nontoxic but may contain more toxic contaminants (e.g., dioxin)	Ingestion causes anorexia and dehydration in animals; contact causes irritation to skin and mucous membranes.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Simazine (triazine pesticide) (122-34-9)	NA	NA	NA	NA	Low acute oral toxicity in experimental rodents; delayed neurological symptoms occurred (10-20 days) in sheep (e.g. paralysis) upon single oral dose of 500 mg/kg.	Decreased weight gain and blood effects seen in laboratory animals upon chronic ingestion; mammary tumors seen in rats.	NA	NA	OSHA: No US EPA: C ACGIH: No	NA
Sodium Cyanide (skin) (143-33-9)	25 mg/m^3 (as CN)	See STEL	C5 mg/m^3	NA	Extremely toxic by ingestion, inhalation, and skin absorption. Adverse effects to CNS, respiratory system, and cardiovascular system may result due to high levels of cyanides for short durations. See Cyanide Acute Effects. Sodium Cyanide may also be corrosive to the skin.	Chronic exposure to low levels of NaCN may cause effects to the nervous system and thyroid gland. Skin ulcers have also been reported. See Cyanide Chronic Effects for additional health effects.	NA	NA	OSHA: No US EPA: No ACGIH: No NTP: No IARC: No	VP: 0 mm BP: 2725ºF Sol: Sol. in water FlP: NA pH: 11.13-11.7 Odor: Faint odor of bitter almonds
Stoddard Solvent (mineral spirits) (8052-41-3)	20,000 mg/m^3	100	NA	10.2	In humans, acute inhalation exposure may produce eye, nose, and throat irritation. CNS depression (headaches, nausea, vomiting, diarrhea, and fatigue) may also occur. Ingestion may cause similar effects along with abdominal pain.	Prolonged or repeated direct skin contact may cause defatting, drying, scaling, and possible development of dermatitis. Long-term inhalation exposure has resulted in kidney damage in animal studies (particularly in male rats).	0.8-1.1	6.0	OSHA: No US EPA: No ACGIH: No	OT: 1-30 ppm VP: 3 mm Hg BP: 309-396ºF FP: >100ºF Sol: Insoluble Odor: Kerosene-like odor
Sulfur Dioxide (7446-09-5)	100	2	5	12.30	Irritation of the skin, eyes, mucous membranes, and respiratory system. Effects include coughing, choking, or suffocation, bronchoconstriction and skin burn.	Prolonged inhalation exposure can increase the incidence of upper respiratory tract disorders such as bronchitis.	NA	NA	OSHA: No US EPA: B2 ACGIH: No	BP: 14ºF Sol: 10% Fl.P: NA VP: 3.2 atm Odor: Colorless gas with a pungent, irritating odor

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Sulfuric Acid (7664-93-9)	15 mg/m^3	1 mg/m^3	3 mg/m^3	NA	Corrosive; may cause burns to eyes and skin. May cause severe irritation or burns to respiratory system. Severe inhalation exposure may cause a chemical pneumonitis (an inflammation of the lung).	Repeated contact with dilute solutions may cause a dermatitis. Repeated or pronounced inhalation of the mist may cause inflammation of the upper respiratory tract leading to chronic bronchitis.	NA	NA	OSHA: No USEPA: No ACGIH: No	OT: 1 mg/m^3 VP: 0.0001 mm BP: 554ºF Sol: Miscible Fl.P: NA Odor: Odorless
2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) (1746-01-6)	Ca	NA	NA	NA	Acute oral exposure produces varied toxic effects in different animal species; the main target organs appear to be the liver and thymus. Humans exposed by an industrial accident reported flu-like symptoms, skin burns and chloracne, stomach pains, and internal bleeding.	Effects following chronic exposure are similar to acute effects and include weight loss. TCDD causes birth defects in, is fetotoxic to, and causes adverse reproductive effects in animals.	NA	NA	OSHA: No US EPA: B2 ACGIH: No	VP: 2.0 x 10^{-6} mm BP: Decomposes Sol: Insoluble
Terbufos (organophosphate pesticide) (13071-79-9)	NA	Biological Exposure Index available (organo-phosphorus choline-sterase inhibitors).	NA	NA	Ingestion may lead to central nervous system effects (nausea, sweating, headache, dizziness, and fatigue).	Decreased cholinesterase activity seen in the brain and blood upon chronic ingestion by rats.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
1,1,2,2-Tetrachloroethane (skin) (79-34-5)	Ca 100	1	NA	11.10	Inhalation exposure causes CNS depression; severe acute exposure may lead to unconsciousness and death; respiratory irritation leading to injury and gastrointestinal tract irritation may result; may be absorbed through skin, but not highly toxic by this route.	Liver and kidney injury may occur upon subchronic or chronic inhalation exposure.	NA	NA	OSHA: No US EPA: C ACGIH: No[4]	OT: 0.5 ppm VP: 5 mm Hg at 86ºF BP: 296ºF Fl P: NA Sol: Insoluble Odor: Pungent, chloroform-like odor

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Tetrachloroethylene (perchloroethylene) (127-18-4)	Ca 150	25	100	9.32	Eye, nose and throat irritant at high concentrations; inhalation exposure to high concentrations results in CNS depression (nausea, headache, dizziness) and may lead to liver and kidney injury.	Chronic inhalation exposure to moderate levels (230 ppm) results in pathological liver changes and kidney effects in lab animals; CNS depression by the inhalation route of exposure.	NA	NA	OSHA: No US EPA: B2 ACGIH: No[4]	OT: 5 ppm VP: 14 mm Hg BP: 250ºF Fl P: NA Sol: 0.02% Odor: Mild, chloroform-like odor
Tetraethyl lead (skin) (78-00-2)	40 mg/m^3 as Pb	0.1 mg/m^3 0.075 mg/m^3 (PEL)	NA	11.10	TEL is absorbed through the skin from gasoline when in concentrations greater than 0.1%. Symptoms of over-exposure include weakness, fatigue, headache, nausea, insomnia and nightmares. Nervous system involvement may be seen by incoordination and tremors through all routes of exposure.	Nervous system effects; blood changes have been noted in rats administered TEL through oral, inhalation and dermal routes.	1.8	NA	OSHA: No US EPA: No ACGIH: No	VP: 0.2 mm Hg BP: 228ºF Fl P: 200ºF Sol: Insoluble Odor: Pleasant, sweet odor
Tetrahydrofuran (109-99-9)	2,000 (10% LEL)	200	250	9.45	Respiratory, eye, skin irritant; inhalation exposure may cause CNS depression (nausea, dizziness, headache, fatigue); vomiting; abdominal pain.	Skin contact may cause dermatitis; inhalation exposure may cause bronchitis.	2	11.8	OSHA: No US EPA: No ACGIH: No	OT: 20-50 ppm VP: 132 mm Hg BP: 151ºF Fl P: 6ºF Sol: Miscible Odor: Ether-like odor
Toluene (skin) (108-88-3)	500	50	NA	8.82	Respiratory, eye, skin irritant; inhalation exposure may cause CNS depression (nausea, dizziness, headache, fatigue); vomiting; abdominal pain.	Repeated or prolonged skin contact may cause dermatitis; inhalation exposure may cause bronchitis.	1.1	7.1	OSHA: No US EPA: No ACGIH: No	OT: 0.17 ppm VP: 21 mm Hg BP: 232ºF Fl P: 40ºF Sol: 0.07% Odor: Sweet, pungent, benzene-like odor

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Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Toluene Diisocyanate (TDI) (584-84-9)	Ca 2.5	0.005	0.02	9.45	TDI is a strong irritant to eyes, mucous membranes and skin; at concentrations greater than 5 ppm, severe respiratory symptoms may develop (by the inhalation route of exposure) with a latency period of 4 to 8 hours.	Repeated inhalation exposure to TDI at levels of 0.02 ppm and below can lead to asthma in sensitized individuals. Once sensitization occurs, reaction can be produced by concentrations of 0.005 ppm or less.	0.9	9.5	OSHA: No US EPA: No ACGIH: No[4]	OT: 0.4-2.14 ppm VP: 0.05 mm Hg @ 77ºF BP: 484ºF Fl P: 260ºF Sol: Insoluble Odor: Sharp, pungent odor
1,1,1-Trichloroethane (methyl chloroform) (71-55-6)	700	350	450	11.00	Inhalation exposure of high concentrations may cause CNS depression (headache, fatigue, dizziness, nausea); Skin irritant, Eye irritant	Very little information available. Prolonged exposure may cause balance problems, skin burns, tiredness.	7.5	12.5	OSHA: No US EPA: D ACGIH: No	VP: 100 mm Hg MW: 133.4 BP: 165ºF Fl P: None Sol: 0.4% Odor: Mild, chloroform-like odor
1,1,2-Trichloroethane (skin) (79-00-5)	Ca 100	10	NA	11.00	Eye, respiratory, skin irritant. May be absorbed through the skin; inhalation and oral exposure may result in CNS depression (headache, fatigue, dizziness, nausea); intoxication; single oral doses have resulted in liver damage in animals.	Inhalation and oral exposure may result in CNS depression; produces liver and kidney damage in animals upon all routes of exposure.	6	15.5	OSHA: No US EPA: C ACGIH: No[4]	OT: 50 ppm VP: 19 mm Hg BP: 237ºF Fl P: None measurable by standard test methods Sol: Insoluble Odor: Sweet, chloroform-like odor
Trichloroethylene (79-01-6)	Ca 1000	50	100	9.45	Eye, respiratory, skin irritant; inhalation of high concentrations may cause CNS depression (headache, fatigue, dizziness, nausea).	Inhalation exposure may cause CNS depression; may produce liver and kidney toxicity by the inhalation route of exposure; repeated or prolonged skin contact may cause dermatitis.	8	10.5	OSHA: No US EPA: B2 ACGIH: No[4]	OT: 50 ppm VP: 58 mm Hg BP: 189ºF Fl P: 90ºF Sol: Insoluble Sp.Gr.: 1.46 Odor: Chloroform-like odor
Vanadium (all data based upon vanadium pentoxide)	35 mg/m^3	0.05 mg/m^3	NA	NA	Inhalation may cause respiratory and nasal irritation. Higher-level irritation may cause pneumonitis.	No chronic effects.	NA	NA	OSHA: No US EPA: No ACGIH: No	Vanadium: BP: 3182ºF (decomposes) Sol: 0.8% Fl P: NA VP: 0 mm (approx.)

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects[1]	Chronic Effects[2]	Flamm. Range		Carcino-genicity Class[3]	Other
							LEL%	UEL%		
Vinyl Chloride (75-01-4)	Ca	1	C5 (OSHA)	9.99	Inhalation to high concentrations may cause CNS depression (dizziness, light headaches, nausea, dulling of vision and hearing); liver function impaired upon inhalation exposure to 300-500 ppm.	Repeated exposure may cause bone degeneration, malignant tumors (affected organ systems include CNS, respiratory, liver and blood) have resulted in vinyl chloride workers; additional effects in workers include liver and kidney damage, decreased pulmonary function, gastrointestinal toxicity, and enlarged spleens.	3.6	33	OSHA: Yes US EPA: A ACGIH: A1	OT: 260 ppm VP: 3.3 atm BP: 7ºF Fl P: NA(gas) Sol: 0.1% (77ºF) Odor: Pleasant odor at high conc.
Xylene (1330-20-7)	900	100	150	8.56	Respiratory, eye, skin irritant; CNS depression (nausea, dizziness, headache, fatigue) at high concentrations by the inhalation route of exposure; vomiting; abdominal pain may also occur.	Skin contact may cause dermatitis; inhalation exposure may cause bronchitis.	1	7	OSHA: No US EPA: No ACGIH: No	OT: 0.05 ppm VP: 9 mm Hg Fl P: 63ºF (ortho) Sol: Insoluble Odor: Aromatic odor
Zinc (7440-66-6)	NA	NA	NA	NA	Accidental ingestion of high concentrations of zinc causes fever, vomiting, stomach cramps and diarrhea.	Metal fume fever, an influenza-like illness can result from inhalation of freshly generated zinc oxide fumes. Consistent handling of zinc salts can lead to dermal toxicity. Inhalation of zinc chloride mists or fumes can cause irritation of the GI and respiratory tract, as well as a gray cyanosis, dermatosis and ulceration of the nasal passages.	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties vary depending on specific compound; essential element for humans-daily intake is 12 mg. Odor: Odorless

[1] Symptoms that may occur upon short-term high level exposure.
[2] Symptoms that may occur upon long-term low level exposure.
[3] Refer to Table 6-1 for carcinogen categories.
[4] Substance identified by other sources as a suspected or confirmed human carcinogen.

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Appendix B

Landmark Environmental, LLC
Standard Operating Procedure for
Field Investigations and Sampling

Standard Operating Procedures for the Collection of Groundwater Samples

Purpose

To describe the collection of groundwater samples from monitoring wells, residential wells, and residential systems.

Applicability

This procedure applies to the collection of groundwater samples by the sampling technician(s).

References

Ground Water Sampling Guidelines by MPCA

Discussion

- Monitoring wells may either be installed permanently or temporarily. They are constructed for the collection of groundwater samples. These monitoring wells have a wide variety of diameters. Groundwater samples might also be collected out of a pit or a drilled hole.

- Residential sampling is sampling conducted on a potable water supply. It is very important that these samples are representative of that water supply. The sampling point must be located ahead of any filtering devices or water conditioners. The highest standard of sampling technique is required for residential well sampling.

- Residential systems is sampling done on a water supply system. It must be representative of the water quality of that system. Preferably, a sampling tap will be ahead of the storage tank and close to the well head. Sample collection from this tap in the system must be from a steady stream of water.

Responsibilities

The technician(s) are responsible for the groundwater sampling at monitoring wells, residential wells, and residential systems.

Procedure

Groundwater Sampling

A. Monitoring Wells (permanent or temporary)

1. Put on sampling gloves to protect the sample and skin.

   Note: New sampling gloves are needed for each well. Never reuse old gloves.

2. Prepare sampling containers by filling out the label with the following information:

   - Project number
   - Location sampled
   - Individual collecting the samples
   - Date and time of sample collection
   - Sample analysis (if required by the lab)

   Note: Use an inedible permanent pen to avoid ink bleeding (Pilot permanent SC-UF).

3. Set up sampling apparatus to hold downrigger.

   - Ladder assembly —put the downrigger on the downrigger plate on the top of the ladder.

   - Well casing assembly—the downrigger is already connected to the assembly. Place the assembly on the well casing (use the slot in the assembly) and tighten the assembly to the well casing.

4. Remove foil from the bailer top (stainless steel).

5. Connect the downrigger cable to the bailer top.

   Note: This connection is done with a crimp:

   Step 1: Thread crimp onto the downrigger cable
   Step 2: Run cable through the bailer top
   Step 3: Insert cable through the crimp again
   Step 4: Make a loop and run the cable through the crimp for the final time

6. Remove foil from the bailer body (stainless steel) and the check valve (Teflon).

7. Connect these two parts together, screw these pieces into the bailer top.

8. Place bailer into the well; release the downrigger brake.

9. Apply pressure to the spool of the downrigger to ensure a slow descent.

10. Lower the bailer slowly into the water column.

    Note: Make sure not to stir up the water with the bailer, thus volatizing the samples.

11. Keep the bailer in the top portion of the water column when collecting the sample.

12. Engage the brake and crank downrigger handle to retrieve the bailer out of the well.

13. Remove cap from the first sample container.

14. Fill sampling container (do not overfill).

15. Continue the process until all sampling containers are filled.

16. After all of the samples are collected, place the samples in a sampling cooler with ice.

17. Disassemble the sampling apparatus.

    Step 1: Cut downrigger cable (about 1 foot above the bailer)
    Step 2: Dismantle bailer assembly
    Step 3: Place bailer parts into a dirty bailer cooler (cooler is then sent to lab for decontamination of bailers)

18. After sampling is completed, clean sampling apparatus with distilled water.

When sampling from a Geoprobe boring, the following operating procedures are followed.

1. A slotted (.0.20" vertical slots) probe rod similar to a well screen is advanced below the water table, exposing the slotted section to the water bearing soils.

2. A stainless steel check valve is connected to a length of clean polyethylene tubing.

3. The check valve and tubing is inserted into the probe rods or temporary monitoring wells and oscillated up and down to fill the tubing with groundwater.

4. New, clean polyethylene tubing is used at each sample location.

5. Groundwater samples collected in the polyethylene tubing are emptied into clean sampling containers.

B. Residential Sampling—potable water supply

1. Put on sampling gloves to protect samples and skin.

2. Purge private wells before sampling (including taking pH, conductivity, and temperature).

   Note: Rule of thumb—at least one well and storage tank volume should be removed.

   Note: 15-minute purging period is usually sufficient for residential wells.

3. Prepare sampling containers by filling out the label with the following information:

   - Project number
   - Location sampled
   - Individual collecting the samples
   - Date and time of sample collection
   - Sample analysis (if required by the lab)

4. Unscrew sampling container top (do not let the container or container top touch anything).

5. Collect sample from the purge tap.

6. After completing the collection of the samples, place samples in a cooler with ice.

7. Turn off the tap; clean up any mess made by sampling.

C. Residential Systems (water supply system)

1. Select a tap that is free from exterior contamination (remove anything attached to the faucet).

2. Put on sampling gloves to protect samples and skin.

3. Turn on cold water tap; make sure the water is a steady stream out of the tap.

   Note: If water is not a steady stream, find a new tap. Also, make sure the tap is not leaking by the valve handle.

4. The cold water tap should be run steadily for two to three minutes or a sufficient time to permit clearing of the service line. Take pH, conductivity, and temperature.

5. Prepare sampling containers by filling out the label with the following information:

   - Project number
   - Location sampled
   - Individual collecting the samples
   - Date and time of sample collection
   - Sample analysis (if required by the lab)

6. Without changing water flow, the sample(s) can be collected.
   Note: Make sure there is no water splash up into the sampling container or cap.

7. Place sampling containers in the appropriate cooler with ice.
8. Clean up any mess made by the sampling event.

Documentation

The technician(s) will document the groundwater sampling events on field log data sheets, field log cover sheets, and field log data reports.

Standard Operating Procedure for General Soil Sample Collection And Field Screening

A variety of samplers (split-barrel, geoprobe macrocore, backhoe, auger, shovel, and hand sampling methods) may be used to retrieve soil from sampling locations. Immediately after collection, the soil sample will be transferred to laboratory-supplied containers. Equipment required to transfer soil from the sampler to the laboratory-supplied sample containers includes nitrile gloves, stainless steel spoons or scoops, and the appropriate personal protective equipment necessary for collection and handling of soil samples as described in the Site Safety Plan.

To prevent sample cross-contamination, all soil sampling equipment will be new and or cleaned prior to sampling. All sampling tools, including split-barrels and stainless steel spoons and scoops, will be cleaned before use and between samples by washing with a TSP solution, using a brush if necessary, and rinsing with deionized water. Gloves will be discarded between sampling locations.

Metals, Cyanide, Semi-Volatile Organic, and other General Analytical Samples

Soil samples collected with a sampler:

1. Open the sampler.

2. Collect a sample with a stainless steel spoon and place in the sample jar. Wipe the jar lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.

3. Cool the sample to approximately 4°C immediately after collection.

Soil samples collected by hand:

1. Dig to the desired sampling interval, exposing a fresh soil surface to sample.

2. Collect a large sample on a shovel or auger and bring it to the surface, or collect the sample directly from the fresh soil surface.

3. Collect the sample with a stainless steel spoon and place in the jar. Wipe the jar lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.

4. Cool the sample to approximately 4°C immediately after collection.

Volatile Organic Samples

Soil samples collected either by sampler or by hand:

1. Expose fresh soil surface in sampler.

2. Using a subcoring device, such as an Encore sampler, obtain a soil sample and either cap the subcoring device immediately or extrude the sample into a sample jar that contains methanol.

3. Wipe the jar lip and screw threads to remove soil and provide a good sealing surface, and immediately screw on the lid.

4. Cool the sample to approximately 4°C immediately after collection.

Sample Storage

Immediately after samples are collected, place them in a cooler containing ice. Keep samples cold (approximately 4°C) until they are received at the laboratory, where they are to be stored in a refrigerated area. The sampler will maintain custody of the samples until transferred to the shipper or laboratory.

Sample Transporting

Prior to collecting samples, review the holding times for specific analyses. See that samples arrive at the laboratory in time to allow the analyses to be completed within holding times. Transport samples in such a manner as to preserve their integrity. Send samples to the laboratory by overnight delivery on the same day they are collected or, at the latest, within 36 hours of sampling.

Documentation on a Chain-of-Custody

The Chain-of-Custody shows traceable possession of samples from the time they are obtained until they are introduced as evidence in legal proceedings.

1. Complete the Chain-of-Custody prior to leaving the sampling location.

2. Complete one Chain-of-Custody or more as needed for each cooler of samples.

3. Provide the following information on the Chain-of-Custody form:
   a. Project number
   b. Sample identification
   c. Date and time of sample collection
   d. Container type and number
   e. Whether the sample is a grab, composite, or blank sample
   f. Project manager
   g. Project contact
   h. Laboratory
   i. Analyses required
   j. Signature of sampler(s)
   k. Signature of transferee
   l. Date and time of transfer
   m. Method of transport and any shipping numbers

4. Have the Chain-of-Custody always accompany the cooler of samples. Page one (white) of the Chain-of-Custody goes to the laboratory, and page two (yellow) is retained for the file.

Field Screening Soil Samples

Field screening techniques for soils are as follows: (1) visual examination; (2) odor; (3) headspace organic vapor screening; and (4) soil pH. These four screening procedures may be used to screen soil samples for possible contamination.

- **Visual Examination.** Note any discoloration of the soil or visible oiliness or tar.

- **Odor.** Note the presence of incidental odors while handling the soil sample. Describe the odor as light, moderate, or strong, and include a description of the type of odor, if evident.

- **Headspace Organic Vapor Screening.** The headspace organic vapor screening method will be used in the field to screen soils suspected to contain volatile organic compounds. In most cases, the screening will be used in conjunction with analytical laboratory data.

  The following equipment is required to conduct headspace organic vapor screening: photoionization or flame ionization detector (PID or FID); clean pint-size ziplock plastic bags; log book or record sheet; and appropriate personal protective equipment as described in the Project Health and Safety Plan. The meter shall be calibrated daily or more frequently, if data are suspect.

  Use the following procedure to conduct headspace organic vapor screening:

  1. Collect soil samples from a split-barrel sampler immediately after opening the split-barrel. Collect samples from excavation walls, soil piles, or backhoe buckets from freshly exposed surfaces.

  1. Using a stainless steel spoon or gloved hand, fill a clean ziplock bag halfway with the sample to be analyzed and quickly seal the bag.

  4. Agitate the bag for 15 seconds, trying not to allow cohesive soils to form a ball.

  5. Allow headspace to develop for approximately 5 to 10 minutes. Keep the sample in a shaded area out of direct sunlight. Record the ambient temperature during headspace development. Allow headspace to develop inside a heated vehicle or other warm area, when ambient temperatures are below 50 degrees Fahrenheit.

  6. Agitate the bag again for an additional 15 seconds.

  7. Puncture the bag with the sampling probe to a point halfway within the headspace area. Exercise care to avoid uptake of water droplets or soil particles.

  8. Record the highest meter response as the headspace concentration. The maximum response will likely occur between 0 to 5 seconds.

  9. When using a flame ionization detector, correct for methane, if necessary. In this case, take a reading first with a carbon filter and then without using two duplicate bag samples. To adjust the reading for methane, subtract the carbon filter reading from the second reading. Consider adjusted readings less than zero to be zero. Methane correction is not necessary if a photo-ionization detector is used.

- **Soil pH.** The soil pH screening method will be used to obtain "real time" soil pH measurements.

  The following equipment is required to conduct soil pH measurements: pH indicator paper or pH meter; paper cups; stainless steel stirring spoon; and distilled water.

  Use the following procedure to determine soil pH:

  1. Place approximately 1 tablespoon of soil in a paper cup.
  2. Add 1 or 2 tablespoons of distilled water to the soil to form a soil suspension in the cup.
  3. Stir the soil suspension with the stainless steel spoon.
  4. Place pH paper or pH meter into the soil suspension.
  5. Wait for the color of the pH paper or the pH meter reading to stabilize, as directed by the manufacturer.
  6. As directed by the manufacturer, record the pH meter reading or compare the color of the pH paper to the color chart on the pH paper container and record the pH to the nearest unit.
  7. Record the pH values of samples in the field book or on the boring logs.

Exhibit G

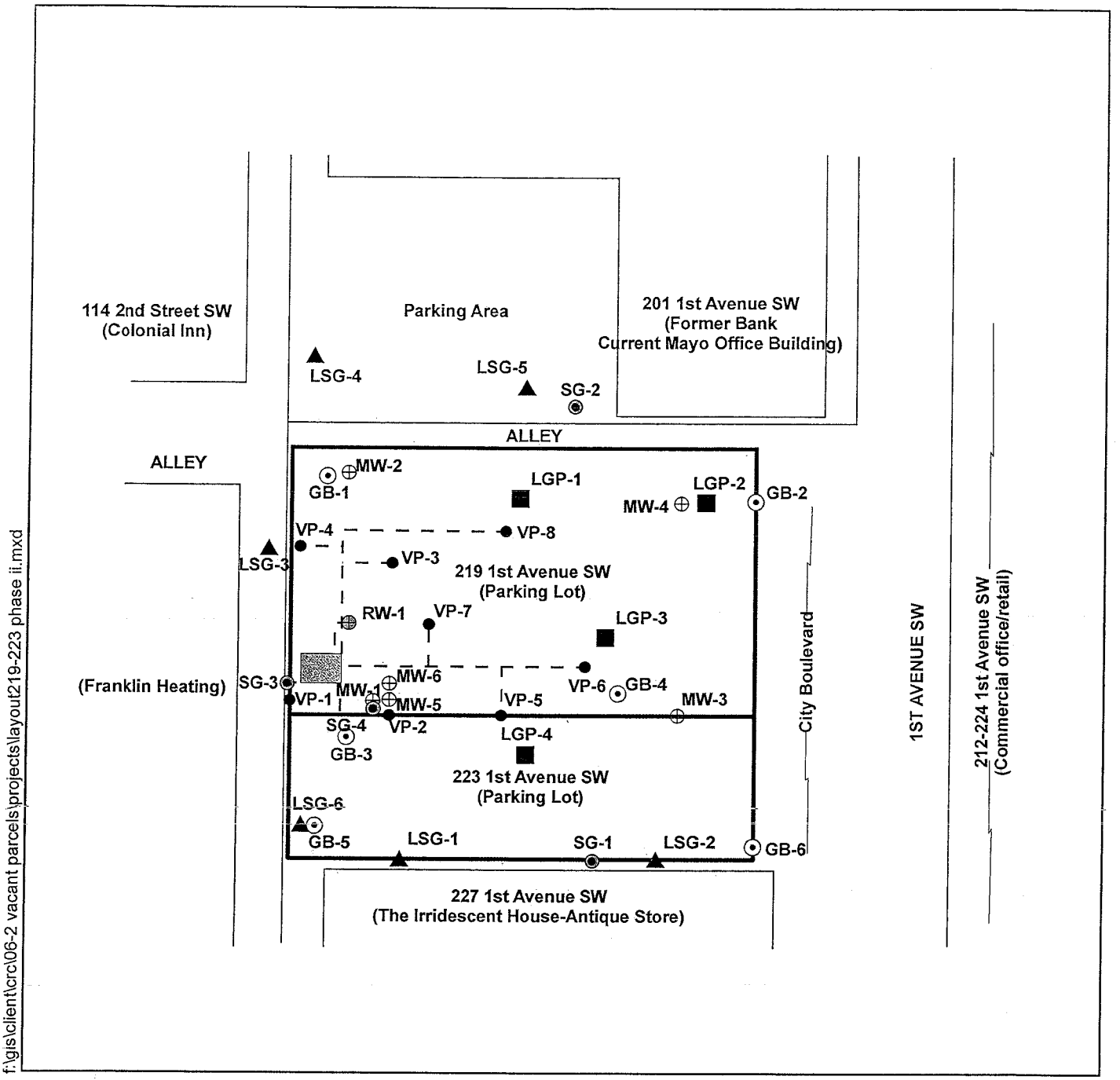
Previous Groundwater Analytical Data

Phase II Environmental Investigation Report

219 and 223 1st Avenue Southwest
Rochester, Minnesota

Prepared for
The City of Rochester

March 2007



LEGEND

- Property Line

Previous Investigation/Remediation Locations

- Remediation Building
- Lateral Piping
- Monitoring Well
- Recovery Well
- Vapor Port
- Previous Soil Gas Probe

2006 Phase II Investigation Locations

- Landmark Soil Gas Vapor Point
- Landmark Geoprobe
- Geotechnical Boring (groundwater samples collected at GB-3, -4, and -5)

N

1" = 40'

Note: Locations and scale are approximate.

FIGURE 2

PROPERTY LAYOUT MAP
WITH INVESTIGATION LOCATIONS
219-223 1st Avenue SW
Rochester, Minnesota

Table 3
Analytical Groundwater Sampling Summary -Detected Parameters
(results in ug/L)

Sample Name Sample Date Sample Depth Laboratory Name Laboratory Type Parameter = Volatile Organic Compounds	Minnesota Department of Health HRLs	GB-3 29-Dec-06 PACE Fixed	GB-4 29-Dec-06 PACE Fixed	GB-5 29-Dec-06 PACE Fixed	DUP 29-Dec-06 (GB-4) PACE Fixed
Acetone	700	ND	11.9	14.6	11.4
Benzene	10	**13.8**	8.4	ND	9.0
Bromodichloromethane	ns	ND	1.1	ND	1.1
2-Butanone	ns	13.1	15.6	12.3	5.5
Chloroethane	280	ND	2.1	ND	2.3
Chloroform	60	1.6	2.1	2.5	2.2
Dibromochloromethane	ns	2.6	2.9	2.7	3.1
Tetrachloroethene	7	2.2	**997**	ND	**989**
Toluene	1,000	2.9	4.7	1.3	4.7
1,1,2-Trichlorotrifluoroethane	200000	ND	62.0	ND	65.4

Footnotes:
concentrations listed in ug/L
HRL = Health Risk Limit
na=not analyzed
ns=no standard

August 24, 2007

DPRA
Creative People. Smart Solutions.

Ed Olson
MPCA
520 Lafayette Road
St Paul, MN 55155-4194

RE: Status Update
Former Dry Cleaners
219 First Avenue Southwest
Rochester, Minnesota

Dear Mr. Olson:

N 44 DEG 56 MIN 45 SEC
W 93 DEG 05 MIN 27 SEC

332 Minnesota Street
Suite E-1500
St Paul, MN 55101-1323

651.227.6500 Voice
651 227.5522 Fax

www.dpra.com

The purpose of this letter is to present a status update for the site activities completed at the Site since the previous status update was submitted to the Minnesota Pollution Control Agency (MPCA) on May 10, 2007.

Introduction

Since the previous report, DPRA measured water levels, collected groundwater samples from the on-site monitoring wells, monitored system operating parameters, and collected discharge water and air emission samples from the dual phase extraction (DPE) system. On July 25, 2007, the system was monitored and sampled for the last time. The DPE system, along with all of the monitoring wells, vapor ports, and the recovery well, were abandoned on August 3, 2007, in preparation for development of the Site. Figure 1 is a site location map and Figure 2 is a site map. Copies of the well abandonment forms are included in Appendix A.

Groundwater Results

On June 15, 2007, DPRA collected groundwater elevations and samples from the existing monitoring wells and vapor ports at the site. The samples were submitted to a laboratory for analysis of volatile organic compounds (VOCs) by EPA method 8260. Samples from the vapor ports were only analyzed for tetrachloroethylene (PCE). Samples were not collected from monitoring well MW-4 as it is buried and not accessible. PCE was detected in monitoring well MW-6 at a concentration of 5.3 microgram per liter (µg/l) and ranged from 1,500 ug/l to 4,000 ug/l in monitoring wells MW-1, MW-2, MW-3, and MW-5. PCE was detected in vapor port VP-3 at a concentration of 5,1 00 ug/l, VP-7 at a concentration of 1,600 ug/l, and ranged from 1.0 ug/l to 570 ug/l in vapor ports VP-1,

VP-2, VP-4, VP- 5, VP- 6, and VP-8. PCE was detected in recovery well RW-1 at a concentration of 2,800 ug/l. Table 1 is a monitoring well construction summary; Table 2 summarizes the groundwater elevations; and Table 3 summarizes the aqueous analytical results. Copies of the laboratory reports are included in Appendix B. DPRA's Field methods and Procedures are included in Appendix C.

System Operating Results

Air emission samples were collected from the dual-phase extraction (DPE) system on June 4 and July 25, 2007. PCE was detected in the air emissions at concentrations of 75,000 micrograms per cubic meter ($\mu g/m^3$) and 12,000 ug/m^3, respectively. Table 4 summarizes system operation data and Table 5 summarizes the air emission analytical results.

The DPE system was abandoned in August 2007. During one year of DPE operation, the system removed over 158 pounds of PCE and approximately 181,000 gallons of impacted groundwater from the subsurface. Figure 3 is a graph showing cumulative PCE removal over time. Table 6 summarizes the air emission removal calculations and Table 7 summarizes the aqueous analytical results from the groundwater recovery system.

Future

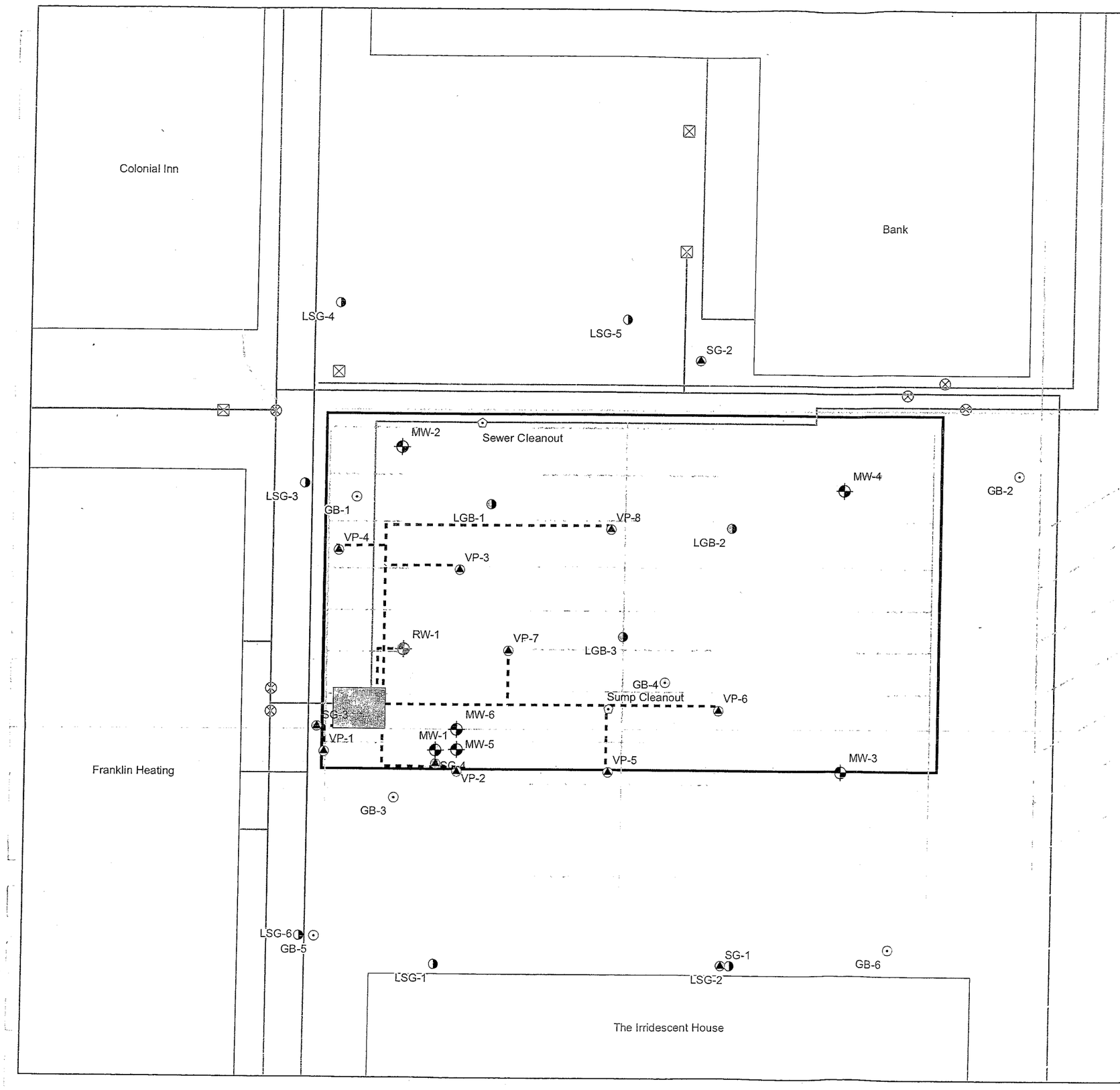
It is DPRA's understanding that Landmark plans to re-install a DPE system for the City of Rochester within the proposed building, per their approved Response Action Plan (RAP).

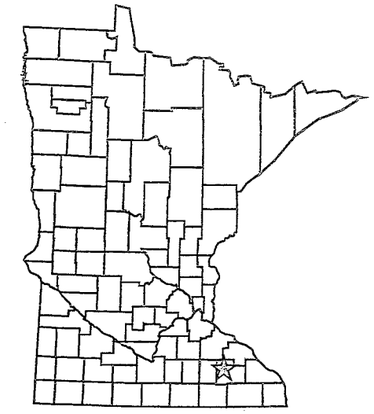
If you have any questions regarding this project, please contact me at 651-215-4234 or at matt.schemmel@dpra.com.

Sincerely,

Matt Schemmel, P.G.
Hydrogeologist

cc: Gary Neumann – City of Rochester
Jason Skramstad – Landmark Environmental
Jenny Kessler - Sunstone Hotel Investors, Inc.
DPRA File 5727.0001.0008





Site Location

Legend

- Monitoring Well
- Recovery Well
- DPRA Soil Gas Probe
- Vapor Port
- Cleanout
- Utility Box
- Manhole

Utility

- Electric
- Fiber Optic / TV
- Gas
- Sanitary
- Steam
- Storm

Landmark Environmental Borings

- Geotechnical Boring
- Soil Gas Probe
- Soil Probe

- Lateral Piping
- Remediation Building

N

10 0 10 20 Feet

FIGURE 2
SITE MAP
SUNSTONE PROPERTY
219 FIRST AVENUE SW
ROCHESTER, MINNESOTA

DPRA Creative People. Smart Solutions.

Date:10/31/2005
Revision: 03/09/2006

Scale: 1:240
1 inch equals 20.0 feet

Project Number:
5727.0001.0007

Drawn By: MKB

DPRA
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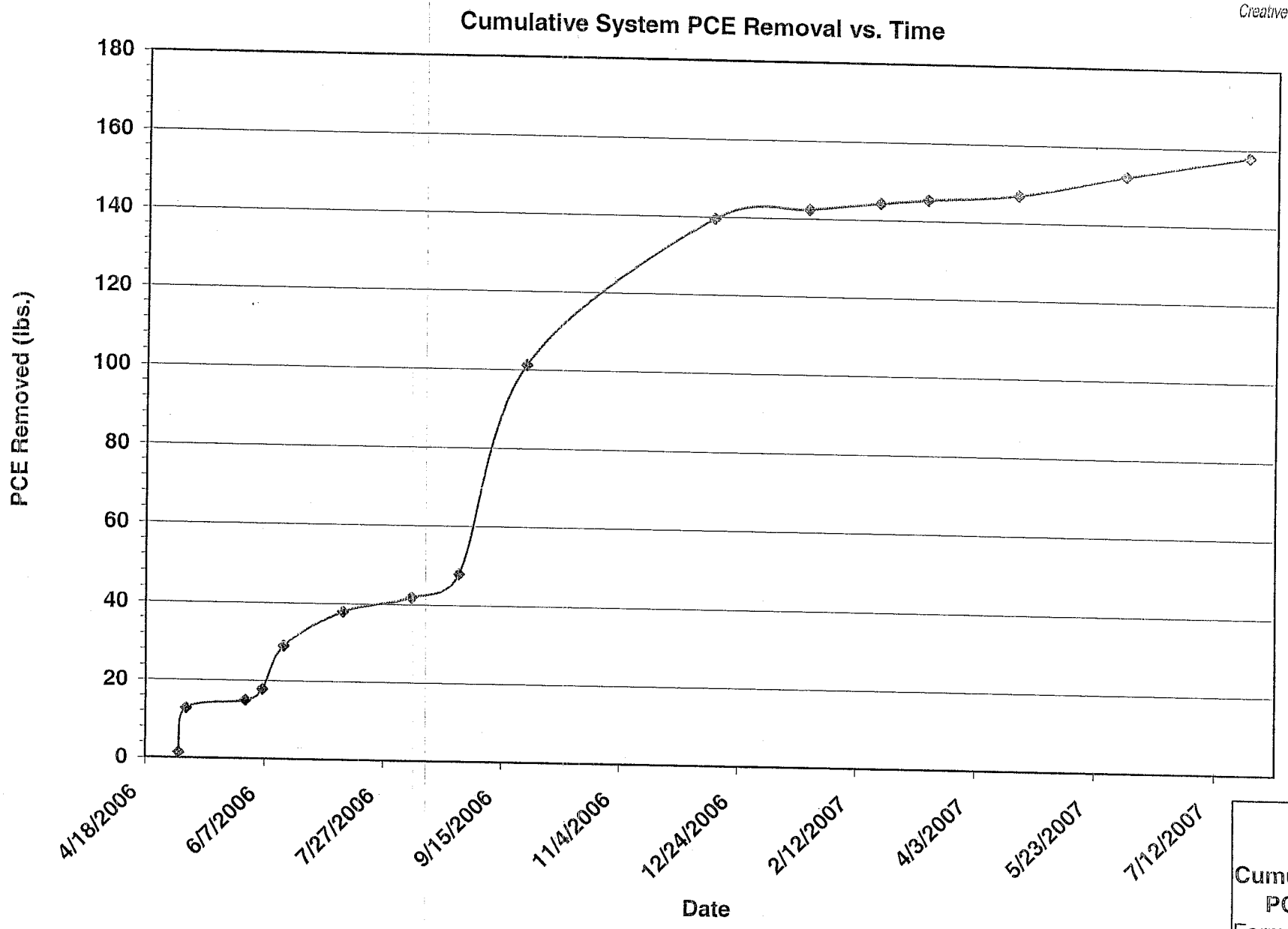

FIGURE 3
Cumulative System PCE Removal
Former Dry Cleaners
219 1st Ave. SW
Rochester, MN

5727.0001.0008
August 2007

TABLE 3

DPRA
Creative People. Smart Solutions.

AQUEOUS ANALYTICAL RESULTS - WELLS

Former Dry Cleaners
219 First Avenue SW
Rochester, Minnesota

Sample	Sample Date	Acetone (µg/l)	PCE (µg/l)	TCE (µg/l)	cis-1,2 DCE (µg/l)	Naphthalene (µg/l)	1,1,2-TCTF (µg/l)
MW-1	5/30/2000	<1,000	**7,500**	< 100	**350**	< 100	< 100
MW-1	8/16/2000	<500	**10,000**	< 100	**520**	< 100	860
MW-1	1/3/2001	<250	**3,500**	< 50	**240**	< 50	< 50
MW-1	5/9/2001	<500	**12,000**	< 100	**750**	< 100	390
MW-1	12/26/2002	<250	**5,000**	<50	**380**	<50	710
MW-1	3/15/2003	<250	**4,100**	<50	**220**	<50	740
MW-1	7/29/2003	<5.0	**6,300**	**40**	**500**	<1.0	230
MW-1	11/4/2003	<250	**3,800**	<50	**310**	<50	100
MW-1	1/29/2004	<100	**3,400**	<20	**280**	<20	220
MW-1	10/25/2005	<7.6	<0.43	28	**390**	<0.27	150
MW-1 Shallow PDBS	2/22/2006	<190	**8,400**	**39**	**570**	17	930
MW-1 Deep PDBS	2/22/2006	<76	**8,600**	**38**	**550**	<2.7	870
MW-1	9/13/2006	<50	**2,000**	8.6	<1.0	<0.27	380
MW-1	12/13/2006	220	**11**	<10	**12**	<50	<10
MW-1	3/13/2007	<50	**1,200**	6.3	**59**	<50	210
MW-1	6/15/2007	<250	**2,400**	9.6	**130**	<25	120
MW-2	8/16/2000	<250	**3,800**	< 50	**290**	< 50	< 50
MW-2	1/3/2001	<500	**8,500**	< 100	**180**	< 100	1,100
MW-2	5/9/2001	<100	**1,600**	< 20	**72**	< 20	220
MW-2	12/26/2002	<100	**9,900**	**45**	**460**	<20	1,400
MW-2	3/15/2003	<500	**6,900**	<100	**330**	<100	890
MW-2	7/29/2003	<5.0	**14,000**	**61**	**520**	<1.0	2,700
MW-2	11/4/2003	<500	**11,000**	<100	**420**	<100	1,500
MW-2	1/29/2004	<500	**4,300**	<100	**200**	<100	410
MW-2	10/25/2005	<7.6	**1,400**	**42**	**160**	<0.27	140
MW-2	9/13/2006	17	**1,900**	8.6	<0.26	<0.27	430
MW-2	12/13/2006	230	**17**	<10	<10	<50	<10
MW-2	3/13/2007	<50	**1,200**	5.6	**26**	<50	440
MW-2	6/15/2007	<50	**2,400**	7.5	**32**	<5	390
MW-3	8/16/2000	<130	**3,600**	< 25	< 25	< 25	570
MW-3	1/3/2001	<1,300	**14,000**	< 250	< 250	< 250	1,700
MW-3	5/9/2001	<25	**340**	< 5.0	< 5.0	< 5.0	67.0
MW-3	12/26/2002	32	**7,800**	7.5	9.1	<5.0	1,700
MW-3	3/15/2003	<250	**7,200**	<50	<50	<50	1,800
MW-3	7/29/2003	<5.0	**9,700**	6.3	7.0	<1.0	1,000
MW-3	11/4/2003	<250	**9,700**	<50	<50	<50	2,300
MW-3	1/29/2004	<250	**12,000**	<50	<50	<50	1,300
MW-3	10/25/2005	560	**5,000**	<2.6	9.0	<2.7	930
MW-3	9/13/2006	<17	**1,200**	0	<0.26	<0.27	140
MW-3	12/13/2006	<50	<1.0	<1.0	<1.0	<5.0	1.1
MW-3	3/13/2007	<50	**1,500**	**2.5**	**2.9**	<5.0	800
MW-3	6/15/2007	<500	**4,000**	<10	<10	<50	770

TABLE 3

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Former Dry Cleaners
219 First Avenue SW
Rochester, Minnesota

Sample	Sample Date	Acetone (µg/l)	PCE (µg/l)	TCE (µg/l)	cis-1,2 DCE (µg/l)	Naphthalene (µg/l)	1,1,2-TCTF (µg/l)
MW-4	8/16/2000	<5.0	**24**	< 1.0	< 1.0	< 1.0	2
MW-4	1/3/2001	<25	**410**	< 5.0	9	< 5.0	24
MW-4	5/9/2001	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-4	12/26/2002	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-4	3/15/2003	<5.0	**14**	<1.0	<1.0	<1.0	<1.0
MW-4	7/29/2003	<5.0	**30**	<1.0	<1.0	<1.0	<1.0
MW-4	11/4/2003	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-4	1/29/2004	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-4	10/25/2005	Inaccessible - Buriedand/or filled with gravel					
MW-4	8/2/2007	Well abandoned					
MW-5	8/16/2000		**8,100**	< 50	**380**	< 50	530
MW-5	1/3/2001	<130	**1,600**	< 25	50	< 25	150
MW-5	5/9/2001	<100	**2,900**	< 20	**95**	< 20	450
MW-5	12/26/2002	<100	<20	**2,400**	**74**	<20	470
MW-5	3/15/2003	<25	**530**	<5.0	27	<5.0	130
MW-5	7/29/2003	<100	**2,200**	<20	56	<20	310
MW-5	11/4/2003	<100	**1,800**	<20	47	<20	420
MW-5	1/29/2004	<50	**1,400**	<20	53	<20	360
MW-5	10/25/2005	310	**1,600**	7	60	<1.3	320
MW-5	9/13/2006	<17	**700**	12	<0.26	<0.27	55
MW-5	12/13/2006	230	**56**	<10	**12**	<50	<10
MW-5	3/13/2007	<50	**1,200**	15	**24**	<5.0	37
MW-5	6/15/2007	<500	**1,500**	13	**15**	<50	56
MW-6	1/3/2001	<110	**230**	< 2.0	2	< 2.0	21
MW-6	5/9/2001	<25	**240**	< 5.0	< 5.0	< 5.0	33
MW-6	12/26/2002	<5.0	<1.0	**74**	<1.0	<1.0	10
MW-6	3/15/2003	<5.0	**170**	<1.0	3	<1.0	40
MW-6	7/29/2003	<10	**240**	<2.0	3	<2.0	33
MW-6	11/4/2003	<10	**200**	<2.0	<2.0	<2.0	26
MW-6	1/29/2004	<10	**190**	<2.0	<2.0	<2.0	27
MW-6	10/25/2005	81	**16**	0.62	0.59	<0.27	<0.34
MW-6	9/13/2006	<17	**21**	<0.26	<0.26	<0.27	<0.34
MW-6	12/13/2006	18	0.84	<1.0	<1.0	<5.0	<1.0
MW-6	3/13/2007	<50	**21**	0.97	0.80	<5.0	<1.0
MW-6	6/15/2007	<50	5.3	<1.0	1.20	<5.0	<1.0
MW-8	2/4/2001	24	< 1.0	< 1.0	< 1.0	4	< 1.0
MW-8	5/9/2001	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-8	12/26/2002	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-8	3/15/2003	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-8	7/30/2003	<5.0	6	<1.0	<1.0	<1.0	<1.0
MW-8	11/5/2003	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0
MW-8	1/30/2004	<10	<1.0	<1.0	<1.0	<1.0	<1.0
MW-8	11/11/2005		Abandoned				

TABLE 3

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Sample	Sample Date	Acetone (µg/l)	PCE (µg/l)	TCE (µg/l)	cis-1,2 DCE (µg/l)	Naphthalene (µg/l)	1,1,2-TCTF (µg/l)	
MW-9	2/4/2001	33	< 5.0	< 5.0	< 5.0	17	< 5.0	(1)
MW-9	5/9/2001	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	(1)
MW-9	12/26/2002	25	<1.0	5	<1.0	3	<1.0	(1)
MW-9	3/15/2003	84	< 1.0	< 1.0	< 1.0	35	< 1.0	(1)
MW-9	7/30/2003	85	<5.0	<5.0	<5.0	56	<5.0	(1)
MW-9	11/5/2003	140	<10	<10	<10	**470**	<10	(1)
MW-9	1/30/2004	140	<10	<10	<10	110	<10	(1)
MW-9	11/11/2005		Abandoned					
MW-11	2/4/2001	6.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-11	5/9/2001	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-11	3/15/2003	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-11	7/30/2003	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	
MW-11	11/5/2003	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	
MW-11	1/30/2004	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	
MW-11	11/11/2005		Abandoned					
MW-12	3/3/2001	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-12	5/9/2001	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-12	12/26/2002	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-12	3/15/2003	<5.0	**9**	<1.0	<1.0	<1.0	<1.0	
MW-12	7/30/2003	<5.0	1	<1.0	<1.0	<1.0	<1.0	
MW-12	11/4/2003	<5.0	4	<1.0	<1.0	<1.0	<1.0	
MW-12	1/30/2004	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	
MW-12				abandoned 06/23/04				
MW-13	3/21/2001	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-13	5/9/2001	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-13	12/26/2002	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-13	3/15/2003	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	
MW-13	7/30/2003	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	
MW-13	11/4/2003	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	
MW-13	1/30/2004	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	
MW-13				abandoned 06/23/04				
RW-1	11/11/2005	**43,000**	**78,000**	**2,800**	<2,200	<1,300	<1,700	
RW-1	2/22/2006	280	**5,400**	**49**	**1,200**	<5.3	36	
RW-1	4/24/2006	<8,500	**120,000**	**270**	**2,300**	130	1,400	
RW-1	6/15/2006	<8500	**89,000**	**270**	**1,200**	<500	2,100	
RW-1	8/8/2006	<3400	**59,000**	**77**	**490**	**780**	1100	
RW-1	9/25/2006	32	**41,000**	**51**	<1000	0.86	960	
RW-1	11/9/2006	<500	**1,600**	<10	15	<50	40	
RW-1	12/13/2006	340	**7,200**	8.6	**72**	39	170	
RW-1	3/13/2007	<50	**1,200**	5.2	**42**	<5	220	
RW-1	6/4/2007	<50	**3,100**	9.7	**72**	<5.0	170	
RW-1	6/15/2007	<50	**2,800**	8.8	**56**	<5.0	120	
RW-1	7/25/2007	<50	**6,200**	16.0	**140**	<5.0	86	

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VP-1	9/13/2006	<50	1.8	<1.0	<1.0	<5.0	<1.0
VP-1	12/13/2006	NA	<1.0	NA	NA	NA	NA
VP-1	3/13/2007	NA	NA	NA	NA	NA	NA
VP-1	6/4/2007	NA	480	NA	NA	NA	NA
VP-1	6/15/2007	NA	1.0	NA	NA	NA	NA
VP-2	10/25/2005	NA	<0.43	NA	NA	NA	NA
VP-2	9/13/2006	<50	**1,800**	6.8	94.0	<1.0	250.00
VP-2	12/13/2006	<50	1	<1.0	2.8	<5.0	<1.0
VP-2	3/13/2007	NA	**230.0**	NA	NA	NA	NA
VP-2	6/15/2007	NA	**570.0**	NA	NA	NA	NA
VP-3	10/25/2005	NA	<0.43	NA	NA	NA	NA
VP-3	9/13/2006	<50	**3,000**	14.00	<1.0	<1.0	110.00
VP-3	12/13/2006	<50	**9.7**	<1.0	11	<5.0	2.80
VP-3	3/13/2007	NA	**130,000**	NA	NA	NA	NA
VP-3	6/15/2007	NA	**5,100**	NA	NA	NA	NA
VP-4	9/13/2006	<50	**95**	1.70	<1.0	<1.0	2.00
VP-4	12/13/2006	NA	<1.0	NA	NA	NA	NA
VP-4	3/13/2007	NA	NA	NA	NA	NA	NA
VP-4	4/20/2007	NA	6.2	NA	NA	NA	NA
VP-4	6/15/2007	NA	6.7	NA	NA	NA	NA
VP-5	10/25/2005	---	**77**	---	---	---	---
VP-5	9/13/2006	<50	**10**	<1.0	<1.0	<1.0	<1.0
VP-5	12/13/2006	<50	**28**	<1.0	<1.0	3.5	0.54
VP-5	3/13/2007	NA	**460**	NA	NA	NA	NA
VP-5	6/15/2007	NA	6.3	NA	NA	NA	NA
VP-6	10/25/2005	---	<0.43	---	---	---	---
VP-6	9/13/2006	<50	<0.43	<1.0	<1.0	<1.0	<1.0
VP-6	12/13/2006	<250	**2200**	2	2.6	16.0	40.0
VP-6	3/13/2007	NA	1.5	NA	NA	NA	NA
VP-6	6/15/2007	NA	<1.0	NA	NA	NA	NA
VP-7	10/25/2005	---	**3,600**	---	---	---	---
VP-7	9/13/2006	<50	**1,200**	1.90	3.40	<1.0	51.00
VP-7	12/13/2006	<50	**480**	0.60	0.74	1/3/1900	20.00
VP-7	3/13/2007	NA	NA	NA	NA	NA	NA
VP-7	4/20/2007	---	**4,100**	NA	NA	NA	NA
VP-7	6/15/2007	NA	**1,600**	NA	NA	NA	NA
VP-8	10/25/2005	---	**47**	---	---	---	---
VP-8	9/13/2006	44.00	**9**	<1.0	<1.0	<1.0	<1.0
VP-8	12/13/2006	NA	1.2	NA	NA	NA	NA
VP-8	3/13/2007	NA	**100**	NA	NA	NA	NA

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VP-8	6/15/2007	NA	**7.4**	NA	NA	NA	NA
FH-N	1/3/2001	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-N	5/8/2001	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-N	12/26/2002	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-N	3/15/2003	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-N	7/29/2003	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-N	11/5/2003	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-N	1/29/2004	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-S	1/3/2001	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-S	12/26/2002	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-S	3/15/2003	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-S	7/29/2003	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
FH-S	1/29/2004	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
GB-4	12/29/2006	<50	**730**	0.5	<1.0	<5.0	72
HRLs		**700**	**7**	**30**	**70**	**300**	**NE**

FH-N	=	Franklin Heating Station - north well
FH-S	=	Franklin Heating Station - south well
PCE	=	Tetrachloroethene
TCE	=	Trichloroethene
DCE	=	Dichloroethene
TTFE	=	Trichlorotrifluoroethane
µg/l	=	Micrograms per liter
<	=	Less than reported value
NE	=	Not Established
HRLs	=	Health Risk Limits
NA		Not Analyzed
(1)	=	Petroleum and other VOCs constituents present, see laboratory report

Table 4
System Operational Data

Former Dry Cleaners
219 First Avenue SW
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Dual-Phase System

	Time	Flow rate (cfm)	Flow rate (m^3/sec)	Vacuum (inches Hg)	PID (ppm)	O2 (%)	LEL (%)	Hour Meter (Hours)	Gallons		Ave. GPM	Samples Collected?	
04/24/06		20	0.009438948	17	250.0			0.1	10			Water	Installed new blower, ran for 10 minutes, samples RW-1 and condensate tank
05/02/06	Start	20	0.009438948	17	70.0	20.5	5	1.3	103		1.32	DPE Air	Started new system, sampled air emissions
05/05/06	1000	20	0.009438948	19	230.0	20.9	4	66.7	3092		0.77	DPE Air and water	Monitored system, collected samples
05/06/06	1000												System Shut-down at 10am
05/08/06	1000							90.7	3956		0.73	No	Re-started system 10am
05/09/06	1000												System shut down at 10am
05/10/06	1030							117.0	4639		0.66		MRSI on-site, increases transfer GPM, changes float, re-starts system
05/14/06	1240												System off at 1240pm
05/15/06	1130												
05/15/06	1715												Added check-valve, lengthened pump start probe, fixed air check-valve, restarted 1130am
05/17/06	1000	20	0.009438948	16	37.0	20.9	0	222.2	9089		0.68	No	System off at 515pm
05/18/06	1245												Restarted system, raised tank float
05/19/06	1000												System off 1245pm
05/20/06	1044												MRSI on-site, replaced tank float, re-started 10am
05/23/06	1030												System off at 1044am
05/30/06	1100	70	0.033036318	14	12.7	20.6	0	443.5	15,984		0.60	DPE Air and water	MRSI replace relay, replumbed tank, restarted
06/06/06	1000	30	0.014158422	13	20.5	20.9	2	610.1	20,811		0.57	DPE Air and water	System OK, has run for 7 days straight
06/10/06	100												System OK, samples air and water, measure GW in all wells
06/15/06	1030	40	0.018877896	16	35.2	20.4	0	827.5	22,877		0.46	DPE Air and water	Blower Off due to VFD over-voltage
06/26/06	1230	68	0.032092423	16	12.1	20.5	0	1094.1	29,652		0.45	No	System off upon arrival, Restarted and sampled
07/10/06	1300	68	0.032092423	16	82.0	---	---	1429.4	34,073		0.40	DPE Air and water	Everything running well
07/21/06	1000	68	0.032092423	14	300.0	---	---	1690.6	34,074		0.34		System off upon arrival, Restarted and sampled
08/08/06	1045	70	0.033036318	14.8	0.0	20.8	0	2123.4	34,074	51,354	0.27	DPE Air and water	System working, flow meter NOT, turned off SVE, fixed flow meter
Flow meter Reset		Flow meter not working for short period, calculated average flow for that period							17,280	Cumulative		17280 gal for 30 days	
08/28/06	900	70	0.033036318	14.5	---	---	---	2602.8	4,265	55,619	0.03	DPE Air and water	
09/13/06	1030	70	0.033036318	8.0	3.5	20.9	0	2988.2	8,095	59,449	0.05	None	
09/18/06	1330	70	0.033036318	8.2	15.4	20.9	0	3109.8	8,799	60,153	0.05	None	System off on 09/17/06
09/25/06	1430	65	0.030676581	5.0	6.0	20.9	3	3278.6	10,448	61,802	0.05	DPE Air and water	Samples system and all wells
10/09/06	1400		0	6.0	230.0	---	---	3614.3	10,448	61,802	0.05	None	RW-1 valve partially closed so no water removed
11/09/06	1000	30	0.014158422	16.4	139.0	20.4	4	4352.4	26,524	77,878	0.10	DPE Air and water	System OK, samples air and water, measure GW in all wells
12/01/06	1230	32	0.015102317	15.8	83.6	20.9	5	4883.8	42,100	93,454	0.14	None	System OK, measured GW elevations, started SVE blower
12/04/06	15.15	34	0.016046212	16.9	19.0			4958.6	44,509	95,863	0.15	None	Water in RW-1. Drop pipe redirected and system worked fine afterwards
12/13/06	830	33	0.015574264	16.6	6.0	20.9	2	5168.0	48,694	100,048	0.16	DPE Air and water	System OK, measured GW elevations, started SVE blower
01/22/07	11	23	0.01085479	6.8	1.4	20.9	4	6132.0	66,779	118,133	0.18	DPE Air and water	System OK, low vacuum?
02/14/07	2.15	33	0.015574264	16.5				6822.7	71,327	122,681	0.17	None	Brad monitored the system., as he was on-site carrying out system maintenance. He did not take O2, PID, or LEL readings
02/21/07	10.30	30	0.014158422	16.5	1.7	20.9	0	6847.0	74,261	125,615	0.18	DPE Air and water	System OK, sampled air and water, measure GW and vacuum in all wells
03/13/07	10.00	32	0.015102317	16.6	30.0	20.6	8	7325.7	82,619	133,973	0.19	DPE Air and water	System OK, sampled air and water, measure GW and vacuum and sampled in all wells
03/30/07		35	0.016518159	16.0				7740.2	87,491	138,845	0.19	None	System OK. Matt disconnected digital input 3 from telemetric (transfer pump).
04/20/07	945	34	0.016046212	16.0	1.7	20.9	4	8238.6	94,079	145,433	0.19	DPE Air and water	System OK, sampled air and water, measure GW and vacuum in all wells
06/04/07	1200	30	0.014158422	14.0	3.5	20.5	4	9320.6	114,664	166,018	0.21	DPE Air and water, RW-1, VP-1	
06/15/07	1100	32	0.015102317	12.1	5.5	20.9	4	9583.9	119,479	170,833	0.21		Sampled all wells and vapor ports and system discharge
06/26/07													System OFF due to High Temp
06/29/07													System restarted
07/25/07	930	25	0.011798685	16.7	0.5	20.9	0	10473.5	129,751	181,105	0.21	DPE Air and water	Final system sampling event prior to abandonment

PID	=	Photoionization Detector
ppm	=	Parts per million
LEL	=	Lower Explosive Limit
---	=	Not Measured
*	=	Air flow estimated from blower performance at standard conditions curve.
cfm	=	ft/min X 0.02292 X 0.99

Table 6

Air Emission Calculations

Former Dry Cleaners
219 First Avenue SW
Rochester, Minnesota

DPRA
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Date	Air Flow (cfm)	Period Run Time (hours)		PCE Concentration (mg/m3)	PCE Rate (kg/hr)	Avg PCE Rate** (kg/hr)	Avg PCE Rate (kg/day)	PCE Removed (kg)	Total PCE to Date (kg)	Total PCE to Date (lbs.)
07/31/03	100			0.0000	0.0000					
		500				0.0001	0.0032	0.07	0.07	0.15
09/10/03	95			1.6546	0.0003					
		100				0.0001	0.0032	0.01	0.08	0.18
09/17/03	120			0.0000	0.0000					
		500				0.0001	0.0024	0.05	0.13	0.28
11/05/03	120			0.9652	0.0002					
		250				0.0004	0.0098	0.10	0.23	0.51
01/02/04	80			4.5500	0.0006					
		648				0.0003	0.0074	0.20	0.43	0.95
01/29/04	102			0.0000	0.0000					
		864				0.0000	0.0000	0.00	0.43	0.95
03/05/04	102			0.0000	0.0000					
		0				0.0022	0.0537	0.00	0.43	0.95
02/22/06	91			29.0000	0.0045					
		400				0.0023	0.0543	0.904	1.34	2.94
12/13/06	70			0.4200	0.00005					

Start of Dual-Phase System

Date	Air Flow (cfm)	Total Run Time (hours)	Period Run Time (hours)	PCE Concentration (mg/m3)	PCE Rate (kg/hr)	Avg PCE Rate** (kg/hr)	Avg PCE Rate (kg/day)	PCE Removed (kg)	Total PCE to Date (kg)	Total PCE to Date (lbs.)
05/02/06	20	1		0.0430	0.0000					
			66			0.0099	0.2365	0.65	0.65	1.42
05/05/06	20	67		580	0.0197					
			377			0.0137	0.3293	5.17	5.81	12.79
05/30/06	70	444		65	0.0077					
			167			0.0059	0.1423	0.99	6.80	14.96
06/06/06	30	610		81	0.0041					
			217			0.0061	0.1474	1.34	8.14	17.90
06/15/06	40	828		120	0.0082					
			602			0.0084	0.2018	5.06	13.20	29.04
07/10/06	68	1429		75	0.0087					
			694			0.0058	0.1397	4.04	17.24	37.92
08/08/06	70	2123		25	0.0030					
			479			0.0037	0.0885	1.77	19.00	41.81
08/28/06	70	2603		37	0.0044					
			676			0.0041	0.0992	2.79	21.80	47.95
09/25/06	65	3279		35	0.0039					
			1074			0.0226	0.5418	24.24	46.04	101.28
11/09/06	30	4352		810	0.0413					
			816			0.0214	0.5129	17.43	63.47	139.63
12/13/06	33	5168		26	0.0015					
			964			0.0013	0.0320	1.29	64.76	142.46
01/22/07	23	6132		31	0.0012					
			715			0.0012	0.0292	0.87	65.63	144.38
02/21/07	30	6847		24	0.0012					
			478.7			0.0011	0.0258	0.51	66.14	145.51
03/13/07	32	7325.7		17	0.0009					
			912.9			0.0008	0.0194	0.74	66.88	147.13
04/20/07	34	8238.6		12	0.0007					
			1082			0.0023	0.0542	2.44	69.32	152.51
06/04/07	30	9320.6		75	0.0038					
			1152.9			0.0022	0.0520	2.50	71.82	158.00
07/25/07	25	10473.5		12	0.0005					

cfm = cubic feet per minute
mg/m3 = milligrams per cubic meter
kg/hr = kilograms per hour
Note = Run time hours are estimated due to the system being down for extended periods of time.
A run-time meter was installed on January 16 2004

TABLE 7

Groundwater Treatment and Recovery-Aqueous Analytical Results

219 First Avenue SW
Rochester, Minnesota

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Sample	Date Sampled	Benzene µg/l	cis-1,2-Dichloro ethene µg/l	1,3-Dichloro-benzene µg/l	1,4-Dicloro-benzene µg/l	Ethylebenzene µg/l	Naphthalene µg/l	1,1,2-TCTF µg/l	PCE µg/l	Tetrahydro-furan µg/l	Toluene µg/l	1,1,1-Trichloro ethane µg/l	TCE µg/l	Total VOCs µg/l	Percent Reduction
RW-1	4/24/2006	340	2,300	<140	<150	300	130	1,400	120,000	2,400	640	<190	270	127,780	
	6/15/2006	<100	1,200	<100	<100	<100	<500	2,100	89,000	NA	<500	<100	270	92,570	
	8/8/2006	<200	490	<200	<200	<200	780	1100	59,000	<1000	190	<200	77	61,637	
	9/25/2006	<310	<1000	2.3	<1.0	0.97	0.86	960	41,000	70	0.46	13	51	42,099	
	11/9/2006	<10	15	<10	<10	<10	<50	40	1,600	<50	<50	9.4	<10	1,664	
	12/13/2006	<20	72	<20	<20	<20	39	170	7,200	<100	6.5	<20	8.6	7,496	
	2/22/2007	<10	39	<10	<10	<10	<50	170	2,500	<50	<50	<10	4.4	2,713	
	3/13/2007	<1	42	<1	<1	<1	<5	220	1,200	<5	<5	1.7	5.2	1,469	
	4/20/2007	<1	40	<1	<1	<1	<5	160	1,700	<5	<5	1.5	4.6	1,906	
	6/4/2007	<1.0	72	<1	<1	<1	<5	170	3,100	<5	<5	<1.0	9.7	3,352	
	6/15/2007	<1.0	56	<1	<1	<1	<5	120	2,800	<5	<5	3.9	8.8	2,989	
	7/25/2007	<1.0	140	0.34	<1.0	<1.0	<5.0	86	6,200	<5.0	<5.0	0.75	16	6,443	
System Discharge	4/24/2006	<1.0	NA	1.0	1.9	<1.0	NA	NA	5,400	NA	<5.0	3.4	40.0	5,446.3	95.74%
	5/5/2006	<1.0	NA	<1.0	1.1	<1.0	NA	NA	4,100	NA	<5.0	1.6	9.8	4,112.5	NA
	5/30/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	<1.0	NA	<5.0	<1.0	<1.0	0.0	NA
	6/6/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	500	NA	<5.0	<1.0	1.4	501.4	NA
	6/15/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	450	NA	<5.0	<1.0	2.7	452.7	99.51%
	7/10/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	380	NA	<5.0	<1.0	1.9	381.9	NA
	8/8/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	25	NA	<5.0	<1.0	<1.0	25.0	99.96%
	8/28/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	18	NA	<5.0	<1.0	<1.0	18.0	NA
	9/25/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	37	NA	<5.0	<1.0	<1.0	37.0	99.91%
	11/9/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	760	NA	<50	<1.0	<1.0	760.0	54.34%
	12/13/2006	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	45	NA	<5.1	<1.0	<1.0	45.0	99.40%
	1/22/2007	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	36	NA	<5.0	<1.0	<1.0	36.0	NA
	2/21/2007	<1.0	NA	<1.0	<1.0	<1.0	<5.0	<1.0	15	<5.0	<5.0	<1.0	<1.0	15.0	99.45%
	3/13/2007	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	17	NA	<5.0	<1.0	<1.0	17.0	98.84%
	4/20/2007	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	22	NA	<5.0	<1.0	<1.0	22.0	98.85%
	6/4/2007	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	75	NA	<5.0	<1.0	<1.0	22.0	99.34%
	6/15/2007	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	35	NA	<5.0	<1.0	<1.0	22.0	99.26%
	7/25/2007	<1.0	NA	<1.0	<1.0	<1.0	NA	NA	13	NA	<5.0	<1.0	<1.0	22.0	99.66%

Notes:
PCE = Tetrachloroethene
TCE = Trichloroethene
1,1,2-TCTF = 1,1,2-Trichloro-1,2,2-Trifluoro
µg/l = Micrograms per liter

RW-1 analyzed by method 8260B

System Discharge analyzed by method 624 - Total Toxic Organics (TTO)