# DOCUMENTATION OF DUE CARE COMPLIANCE

FORMER ROGELL GOLF COURSE
18600 AND 18601 BERG ROAD
DETROIT, MICHIGAN

SME Project Number: 0777832.001.009
May 18, 2018

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## APPENDICES

# 1. INTRODUCTION AND LIMITATIONS

The City of Detroit (hereinafter "the Owner") plans to purchase the former Rogell Golf Course in Detroit, Michigan (the Property) and hold the Property for future redevelopment as a public park, sustainable stormwater management site, and possible multi-family residential uses. Contamination is present in soil and groundwater on the Property at levels above those specified in Part 201 of the *Environmental Remediation*, of the Natural Resources and Environmental Protection Act, Public Act 451 of 1994, as amended (Part 201) for unlimited residential use; therefore, the Owner is obligated to comply with the due care obligations described in Section 20107a of Part 201. Section 20107a requires owners and operators who have knowledge that their property is contaminated (i.e., a "facility" as defined in Part 201) to:

- Limit unacceptable exposures to hazardous substances, prevent fire and explosion hazards due to hazardous substances, and allow the Property to be used in a way that protects the public health and safety.
- Take reasonable precautions against the reasonably foreseeable acts or omissions of a third party.
- Prevent worsening or spreading of the known impact.
- Provide reasonable cooperation, assistance, and access to persons authorized to conduct response actions on the Property.
- Provide all required notifications to the Michigan Department of Environmental Quality (MDEQ) and others.
- Comply with and not limit the effectiveness of land use or resource use restrictions established to prevent exposure to hazardous substances at the Property.

A discussion of 1) the potential for human exposure to impacted soil and groundwater; 2) plans and procedures for preventing unacceptable human exposures to, and exacerbation of, existing contamination during future use and maintenance of the Property; and 3) important information regarding Due Care documentation, are provided in this document. The Michigan Department of Environmental Quality's (MDEQ's) "Due Care Guide," attached in Appendix A, provides additional information associated with owning contaminated property in Michigan.

This Documentation of Due Care Compliance (DDCC) is intended for the "holding" period, which will be after the City of Detroit purchases the Property and before redevelopment activities occur. This document does not address the Owner's due care obligations during the redevelopment or post-redevelopment periods. Uses of the Property during the period covered by this DDCC will be nonresidential in nature; therefore, the Part 201 nonresidential cleanup criteria will apply for Due Care compliance at the Property during the "holding" period. This DDCC will be reviewed and revised as needed when redevelopment occurs or use otherwise changes, or if new environmental information becomes available.

**This DDCC is not, and should not be used as, a comprehensive Health and Safety Plan (HASP) for the Property or for contractors. Contractors and other parties working on the Property are responsible for the health and safety of their employees. In addition to Due Care requirements under applicable law, contractors will follow all applicable Michigan Occupational Safety and Health Administration (MIOSHA) and OSHA guidelines, and other applicable local, state, and federal regulations. This DDCC does not address mold, radon, asbestos, or other potential hazards, other than the soil and groundwater contamination described herein.**

# 2. PROPERTY DESCRIPTION, HISTORY, AND PLANNED USE

The Property includes two parcels of land at 18600 and 18601 Berg Road, in the City of Detroit, Wayne County, Michigan, which were formerly developed as a golf course. The Property location is shown on Figure 1, and the Property features are shown on Figure 2. The eastern, 93.62-acre parcel (18600 Berg Road) is currently occupied by a 2,700 square-foot former maintenance building, former irrigation well pump house, ticket booth building, and unmaintained grass- and tree-covered areas that were formerly part of the golf course. The western, 29.77-acre parcel (18601 Berg Road) is occupied by the former club house, a refrigeration house, two asphalt parking lots, and unmaintained grass- and tree-covered land that was part of the former golf course. The Rouge River flows from north to south on the western parcel.

The Property was developed prior to 1905, the earliest available records, with four structures (a church and possible residences) along West Seven Mile Road and three structures (likely residences) along Berg Road. These buildings were demolished between 1931 and 1952. A portion of the Property was developed as the Phoenix Golf Club, a nine-hole golf course, in 1913/1914. The Property was sold to the City of Redford in 1920 and redesigned as an 18-hole golf course in 1920/1921. The City of Detroit purchased the Property in 1945 and continued to operate the golf course. The clubhouse and maintenance building were constructed in the 1930s and 1940s, and by the 1960s, a pump house for an irrigation well and a refrigeration house for an ice rink were present on the Property. During the 1970s and 1980s, and possibly longer, an ice skating rink was present in the basement of the clubhouse building. Greater Grace Temple purchased the Property in 2007, and golf course operations ceased in 2013. Historical golf course operations on the Property included the use of four underground storage tanks (USTs) used to store heating oil and gasoline.

The City of Detroit plans to hold the Property for future redevelopment. Redevelopment plans were in progress at the time of this DDCC.

# 3. KNOWN CONTAMINATION AND EXPOSURE PATHWAY EVALUATION

An overview of the known contamination and an evaluation of potential exposure pathways during the "holding" period, based on the known contamination and planned use of the Property, are presented in the following subsections.

## 3.1 KNOWN CONTAMINATION

The site environmental conditions were determined from the results of a site assessment conducted by SME[1], and through a review of historical UST assessments conducted by others. Property features and environmental sampling locations are depicted on Figure 2.

The historical use of the Property as a golf course has resulted in environmental impacts to the Property, likely due to the use and storage of fertilizers, insecticides, herbicides, fungicides, and/or other chemicals used to maintain the golf course. The concentrations of dieldrin, beta-hexachlorocyclohexane, arsenic, cadmium, lead, mercury, selenium, and zinc in shallow (i.e. one to three feet below the ground surface) soil samples were above the Part 201 generic nonresidential cleanup criterion (Part 201 criterion) for the drinking water, groundwater surface water interface, and/or direct contact pathways in multiple sampling locations. The highest concentrations of these analytes were generally observed in samples collected from the golf course greens. In addition, the concentrations of arsenic and lead exceeded the Part 201 nonresidential direct contact criteria.

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[1] *Phase II Environmental Site Assessment Report, Former Rogell Golf Course, 18600 and 18601 Berg Road, Detroit, Michigan*, prepared by SME, dated April 17, 2018

The concentrations of arsenic and lead in groundwater were above the Part 201 residential drinking water and groundwater surface water interface (GSI) criteria in the sample collected from SB44, which was advanced in the location of a previous remedial excavation near the northwest corner of the maintenance building.

Target analytes reported at concentrations greater than one or more Part 201 criteria in soil are depicted on Figures 3 and 3A and in Table 1, in Appendix B. Target analytes reported at concentrations greater than one or more Part 201 criteria in groundwater are depicted on Figure 4 and in Table 2, in Appendix B.

The concentrations of volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs) in soil and groundwater samples collected from the known locations of former USTs (i.e., UST #1, UST #2, UST #4) ASTs, existing above-ground storage tanks (ASTs) and drum storage area were below the laboratory reporting limits; therefore, the soil analyses results did not confirm the previously reported (by others) presence of benzene in groundwater in the UST #1 area (SB41 and SB43) or 1,2,4-TMB and 1,3,5-TMB in soil in the UST #4 area (SB51).

## 3.2 EVALUATION OF EXPOSURE PATHWAYS

This section includes a discussion of the relevant human exposure pathways on the Property and those that are that are complete or which could become complete during the vacant “holding period.

### 3.2.1 PATHWAY RELEVANCY

The relevancy of the Part 201 generic non-residential cleanup criteria and the MDEQ’s vapor intrusion (VI) screening values for the various human exposure pathways is discussed below:

- **Ingestion of groundwater (drinking water)** is not considered a relevant human exposure pathway because the Property will be unoccupied, with the exception of occasional occupancy for Property maintenance purposes. No potable water wells are currently present on the Property or will be allowed on the Property in the future. The former golf course irrigation well will not be used during the “holding” period, and will be properly abandoned as part of site redevelopment.

- **Vapor intrusion (vapors entering enclosed buildings)** is not a relevant exposure pathway because there will be no human occupied structures on the Property.

- The **ambient air pathway** is considered a relevant exposure pathway because City employees and third parties may occasionally access the Property.

- The **direct contact (skin contact or ingestion) pathway** is a relevant pathway because City employees and third parties may occasionally access the Property.

### 3.2.2 PATHWAY COMPLETION

For the purposes of this DDCC, complete pathways for human exposure are those where contaminants are present at levels that may pose a threat to the human health of persons occupying the Property during day-to-day activities. Pathways that may become complete are those where persons may be exposed to contaminants through unauthorized site use or activities, such as or excavation and subsurface construction, that exposes people to contaminated environmental media otherwise protected from human exposure.

A summary of the completeness of relevant pathways during the future “holding” period is provided below:

- The **ambient air pathway** is not a complete pathway. Mercury is present in soil at concentrations exceeding the generic volatile soil inhalation criteria (VSIC); however, these results do not represent elemental mercury, the form assumed for development of the generic exposure criteria. Mercury on the Property was applied in the form of an organo-mercury fungicide, a common type of pesticide used on the golf courses. The mercury in organo-mercury compounds does not volatilize in a manner that would be expected for elemental mercury.

- The **direct contact (skin contact or ingestion) pathway** is a complete pathway because arsenic and lead were measured at concentrations exceeding their respective direct contact criterion in shallow soil (i.e. one to three feet below ground surface).

# 4. DUE CARE COMPLIANCE

The exceedances of the Part 201 residential criteria for pesticides and metals in soil and for metals in groundwater indicate soil and groundwater must be managed properly when removed from the site and/or relocated on-site to prevent exacerbation of the contamination. The exceedances of the nonresidential direct contact criteria for arsenic and lead in soil samples collected from the Property indicate that direct skin contact and/or soil ingestion exposure risks exist. Persons visiting the site will be protected from unacceptable exposures to the contamination as described subsections 4.1 and 4.2. Failure to properly manage soil and groundwater may result in exacerbation of the identified impact. Measures to minimize the potential for exacerbating the existing contamination are presented in Section 4.3.

## 4.1 PREVENTION OF UNACCEPTABLE HUMAN EXPOSURE TO CONTAMINATED SOIL DURING NORMAL SITE USE

The Property will not be used or occupied on a regular basis, and will be fenced; therefore, there are no expected day-to-day human exposures.

## 4.2 PROTECTION OF THIRD PARTIES

Soil is contaminated with arsenic and lead at concentrations above those deemed safe for human contact (skin contact or ingestion) during nonresidential uses applicable to third parties. Third parties that may be exposed to contamination include grounds and maintenance workers; subsurface construction and utility workers; visitors planning the redevelopment; and trespassers.

During the “holding” period, the Owner will mitigate potential human contact exposures to impacted soil by maintaining a secure fence around the perimeter of the Property. The fence will be inspected within 45 days of acquisition and holes or other damage to the fence which would allow persons to access the Property will be repaired within two weeks of discovery of the damage, or as soon as practical based on contractor or materials availability. All gates will be securely locked. The perimeter fence will be inspected semi-annually, and repairs will be made to maintain security. A fence repair record is provided in Appendix D.

Construction, maintenance, and utility contractors who conduct subsurface work on the Property will be provided a copy of this DDCC and the hazard communication letter in Appendix C. They will be required to complete the Contractor Acknowledgement Form (Appendix C) and prepare their own site-specific Health and Safety Plan (HASP) to protect employees from potential site exposures when conducting subsurface activities. When soil throughout the Property is exposed for excavations or other construction or maintenance purposes, access to the work area will be physically restricted by a temporary fence or other effective barricade to minimize the potential for exposure of other occasional visitors planning the redevelopment.

The Owner and/or third parties planning to conduct subsurface construction/maintenance/utility work on the Property will be responsible for communicating potential environmental hazards and risks to their employees and subcontractors in conformance with the OSHA Hazard Communication Standard (29 CFR 1910.1200), as applicable.

## 4.3 PREVENTION OF EXACERBATION

Soil and groundwater on the Property are contaminated at levels requiring the use of special management techniques to prevent the spread (exacerbation) of contamination if excess soil or dewatering effluent is generated during maintenance activities. Prevention of exacerbation includes preventing the spread of contamination on and off the Property and between environmental media (soil, groundwater, and air). For purposes of this DDCC, all soil and groundwater on the Property will be considered contaminated at levels requiring these special handling and management procedures, unless additional soil or groundwater characterization data demonstrates otherwise.

The following precautions will be followed when soil is excavated during construction/maintenance/utility activities:

- Soil erosion and sedimentation controls will be installed prior to excavation, as required by local, state, and federal requirements, and dust suppression measures will be used to control the release of fugitive dusts.

- Procedures will be implemented to minimize/control track-out of contaminated soil during construction activities. Soil will be removed from construction vehicles prior to leaving the Property, and vehicles will be visually inspected to verify that soil has been removed. Streets and sidewalks will be cleaned daily, or as needed, to remove soil tracked out from the Property. Street sweepings will be managed in the same manner as excavated soil.

- Soil removed from excavations will be stockpiled on-site and returned to the excavation when possible.

- Excess soil from excavations may be able to be relocated on the Property, but will NOT be moved to any other Property, unless additional soil characterization data supports off-site reuse. If excess soil is planned to be relocated on the Property, it will be relocated in accordance with Part 201, may require MDEQ notification, and may require additional characterization prior to the relocation activities. The Owner will be contacted if soil relocation is planned so the relocation activities can be designed in a manner that does not cause exacerbation of the impact. The Owner will maintain records of, and disclose to a purchaser or other person to which the Property is transferred:

    - a description of the condition and volume of soil that was relocated;

    - the location from which the soil was removed and the location where it was relocated; and

    - a summary of the basis for the determination that the relocation did not cause exacerbation of contamination on the Property (relocation of certain volumes of soil may require MDEQ notification/approval).

- Excess soil that cannot be relocated on the Property will be:

    - characterized according to waste disposal site requirements and transported for disposal at a licensed disposal facility in accordance with applicable laws and regulations, or

    - properly characterized for off-site re-use.

If excess soil is likely to be generated from excavation activities, the contractor will be required to have a plan for management, off-site disposal, and/or reuse prior to commencing activities. The plan must be in accordance with Part 201 and must be approved by the Owner.

If groundwater is encountered during subsurface activities and needs to be removed (e.g., dewatering during construction), it will be properly characterized and managed according to applicable regulations. Under no circumstances will groundwater be discharged: 1) to surface water, 2) to a storm sewer or sanitary sewer without obtaining a proper permit, or 2) in a manner that results in uncontrolled flow off the Property. Groundwater generated from dewatering activities will be:

- containerized on-site, characterized in accordance with disposal site requirements, and transported for proper disposal at an off-site licensed facility; or

- characterized and permitted pursuant to the City's sanitary sewer ordinances and discharged to the sanitary sewer.

If evidence of environmental impact that is not consistent with known impact is observed during subsurface maintenance or construction activities, the Owner will be notified, and this DDCC will be evaluated and modified as appropriate. Such impact or conditions will be characterized and managed in accordance with applicable requirements, guidelines, and rules of state and federal law.

# 5. RECORD KEEPING AND NOTIFICATIONS

Owners and operators are required to maintain Due Care documentation, which must be available upon request of the MDEQ. Due Care records that should be maintained in a Due Care file are discussed below. Submittal of these records to the MDEQ is not required, but may be done, if desired.

## 5.1 DOCUMENTATION

A current copy of this DDCC and other pertinent due care documentation will be maintained in a Due Care file at the offices of the Owner Contact (Section 6). The Due Care file will be readily available to the MDEQ or other appropriate parties as needed and/or upon request. This DDCC and other documentation will be revised as needed when Property conditions, uses, and/or features described in this DDCC change, or if conditions are found to be different in the future.

The Owner will maintain documentation of the following in the due care file:

- Records of parties who were provided the hazard communication information and contractor acknowledgement form in Appendix C.

- Records of fence repairs, as needed, on the fence repair record form in Appendix D.

- Soil and/or groundwater removal – If construction or maintenance activities require soil and/or groundwater removal, the Owner will maintain records of the removal and disposal of soil and/or groundwater from the Property. Records will include manifests and landfill load tickets for soil, manifests and disposal facility receipts for groundwater, permit applications and approval documentation, and other pertinent information.

- Soil relocation – The Owner will maintain records of soil relocation on the Property in accordance with Part 201 and as described in Section 4.3.

- Notices - Any notices to other parties that may be required as described in Section 5.2.

## 5.2 PROPERTY NOTICES

In accordance with Part 201, the Property owner is required to make certain notifications. Documentation of all notifications will be kept in the Due Care file.

Part 201 requires the Owner to notify purchasers that the site is a Part 201 "facility". The Owner will disclose the reports documenting the Property conditions to subsequent purchasers prior to purchase. Available reports include this DDCC and those referenced in Section 7.0.

### RULE 1013 NOTICE – EXPOSURE MITIGATION TO UTILITIES AND/OR EASEMENT HOLDERS

A Rule 1013 notice is required if contamination on the Property may present an unacceptable exposure to utility workers or others conducting activities in an easement, under the terms of a utility franchise, or pursuant to severed subsurface mineral rights or severed subsurface formations are known to be present on the Property. There are no known utility franchise easements on the Property; therefore, no Rule 1013 Notice is needed.

Construction and utility personnel installing new utilities or maintaining existing utilities on the Property will be advised of the known impact prior to conducting their work. The Owner, prior to subsurface activities, will provide a copy of this Document and the hazard communication letter in Appendix C. The Owner will require construction and utility personnel to complete the Contractor Acknowledgement Form (Appendix C).

### RULE 1015 NOTICE – ABANDONED CONTAINERS

SME observed ASTs, drums, and chemical containers on the Property and in the buildings. The drums, ASTs, and chemical containers will be removed from the Property within 45 days of acquiring the Property; therefore a Rule 1015 notice is not required. If additional abandoned containers are discovered in the future, the containers will be promptly removed from the Property and managed in accordance with applicable State and Federal rules and regulations.

### RULE 1017 NOTICE – NOTICE OF MIGRATION OF CONTAMINATION

The available data does not support a reasonable inference that hazardous substances have migrated from the Property or that any hazardous substances that may be present beyond the Property boundary emanated from the Property; therefore, no Property off-site notices are necessary.

### RULE 1019 NOTICE – FIRE/EXPLOSION HAZARDS

There are no known fire or explosion hazards related to existing contamination; therefore, a Rule 1019 notice is not required.

Additional notifications may be necessary if Property conditions change or if Property conditions are found to be different in the future.

## 6. OWNER CONTACT

Questions related to this DDCC should be directed to:

Mr. Paul Max
General Manager – Environmental Affairs
Buildings, Safety Engineering and Environmental Department
City of Detroit
2 Woodward Avenue, Suite 401
Detroit, Michigan 48226
Phone: (313) 471-5115
Email: maxp@detroitmi.gov

## 7. REFERENCES

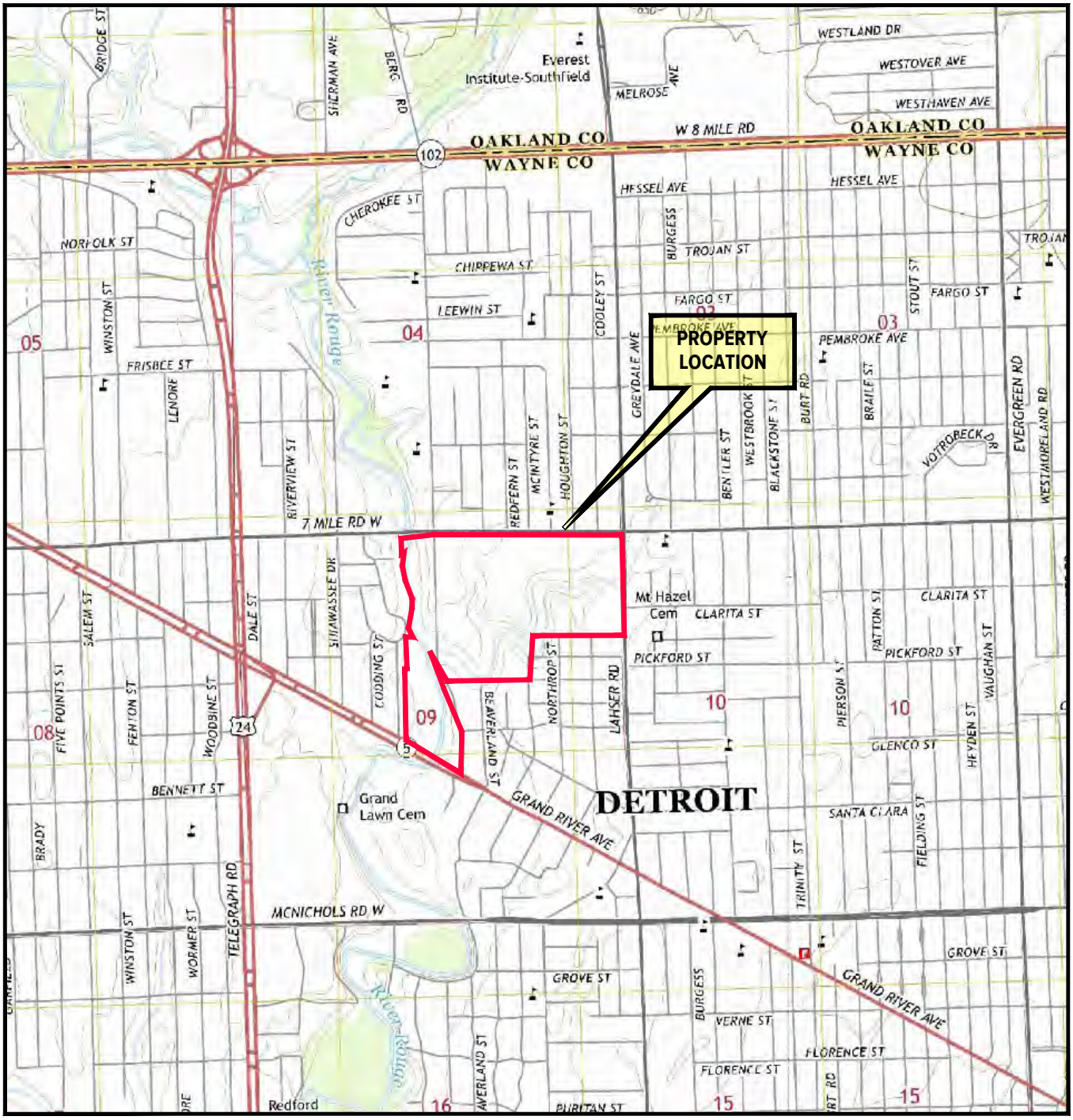
1. **Part 201 of 1994 PA 451, as amended, the Natural Resources and Environmental Protection Act**, and applicable portions of the associated Part 10 Rules in effect at the time the BEA was prepared, December 21, 2002.

2. The Michigan Department of Environmental Quality, Promulgated Cleanup Criteria, R299.44, R299.46, R299.48, and R299.49, **Part 201 Generic Residential and Nonresidential Cleanup Criteria and Screening Levels**, December 30, 2013.

3. **Phase I Environmental Site Assessment Report, Former Rogell Golf Course, 18600 and 18601 Berg Road, Detroit, Michigan,** prepared by SME, dated March 8, 2018.

4. **Phase II Environmental Site Assessment Report, Former Rogell Golf Course, 18600 and 18601 Berg Road, Detroit, Michigan,** prepared by SME, dated April 17, 2018.

# FIGURES




Base map obtained from EDR.

USGS QUADRANGLE(s) REFERENCED
REDFORD (MI) TOPO QUAD - 2014
ROYAL OAK (MI) TOPO QUAD - 2014

NORTH

0' 2000'

SCALE: 1" = 2000'

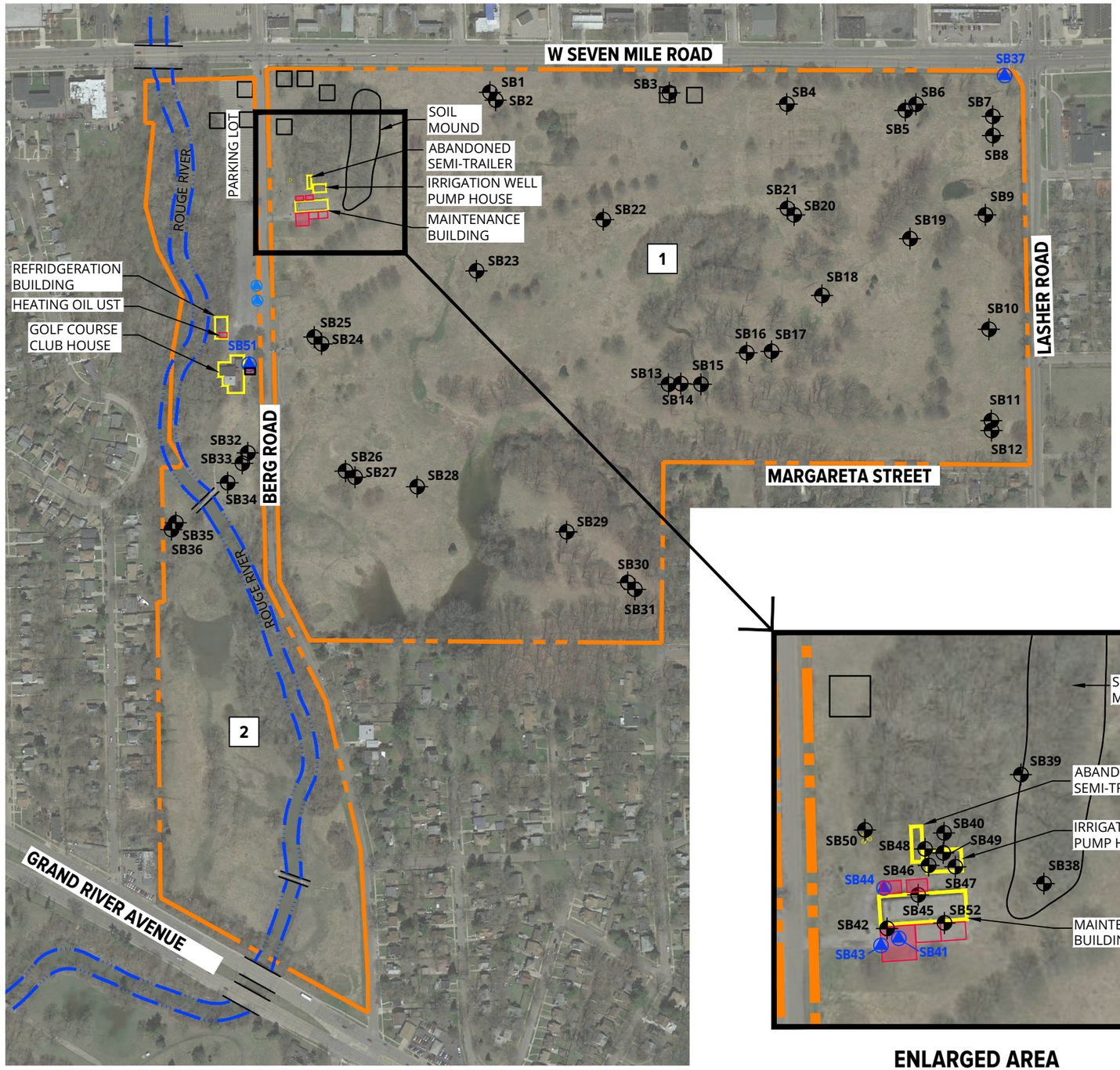
| No. | Revision Date | | |
|---|---|---|---|
| | | Date | 12-19-17 |
| | | Drawn By | GM |
| | | Designed By | AK |
| | | Scale | 1" = 2000' |
| | | Project | 077832.00.001.006 |

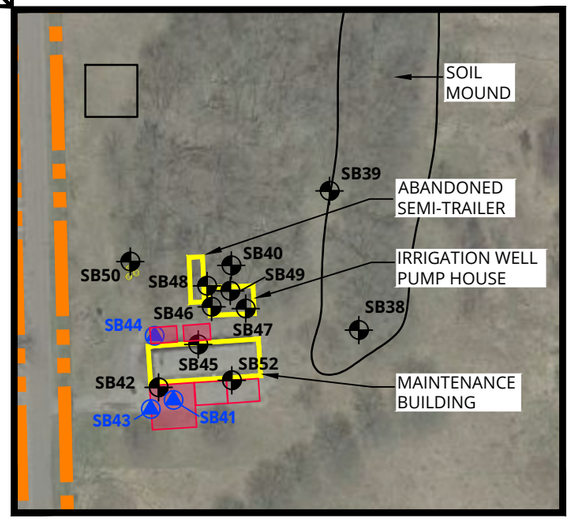
# PROPERTY LOCATION MAP
# FORMER ROGELL GOLF COURSE
# 18600 - 18601 BERG ROAD
# DETROIT, MICHIGAN

SME
www.sme-usa.com

**Figure No. 1**

Dec 19, 2017 - 10:43am - MANDRILA \\Sme-inc\pz\WIP\077832.00\CAD\077832.00.001.003\077832.00.001.003-01.dwg




**ENLARGED AREA**

SCALE: 1" = 150'

NORTH

0' 400' 800'

GRAPHIC SCALE: 1" = 400'

## LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING MONITORING WELLS
- POLE-MOUNTED TRANSFORMERS
- FORMER LOCATION OF BUILDINGS
- FORMER LOCATION OF GASOLINE USTs
- GASOLINE AND DIESEL ASTs
- FORMER LOCATION OF DIESEL ASTs
- FORMER LOCATION OF HEATING OIL UST
- 1 — 18600 BERG ROAD
- 2 — 18601 BERG ROAD
- APPROXIMATE SOIL BORING LOCATION
- APPROXIMATE SOIL BORING LOCATION WITH TEMPORARY MONITORING WELL

NOTE:
DRAWING INFORMATION TAKEN FROM GOOGLE EARTH PRO 2016 AERIAL PHOTO AND SITE OBSERVATIONS.

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**Project**
FORMER ROGELL GOLF COURSE

**Project Location**
18600 AND 18601 BERG ROAD DETROIT, MICHIGAN

**Sheet Name**
SAMPLE LOCATION DIAGRAM

| No. | Revision Date |
|---|---|
| | |
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| | |
| | |

Date: 2-2-18
CADD: JAB
Designer: AHR
Scale: 1" = 400'
Project: 077832.00.001.006
Figure No.: 2



PLOT DATE: Feb 02, 2018 - 12:12pm - jblake FILE LOCATION: \\Sme-inc\pz\WIP\077832.00\CAD\077832.00.001.006\rev0\077832.00.001.006-SB.dwg

# APPENDIX A
## MDEQ DUE CARE CITITZEN'S GUIDE

DEQ-RRD Due Care GUIDE

# Due Care Obligations

*For owners or operators of contaminated property*

This guide to Due Care describes the obligations of an owner or operator of contaminated property, which are designed so contaminated properties can be safely used.

Section 20107a of Part 201, Environmental Remediation, and Section 21304c, Leaking Underground Storage Tanks, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), requires that owners and operators take measures to ensure that existing contamination on a property does not cause unacceptable risks and is not exacerbated. Such measures include evaluating the contamination and undertaking the necessary actions to address the unacceptable risks. Due care obligations are not related to the owner or operator's liability for the contaminants; they apply to both non-liable parties and liable parties.

**◄◄ NOTE ►►**

This is an informational document from the Michigan Department of Environmental Quality (DEQ). A thorough review of the statute, administrative rules, and guidelines should be completed before making site- specific decisions.

The Part 201 and Part 213 statutes, Part 10 Administrative Rules, and guidelines are available electronically at this DEQ Web site: michigan.gov/deqduecare

## DUE CARE REQUIREMENTS SECTIONs 20107a & 21304c

An owner or operator of contaminated property shall do all of the following with respect to contamination at the property:

- Prevent exacerbation of the existing contamination.
- Prevent unacceptable human exposure and mitigate fire and explosion hazards to allow for the intended use of the facility in a manner that protects the public health and safety.
- Take reasonable precautions against the reasonably foreseeable acts or omissions of a third party
- Provide notifications to the DEQ and others.
- Provide reasonable cooperation, assistance, and access to the persons that are authorized to conduct response activities or corrective actions at the property.
- Comply with any land use or resource use restrictions established or relied on in connection with the response activities or corrective actions.
- Not impede the effectiveness or integrity of any land use or resource use restriction.

Sections 20101 and 21303 of the NREPA define a facility or a site as property with contamination in soil or groundwater at concentrations above Michigan's cleanup criteria for residential property.

An owner or operators "due care" obligations are summarized on the next few pages and are specified in Part 201, Section 20107a and its Administrative Rules 1001-1021 and Part 213, Section 21304c. Further information can be found on the DEQ RRD due care web page (michigan.gov/deqduecare):

- Part 201 of NREPA
- Part 201 Administrative Rules (Part 10)
- Part 201 Residential Cleanup Criteria
- Part 213 of NREPA
- DEQ-RRD Citizen's Guides
- Due Care Brochure, Matrix and Forms

A fact sheet on Michigan's environmental cleanup program from...

**Michigan Department of Environmental Quality**
**Remediation and Redevelopment Division**
**PO Box 30426, Lansing, MI 48909-7926**
**Main Telephone: 517-284-5087**
**www.michigan.gov/deqrrd**

**Rick Snyder, Governor * Dan Wyant, Director**

*Revised May 2016*

## PREVENTING EXACERBATION

Exacerbation occurs when an activity undertaken by the person who owns or operates the property causes the existing contamination to migrate beyond the property boundaries. Examples of exacerbation can include: the mishandling of excavated contaminated soil such that contamination now migrates off-site; pumping contaminated water from footing drains into a nearby ditch; or creating a new migration pathway by putting a utility line through a zone of highly contaminated groundwater or soil. An owner or operator can also exacerbate contamination by changing the facility conditions in a manner that would increase the response activity or corrective action costs for the liable party. An example might be to place a building over the source of the existing contamination. A person that causes exacerbation would be liable for remediation of the contamination they caused or paying the increase in the response activity or corrective action costs.

## PREVENTING UNACCEPTABLE HUMAN RISK

Owners and operators must evaluate the existing contamination to determine if the people using or working at the property would be exposed to contamination at levels above the appropriate generic or site-specific criteria. Upon the identification of unacceptable risks, the owner and operators must then undertake the actions that are necessary to prevent unacceptable exposures to contamination in order to demonstrate compliance with their due care obligations. Criteria for differing land uses can be found in the Part 201 Administrative Rules (Rules 1-50). For example, if groundwater used for drinking is contaminated above the drinking water criteria then the owner and operator must prevent the use of the contaminated drinking water. If soils are contaminated above the direct contact criteria for the appropriate land use at the surface of the property, then people must be prevented from coming into contact with those soils by restricting access, installing a barrier to prevent exposure, or removing contaminated soil. Exposure barriers can be clean soil, concrete, paving, etc. In some instances, remediation of the contamination may be the most cost effective response. In addition, if there is a potential unacceptable risk for utility workers or people conducting activities in an easement on the property, then utility and/or easement holders must be notified in writing of the conditions by the owner and operator. If there is a fire and explosion hazard, the local fire department must be notified and the situation must be mitigated.

## TAKING REASONABLE PRECAUTIONS

Taking reasonable precautions against the reasonably foreseeable actions and omissions of a third party means trying to prevent things that could cause a third party to be exposed to an unacceptable risk. This might include: notifying contractors of contamination so they can take proper precautions; preventing trespass that would result in an unacceptable exposure (neighborhood kids playing in a vacant industrial yard that has direct contact hazards); and taking actions to secure abandoned containers so they don't get damaged by traffic, etc.

## PROVIDE REASONABLE COOPERATION, ASSISTANCE, AND ACCESS

Owners and operators must allow a person authorized to take response activities or corrective actions on the property (such as the liable person, or the state) to take such actions as: installing monitor wells, operating a remediation system, and maintaining the integrity of an exposure barrier, etc. However,

the statute specifically states that this shall not be interpreted as providing any right of access not expressly authorized by law. The authorized person must still go through the normal process of acquiring voluntary or court ordered access, including the potential for compensation as the parties and/or court deem reasonable.

## COMPLY WITH AND NOT IMPEDE THE EFFECTIVENESS OF LAND USE AND RESOURCE USE RESTRICTIONS

If there are land use or resource use restrictions on the property, owners and operators must comply with those restrictions and not take actions that would impede their effectiveness. Examples of compliance might include: not installing a well if there is a restriction on using the groundwater for drinking water purposes, not allowing a residential use on a property if there is a restriction limiting the property use to nonresidential, not removing a barrier installed to prevent contact with contaminated soil, and not turning off an operating remediation system.

## EVALUATING THE NEED FOR DUE CARE

The necessity for conducting response actions are determined by evaluating the current/intended property use and the existing contamination. Based on that evaluation, the actions needed to prevent unacceptable exposures and comply with all due care obligations must be implemented. Environmental professionals often assist with this process (see Environmental Professionals section at end of document).

## DUE CARE DOCUMENTATION

Owners and operators must maintain documentation than an evaluation to identify unacceptable risks was conducted, any actions that are needed have been taken and are adequate. Certain response actions (e.g., exposure barriers, mitigation system, etc.) will require continued maintenance, inspections, and repair that must also be documented. Documentation requirements are described in the Part 201 Administrative Rule 1003. The documentation does not need to be submitted to the DEQ, but must be available for the DEQ to review upon request within eight (8) months of becoming the owner or operator or of having knowledge that the property is contaminated. You may request and submit for DEQ to review and determination Documentation of Due Care Compliance pursuant to Sections 20114g or 21323n.

## NOTIFICATION

The Part 10 ("due care") Rules require notification to the DEQ and others in the following circumstances:

- Notify the DEQ if there are discarded or abandoned containers that contain hazardous substances on the property; see Form EQP 4476.
- Notify the DEQ and adjacent property owners if contaminants are migrating off the property; see Form EQP 4482.
- Notify the local fire department if there is a fire or explosion hazard.
- Notify utility and easement holders if contaminants could cause unacceptable exposures and/or fire and explosion hazards.

These notices must be made within 45 days of becoming the owner or operator, or of having knowledge of the conditions. The forms are available at DEQ District Offices and the DEQ Web Page: michigan.gov/deqduecare.

## EXEMPTIONS/LIMITATIONS

Parts 201 and 213 provide exemptions to the "due care" obligations to prevent exacerbation, prevent or mitigate unacceptable exposures, and take reasonable precautions for the following entities:

- An owner or operator of property where the contamination is migrating onto the property.
- An owner or operator of a utility franchise on the property.
- An owner or operator of the severed mineral rights to the property.
- A local unit of government (LUG) that: involuntarily acquires title or control of property by virtue of its governmental functions, or the property is transferred to the LUG from the state or a LUG that is not liable under Part 201 or 213, or by seizure, receivership or forfeiture or court order, or voluntarily acquired the property and conducted a baseline environmental assessment (BEA).
- A LUG that has an easement interest or holds a utility franchise for a transportation or utility corridor or public right of way, or for conveying or providing goods and services.
- A LUG that is not liable and is leasing the property to a non-liable party.

However, if the state or LUG exempted above offers access to the property and makes it available for public use, such as for parks, schools, municipal office buildings, public works operations, etc., then the person, state, or LUG must comply with all due care obligations for that portion of the property that is accessible to the public.

Additionally, the person, state, or LUG that is exempted above still has due care obligations to provide cooperation, assistance, and access, comply with land use or resource use restrictions, and not impede the integrity or effectiveness of the land or resource use restriction. Further, Sections 20107a(6) and 21304c(6) specify utilities and severed mineral right owners must comply with due care in regard to their own activities.

While Parts 201 and 213 provide these exemptions, it may be in the owner or operator's best interest to ensure the property is safe for the intended use and that they do not cause a new release by their actions or exacerbate pre-existing contamination.

## ENVIRONMENTAL PROFESSIONALS

Resources for finding an environmental professional, consultant or engineer, include: online searches for Environmental, Ecological, or Engineering consulting firms; referrals from financial institutions, real estate agencies, or trade associations, etc. It's wise to ask the professional or consultant for references and inquire as to past due care compliance documentation reports they have successfully completed. The DEQ does not provide recommendations for environmental professionals, consultants or engineers.

## SOURCES OF INFORMATION

**DEQ Environmental Assistance Center**
1-800-662-9278

michigan.gov/degduecare

**DEQ Remediation and Redevelopment Division Web Page**
www.michigan.gov/deqrrd

**DEQ Remediation and Redevelopment Division Contact**
Jeanne Schlaufman
586-753-3823
schlaufmanj1@michigan.gov

**DEQ Office of Oil, Gas and Minerals Contact**
Part 615 (Supervisor of Wells – oil/gas wells) and Part 625 (Mineral Wells)
Janice Smith
517-242-3134
smithj6@michigan.gov

*Revised May 2016*

# APPENDIX B

## ENVIRONMENTAL ASSESSMENT RESULTS DIAGRAMS AND ANALYTICAL SUMMARY TABLES FOR SOIL AND GROUNDWATER

**TABLE 1**
**SUMMARY OF ANALYSIS RESULTS - SOIL**
**FORMER ROGELL GOLF COURSE**
**18600 and 18601 BERG ROAD**
**DETROIT, MICHIGAN**
**SME PROJECT NO. 077832.00.001.006**


| CONSTITUENT | Chemical Abstract Service Number | Statewide Default Background Levels | Part 201 Generic Residential Cleanup Criteria | | | Part 201 Generic Nonresidential Cleanup Criteria | | | | CHEMICAL ANALYSIS RESULTS Sample Identification Depth (feet) Date Collected Area of Evaluation Parcel Address | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Direct Contact Criteria | Drinking Water Protection Criteria | Infinite Source Volatile Soil Inhalation Criteria (VSIC) | Particulate Soil Inhalation Criteria | Direct Contact Criteria | SB1 | SB2 | SB7 | SB8 | SB13 | SB14 | SB26 | SB27 |
| | | | | | | | | | | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 |
| | | | | | | | | | | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/12/18 | 1/12/18 |
| | | | | | | | | | | Former golf course - tee boxes | | | | | | | |
| | | | | | | | | | | 18600 Berg Road | | | | | | | |
| **VOCs** | | | | | | | | | | | | | | | | | |
| All Analyzed VOCs | CS | NA | CS | CS | CS | CS | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE | NE |
| **PAHs** | | | | | | | | | | | | | | | | | |
| Fluoranthene | 206-44-0 | NA | 730,000 | 5,500 | 46,000,000 | 730,000 | 890,000,000 | 1,000,000,000 | 130,000,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| All Other Analyzed PAHs | CS | NA | CS | CS | CS | CS | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE | NE |
| **PCBs** | | | | | | | | | | | | | | | | | |
| Total of All Analyzed PCB Aroclors | CS | NA | CS | CS | 4,000 | CS | CS | CS | 16,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| **Metals** | | | | | | | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 5,800 | *5,800* | *5,800* | 7,600 | *5,800* | NLV | 910,000 | 37,000 | **5,400** | **2,700** | **3,200** | **2,600** | **5,700** | **5,700** | **6,300** | **3,100** |
| Barium | 7440-39-3 | 75,000 | 1,300,000 | 440,000* | 37,000,000 | 1,300,000 | NLV | 150,000,000 | 130,000,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Cadmium | 7440-43-9 | 1,200 | 6,000 | 3,000* | 550,000 | 6,000 | NLV | 2,200,000 | 2,100,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Chromium, Total** | 16065-83-1 | 18,000 | 1,000,000,000 | 1,000,000,000 | 790,000,000 | 1,000,000,000 | NLV | 150,000,000 | 1,000,000,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Chromium VI | 18540-29-9 | NA | 30,000 | 3,300 | 2,500,000 | 30,000 | NLV | 240,000 | 9,200,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Copper | 7440-50-8 | 32,000 | 5,800,000 | 75,000* | 20,000,000 | 5,800,000 | NLV | 59,000,000 | 73,000,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Lead | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | 700,000 | NLV | 44,000,000 | 900,000 | **40,000** | **17,000** | **36,000** | **28,000** | **26,000** | **48,000** | **30,000** | **19,000** |
| Lead, Total (Calculated) | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | 700,000 | NLV | 44,000,000 | 900,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Lead, Coarse Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | 700,000 | NLV | 44,000,000 | 900,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Lead, Fine Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | 700,000 | NLV | 44,000,000 | 900,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Mercury | 7439-97-6 | 130 | 1,700 | *130* | 160,000 | 1,700 | 62,000 | 8,800,000 | 580,000 | **220** | **110** | **140** | **140** | **290** | **120** | **380** | **77** |
| Selenium | 7782-49-2 | 410 | 4,000 | *410* | 2,600,000 | 4,000 | NLV | 59,000,000 | 9,600,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Silver | 7440-22-4 | 1,000 | 4,500 | *1,000* | 2,500,000 | 13,000 | NLV | 2,900,000 | 9,000,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| Zinc | 7440-66-6 | 47,000 | 2,400,000 | 170,000* | 170,000,000 | 5,000,000 | NLV | ID | 630,000,000 | NE | NE | NE | NE | NE | NE | NE | NE |
| **Herbicides** | | | | | | | | | | | | | | | | | |
| Dalapon | 75-99-0 | NA | 4,000 | NA | 19,000,000 | 4,000 | NLV | ID | 62,000,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Dicamba | 1918-00-9 | NA | 4,400 | NA | 3,400,000 | 13,000 | NLV | ID | 17,000,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2,4-Dichlorophenoxyacetic acid | 94-75-7 | NA | 1,400 | 4,400 | 2,500,000 | 1,400 | NLV | 2,900,000,000 | 8,600,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| Dinoseb | 88-85-7 | NA | 300 | 200 | 66,000 | 300 | NLV | 120,000,000 | 390,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Silvex (2,4,5-TP) | 93-72-1 | NA | 3,600 | 2,200 | 1,700,000 | 3,600 | NLV | ID | 5,500,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| All Other Analyzed Herbicides | CS | CS | CS | CS | CS | | | | | <RL | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **Pesticides** | | | | | | | | | | | | | | | | | |
| Aldrin | 309-00-2 | NA | NLL | NLL | 1,000 | NLL | 200,000 | 800,000 | 4,300 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Chlordane | 57-74-9 | NA | NLL | NLL | 31,000 | NLL | 4,200,000 | 21,000,000 | 150,000 | <25 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| 4-4'-DDD | 72-54-8 | NA | NLL | NLL | 95,000 | NLL | NLV | 56,000,000 | 400,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| 4-4'-DDE | 72-55-9 | NA | NLL | NLL | 45,000 | NLL | NLV | 40,000,000 | 190,000 | **64** | <20 | <20 | <20 | **45** | **54** | <20 | <20 |
| 4-4'-DDT | 50-29-3 | NA | NLL | NLL | 57,000 | NLL | NLV | 40,000,000 | 280,000 | **63** | <20 | <20 | <20 | **31** | **45** | <20 | <20 |
| Dieldrin | 60-57-1 | NA | NLL | NLL | 1,100 | NLL | 64,000 | 850,000 | 4,700 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Total Endosulfan | 115-29-7 | NA | NLL | NLL | 1,400,000 | NLL | ID | ID | 4,400,000 | <40 | <40 | <40 | <40 | <40 | <40 | <40 | <40 |
| Endrin | 72-20-8 | NA | NLL | NLL | 65,000 | NLL | NLV | ID | 190,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Endrin Aldehyde | 7421-93-4 | NA | NA | NA | NA | | | | | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor | 76-44-8 | NA | NLL | NLL | 5,600 | NLL | 210,000 | 3,000,000 | 23,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor epoxide | 1024-57-3 | NA | NLL | NLL | 3,100 | NLL | NLV | 1,500,000 | 9,500 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| alpha-Hexachlorocyclohexane | 319-84-6 | NA | 18 | ID | 2,600 | 71 | 41,000 | 2,100,000 | 12,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| beta-Hexachlorocyclohexane | 319-85-7 | NA | 37 | ID | 5,400 | 150 | NLV | 7,400,000 | 25,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Lindane | 58-89-9 | NA | 20 | 20 | 8,300 | 20 | ID | ID | 42,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Methoxychlor | 72-43-5 | NA | 16,000 | NA | 1,900,000 | 16,000 | ID | ID | 5,600,000 | <50 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| Toxaphene | 8001-35-2 | NA | 24,000 | 8,200 | 20,000 | 24,000 | NLV | 12,000,000 | 85,000 | <170 | <170 | <170 | <170 | <170 | <170 | <170 | <170 |
| All Other Analyzed Pesticides | CS | CS | CS | CS | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL | <RL |

Notes:
1. Concentrations reported in micrograms per kilogram (µg/kg).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.46, Table 2. Soil: Residential Part 201 Generic Cleanup Criteria and Screening Levels and the MDEQ Media-Specific Volatilization to Indoor Air Interim Action Screening Levels, August 2017.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds. PAHs - Polynuclear Aromatic Hydrocarbons. PCBs - Polychlorinated Biphenyl. Refer to the analytical report for the full list of VOC, PAH, and PCB analytes.
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit(s).
7. ID - Insufficient data to develop criteria.
8. NA - Not applicable.
9. NE - Not evaluated.
10. NLV - Not likely to volatilize.
11. NLL - Not likely to leach.
12. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water hardness value of 150 mg/kg as CaCO3 was used to calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
13. *Italicized* - the respective criterion was below the Statewide Default Background Level (SDBL) and therefore the value defaulted to the SDBL value.
14. ** - Total chromium results compared to the more restrictive hexavalent chromium criteria because chromium was not speciated.
15. Concentrations were also compared to, and found to be below, the soil saturation concentration screening levels and particulate soil inhalation criteria.

**TABLE 1**
**SUMMARY OF ANALYSIS RESULTS - SOIL**
**FORMER ROGELL GOLF COURSE**
**18600 and 18601 BERG ROAD**
**DETROIT, MICHIGAN**
**SME PROJECT NO. 077832.00.001.006**


| CONSTITUENT | Chemical Abstract Service Number | Statewide Default Background Levels | Part 201 Generic Residential Cleanup Criteria | | | CHEMICAL ANALYSIS RESULTS Sample Identification Depth (feet) Date Collected Area of Evaluation Parcel Address | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Direct Contact Criteria | SB3 | SB4 | SB9 | SB10 | SB15 | SB15 | SB18 |
| | | | | | | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 3 - 4 | 0 - 1 |
| | | | | | | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 |
| | | | | | | Former golf course - fairways | | | | | | |
| | | | | | | 18600 Berg Road | | | | | | |
| **VOCs** | | | | | | | | | | | | |
| All Analyzed VOCs | CS | NA | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE |
| **PAHs** | | | | | | | | | | | | |
| Fluoranthene | 206-44-0 | NA | 730,000 | 5,500 | 46,000,000 | NE | NE | NE | NE | NE | NE | NE |
| All Other Analyzed PAHs | CS | NA | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE |
| **PCBs** | | | | | | | | | | | | |
| Total of All Analyzed PCB Aroclors | CS | NA | CS | CS | 4,000 | NE | NE | NE | NE | NE | NE | NE |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 5,800 | *5,800* | *5,800* | 7,600 | **2,200** | **2,600** | **7,000** | **3,600** | **6,200** | **19,000** | **11,000** |
| Barium | 7440-39-3 | 75,000 | 1,300,000 | 440,000* | 37,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Cadmium | 7440-43-9 | 1,200 | 6,000 | 3,000* | 550,000 | NE | NE | NE | NE | NE | NE | NE |
| Chromium, Total** | 16065-83-1 | 18,000 | 1,000,000,000 | 1,000,000,000 | 790,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Chromium VI | 18540-29-9 | NA | 30,000 | 3,300 | 2,500,000 | NE | NE | NE | NE | NE | NE | NE |
| Copper | 7440-50-8 | 32,000 | 5,800,000 | 75,000* | 20,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Lead | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **28,000** | **17,000** | **21,000** | **16,000** | **14,000** | **5,000** | **13,000** |
| Lead, Total (Calculated) | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE | NE | NE |
| Lead, Coarse Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE | NE | NE |
| Lead, Fine Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE | NE | NE |
| Mercury | 7439-97-6 | 130 | 1,700 | *130* | 160,000 | **53** | <50 | **85** | **130** | **300** | <50 | **100** |
| Selenium | 7782-49-2 | 410 | 4,000 | *410* | 2,600,000 | NE | NE | NE | NE | NE | NE | NE |
| Silver | 7440-22-4 | 1,000 | 4,500 | *1,000* | 2,500,000 | NE | NE | NE | NE | NE | NE | NE |
| Zinc | 7440-66-6 | 47,000 | 2,400,000 | 170,000* | 170,000,000 | NE | NE | NE | NE | NE | NE | NE |
| **Herbicides** | | | | | | | | | | | | |
| Dalapon | 75-99-0 | NA | 4,000 | NA | 19,000,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Dicamba | 1918-00-9 | NA | 4,400 | NA | 3,400,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2,4-Dichlorophenoxyacetic acid | 94-75-7 | NA | 1,400 | 4,400 | 2,500,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| Dinoseb | 88-85-7 | NA | 300 | 200 | 66,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Silvex (2,4,5-TP) | 93-72-1 | NA | 3,600 | 2,200 | 1,700,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| All Other Analyzed Herbicides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **Pesticides** | | | | | | | | | | | | |
| Aldrin | 309-00-2 | NA | NLL | NLL | 1,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Chlordane | 57-74-9 | NA | NLL | NLL | 31,000 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| 4-4'-DDD | 72-54-8 | NA | NLL | NLL | 95,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| 4-4'-DDE | 72-55-9 | NA | NLL | NLL | 45,000 | <20 | <20 | <20 | <20 | **61** | <20 | <20 |
| 4-4'-DDT | 50-29-3 | NA | NLL | NLL | 57,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Dieldrin | 60-57-1 | NA | NLL | NLL | 1,100 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Total Endosulfan | 115-29-7 | NA | NLL | NLL | 1,400,000 | <40 | <40 | <40 | <40 | <40 | <40 | <40 |
| Endrin | 72-20-8 | NA | NLL | NLL | 65,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Endrin Aldehyde | 7421-93-4 | NA | NA | NA | NA | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor | 76-44-8 | NA | NLL | NLL | 5,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor epoxide | 1024-57-3 | NA | NLL | NLL | 3,100 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| alpha-Hexachlorocyclohexane | 319-84-6 | NA | 18 | ID | 2,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| beta-Hexachlorocyclohexane | 319-85-7 | NA | 37 | ID | 5,400 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Lindane | 58-89-9 | NA | 20 | 20 | 8,300 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Methoxychlor | 72-43-5 | NA | 16,000 | NA | 1,900,000 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| Toxaphene | 8001-35-2 | NA | 24,000 | 8,200 | 20,000 | <170 | <170 | <170 | <170 | <170 | <170 | <170 |
| All Other Analyzed Pesticides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |

Notes:
1. Concentrations reported in micrograms per kilogram (µg/kg).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.46, Table 2. Soil: Residential Par
   the MDEQ Media-Specific Volatilization to Indoor Air Interim Action Screening Levels, August 2017.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds. PAHs - Polynuclear Aromatic Hydrocarbons. PCBs - Polychlorinated Biphenyl. Refer to th
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit(s).
7. ID - Insufficient data to develop criteria.
8. NA - Not applicable.
9. NE - Not evaluated.
10. NLV - Not likely to volatilize.
11. NLL - Not likely to leach.
12. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water ha
    calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
13. *Italicized* - the respective criterion was below the Statewide Default Background Level (SDBL) and therefore the value defaulte
14. ** - Total chromium results compared to the more restrictive hexavalent chromium criteria because chromium was not speciate
15. Concentrations were also compared to, and found to be below, the soil saturation concentration screening levels and particulat

**TABLE 1**
**SUMMARY OF ANALYSIS RESULTS - SOIL**
**FORMER ROGELL GOLF COURSE**
**18600 and 18601 BERG ROAD**
**DETROIT, MICHIGAN**
**SME PROJECT NO. 077832.00.001.006**


| CONSTITUENT | Chemical Abstract Service Number | Statewide Default Background Levels | Part 201 Generic Residential Cleanup Criteria | | | CHEMICAL ANALYSIS RESULTS Sample Identification Depth (feet) Date Collected Area of Evaluation Parcel Address | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Direct Contact Criteria | SB19 | SB22 | SB23 | SB28 | SB29 | Duplicate-03 | SB34 |
| | | | | | | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | SB29 (0 - 1) | 0 - 1 |
| | | | | | | 1/11/18 | 1/11/18 | 1/11/18 | 1/12/18 | 1/12/18 | 1/12/18 | 1/11/18 |
| | | | | | | Former golf course - fairways | | | | | | |
| | | | | | | 18600 Berg Road | | | | | | 18601 Berg Road |
| **VOCs** | | | | | | | | | | | | |
| All Analyzed VOCs | CS | NA | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE |
| **PAHs** | | | | | | | | | | | | |
| Fluoranthene | 206-44-0 | NA | 730,000 | 5,500 | 46,000,000 | NE | NE | NE | NE | NE | NE | NE |
| All Other Analyzed PAHs | CS | NA | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE |
| **PCBs** | | | | | | | | | | | | |
| Total of All Analyzed PCB Aroclors | CS | NA | CS | CS | 4,000 | NE | NE | NE | NE | NE | NE | NE |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 5,800 | *5,800* | *5,800* | 7,600 | **7,700** | **2,800** | **2,100** | **13,000** | **3,400** | **3,300** | **3,900** |
| Barium | 7440-39-3 | 75,000 | 1,300,000 | 440,000* | 37,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Cadmium | 7440-43-9 | 1,200 | 6,000 | 3,000* | 550,000 | NE | NE | NE | NE | NE | NE | NE |
| Chromium, Total** | 16065-83-1 | 18,000 | 1,000,000,000 | 1,000,000,000 | 790,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Chromium VI | 18540-29-9 | NA | 30,000 | 3,300 | 2,500,000 | NE | NE | NE | NE | NE | NE | NE |
| Copper | 7440-50-8 | 32,000 | 5,800,000 | 75,000* | 20,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Lead | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **30,000** | **9,100** | **13,000** | **41,000** | **8,400** | **11,000** | **18,000** |
| Lead, Total (Calculated) | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE | NE | NE |
| Lead, Coarse Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE | NE | NE |
| Lead, Fine Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE | NE | NE |
| Mercury | 7439-97-6 | 130 | 1,700 | *130* | 160,000 | **580** | <50 | <50 | **1,500** | <50 | **63** | **170** |
| Selenium | 7782-49-2 | 410 | 4,000 | *410* | 2,600,000 | NE | NE | NE | NE | NE | NE | NE |
| Silver | 7440-22-4 | 1,000 | 4,500 | *1,000* | 2,500,000 | NE | NE | NE | NE | NE | NE | NE |
| Zinc | 7440-66-6 | 47,000 | 2,400,000 | 170,000* | 170,000,000 | NE | NE | NE | NE | NE | NE | NE |
| **Herbicides** | | | | | | | | | | | | |
| Dalapon | 75-99-0 | NA | 4,000 | NA | 19,000,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Dicamba | 1918-00-9 | NA | 4,400 | NA | 3,400,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2,4-Dichlorophenoxyacetic acid | 94-75-7 | NA | 1,400 | 4,400 | 2,500,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| Dinoseb | 88-85-7 | NA | 300 | 200 | 66,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Silvex (2,4,5-TP) | 93-72-1 | NA | 3,600 | 2,200 | 1,700,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| All Other Analyzed Herbicides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **Pesticides** | | | | | | | | | | | | |
| Aldrin | 309-00-2 | NA | NLL | NLL | 1,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Chlordane | 57-74-9 | NA | NLL | NLL | 31,000 | <25 | <25 | <25 | <25 | <25 | <25 | <25 |
| 4-4'-DDD | 72-54-8 | NA | NLL | NLL | 95,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| 4-4'-DDE | 72-55-9 | NA | NLL | NLL | 45,000 | **23** | <20 | <20 | <20 | <20 | <20 | <20 |
| 4-4'-DDT | 50-29-3 | NA | NLL | NLL | 57,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Dieldrin | 60-57-1 | NA | NLL | NLL | 1,100 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Total Endosulfan | 115-29-7 | NA | NLL | NLL | 1,400,000 | <40 | <40 | <40 | <40 | <40 | <40 | <40 |
| Endrin | 72-20-8 | NA | NLL | NLL | 65,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Endrin Aldehyde | 7421-93-4 | NA | NA | NA | NA | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor | 76-44-8 | NA | NLL | NLL | 5,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor epoxide | 1024-57-3 | NA | NLL | NLL | 3,100 | <20 | <20 | <20 | <20 | <20 | **46** | <20 |
| alpha-Hexachlorocyclohexane | 319-84-6 | NA | 18 | ID | 2,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| beta-Hexachlorocyclohexane | 319-85-7 | NA | 37 | ID | 5,400 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Lindane | 58-89-9 | NA | 20 | 20 | 8,300 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Methoxychlor | 72-43-5 | NA | 16,000 | NA | 1,900,000 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| Toxaphene | 8001-35-2 | NA | 24,000 | 8,200 | 20,000 | <170 | <170 | <170 | <170 | <170 | <170 | <170 |
| All Other Analyzed Pesticides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |

Notes:
1. Concentrations reported in micrograms per kilogram (µg/kg).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.46, Table 2. Soil: Residential Par the MDEQ Media-Specific Volatilization to Indoor Air Interim Action Screening Levels, August 2017.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds. PAHs - Polynuclear Aromatic Hydrocarbons. PCBs - Polychlorinated Biphenyl. Refer to th
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit(s).
7. ID - Insufficient data to develop criteria.
8. NA - Not applicable.
9. NE - Not evaluated.
10. NLV - Not likely to volatilize.
11. NLL - Not likely to leach.
12. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water h calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
13. *Italicized* - the respective criterion was below the Statewide Default Background Level (SDBL) and therefore the value defaulte
14. ** - Total chromium results compared to the more restrictive hexavalent chromium criteria because chromium was not speciate
15. Concentrations were also compared to, and found to be below, the soil saturation concentration screening levels and particulat

**TABLE 1**
**SUMMARY OF ANALYSIS RESULTS - SOIL**
**FORMER ROGELL GOLF COURSE**
**18600 and 18601 BERG ROAD**
**DETROIT, MICHIGAN**
**SME PROJECT NO. 077832.00.001.006**


| CONSTITUENT | Chemical Abstract Service Number | Statewide Default Background Levels | Part 201 Generic Residential Cleanup Criteria | | | CHEMICAL ANALYSIS RESULTS Sample Identification Depth (feet) Date Collected Area of Evaluation Parcel Address | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Direct Contact Criteria | SB5 | SB6 | SB11 | SB12 | SB16 | SB17 | SB20 |
| | | | | | | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 |
| | | | | | | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 | 1/11/18 |
| | | | | | | Former golf course -greens | | | | | | |
| | | | | | | 18600 Berg Road | | | | | | |
| **VOCs** | | | | | | | | | | | | |
| All Analyzed VOCs | CS | NA | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE |
| **PAHs** | | | | | | | | | | | | |
| Fluoranthene | 206-44-0 | NA | 730,000 | 5,500 | 46,000,000 | NE | NE | NE | NE | NE | NE | NE |
| All Other Analyzed PAHs | CS | NA | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE |
| **PCBs** | | | | | | | | | | | | |
| Total of All Analyzed PCB Aroclors | CS | NA | CS | CS | 4,000 | NE | NE | NE | NE | NE | NE | NE |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 5,800 | *5,800* | *5,800* | 7,600 | **11,000** | **100,000** | **330,000** | **100,000** | **36,000** | **14,000** | **150,000** |
| Barium | 7440-39-3 | 75,000 | 1,300,000 | 440,000* | 37,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Cadmium | 7440-43-9 | 1,200 | 6,000 | 3,000* | 550,000 | NE | NE | NE | NE | NE | NE | NE |
| Chromium, Total** | 16065-83-1 | 18,000 | 1,000,000,000 | 1,000,000,000 | 790,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Chromium VI | 18540-29-9 | NA | 30,000 | 3,300 | 2,500,000 | NE | NE | NE | NE | NE | NE | NE |
| Copper | 7440-50-8 | 32,000 | 5,800,000 | 75,000* | 20,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Lead | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **28,000** | **360,000** | **1,100,000** | **380,000** | **83,000** | **49,000** | **640,000** |
| Lead, Total (Calculated) | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | **327,000** | **1,020,000** | NE | NE | NE | **655,000** |
| Lead, Coarse Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | **338,000** | **1,080,000** | NE | NE | NE | **690,000** |
| Lead, Fine Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | **253,000** | **752,000** | NE | NE | NE | **257,000** |
| Mercury | 7439-97-6 | 130 | 1,700 | *130* | 160,000 | **6,800** | **51,000** | **120,000** | **67,000** | **27,000** | **12,000** | **130,000** |
| Selenium | 7782-49-2 | 410 | 4,000 | *410* | 2,600,000 | NE | NE | NE | NE | NE | NE | NE |
| Silver | 7440-22-4 | 1,000 | 4,500 | *1,000* | 2,500,000 | NE | NE | NE | NE | NE | NE | NE |
| Zinc | 7440-66-6 | 47,000 | 2,400,000 | 170,000* | 170,000,000 | NE | NE | NE | NE | NE | NE | NE |
| **Herbicides** | | | | | | | | | | | | |
| Dalapon | 75-99-0 | NA | 4,000 | NA | 19,000,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Dicamba | 1918-00-9 | NA | 4,400 | NA | 3,400,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2,4-Dichlorophenoxyacetic acid | 94-75-7 | NA | 1,400 | 4,400 | 2,500,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| Dinoseb | 88-85-7 | NA | 300 | 200 | 66,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Silvex (2,4,5-TP) | 93-72-1 | NA | 3,600 | 2,200 | 1,700,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| All Other Analyzed Herbicides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **Pesticides** | | | | | | | | | | | | |
| Aldrin | 309-00-2 | NA | NLL | NLL | 1,000 | <20 | **370** | <20 | **32** | <20 | <20 | <20 |
| Chlordane | 57-74-9 | NA | NLL | NLL | 31,000 | **2,200** | **10,000** | **2,700** | **5,600** | **3,100** | **740** | **12,000** |
| 4-4'-DDD | 72-54-8 | NA | NLL | NLL | 95,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| 4-4'-DDE | 72-55-9 | NA | NLL | NLL | 45,000 | **58** | <83 | <20 | <20 | **72** | **48** | **160** |
| 4-4'-DDT | 50-29-3 | NA | NLL | NLL | 57,000 | <39 | <83 | <20 | <20 | <20 | **25** | <20 |
| Dieldrin | 60-57-1 | NA | NLL | NLL | 1,100 | **570** | **1,900** | **1,100** | **2,700** | **1,300** | **160** | **1,100** |
| Total Endosulfan | 115-29-7 | NA | NLL | NLL | 1,400,000 | <40 | <40 | <40 | <40 | <40 | <40 | <40 |
| Endrin | 72-20-8 | NA | NLL | NLL | 65,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Endrin Aldehyde | 7421-93-4 | NA | NA | NA | NA | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor | 76-44-8 | NA | NLL | NLL | 5,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor epoxide | 1024-57-3 | NA | NLL | NLL | 3,100 | **42** | <83 | **88** | **90** | <20 | <20 | **160** |
| alpha-Hexachlorocyclohexane | 319-84-6 | NA | 18 | ID | 2,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| beta-Hexachlorocyclohexane | 319-85-7 | NA | 37 | ID | 5,400 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Lindane | 58-89-9 | NA | 20 | 20 | 8,300 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Methoxychlor | 72-43-5 | NA | 16,000 | NA | 1,900,000 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| Toxaphene | 8001-35-2 | NA | 24,000 | 8,200 | 20,000 | <170 | <170 | <170 | <170 | <170 | <170 | <170 |
| All Other Analyzed Pesticides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |

Notes:
1. Concentrations reported in micrograms per kilogram (µg/kg).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.46, Table 2. Soil: Residential Par the MDEQ Media-Specific Volatilization to Indoor Air Interim Action Screening Levels, August 2017.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds. PAHs - Polynuclear Aromatic Hydrocarbons. PCBs - Polychlorinated Biphenyl. Refer to th
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit(s).
7. ID - Insufficient data to develop criteria.
8. NA - Not applicable.
9. NE - Not evaluated.
10. NLV - Not likely to volatilize.
11. NLL - Not likely to leach.
12. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water ha calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
13. *Italicized* - the respective criterion was below the Statewide Default Background Level (SDBL) and therefore the value defaulte
14. ** - Total chromium results compared to the more restrictive hexavalent chromium criteria because chromium was not speciate
15. Concentrations were also compared to, and found to be below, the soil saturation concentration screening levels and particulat

# TABLE 1
## SUMMARY OF ANALYSIS RESULTS - SOIL
## FORMER ROGELL GOLF COURSE
## 18600 and 18601 BERG ROAD
## DETROIT, MICHIGAN
## SME PROJECT NO. 077832.00.001.006


| CONSTITUENT | Chemical Abstract Service Number | Statewide Default Background Levels | Part 201 Generic Residential Cleanup Criteria | | | CHEMICAL ANALYSIS RESULTS Sample Identification Depth (feet) Date Collected Area of Evaluation Parcel Address | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Direct Contact Criteria | SB21 | SB24 | SB25 | SB30 | SB31 | SB32 | Duplicate-02 |
| | | | | | | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 | SB32 (0 - 1) |
| | | | | | | 1/11/18 | 1/12/18 | 1/12/18 | 1/12/18 | 1/12/18 | 1/11/18 | 1/11/18 |
| | | | | | | Former golf course -greens | | | | | | |
| | | | | | | 18600 Berg Road | | | | | 18601 Berg Road | |
| **VOCs** | | | | | | | | | | | | |
| All Analyzed VOCs | CS | NA | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE |
| **PAHs** | | | | | | | | | | | | |
| Fluoranthene | 206-44-0 | NA | 730,000 | 5,500 | 46,000,000 | NE | NE | NE | NE | NE | NE | NE |
| All Other Analyzed PAHs | CS | NA | CS | CS | CS | NE | NE | NE | NE | NE | NE | NE |
| **PCBs** | | | | | | | | | | | | |
| Total of All Analyzed PCB Aroclors | CS | NA | CS | CS | 4,000 | NE | NE | NE | NE | NE | NE | NE |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 5,800 | *5,800* | *5,800* | 7,600 | **130,000** | **19,000** | **6,100** | **78,000** | **270,000** | **120,000** | **210,000** |
| Barium | 7440-39-3 | 75,000 | 1,300,000 | 440,000* | 37,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Cadmium | 7440-43-9 | 1,200 | 6,000 | 3,000* | 550,000 | NE | NE | NE | NE | NE | NE | NE |
| Chromium, Total** | 16065-83-1 | 18,000 | 1,000,000,000 | 1,000,000,000 | 790,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Chromium VI | 18540-29-9 | NA | 30,000 | 3,300 | 2,500,000 | NE | NE | NE | NE | NE | NE | NE |
| Copper | 7440-50-8 | 32,000 | 5,800,000 | 75,000* | 20,000,000 | NE | NE | NE | NE | NE | NE | NE |
| Lead | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **310,000** | **56,000** | **34,000** | **310,000** | **1,200,000** | **580,000** | **400,000** |
| Lead, Total (Calculated) | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | **379,000** | NE | NE |
| Lead, Coarse Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | **386,000** | NE | NE |
| Lead, Fine Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | **347,000** | NE | NE |
| Mercury | 7439-97-6 | 130 | 1,700 | *130* | 160,000 | **160,000** | **9,700** | **380** | **51,000** | **71,000** | **78,000** | **91,000** |
| Selenium | 7782-49-2 | 410 | 4,000 | *410* | 2,600,000 | NE | NE | NE | NE | NE | NE | NE |
| Silver | 7440-22-4 | 1,000 | 4,500 | *1,000* | 2,500,000 | NE | NE | NE | NE | NE | NE | NE |
| Zinc | 7440-66-6 | 47,000 | 2,400,000 | 170,000* | 170,000,000 | NE | NE | NE | NE | NE | NE | NE |
| **Herbicides** | | | | | | | | | | | | |
| Dalapon | 75-99-0 | NA | 4,000 | NA | 19,000,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Dicamba | 1918-00-9 | NA | 4,400 | NA | 3,400,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2,4-Dichlorophenoxyacetic acid | 94-75-7 | NA | 1,400 | 4,400 | 2,500,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| Dinoseb | 88-85-7 | NA | 300 | 200 | 66,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Silvex (2,4,5-TP) | 93-72-1 | NA | 3,600 | 2,200 | 1,700,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| All Other Analyzed Herbicides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **Pesticides** | | | | | | | | | | | | |
| Aldrin | 309-00-2 | NA | NLL | NLL | 1,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Chlordane | 57-74-9 | NA | NLL | NLL | 31,000 | **6,200** | <25 | <25 | **12,000** | **5,200** | **2,100** | **3,100** |
| 4-4'-DDD | 72-54-8 | NA | NLL | NLL | 95,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| 4-4'-DDE | 72-55-9 | NA | NLL | NLL | 45,000 | **85** | <20 | <20 | **130** | **79** | **30** | **30** |
| 4-4'-DDT | 50-29-3 | NA | NLL | NLL | 57,000 | <46 | <20 | <20 | <20 | **63** | <20 | <20 |
| Dieldrin | 60-57-1 | NA | NLL | NLL | 1,100 | **1,200** | <20 | <20 | **2,800** | **2,100** | **760** | **1,200** |
| Total Endosulfan | 115-29-7 | NA | NLL | NLL | 1,400,000 | <40 | <40 | <40 | <40 | <40 | <40 | <40 |
| Endrin | 72-20-8 | NA | NLL | NLL | 65,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Endrin Aldehyde | 7421-93-4 | NA | NA | NA | NA | <20 | <20 | <20 | **26** | <20 | <20 | <20 |
| Heptachlor | 76-44-8 | NA | NLL | NLL | 5,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor epoxide | 1024-57-3 | NA | NLL | NLL | 3,100 | **130** | <20 | <20 | **78** | **57** | **39** | **46** |
| alpha-Hexachlorocyclohexane | 319-84-6 | NA | 18 | ID | 2,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| beta-Hexachlorocyclohexane | 319-85-7 | NA | 37 | ID | 5,400 | <20 | <20 | <20 | **41** | <20 | <20 | <20 |
| Lindane | 58-89-9 | NA | 20 | 20 | 8,300 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Methoxychlor | 72-43-5 | NA | 16,000 | NA | 1,900,000 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| Toxaphene | 8001-35-2 | NA | 24,000 | 8,200 | 20,000 | <170 | <170 | <170 | <170 | <170 | <170 | <170 |
| All Other Analyzed Pesticides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |

Notes:
1. Concentrations reported in micrograms per kilogram (µg/kg).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.46, Table 2. Soil: Residential Par the MDEQ Media-Specific Volatilization to Indoor Air Interim Action Screening Levels, August 2017.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds. PAHs - Polynuclear Aromatic Hydrocarbons. PCBs - Polychlorinated Biphenyl. Refer to th
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit(s).
7. ID - Insufficient data to develop criteria.
8. NA - Not applicable.
9. NE - Not evaluated.
10. NLV - Not likely to volatilize.
11. NLL - Not likely to leach.
12. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water ha calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
13. *Italicized* - the respective criterion was below the Statewide Default Background Level (SDBL) and therefore the value defaulte
14. ** - Total chromium results compared to the more restrictive hexavalent chromium criteria because chromium was not speciate
15. Concentrations were also compared to, and found to be below, the soil saturation concentration screening levels and particulat

| CONSTITUENT | Chemical Abstract Service Number | Statewide Default Background Levels | Part 201 Generic Residential Cleanup Criteria | | | CHEMICAL ANALYSIS RESULTS Sample Identification Depth (feet) Date Collected Area of Evaluation Parcel Address | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Direct Contact Criteria | SB33 | SB35 | SB36 | SB38 | SB39 | Duplicate-01 | SB40 |
| | | | | | | 0 - 1 | 0 - 1 | 0 - 1 | 1 - 2 | 1 - 3 | SB39 (1 - 3) | 1 - 2 |
| | | | | | | 1/11/18 | 1/11/18 | 1/11/18 | 1/10/18 | 1/10/18 | 1/10/18 | 1/10/18 |
| | | | | | | Former golf course - greens | | | Soil Mound | | | |
| | | | | | | 18601 Berg Road | | | 18600 Berg Road | | | |
| **VOCs** | | | | | | | | | | | | |
| All Analyzed VOCs | CS | NA | CS | CS | CS | NE | NE | NE | <RL | <RL | <RL | <RL |
| **PAHs** | | | | | | | | | | | | |
| Fluoranthene | 206-44-0 | NA | 730,000 | 5,500 | 46,000,000 | NE | NE | NE | <330 | **330** | <330 | <330 |
| All Other Analyzed PAHs | CS | NA | CS | CS | CS | NE | NE | NE | <RL | <RL | <RL | <RL |
| **PCBs** | | | | | | | | | | | | |
| Total of All Analyzed PCB Aroclors | CS | NA | CS | CS | 4,000 | NE | NE | NE | <RL | <RL | <RL | <RL |
| **Metals** | | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 5,800 | *5,800* | *5,800* | 7,600 | **120,000** | **6,000** | **10,000** | **5,100** | **8,600** | **11,000** | **4,800** |
| Barium | 7440-39-3 | 75,000 | 1,300,000 | 440,000* | 37,000,000 | NE | NE | NE | **23,000** | **58,000** | **49,000** | **31,000** |
| Cadmium | 7440-43-9 | 1,200 | 6,000 | 3,000* | 550,000 | NE | NE | NE | **240** | **420** | **350** | **330** |
| Chromium, Total** | 16065-83-1 | 18,000 | 1,000,000,000 | 1,000,000,000 | 790,000,000 | NE | NE | NE | **9,000** | **24,000** | **18,000** | **11,000** |
| Chromium VI | 18540-29-9 | NA | 30,000 | 3,300 | 2,500,000 | NE | NE | NE | NE | <2,300 | NE | NE |
| Copper | 7440-50-8 | 32,000 | 5,800,000 | 75,000* | 20,000,000 | NE | NE | NE | **10,000** | **15,000** | **12,000** | **8,100** |
| Lead | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **580,000** | **38,000** | **52,000** | **27,000** | **40,000** | **48,000** | **19,000** |
| Lead, Total (Calculated) | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **631,000** | NE | NE | NE | NE | NE | NE |
| Lead, Coarse Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **641,000** | NE | NE | NE | NE | NE | NE |
| Lead, Fine Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **499,000** | NE | NE | NE | NE | NE | NE |
| Mercury | 7439-97-6 | 130 | 1,700 | *130* | 160,000 | **120,000** | **12,000** | **20,000** | **200** | **120** | **110** | **330** |
| Selenium | 7782-49-2 | 410 | 4,000 | *410* | 2,600,000 | NE | NE | NE | **220** | **380** | **390** | **330** |
| Silver | 7440-22-4 | 1,000 | 4,500 | *1,000* | 2,500,000 | NE | NE | NE | <100 | <100 | <100 | <100 |
| Zinc | 7440-66-6 | 47,000 | 2,400,000 | 170,000* | 170,000,000 | NE | NE | NE | **43,000** | **60,000** | **64,000** | **36,000** |
| **Herbicides** | | | | | | | | | | | | |
| Dalapon | 75-99-0 | NA | 4,000 | NA | 19,000,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Dicamba | 1918-00-9 | NA | 4,400 | NA | 3,400,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| 2,4-Dichlorophenoxyacetic acid | 94-75-7 | NA | 1,400 | 4,400 | 2,500,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| Dinoseb | 88-85-7 | NA | 300 | 200 | 66,000 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| Silvex (2,4,5-TP) | 93-72-1 | NA | 3,600 | 2,200 | 1,700,000 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| All Other Analyzed Herbicides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **Pesticides** | | | | | | | | | | | | |
| Aldrin | 309-00-2 | NA | NLL | NLL | 1,000 | **27** | <20 | <20 | <20 | <20 | <20 | <20 |
| Chlordane | 57-74-9 | NA | NLL | NLL | 31,000 | **7,400** | **700** | **1,500** | **650** | **800** | <25 | **610** |
| 4-4'-DDD | 72-54-8 | NA | NLL | NLL | 95,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| 4-4'-DDE | 72-55-9 | NA | NLL | NLL | 45,000 | **90** | <20 | **36** | **140** | **1,000** | <20 | **53** |
| 4-4'-DDT | 50-29-3 | NA | NLL | NLL | 57,000 | **58** | <20 | <20 | **92** | **880** | <20 | **120** |
| Dieldrin | 60-57-1 | NA | NLL | NLL | 1,100 | **2,200** | **500** | **980** | <20 | <20 | <20 | **110** |
| Total Endosulfan | 115-29-7 | NA | NLL | NLL | 1,400,000 | <40 | <40 | <40 | <40 | <40 | <40 | <40 |
| Endrin | 72-20-8 | NA | NLL | NLL | 65,000 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Endrin Aldehyde | 7421-93-4 | NA | NA | NA | NA | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor | 76-44-8 | NA | NLL | NLL | 5,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Heptachlor epoxide | 1024-57-3 | NA | NLL | NLL | 3,100 | **95** | <20 | <20 | <20 | <20 | <20 | <20 |
| alpha-Hexachlorocyclohexane | 319-84-6 | NA | 18 | ID | 2,600 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| beta-Hexachlorocyclohexane | 319-85-7 | NA | 37 | ID | 5,400 | <20 | <20 | **28** | <20 | <20 | <20 | <20 |
| Lindane | 58-89-9 | NA | 20 | 20 | 8,300 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Methoxychlor | 72-43-5 | NA | 16,000 | NA | 1,900,000 | <50 | <50 | <50 | <50 | <50 | <50 | <50 |
| Toxaphene | 8001-35-2 | NA | 24,000 | 8,200 | 20,000 | <170 | <170 | <170 | <170 | <170 | <170 | <170 |
| All Other Analyzed Pesticides | CS | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |

Notes:
1. Concentrations reported in micrograms per kilogram (µg/kg).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.46, Table 2. Soil: Residential Par the MDEQ Media-Specific Volatilization to Indoor Air Interim Action Screening Levels, August 2017.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds. PAHs - Polynuclear Aromatic Hydrocarbons. PCBs - Polychlorinated Biphenyl. Refer to th
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit(s).
7. ID - Insufficient data to develop criteria.
8. NA - Not applicable.
9. NE - Not evaluated.
10. NLV - Not likely to volatilize.
11. NLL - Not likely to leach.
12. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water ha calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
13. *Italicized* - the respective criterion was below the Statewide Default Background Level (SDBL) and therefore the value defaulte
14. ** - Total chromium results compared to the more restrictive hexavalent chromium criteria because chromium was not speciate
15. Concentrations were also compared to, and found to be below, the soil saturation concentration screening levels and particulat

**TABLE 1**
**SUMMARY OF ANALYSIS RESULTS - SOIL**
**FORMER ROGELL GOLF COURSE**
**18600 and 18601 BERG ROAD**
**DETROIT, MICHIGAN**
**SME PROJECT NO. 077832.00.001.006**


| CONSTITUENT | Chemical Abstract Service Number | Statewide Default Background Levels | Part 201 Generic Residential Cleanup Criteria | | | CHEMICAL ANALYSIS RESULTS Sample Identification Depth (feet) Date Collected Area of Evaluation Parcel Address | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Direct Contact Criteria | SB41 | SB42 | SB43 | SB44 | SB45 | SB46 | SB47 | SB48 |
| | | | | | | 10 - 11 | 10 - 11 | 10 - 11 | 10 - 11 | 0 - 1 | 0 - 1 | 0 - 1 | 0 - 1 |
| | | | | | | 1/10/18 | 1/10/18 | 1/10/18 | 1/10/18 | 1/10/18 | 1/10/18 | 1/10/18 | 1/10/18 |
| | | | | | | Former LUST area and gasoline and diesel ASTs area | | | Drum storage, former diesel AST area, and former excavation area | Drums of unknown content | | | |
| | | | | | | 18600 Berg Road | | | | | | | |
| **VOCs** | | | | | | | | | | | | | |
| All Analyzed VOCs | CS | NA | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **PAHs** | | | | | | | | | | | | | |
| Fluoranthene | 206-44-0 | NA | 730,000 | 5,500 | 46,000,000 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 |
| All Other Analyzed PAHs | CS | NA | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **PCBs** | | | | | | | | | | | | | |
| Total of All Analyzed PCB Aroclors | CS | NA | CS | CS | 4,000 | NE | NE | NE | <RL | NE | NE | NE | NE |
| **Metals** | | | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 5,800 | *5,800* | *5,800* | 7,600 | **2,600** | **1,900** | **2,700** | **3,800** | **20,000** | **5,100** | **8,600** | **2,800** |
| Barium | 7440-39-3 | 75,000 | 1,300,000 | 440,000* | 37,000,000 | **4,800** | **6,100** | **6,000** | **15,000** | **150,000** | **21,000** | **36,000** | **16,000** |
| Cadmium | 7440-43-9 | 1,200 | 6,000 | 3,000* | 550,000 | <50 | **62** | **62** | **110** | **7,300** | **350** | **440** | **150** |
| Chromium, Total** | 16065-83-1 | 18,000 | 1,000,000,000 | 1,000,000,000 | 790,000,000 | **2,900** | **3,900** | **3,000** | **7,700** | **110,000** | **10,000** | **11,000** | **4,800** |
| Chromium VI | 18540-29-9 | NA | 30,000 | 3,300 | 2,500,000 | NE | NE | NE | NE | <2,300 | NE | NE | NE |
| Copper | 7440-50-8 | 32,000 | 5,800,000 | 75,000* | 20,000,000 | **3,000** | **4,400** | **2,900** | **6,700** | **44,000** | **6,600** | **13,000** | **3,000** |
| Lead | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **1,600** | **2,200** | **1,500** | **4,800** | **260,000** | **18,000** | **44,000** | **5,400** |
| Lead, Total (Calculated) | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | **125,000** | NE | NE | NE |
| Lead, Coarse Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | **126,000** | NE | NE | NE |
| Lead, Fine Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | **116,000** | NE | NE | NE |
| Mercury | 7439-97-6 | 130 | 1,700 | *130* | 160,000 | <50 | <50 | <50 | <50 | **4,000** | **260** | **880** | **150** |
| Selenium | 7782-49-2 | 410 | 4,000 | *410* | 2,600,000 | <200 | <200 | <200 | <200 | **810** | <200 | **300** | <200 |
| Silver | 7440-22-4 | 1,000 | 4,500 | *1,000* | 2,500,000 | <100 | <100 | <100 | <100 | **660** | <100 | <100 | <100 |
| Zinc | 7440-66-6 | 47,000 | 2,400,000 | 170,000* | 170,000,000 | **8,300** | **12,000** | **8,400** | **22,000** | **280,000** | **67,000** | **52,000** | **83,000** |
| **Herbicides** | | | | | | | | | | | | | |
| Dalapon | 75-99-0 | NA | 4,000 | NA | 19,000,000 | NE | NE | NE | <100 | <100 | <100 | <100 | <100 |
| Dicamba | 1918-00-9 | NA | 4,400 | NA | 3,400,000 | NE | NE | NE | <100 | <100 | <100 | <100 | <100 |
| 2,4-Dichlorophenoxyacetic acid | 94-75-7 | NA | 1,400 | 4,400 | 2,500,000 | NE | NE | NE | <200 | <200 | <200 | <200 | <200 |
| Dinoseb | 88-85-7 | NA | 300 | 200 | 66,000 | NE | NE | NE | <100 | <100 | <100 | <100 | <100 |
| Silvex (2,4,5-TP) | 93-72-1 | NA | 3,600 | 2,200 | 1,700,000 | NE | NE | NE | <200 | <200 | <200 | <200 | <200 |
| All Other Analyzed Herbicides | CS | CS | CS | CS | CS | NE | NE | NE | <RL | <RL | <RL | <RL | <RL |
| **Pesticides** | | | | | | | | | | | | | |
| Aldrin | 309-00-2 | NA | NLL | NLL | 1,000 | NE | NE | NE | <20 | <20 | <20 | <20 | <20 |
| Chlordane | 57-74-9 | NA | NLL | NLL | 31,000 | NE | NE | NE | <25 | <30 | <25 | <25 | <25 |
| 4-4'-DDD | 72-54-8 | NA | NLL | NLL | 95,000 | NE | NE | NE | <20 | **160** | <20 | <20 | <20 |
| 4-4'-DDE | 72-55-9 | NA | NLL | NLL | 45,000 | NE | NE | NE | <20 | **710** | **44** | <20 | <20 |
| 4-4'-DDT | 50-29-3 | NA | NLL | NLL | 57,000 | NE | NE | NE | <20 | **130** | **50** | <20 | <20 |
| Dieldrin | 60-57-1 | NA | NLL | NLL | 1,100 | NE | NE | NE | <20 | <20 | <20 | **150** | <20 |
| Total Endosulfan | 115-29-7 | NA | NLL | NLL | 1,400,000 | NE | NE | NE | <40 | <40 | <40 | <40 | <40 |
| Endrin | 72-20-8 | NA | NLL | NLL | 65,000 | NE | NE | NE | <20 | <20 | <20 | <20 | <20 |
| Endrin Aldehyde | 7421-93-4 | NA | NA | NA | NA | NE | NE | NE | <20 | <20 | <20 | <20 | <20 |
| Heptachlor | 76-44-8 | NA | NLL | NLL | 5,600 | NE | NE | NE | <20 | <20 | <20 | <20 | <20 |
| Heptachlor epoxide | 1024-57-3 | NA | NLL | NLL | 3,100 | NE | NE | NE | <20 | <20 | <20 | <20 | <20 |
| alpha-Hexachlorocyclohexane | 319-84-6 | NA | 18 | ID | 2,600 | NE | NE | NE | <20 | <20 | <20 | <20 | <20 |
| beta-Hexachlorocyclohexane | 319-85-7 | NA | 37 | ID | 5,400 | NE | NE | NE | <20 | <20 | <20 | <20 | <20 |
| Lindane | 58-89-9 | NA | 20 | 20 | 8,300 | NE | NE | NE | <20 | <20 | <20 | <20 | <20 |
| Methoxychlor | 72-43-5 | NA | 16,000 | NA | 1,900,000 | NE | NE | NE | <50 | <50 | <50 | <50 | <50 |
| Toxaphene | 8001-35-2 | NA | 24,000 | 8,200 | 20,000 | NE | NE | NE | <170 | <170 | <170 | <170 | <170 |
| All Other Analyzed Pesticides | CS | CS | CS | CS | CS | NE | NE | NE | <RL | <RL | <RL | <RL | <RL |

Notes:
1. Concentrations reported in micrograms per kilogram (µg/kg).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.46, Table 2. Soil: Residential Par the MDEQ Media-Specific Volatilization to Indoor Air Interim Action Screening Levels, August 2017.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds. PAHs - Polynuclear Aromatic Hydrocarbons. PCBs - Polychlorinated Biphenyl. Refer to th
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit(s).
7. ID - Insufficient data to develop criteria.
8. NA - Not applicable.
9. NE - Not evaluated.
10. NLV - Not likely to volatilize.
11. NLL - Not likely to leach.
12. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water ha calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
13. *Italicized* - the respective criterion was below the Statewide Default Background Level (SDBL) and therefore the value defaulte
14. ** - Total chromium results compared to the more restrictive hexavalent chromium criteria because chromium was not speciate
15. Concentrations were also compared to, and found to be below, the soil saturation concentration screening levels and particulat

**TABLE 1**
**SUMMARY OF ANALYSIS RESULTS - SOIL**
**FORMER ROGELL GOLF COURSE**
**18600 and 18601 BERG ROAD**
**DETROIT, MICHIGAN**
**SME PROJECT NO. 077832.00.001.006**


| CONSTITUENT | Chemical Abstract Service Number | Statewide Default Background Levels | Part 201 Generic Residential Cleanup Criteria | | | CHEMICAL ANALYSIS RESULTS Sample Identification Depth (feet) Date Collected Area of Evaluation Parcel Address | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Drinking Water Protection Criteria | Groundwater Surface Water Interface Protection Criteria | Direct Contact Criteria | SB49 | SB50 | SB51 | SB52 | Methanol Blank |
| | | | | | | 0 - 1 | 0 - 1 | 10.5 - 11.5 | 1 - 2 | Quality Control |
| | | | | | | 1/10/18 | 1/10/18 | 1/11/18 | 1/10/18 | 1/12/18 |
| | | | | | | Drums of unknown content | Pole mounted transformer | Former heating oil UST area | Gasoline and diesel AST area | - |
| | | | | | | 18600 Berg Road | | 18601 Berg Road | 18600 Berg Road | - |
| **VOCs** | | | | | | | | | | |
| All Analyzed VOCs | CS | NA | CS | CS | CS | <RL | NE | <RL | <RL | <RL |
| **PAHs** | | | | | | | | | | |
| Fluoranthene | 206-44-0 | NA | 730,000 | 5,500 | 46,000,000 | <330 | NE | <330 | <330 | NE |
| All Other Analyzed PAHs | CS | NA | CS | CS | CS | <RL | NE | <RL | <RL | <RL |
| **PCBs** | | | | | | | | | | |
| Total of All Analyzed PCB Aroclors | CS | NA | CS | CS | 4,000 | NE | <RL | NE | NE | NE |
| **Metals** | | | | | | | | | | |
| Arsenic | 7440-38-2 | 5,800 | *5,800* | *5,800* | 7,600 | **5,700** | NE | **6,300** | **5,400** | NE |
| Barium | 7440-39-3 | 75,000 | 1,300,000 | 440,000* | 37,000,000 | **29,000** | NE | **54,000** | **57,000** | NE |
| Cadmium | 7440-43-9 | 1,200 | 6,000 | 3,000* | 550,000 | **500** | NE | **190** | **800** | NE |
| Chromium, Total** | 16065-83-1 | 18,000 | 1,000,000,000 | 1,000,000,000 | 790,000,000 | **12,000** | NE | **15,000** | **18,000** | NE |
| Chromium VI | 18540-29-9 | NA | 30,000 | 3,300 | 2,500,000 | <2,300 | NE | NE | <2,200 | NE |
| Copper | 7440-50-8 | 32,000 | 5,800,000 | 75,000* | 20,000,000 | **8,600** | NE | **17,000** | **4,700** | NE |
| Lead | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | **41,000** | NE | **9,000** | **42,000** | NE |
| Lead, Total (Calculated) | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE |
| Lead, Coarse Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE |
| Lead, Fine Fraction | 7439-92-1 | 21,000 | 700,000 | 2,500,000* | 400,000 | NE | NE | NE | NE | NE |
| Mercury | 7439-97-6 | 130 | 1,700 | *130* | 160,000 | **1,100** | NE | <50 | **620** | NE |
| Selenium | 7782-49-2 | 410 | 4,000 | *410* | 2,600,000 | **270** | NE | **370** | <200 | NE |
| Silver | 7440-22-4 | 1,000 | 4,500 | *1,000* | 2,500,000 | <100 | NE | <100 | <100 | NE |
| Zinc | 7440-66-6 | 47,000 | 2,400,000 | 170,000* | 170,000,000 | **49,000** | NE | **48,000** | **99,000** | NE |
| **Herbicides** | | | | | | | | | | |
| Dalapon | 75-99-0 | NA | 4,000 | NA | 19,000,000 | <100 | NE | NE | NE | NE |
| Dicamba | 1918-00-9 | NA | 4,400 | NA | 3,400,000 | <100 | NE | NE | NE | NE |
| 2,4-Dichlorophenoxyacetic acid | 94-75-7 | NA | 1,400 | 4,400 | 2,500,000 | <200 | NE | NE | NE | NE |
| Dinoseb | 88-85-7 | NA | 300 | 200 | 66,000 | <100 | NE | NE | NE | NE |
| Silvex (2,4,5-TP) | 93-72-1 | NA | 3,600 | 2,200 | 1,700,000 | <200 | NE | NE | NE | NE |
| All Other Analyzed Herbicides | CS | CS | CS | CS | CS | <RL | NE | NE | NE | NE |
| **Pesticides** | | | | | | | | | | |
| Aldrin | 309-00-2 | NA | NLL | NLL | 1,000 | <20 | NE | NE | NE | NE |
| Chlordane | 57-74-9 | NA | NLL | NLL | 31,000 | <25 | NE | NE | NE | NE |
| 4-4'-DDD | 72-54-8 | NA | NLL | NLL | 95,000 | <20 | NE | NE | NE | NE |
| 4-4'-DDE | 72-55-9 | NA | NLL | NLL | 45,000 | **110** | NE | NE | NE | NE |
| 4-4'-DDT | 50-29-3 | NA | NLL | NLL | 57,000 | **80** | NE | NE | NE | NE |
| Dieldrin | 60-57-1 | NA | NLL | NLL | 1,100 | **33** | NE | NE | NE | NE |
| Total Endosulfan | 115-29-7 | NA | NLL | NLL | 1,400,000 | <40 | NE | NE | NE | NE |
| Endrin | 72-20-8 | NA | NLL | NLL | 65,000 | <20 | NE | NE | NE | NE |
| Endrin Aldehyde | 7421-93-4 | NA | NA | NA | NA | <20 | NE | NE | NE | NE |
| Heptachlor | 76-44-8 | NA | NLL | NLL | 5,600 | <20 | NE | NE | NE | NE |
| Heptachlor epoxide | 1024-57-3 | NA | NLL | NLL | 3,100 | <20 | NE | NE | NE | NE |
| alpha-Hexachlorocyclohexane | 319-84-6 | NA | 18 | ID | 2,600 | <20 | NE | NE | NE | NE |
| beta-Hexachlorocyclohexane | 319-85-7 | NA | 37 | ID | 5,400 | <20 | NE | NE | NE | NE |
| Lindane | 58-89-9 | NA | 20 | 20 | 8,300 | <20 | NE | NE | NE | NE |
| Methoxychlor | 72-43-5 | NA | 16,000 | NA | 1,900,000 | <50 | NE | NE | NE | NE |
| Toxaphene | 8001-35-2 | NA | 24,000 | 8,200 | 20,000 | <170 | NE | NE | NE | NE |
| All Other Analyzed Pesticides | CS | CS | CS | CS | CS | <RL | NE | NE | NE | NE |

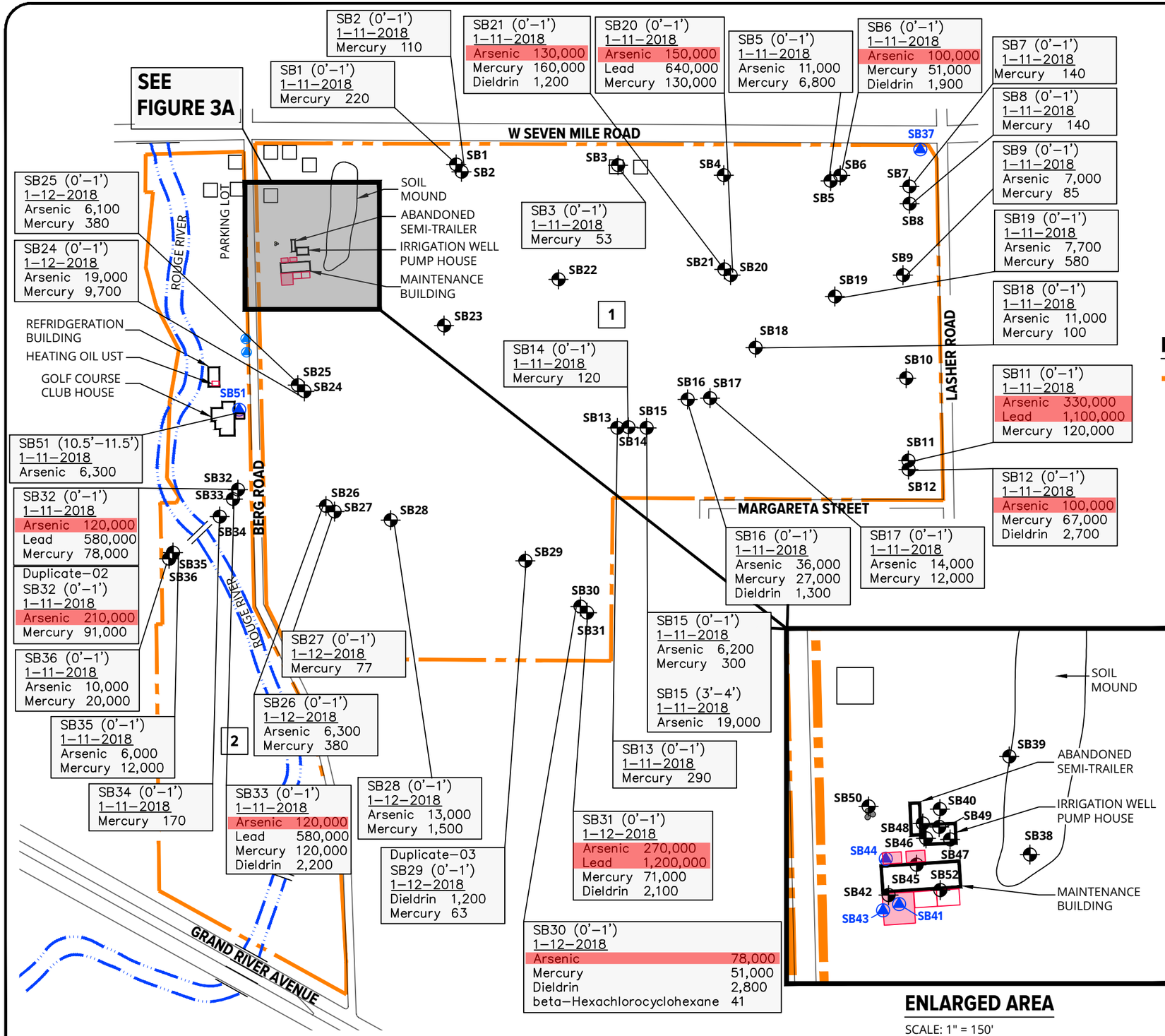
Notes:
1. Concentrations reported in micrograms per kilogram (µg/kg).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.46, Table 2. Soil: Residential Par the MDEQ Media-Specific Volatilization to Indoor Air Interim Action Screening Levels, August 2017.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds. PAHs - Polynuclear Aromatic Hydrocarbons. PCBs - Polychlorinated Biphenyl. Refer to th
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit(s).
7. ID - Insufficient data to develop criteria.
8. NA - Not applicable.
9. NE - Not evaluated.
10. NLV - Not likely to volatilize.
11. NLL - Not likely to leach.
12. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water ha calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
13. *Italicized* - the respective criterion was below the Statewide Default Background Level (SDBL) and therefore the value defaulte
14. ** - Total chromium results compared to the more restrictive hexavalent chromium criteria because chromium was not speciate
15. Concentrations were also compared to, and found to be below, the soil saturation concentration screening levels and particulat

# TABLE 2
## SUMMARY OF ANALYSIS RESULTS - GROUNDWATER
## FORMER ROGELL GOLF COURSE
## 18600-18601 BERG ROAD
## DETROIT, MICHIGAN
## SME PROJECT NO. 077832.00.001.006


| CONSTITUENT | Chemical Abstract Service Number | Part 201 Generic Cleanup Criteria | | | Chemical Analytical Results<br>Sample Identification<br>Screened Interval (depth in feet)<br>Date Collected | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Residential Drinking Water Criteria | Nonresidential Drinking Water Criteria | Groundwater Surface Water Interface Criteria | SB37<br>7 - 12<br>01/11/18 | SB41<br>8 - 12<br>01/10/18 | Duplicate-01<br>SB41 (8 - 12)<br>01/10/18 | SB43<br>6 - 10<br>01/10/18 | SB44<br>8 - 12<br>01/10/18 | SB51<br>8 - 12<br>01/11/18 | Field Blank<br>Quality Control<br>01/12/18 |
| **VOCs** | | | | | | | | | | | |
| All Analyzed VOCs | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **PAHs** | | | | | | | | | | | |
| All Analyzed PAHs | CS | CS | CS | CS | <RL | <RL | <RL | <RL | <RL | <RL | <RL |
| **Metals** | | | | | | | | | | | |
| Arsenic | 7440-38-2 | 10 | 10 | 10 | <5.0 | <5.0 | <5.0 | <5.0 | **24** | NE | NE |
| Arsenic, dissolved | 7440-38-2 | 10 | 10 | 10 | NE | NE | NE | NE | **44** | NE | NE |
| Barium | 7440-39-3 | 2,000 | 2,000 | 670* | <100 | <100 | <100 | <100 | <100 | NE | NE |
| Cadmium | 7440-43-9 | 5 | 5 | 2.5* | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | NE | NE |
| Chromium, total** | 18540-29-9 | 100 | 100 | 11 | <10 | <10 | <10 | <10 | <10 | NE | NE |
| Copper | 7440-50-8 | 1,000 | 1,000 | 13* | **4.1** | <4.0 | <4.0 | <4.0 | **5.3** | NE | NE |
| Lead | 7439-92-1 | 4.0 | 4.0 | 14* | <3.0 | <3.0 | <3.0 | <3.0 | **5.4** | NE | NE |
| Lead, dissolved | 7439-92-1 | 4.0 | 4.0 | 14* | NE | NE | NE | NE | <3.0 | NE | NE |
| Mercury | 7439-97-6 | 2.0 | 2.0 | 0.0013 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | NE | NE |
| Selenium | 7782-49-2 | 50 | 50 | 5 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | NE | NE |
| Silver | 7440-22-4 | 34 | 98 | 0.2 | <0.20 | <0.20 | <0.20 | <0.20 | <0.20 | NE | NE |
| Zinc | 7440-66-6 | 2,400 | 5,000 | 170* | <50 | <50 | <50 | <50 | <50 | NE | NE |

Notes:

1. Concentrations reported in micrograms per liter (µg/L).
2. Analytical results were compared to December 30, 2013 Promulgated Cleanup Criteria, R 299.44, Table 1. Groundwater Residential and Nonresidential Part 201 Generic Cleanup Criteria and Screening Levels and the MDEQ Volatilization to Indoor Air Recommendations for Interiim Action Screening levels and Time-Sensitive Interim Action Screening Levels.
3. Results exceeding one or more criteria are shaded, as are the criteria exceeded.
4. VOCs - Volatile Organic Compounds, PAHs - Polynuclear Aromatic Hydrocarbons. Refer to the analytical report for the full list of VOC and PAH analytes.
5. CS - Criterion is specific to individual constituent.
6. <RL - Analytical result was below laboratory reporting limit.
7. NE - Not evaluated.
8. NA - Not available.
9. ID - Insufficient data to develop criterion.
10. NLL - Not likely to leach under most soil conditions.
11. * = GSI Protection was calculated for the indicated metals using the MDEQ spreadsheet for calculating GSI. A default water hardness value of 150 mg/kg as $CaCO_3$ was used to calculate GSI. Results are presented for surface water receiving bodies protected as a drinking water source.
12. **Total chromium concentrations were compared to the more restrictive hexavalent chromium criteria because chromium was not speciated.
13. Concentrations were also compared to, and found to be below, the groundwater volatilization to indoor air inhalation criteria, the flammability and explosivity screening levels, and the water soluability screening levels.




## ENLARGED AREA

SCALE: 1" = 150'

NORTH

0' 400' 800'

GRAPHIC SCALE: 1" = 400'

## LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING MONITORING WELLS
- POLE-MOUNTED TRANSFORMERS
- FORMER LOCATION OF BUILDINGS
- FORMER LOCATION OF GASOLINE USTs
- GASOLINE AND DIESEL ASTs
- FORMER LOCATION OF DIESEL ASTs
- FORMER LOCATION OF HEATING OIL UST
- 1 18600 BERG ROAD
- 2 18601 BERG ROAD
- APPROXIMATE SOIL BORING LOCATION
- APPROXIMATE SOIL BORING LOCATION WITH TEMPORARY MONITORING WELL

**CONSTITUENTS AND CONCENTRATIONS HIGHLIGHTED IN RED EXCEED THE PART 201 NONRESIDENTIAL DIRECT CONTACT CRITERIA**

NOTES:
1. DRAWING INFORMATION TAKEN FROM GOOGLE EARTH PRO 2016 AERIAL PHOTO AND SITE OBSERVATIONS.
2. CONCENTRATIONS ARE SHOWN IN MICROGRAMS PER KILOGRAM (µg/kg) AND EXCEED ONE OR MORE PART 201 GENERIC RESIDENTIAL CLEANUP CRITERIA

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**Project**
FORMER ROGELL GOLF COURSE

**Project Location**
18600 AND 18601 BERG ROAD DETROIT, MICHIGAN

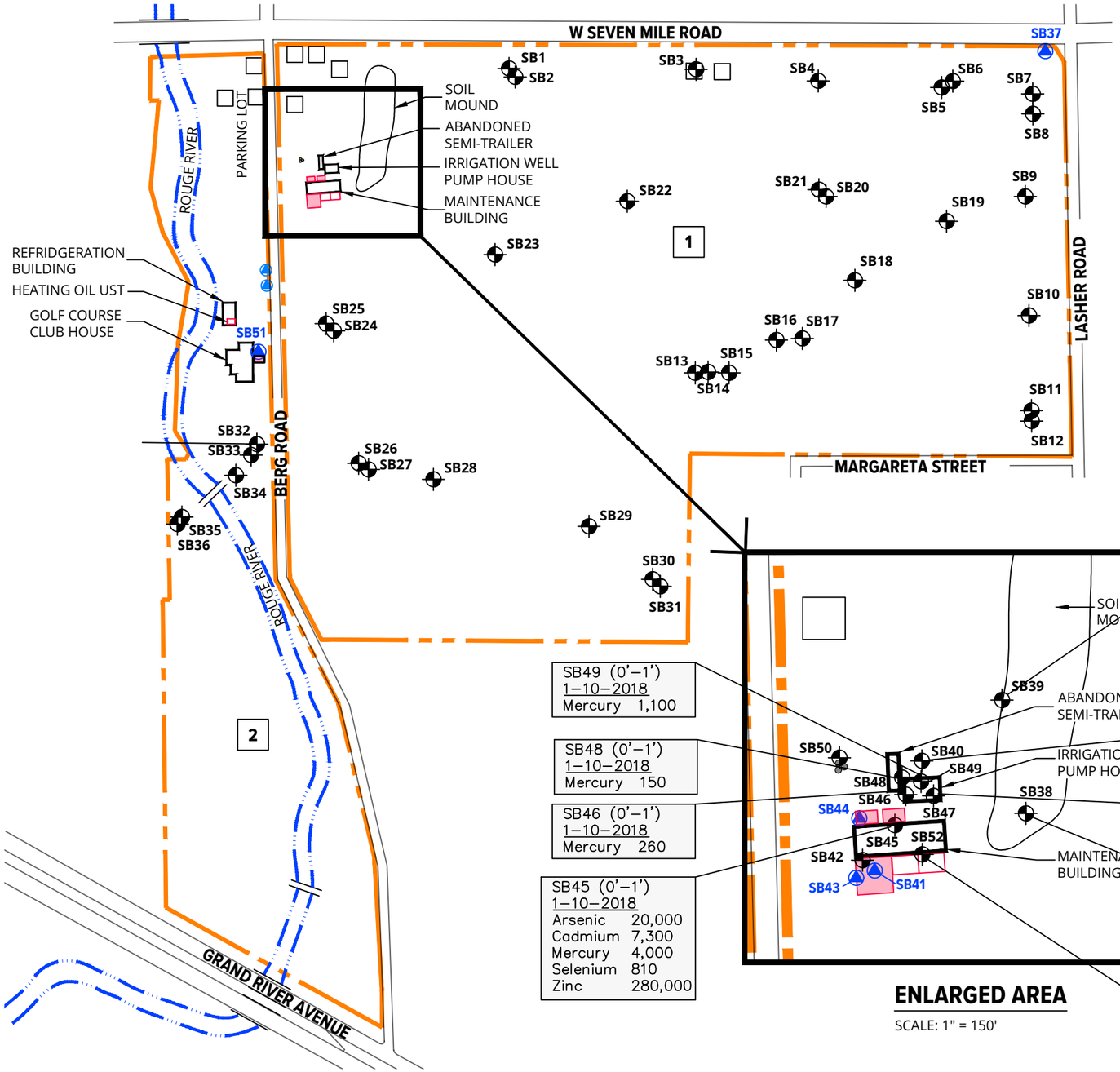
**Sheet Name**
PROPERTY AND ASSESSMENT SUMMARY DIAGRAM - SOIL

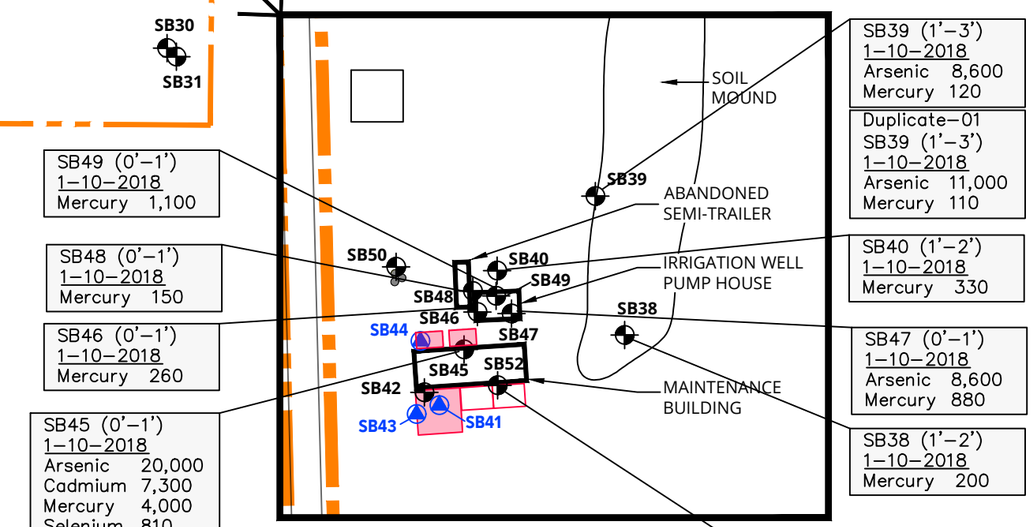
| No. | Revision Date |
|---|---|
| | |
| | |
| | |
| | |

Date: 2-2-18
CADD: JAB
Designer: AHR
Scale: 1" = 400'
Project: 077832.00.001.006
Figure No.: 3



PLOT DATE: Mar 21, 2018 - 3:53pm - jblake
FILE LOCATION: \\Sme-inc\pz\WIP\077832.00\CAD\077832.00.001.006\rev0\077832.00.001.006-AN.dwg




SB49 (0'–1')
1–10–2018
Mercury 1,100

SB48 (0'–1')
1–10–2018
Mercury 150

SB46 (0'–1')
1–10–2018
Mercury 260

SB45 (0'–1')
1–10–2018
Arsenic 20,000
Cadmium 7,300
Mercury 4,000
Selenium 810
Zinc 280,000

SB39 (1'–3')
1–10–2018
Arsenic 8,600
Mercury 120

Duplicate–01
SB39 (1'–3')
1–10–2018
Arsenic 11,000
Mercury 110

SB40 (1'–2')
1–10–2018
Mercury 330

SB47 (0'–1')
1–10–2018
Arsenic 8,600
Mercury 880

SB38 (1'–2')
1–10–2018
Mercury 200

SB52 (1'–2')
1–10–2018
Mercury 620

## ENLARGED AREA

SCALE: 1" = 150'

NORTH

0' 400' 800'

GRAPHIC SCALE: 1" = 400'

## LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING MONITORING WELLS
- POLE-MOUNTED TRANSFORMERS
- FORMER LOCATION OF BUILDINGS
- FORMER LOCATION OF GASOLINE USTs
- GASOLINE AND DIESEL ASTs
- FORMER LOCATION OF DIESEL ASTs
- FORMER LOCATION OF HEATING OIL UST
- 1 — 18600 BERG ROAD
- 2 — 18601 BERG ROAD
- APPROXIMATE SOIL BORING LOCATION
- APPROXIMATE SOIL BORING LOCATION WITH TEMPORARY MONITORING WELL

NOTES:
1. DRAWING INFORMATION TAKEN FROM GOOGLE EARTH PRO 2016 AERIAL PHOTO AND SITE OBSERVATIONS.
2. CONCENTRATIONS ARE SHOWN IN MICROGRAMS PER KILOGRAM (µg/kg) AND EXCEED ONE OR MORE PART 201 GENERIC RESIDENTIAL CLEANUP CRITERIA

SME
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**Project**
FORMER ROGELL GOLF COURSE

**Project Location**
18600 AND 18601 BERG ROAD DETROIT, MICHIGAN

**Sheet Name**
PROPERTY AND ASSESSMENT SUMMARY DIAGRAM - SOIL

| No. | Revision Date |
|---|---|
| | |
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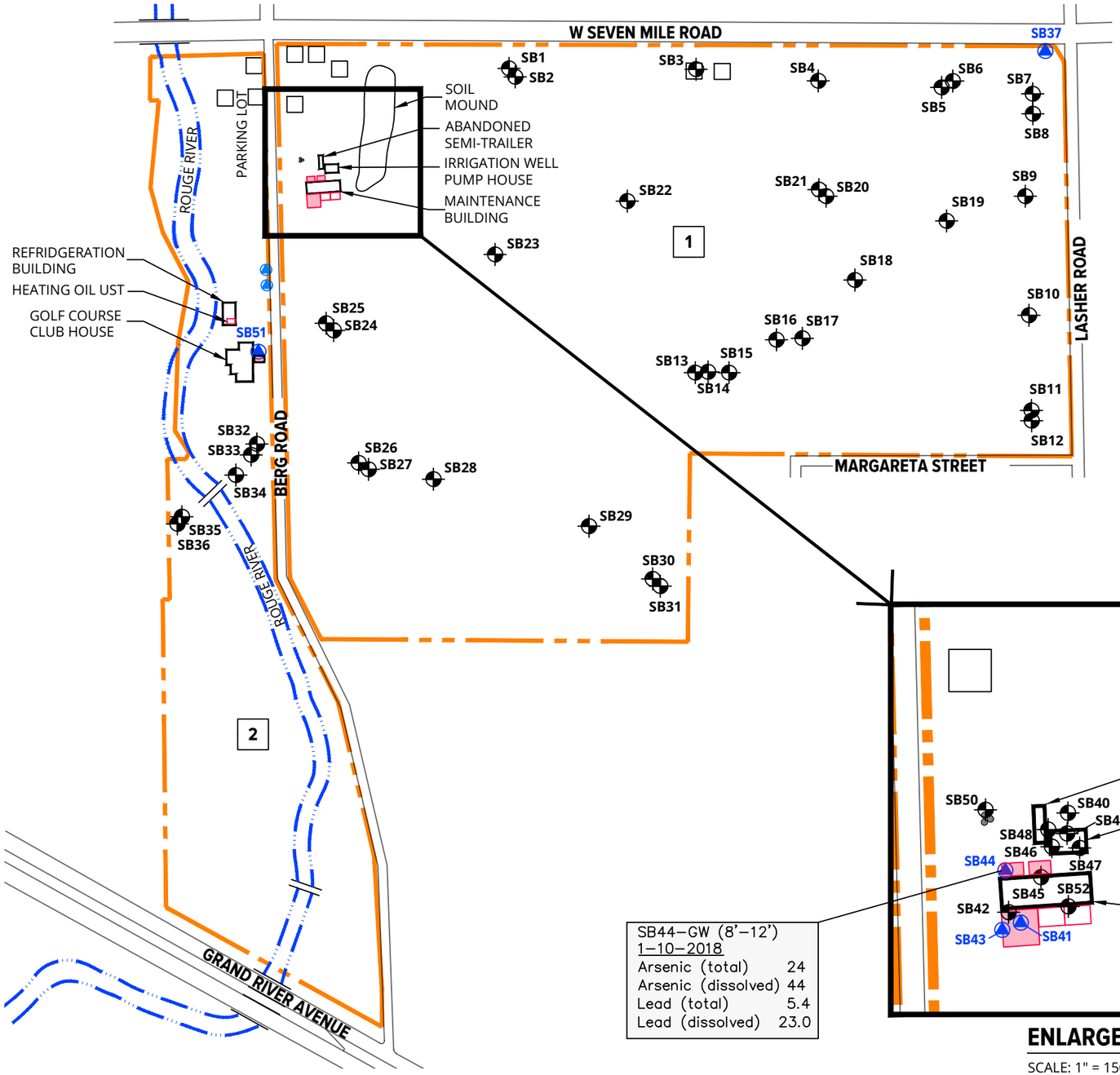
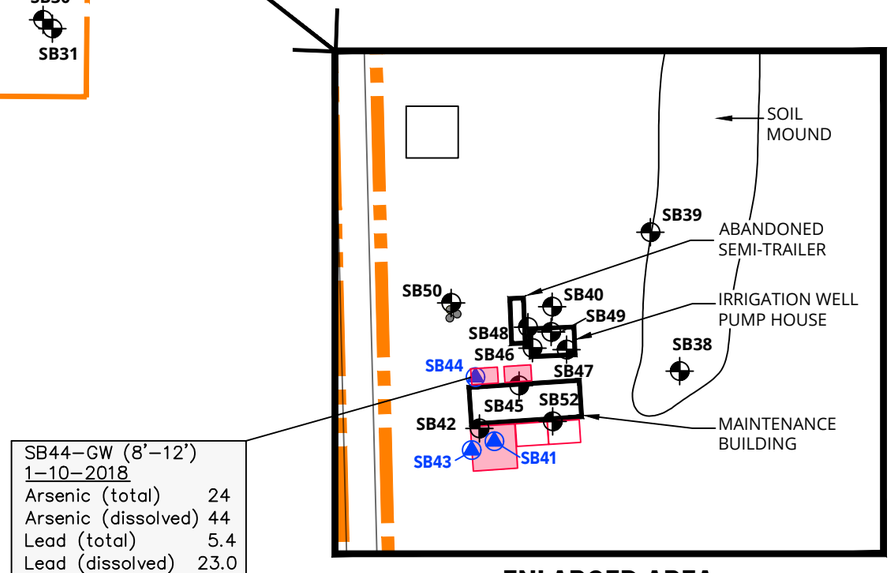
Date: 2-2-18
CADD: JAB
Designer: AHR
Scale: 1" = 400'
Project: 077832.00.001.006
Figure No.: 3A



PLOT DATE: Mar 21, 2018 - 4:04pm - jblake
FILE LOCATION: \\Sme-inc\pz\WIP\077832.00\CAD\077832.00.001.006\rev01\077832.00.001.006-AN.dwg




SB44–GW (8'–12')
1–10–2018

| | |
|---|---|
| Arsenic (total) | 24 |
| Arsenic (dissolved) | 44 |
| Lead (total) | 5.4 |
| Lead (dissolved) | 23.0 |

## ENLARGED AREA

SCALE: 1" = 150'

NORTH

0' 400' 800'

GRAPHIC SCALE: 1" = 400'

## LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING MONITORING WELLS
- POLE-MOUNTED TRANSFORMERS
- FORMER LOCATION OF BUILDINGS
- FORMER LOCATION OF GASOLINE USTs
- GASOLINE AND DIESEL ASTs
- FORMER LOCATION OF DIESEL ASTs
- FORMER LOCATION OF HEATING OIL UST
- 1 — 18600 BERG ROAD
- 2 — 18601 BERG ROAD
- APPROXIMATE SOIL BORING LOCATION
- APPROXIMATE SOIL BORING LOCATION WITH TEMPORARY MONITORING WELL

NOTES:
1. DRAWING INFORMATION TAKEN FROM GOOGLE EARTH PRO 2016 AERIAL PHOTO AND SITE OBSERVATIONS.
2. CONCENTRATIONS ARE SHOWN IN MICROGRAMS PER LITER (µg/L) AND EXCEED ONE OR MORE PART 201 GENERIC RESIDENTIAL CLEANUP CRITERIA.

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**Project**
FORMER ROGELL GOLF COURSE

**Project Location**
18600 AND 18601 BERG ROAD DETROIT, MICHIGAN

**Sheet Name**
PROPERTY AND ASSESSMENT SUMMARY DIAGRAM - GROUNDWATER

| No. | Revision Date |
|---|---|
| | |
| | |
| | |
| | |

| | |
|---|---|
| Date | 2-2-18 |
| CADD | JAB |
| Designer | AHR |
| Scale | 1" = 400' |
| Project | 077832.00.001.006 |
| Figure No. | 4 |



PLOT DATE: Mar 21, 2018 - 4:03pm - jblake
FILE LOCATION: \\Sme-inc\pz\WIP\077832.00\CAD\077832.00.001.006\rev0\077832.00.001.006-AN.dwg

# APPENDIX C

## HAZARD COMMUNICATION INFORMATION AND CONTRACTOR ACKNOWLEDGEMENT FORM

# Arsenic - ToxFAQs™

**CAS # 7440-38-2**

This fact sheet answers the most frequently asked health questions (FAQs) about arsenic. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS: Exposure to higher than average levels of arsenic occur mostly in the workplace, near hazardous waste sites, or in areas with high natural levels. At high levels, inorganic arsenic can cause death. Exposure to lower levels for a long time can cause a discoloration of the skin and the appearance of small corns or warts. Arsenic has been found in at least 1,149 of the 1,684 National Priority List (NPL) sites identified by the Environmental Protection Agency (EPA).**

## What is arsenic?

Arsenic is a naturally occurring element widely distributed in the earth's crust. In the environment, arsenic is combined with oxygen, chlorine, and sulfur to form inorganic arsenic compounds. Arsenic in animals and plants combines with carbon and hydrogen to form organic arsenic compounds.

Inorganic arsenic compounds are mainly used to preserve wood. Copper chromated arsenate (CCA) is used to make "pressure-treated" lumber. CCA is no longer used in the U.S. for residential uses; it is still used in industrial applications. Organic arsenic compounds are used as pesticides, primarily on cotton fields and orchards.

## What happens to arsenic when it enters the environment?

- Arsenic occurs naturally in soil and minerals and may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching.
- Arsenic cannot be destroyed in the environment. It can only change its form.
- Rain and snow remove arsenic dust particles from the air.
- Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.
- Fish and shellfish can accumulate arsenic; most of this arsenic is in an organic form called arsenobetaine that is much less harmful.

## How might I be exposed to arsenic?

- Ingesting small amounts present in your food and water or breathing air containing arsenic.
- Breathing sawdust or burning smoke from wood treated with arsenic.
- Living in areas with unusually high natural levels of arsenic in rock.
- Working in a job that involves arsenic production or use, such as copper or lead smelting, wood treating, or pesticide application.

## How can arsenic affect my health?

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs.

Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet.

Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso.

Skin contact with inorganic arsenic may cause redness and swelling.

Almost nothing is known regarding health effects of organic arsenic compounds in humans. Studies in animals show that some simple organic arsenic

compounds are less toxic than inorganic forms. Ingestion of methyl and dimethyl compounds can cause diarrhea and damage to the kidneys.

## How likely is arsenic to cause cancer?

Several studies have shown that ingestion of inorganic arsenic can increase the risk of skin cancer and cancer in the liver, bladder, and lungs. Inhalation of inorganic arsenic can cause increased risk of lung cancer. The Department of Health and Human Services (DHHS) and the EPA have determined that inorganic arsenic is a known human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic arsenic is carcinogenic to humans.

## How can arsenic affect children?

There is some evidence that long-term exposure to arsenic in children may result in lower IQ scores. There is also some evidence that exposure to arsenic in the womb and early childhood may increase mortality in young adults.

There is some evidence that inhaled or ingested arsenic can injure pregnant women or their unborn babies, although the studies are not definitive. Studies in animals show that large doses of arsenic that cause illness in pregnant females, can also cause low birth weight, fetal malformations, and even fetal death. Arsenic can cross the placenta and has been found in fetal tissues. Arsenic is found at low levels in breast milk.

## How can families reduce the risks of exposure to arsenic?

- If you use arsenic-treated wood in home projects, you should wear dust masks, gloves, and protective clothing to decrease exposure to sawdust.
- If you live in an area with high levels of arsenic in water or soil, you should use cleaner sources of water and limit contact with soil.
- If you work in a job that may expose you to arsenic, be aware that you may carry arsenic home on your clothing, skin, hair, or tools. Be sure to shower and change clothes before going home.

## Is there a medical test to determine whether I've been exposed to arsenic?

There are tests available to measure arsenic in your blood, urine, hair, and fingernails. The urine test is the most reliable test for arsenic exposure within the last few days. Tests on hair and fingernails can measure exposure to high levels of arsenic over the past 6-12 months. These tests can determine if you have been exposed to above-average levels of arsenic. They cannot predict whether the arsenic levels in your body will affect your health.

## Has the federal government made recommendations to protect human health?

The EPA has set limits on the amount of arsenic that industrial sources can release to the environment and has restricted or cancelled many of the uses of arsenic in pesticides. EPA has set a limit of 0.01 parts per million (ppm) for arsenic in drinking water.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit (PEL) of 10 micrograms of arsenic per cubic meter of workplace air (10 $\mu g/m^3$) for 8 hour shifts and 40 hour work weeks.

## References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Arsenic (Update). Atlanta, GA: U.S. Department of Health and Human Services. Public Health Service.

## Where can I get more information?

**For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.**

**Phone: 1-800-232-4636**

**ToxFAQs™ Internet address via WWW is http://www.atsdr.cdc.gov/toxfaqs/index.asp.**

**ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.**

# Lead – ToxFAQs™

**CAS # 7439-92-1**

This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS: Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,272 of the 1,684 National Priority List (NPL) sites identified by the Environmental Protection Agency (EPA).**

## What is lead?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. The use of lead as an additive to gasoline was banned in 1996 in the United States.

## What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.

## How might I be exposed to lead?

- Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out into the water.
- Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.
- Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.
- Using health-care products or folk remedies that contain lead.

## How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity is the nervous system, both in adults and children. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high-levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production.

## How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of some kind of lead compounds. The Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

# Lead

**CAS # 7439-92-1**

## How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead. Some of these effects may persist beyond childhood.

## How can families reduce the risks of exposure to lead?

- Avoid exposure to sources of lead.
- Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint.
- If you have a water lead problem, run or flush water that has been standing overnight before drinking or cooking with it.
- Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children.
- If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

## Is there a medical test to determine whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter (µg/dL). These tests usually require special analytical equipment that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

## Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3–6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC has updated its recommendations on children's blood lead levels. Experts now use an upper reference level value of 97.5% of the population distribution for children's blood lead. In 2012-2015, the value to identify children with blood lead levels that are much higher than most children have, is 5 micrograms per deciliter (µg/dL). EPA limits lead in drinking water to 15 µg per liter.

## References

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for lead (Update). Atlanta, GA: U.S. Department of Public Health and Human Services, Public Health Service.

## Where can I get more information?

**For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.**

**Phone: 1-800-232-4636.**

**ToxFAQs™ Internet address via WWW is http://www.atsdr.cdc.gov/toxfaqs/index.asp.**

**ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.**

# SAMPLE LETTER TO CONTRACTORS

DATE

Mr./Ms. XXXXXXXXXX
Company
Address
City, State Zip Code

SUBJECT: OSHA Hazard Communication Standard
Former Rogell Golf Course Site
18600 and 18601 Berg Road
Detroit, Michigan

Dear Mr. or Ms. XXXXX:

The Occupational Safety & Health Administration (OSHA) Hazard Communication Standard (29CFR 1910.1200) states that contractors must be informed of the hazardous chemicals to which their employees may be exposed while performing their work. The City of Detroit is providing you this notification for the above-referenced site. Soil is impacted with arsenic and lead at concentrations exceeding the Michigan Department of Environmental Quality's (MDEQ's) human health protection threshold for direct skin contact and ingestion. We have attached chemical hazard information for arsenic and lead. The concentrations of arsenic and lead in soil may cause unacceptable skin contact or ingestion exposures if precautions (e.g., personal protective equipment) are not taken prior to working with impacted soil.

If I can be of further assistance, please contact me at (XXX) XXX-XXXX.

Sincerely,

City of Detroit
Name
Title

Attachment: Chemical fact sheets for arsenic and lead

## ACKNOWLEDGEMENT OF DOCUMENTATION OF DUE CARE COMPLIANCE

Contractors that may encounter impacted soil and/or groundwater will sign this sheet below acknowledging they have received, reviewed and understand the DDCC and will communicate the information in the DDCC to their workers.

| DATE | NAME | SIGNATURE | COMPANY |
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# APPENDIX D
## FENCE REPAIR RECORD

# FENCE REPAIR RECORD

## FORMER ROGELL GOLF COURSE
## 18600 AND 18601 BERG ROAD
## DETROIT, MICHIGAN

| REPAIR CONDUCTED BY (NAME AND TITLE) | SUMMARY OF DAMAGE OBSERVED | DATE OBSERVED/ DATE REPAIRED | SUMMARY OF REPAIR ACTIVITIES |
|---|---|---|---|
| EXAMPLE: Bill Smith – Facility Manager | Tree fell on a section of the fence | Observed 9/1/18<br>Repaired 9/5/18 | Removed downed tree from fence, and fence restored |
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*Passionate People Building*
*and Revitalizing our World*

SME